STCE/RTU Configuration Tool User Manual

MT 720081020-GB Issue 3

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ABBREVIATIONS, ACRONYMS AND LOGOS

2x32 DCO	2x32 Digital Command Output Unit
2x16 DCC	2x16 Digital Command Continuous Unit
2x8 DRO	2x32 Digital Regulation Output Unit
32 OAI	32 Optoinsulated Analog Input Unit
32 OAO	32 Optoinsulated Analog Output Unit
8OAI/8DCO	8 Opto Analog Input/8 Digital Command Output mixed Unit
32ODI/4OAI/10DCO	32 Opto Digital Input/4 Opto Analog Input/10 Digital Command Output mixed Unit
2SC+ETH	2 Serial Channel + Ethernet Unit
4SC	4 Serial Channel Unit
4SC 101	4 Serial Channel Unit with *IEC60870*-5-101 Master Protocol
4SC 103	4 Serial Channel Unit with IEC60870-5-103 Master Protocol
4SC Modbus	4 Serial Channel Unit with Modbus protocol
4SC SAMP	4 Serial Channel Unit with SAMP Protocol
4SC SASP	4 Serial Channel Unit with SASP Protocol
64 ODI	64 Optoinsulated Digital Input Unit
64 ODO	64 Optoinsulated Digital Output Unit
A/D	Analog/Digital
AI1	14 bit Analog Input from F/E STCR
ASDU	Application Service Data Unit
CPU	Central Processing Unit
CPU2000	STCE/RTU Central Unit
DB	Data Base
DCE	Data Circuit-terminating Equipment
DP	Double Point
DTE	Data Terminal Equipment
EEPROM	Electrically Erasable Programmable Read Only Memory
EPROM	Erasable Programmable Read Only Memory
F/E	Front End
GPS	Global Positioning Satellite
GPRS	General Packet Radio Service
HW	Hardware
I/O	Input/Output
IEC	International Electrotechnical Commission
IED	Intelligent Electronic Device

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IP	Internet Protocol
MMI	Man Machine Interface
N.A.	Not Applicable
PC	Personal Computer
PPP	Point to Point Protocol
RCE	Event Chronological Recorder
SAMP	Selta Asynchronous Multipoint Protocol
SASP	Selta Asynchronous Single-point Protocol
SCADA	Supervisory Control and Data Acquisition
SLIP	Serial Line Internet Protocol
SP	Single Point / Set Point
STD	Standard
SU2000	STCE Service Unit
SW	Software
TC	Remote command
TCP/IP	Transmission Control Protocol/Internet Protocol
TM	Remote Measurement
TMD	Digital Remote Measurement
TR	Remote Adjustment
TS	Telesignal
UC	Central Unit
UP	Peripheral Unit
VSC	Tap Changer (Step Position Information)

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1. INTRODUCTION

The purpose of this document is to describe the operating modes of the Configuration Software related to the Remote-control Selta equipment belonging to the STCE group.
The following programs are described:

- the program that allows creating the configuration (*WCfgRTU*)
- the program that allows executing the downloading or the uploading of the configuration itself (*DownloadRTU*)
- the program that allows updating the configuration to the version of the current configurator (*Aggimp*)
- the program that allows displaying in real time the plant data (*Monitor RTU*)

For each station, it is possible to configure the equipping kit (the Hardware composition in terms of Sub-racks and I/O Cards that equip the Sub-racks themselves) and the points on each single card. The program allows, by means of a proper function, checking the correct configuration of the parameters.
The configuration data are organized on a Microsoft Access database and each equipment to be configured corresponds to a single database. The access to the configuration is executed through the detection of an access password. The configuration defined with this instrument could be transferred later to the STCE/RTU station through the download program.

The following part of the document will indifferently talk about *Configuration Data Base*, *Plant one* or also about *Equipment Configuration* assigning to such words the same meaning.

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2. PRODUCT FUNCTIONS

The configuration software of the STCE/RTU equipment allows realizing the following macro functions:

1. Creation of the configuration Data Base and check of its congruence.
2. Filling in and transfer of the configuration Data Base to the STCE/RTU equipment.
3. Storing and printing of the configuration Data Base.

The program allows creating, in a completely guided way, the configuration of the equipment composed by the following elements:

- Equipment identification parameters
- General operation parameters
- Communication parameters with the centres
- Communication parameters with the field intelligent devices
- Hardware equipping kit
- Connected I/O quantities

With the aim to make the insertion of the configuration parameters easier and quicker, the program displays the default values where it is possible.

The configuration parameters are defined in “source” format when they are in a format different from the binary one known to the equipment. The system stores the configuration parameters with source format into a Microsoft Access Data Base file; from such a file, the system takes up the data for the creation of the configuration binary file to be transferred to the equipment.

Already during the insertion phase of the parameter, the program executes a series of checks necessary to ensure the creation of a correct and congruent configuration.

The switching operation of the configuration parameters from *source* format to a *binary* one known to the equipment is called *Compiling*. During the compiling phase the program ends the checks already started during the data insertion phase.

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Then, the subject document describes the following elements:

- The user interface in Windows ambient and the program using modes, above all connected with the use of the mouse and of the visual instruments.
- The *Technical Cards* (Form) for the insertion of the parameters.
- The checks executed on the inserted data with the aim to ensure the congruence of the created configuration.
- The application meaning of the several parameters.
- The auxiliary services make available by the program.
- The uploading modes of the configuration on the STCE/RTU equipment (download).
- The reverse uploading modes, from equipment to Personal Computer, of the configuration (upload) and the creation, through *Reverse Compiling*, of the *Source* Data Base.

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3. PROGRAM INSTALLATION

3.1 HARDWARE AND SOFTWARE REQUIREMENTS

The configuration program of the STCE/RTU equipment has to be installed on a Personal Computer with the following minimum characteristics:

- CPU Pentium III 250 MHz
- SVGA Graphical Card with minimum resolution of 800x600 pixel at 65536 colors (16 bit)
- 64 Mbyte RAM Memory
- Hard Disk with at least 100 Mbyte free
- CD ROM Driver
- One RS232 serial port
- One parallel port
- Color screen 15''
- Operating System MS Windows 95/98/NT 4.0/2000/XP

The program ensures the correct functioning with Operating System MS Windows 95/98/NT Workstation4.0/2000.

Then, the user has to configure a remote access connection according to the description pointed out in the “Personal Computer Initialization” A1 Appendix.

The installation program comprised into the supply allows the execution of the initialization and the possible installation of the drivers necessary for the operation of the application programs.

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3.2 INSTALLATION PROCEDURE

The product is always provided on CD-Rom and, therefore, it is necessary to execute its installation. To execute the installation, it is necessary to insert the CD-Rom into the proper driver and to execute the Setup program.

Follow the instructions displayed on the screen during the installation phase.

The installation software detects the configuration present on the personal computer and it executes the loading of all the programs and/or the drivers necessary for the working of the application programs.

By default, the system executes the installation on the position C:\Programs\SELTA S.p.A.\Selta ConfigStce-Rtu.

At the end of this installation procedure, the program is ready for the execution.

*For the use of the download program, it is necessary to configure before on the personal computer a Remote Access connection according to the modes described into the "*Personal Computer Initialization" Appendix*.*

NOTE: If a old version of the STCE configuration software is already present, on the personal computer, before executing every successive installation, it is necessary to execute its uninstall that can be executed through the "Application program installation" window that is on the windows control panel.

WindowsNT: In the case of installation on Windows NT Workstation 4.0, at the end of the installation phase, the system can display the message "Error.....", ignore it and continue the installation.

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4. PROGRAM STARTING-UP

To start-up the program, position the cursor on the “Selta WCfgStceRTU” group of the “Start/Programs” menu and select the “WCfgRTU” icon.

The access to the use of the program is submitted to *password*.

The program for the configuration of the STCE/RTU equipment provides two levels of access passwords. The first level (*user*) allows changing all the equipment configuration parameters with the exception of the one related to the communication modes that, if uploaded from remote and incompatible with the equivalent ones used by the centre, can cause the loss of the communication with the RTU. With details, the *user* password level does not enable the creation of a new equipment configuration, but only the opening and the changing of an existing configuration. The second password level (*superuser*) enables a new database creation and of all the parameters modification.
The two password levels are linked to the program and not to the specific configuration.

During its setup the program does not set any password by default.

At the first program starting-up and until it has not been executed the password changing, both the user levels allow entering the program without entering any password.

The following figure shows the form displayed on the screen for the program *login*.

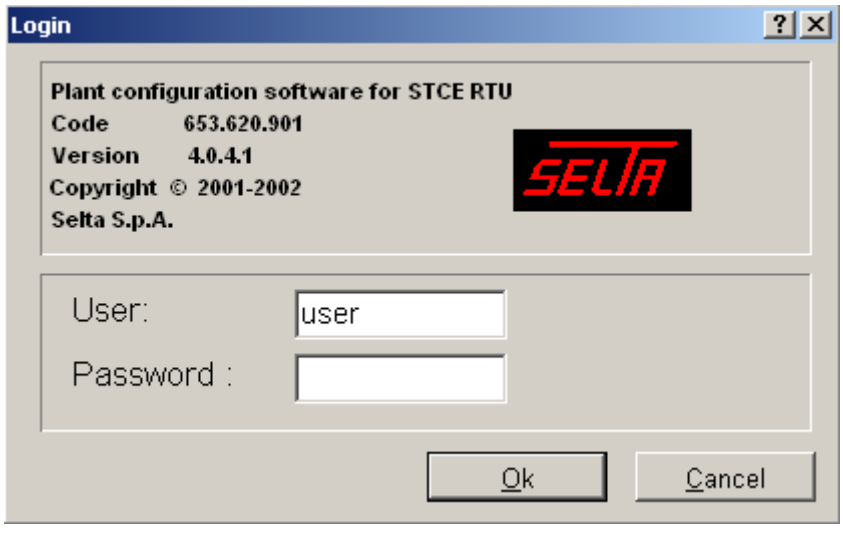

Figure 4-1 – Program login

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To have the control on the users enabled for the program use, it is recommended to set a password different from the default one for the accesses after the first one.

After having inserted the user type (*username*) and the correct password, the program starts-up displaying its “main window”.

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5. CONFIGURATION TOOL

5.1 INTRODUCTION

To be able to insert the STCE/RTU equipment into a system that contains the communication network for the dialogue with the Center/s and the field, it is necessary to provide it a series of parameters that specify its characteristics and operation modes.

To allow to the user to insert these data, the system provides a certain number of *Technical Cards* (Editing windows) that will be described with details here below.

One Technical Card contains an assembly of fields logically coupled. At the end of the editing phase, the system saves on file the contents of such fields into a Microsoft Access relational Data Base.

The Data Base where the system memorizes the data inserted into the Technical Cards is composed by a single file having the name specified by the user and *.MDB* extension.

After having selected a Technical Card, the program displays the relevant Editing window. The fields of such window can contain the following values:

- initialization values that the program assigns by default to the fields when such fields have not yet been customized
- values that the program reads from the Data Base that contains the last customization inserted when it is involved a changing operation of an existing configuration

In the following part of the document, it is reported, for each presented Technical Card, a detailed description that contains for each field the following data:

Name	It reports the clear name of the field as it is displayed on the screen into the *Technical Card*
Dependence	It is meaningful only in the case where the displaying or the meaning of the field is conditioned by preceding choices; in this case, the system reports, into the column, the name of the conditioning field and the values that it gets into this status
I.V.	It returns the Initialization Value of the field (default) and the possible indication of “Not Applicable” (NA) field
P.V.	It reports the assembly of the possible values that can be get by the field.
Description	It briefly reports the application meaning of the field and the possible indication of “Not Editable” (NE) field

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On the data inserted into the generic Technical Card, the system executes the following three control levels:

1. Control on the value inserted into the generic field;
2. *Local Control to the Card* (realized at the closing moment and of the subsequent saving of the Card itself);
3. *Crossed Control among Cards* (already realized at configuration level of the Technical Card according to the possibilities and in a complete way during the "Compilation" phase).

5.2 USER INTERFACE

5.2.1 Overview

All the activities that can be realized through this program, with the exception of the insertion of alphanumeric characters, that is a performance limited to the keyboard, can be controlled with the mouse.
The program allows also the use of the mouse right hand side push-button that is coupled with the typical functions of *Cut*, *Copy*, *Paste*, *Delete*.

The user interface has been developed starting from a choice menu placed into the *main window* of the program (*main menu*). Through such a menu, it is possible to access to the single functions realized by some specialized dialogue windows (*Editing Form*).

Into the subject chapter, the system provides some general indications relevant to:

- Video Interface
- Program Main Window
- Editing Window
- Windows Objects of common use

5.2.2 Video Interface

The best graphical result of the program can be get with the following configuration of the video:

- Resolution 1024x768 pixel
- 65536 colors (16 bit)
- Small characters

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5.2.3 Main Window of the Program

The following window shows the main window. From such a window, it is possible to access to all the configuration functions of an equipment.

Into the title bar of the window, the system always points out the complete path name of the plant correctly in configuration.

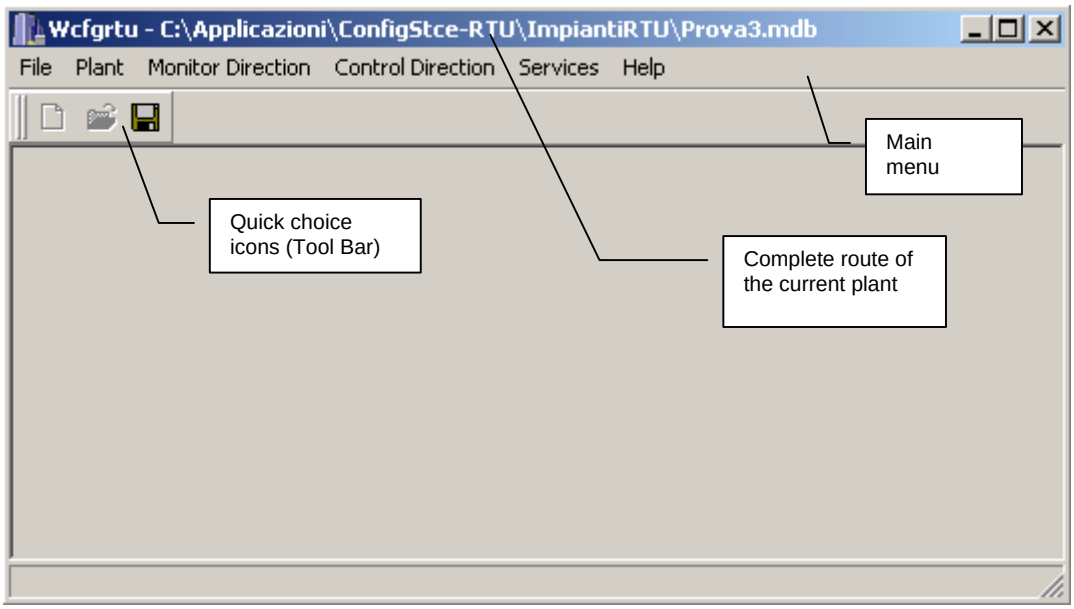

Figure 5-1– Program Main window

5.2.4 Editing Window

Here below, the user interface in relation with the general performances of the *Editing Windows* is described.

Each Editing Window of the data contains a title bar, inside which there are the description of the contents of the window itself and the windows standard buttons for its reduction to icon, the enlargement and the closing. The closing button of the window executes the same functions of the Cancel button.

Then, according to the type of the information that the system is configuring, the window can contain:

- the OK button, that executes the possible check, the memorization of the information into the database and the closing of the window.

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- The APPLY button, when it is present, executes the check and the storing of the information into the database without closing the window.
- The CANCEL button, that executes the closing of the window without saving the possible changes inserted for the information.
- The ADD button is present when it is possible to insert more than one record (for example more points) into the same editing session and it needs for adding a new record to the list.
- The DELETE button is present when the current record can be deleted. During the editing of the points, it is possible, through such a button, to delete the currently displayed point from the table.
- The scrolling bar allows the scrolling of the records forward or backward (for instance of the points, in such a way to be able to display every configured point).

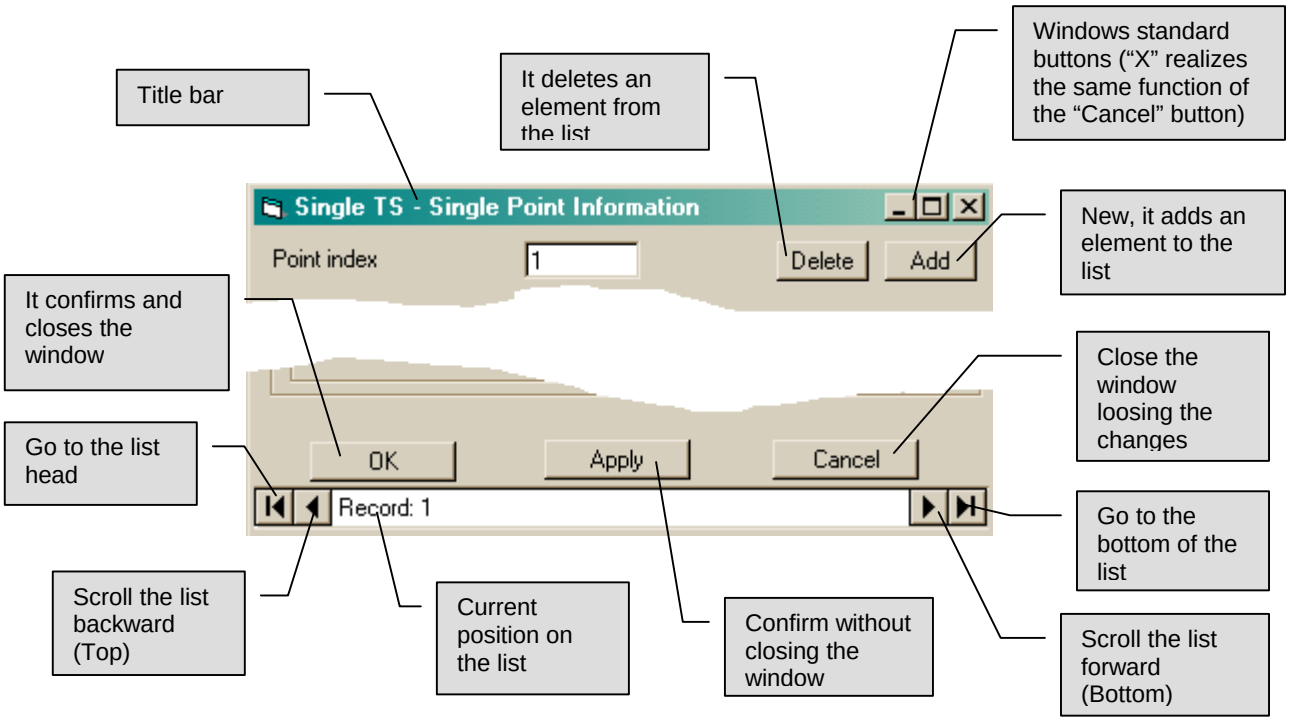

Figure 5-2– Editing Window

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According to the insertion status of the data some of the above described buttons can result disabled, for instance during the insertion of a new point, the ADD and Delete buttons result disabled until when the user has not applied the changes pressing the Apply button.

Each form is equipped with help, that can be recalled pressing the <F1> key.

Then, the system keeps always activated the control keys that makes available the editing and positioning functions of the cursor typical of the windows ambient.

Key combination	Functions
Up\Down arrows	Into the drop down type menus, they allow moving from one option to another one; the wrap-around function is activated. Into the edit boxes, they allow the passage from one character to the other one inside a field or the movement inside a generic list.
L.H./R.H. arrows	Into the edit boxes, they allow the passage from one character to the other one inside a field or the movement inside a generic list.
<Canc>	It deletes the characters present on the R.H. side of the cursor or the entire contents of the selected field.
<Back Space>	It deletes the characters present on the L.H. side of the cursor or the entire contents of the selected field.
<Home>	It positions the cursor on the L.H. side of the first character inside a field for the insertion of alphanumeric values.
<End>	It positions the cursor on the R.H. side of the last character inside a field for the insertion of alphanumeric values.
<Tab>	It allows the passage from a field to another one of the form with confirmation function of the inserted datum; then, it allows the movement from one functional button to another one.
<Shift><Tab>	It acts as the <Tab> but in the opposite direction.

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5.2.5 Windows objects

Here below, it is reported a series of examples concerning the typical objects of the Windows ambient that will be used for the user realization of the program, detected with their correct terminology.

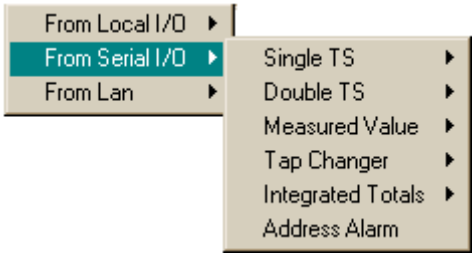

Figure 5-3– Windows object: Pop-up menu

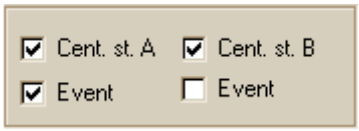

Figure 5-4 – Windows object: Check boxes

Figure 5-5 – Windows object: Spin Box

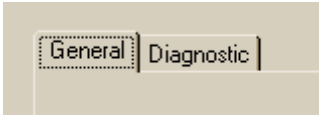

Figure 5-6 – Windows object: Tab Controls

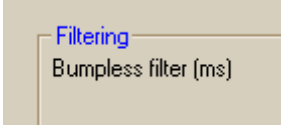

Figure 5-7 – Windows object: Static Text

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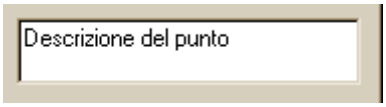

Figure 5-8 – Windows object: Text box

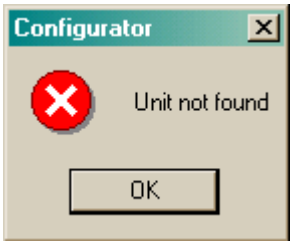

Figure 5-9 – Windows object: Message box

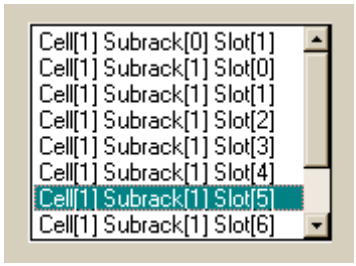

Figure 5-10 – Windows object: Single selection List Box

Figure 5-11 – Windows object: Radio Button

Figure 5-12 – Windows object: Main bar

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5.3 PROGRAM ORGANIZATION

The program is organized in menus and sub-menus. The user can access to all such menus and sub-menus starting from a *Main Menu*.
The hierarchical organization of such menus is reported into the following table.

Main Menu	Lev. 2 Menu	Lev. 3 Menu	Lev. 4 Menu
FILE	Open		
	New		
	Close		
	Save as ...		
	Delete		
	Exit		
PLANT	*Identification Parameters*		
	General		
	Equipment		
	Communication		
	Plant Zone		
	IEC Procedure		
	Struct. Addr. Format		
	Authentication		
MONITOR DIRECTION	From Local I/O	Single Point	*With Time Tag/Normal For RCEI*
		Double Point	*With Time Tag/Normal*
		Analog Telemeasurement	*With Time Tag/Normal*
		Digital Telemeasurement	*With Time Tag/Normal*
		Analog Step Position	*With Time Tag/Normal*
		Digital Step Position	*With Time Tag/Normal*
		Multiple Telesignal	*With Time Tag/Normal*
		Integrated Totals	*With Time Tag/Normal*

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Main Menu	Lev. 2 Menu	Lev. 3 Menu	Lev. 4 Menu
	From Serial	Single Point	*With Time Tag/Normal*
		Double Point	*With Time Tag/Normal*
		Telemeasurement	*With Time Tag/Normal*
		Step Position	*With Time Tag/Normal*
		Multiple Telesignal	*With Time Tag/Normal*
		Integrated Totals	*With Time Tag/Normal*
		Address Alarm	
	From Automation	Single Point	*With Time Tag/Normal*
		Double Point	*With Time Tag/Normal*
		Telemeasurement	*With Time Tag/Normal*
		Step Position	*With Time Tag/Normal*
		Multiple Telesignal	*With Time Tag/Normal*
		Integrated Totals	*With Time Tag/Normal*
	From Protection Equipment	*Time-tagged message*	
		Time-tagged message with relative time	
		Measurands I	
		Time-tagged measurands with relative time	
		Identification message	
		Measurands II	
CONTROL DIRECTION	To Local	*1 Contact Single Command*	
		2 Contact Single Command	
		Single Command Continuous	
		1 Contact Double Command	
		2 Contact Double Command	
		Step Command	
		Up/Down Set Point	
		Digital Setpoint	
		Analog Setpoint	
		Output Signal	
	To Serial	*Single Command*	
		Double Command	
		Step Command	
		Output Signal	
		Set Point	

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Main Menu	Lev. 2 Menu	Lev. 3 Menu	Lev. 4 Menu
	To Automation	*Single Command*	
		Double Command	
		Step Command	
		Output Signal	
		Set Point	
SERVICES	Find		
	Power Consumption		
	Modify Password		
	Download Conf.		
	Monitor RTU		
Help	About		

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The following flow chart reports the sequence of the principal operation advised for the realization of a complete configuration of the STCE/RTU equipment.

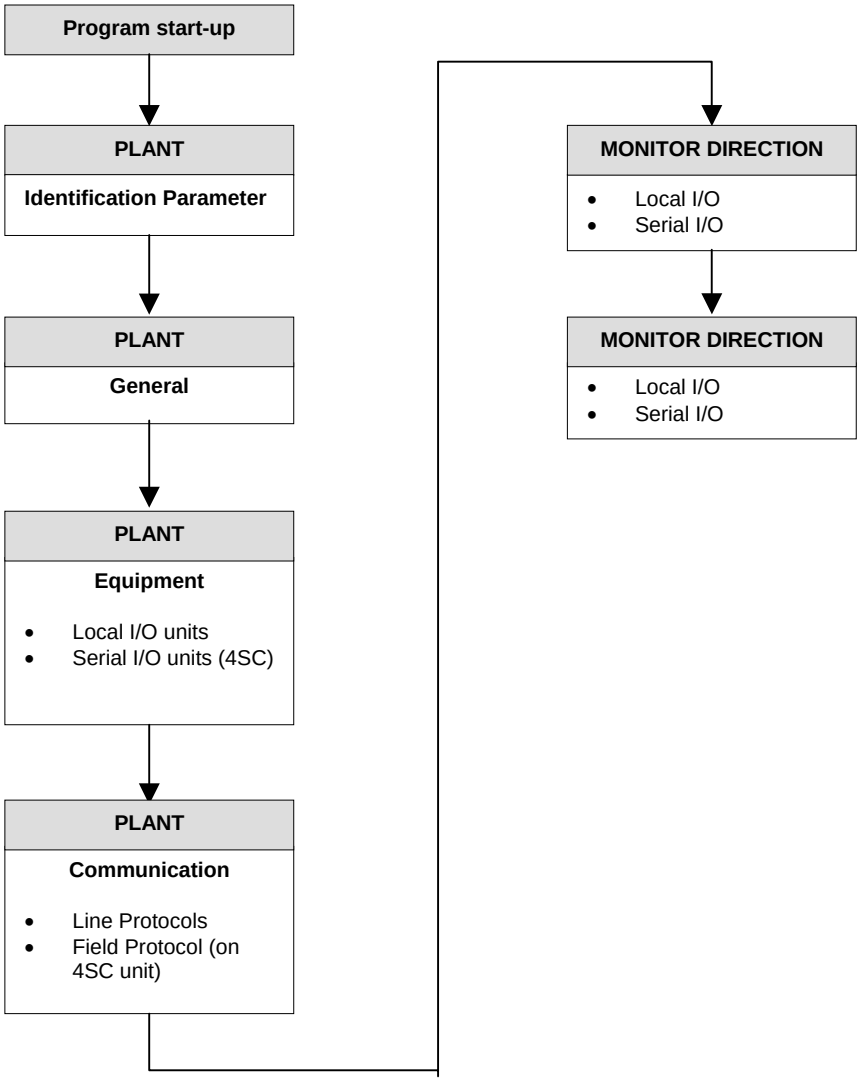

Figure 5-13 – Advised sequence for the configuration

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5.4 FILE

Under the “File” option of the main menu into the configuration program, the system makes available all the functions with the following purposes:

- To open an existing configuration Data Base to display and to change its contents through the “**Open**” option.
- To create a new configuration Data Base (a new plant) through the “**New**“ option or through the “Save as …” option.
- To close and to save the current configuration through the “**Close**” option.
- To realize a copy of an existing plant configuration through the “**Save as …**” option.
- To delete an existing plant configuration through the “**Delete**” option.
- To exit from the program through the “**Exit**” option.

A configuration Data Base can be considered as “open” when its name is displayed on the bar of the Main Window as current Data Base.

The program allows the opening of a single configuration Data Base at a time. The system marks the open Data Base as “unavailable” (Lock) for each other program.

The New, Open and Save As... operations can be executed also through the activation of the icons placed on the Tool Bar positioned under the bar of the main menu.

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5.4.1 New

If the user activates this option of the “Plant” menu, the system displays the File Selection Box for the request of a name for the new configuration Data Base to be created (new plant).

If the user confirms the creation operation of a new configuration, the system arranges the database files properly initialized with the default values.

The database is automatically predisposed by the program depending on some basic choices that the user has to effect; such choices are mutually exclusive couples and they must have effected keeping in mind the loaded software on the CPU2000 to maintain its compatibility.

The following figure show the window displayed for these initial choices.

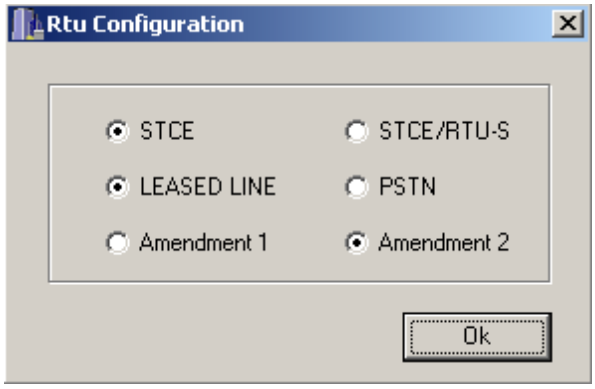

Figure 5-14 – New Plant – Amendment Choice

Warning

These initial choices can’t be modified later, i. e. it’s not possible to change these choices in an existing configuration.

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RTU Configuration – Basic choices		
Mutuamente esclusive		**DESCRIZIONE**
STCE	STCE/RTU-S	It allows to choose the equipment type to which the configuration is assigned. The STCE/RTU-S option allows to configure the Small version of STCE equipment.
LEASED LINE	PSTN	It allows to choose if the application will be on Leased Line or on switched line (PSTN). Note: the CPU2000 software that manages the switched line also manages the leased one but not vice versa.
Amendment 1	Amendment 2	It allows to choose to what version of IEC60870-5-101/104 protocol the CPU2000 software has to result compatible.

Table 5-1 – RTU Configuration – Basic choices

For the creation of a new configuration, you have to insert the following information:

- Plant name (it is the same name of the Data Base file devoted to contain the configuration);
- Path (drive and directory under which the new plant has to be saved).
  The default directory containing the plant databases is *…\Selta S.p.A\Selta ConfigStce-RTU\ImpiantiRTU;* the user can change, in every case, the destination directory acting on the proper push-button pointed out in Figure 5-15.

The user can stop the operation on progress pressing the Delete push-button.

If the name requested for the new plant is an already existing name, the program displays a dialogue box, where it requires to the user the confirmation for the over-writing operation.

The system points out the executed creation of the plant through the displaying, on the title bar of the Main Window, of the plant name comprising also its relevant path.

The following figure shows the window displayed on the screen for the generation of a new plant.

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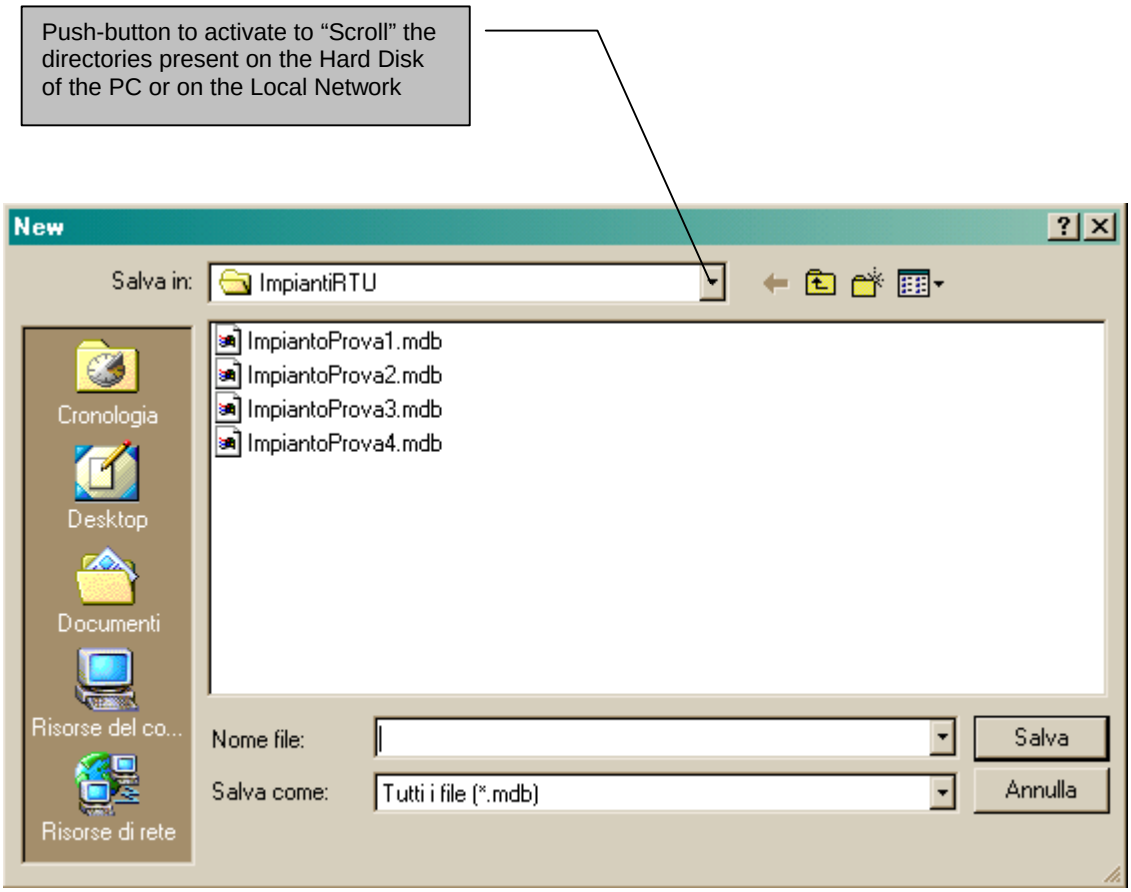

Figure 5-15 - New Plant

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5.4.2 Open

Through this option the user can select a plant among the existing ones.

For the opening of a plant, you have to select the following information:

- Plant name (it is the same name of the Data Base file that contains the configuration)
- Path (drive and directory under which the system has memorized the Data Base). The program suggests the following default directory:*...\Selta ConfigStce-RTU\ImpiantiRTU;* in every case, the user can search into other directories for the plant to be open acting on the proper pushbutton pointed out into Figure 5-15

The user can stop the operation on progress pressing the Delete push-button.

The system points out the executed opening of the plant through the displaying, on the title bar of the Main Window, of the plant name that contains its relevant path.

The following figure shows the window displayed on the screen for the opening of an existing plant.

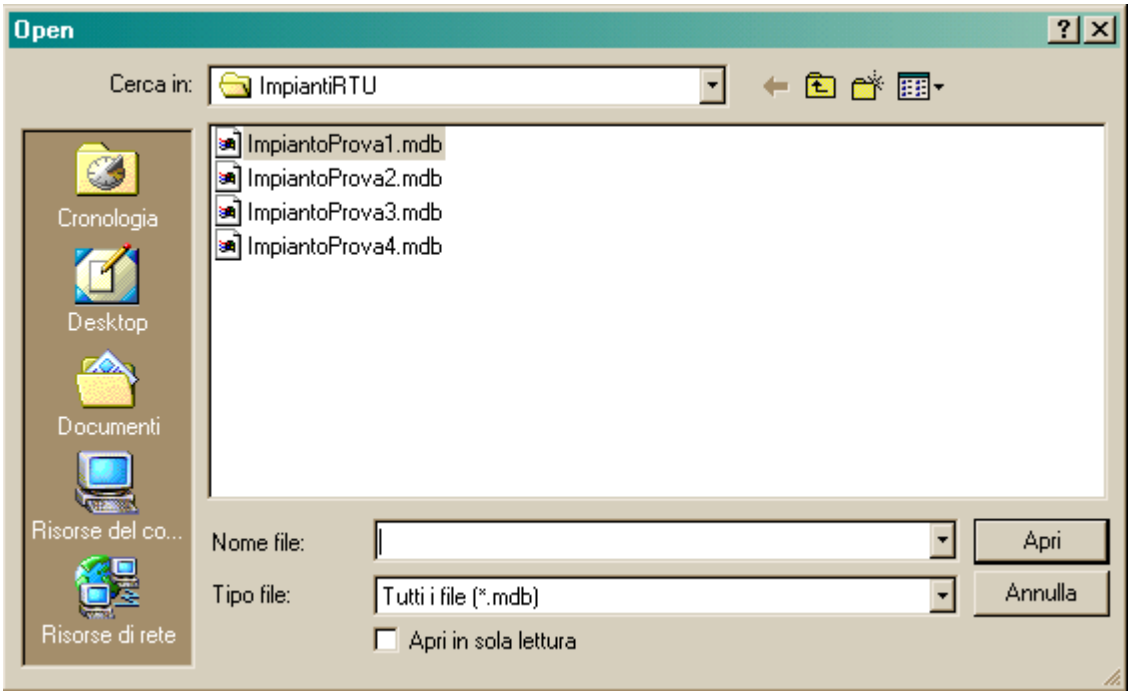

Figure 5-16 – Opening of the existing system

To open a file, it is necessary to position the mouse cursor on the desired name, to click through the R.H. side button and, then, in the same way, to select the “Apri” button.

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5.4.3 Save As

Through this option the user can copy the currently open plant by assigning it a new name.

For the saving of the plant with a new name, you have to insert the following information:

- Plant name (it is the same name of the Data Base file that contains the configuration)
- Path (drive and directory under which the system has to save the new plant).
  The program suggests the following predefined directory: *.. \Selta ConfigStce-RTU\ImpiantiRTU;* in every case, the user can change the destination directory acting on the proper pushbutton pointed out into Figure 5-15

If the name requested for the new plant is an already existing one, the program displays a dialogue window where the user is requested to confirm the overwriting operation.

The system points out the executed creation of the plant, that is a copy of the current one, through the displaying, on the title bar of the Main Window, of the plant new name that contains its relevant path.

The program does not execute processes on the original Data Base that therefore remains unchanged. The following figure shows the window displayed on the screen for the execution of the “Save As …” operation.

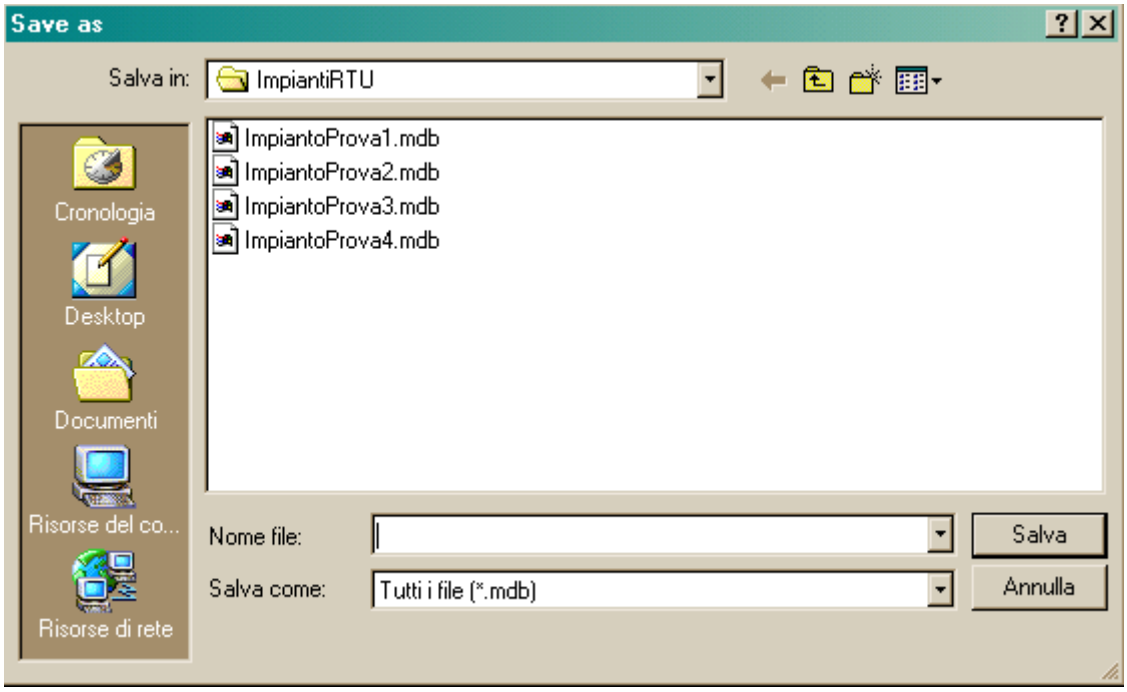

Figure 5-17 – Save as

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5.4.4 Delete

Through this option the user can delete an existing plant.

For the deleting of an existing plant, you have to select the following information:

- Plant name (it is the same name of the Data Base file that contains the configuration)
- Path (drive and directory under which there is the plant to be deleted).
  The program suggests the following predefined directory: *.. \Selta ConfigStce-RTU\ImpiantiRTU;* in every case, the user can change the directory where it has to be searched the plant to be deleted acting on the proper pushbutton pointed out into Figure 5-18.

The user can stop the operation on progress pressing the Cancel button.

The program always displays a dialogue window that requires to the user to confirm the deleting operation.

The following figure shows the window displayed on the screen for the execution of the "Delete" operation.

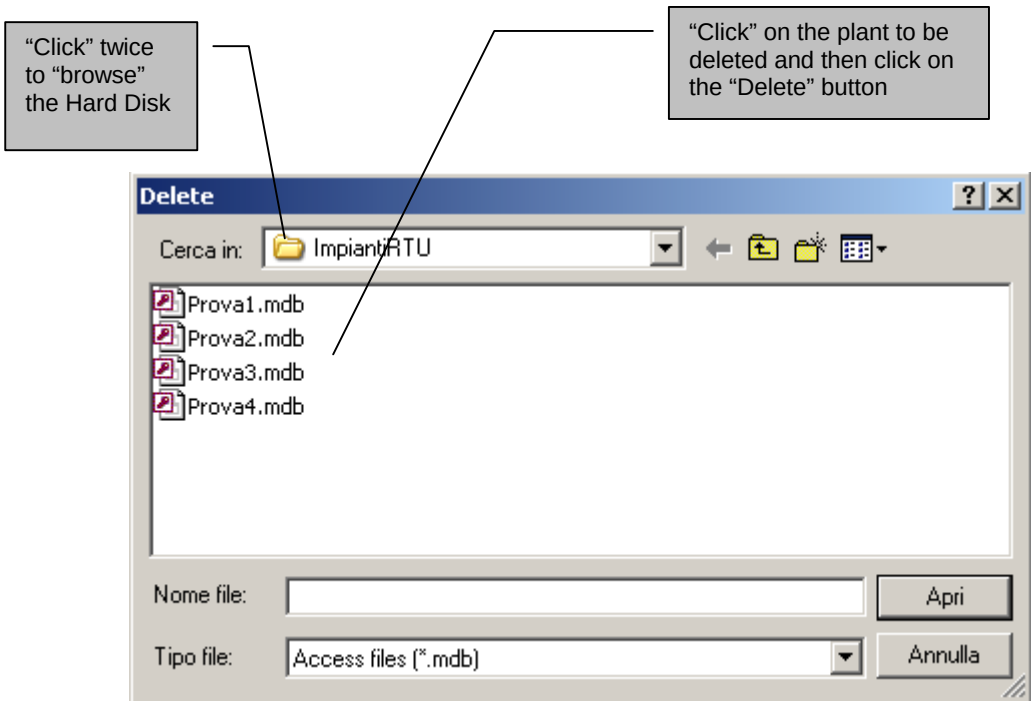

Figure 5-18 – Delete an existing plant

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5.4.5 Close

This function allows closing the open configuration Data Base (current) in such a way to be able to execute the opening of another Data Base without exiting from the program.

After the closing operation, the system updates the bar of the Main Window in such a way to point out the absence of an open Data Base.

The system disables all the changing operations of the configuration until to the next opening operation or plant creation one.

5.4.6 Exit

If the user select this option, the system ends the configuration program, eventually closing the plant that has remained open. The system will keep all the executed changes of the plant.

The user can get the exit from the program, also selecting, as it is generally allowed by the programs in windows ambient, the “X” present on the bar of the Main Window or again with <Alt><F4>.

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5.5 PLANT

The options of the *Plant* menu are enabled exclusively after having created and/or open a specific plant.

The *General* and *Communication* configuration options will be enabled only for the *Superuser* users.

For all the forms described here below, at the pressing of the Cancel button, the system, in presence of updated data, will display a confirmation requesting-window. If the user confirms the closing option of the window, the system will delete all the changes inserted for the data.

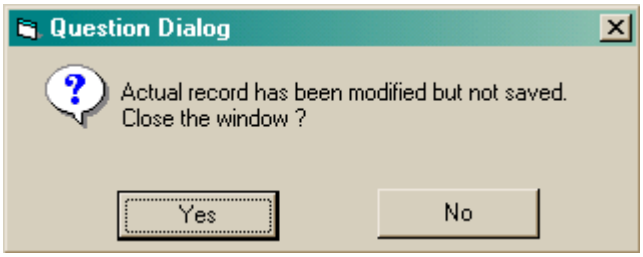

Figure 5-19 – Confirmation request

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5.5.1 Identification Parameters

The user can reach this option choosing successively the *Plant* option of the main menu and then*Identification parameters*.

This function allows configuring the parameters for the identification of the of the equipment inside the system where it is inserted.

The configuration of the identification parameters can be executed by every user.

The system keeps memorized the identification parameters into the configuration Data Base with documentation purpose and it does not forward them to the equipment.

The following figure displays the Editing window for the insertion of the Identification parameters.

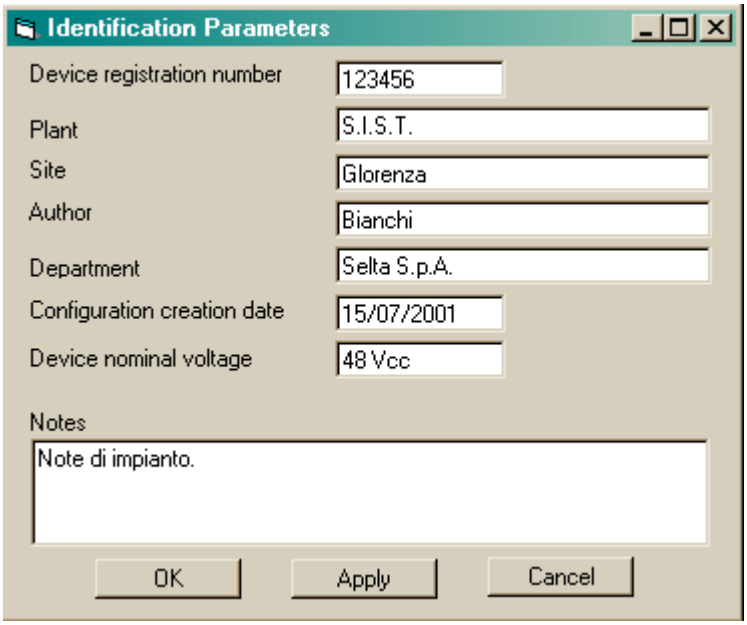

Figure 5-20 – Identification Parameters

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The configuration parameters in the *Identification Parameters* are listed in the following table together whit a brief description.

Identification Parameters				
FIELD NAME	**DEPENDENCE**	**I.V.**	**P. V.**	**DESCRIPTION**
Device registration number	None	Blank	Max 10 alphanumeric characters	Device registration number
Plant	None	Blank	alphanumeric characters	Name of the plant or of the system where the equipment is installed
Site	None	Blank	alphanumeric characters	Location where the equipment is installed
Author	None	Blank	alphanumeric characters	Author of the configuration
Department	None	Blank	alphanumeric characters	Department with the system responsibility
Configuration creation date	None	Blank	Gg/mm/aaaa	Date of the configuration creation
Device nominal voltage	None	Blank	24/48/110 Vcc	Power supply Nominal voltage of the equipment in field
Notes	None	Blank	Max 255 alphanumeric characters	Free note field

Table 5-2 – Identification parameters

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5.5.2 General

The user can reach this option choosing successively the Plant option of the main menu and the *General* one.

This function allows configuring or changing a set of general parameters that the STCE/RTU equipment needs for its correct functioning.

The configuration of the general parameters can be executed by a privileged user only.

The following figure displays the Editing window for the insertion of the General parameters.

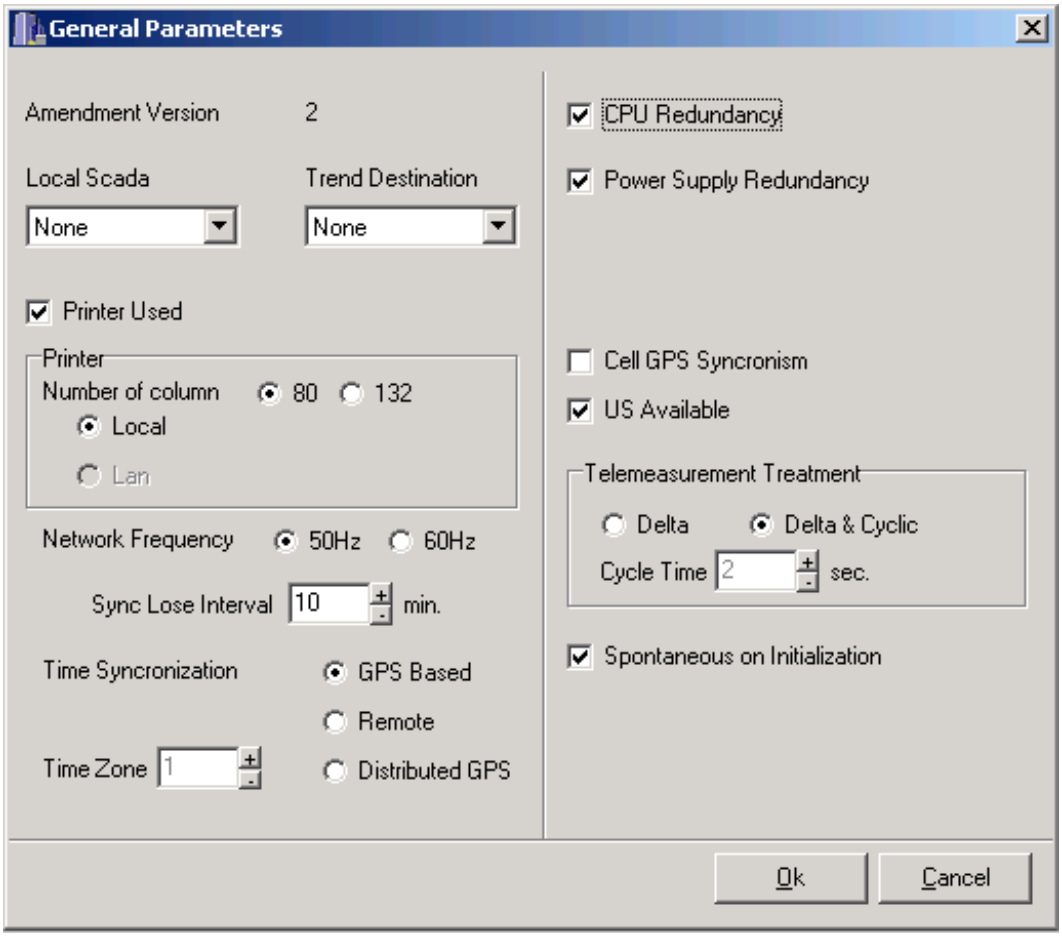

Figure 5-21 – General Parameters

The following table lists the parameters that can be configured into the *General Parameters* card and points out a brief description.

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General Parameters				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Amendment Version	None	N.A.	1, 2	Only display field. It says if the equipment firmware is consistent with the 2" Amendment of the IEC60870-5-101protocol . This option can be chosen when opening a new configuration.
Local SCADA	None	None	None Center A Center B Center C	It allows choosing among the three independent Centers that can be managed by the STCE/RTU equipment, the one that has to be considered as "Local Center"
Trend Destination	None	None	None Center A Center B Center C	It allows choosing among the three independent Centers that can be managed by the STCE/RTU equipment, the one to which it is necessary to forward the Trends
Printer used	None	Enabled	Enabled /Disabled	It allows configuring the presence of a local printer to which it is necessary to forward field and diagnostic events, according to the configuration.
Printer no. of column	"Printer used" = Enabled	80	80, 132	It allows configuring the number of columns used by the possible local printer (this information allows the correct formatting operation of the print string)
Local	"Printer used" = Enabled	Enabled	Enabled /Disabled	The printer is directly connected with the serial line of the STCE equipment
Lan	"Printer used" = Enabled The "Local" and "LAN" fields are mutually exclusive ones	Disabled	Enabled /Disabled	The printer is connected with the same TCP/IP local network connected with the STCE equipment. The performance is not implemented at the moment.
Printer server TCP/IP address	"On LAN" = Enabled	Blank	TCP/IP address	It allows configuring the network address of the Printer Server through which the STCE equipment can execute the printing operations on network
Network Frequency	None	50 Hz	50Hz 60Hz	It allows configuring the network frequency present into the system where it is inserted the equipment. The system uses this information to size correctly the residual voltage filter on the analog measuring inputs.
Sync Lose Interval (min)	None	10	1÷5760 step1	Time range beginning from the last received hourly synchronism (from GPS or from the centre). After this time hourly events mark is declared "suspicious of error" by special Protocol flags.

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General Parameters				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Time synchronization	None	Remote	- GPS based - Remote - Distributed GPS	It allows configuring the time synchronization source that can be as an alternative from remote host (by means of the same communication protocol with the centre) or from local GPS. The options are mutually exclusive ones The GPS Based and Distributed GPS options can be enabled only if the presence of the Service Unit is configured
Time zone	It is significant only with synchronization from GPS	1	–12 ÷ +12 Step 0,5	It allows setting the local time for the correct GPS initialization.
CPU Redundancy	None	Disabled	Enabled /Disabled	It allows to configure the Central Unit presence in dual configuration
Power Supply Redundancy	None	Disabled	Enabled /Disabled	It allows to configure the Power Supply Unit (converter) presence in dual configuration
Redundancy Control	“Power supply redundancy”=SI	1/1	1/1,1/2, 2/2	Converter redundancy type
US Available	None	Disabled	Enabled /Disabled	It allows to configure the Service Unit (SU2000) presence. US2000 Unit infact, is mandatory only when the hourly synchronism has to be generated by local GPS
Telemeasurement Treatment				
Delta	Mutually exclusive with *Delta & Cyclic* field	Disabled	Enabled /Disabled	It allows to enable measurements sending by threshold. The option is valid for the whole equipment and the forwarding for Delta overcoming will be applied to all the configured measurements
Delta & Cyclic	Mutually exclusive with *Delta* field	Disabled	Enabled /Disabled	It allows to enable the measurements forwarding by threshold and cyclic. During the configuration of every single measurements it will be necessary to specify which of the two formalities to apply.
Cycle Time (s)	“Delta & Cyclic”=SI	2	2 ÷ 300 Step 2	It allows to configure the basic time for the cyclic measurements forwarding.
Spontaneous on Initialization	None	Disabled	Enabled /Disabled	This options allows to choose if send or not spontaneous messages about the initial state field acquisition (the first state variation acquired from field during RTU initialization .

Table 5-3– General Parameters

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5.5.3 Equipment

5.5.3.1 STCE/RTU Equipment

The user can reach this option choosing successively the *Plant* option of the main menu and the *Equipment* one.

This function allows configuring the hardware equipping kit of STCE/RTU equipment concerning the Sub-racks (Base and Extension) and the Interface cards equipped into such ones.

The system executes the configuration through a graphical interface, as it is pointed out into the following figures. The user can insert and remove a card into a specific position inside a sub-rack and he can also configure its specific parameters.

Then, it is allowed the possibility to move a card on a specific position also between different Subrack inside the same Cell; on the contrary, it is not allowed moving a card between different cells in the case of plant distributed on more cells. The deleting function of a card causes also the deleting of the points configured on such a card, after the confirmation of the operation executed by the user.

The configuration of the Base Subrack is different with respect to the other Subrack because only the first seven positions can be set with I/O cards chosen by the user because the other positions are reserved for the Central Unit (eventually redounded), Service Unit and power supply (eventually redounded) cards.

At the choice of the *Equipment* option, the program displays the graphical representation of the STCE/RTU equipment reported into the following figure. The equipment in its most extended version can be composed by a maximum of sixteen Subracks, included the Base one, interconnected one each other.

If the STCE equipment small version is configured - i. e. STCE/RTU-S, see paragraph 5.4.1 – Extension Sub-Racks are not scheduled and the Base Sub-rack is smaller than the 19'' standard. In this case, when *Equipment* option is chosen, the program displays the STCE/RTU-S equipment structure graphic representation, as shown in figure:

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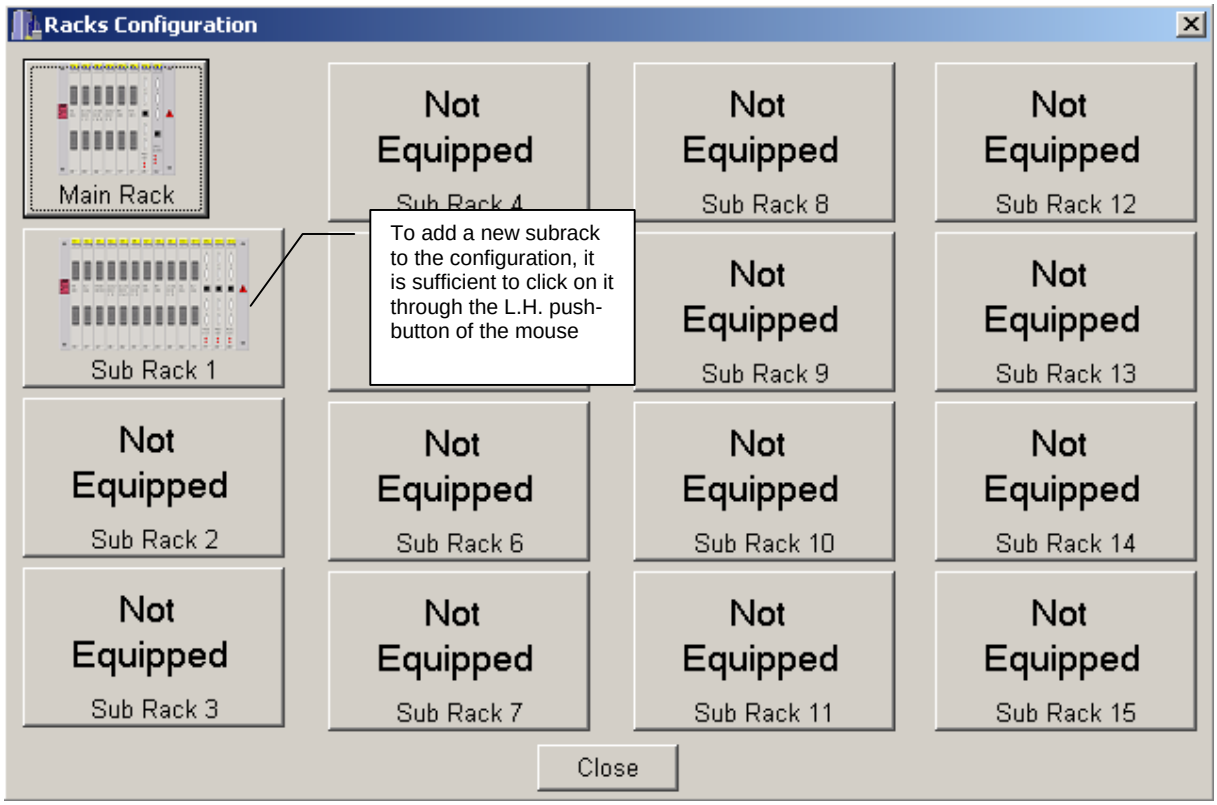

Figure 5-22 – Equipping kit

If the user chooses the Subrack to be configured, the system displays it in a graphical way as it is pointed out into the following figure.

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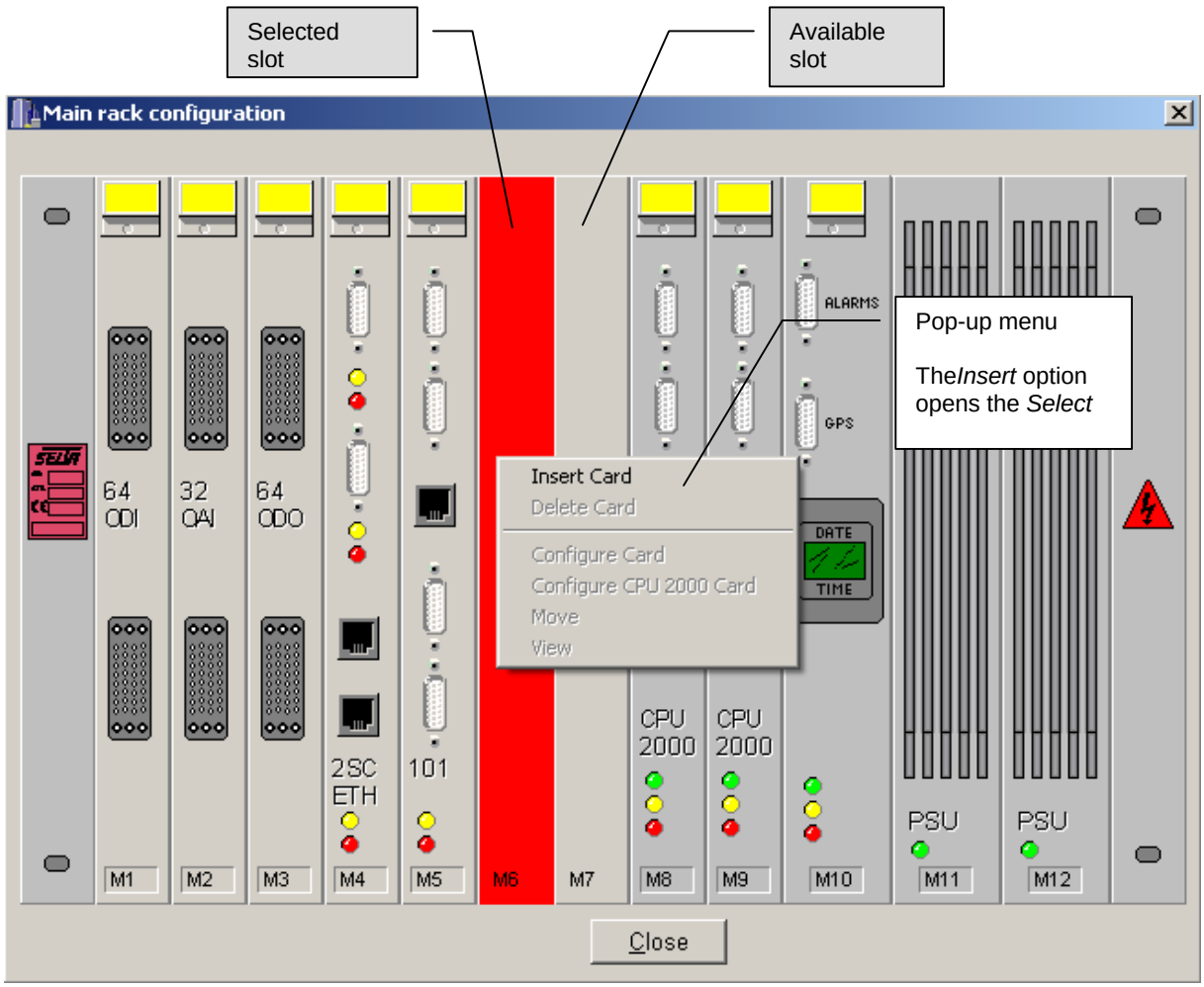

Figure 5-23 – STCE/RTU Base Sub-rack

If the user selects, through the L.H. push-button of the mouse, an available slot and then clicks on it through the R.H. push-button of the mouse, the system activates a pop-up menu that allows, through the *Insert Card* option, the opening of the *Select unit type* form with the list of all the I/O units available for the equipment. The insertion of a card can be easily executed selecting the corresponding radio button and confirming the choice through the *OK* push-button.

The system points out a selected slot, so as a selected I/O card through a red color border.

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The following figure displays the Card Selection form.

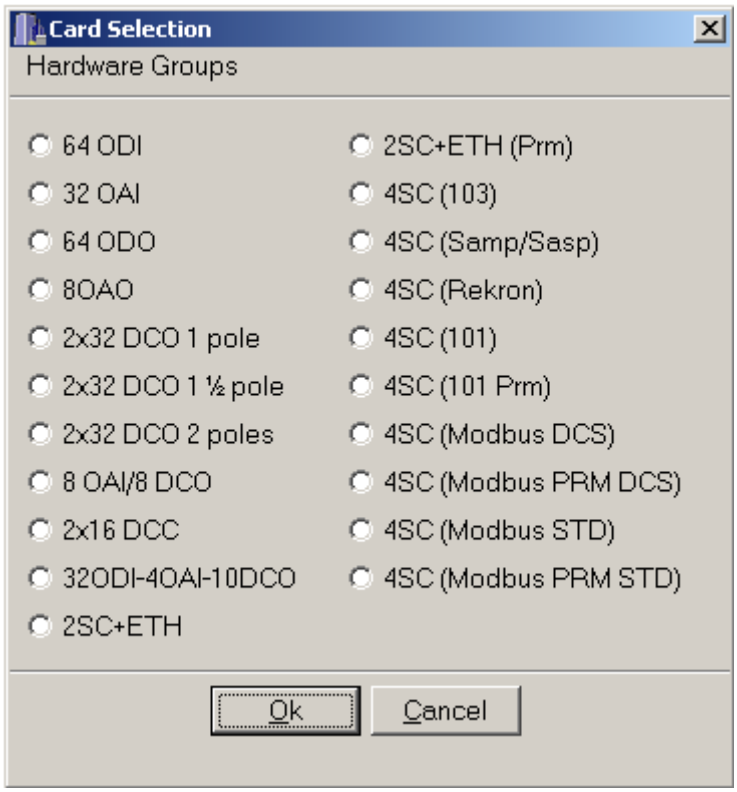

Figure 5-24 – Card type selection

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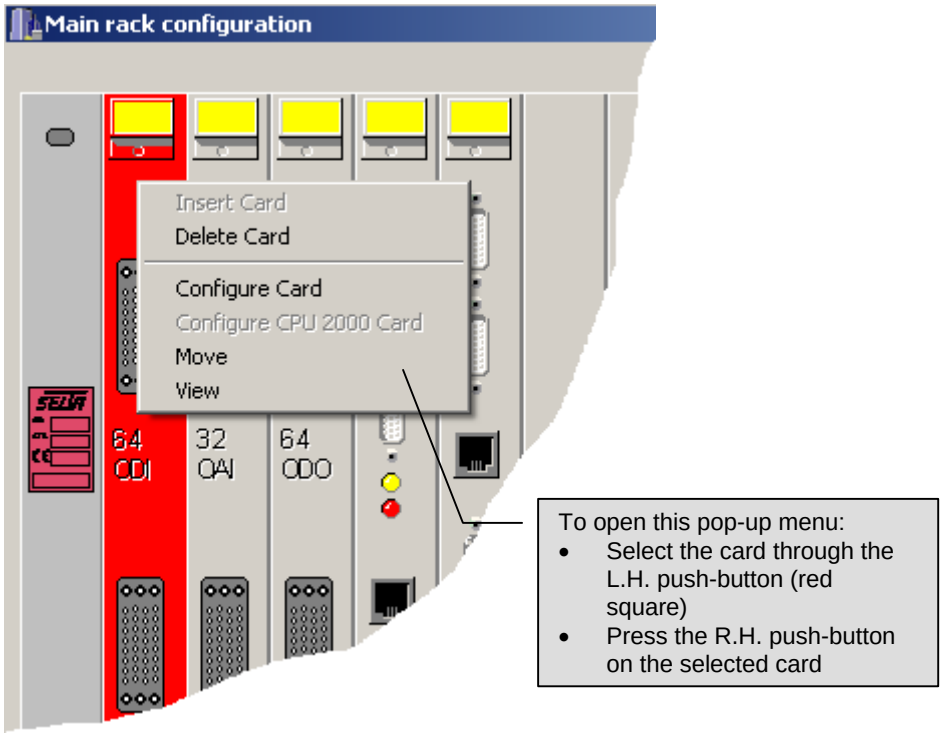

Figure 5-25 – Pop-up menu for the card management

On the I/O cards inserted into the subrack, the user can activate, through the R.H. push-button of the mouse on the selected unit, a pop-up menu that makes available the following functions:

Delete Card	It allows removing the selected card from the configuration. **If the card chosen for the removal has some connected field points, the system removes them all** (the program requires for the confirmation to continue the procedure through a proper dialog box).
Configure Card	It allows configuring the specific hardware characteristics of the selected card and in particular the diagnostic points (Single Point) coupled with it. The system forwards the configured diagnostic points to the Supervisory and control Center/s according to the configured treatment.
Configure CPU2000 Card	It allows configuring the specific hardware characteristics of the CPU2000 Central Unit. When CPU2000 Unit is selected, the option is enabled.
Move	It allows moving the card from a subrack position to the other one. It is allowed also the displacement of the card from a subrack to the other one. The displacement does not cause changes to the configuration of the points eventually already connected with the card. Figure 5-26 shows the form displayed on the screen, after the displacement request of a card from a position to the other one.

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View

It allows displaying the configuration status of the selected electronic card. The displayed information are the following ones:

- pins of the configured connectors
- type of coupled input, detected through an acronym
- IEC index of the point

An example of window that reports the configuration status of a card is reported in Figure 5-27.

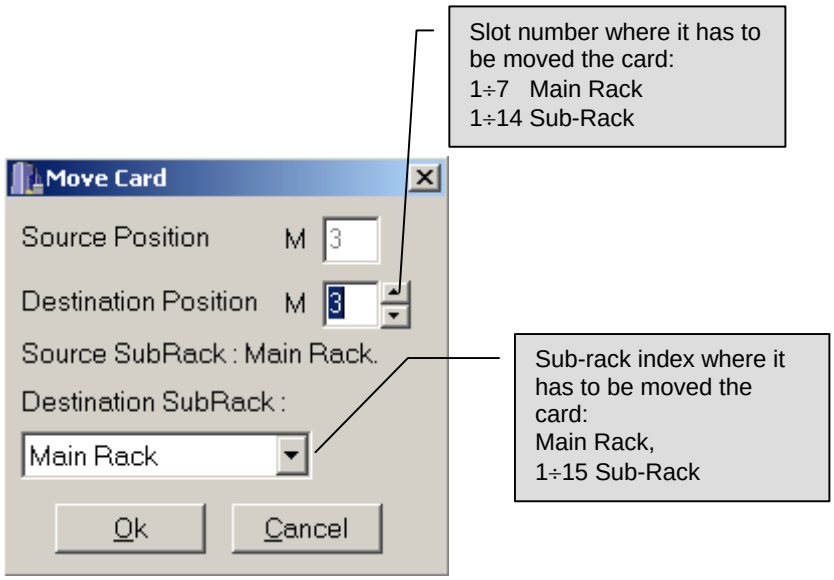

Figure 5-26 – Card displacement

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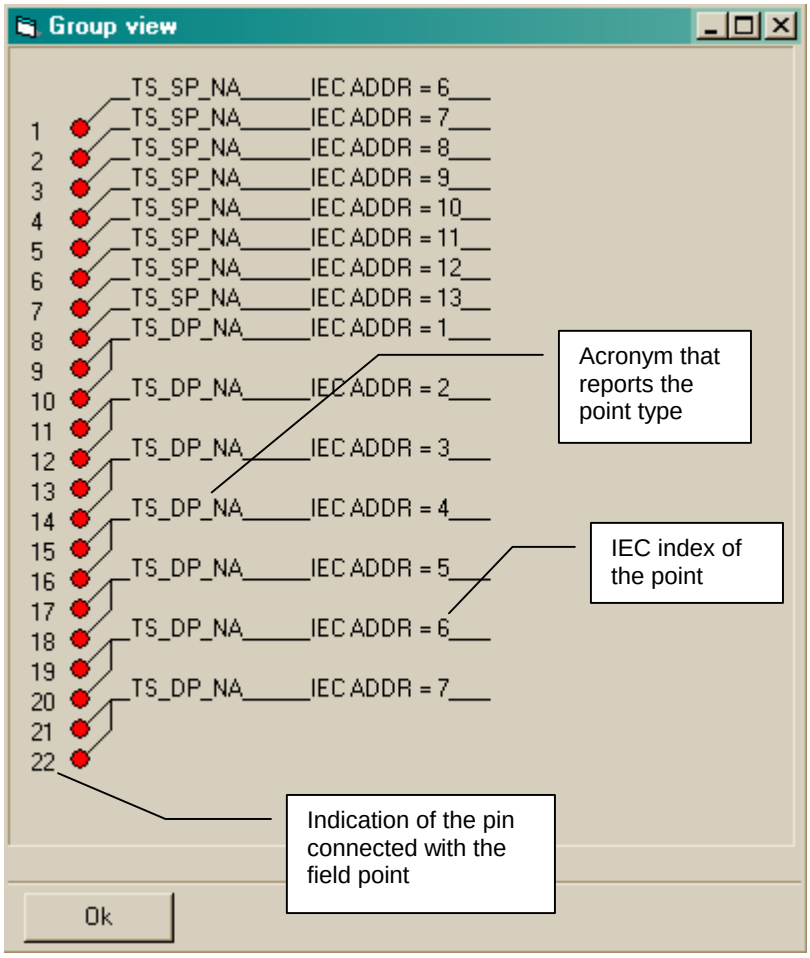

Figure 5-27 – Group configuration status view

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5.5.3.2 STCE/RTU-S equipment

If the current configuration is relevant to a STCE equipment small type (i. e. STCE/RTU-S), Extension Sub-racks are not scheduled, so from Equipment options the sub-rack graphic description is directly entered.

The STCE/RTU-S Base Sub-rack size is smaller than the 19'' standard, as shown in the following figure:

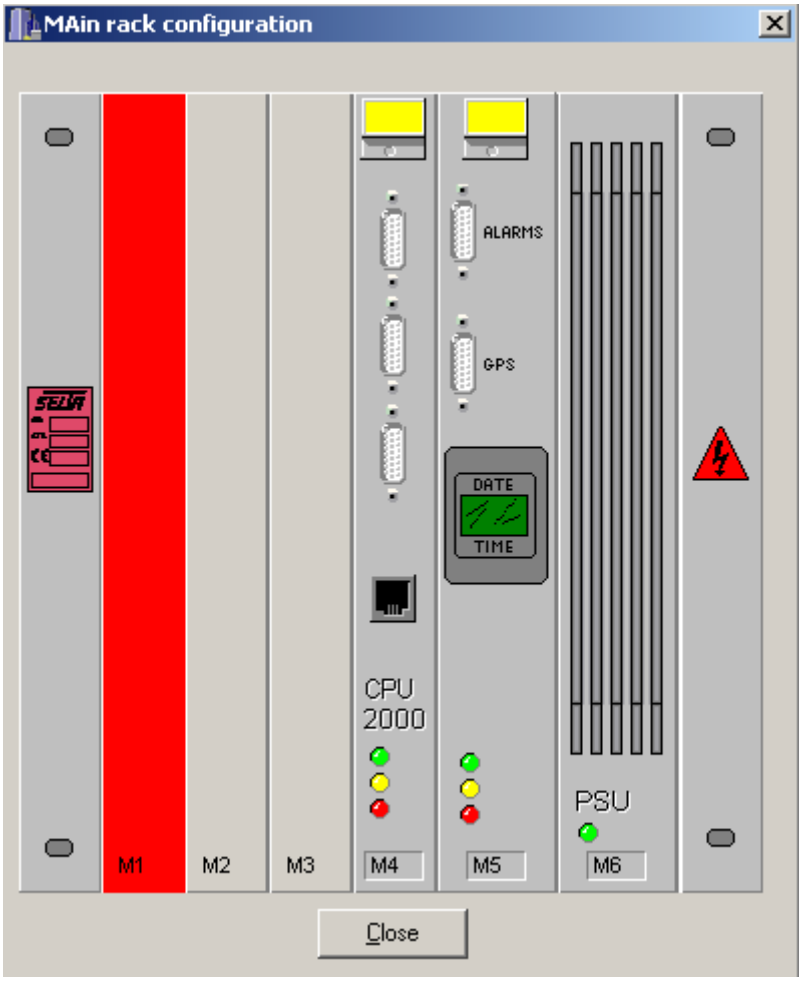

Figure 5-28 - STCE/RTU-S Base Sub-rack

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The most important differences between STCE small version and the standard are the followings:

- the Base Sub-rack size is smaller and can equip up to three I/O unities (the type unit are the same scheduled in the standard STCE equipment)
- CPU2000 Central Unit is not redoundable
- Power Supply is not redoundable
- It is not possible to connect Extension Sub-racks
- The points data base managed is reduced

The attestation of the different I/O unities in the Sub-rack is the same decrypted in the precedent paragraph.

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5.5.3.3 64ODI card configuration

The configuration of the 64ODI card requires the diagnostic digital configuration associated to it. The configuration form layout is reported in the following figure.

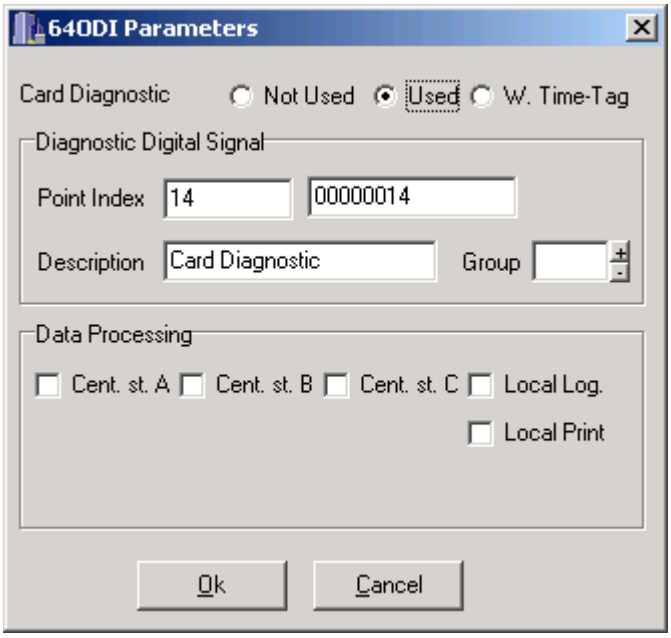

Figure 5-29 – 64ODI card configuration

64ODI card configuration				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Card Diagnostic	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the card, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if "Generic fault" = Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"Card Diagnostic"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-4 – 64ODI card configuration

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5.5.3.4 32OAI card configuration

The configuration of the 32OAI card provides two different sections that can be accessed by Tab Controls: one, general and related to the card hardware, and the other dedicated to diagnostic.

The configured treatment is common to the two allowed diagnostic points.

The layout of the configuration form is reported in the following figure.

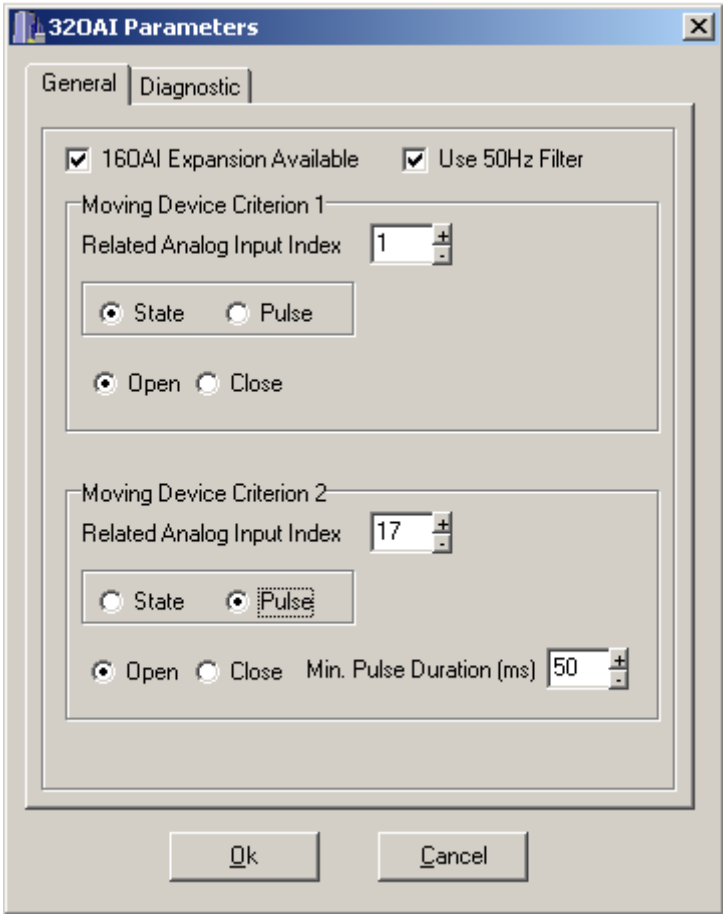

Figure 5-30 – 32OAI card configuration - General

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32OAI card configuration - General				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
16OAI expansion unit available	None	Enabled	Enabled/Disabled	It configures the presence or not of the *16 Optoinsulated Analog Input Expansion* card. This card is assembled on the base one
Use 50Hz Filter	None	Enabled	Enabled/Disabled	It allows to configure the filter software use on the measurements inputs. This filter is on purpose realized for filtering the disturbance induced by the net frequency at 50Hz. This filter removal makes faster the measurement acquisition but it makes particularly sensitive the input to that disturbance, so it becomes mandatory the Data Reduction value, used to reduce the measurements quantity sent to the Center.
Moving device criterion 1				
Related analog input index	The two *Moving Device Criteria* cannot be associated to the same analog input	0	1÷32 step 1 0=not used	It allows configuring which of the 32 analog inputs the *Moving Device Criterion 1* must be associated to. The *Moving Device Criterion* has the purpose to avoid the acquisition of transient and not meaningful values. The *Moving Device Criterion i*s provided by a digital input present on the 32OAI card and allows, associated to an analog input, to acquire an analog step quantity (for instance, the state of a Tap Changer provided in analog format) validating the state
State	Mutually exclusive with *Pulse*	Enabled	Enabled/Disabled	It allows configuring the acquisition modality of *Moving Device Criterion 1*, which is managed by the program. The *Moving Device Criterion* can be acquired as *State* or as *Pulse*
Rest state	Meaningful if *State* = Enabled	Open	Open Close	It allows configuring, when the *Moving Device Criterion1* is provided as STATE, the fixed state assumed by the digital input when this points out the measurement is valid
Pulse	Mutually exclusive with *State*	Disabled	Enabled/Disabled	It allows configuring the acquisition modality of the *Moving Device Criterion 1* that is managed by the program
Rest state	Meaningful if *Pulse* = Enabled	Open	Open Close	It allows configuring, when the *Moving Device Criterion 1* is provided as PULSE, the rest state (Normally Opened/Normally Closed) of the pulse itself. If the defined rest state is, for instance, Open, this means that the pulse of the Measurement validation is active when Closed
Min. Pulse duration (ms)	Meaningful if *Pulse* = Enabled	50	50÷300 step 50	If the *Moving Device Criterion* is provided as pulse, it is possible to configure the minimum duration that it must have to validate the analog quantity in input. The minimum duration must be greater than the Bumpless filter
Moving device criterion 2				

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32OAI card configuration - General				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Related analog input index	The two *Moving Device Criteria* cannot be associated to the same analog input	17	1÷32 step 1 0=not used	It allows configuring which of the 32 analog inputs the *Moving Device Criterion 2* must be associated to.
State	Mutually exclusive with *Pulse*	Enabled	Enabled/Disabled	It allows configuring the acquisition modality of the *Moving Device Criterion 2* that is managed by the program.
Rest state	Meaningful if *State* = Enabled	Open	Open Close	It allows configuring, when the *Moving Device Criterion 2* is provided as STATE, the fixed state assumed by the digital input when this points out the measurement is valid
Pulse	Mutually exclusive with *State*	Disabled	Enabled/Disabled	It allows configuring the acquisition modality of the *Moving Device Criterion 2* that is managed by the program
Rest state	Meaningful if *Pulse* = Enabled	Open	Open Close	It allows configuring, when the *Moving Device Criterion 2* is provided as PULSE, the rest state (Normally Open/Normally Closed) of the pulse itself. If the defined rest state is, for instance, Open, this means that the pulse of the Measurement validation is active when Closed
Min. Pulse duration (ms)	Meaningful if *Pulse* = Enabled	50	50÷300 step 50	If the *Moving Device Criterion* 2 is provided as pulse, it is possible to configure the minimum duration that it must have to validate the analog quantity in input. The minimum duration must be greater than the Bumpless Filter

Table 5-5 – 32OAI card configuration - General

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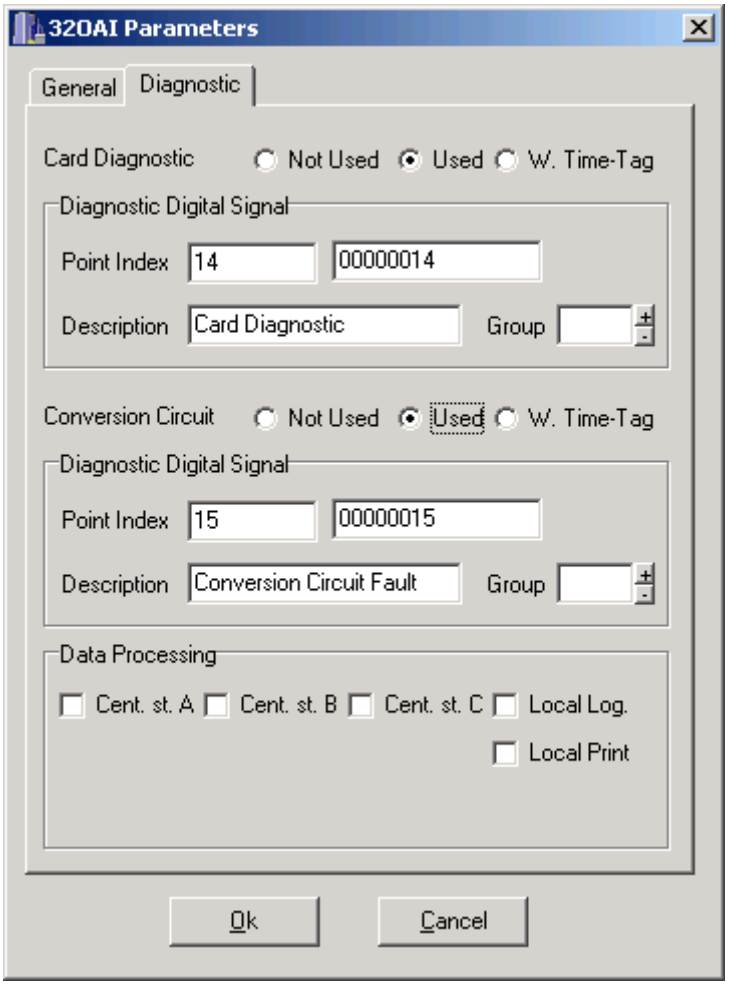

Figure 5-31 – 32OAI card configuration - Diagnostic

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32OAI card configuration - Diagnostic				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Generic fault	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the card, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if “Generic fault" = Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“Generic fault”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Conversion circuit failure	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the A/D conversion circuit alarm, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if “Conversion circuit failure"=Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Peripheral Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“Conversion circuit failure”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-6 - 32OAI card configuration - Diagnostic

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5.5.3.5 64ODO card configuration

The configuration of the 64ODO card requires only the configuration of the diagnostic digital associated to it. The layout of the configuration form is reported in the following figure.

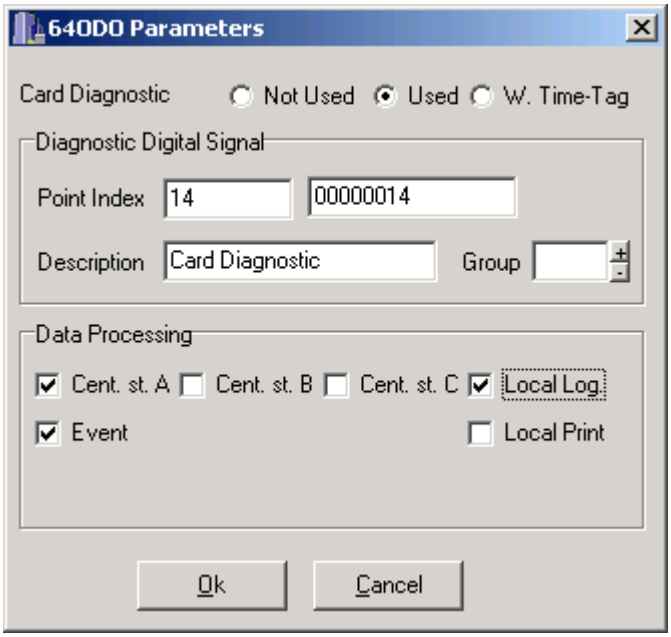

Figure 5-32 – 64ODO card configuration

64ODO card configuration				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Card Diagnostic	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the card, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if “Generic fault" = Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“Card Diagnostic”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-7 – 64ODO card configuration

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5.5.3.6 8OAO card configuration

The configuration of the 8OAO card requires only the configuration of the two diagnostic digitals associated to it. The layout of the configuration form is reported in the following figure.

The configured treatment is common to the two available diagnostic points.

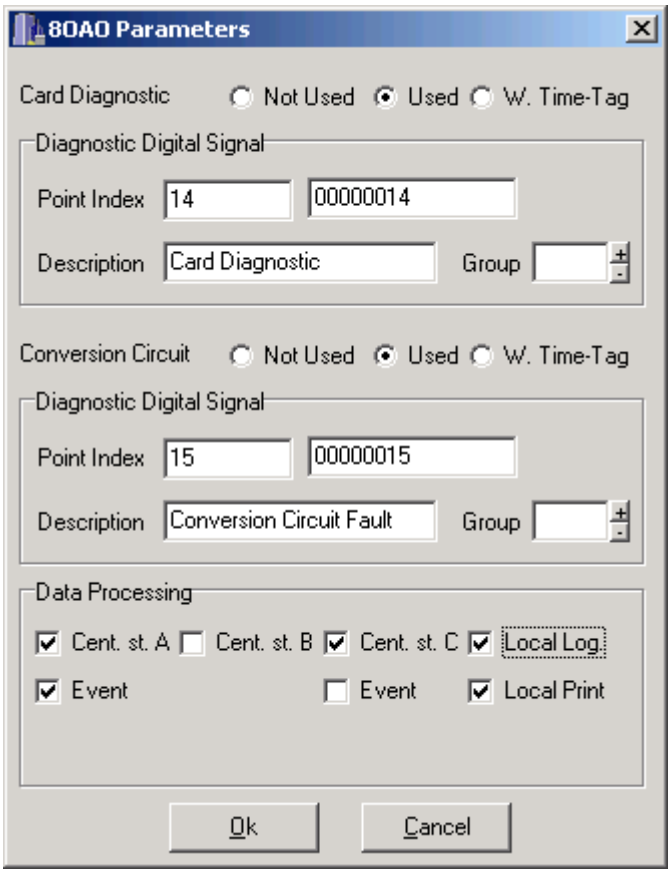

Figure 5-33 – 8OAO card configuration

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8OAO card configuration				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Card Diagnostic	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the card, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if “Generic fault" = Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“Generic fault”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Conversion Circuits	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the A/D conversion circuit alarm, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if “Conversion circuit failure"=Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Peripheral Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“Conversion circuit failure”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Diagnostic digital treatment				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-8 - 8OAO card configuration

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5.5.3.7 2x32DCO card configuration (1 pole, 1 pole and ½, 2 poles)

The configuration to insert for the three different system applications allowed for the card (1 pole, 1 ½ poles and 2 poles) is the same, therefore a single discussion will be made for the three cases.

The configuration of the 2x32DCO card provides two different sections that can be accessed by Tab Controls: one general, related to the card hardware, and the other one dedicated only to diagnostic.

The 2x32DCO card provides up to three diagnostic Single Points: *generic fault*, *load impedance fault* and 1/*N fault*. For the diagnostic points *generic fault* and 1/*N* fault the configure treatment (Data processing) is common.

The configuration form layout is reported in the following figure:

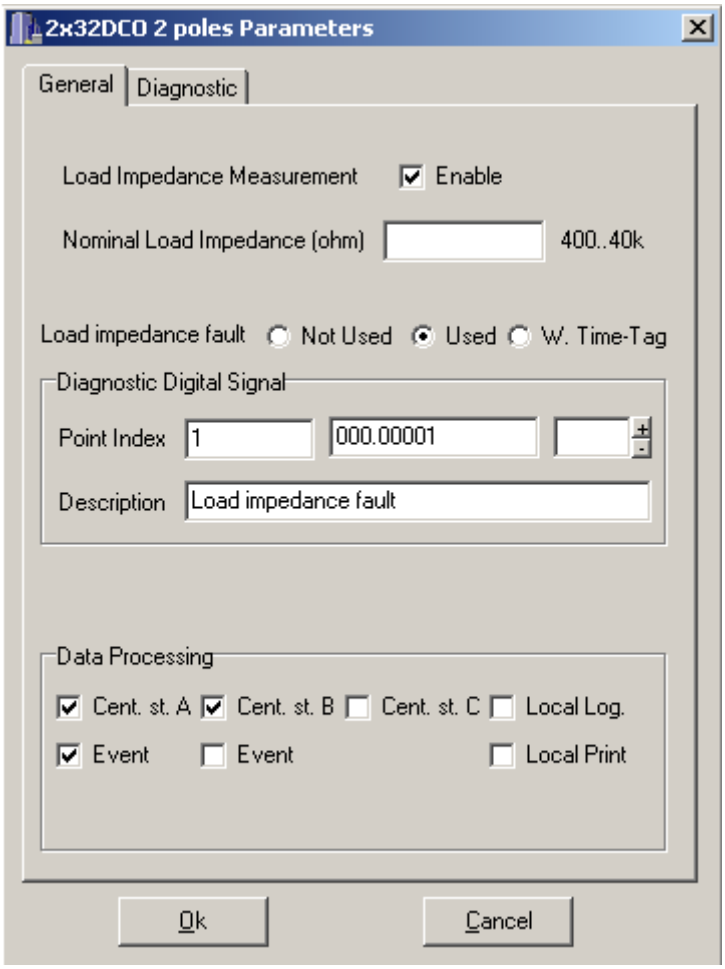

Figure 5-34– 2x32DCO card configuration - General

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2x32DCO card configuration – General				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Load impedance measurement				
Enabled	The load impedance measurement can not be enabled on 1 pole 2x32DCO Unit	Disabled	Enabled/Disabled	It allows enabling on the card the circuit that measures the load impedance with the purpose to find and signal possible anomalies on the field connection external to the card
Nominal Load Impedance (Ohm)	Meaningful if "Load impedance measurement" = Enabled	Blank	400÷40000 step 1	It allows configuring the nominal load impedance necessary to allow the measurement. Admitted maximum tolerance is of 20%. **The configuration of a wrong load impedance value can cause the signaling of a false alarm and the out of order of the remote command**. Given that the impedance measurement is made when the remote command is executed, the alarm status for wrong load impedance can automatically clear and, however, it does not influence other commands.
Load impedance fault	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the alarm on the load impedance measurement, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if "Load impedance fault"=Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication of the alarm associated to the load impedance to the centre. Issuing and clearing of this alarm are managed by the Peripheral Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"Load impedance fault"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-9 - 2x32DCO card configuration – General

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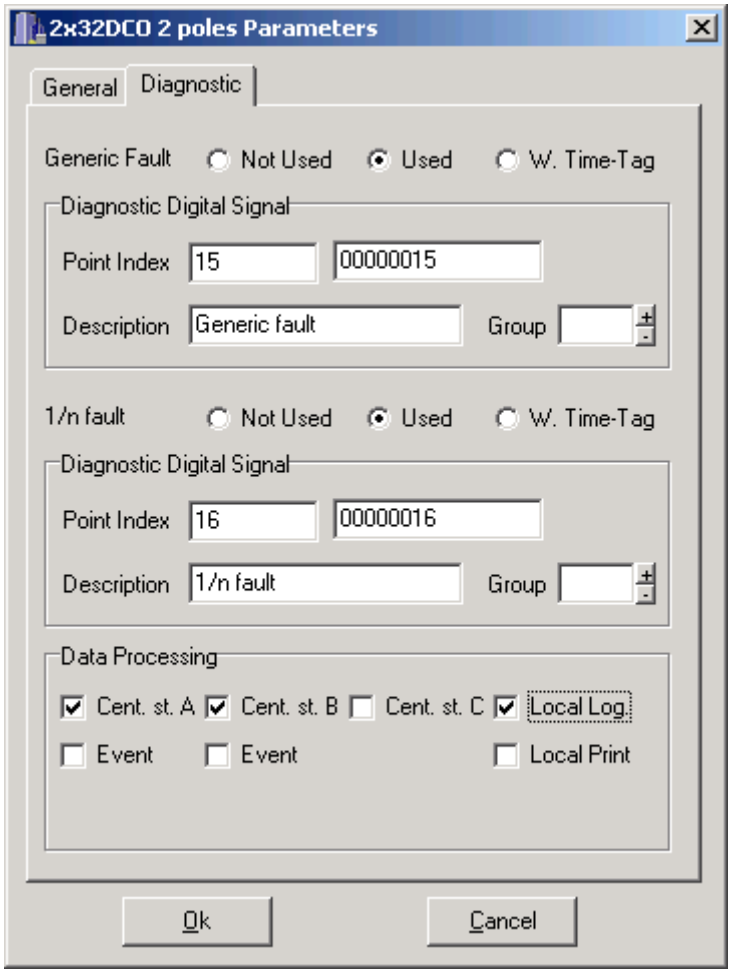

Figure 5-35 – 2x32DCO card configuration- Diagnostic

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2x32DCO card configuration – Diagnostic				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Generic fault	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the card, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if "Generic fault" = Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"Generic fault"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
1/N fault	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the 1/N alarm, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if "Conversion circuit failure"=Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication of the 1/N alarm to the centre. Issuing and clearing of this alarm are managed by the Peripheral Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"1/N fault"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Data processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-10 - 2x32DCO card configuration- Diagnostic

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5.5.3.8 4SC card configuration

The configuration of the 4SC card requires only the configuration of the diagnostic digital associated to it. The layout of the configuration form is reported in the following figure.

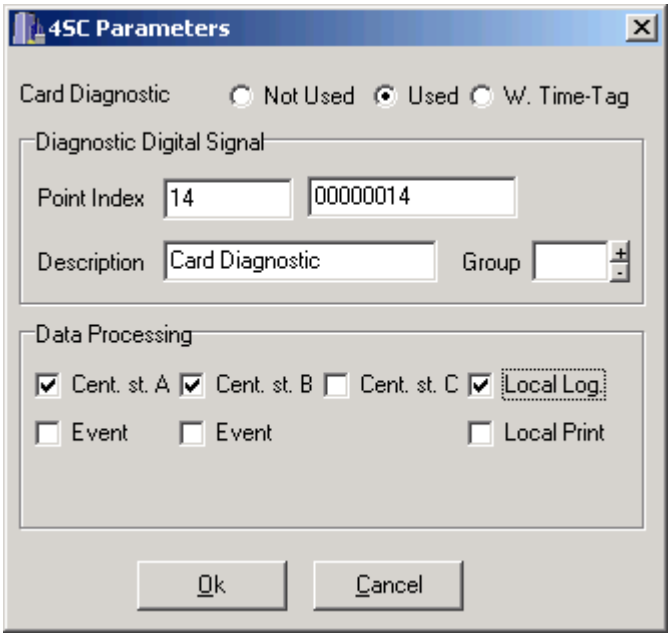

Figure 5-36 - 4SC card configuration

4SC card configuration				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Card Diagnostic	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the card, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if “Generic fault" = Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“Generic fault”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Diagnostic digital treatment				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-11 - 4SC card configuration

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5.5.3.9 4SC dualized card configuration

The serial interface 4SC card can be used also in a dualized mode; this allows to dualize both the communication line and the processor dedicated to the communication.

The 4SC dualized card supports the functionalities of DCS Modbus protocol and of Standard Modbus protocol; these functionalities are respectively called *4SC Modbus Prm DCS* and *4SC Modbus Prm STD* on the “Select Unit Type” Form.

Inside the Sub-rack the 4SC *primary* (*Prm*) dualized card can be attested only in even position (considering the slot numeration in the Sub-racks beginning from one, the positions in which it is accepted to position the card are: 2, 4 and 6 in the Base Sub-rack and 2, 4, 6, 8, 10, 12 in the Extension Sub-racks); automatically the second card is positioned on the successive slot (odd).

For both the cards constituting the dualized 4SC, the followings points must be modifiable:

Generic Fault:	this Single point (with or without Time Tag) is directly managed by the CPU2000 Unit and refers to the Center information about bad operation of the card.
4SC Master/Slave:	this Single point (with or without Time Tag) reports indication of Master card state or slave card state. If the card state is Master the single point is set on the active state (1=ON); in the contrary case it is set on the idle state.
Line diagnostic:	this Single point (with or without Time Tag) reports the link state alarm with the slave on the used line. If on line there is a connection the alarm is absent and the single point gets the idle value (0=OFF); otherwise it gets the active state (1=ON) to indicate the alarm presence.

The configuration form layout for the 4SC dualized card is reported in the following figure:

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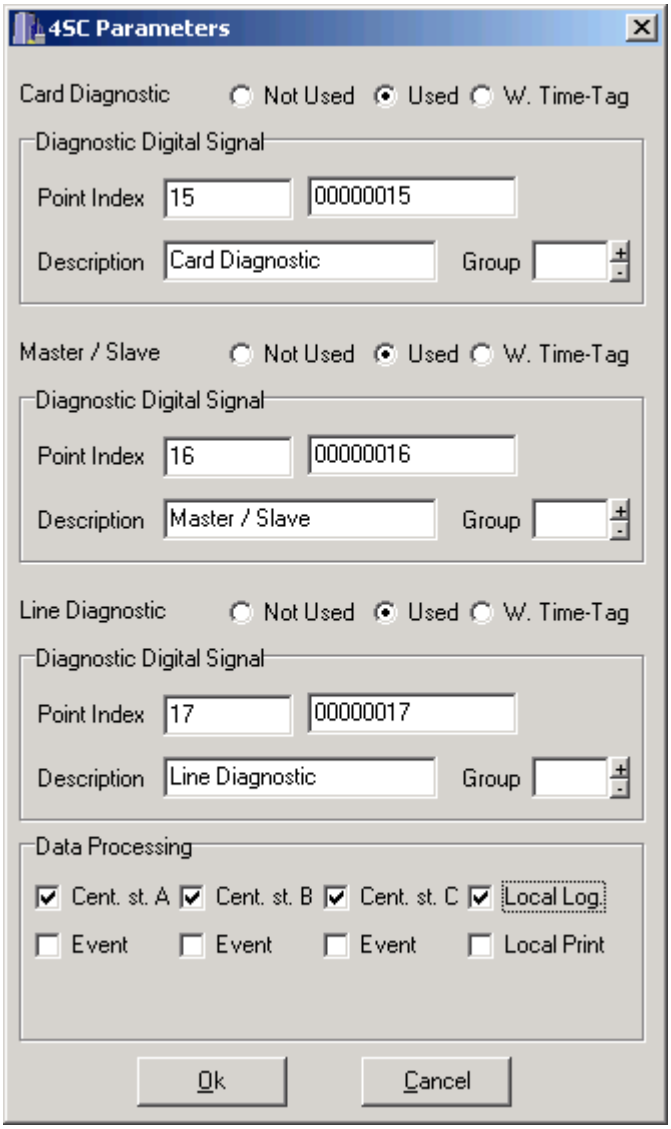

Figure 5-37 – 4SC dualized card Configuration

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4SC card configuration				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Card Diagnostic	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the card, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if “Generic fault" = Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“Card Diagnostic ”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Master / Slave	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital that reports to the Center the Master or Slave card state, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if “4SC Master/Slave" = Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to centre of the Master or Slave card state. Issuing and clearing of this alarm are managed by the 4SC Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“Master/Slave”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Line Diagnostic	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital that reports to the Center the link state with the Slave attested to the line, with time tag (*W. Time-Tag*) or without (*Used*)
Point Index	Meaningful if “Line diagnostic" =Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to centre of the link state with the Slave attested to the line. Issuing and clearing of this alarm are managed by the 4SC Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“Line Diagnostic”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-12 – 4SC dualized card configuration

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5.5.3.10 2SC+ETH card configuration

The 2 serial channels + Ethernet (2SC+ETH) card configuration requires the configuration of the diagnostic digital associated to it and the configuration of the remote-command that makes active on it the data base scanning.

The configuration form layout is reported in the following figure:

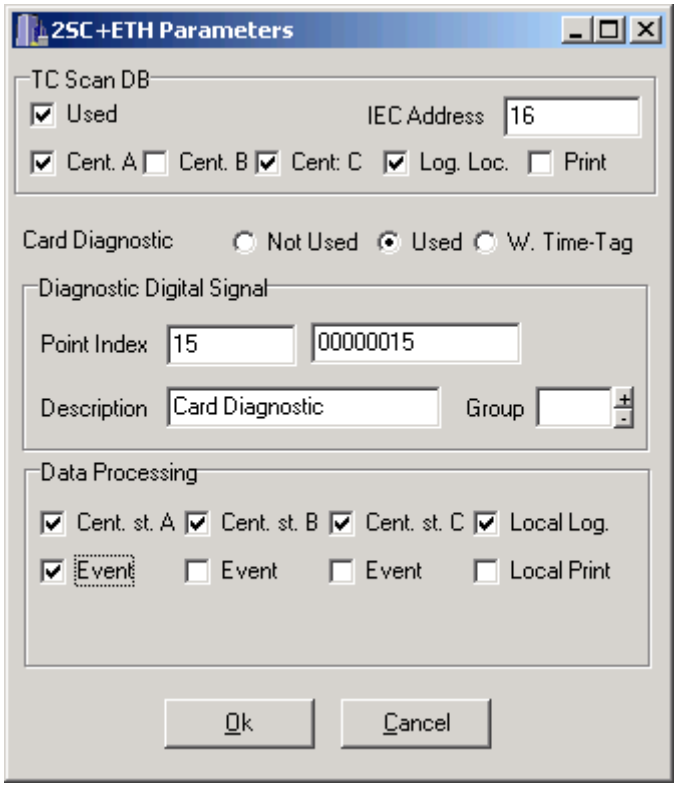

Figure 5-38 – 2SC+ETH card configuration

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2SC+ETH card configuration				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
TC Scan DB	None	Not Used	Not Used Used	It allows enabling the remote-command management that activates the data base scanning on the 2 SC+ETH group.
IEC Address	Meaningful if “TC Scan DB" = Used	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	Remote-command IEC address (Information Object Address)
Remote-command origin				
For the treatment of the quantity, refer to par. 5.7.1				
Card Diagnostic	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the card, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if “Card Diagnostic" = Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“Card Diagnostic”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-13 - 2SC+ETH card configuration

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5.5.3.11 8OAI/8DCO card configuration

The configuration of the 8OAI/8DCO mixed card provides two different sections that can be accessed by Tab Controls: the first general and related to the card hardware and the other dedicated to diagnostic.

The configured treatment is common to all the available diagnostic points.

The 8OAI/8DCO card provides up to four diagnostic Single Points: *pasted contact fault, card general alarm, A/D conversion circuit alarm* and *1/N alarm*. The treatment configured in the G*eneral* section is common to the four available diagnostic points.

The layout of the configuration form is reported in the following figure.

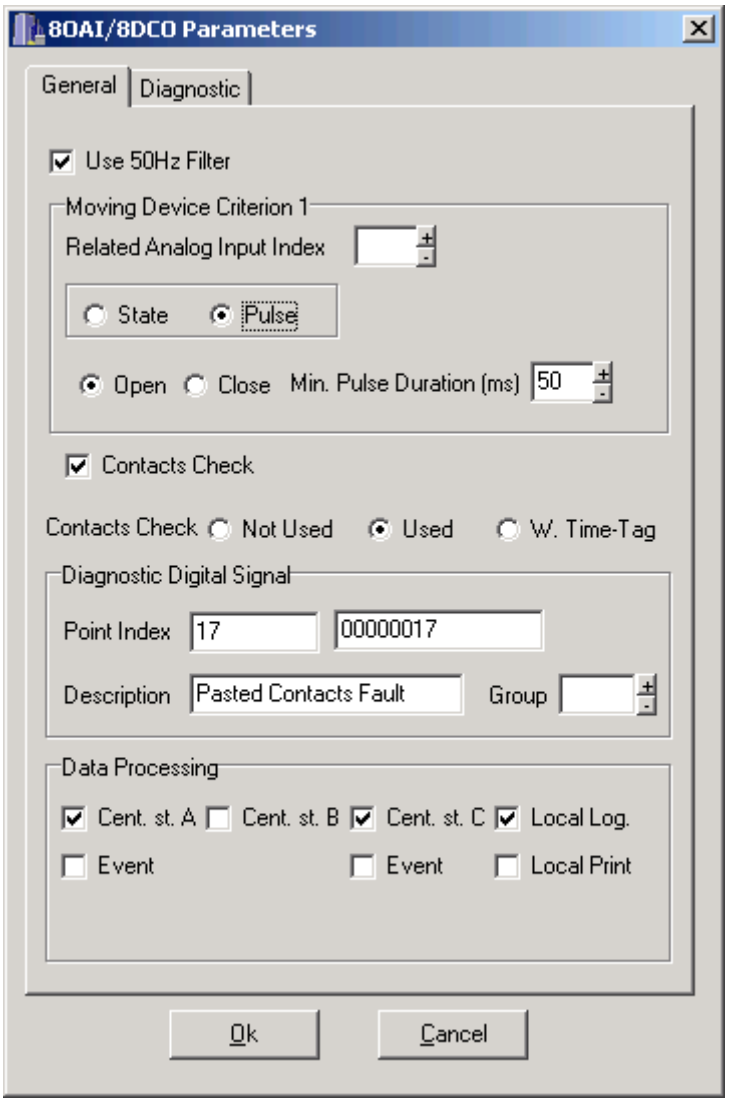

Figure 5-39 – 8OAI/8DCO card configuration - General

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8OAI/8DCO card configuration - General				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Use 50Hz Filter	None	Enabled	Enabled/Disabled	It allows to configure the filter software use on the measurements inputs. This filter is on purpose realized for filtering the disturbance induced by the net frequency at 50Hz. This filter removal makes faster the measurement acquisition but it makes particularly sensitive the input to that disturbance, so it becomes mandatory the Data Reduction value, used to reduce the measurements quantity sent to the Center.
Moving device criterion				
Related analog input index	None	Blank	1÷8 step 1 Blank=not used	It allows configuring which of the 8 analog inputs the *Moving Device Criterion 1* must be associated to. The *Moving Device Criterion* has the purpose to avoid the acquisition of transient and not meaningful values. The *Moving Device Criterion* is provided by a digital input present on the 8OAI 8DCO card and allows, associated to an analog input, to acquire an analog step quantity (for instance, the state of a Tap Changer provided in analog format) validating the state
State	Mutually exclusive with *Pulse*	Enabled	Enabled/Disabled	It allows configuring the acquisition modality of *Moving Device Criterion 1*, which is managed by the program. The *Moving Device Criterion* can be acquired as *State* or as *Pulse*
Rest state	Meaningful if *State* = Enabled	AP	AP/CH	It allows configuring, when the *Moving Device Criterion 1* is provided as STATE, the fixed state assumed by the digital input when this points out the measurement is valid
Pulse	Mutually exclusive with *State*	Disabled	Enabled/Disabled	It allows configuring the acquisition modality of the *Moving Device Criterion 1* that is managed by the program
Rest state	Meaningful if *Pulse* = Enabled	AP	AP/CH	It allows configuring, when the *Moving Device Criterion 1* is provided as PULSE, the rest state (Normally Open/Normally Closed) of the pulse itself. If the defined rest state is, for instance, Open, this means that the pulse of the Measurement validation is active when Closed
Min. Pulse duration (ms)	Meaningful if *Pulse* = Enabled	50	50÷300 step 50	If the *Moving Device Criterion* is provided as pulse, it is possible to configure the minimum duration that it must have to validate the analog quantity in input. The minimum duration must be greater than the Bumpless Filter
Contacts Check				
Contacts Check	None	Disabled	Enabled/Disabled	It allows enabling the circuit card that checks the pasted contacts on the outputs of the Remote command
Contacts check	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the pasted contacts alarm, with time tag (*W. Time-Tag*) or without (*Used*).

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8OAI/8DCO card configuration - General				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	Meaningful if “Generic fault" = Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication of the pasted contacts alarm to the centre. Issuing and clearing of this alarm are managed by the Peripheral Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“Pasted contacts fault”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-14 - Card configuration - 8OAI/8DCO - General

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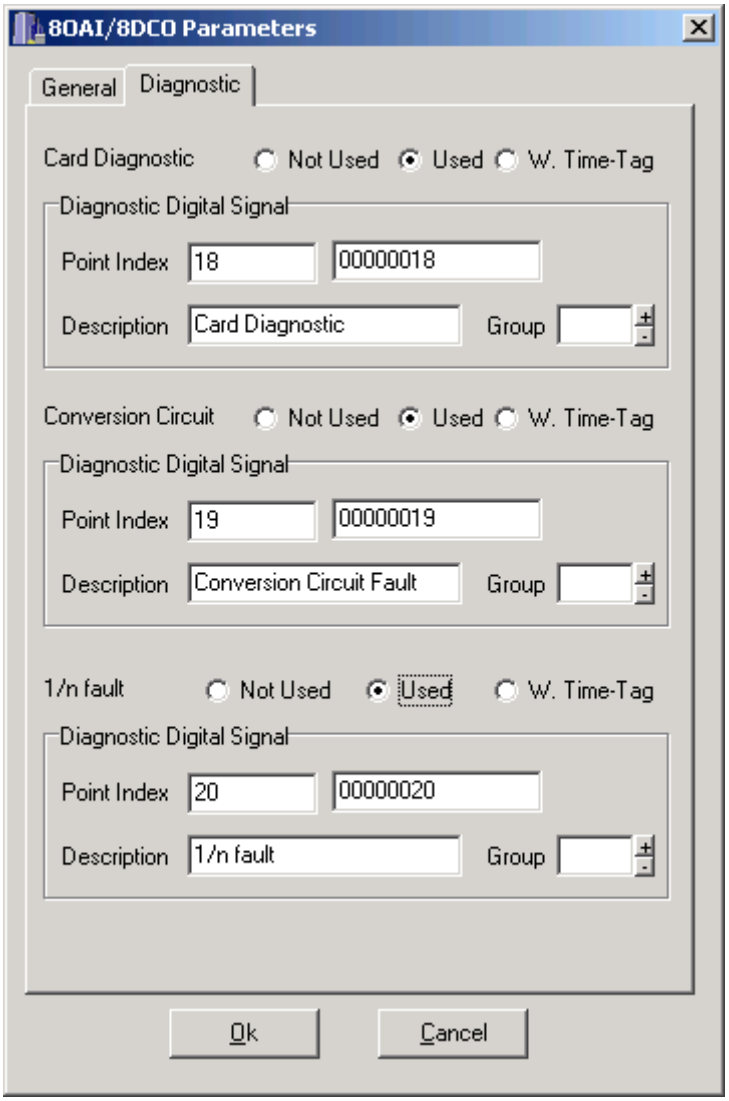

Figure 5-40 – 8OAI/8DCO card configuration - Diagnostic

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8OAI/8DCO card configuration - Diagnostic				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Card Diagnostic	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the card, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if “Generic fault" = Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“Card Diagnostic”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Conversion Circuits Fault	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the A/D conversion circuit alarm, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if “Conversion circuit failure"=Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication of the conversion circuit alarm the to the centre. Issuing and clearing of this alarm are managed by the Peripheral Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“Conversion circuit failure”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
1/N fault	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the 1/N alarm, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if “Conversion circuit failure”=Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication of the 1/N alarm to the centre. Issuing and clearing of this alarm are managed by the Peripheral Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“1/N fault”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Diagnostic digital treatment				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-15 - 8OAI/8DCO card configuration - Diagnostic

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5.5.3.12 32ODI/4OAI/10DCO card configuration

The 32ODI/4OAI/10DCO mixed card configuration requires two distinct sections that can be accessed by Tab Controls: the first general and related to the card hardware and the other dedicated to diagnostic.

The configured treatment is common to all the available diagnostic points.

The 32ODI/4OAI/10DCO card provides up to four diagnostic Single Points: *pasted contact fault, card general alarm, A/D conversion circuit alarm* and *1/N alarm*. The treatment configured in the G*eneral* section is common to the four available diagnostic points.

The layout of the configuration form is reported in the following figure.

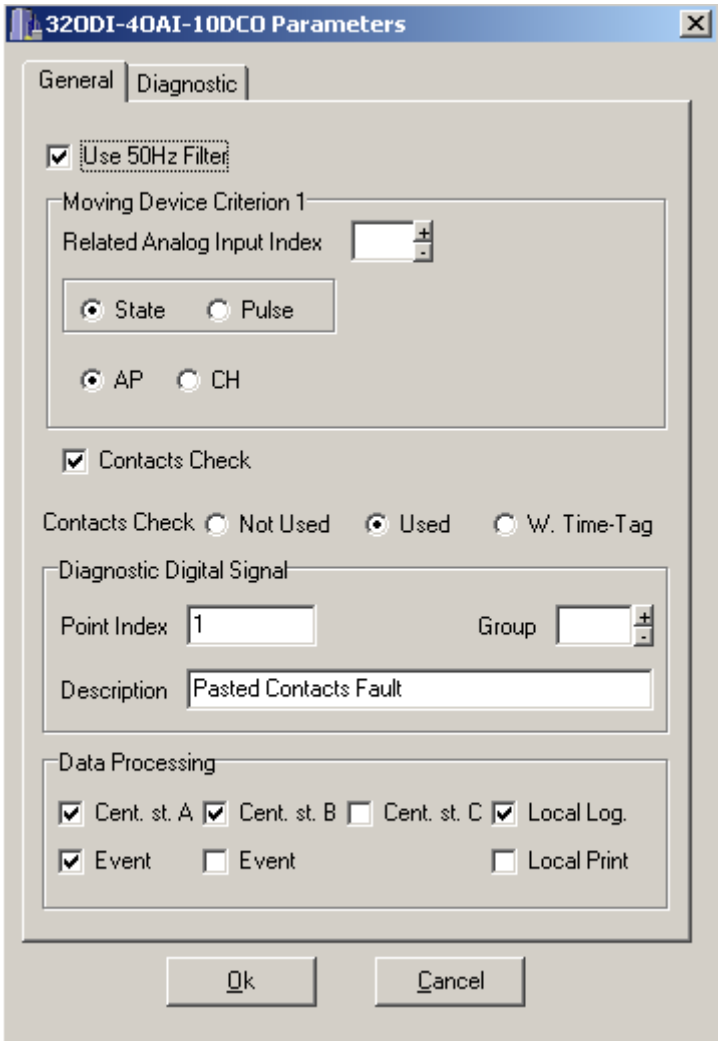

Figure 5-41 - 32ODI/4OAI/10DCO card configuration – General

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32ODI/4OAI/10DCO card configuration - General				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Use 50Hz Filter	None	Enabled	Enabled/Disabled	It allows to configure the filter software use on the measurements inputs. This filter is on purpose realized for filtering the disturbance induced by the net frequency at 50Hz. This filter removal makes faster the measurement acquisition but it makes particularly sensitive the input to that disturbance, so it becomes mandatory the Data Reduction value, used to reduce the measurements quantity sent to the Center
Moving device criterion				
Related analog input index	The two *Moving Device Criterion* can not be associated to the same analog input	Blank	1÷8 step 1 Blank=not used	It allows configuring which of the 8 analog inputs the *Moving Device Criterion 1* must be associated to. The *Moving Device Criterion* has the purpose to avoid the acquisition of transient and not meaningful values. The *Moving Device Criterion* is provided by a digital input present on the 8OAI 8DCO card and allows, associated to an analog input, to acquire an analog step quantity (for instance, the state of a Tap Changer provided in analog format) validating the state
State	Mutually exclusive with *Pulse*	Enabled	Enabled/Disabled	It allows configuring the acquisition modality of *Moving Device Criterion 1*, which is managed by the program. The *Moving Device Criterion* can be acquired as *State* or as *Pulse*
Rest state	Meaningful if *State* = Enabled	AP	AP/CH	It allows configuring, when the *Moving Device Criterion 1* is provided as STATE, the fixed state assumed by the digital input when this points out the measurement is valid
Pulse	Mutually exclusive with *State*	Disabled	Enabled/Disabled	It allows configuring the acquisition modality of the *Moving Device Criterion 1* that is managed by the program
Rest state	Meaningful if *Pulse* = Enabled	AP	AP/CH	It allows configuring, when the *Moving Device Criterion 1* is provided as PULSE, the rest state (Normally Open/Normally Closed) of the pulse itself. If the defined rest state is, for instance, Open, this means that the pulse of the Measurement validation is active when Closed
Min. Pulse duration (ms)	Meaningful if *Pulse* = Enabled	100	50÷300 step 50	If the *Moving Device Criterion* is provided as pulse, it is possible to configure the minimum duration that it must have to validate the analog quantity in input. The minimum duration must be greater than the Bumpless Filter
Contacts Check				
Contacts Check	None	Disabled	Enabled/Disabled	It allows enabling the circuit card that checks the pasted contacts on the outputs of the Remote command
Contacts check	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the pasted contacts alarm, with time tag (*W. Time-Tag*) or without (*Used*).

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32ODI/4OAI/10DCO card configuration - General				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	Meaningful if “Generic fault" = Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication of the pasted contacts alarm to the centre. Issuing and clearing of this alarm are managed by the Peripheral Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“Pasted contacts fault”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-16 - 32ODI/4OAI/10DCO card configuration – General

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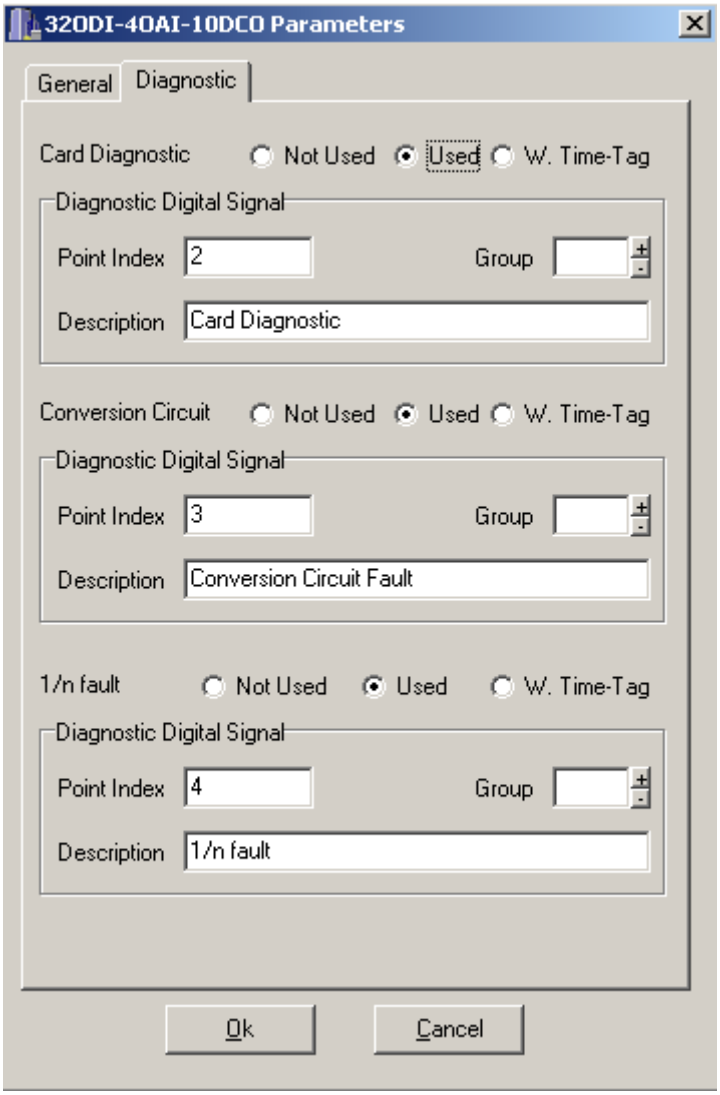

Figure 5-42 - 32ODI/4OAI/10DCO card configuration – Diagnostic

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32ODI/4OAI/10DCO card configuration - Diagnostic				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Card Diagnostic	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the card, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if “Generic fault" = Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“Generic fault”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Conversion Circuits	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the A/D conversion circuit alarm, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if “Conversion circuit failure"=Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication of the conversion circuit alarm the to the centre. Issuing and clearing of this alarm are managed by the Peripheral Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“Conversion circuit failure”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
1/N fault	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the 1/N alarm, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if “Conversion circuit failure”=Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication of the 1/N alarm to the centre. Issuing and clearing of this alarm are managed by the Peripheral Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“1/N fault”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment

Table 5-17 – 32ODI/4OAI/10DCO card configuration - Diagnostic

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5.5.3.13 2x16DCC card configuration

The 2x16 Direct Continuous Command card configuration required the configuration only of the two diagnostic digitals associated to it.

This card allows the contemporary execution of more commands, so it is used especially in presence of automations and, obviously, when the continuous commands execution is required.

Altogether the 2x16DCC card has two diagnostic Single Point: *pasted contact fault* and *card general alarm.*

The treatment configured in the G*eneral* section is common to the four available diagnostic points.

The layout of the configuration form is reported in the following figure.

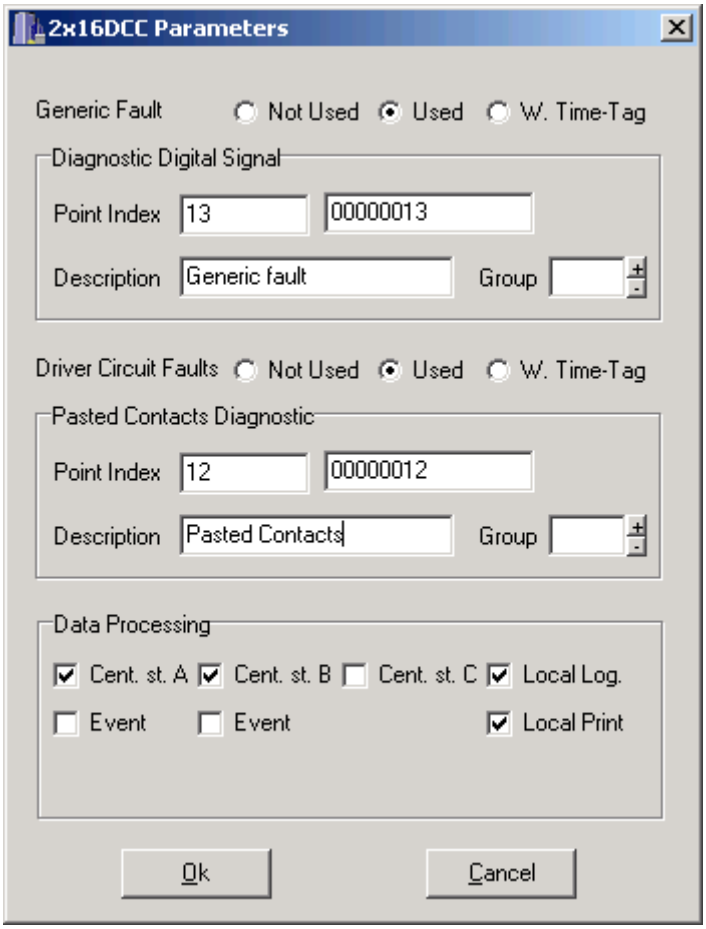

Figure 5-43 – 2x16DCC card configuration

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2x16DCC card configuration				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Generic fault	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the card, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if “Generic fault" = Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“Generic fault”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Driver Circuits Fault	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the diagnostic digital management associated to the control on the output contacts pilotage circuit, with time tag (*W. Time-Tag*) or without (*Used)*
Point Index	Meaningful if “Conversion circuit failure"=Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication of the conversion circuit alarm the to the centre. Issuing and clearing of this alarm are managed by the Peripheral Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“Pasted Contacts”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-18 - 2x16DCC card configuration

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5.5.3.14 CPU2000 card configuration

The CPU2000 card configuration required the configuration of several distinct sections that can be accessed by Tab Controls:

- a general one, related to the Central Unit (CPU2000) Master/Slave State
- one related to Service Unit and GPS Receiver anomaly state
- one related to Local Print anomaly state
- one related to Power Supply anomaly state
- three related to diagnostic information to send to the possible Centers
- one related to Automations state
- four related to the spoiled groups summary

The treatment configured in the Ge*neral* section is common to the four available diagnostic points.

The layout of the configuration form is reported in the following figure.

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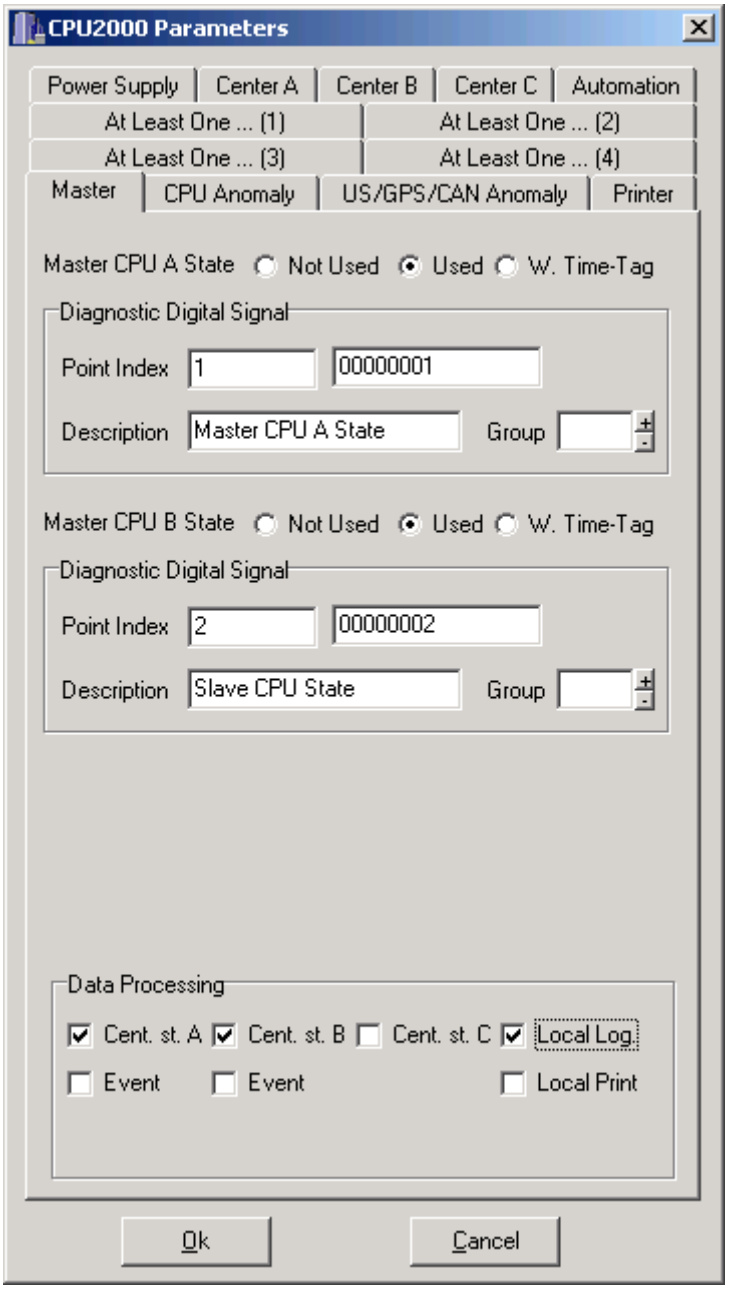

Figure 5-44 – CPU2000 card configuration – Master

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CPU2000 card configuration - Master				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Master CPU A State	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the Central Unit in position A,, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"Master CPU A State"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Master CPU B State	Field present only if the *CPU Redundancy* field is configured in *General*	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the Central Unit in position B,, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication of the conversion circuit alarm the to the centre. Issuing and clearing of this alarm are managed by the Peripheral Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"Slave CPU State"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-19 - CPU2000 card configuration – Master

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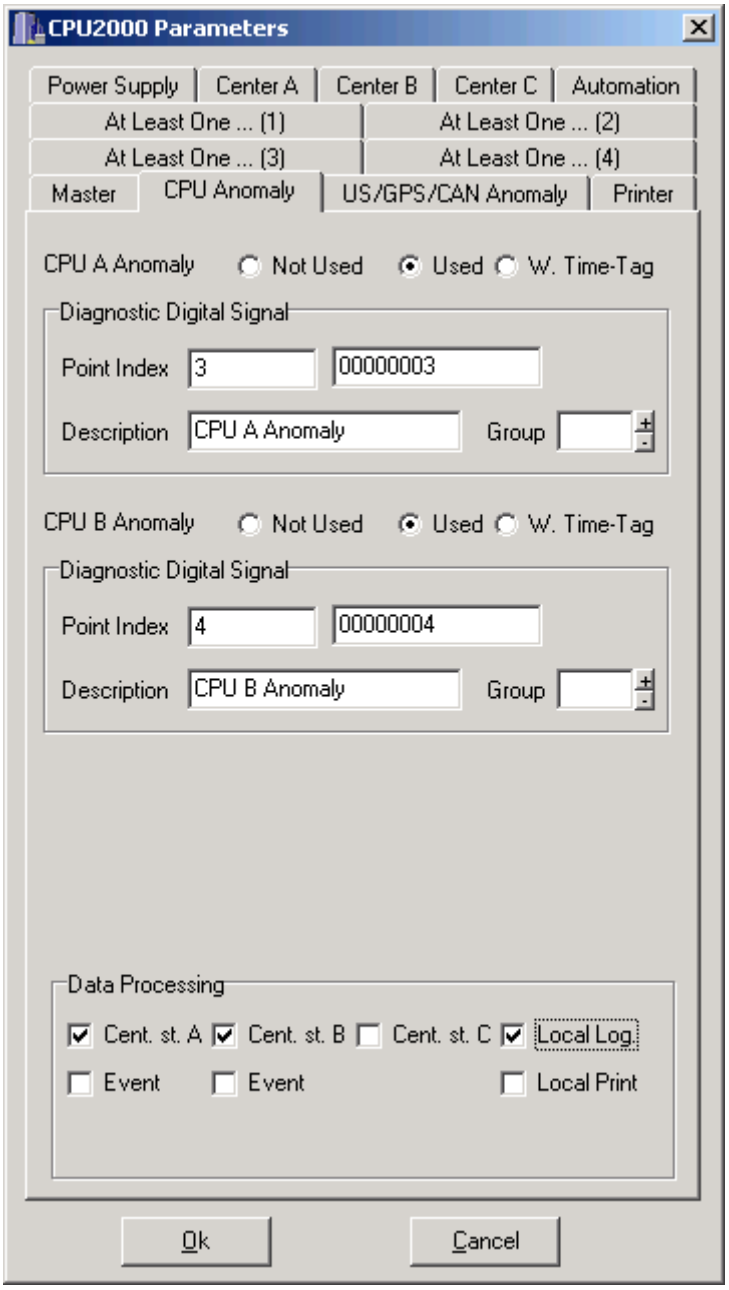

Figure 5-45 - CPU2000 card configuration – CPU Anomaly

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CPU2000 card configuration – CPU Anomaly				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
CPU A Anomaly	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the Central Unit in position A,, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"CPU A Anomaly"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
CPU B Anomaly	Field present only if the *CPU Redundancy* field is configured in *General*	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the Central Unit in position B,, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication of the conversion circuit alarm the to the centre. Issuing and clearing of this alarm are managed by the Peripheral Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"CPU B Anomaly"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-20 - CPU2000 card configuration – CPU Anomaly

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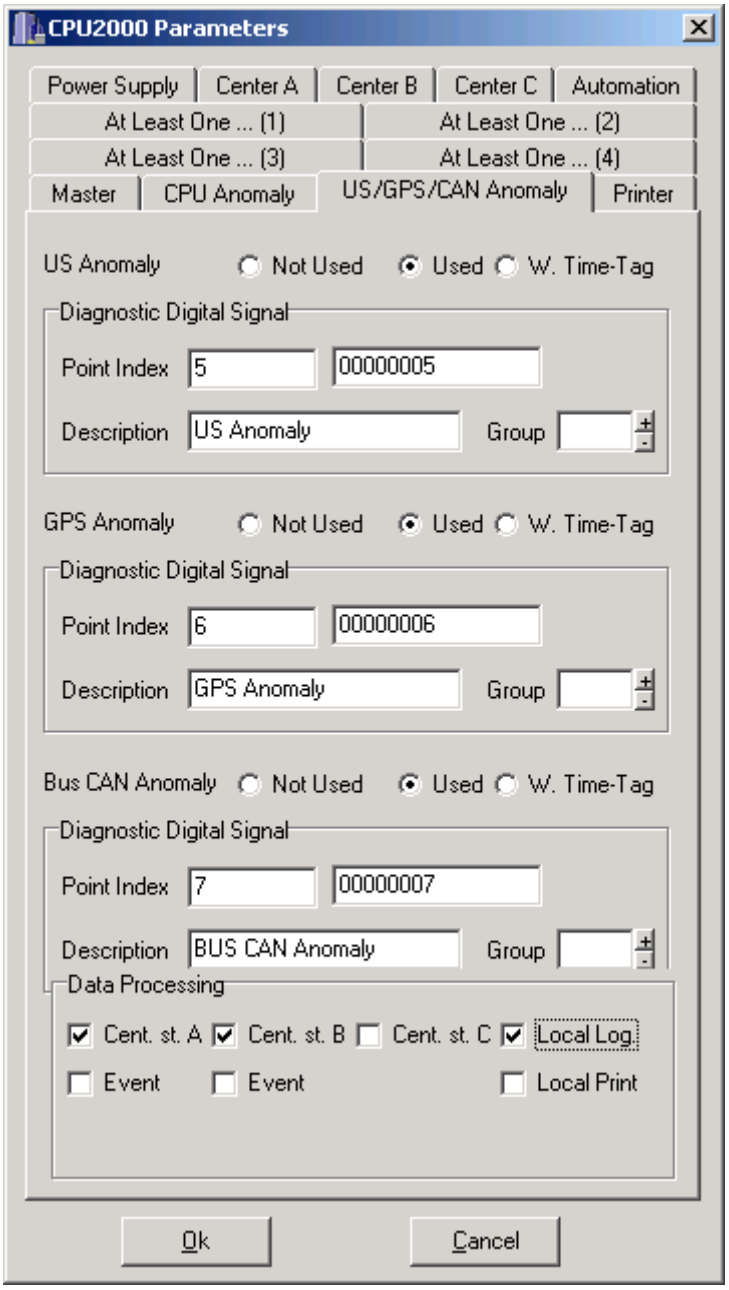

Figure 5-46 - CPU2000 card configuration – US/GPS/CAN Anomaly

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CPU2000 card configuration – US/GPS/CAN Anomaly				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
US Anomaly	Field present only if the *GPS Based option* is configured in *General*	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the Service Unit,, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"US Anomaly"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
GPS Anomaly	Field present only if the *GPS Based or the Distributed GPS* option is configured in the *Time Synchronization* field in *General*	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the GPS Receiver, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"GPS Anomaly"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Bus CAN Anomaly	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the bus CAN, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"Bus CAN Anomaly"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment

Data Processing
For the treatment of the quantity, refer to par. 5.6.1

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Table 5-21 - CPU2000 card configuration – US/GPS/CAN Anomaly

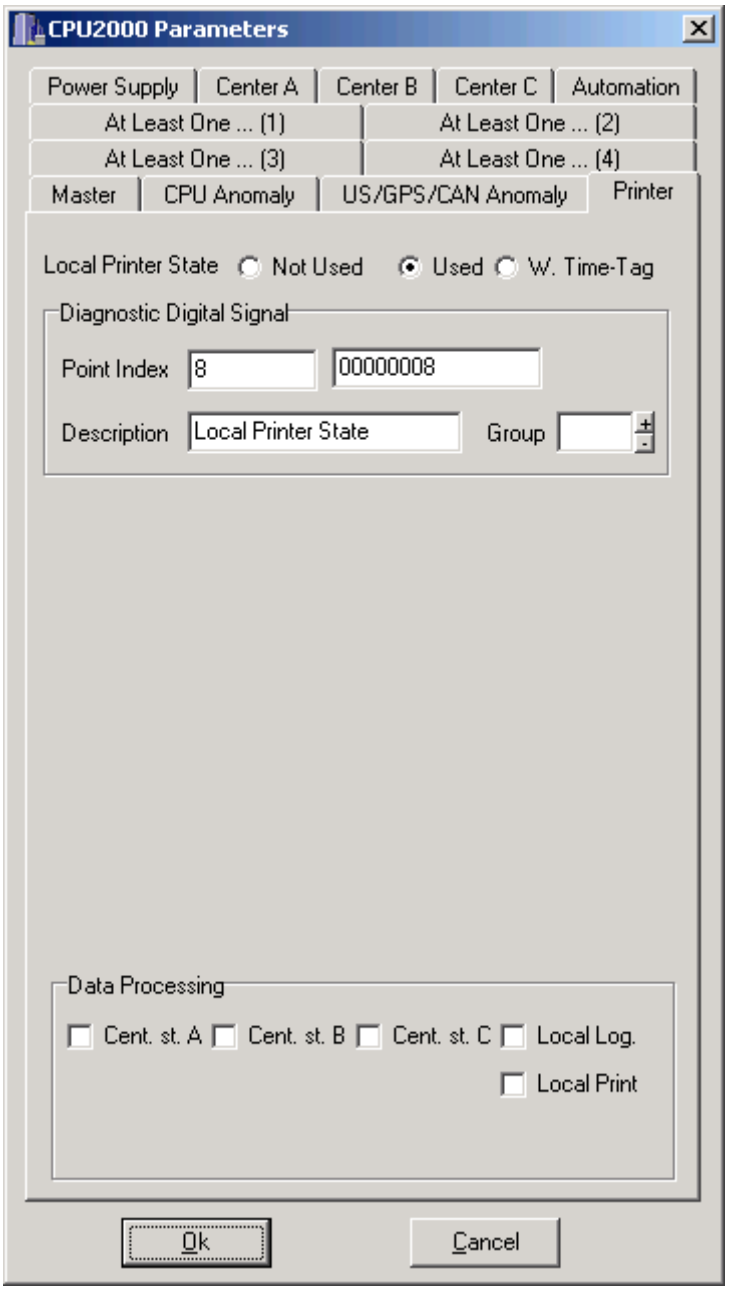

Figure 5-47 – CPU2000 card configuration – Printer

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CPU2000 card configuration – Printer				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Local printer state	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the Local Printer, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"Local printer state"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-22 - CPU2000 card configuration – Printer

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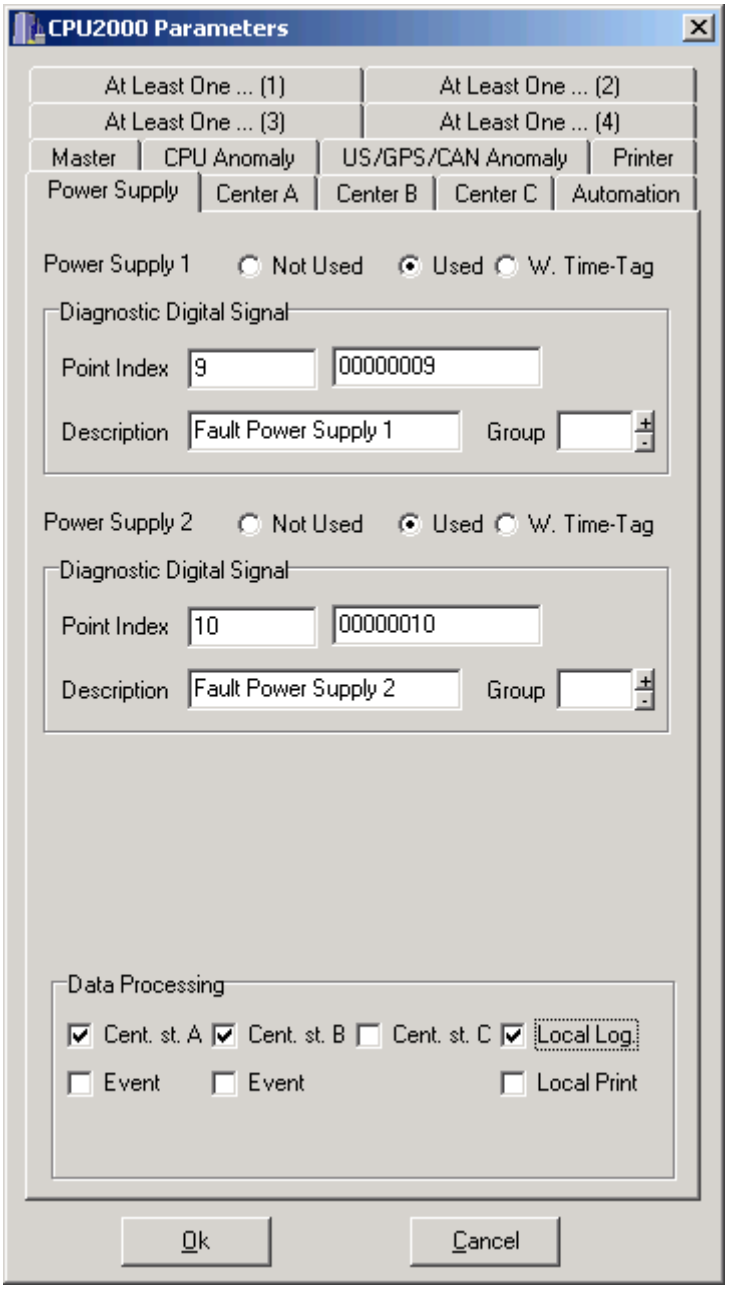

Figure 5-48 – CPU2000 card configuration – Power Supply

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CPU2000 card configuration – Power Supply				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Power Supply 1	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the Power Supply, position 1, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"Fault Power Supply 1"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Power Supply 2	This field is present only if the *Power Supply Redundancy* field is configured in *General*	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the Power Supply, position 2, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"Fault Power Supply 2"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-23 - CPU2000 card configuration – Power Supply

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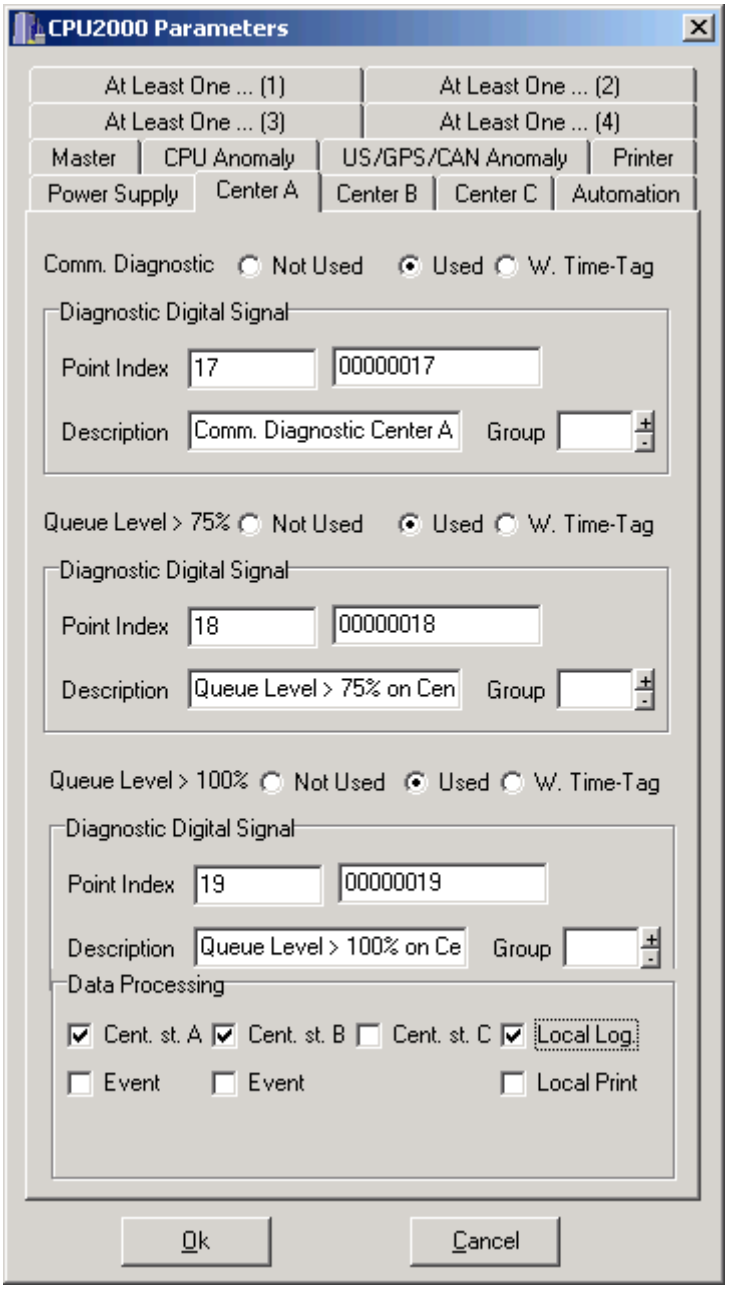

Figure 5-49 - CPU2000 card configuration – Center A

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CPU2000 card configuration – Center A/B/C				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Comm. Diagnostic	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the communication, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"Comm. Diagnostic Center A"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Queue Level > 75%	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to a buffer Events filling superior to the 75% of its capacity, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"Queue Level > 75% on Center A"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Queue Level > 100%	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to a buffer Events filling superior to the 100% of its capacity, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"Queue Level > 100% on Center A"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-24 - CPU2000 card configuration – Center A/B/C

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What above described related to the diagnostic toward the Center A, it is also valid for the Center B and for the Center C.

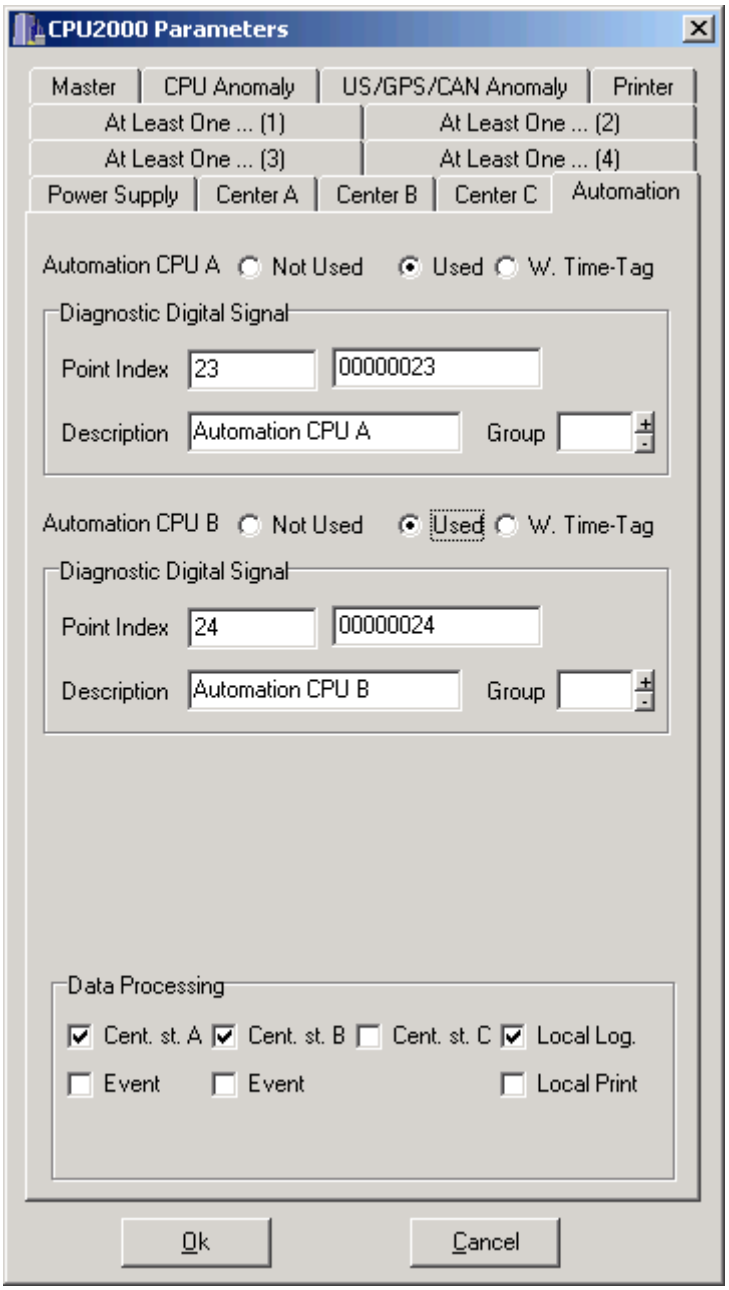

Figure 5-50 – CPU2000 card configuration – Automation

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CPU2000 card configuration – Automation				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Automation CPU A	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the automation presence on the Central Unit in position A,, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"Automation CPU A"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Automation CPU B	Field present only if the *Power supply Redundancy* field is configured in *General*	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital associated to the automation presence on the Central Unit in position B,, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication of the conversion circuit alarm the to the centre. Issuing and clearing of this alarm are managed by the Centrall Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	« Automation CPU B »	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-25 – CPU2000 card configuration - Automation

The following forms, as At Least One… (n), allow the configuration of digital points summarizing the alarms for Unit typology. For instance the digital point 64ODI Anomaly is set in the active state by the CPU2000 when at least a group of 64ODI type is in alarm, i.e. it represents the alarms OR of the 64ODI groups type.

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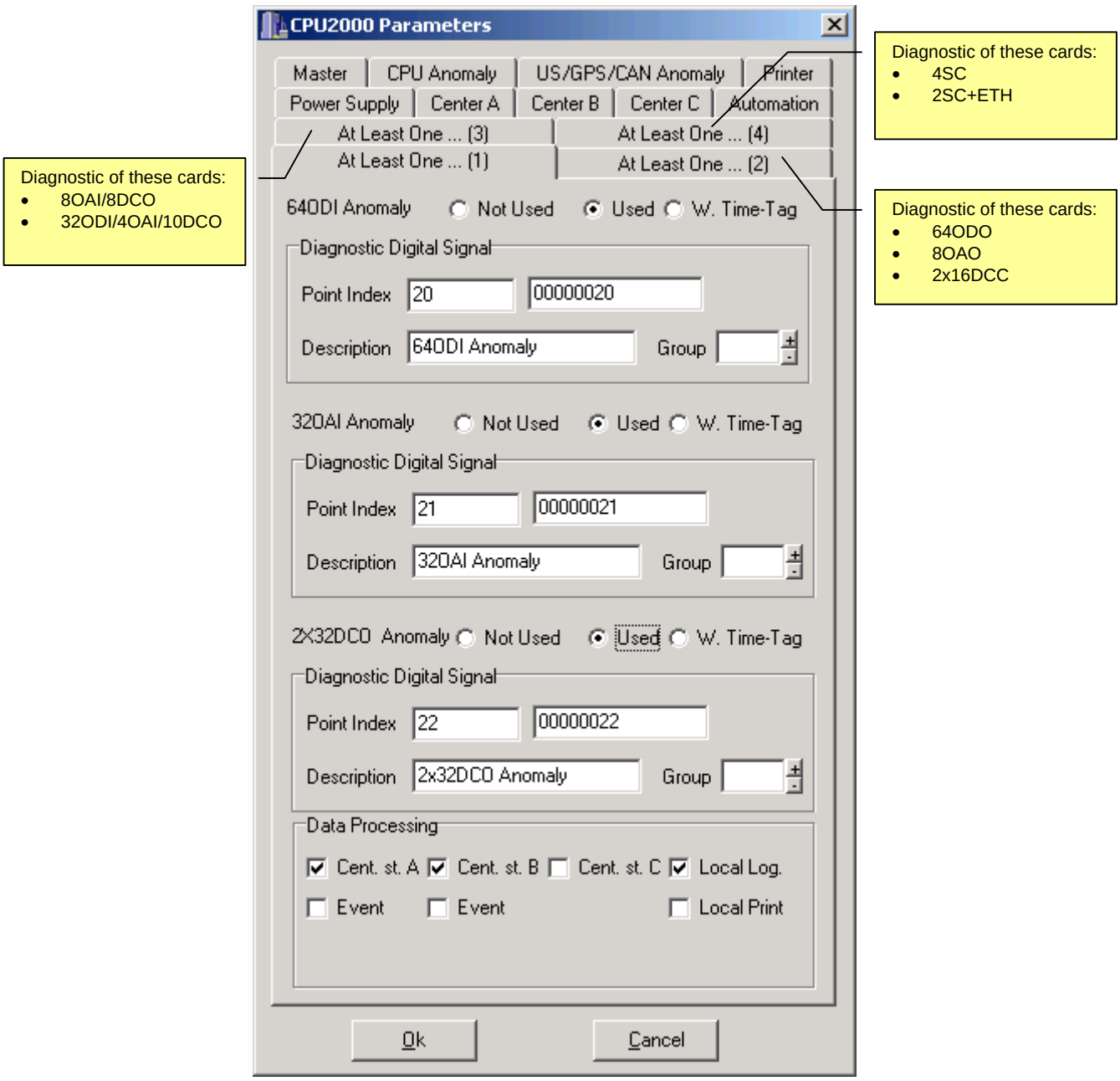

Figure 5-51 – CPU2000 card configuration – Alarms summary

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CPU2000 card configuration – Alarms Summary 1-2-3-4				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Alarm Summary 1				
64ODI Anomaly	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital summarizing 64ODI groups, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“64ODI Anomaly”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
32OAI Anomaly	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital summarizing 32OAI groups, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“32OAI Anomaly”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
2x32DCO Anomaly	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital summarizing 2x32DCO groups, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“2x32DCO Anomaly”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

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CPU2000 card configuration – Alarms Summary 1-2-3-4				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Alarm Summary 2				
64ODO Anomaly	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital summarizing 64ODO groups, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“64ODO Anomaly”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
8OAO Anomaly	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital summarizing 8OAO groups, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“8OAO Anomaly”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
16DCC Anomaly	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital summarizing 2x16DCC groups, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	“16DCC Anomaly”	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

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CPU2000 card configuration – Alarms Summary 1-2-3-4				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Alarm Summary 3				
8OAI/8DCO Anomaly	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital summarizing 8OAI/8DCO groups, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"8OAI/8DCO Anomaly"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
32ODI/4OAI/10DCO Anomaly	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital summarizing 32ODI/4OAI/10DCO groups, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"32ODI/4OAI/10DCO Anomaly"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				
Alarm Summary 4				
4SC Anomaly	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digital summarizing 4SC groups, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"4SC Anomaly"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
2SC+ETH Anomaly	None	Not Used	Not Used Used	It allows enabling the management of the diagnostic digital summarizing 2SC+ETH

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CPU2000 card configuration – Alarms Summary 1-2-3-4				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
			W. Time-Tag	groups, with time tag (*W. Time-Tag*) or without (*Used*).
Point Index	Meaningful if the Digital use is configured	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the card diagnostic centre. Issuing and clearing of this alarm are managed by the Central Unit
Group	None	Blank	1÷16 step 1 Blank	Index of the *IEC Group* where the point can be inserted. The use of this index allows the Center to get the sets of points by means of the *Group Request*
Description	None	"2SC+ETH Anomaly"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. *Description* field is not transferred to the STCE/RTU equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-26 – CPU2000 card configuration – Alarms Summary

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5.5.4 Communications

To reach this option, choose the *Configure* item of the main menu and then *Communication*.

This functionality allows to configure or to modify a set of communication parameters of the STCE/RTU equipment. In particular, it is possible to configure the instance of different line and field protocols managed by the equipment.

The configuration of the communication parameters can be made only by a privileged user.

The configuration of the communication functionalities of STCE/RTU equipment must be made considering the available physical ports, displayed in the following table:

Port (logic name)	Location		Interface type
Serial A	CPU2000 Central Unit (Connector A)		RS232 not insulated
Serial B	CPU2000 Central Unit (Connector B)		RS232 not insulated
Ethernet	CPU2000 Central Sub-unit (Connector ETH)		IEEE 802.3 10BT – RJ45
COM1	4SC card or 2SC+ETH card	Generic slot	RS232 insulated RS422 insulated RS485 insulated
COM2			
COM3	4SC card		
COM4			
ETH	2SC+ETH card	Generic slot	IEEE 802.3 10BT – RJ45

It is necessary to specify that, while *line protocols* can be associated to the *Serial A*, *Serial B* and *Ethernet* ports (for the communication to one or more Supervision Centre), the *field protocols* can be associated to *COM1*, *COM2*, *COM3* and *COM4* ports (for the communication with field equipments or remote equipments, towards which the STCE equipment operates as hub or gateway).

The editing window for the insertion of the communication parameters is subdivided in four different sections that can be accessed by Tab Controls:

- TCP/IP Ports
- Protocols
- Services
- Local IP Addresses UC1
- Local IP Addresses UC2

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5.5.4.1 TCP/IP Ports

The “TCP/IP ports” form allows displaying the numbers of the ports assigned to the different services of the STCE/RTU equipment.

The form layout, read only because the numbers of the ports associated to the different services are automatically assigned by the program, is reported in the following figure.

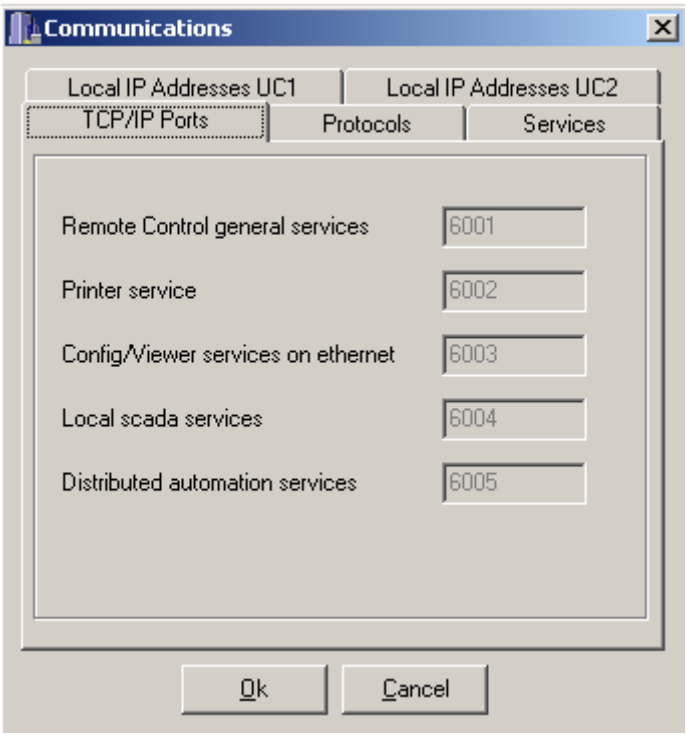

Figure 5-52 - TCP/IP Ports displaying

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5.5.4.2 Protocols

The “Protocols” form allows adding the protocols to be used on the equipment taking from the following list of available protocols:

- **IEC 60870-5-101 Slave** (on CPU2000 card)
- **IEC 60870-5-104 Slave** (on CPU2000 card)
- **IEC 60870-5-104 Slave su GPRS** (on CPU2000card)
- **IEC 60870-5-101 Master** (on 4SC-101 card and 2SC+ETH card)
- **Selta SAMP Master** (on 4SC-SAMP card)
- **Selta SAMP Slave** (on 4SC-SAMP card)
- **Selta SASP Master** (on 4SC-SAMP card)
- **Selta SASP Slave** (on 4SC-SAMP card)
- **Rekron** (on 4SC-Rekron card)
- **Modbus DCS Master** (on 4SC-Modbus DCS card)
- **Modbus DCS Master** (on 4SC-Modbus DCS Dual card)
- **Modbus Master** (on 4SC-Modbus STD card)
- **Modbus Slave** (on 4SC-Modbus STD card)
- **IEC 60870-5-101 Master PSTN** (on 4SC-101 card 2SC+ETH card)
- **IEC 60870-5-104 Master** (on 2SC-ETH card)
- **IEC 60870-5-103 Master** (on 4SC-103 card)

The main editing window, which allows adding in configuration the communication protocols, is reported in the following window.

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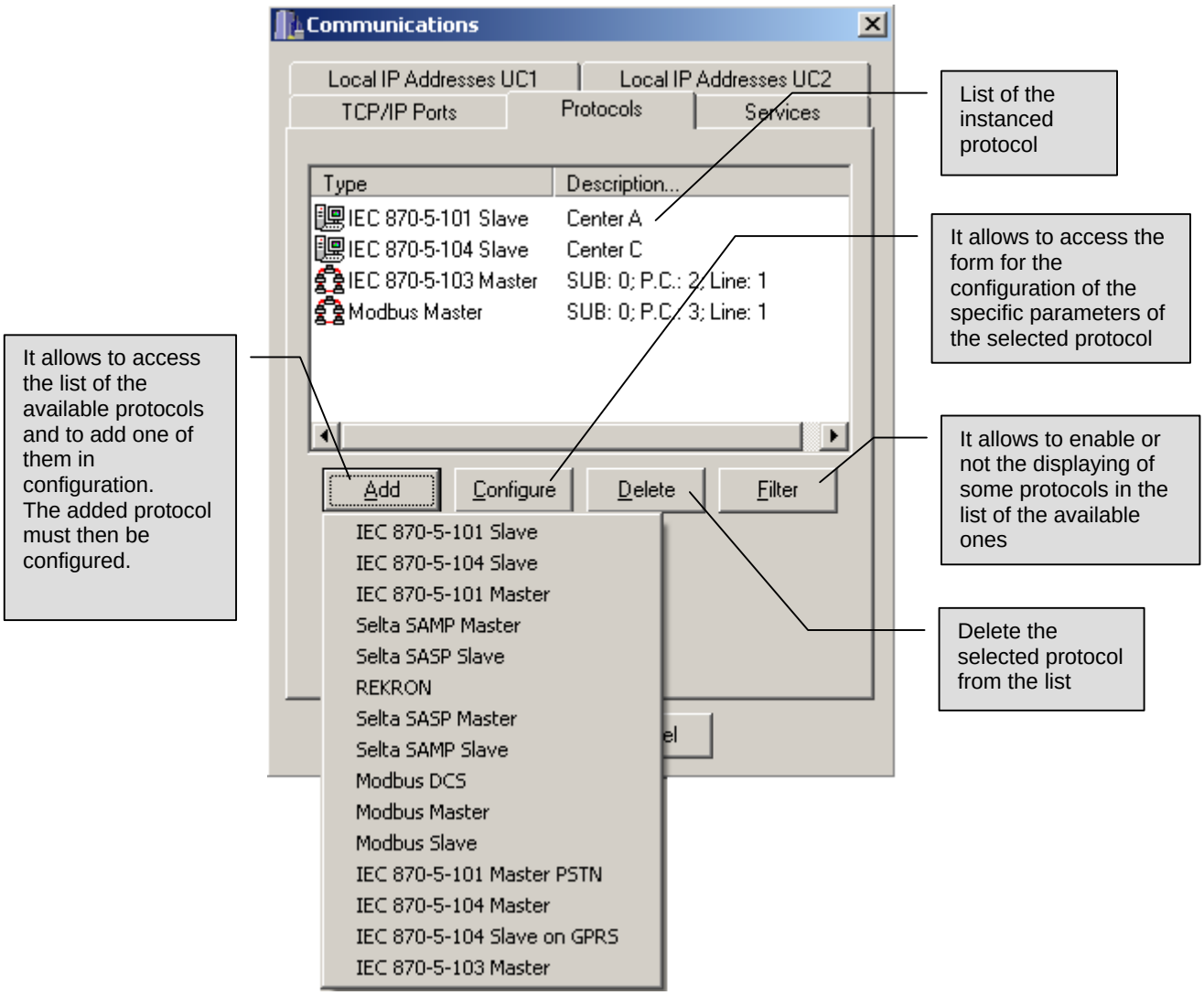

Figure 5-53 – Protocols configuration

For each added protocol, the program allows configuring the specific operating parameters, included, in case of line protocol, the Center (Center A, Center B or Center C) which the protocols allows the communication to.

To access the different editing window for the configuration of the specific parameters of one protocol, it is necessary to select this one ("click" on it with the left button of the mouse) and then press the *Plant* button.

The following paragraphs show the detailed configuration for each protocol that can be instanced on STCE/RTU equipment.

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5.5.4.2.1 Specific parameters of IEC 60870-5-101 Slave protocol

The *IEC60870*-5-101 Slave protocol is a *line protocol*, used for the communication to a Supervision Center (remote or local) by means of a *dedicated line* (leased line).

This protocol can be instanced on the Serial A port or on the Serial B port of the CPU2000 Central Unit.

The globally configurable parameters for the protocols are subdivided in three typologies:

- parameters of the communication serial port
- parameters typical of the *IEC60870*-5-101 protocol
- parameters for the use of the connected Modem (DCE)

Each typology for parameters can be accessed from a single editing window reported in the following figure, by the proper Tab controls.

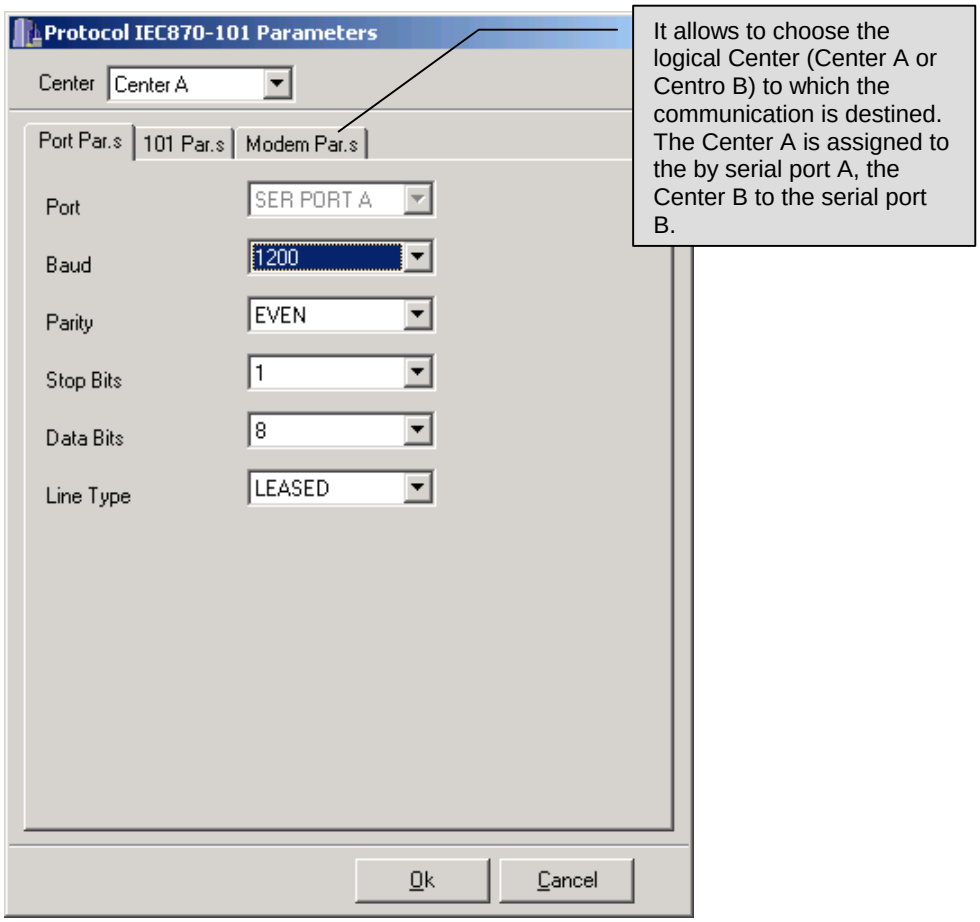

Figure 5-54 – Parameters of IEC60870-5-101 protocol – Port Par.s

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IEC60870-5-101 protocol – Serial port parameters				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Port	The *IEC60870*-5-101 Slave protocol can be instanced only on serial A and B ports available in CPU2000 card	SER PORT A If Center A SER PORT B If Center B	SER PORT A If Center A SER PORT B If Center B	Read only field, it displays the indication of the physical serial port, which the logic Center is associated to. Center A is associated to port A and Center B to port B.
Baud	None	1200	• 50 • 100 • 110 • 150 • 200 • 300 • 400 • 600 • 1200 • 2400 • 4800 • 9600 • 19200	Line transmission rate expressed in bit/s
Parity	None	EVEN	NONE EVEN ODD	It allows to define the type of use of the Parity bit
Stop Bits	None	1	1, 2	It allows to define the number of the Stop bits to insert at the end of the character
Data Bits	None	8	8	Read only field, it displays the number of Data bits
Line Type	None	LEASED	LEASED	Read only field, it displays the type of line used. The Standard STCE/RTU equipment manages only dedicated lines
Line Type	None	LEASED	LEASED PSTN	**The use of the switched line (PSTN) is applicable only with relative CPU2000 Fw.** It allows to configure the connection type that the STCE/RTU equipment can establish with the Center: on Devoted line or on PSTN/GSM Switched Network . The PSTN line type selection enables the further Tab Control PSTN Par.s that allows to configure the specific switched network operation parameters.

Table 5-27 – IEC60870-5-101 protocols – parameters of the serial port

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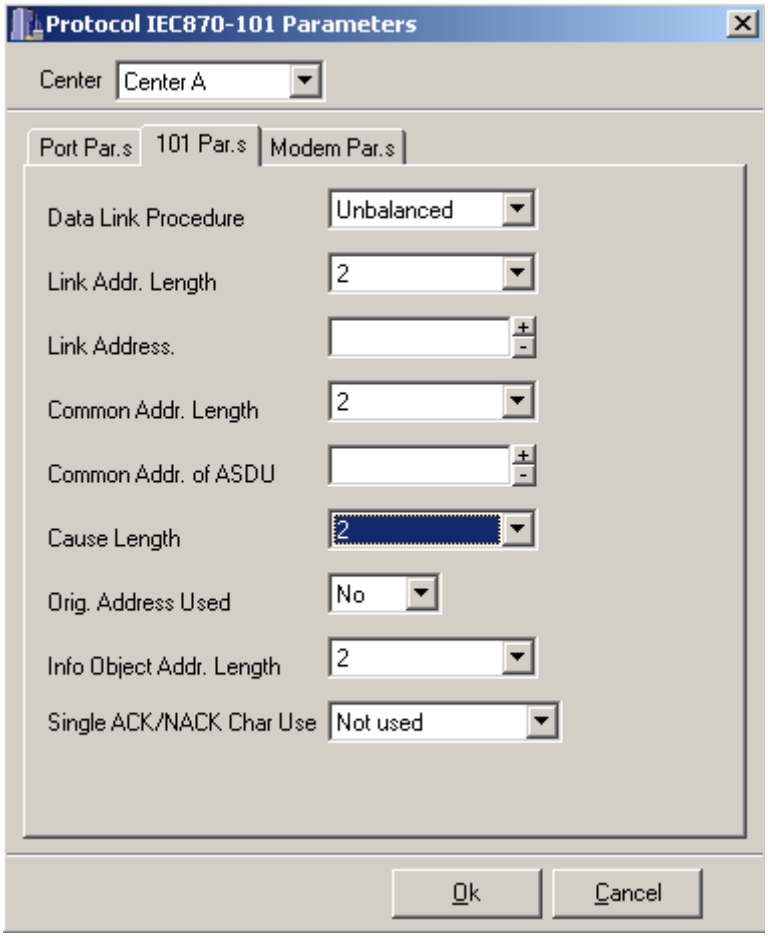

Figure 5-55 – IEC60870-5-101 protocol parameters – 101 Par.s

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IEC60870-5-101 protocol – Specific parameters				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Data Link Procedure	None	UNBALANCED	UNBALANCED BALANCED	It allows configuring the used Data Link procedure. *The balanced procedure can be used only in presence of a connection by dedicated and of point-to-point type line*
Link Addr. Lenght	None	2	0, 1, 2	Length of the Data Link address expressed in number of Byte. The 0 value can be used only with Balanced operation modality.
Link Address	It depends on the numbers of octets of the Link Address	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the equipment (Station IEC address). The Link Address can be omitted if the communication modality is of *Balanced type.* The field is mandatory.
Common Addr. Lenght	None	2	1, 2	It allows to define the Common Address length, expressed in number of Bytes
Common Addr. Of ASDU	Range depends on the defined lenght	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of ASDU. **It normally is set equal to Link Address.** The field is mandatory.
Cause Lenght	None	1	1, 2	It allows to define the Cause of Transmission field length expressed in number Bytes
Orig. Address Used	Enabled only if *Cause Length*=2	No	No/Yes	It allows to define if '*Originator Address* is used. If it isn't used, the Cause of Transmission second byte is fixed to 0
Info Object Addr. Length	None	2	1, 2, 3	It allows to define the Object Addr. Length field length in number Bytes
Single ACK/NACK Char Use	None	Not used	Not used As ACK As ACK and 'No data'	It allows to define the single answer character use.

Table 5-28 – IEC60870-5-101 protocol – specific parameters

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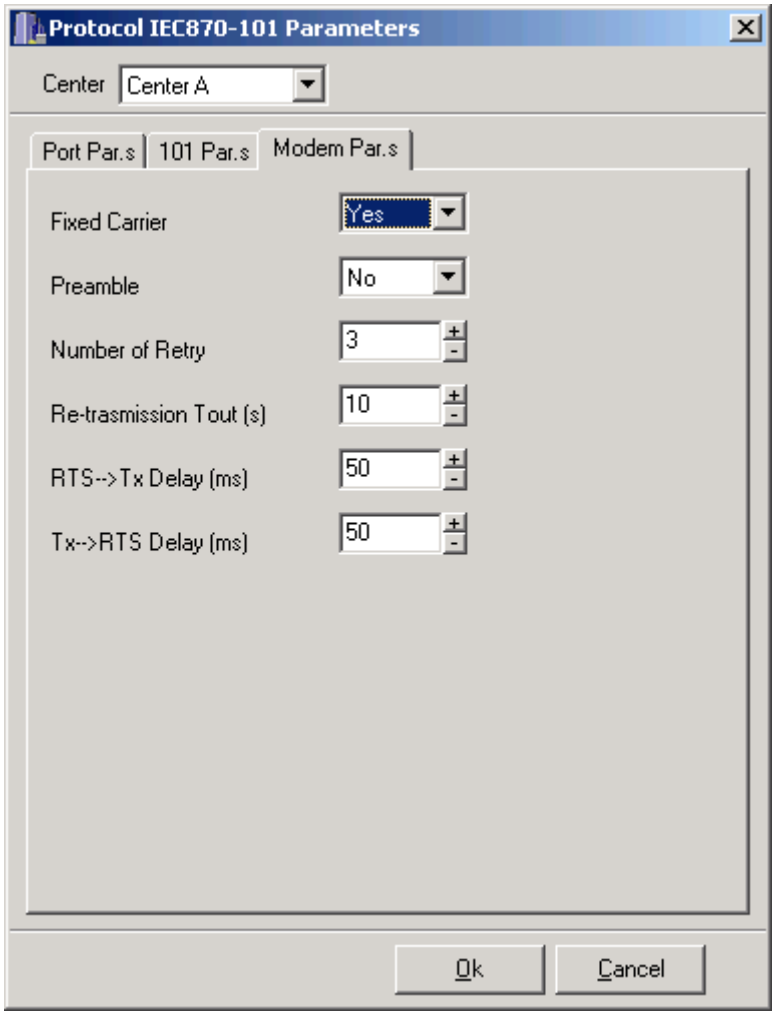

Figure 5-56 - Parameters of IEC60870-5-101 protocol – Modem Par.s

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IEC60870-5-101 protocol – Modem parameters				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Fixed Carrier	None	Disabled	Enabled/Disabled	It allows choosing between the operating modality with commanded carrier or fixed carrier. The user must configure the “commanded carrier” modality in the following cases: • point-to-point connection with 2-wiresline • point-multipoint connection
Preamble	None	Disabled	Enabled/Disabled	It allows to enable the preamble insertion at the beginning of each transmission
Number of Retry	None	3	1÷10 step 1	It allows to configure the maximum number of re-transmissions to be made in case of failed transmission
Re-transmission Tout (s)	None	10	10÷100 step 10	It allows to configure the waiting period before executing the re-transmission
RTS→Tx Delay (ms)	None	50	50÷500 step 50	It sets the maximum waiting period, in ms, between the activation of the RTS criterion and the transmission of the first byte in line
Tx→RTS Delay (ms)	None	50	50÷500 step 50	It sets the maximum waiting period, in ms, between the transmission of the last byte in line and the deactivation of the RTS criterion

Table 5-29 – IEC60870-5-101 protocol – Modem parameters

If a PSTN type line has been selected, in the IEC60870-5-101 Slave Protocol configuration form a further Tab Control (PSTN Par.s) appears: it allows to configure specific further operation parameters for the switched network.

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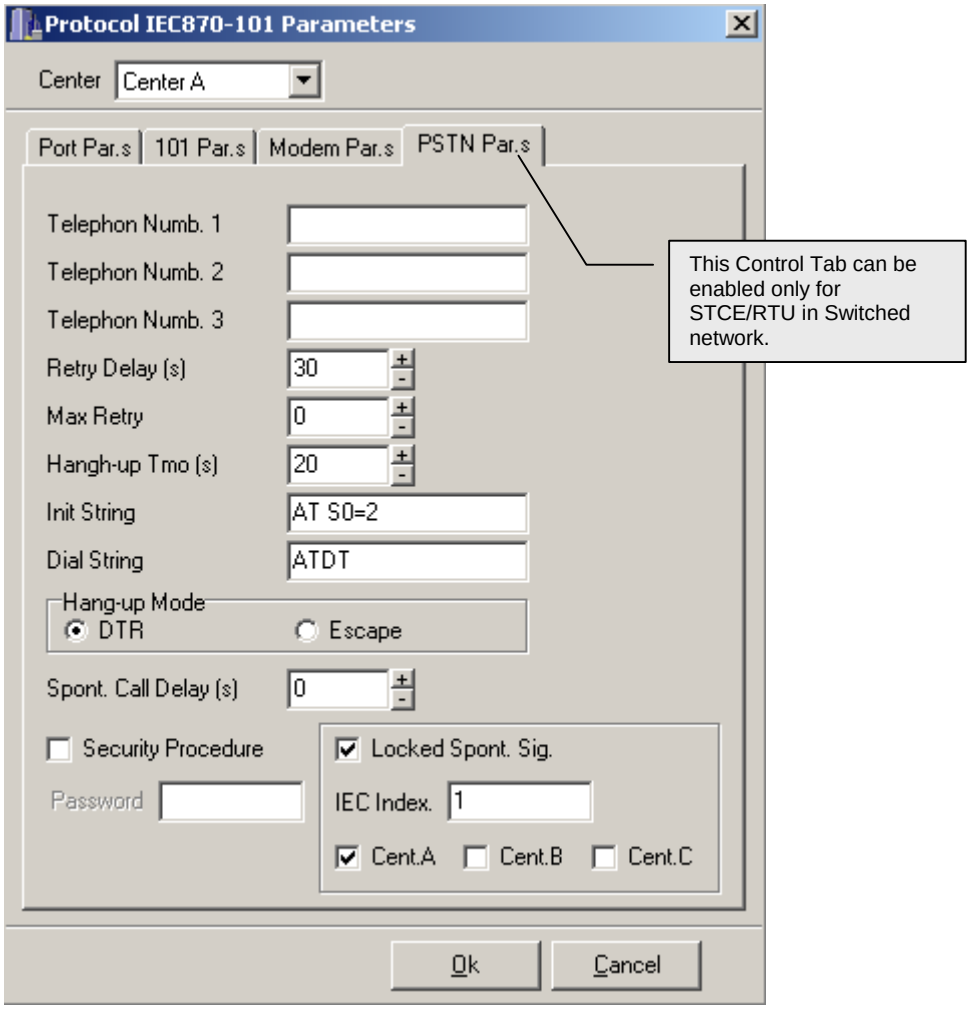

Figure 5-57 – IEC60870-5-101 protocol parameters – PSTN Par.s

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IEC60870-5-101 protocol – PSTN parameters				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Telephone Numb. 1	None	Blank	Telephone number Max. 20 digits	It allows to define the first of the three telephone number of the Center. The equipment software uses, for the spontaneous calls to the centre, the phone numbers of the list, giving maximum priority to the first number. If the call toward the centre using the first number breaks down and there are no more possible retries, the equipment uses the second number of the list and eventually, in case of another failure, goes to the third one. This field is mandatory.
Telephone Numb. 2	None	Blank	Telephone number Max. 20 digits	It allows to define the second of the three telephone number of the Center.
Telephone Numb. 3	None	Blank	Telephone number Max. 20 digits	It allows to define the last of the three telephone number of the Center.
Retry Delay (s)	None	30	10÷255 step 1	It allows to define the timeout between a spontaneous call not reached destination and the following retry. This field is meaningful only if spontaneous events classifications are present inside the configuration.
Max Retry	None	Blank	Blank 1÷255 step 1	Maximum number of spontaneous retries: it allows to define the number of possible retries in case of call not reached destination. Reached such limit, the peripheral place is set in the state of "spontaneous block." By introducing the Blank value, the peripheral place will retry calls for endless times, never entering, therefore, in the state of "spontaneous block".
Hang-up Tmo (s)	None	20	10÷120 step 1	Timeout forced line hung-up: it allows to define the time after which, in case of missed receipt of a valid message, a forced hung-up of the switched line must be caused.
Init String	None	AT S0=2	48 alphanumeric characters	DCE initialization string. (HAYES Modem). It is sent to DCE during its initialization. The default value suggested by the program (S0=2) configures the modem to automatically answer after recognizing two call tones. The user has the task to insert a string congruent with the DCE type used. For instance it is reported a possible initialization string for a PSTN modem: ATS0=2|ATS6=3|ATX4|AT&C1|AT&D2|AT\N3|ATL1|ATS7=15 *WARNING: The initialization string for the DCE must not be inserted the DCE is predisposed already configured and its configuration is made permanent (command AT&W).*

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IEC60870-5-101 protocol – PSTN parameters				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Dial String	None	ATDT	16 alphanumeric characters	Telephone number selection string. The default value suggested by the program (ATDT) configures the selection mode by DTMF tones.
Hang-up Mode	None	DTR	DTR ESCAPE	It allows to configure the mode to execute the telephone line hung-up on the DCE. Instead of using the default DTR criterion, it is possible to require that the telephone line hung-up is executed following the escape sequence "+++", by sending an AT command (i. e. ATH0)
Spont. Call Delay (s)	None	0	0÷120 step 1	It allows to define the delay to be introduced between a state variation rising up and the beginning of the spontaneous message transmission to which the variation belongs. This field is meaningful only if spontaneous events classifications are present inside the configuration.
Security Procedure	None	Disabled	Enabled/Disabled	It allows to define the Security Procedure use. The *Security Procedure* is a particular Password Varying procedure that can be activated in every telephone connection between the Center and the RTU; it has the purpose to avoid every possible access from not enabled users. The *Security Procedur*e use is mandatory with *IEC60870*-5-101 protocol working in *Unbalanced* mode. For a correct use of the *Security Procedure* is necessary to configure the same *Password* on the Center and on RTU equipment.
Password	This field is enabled only if the *Security Procedure* is enabled	Blank	8 alphanumeric characters	It allows to define the value of the varying password.
Locked Spont. Sig.	Nessuna	Disabled	Enabled/Disabled	It allows enabling the use of Digital (Single Point) that reports to the Center the Spontaneous Block event. This Single Point becomes active when the RTU, following Spontaneous Call, has finished all the scheduled retries in configuration without succeeding in establishing the connection with the Center. When the condition of Spontaneous Block occurs the issue of the relevant Single Point is inserted in the Events Buffer immediately followed by its reentry.
IEC Index	This field is enabled only if the Digital of *Spontaneous Block* is enabled	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the single point IEC index (Information Object Address) that reports the Spontaneous Block event. This field is mandatory

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IEC60870-5-101 protocol – PSTN parameters				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Center	None	Cent.A	Cent.A Cent.B Cent.C	It allows configuring the destination Center of the Spontaneous Block Single Point The treatment is always applied as Event.

Table 5-30 – IEC60870-5-101 protocol – PSTN parameters

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5.5.4.2.2 Specific parameters of IEC 60870-5-104 Slave protocol

The *IEC60870*-5-104 Slave protocol is a *line protocol*, used for the communication to a Supervision Center (remote or local) by means of a *dedicated line* (leased line) or, more typically, on *packet network* or *IP network*.

This protocol can be instanced on Serial A port or on Serial B port or on the Ethernet 10 BaseT interface of the CPU2000 Central Unit.

On Ethernet interface, the protocol can be instanced more times up to the maximum number of independent centres that can be managed by the equipment.

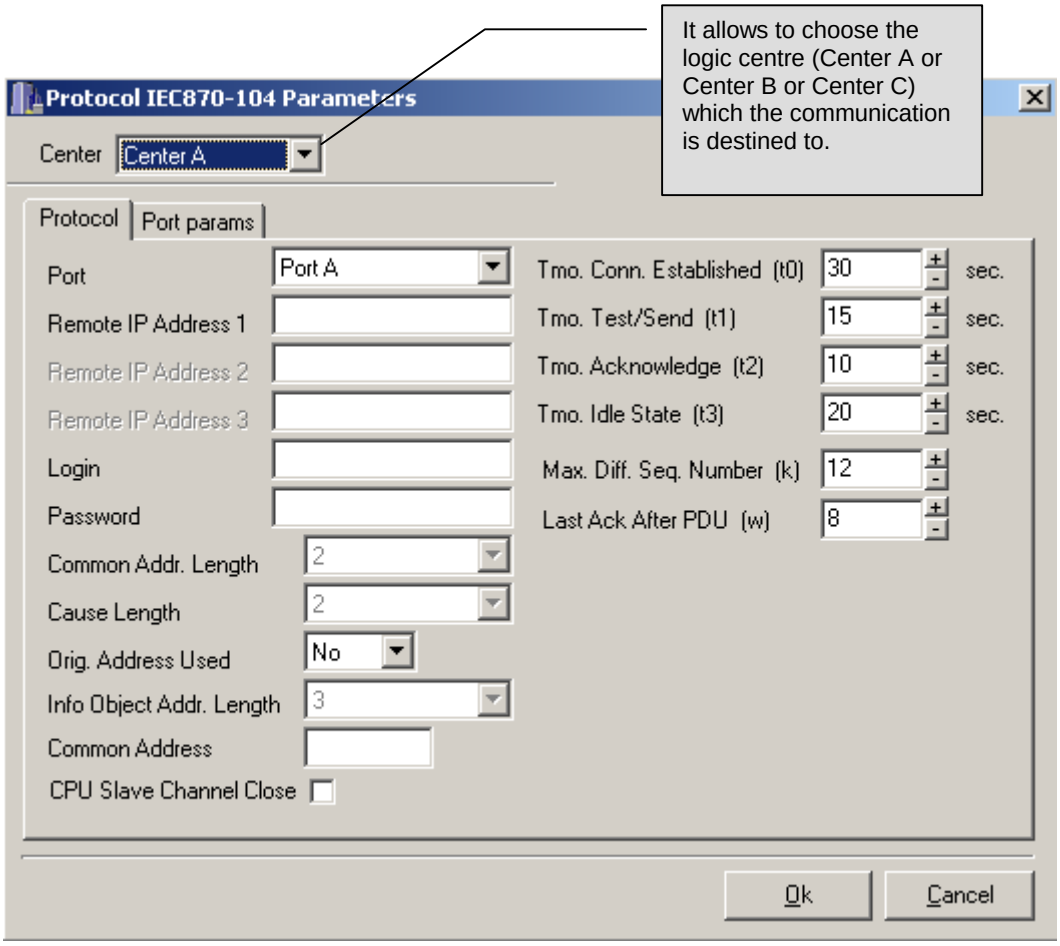

Figure 5-58 - IEC 60870-5-104 protocol parameters

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IEC60870-5-104 Slave protocol				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Center	None	Center A	CENTER A CENTER B CENTER C	It allows choosing the logic centre, which the communication will be established to, using the IEC60870-5-104 protocol. The equipment allows the contemporary communication with three different centres, which a logic identifier is assigned to: A, B, or C. Differently from IEC60870-5-101 protocol, in this case there are no restrictions on the association of the logic centre and the associated physical port.
Port	None	PORT A	PORT A PORT B Ethernet	It allows configuring the physical port to be used for the communication with the Center and, consequently, the physical port where the protocol is instanced. Even if a serial port is chosen, it is mandatory that the IP address be configured for it. In this case, the equipment software will use the Point to Point Protocol (PPP) as transport.
Remote IP Address 1	None	Blank	Valid IP address, with the format: xxx.yyy.vvv.zzz	It allows configuring an IP address, which the equipment accepts a connection to (IP address of Center). To manage more than one Center, one as backup of the other, the equipment is configured to accept the connection from more than one IP address (up to a maximum of three). This field is mandatory
Remote IP Address 2	Enabled only if Port=Ethernet	Blank	Valid IP address, with the format: xxx.yyy.vvv.zzz BlanK	It allows configuring a second IP address, which the equipment accepts a connection to. This field is not mandatory
Remote IP Address 3	Enabled only if Port=Ethernet	Blank	Valid IP address, with the format: xxx.yyy.vvv.zzz BlanK	It allows configuring a third IP address, which the equipment accepts a connection to. This field is not mandatory
Common Addr. Length	None	2	2	It displays the length in bytes of the *Common Address of ASDU* protocol parameter. The field is read only.
Cause Length	None	2	2	It displays the length in bytes of the *Cause of Transmission* protocol parameter. The field is read only.
Info Object Addr. Length	None	3	3	It displays the length in bytes of the *Information Object Address* protocol parameter. The field is read only.
Login	Enabled only for connections on port A/B	Blank	Max 10 alphanumeric characters	It allows configuring the username for the network login
Password	Enabled only for connections on port A/B	Blank	Max 10 alphanumeric characters	It allows configuring the username for the network login
Orig. Address Used	None	No	No Yes	It allows to define the use or nor of the second byte of he Cause Transmission field (*Originator Address).* If the *Originator Address* isn't used, the correspondent byte is fixed to 0

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IEC60870-5-104 Slave protocol				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Common Address	None	Blank	1÷65534 step 1	It allows defining the ASDU Common Address. This field is mandatory.
CPU Slave Channel Closed	None	Disabled	Enabled/Disabled	This field is meaningful only if there is a dualized Central Unit. It allows defining if the CPU in the Slave state it has to operate with open or closed communication channel toward the Center.
Tmo. Conn. Established (T_0)	None	30	1÷100 sec.	T_0 (s) - Time-out of connection establishment
Tmo. Test/Send (T_1)	None	15	1÷100 sec.	T_1 (s) - Time-out of send or test APDUs
Tmo. Acknowledge (T_2)	This timeout must be minor than the precedent one	10	1÷100 sec.	T_2 (s) - Time-out for acknowledges in case of no data messages $T_2 < T_1$
Tmo. Idle State (T_3)	None	20	1÷100 sec.	T_3 (s) - Time-out for sending test frames in case of a long idle state
Max Diff. Seq. Number (k)	None	12	1÷100 step 1	*K (n. APDUs)* - Maximum difference receive sequence number to send state variable It allows defining the *window* in transmission.
Last Ack After PDU (w)	None	8	1÷20 step 1	*W (n. APDUs)* - Latest acknowledge after receiving *W* I format APDUs It allows defining the *window* in reception.
Port Params (enabled only if Port=A or B)				
Baud	This field is meaningful only if the use of a serial port is configured	19200	• 50 • 100 • 110 • 150 • 200 • 300 • 400 • 600 • 1200 • 2400 • 4800 • 9600 • 19200	Line transmission rate expressed in bit/s
Parity	None	NONE	NONE EVEN ODD	It allows to define the type of use of the Parity bit
Stop Bits	None	1	1, 2	It allows to define the number of the Stop bits to insert at the end of the character
Data Bits	None	8	8	Read only field, it displays the number of Data bits

Table 5-31 - IEC60870-5-104 protocol

5.5.4.2.3 Specific parameters of IEC 60870-5-104 Slave protocol on GPRS

The IEC60870-5-104 Slave protocol can be used, as a *line protocol*, also with GPRS network.

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The network is entered by using a proper GPRS modem attested to a CPU2000 serial port.

The GPRS network is used as a WAN : the equipment keep a permanent connection to it and pay depending on the data trade executed.

Every equipment connecting to the network dynamically receives an IP address. The connections among different equipments can be activated by knowing the correspondent addresses.

This protocol can be instanced independently both on the serial ports A and B of the CPU2000 Central Unit.

To enter the network the IEC60870-5-104 protocol uses the Point to Point Protocol (PPP) and on the single physic port is able to support up to two logic connections, one active and the other in standby, with two Control Centers. The system architecture realizable in presence of a backup Center is shown in the following figure:

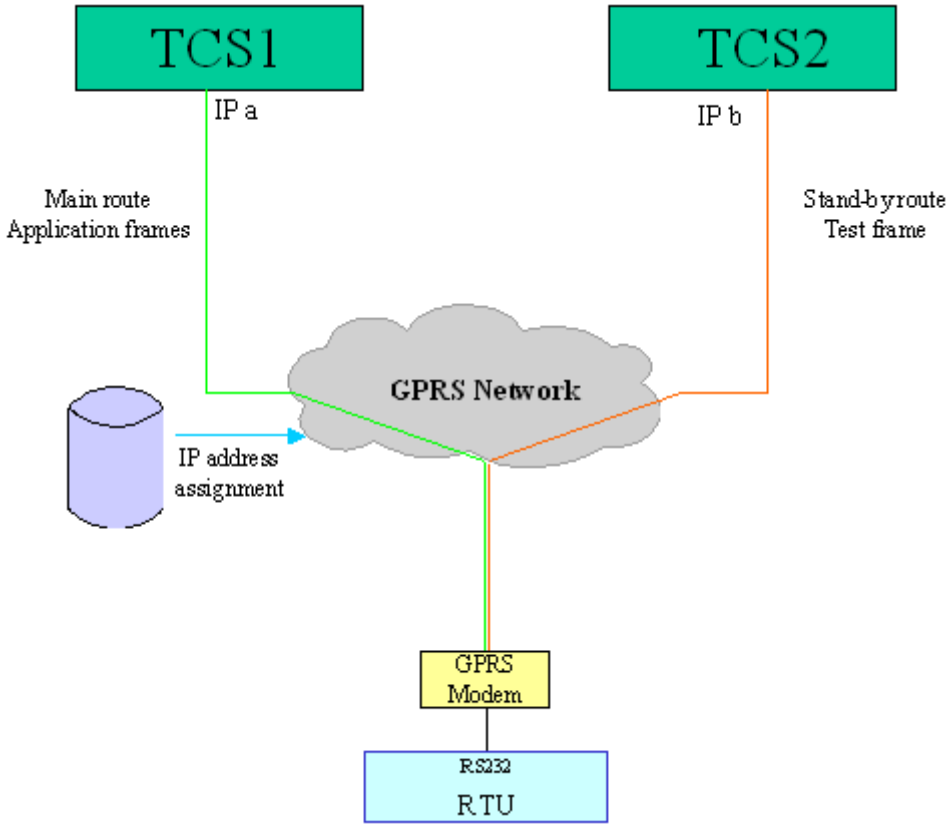

Figure 5-59 – IEC60870-5-104 protocol application on GPRS

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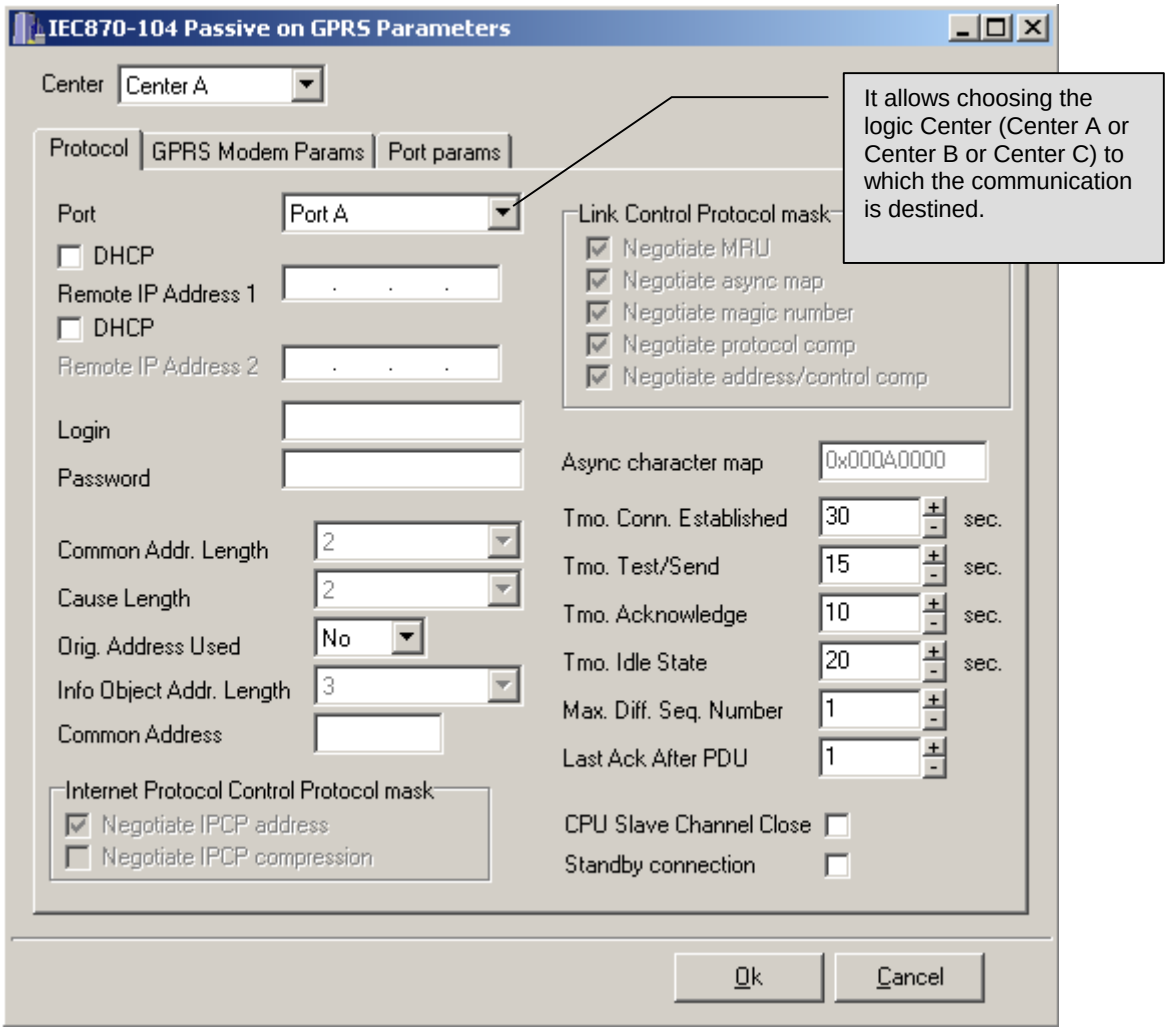

Figure 5-60 - IEC60870-5-104 protocol parameters on GPRS

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IEC60870-5-104 protocol on GPRS				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Center	None	Center A	CENTER A CENTER B CENTER C	It allows choosing the logic centre, which the communication will be established to, using the IEC60870-5-104 protocol. The equipment allows the contemporary communication with three different centres, which a logic identifier is assigned to: A, B, or C.
Port	None	PORT A	PORT A PORT B	It allows configuring the physical port to be used for the communication with the Center and, consequently, the physical port where the protocol is instanced. Even if a serial port is chosen, it is mandatory that the IP address be configured for it. In this case, the equipment software will use the Point to Point Protocol (PPP) as transport.
DHCP	None	Disabled	Enabled/Disabled	The DHCP parameter is related to a Center operation mode. Reported as a result to the RTU, it allows to configure the control type to execute on the IP address of the Center requiring the connection. If DHCP is disabled it is necessary to configure the Center IP address. In this case the connection occurs only if a Center with a configured address requires it. If DHCP is enabled the RTU accepts the connection with every Center without verifying its address.
Remote IP Address 1	This field is meaningful only if the relevant DHCP is disabled	Blank	Valid IP address, with the format: xxx.yyy.vvv.zzz	It allows configuring an IP address, which the equipment accepts a connection to (IP address of Center). To manage more than one Center, one as backup of the other, the equipment is configured to accept the connection from more than one IP address (up to a maximum of three). This field is mandatory
DHCP	None	Disabled	Enabled/Disabled	The field has the same meaning of the precedent homonym one, but is related to the second Center (standby connection).
Remote IP Address 2	Enabled only if if the relevant DHCP is disabled and the *Standby connection* field is enabled	Blank	Valid IP address, with the format: xxx.yyy.vvv.zzz BlanK	It allows configuring a second IP address, which the equipment accepts a connection to. This field is not mandatory and is enabled only if a second Center is scheduled as backup of the first with which a standby channel is kept open. On the standby channel only test frame (TESTFR) are exchanged
Login	None	Blank	Max 10 alphanumeric characters	It allows configuring the username for the GPRS network login. For instance, for the connection to the GPRS network by a TIM provider it is necessary to configure the GSM telephone number of the SIM card as username.
Password	None	Blank	Max 10 alphanumeric characters	It allows configuring the password for the GPRS network login. For instance, for the connection to the GPRS network by a TIM provider it is necessary to use the password obtained while enabling the service.
Common Addr. Length	None	2	2	It displays the length in bytes of the *Common Address of ASDU* protocol parameter. The field is read only.

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IEC60870-5-104 protocol on GPRS				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Cause Length	None	2	2	It displays the length in bytes of the *Cause of Transmission* protocol parameter. The field is read only.
Info Object Addr. Length	None	3	3	It displays the length in bytes of the *Information Object Address* protocol parameter. The field is read only.
Orig. Address Used	None	No	No Yes	It allows to define the use or nor of the second byte of he Cause Transmission field (*Originator Address).* The Originator Address use is not supported by the current equipment software
Common Address	None	Blank	1÷65534 step 1	It allows defining the ASDU Common Address. This field is mandatory.
Async character map	None	0x000A0000	Hexadecimal String	The field is read only
Tmo. Conn. Established (T_0)	None	30	1÷100 sec.	T_0 (s) - Time-out of connection establishment
Tmo. Test/Send (T_1)	None	15	1÷100 sec.	T_1 (s) - Time-out of send or test APDUs
Tmo. Acknowledge (T_2)	This timeout must be minor than the precedent one	10	1÷100 sec.	T_2 (s) - Time-out for acknowledges in case of no data messages $T_2 < T_1$
Tmo. Idle State (T_3)	None	20	1÷100 sec.	T_3 (s) - Time-out for sending test frames in case of a long idle state
Max Diff. Seq. Number (k)	None	12	1÷100 step 1	*K (n. APDUs)* - Maximum difference receive sequence number to send state variable It allows defining the *window* in transmission.
Last Ack After PDU (w)	None	8	1÷20 step 1	*W (n. APDUs)* - Latest acknowledge after receiving *W* I format APDUs It allows defining the *window* in reception.
CPU Slave Channel Closed	None	Disabled	Enabled/Disabled	It allows defining the work toward the Slave CPU line. If this field is enabled the CPU2000 in the Slave state keeps the communication channel closed. This option is applicable only in presence of a dualized CPU2000.
Standby connection	None	Disabled	Enabled/Disabled	It allows enabling the standby connection use toward a second Center as backup of the first one. In presence of a backup Center it is necessary to configure also a second IP address from which accept the connection (*Remote IP Address 2*).
Internet Protocol Control Protocol Mask				
Negotiate IPCP address	None	Enabled	Enabled/Disabled	The field is read only
Negotiate IPCP compression	None	Disabled	Enabled/Disabled	The field is read only

Link Control Protocol Mask

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IEC60870-5-104 protocol on GPRS				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Negotiate MRU	None	Enabled	Enabled/Disabled	The field is read only
Negotiate async map	None	Enabled	Enabled/Disabled	The field is read only
Negotiate magic number	None	Enabled	Enabled/Disabled	The field is read only
Negotiate protocol comp	None	Enabled	Enabled/Disabled	The field is read only
Negotiate address/control comp	None	Enabled	Enabled/Disabled	The field is read only

Table 5-32 - IEC60870-5-104 protocol on GPRS

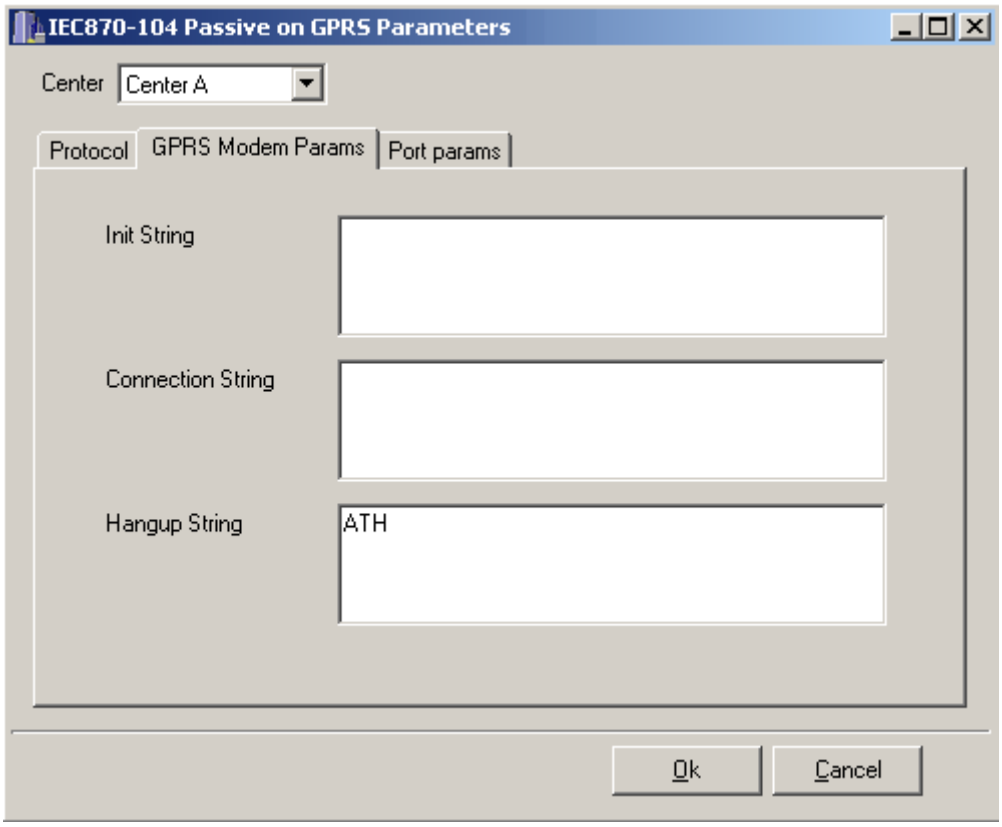

Figure 5-61 - IEC60870-5-104 protocol on GPRS – GPRS Modem Parameters

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IEC60870-5-104 protocol on GPRS Modem Parameters				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Init String	None	Blank		It allows configuring the AT command string that STCE equipment must send to the Modem for its initialization. This string is sent at every STCE equipment startup (for instance: ATE0V1S0=0+CGDCONT=1,IP,uni.tim.it). However, we recommend to memorize the correct work configuration directly on the Modem, so that to avoid a functionalities loss in case of Modem reset.
Connection String	None	Blank	Max 16 alphanumeric characters	It allows configuring the string that STCE equipment must send to the Modem to require the GPRS network connection (for instance: *99***1#).
Hangup String	None	Blank	Max 16 alphanumeric characters	It allows configuring the string that STCE equipment must send to the Modem to require the GPRS network disconnection (for instance: ATH).

Table 5-33 - IEC60870-5-104 protocol on GPRS – Modem Parameters

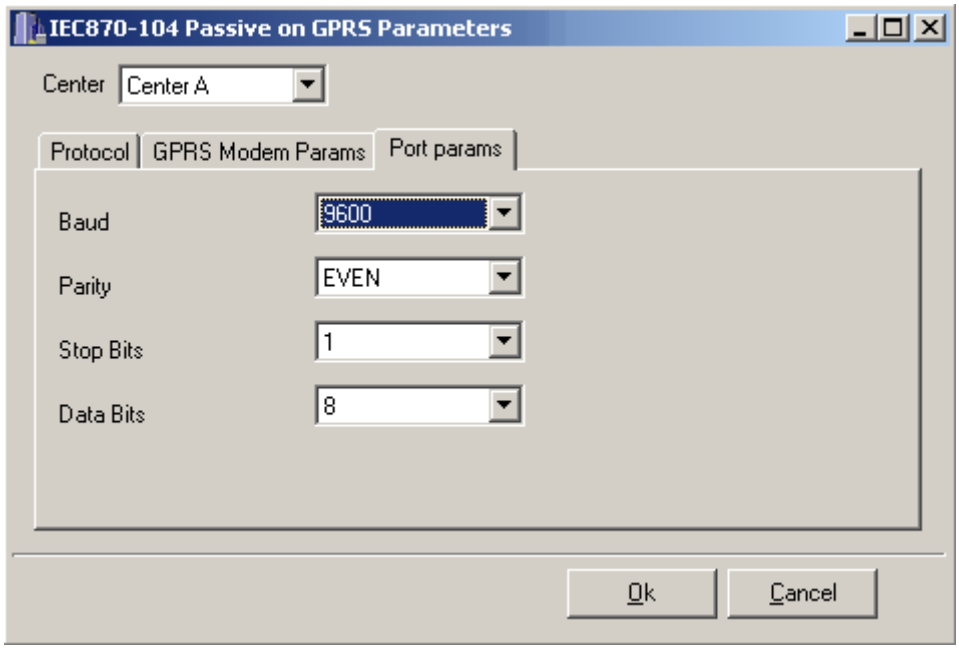

Figure 5-62 - IEC60870-5-104 protocol on GPRS – Port Parameters

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IEC60870-5-104 protocol on GPRS – Serial Port Parameters				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Baud	Enable only if a serial port use is configured	1200	• 50 • 100 • 110 • 150 • 200 • 300 • 400 • 600 • 1200 • 2400 • 4800 • 9600 • 19200	Line transmission rate expressed in bit/s
Parity	None	EVEN	NONE EVEN ODD	It allows to define the type of use of the Parity bit
Stop Bits	None	1	1, 2	It allows to define the number of the Stop bits to insert at the end of the character
Data Bits	None	8	8	Read only field, it displays the number of Data bits

Table 5-34 - IEC60870-5-104 protocol on GPRS – Port Parameters

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5.5.4.2.4 Specific parameters of IEC 60870-5-101 Master protocol

The *IEC60870*-5-101 Master protocol is a *line protocol,* used for the communication with one or more remote equipments respect to the STCE/RTU equipment by means of a *dedicated line* (leased line).

This protocol can be instance independently on each of the four serial ports available on 4SC-101 card (COM1, COM2, COM3 and COM4) or on each of the two serial port available on 2SC+ETH card (COM, COM2)

The globally configurable parameters for the protocols are subdivided in for typologies:

- parameters of the communication serial port
- parameters typical of the IEC60870-5-101 Master protocol
- parameters for the use of the connected Modem (DCE)
- addresses of remote equipment connected to different lines

Each typology of parameters can be accessed from the unique editing window reported in the following figure, by the proper Tab controls.

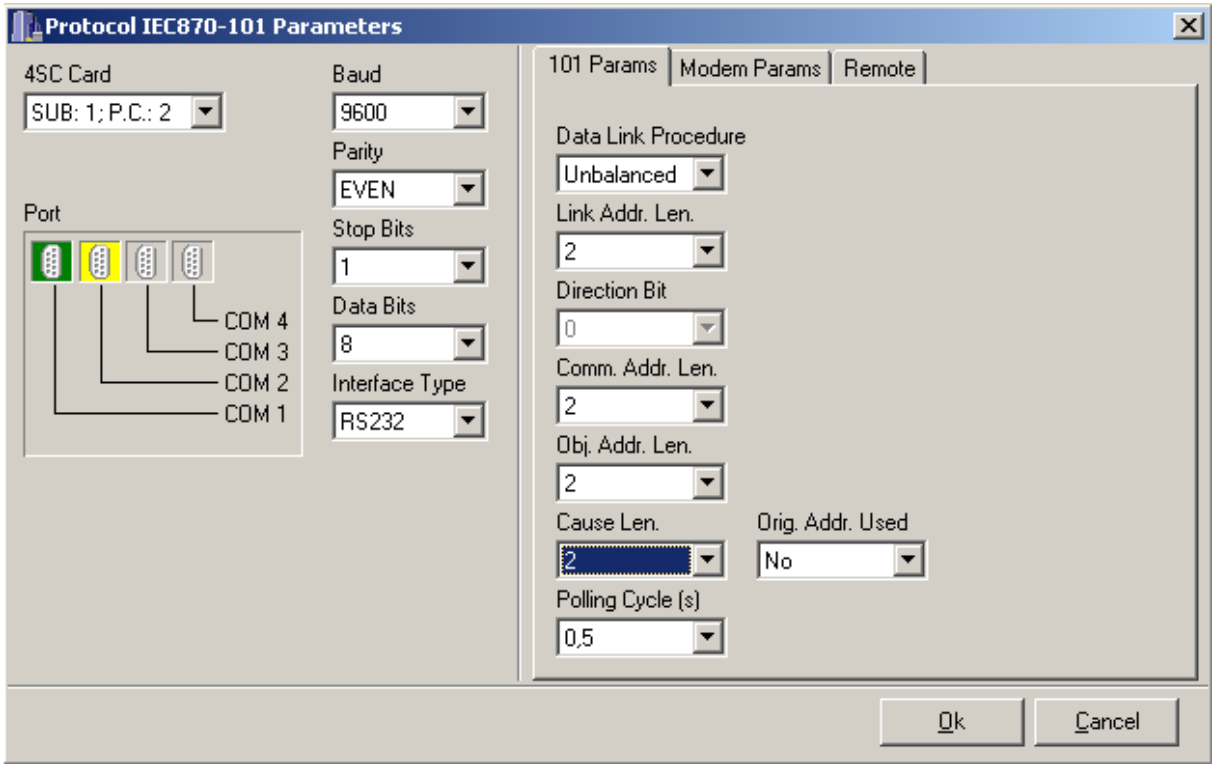

Figure 5-63 – IEC60870-5-101 Master protocol – Par. and 101 Par.port

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IEC60870-5-101 Master protocol on 4SC and 2SC+ETH –Serial port and protocol parameters				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
4SC Card	The list of the 4SC-101 and 2SC+ETH cards inserted during the configuration is displayed	Blank	List of 4SC-101 and 2SC+ETH cards inserted during the configuration with the format: SUB: x; P:C: y	It allows choosing the 4SC card among those inserted in equipping. The position of the equipped card is displayed with the following coordinates: SUB = 0÷15 Subrack index (0 = Base Subrack) (1 = Ext. Subrack 1) etc. P.C. = 0÷13 slot (Ext. Subrack) 0÷6 slot (Base Subrack) This field is mandatory.
Port	None	None	COM1 COM2 COM3 COM4	It allows to choose the serial port where the *IEC60870*-5-101 Master protocol is connected. **The user must remember to equip the desired interface module (RS232, RS422 or RS485) in correspondence of the selected COM** This field is mandatory.
Serial Port Parameters				
Baud	None	9600	• 50 • 100 • 110 • 150 • 200 • 300 • 400 • 600 • 1200 • 2400 • 4800 • 9600 • 19200	Line transmission rate expressed in bit/s
Parity	None	EVEN	NONE EVEN ODD	It allows to define the type of use of the Parity bit
Stop Bits	None	1	1, 2	It allows to define the number of the Stop bits to insert at the end of the character
Data Bits	None	8	8	Read only field, it displays the number of Data bits
Interface Type	None	RS232	RS232 RS422 RS485	It allows defining the type of electric interface, which the selected serial port presents outside. The type of electric interface can be modified with the substitution of an hardware module sub-equipped on the 4SC card. Each serial port has an electric interface independent from the other ones. The FW of the 4SC card signals the possible incongruence between the configured electric interface and the equipped electric interface by lighting the INC led. Note: The normal application, which allows the connection to a DCE for the transmission, is realized with RS232 interface.
Protocol parameters				

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IEC60870-5-101 Master protocol on 4SC and 2SC+ETH –Serial port and protocol parameters				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Data Link Procedure	None	UNBALANCED	UNBALANCED BALANCED	It allows configuring the used Data Link procedure. *The balanced procedure can be used only in presence of a connection by dedicated and of point-to-point type line*
Link Addr. Len.	None	2	0, 1, 2	Length of the Data Link address expressed in number of Byte. The 0 value can be used only with Balanced operation modality.
Direction Bit	None	0	0, 1	It allows to define the Direction Bit value.
Common Addr. Len.	None	2	1, 2	It allows to define the Common Address length, expressed in number of Bytes
Obj. Addr. Len.	None	2	1, 2, 3	It allows defining the length of the Info Object Address field, in number of Bytes
Cause Lenght	None	1	1, 2	It allows to define the Cause of Transmission field length expressed in number Bytes
Orig. Address Used	Enabled only if *Cause Length*=2	No	No/Yes	It allows to define if use or not the second byte of Cause of Transmission field. Currently this field is not managed, so the second byte is fixed to 0 (=No)
Polling Cycle (s)	None	0,5	0,5÷10 Step 0,5	It allows defining the polling sequence on the connection.

Table 5-35 – IEC60870-5-101 Master protocol – Serial and Protocol parameters

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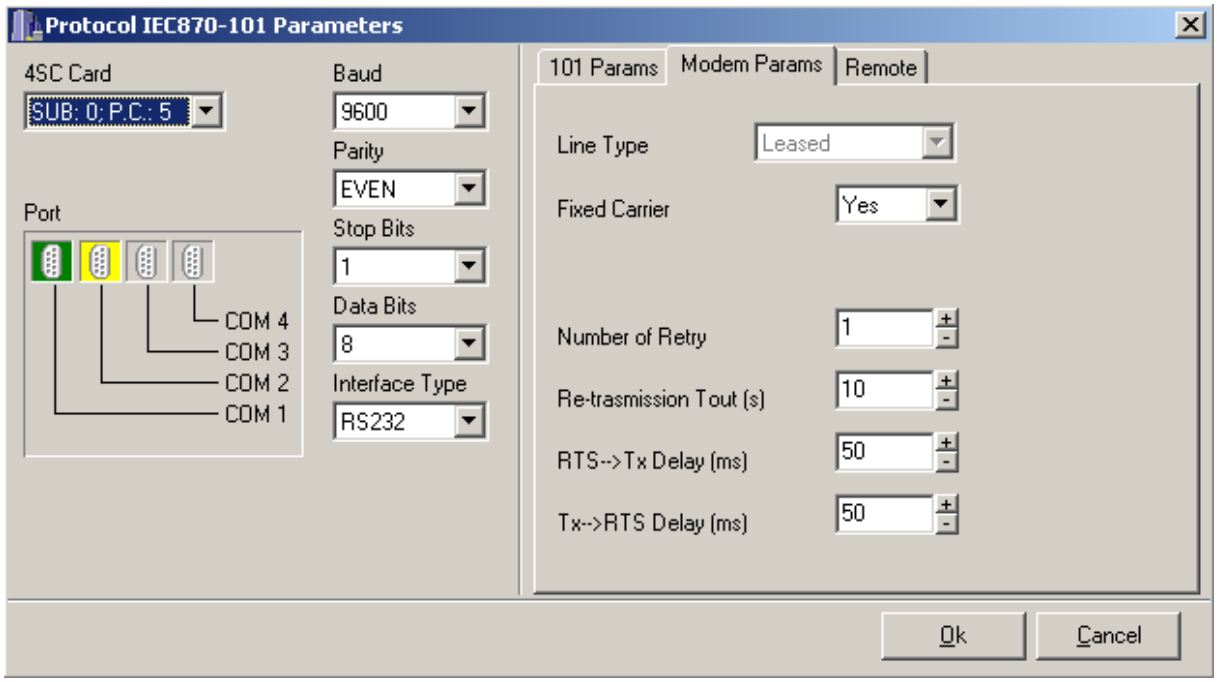

Figure 5-64 – IEC60870-5-101 Master protocol – Port Par. and 101 Par.

IEC60870-5-101 Master protocol on 4SC –Modem parameters				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Line Type	None	LEASED	LEASED	Read only field, it displays the line type used. Currently the equipment manages devoted lines only.
Fixed Carrier	None	Enabled	Enabled/Disabled	It allows to choose between the fixed carrier and controlled carrier operation mode. The user must configure the “controlled carrier” operation mode in the following cases: • point to point connection but with a 2 wires line • point to multipoint connection
Number of Retry	None	1	1÷10 step 1	It allows configuring the maximum number of retries to execute when the transmission fails
Re-transmission Tout (s)	None	10	10÷100 step 10	It allows configuring the timeout before executing a retry
RTS→Tx Delay (ms)	None	50	50÷500 step 50	It sets the maximum timeout, expressed in ms, between the RTS criterion activation and the first byte on line transmission.
Tx→RTS Delay (ms)	None	50	50÷500 step 50	It sets the maximum timeout, expressed in ms, between the last byte on line transmission and the RTS criterion deactivation.

Table 5-36 - IEC60870-5-101 Master protocol – Modem parameters

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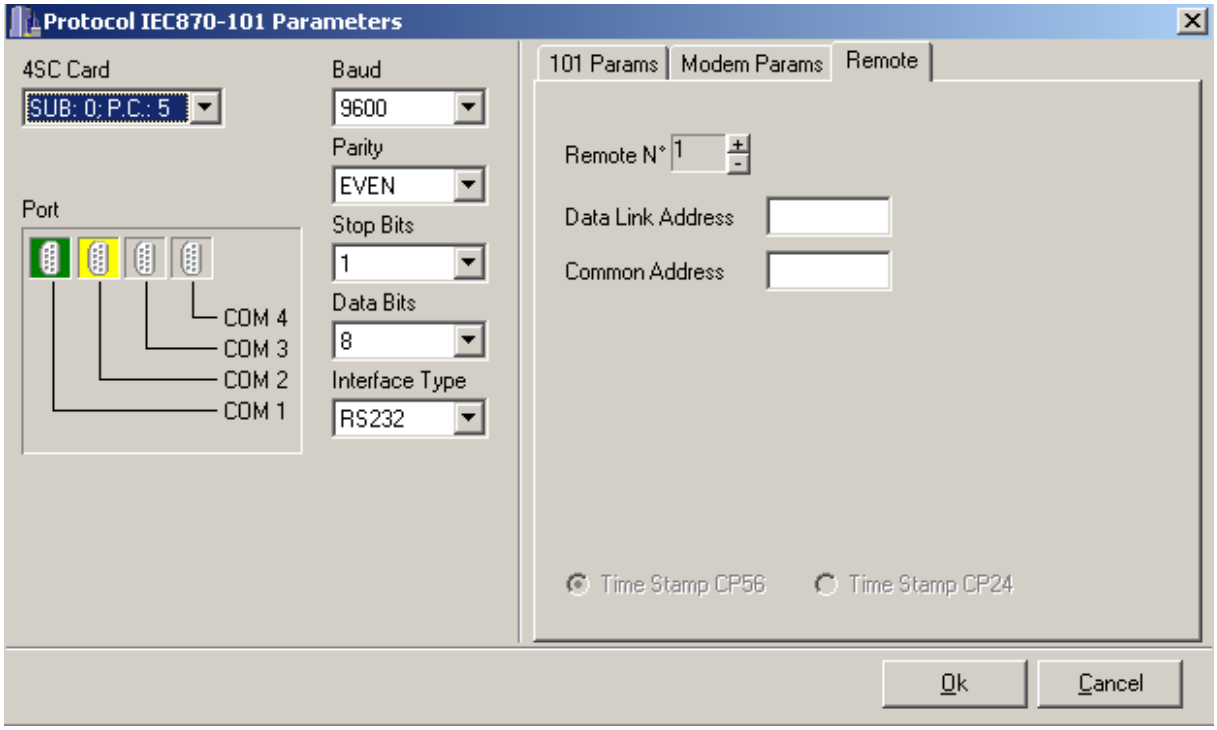

Figure 5-65 – IEC60870-5-101 protocol Master – Remote

IEC60870-5-101 Master protocol on 4SC –Remote Equipments				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Data Link Address	It depends on the number of octets of Link Address	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the Slave equipment (Station IEC address). Slave Address can be omitted if the communication modality is of *Balanced* type. This field is mandatory.
Common Add.	It depends on the number of octets of Link Address	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of the Master ASDU. It is used in Control Direction to send the General Interrogation and the clock synchronization. This field is mandatory.

Table 5-37 - IEC60870-5-101 protocol Master – Remote equipments

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5.5.4.2.5 Specific parameters of IEC 60870-5-104 Master protocol

IEC60870-5-104 Master protocol is a line protocol, used for the communication with one or more remote equipments by using a LAN/WAN connection .

This protocol can be instanced on the available Ethernet 10BT port on 2SC+ETH card.

Thanks to the use of IEC60870-5-104 Master protocol the STCE equipment can execute the functions of concentrator and / or protocol converter towards sub-RTU attested to it.

You can globally configure, for the protocol, two classes of parameters:

- IEC60870-5-104 Master protocol proper parameters
- The addresses of remote equipments connected to different lines

Every parameters typology can be entered by the unique editing window reported in the following figure, through proper Tab controls.

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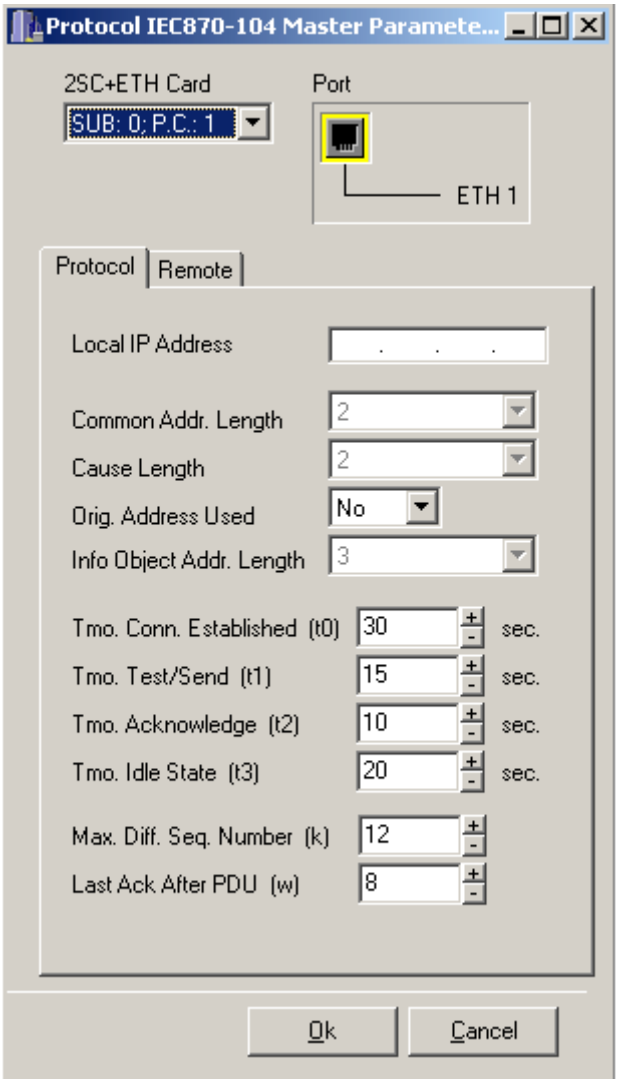

Figure 5-66 - IEC60870-5-104 Master protocol

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IEC60870-5-101 Master protocol on 2SC+ETH –Protocol parameters				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
2SC+ETH Card	The list of the 2SC+ETH cards inserted during the configuration is displayed	Blank	The list of the 2SC+ETH cards inserted during the configuration with format: SUB: x; P:C: y	It allows to choose the 2SC+ETH card among those inserted during the equipping The position of the equipped card is individuated by the following coordinates: SUB = 0÷15 Subrack index (0 = Base Subrack) (1 = Ext. Subrack 1) etc. P.C. = 0÷13 slot (Extension Subrack) 0÷6 slot (Base Subrack) The field is mandatory.
Local IP Address	None	Blank	IP address valid in this format:: xxx.yyy.vvv.zzz	It allows configuring the IP address used by the equipment in a TCP/IP connection on the 2SC+ETH Ethernet port.
Common Addr. Len.	None	2	1, 2	It allows to define the protocol parameter *Common Address of ASDU* length, expressed in number of Bytes. This field is read only
Cause Length	None	2	2	It allows to define the protocol parameter *Cause of Transmission* length, expressed in number of Bytes. This field is read only
Orig. Address Used	None	No	No Yes	It allows to define the use or nor of the second byte of he Cause Transmission field (*Originator Address).* The Originator Address use is not supported by the current equipment software
Info Object Addr. Length	None	3	3	It displays the length in bytes of the *Information Object Address* protocol parameter. The field is read only.
Tmo. Conn. Established (T_0)	None	30	1÷100 sec.	T_0 (s) - Time-out of connection establishment
Tmo. Test/Send (T_1)	None	15	1÷100 sec.	T_1 (s) - Time-out of send or test APDUs
Tmo. Acknowledge (T_2)	This timeout must be minor than the precedent one	10	1÷100 sec.	T_2 (s) - Time-out for acknowledges in case of no data messages $T_2 < T_1$
Tmo. Idle State (T_3)	None	20	1÷100 sec.	T_3 (s) - Time-out for sending test frames in case of a long idle state
Max Diff. Seq. Number (k)	None	12	1÷100 step 1	*K (n. APDUs)* - Maximum difference receive sequence number to send state variable It allows defining the *window* in transmission.
Last Ack After PDU (w)	None	8	1÷20 step 1	*W (n. APDUs)* - Latest acknowledge after receiving *W* I format APDUs It allows defining the *window* in reception.

Table 5-38 - IEC60870-5-104 Master protocol – protocol parameters

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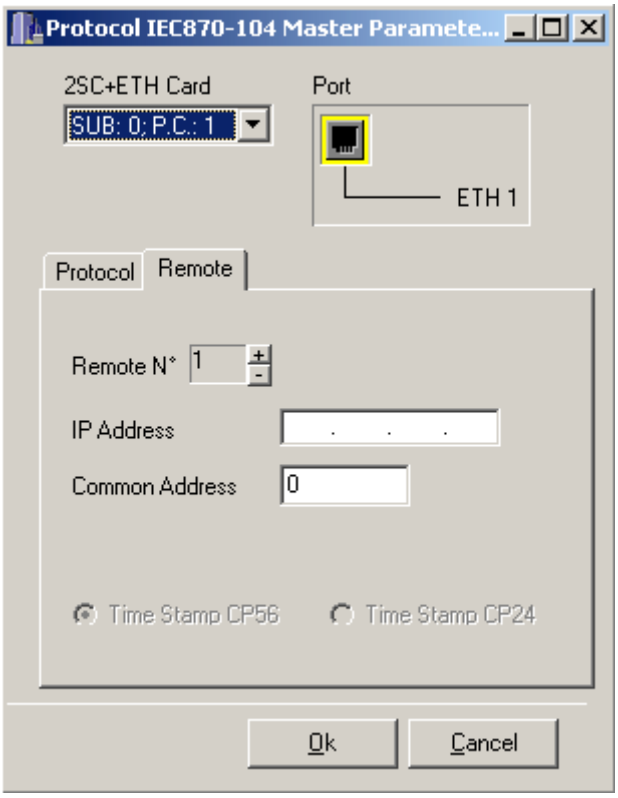

Figure 5-67 - IEC60870-5-104 Master protocol – Remote

IEC60870-5-101 Master protocol on 4SC – Remote equipment				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Data Link Address Address	It depends on the number of octets of Link Address	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the Slave equipment (Station IEC address). Slave Address can be omitted if the communication modality is of *Balanced* type. This field is mandatory.
Common Add.	It depends on the number of octets of Link Address	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of the Master ASDU. It is used in Control Direction to send the General Interrogation and the clock synchronization. This field is mandatory.

Table 5-39 - IEC60870-5-104 Master protocol – Remote Equipments

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5.5.4.2.6 Specific parameters of SAMP Master protocol

SAMP Master protocol is a *local protocol*, used for the communication with Selta Front End of STCR-C or STCR-T type by means of a serial port, which can be of RS232 type (for point-to-point configuration, that is with a single Front End) or RS422 (for point-multipoint configuration that is with more Front Ends, up to a maximum of 32).

This protocol can be instanced on a RS232/RS422/RS485 port of the *I/O Serial* 4SC-SAMP unit (COM1, COM2, COM3 or COM4). The *SAMP Master*, *SASP Master* and *SASP Slave* protocol can co-exist on the same card.

The protocol can be instanced more times on the same 4 Serial Channels Card, up to the number of available ports (four); the protocol can operate on each serial port in point-to–point or point-multipoint modality.

By means of a 4SC interface card provided with SAMP Master protocol, the STCE/RTU equipment can operate as protocol *SCADA* and *Gateway* respect to other Selta equipment possibly already present on field.

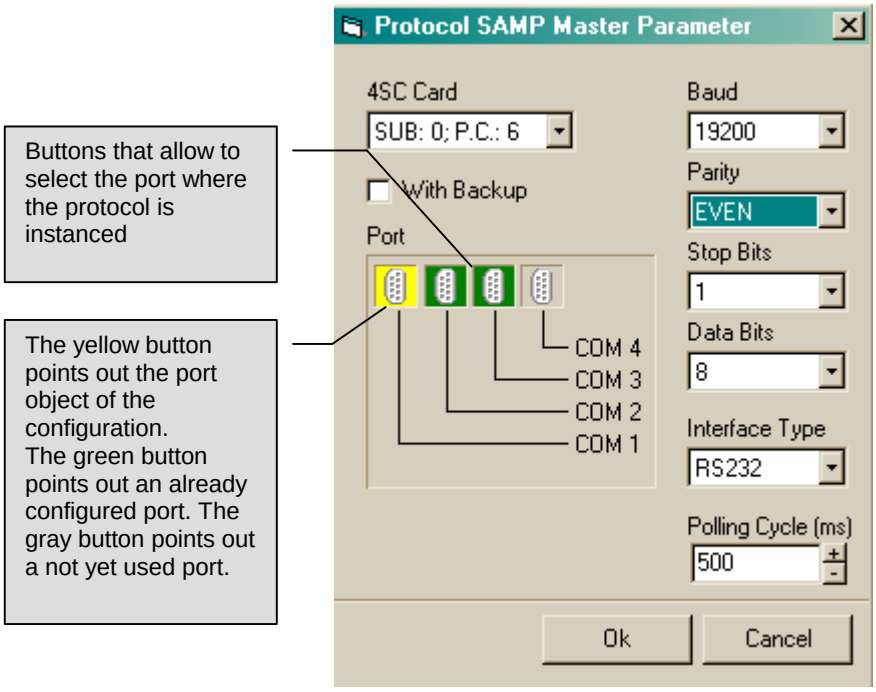

Figure 5-68 - Parameters of SAMP Master protocol

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SAMP Master protocol				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
4SC Card	The list of the 4SC SAMP/SASP cards inserted during the configuration is displayed	Blank	The list of the 4SC SAMP/SASP cards inserted during the configuration with format: SUB: x; P:C: y	It allows to choose the 4SC card among those inserted during the equipping The position of the equipped card is individuated by the following coordinates: SUB = 0÷15 Subrack index (0 = Base Subrack) (1 = Ext. Subrack 1) etc. P.C. = 0÷13 slot (Extension subrack) 0÷6 slot (Base Subrack) The field is manadatory.
With Backup	None	Disabled	Enabled, Disabled	It allows defining the presence of the SAMP network in double. In this case, two of the four available adjacent serial ports are used. The used serial ports can be COM1 and COM2 or COM3 and COM4.
Baud	None	19200	• 50 • 100 • 110 • 150 • 200 • 300 • 400 • 600 • 1200 • 2400 • 4800 • 9600 • 19200	Transmission rate expressed in bit/s. Note: Front End STCR in the current version works with fixed rate of 19200 Bd.
Parity	None	EVEN	NONE EVEN ODD	It allows defining the type of use of the Parity bit. Note: Front End STCR in the current version works with fixed EVEN parity.
Stop Bits	None	1	1, 2	It allows defining the number of the stop bits to insert at the end of the character
Data Bits	None	8	7, 8	It allows defining the number of Data bit. Note: Front End STCR in the current version works with value fixed to 8.
Interface Type	None	RS232	RS232 RS422 RS485	It allows defining the type of electric interface, which the selected serial port uses towards outside. The type of electrical interface can be modified replacing an hardware module sub-equipped on the 4SC card. Each serial port has an electrical interface independent from the other ones. The FW of the 4SC card signals the possible incongruence between the configured electrical interface and the equipped electrical interface by lighting the INC led. Note: The STCR Front End in the current version can use the RS232 or RS422 electrical interface.
Polling Cycle (ms)	None	500	100÷2000 Step 100	It allows defining the polling cycle on the connection

Table 5-40 - SAMP Master protocol

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5.5.4.2.7 Specific parameters of SASP Master protocol

SASP Master protocol is a *local protocol*, used for the communication with Selta Front End of STCR-C or STCR-T type by means of a serial port, which can be of RS232 type or RS422. Independently from the selected electric interface, the protocol supports only point-to-point connections.

This protocol can be instanced on a RS232/RS422/RS485 port of the *I/O Serial* 4SC-SAMP unit (COM1, COM2, COM3 or COM4). The *SAMP Master*, *SASP Master* and *SASP Slave* protocol can co-exist on the same card.

The protocol can be instanced more times on the same 4 Serial Channels Card, up to the number of available ports (four).

By means of a 4SC interface card provided with SASP Master protocol, the STCE/RTU equipment can operate as *concentrator* and *Gateway* respect to other Selta equipments possibly already present on field.

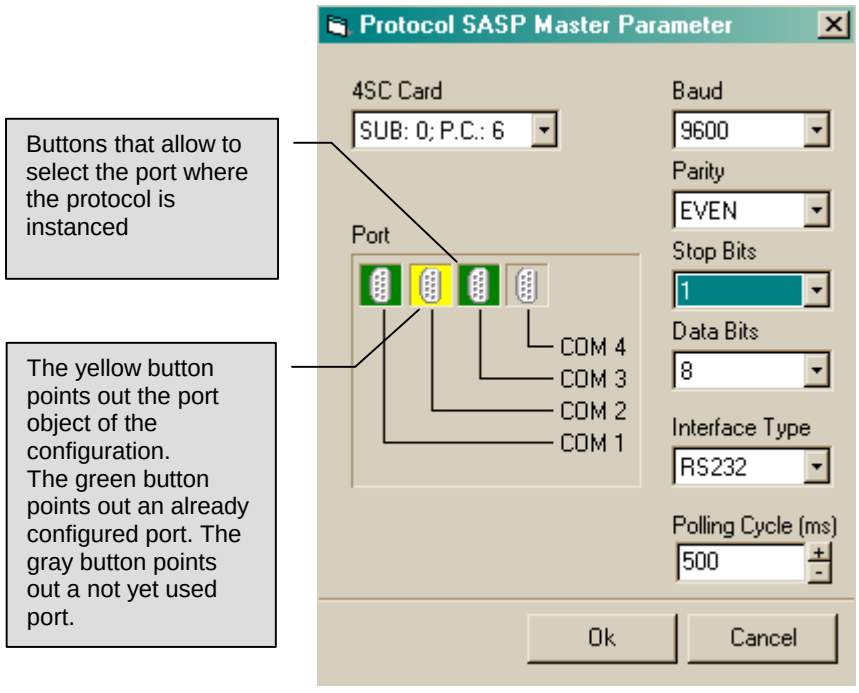

Figure 5-69 - Parameters of SASP Master protocol

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SASP Master protocol				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
4SC Card	The list of the 4SC SAMP/SASP cards inserted during the configuration is displayed	Blank	The list of the 4SC SAMP/SASP cards inserted during the configuration with format: SUB: x; P:C: y	It allows to choose the 4SC card among those inserted during the equipping The position of the equipped card is individuated by the following coordinates: SUB = 0÷15 Subrack index (0 = Base Subrack) (1 = Ext. Subrack 1) etc. P.C. = 0÷13 slot (Extension Subrack) 0÷6 slot (Base Subrack) The field is mandatory.
Baud	None	9600	• 50 • 100 • 110 • 150 • 200 • 300 • 400 • 600 • 1200 • 2400 • 4800 • 9600 • 19200	Transmission rate is expressed in bit/s. Note: Front End STCR in the current version works with fixed rate of 9600 Bd.
Parity	None	EVEN	NONE EVEN ODD	It allows defining the type of use of the Parity bit. Note: Front End STCR in the current version works with fixed EVEN parity.
Stop Bits	None	1	1, 2	It allows defining the number of the stop bits to insert at the end of the character
Data Bits	None	8	7, 8	It allows defining the number of Data bit. Note: Front End STCR in the current version works with value fixed to 8.
Interface Type	None	RS232	RS232 RS422 RS485	It allows defining the type of electric interface, which the selected serial port uses towards outside. The type of electrical interface can be modified replacing an hardware module sub-equipped on the 4SC card. Each serial port has an electrical interface independent from the other ones. The FW of the 4SC card signals the possible incongruence between the configured electrical interface and the equipped electrical interface by lighting the INC led. Note: The STCR Front End in the current version can use the RS232 or RS422 electrical interface.
Polling Cycle (ms)	None	500	100÷2000 Step 100	It allows defining the polling cycle on the connection

Table 5-41 -- SASP Master protocol

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5.5.4.2.8 Specific parameters of SASP Slave protocol

SASP Slave protocol is a *local protocol*, used for the communication with equipments of third providers, typically DCS, which implement the SASP Master protocol.

Independently from the selected electric interface, the protocol supports only point-to-point connections.

This protocol can be instanced on a RS232/RS422/RS485 port of the *I/O Serial* 4SC-SAMP unit (COM1, COM2, COM3 or COM4). The *SAMP Master*, *SASP Master* and *SASP Slave* protocol can co-exist on the same card.

The protocol can be instanced more times on the same 4 Serial Channels Card, up to the number of available ports (four).

By means of a 4SC interface card provided with SASP Slave protocol, the STCE/RTU equipment can operate as protocol *SCADA* and *Gateway* respect to other equipments possibly already present on field.

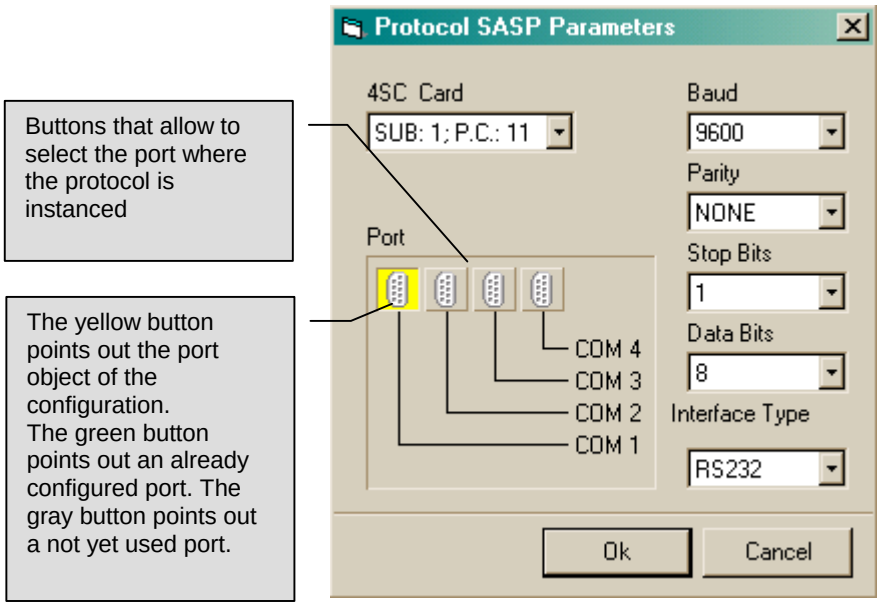

Figure 5-70 - Parameters of SASP Slave protocol

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SASP Slave protocol				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
4SC Card	The list of the 4SC SAMP/SASP cards inserted during the configuration is displayed	Blank	The list of the 4SC SAMP/SASP cards inserted during the configuration with format: SUB: x; P:C: y	It allows to choose the 4SC card among those inserted during the equipping The position of the equipped card is individuated by the following coordinates: SUB = 0÷15 Subrack index (0 = Base Subrack) (1 = Ext. Subrack 1) etc. P.C. = 0÷13 slot (Extension subrack) 0÷6 slot (Base Subrack) The field is mandatory.
Baud	None	9600	• 50 • 100 • 110 • 150 • 200 • 300 • 400 • 600 • 1200 • 2400 • 4800 • 9600 • 19200	Transmission rate is expressed in bit/s. Note: The interfaced DCS in the current version work with fixed rate of 9600 Bd.
Parity	None	EVEN	NONE EVEN ODD	It allows defining the type of use of the Parity bit.
Stop Bits	None	1	1, 2	It allows defining the number of the stop bits to insert at the end of the character
Data Bits	None	8	7, 8	It allows defining the number of Data bit. Note: The interfaced DCS in the current version work with value fixed to 8.
Interface Type	None	RS232	RS232 RS422 RS485	It allows defining the type of electric interface, which the selected serial port uses towards outside. The type of electrical interface can be modified replacing an hardware module sub-equipped on the 4SC card. Each serial port has an electrical interface independent from the other ones. The FW of the 4SC card signals the possible incongruence between the configured electrical interface and the equipped electrical interface by lighting the INC led. Note: The interfaced DCS in the current version can use the RS232 or RS422 electrical interface.

Table 5-42 - SASP Slave protocol

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5.5.4.2.9 Specific parameters of SAMP Slave protocol

SAMP Slave protocol is a *local protocol*, used for the communication with equipments of third providers, typically DCS, which implement the SAMP Master protocol.

Independently from the selected electric interface, the protocol supports only point-to-point connections.

This protocol can be instanced on a RS232/RS422/RS485 port of the *I/O Serial* 4SC-SAMP unit (COM1, COM2, COM3 or COM4). The *SAMP Master*, *SASP Master* and *SASP Slave* protocol can co-exist on the same card.

The protocol can be instanced more times on the same 4 Serial Channels Card, up to the number of available ports (four).

By means of a 4SC interface card provided with SAMP Slave protocol, the STCE/RTU equipment can operate as protocol *Concentrator* and *Gateway* respect to other equipments possibly already present on field.

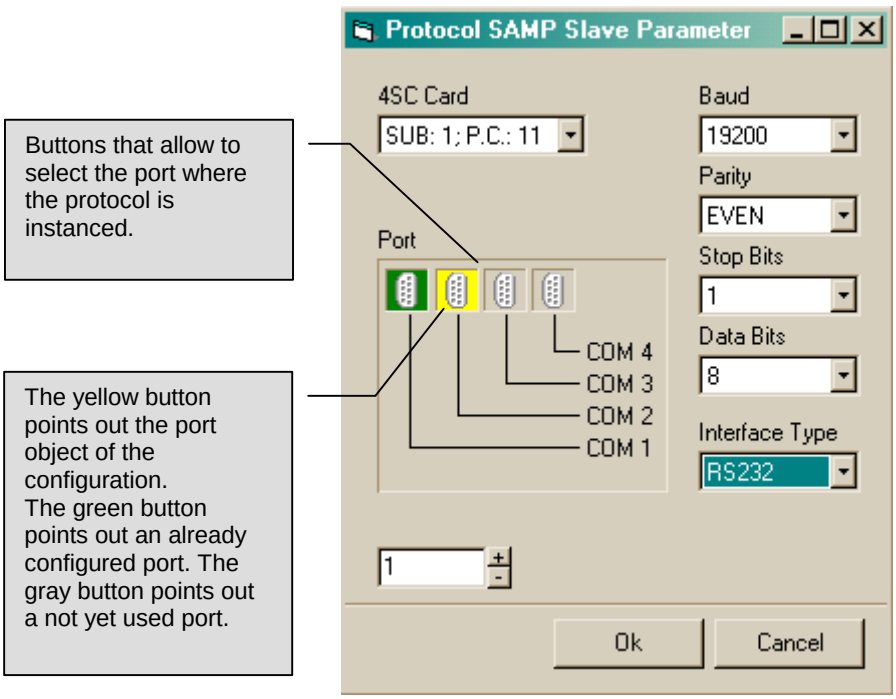

Figure 5-71 - Parameters of SAMP Slave protocol

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SAMP Slave protocol				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
4SC Card	The list of the 4SC SAMP/SASP cards inserted during the configuration is displayed	Blank	The list of the 4SC SAMP/SASP cards inserted during the configuration with format: SUB: x; P:C: y	It allows to choose the 4SC card among those inserted during the equipping The position of the equipped card is individuated by the following coordinates: SUB = 0÷15 Subrack index (0 = Base Subrack) (1 = Ext. Subrack 1) etc. P.C. = 0÷13 slot (Extension Subrack) 0÷6 slot (Base Subrack) The field is mandatory.
Baud	None	19200	• 50 • 100 • 110 • 150 • 200 • 300 • 400 • 600 • 1200 • 2400 • 4800 • 9600 • 19200	Transmission rate is expressed in bit/s. Note: The DCS in the current version work with fixed rate of 19200 Bd.
Parity	None	EVEN	NONE EVEN ODD	It allows defining the type of use of the Parity bit. Note: The DCS in the current version work with fixed EVEN parity.
Stop Bits	None	1	1, 2	It allows defining the number of the stop bits to insert at the end of the character
Data Bits	None	8	7, 8	It allows defining the number of Data bit. Note: The DCS in the current version work with value fixed to 8.
Interface Type	None	RS232	RS232 RS422 RS485	It allows defining the type of electric interface, which the selected serial port uses towards outside. The type of electrical interface can be modified replacing an hardware module sub-equipped on the 4SC card. Each serial port has an electrical interface independent from the other ones. The FW of the 4SC card signals the possible incongruence between the configured electrical interface and the equipped electrical interface by lighting the INC led. Note: The DCS in the current version can use the RS232 or RS422 electrical interface.
Polling Cycle (ms)	None	500	100÷2000 Step 100	It allows defining the polling cycle on the connection
Node Address	None	32	32÷64 Step 1	It allows defining the address of the node, which it answers to (on the configured line).

Table 5-43 - SAMP Slave protocol

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5.5.4.2.10 Specific parameters of Rekron protocol

Rekron (Master) protocol is a proprietary *local protocol*, used for the communication with old generation DCS and RCE equipments for the serial acquisition of RCE events. Independently from the selected electrical interface, the protocol supports only point-to-point connections.

This protocol can be instanced on a RS232/RS422/RS485 port of the *I/O Serial* 4SC-REKRON unit (COM1, COM2, COM3 or COM4).

The protocol can be instanced more times on the same 4 Serial Channels Card, up to the number of available ports (four).

By means of a 4SC interface card provided with REKRON protocol, the STCE/RTU equipment can operate as protocol *Concentrator* and *Gateway* respect to other equipments possibly already present on field.

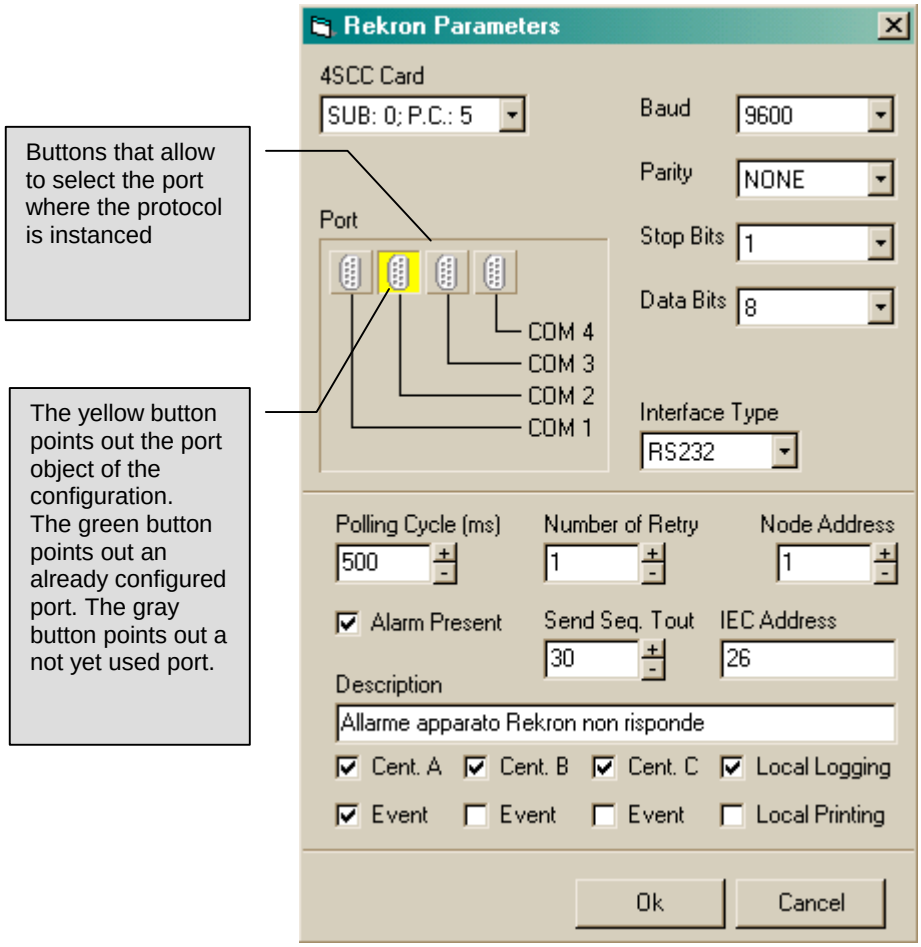

Figure 5-72 - REKRON protocol parameters

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REKRON Master protocol				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
4SC Card	The list of the 4SC SAMP/SASP cards inserted during the configuration is displayed	Blank	The list of the 4SC SAMP/SASP cards inserted during the configuration with format: SUB: x; P:C: y	It allows to choose the 4SC card among those inserted during the equipping The position of the equipped card is individuated by the following coordinates: SUB = 0÷15 Subrack index (0 = Base Subrack) (1 = Ext. Subrack 1) etc. P.C. = 0÷13 slot (Extension subrack) 0÷6 slot (Base Subrack) The field is mandatory.
Baud	None	9600	• 50 • 100 • 110 • 150 • 200 • 300 • 400 • 600 • 1200 • 2400 • 4800 • 9600 • 19200	Transmission rate is expressed in bit/s.
Parity	None	NONE	NONE EVEN ODD	It allows defining the type of use of the Parity bit.
Stop Bits	None	1	1, 2	It allows defining the number of the stop bits to insert at the end of the character
Data Bits	None	8	7, 8	It allows defining the number of Data bits.
Interface Type	None	RS232	RS232 RS422 RS485	It allows defining the type of electric interface, which the selected serial port uses towards outside. The type of electrical interface can be modified replacing an hardware module sub-equipped on the 4SC card. Each serial port has an electrical interface independent from the other ones. The FW of the 4SC card signals the possible incongruence between the configured electrical interface and the equipped electrical interface by lighting the INC led. Note: The DCS and the RCE use the RS232 electrical interface.
Polling Cycle (ms)	None	500	100÷2000 Step 100	It allows defining the polling cycle on the connection
Number of Retry	None	1	1÷10 Step 1	It allows defining the max. number of retry that the Master protocol makes in case of failed transmission before declaring the external equipment alarmed for missed answer
Node Address	None	1	1÷255 Step 1	It allows defining the address of the connected node

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REKRON Master protocol				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Send Seq. Tout (s)	None	30	1÷255 Step 1	It allows configuring the waiting time for the closure and the subsequent transmission of a events' sequence. The timer is re-activated at the reception of any RCE event, at the end of timeout the perturbance is declared closed and all the stored events are transferred to the centre by File Transfer
Alarm Present	None	Disabled	Enabled/Disabled	It allows enabling the management of the diagnostic digital associated to the alarm of missed answer.
IEC Address	Enabled only if "Alarm Present"=Enabled	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point without Time Tag used for the communication to the node diagnostic centre. Issuing and clearing of the alarm are managed by 4SC Unit.
Description	Enabled only if "Alarm Present"=Enabled	"Allarme Apparato Rekron non risponde"	Max 34 alphanumeric characters	Description associated to the diagnostic digital. The *Description* field is not transferred to the STCE/RTU equipment
Treatment				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-44 - REKRON Master protocol

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5.5.4.2.11 Specific parameters of Modbus protocol

The Modbus RTU Master protocol is a *local protocol*, used for the communication with DCS o PLC equipments by means of serial port that can be of RS232 (for point-to-point configurations, that is with only one Slave equipment) or RS422/RS485 (for point-multipoint configurations, that is with more Slave equipments, up to the maximum supported by Modbus standard type).

By means of a 4SC interface card endowed with Modbus Master or Slave protocol the STCE/RTU equipment is able to operate as protocol *Concentrator* and *Gateway* respect to other equipments possibly already present on field.

Two types of Modbus protocol are available:

- one complying with Modicon[1] standard (MODBUS-STD)
- one using frame and functions complying with the standard, but with the user data formatting and specialized procedures to interface the DCS equipments (MODBUS-DCS)

The Modbus Standard (STD) protocol is available both in Master and Slave mode, while for the DCS Modbus protocol is scheduled the Master mode only.

For the DCS Modbus protocol it is possible to realize also two connection type with backup:

- double connection line on the same 4SC card
- double connection line on double 4SC card (dualized 4SC)

[1] Modicon Modbus Protocol – Reference Guide PI-MBUS-300 Rev. J, June 1996

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5.5.4.2.11.1 Specific parameters of Modbus DCS Master protocol

In this application the Modbus communication protocol has the purpose to interface the STCE/RTU equipment to a DCS Slave equipment when it is very important manage the information treatment with absolute safety and efficiency in comparison to the Modbus standard special procedure has been added to manage Events Buffer and remote controls sending.

For the connection with DCS equipments a point to point connection in single or redundant configuration; the redundancy type scheduled are the following:

- a 4SC card with two serial connections towards two DCS communication Server: a Server in the *Master* state, the other in the *Slave* state;
- two 4SC cards in *Master/Slave* configuration, each with a serial connection towards two DCS communication Server: a Server in the *Master* state and the other in the *Slave* state.

This protocol can be instanced on a RS232/RS422/RS485 port of the *I/O Serial* 4SC-MODBUS unit (COM1, COM2, COM3 or COM4).

The following figure reports the possible connections with backup realizable for the DCS Modbus protocol.

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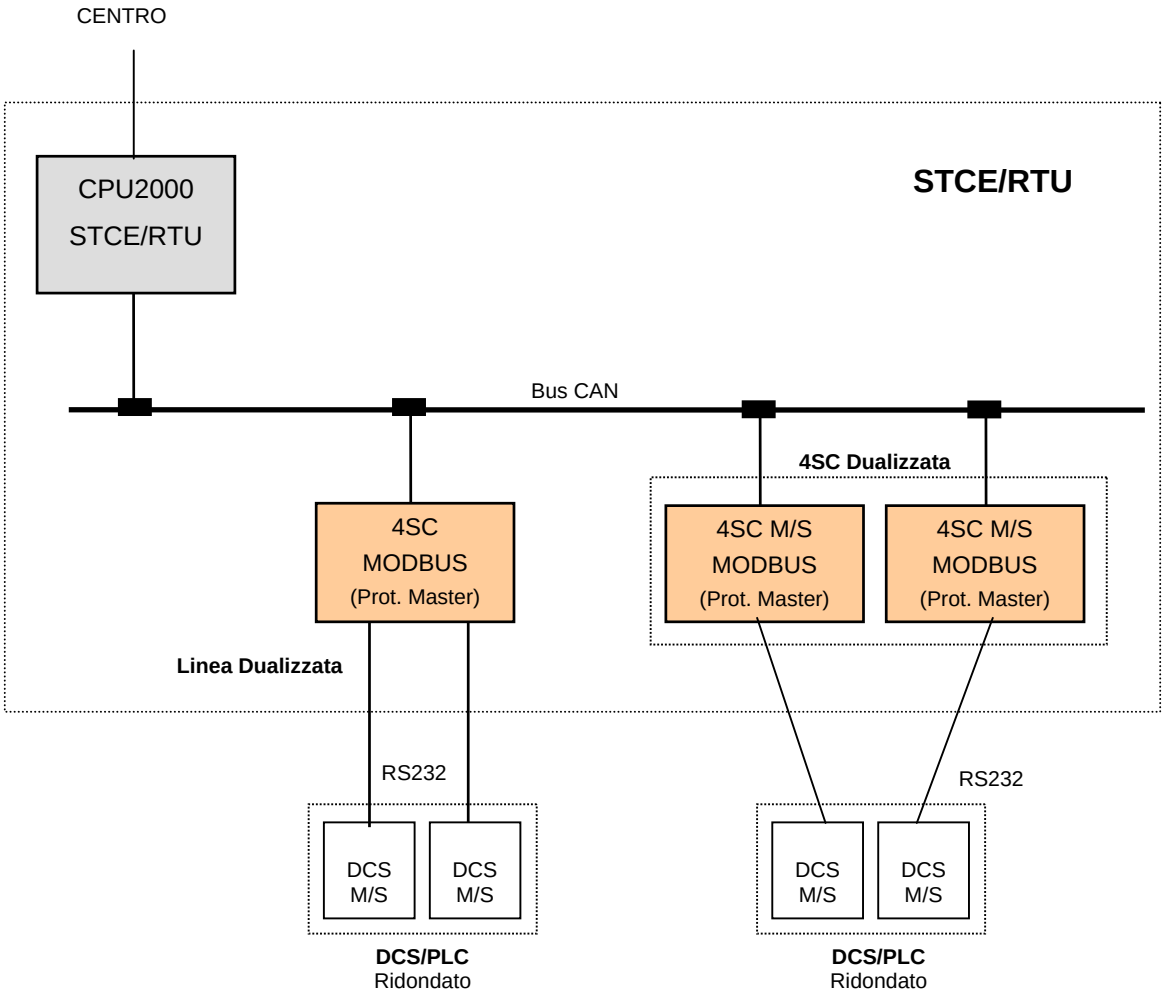

Figure 5-73 – Modbus protocol – Possible configurations with backup connections

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The following figure shows the main form for the DCS Modbus Master protocol when a *Single 4SC* card is used.

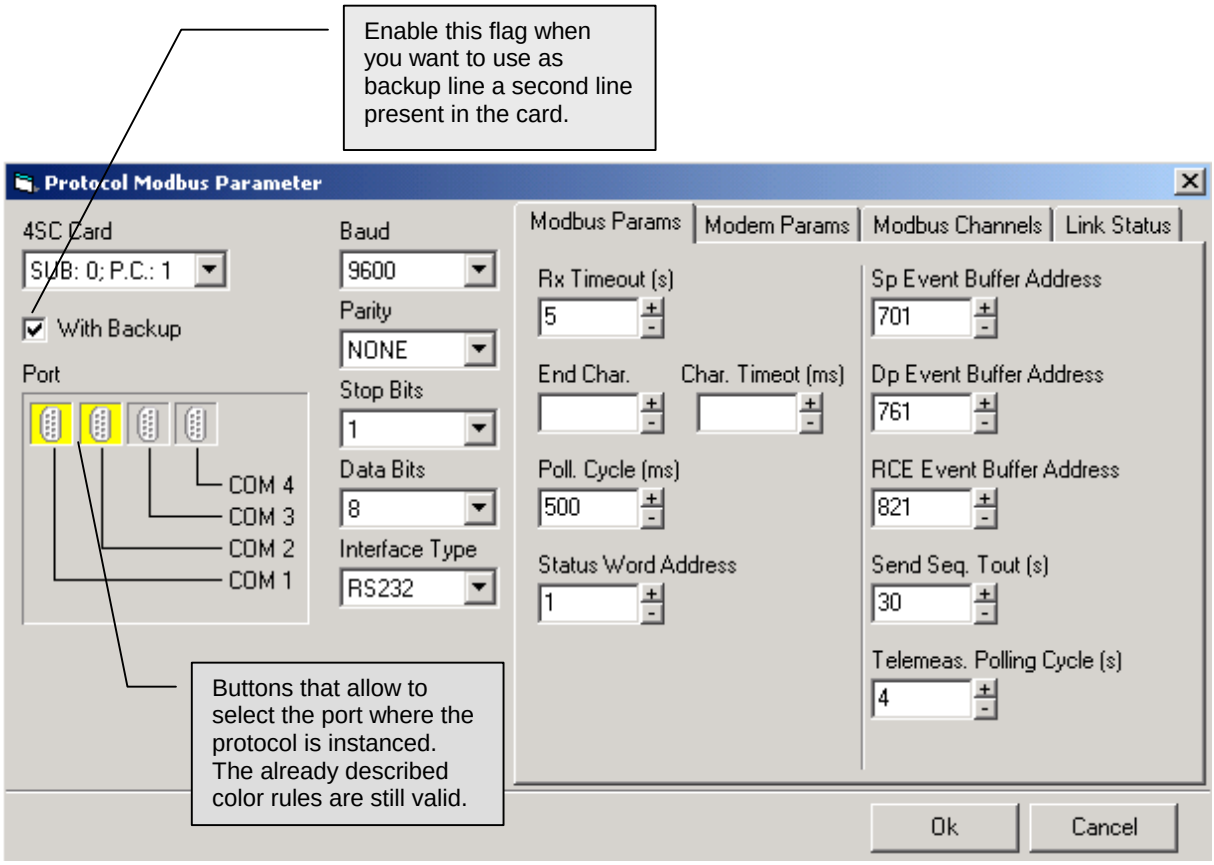

Figure 5-74 - Parameters of Modbus DCS Master protocol – Serial port and Modbus

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MODBUS DCS Master protocol – Serial port and protocol				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
4SC Card	The list of the 4SC MODBUS cards inserted during the configuration is displayed	Blank	The list of the 4SC MODBUS cards inserted during the configuration with format: SUB: x; P:C: y	It allows to choose the 4SC card among those inserted during the equipping The position of the equipped card is individuated by the following coordinates: SUB = 0÷15 Sub-rack index (0 = Base Sub-rack) (1 = Ext. Sub-rack 1) etc. P.C. = 0÷13 slot (Extension sub-rack) 0÷6 slot (Base Sub-rack) The field is mandatory.
With Backup	None	Disabled	Enabled, Disabled	It allows defining the presence of the MODBUS line in double. In this case, two of the four available adjacent serial ports are used. The used serial ports can be COM1 and COM2 or COM3 and COM4.
Serial port parameters				
Baud	None	9600	• 50 • 100 • 110 • 150 • 200 • 300 • 400 • 600 • 1200 • 2400 • 4800 • 9600 • 19200 • 38400	Transmission rate is expressed in bit/s. Note: Front End STCR in the current version works with fixed rate of 19200 Bd.
Parity	None	NONE	NONE EVEN ODD	It allows defining the type of use of the Parity bit.
Stop Bits	None	1	1, 2	It allows defining the number of the stop bits to insert at the end of the character
Data Bits	None	8	7, 8	It allows defining the number of Data bit.
Interface Type	None	RS232	RS232 RS422 RS485	It allows defining the type of electric interface, which the selected serial port uses towards outside. The type of electrical interface can be modified replacing an hardware module sub-equipped on the 4SC card. Each serial port has an electrical interface independent from the other ones. The FW of the 4SC card signals the possible incongruence between the configured electrical interface and the equipped electrical interface by lighting the INC led.

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MODBUS DCS Master protocol – Serial port and protocol				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Protocol parameters				
Rx Timeout (s)	None	5	1÷255 Step 1	Waiting time for the answer to a frame sending.
End Char (Hex)	None	Blank	Alphanumeric characters Blank	In alternative, or in addition, to the "Timeout Interbyte" modality, if the type of transmitted information allows, the end of the frame in input can be individuated by acknowledging two given ending characters expressed in hexadecimal format (for instance CR=0D, LF=0A, ecc.).
Char Timeout (ms)	None	50	1÷255 Step 1 Blank	Char Timeout is like Timeout Interbyte and allows acknowledging the end of a frame in input: the timer is re-activated at the reception of each Byte, at the end of timeout if no byte has been received the frame is declared ended. **Note:** it is mandatory to insert at least a termination modality for the reception: by Timeout Interbyte or by Ending Characters or by both modality
Polling Cycle (ms)	None	500	100÷2000 Step 100	It allows defining the polling cycle on the connection
Status Word Address	None	Blank	0÷65535	It allows configuring the address (decimal) where the *Status Word* is allocated on DCS. Starting from this address, there are four registers (the first is that of PS and the others are used to notify the presence of the different event types). This address must not overwrite any other address.
SP Event Buffer Address	None	Blank	0÷65535	It allows configuring the address (decimal) where the beginning of *Single Point Event Buffer* is allocated on DCS. This address must not overwrite any other address.
DP Event Buffer Address	None	Blank	0÷65535	It allows configuring the address (decimal) where the beginning of *Double Point Event Buffer* is allocated on DCS. This address must not overwrite any other address.
RCE Event Buffer Address	None	Blank	0÷65535	It allows configuring the address (decimal) where the beginning of *RCE Event Buffer* is allocated on DCS This address must not overwrite any other address.
Send Seq. Tout (s)	None	30	1÷255 Step 1	It allows configuring the waiting time for the closure and the subsequent transmission of a events' sequence. The timer is re-activated at the reception of any RCE event or data change event, at the end of timeout the perturbance is declared closed and all the stored events are transferred to the centre by File Transfer.

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MODBUS DCS Master protocol – Serial port and protocol				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Telemeas. Polling Cycle	None	4	3÷255 Step 1	Cycle time for the refresh of Telemeasures. Periodically, with period equal to the configured time, the master application of Modbus protocol reads all the Telemeasures present in DCS DataBase and sends to Center those changed respect to the previous cycle.

Table 5-45 - MODBUS DCS Master protocol – Serial port and protocol

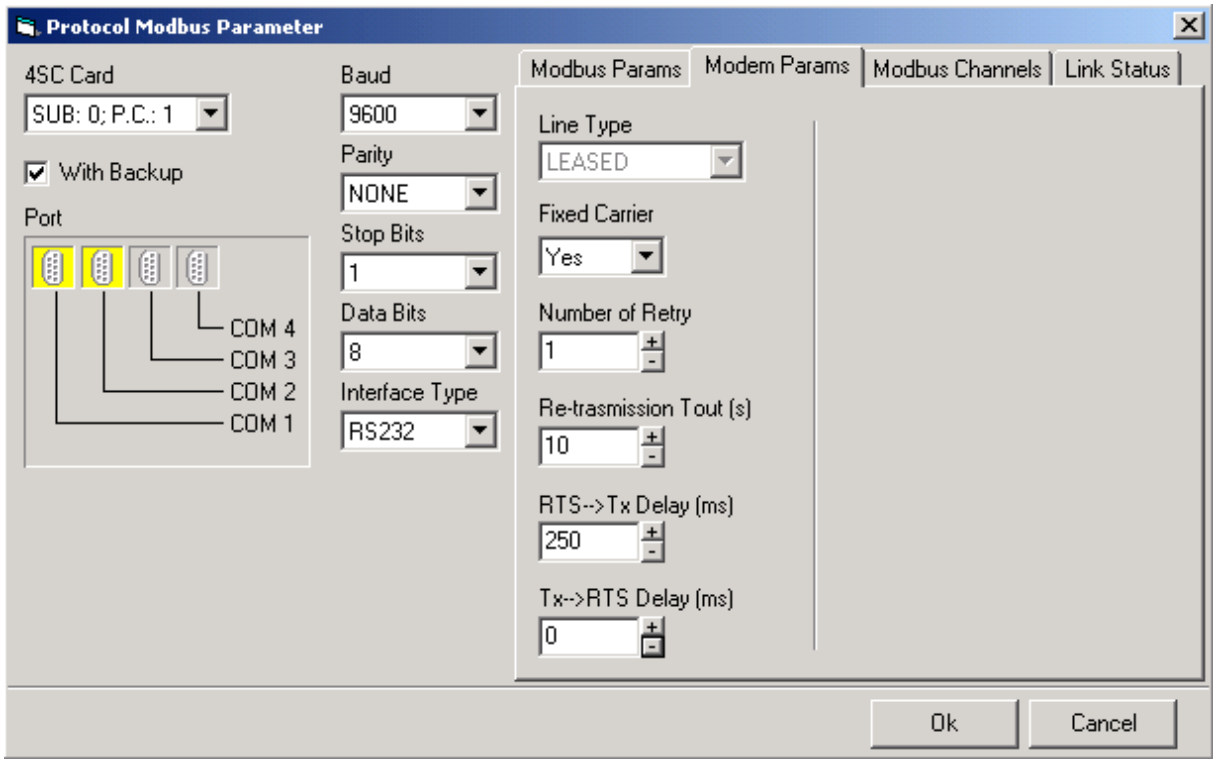

Figure 5-75- Parameters of DCS Modbus Master protocol – Modem

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MODBUS DCS Master protocol – Modem				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Line Type	None	LEASED	LEASED	Read only field, it displays the type of used line. Currently the equipment manages only dedicated lines
Fixed Carrier	None	Enabled	Enabled/Disabled	It allows choosing between the operating modality with commanded carrier or fixed carrier. The user must configure the “commanded carrier” modality in the following cases: • point-to-point connection with 2-wire line • point-multipoint connection
Number of Retry	None	1	1÷10 step 1	It allows to configure the maximum number of re-transmissions to be made in case of failed transmission
Re-transmission Tout (s)	None	10	10÷100 step 10	It allows to configure the waiting period before executing the re-transmission
RTS→Tx Delay (ms)	None	0	0÷250 step 1	It sets the maximum waiting period, in ms, between the activation of the RTS criterion and the transmission of the first byte in line
Tx→RTS Delay (ms)	None	0	0÷250 step 1	It sets the maximum waiting period, in ms, between the transmission of the last byte in line and the deactivation of the RTS criterion

Table 5-46 - MODBUS DCS Master protocol – Modem

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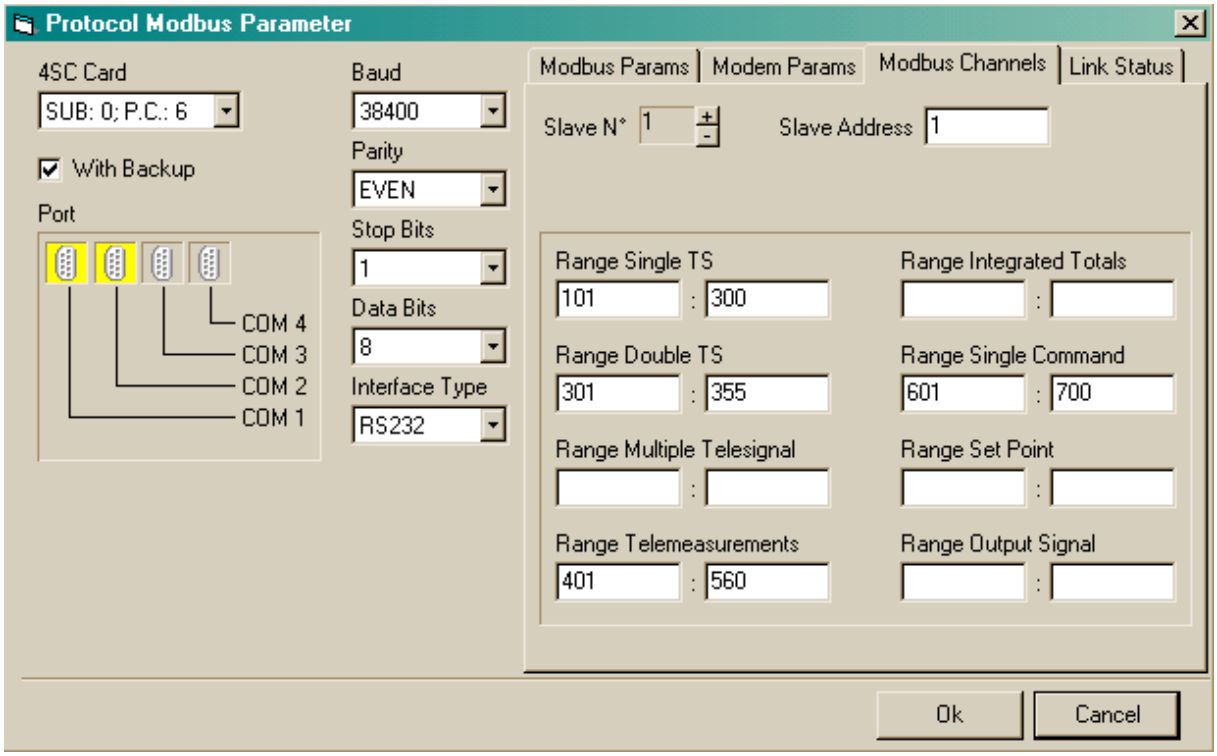

Figure 5-76 - Parameters of Modbus DCS Master protocol – Modbus channels

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MODBUS DCS Master protocol – Modbus channels				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Slave N°	None	Blank	1÷32 step 1	It allows selecting the Slave equipment to be configured on the line (logic progressive).
Slave Address	None	Blank	1÷247 step 1 Blank	It allows configuring the address (expressed in decimal) of the Slave equipment to interface. The Blank field indicates that the Slave n (n=1÷32) is not connected. Up to 32 Slave equipments can be connected to the same serial line. The addresses of the Slave equipments connected to a line can coincide with those of the Slave equipments connected to another line.
Range Single TS				
From	None	Blank	0÷65535 Blank	Lower bound of the memory range containing the Single TS (Single Point Information), with or without Time Tag. The bound is considered included.
To	None	Blank	0÷65535 Blank	Higher bound of the memory range containing the Single TS, with or without Time Tag. The bound is considered included.
Range Double TS				
From	None	Blank	0÷65535 Blank	Lower bound of the memory range containing the Double TS (Double Point Information), with or without Time Tag. The bound is considered included.
To	None	Blank	0÷65535 Blank	Higher bound of the memory range containing the Double TS, with or without Time Tag. The bound is considered included.
Range Multiple Telesignal (**disabled field**)				
From	None	Blank	0÷65535 Blank	Lower bound of the memory range containing the Multiple Telesignal (Bit String of 32 bit), with or without Time Tag. The bound is considered included.
To	None	Blank	0÷65535 Blank	Higher bound of the memory range containing the Multiple Telesignal, with or without Time Tag. The bound is considered included.
Range Telemeasurement				
From	None	Blank	0÷65535 Blank	Lower bound of the memory range containing the Telemeasurement (Measured Value), with or without Time Tag. The bound is considered included.
To	None	Blank	0÷65535 Blank	Higher bound of the memory range containing the Telemeasurement, with or without Time Tag. The bound is considered included.
Range Integrated Totals (**disabled field**)				
From	None	Blank	0÷65535 Blank	Lower bound of the memory range containing the Integrated Totals, with or without Time Tag. The bound is considered included.
To	None	Blank	0÷65535 Blank	Higher bound of the memory range containing the Integrated Totals, with or without Time Tag. The bound is considered included.

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MODBUS DCS Master protocol – Modbus channels				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Range Single Command				
From	None	Blank	0÷65535 Blank	Lower bound of the memory range containing the Single Command. The bound is considered included.
To	None	Blank	0÷65535 Blank	Higher bound of the memory range containing the Single Command. The bound is considered included.
Range Set Point (**disabled field**)				
From	None	Blank	0÷65535 Blank	Lower bound of the memory range containing the Set Point (Set Point Command). The bound is considered included.
To	None	Blank	0÷65535 Blank	Higher bound of the memory range containing the Set Point. The bound is considered included.
Range Output Signal (**disabled field**)				
From	None	Blank	0÷65535 Blank	Lower bound of the memory range containing the Output Signal (Bit String of 32 bit). The bound is considered included.
To	None	Blank	0÷65535 Blank	Higher bound of the memory range containing the Single Command. The bound is considered included.

Table 5-47 - MODBUS DCS Master protocol – Modem

Filling the table, besides the limitations pointed out in the table itself, respect also the following limitations:

a. No overlapping, even if partial, must occur between the ranges of the different types of entities;

b. For each configured range, the higher bound must be ≥ lower one;

c. For each configured range, furthermore, the difference between the two bounds must be ≤ 4096 (decimal);

d. No overlapping, even if partial, must occur between the ranges of the different types of entities and the addresses set for *SP Event Buffer, DP Event Buffer*, *RCE Event Buffer* and *Status Word*.

There are no relationships between the different Slave equipments, that can be however connected to the available serial ports, and there are no relationships between the addressing ranges inside an equipment and the equivalent ranges inside the other equipments.

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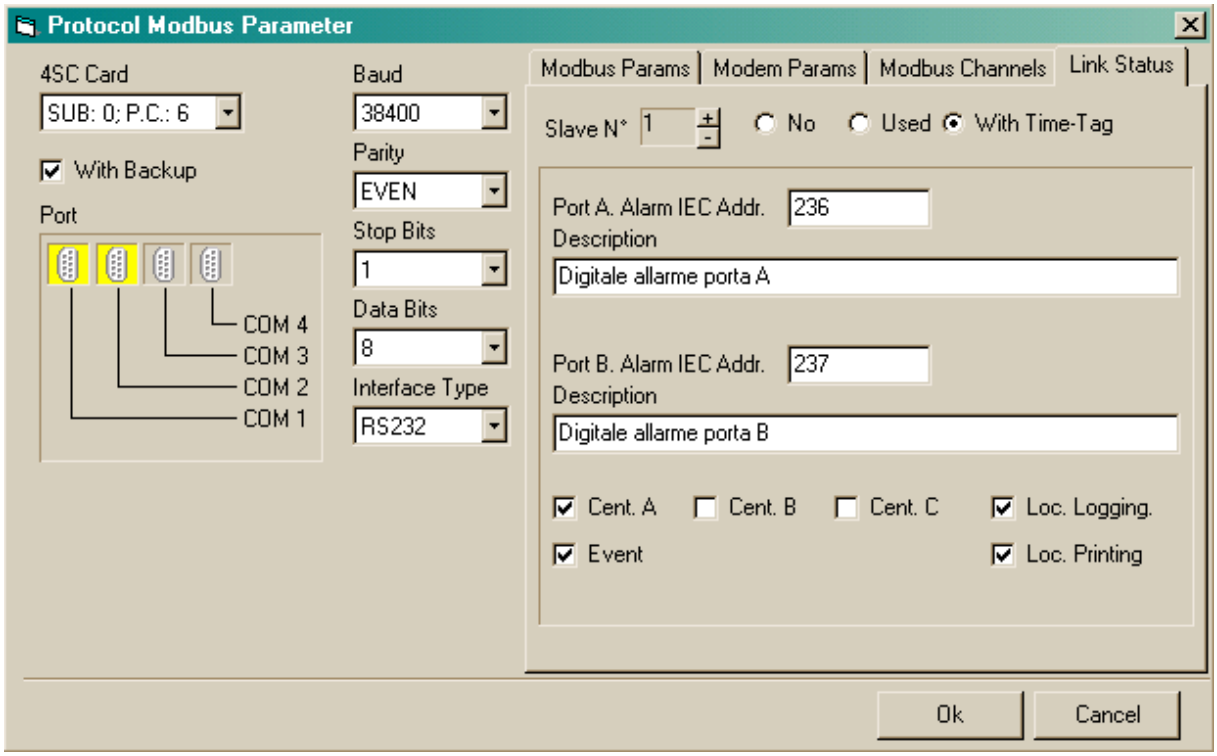

Figure 5-77 - Parameters of DCS Modbus Master protocol – Modbus channels

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MODBUS DCS Master protocol – Link Status				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Slave N°	None	Blank	1÷32 step 1	It allows selecting the Slave equipment to be configured on the line (logic progressive).
Generic fault	None	Not Used	Not Used Used W. Time-Tag	It allows enabling the management of the diagnostic digitals associated to Slave (missed answer), with time tag (*W. Time-Tag*) or without (*Used*).
Port A-Alarm IEC Addr.Point Index	Meaningful if “Generic fault" is different from “Not Used”	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the centre of the diagnostic related to the communication with the Slave. Issuing and clearing of this alarm are managed by 4SC-MODBUS Unit
Description	None	Blank	Max 34 alphanumeric characters	Description associated to the Diagnostic digital. The *Description* field is not transferred to STCE/RTU equipment
Port B-Alarm IEC Addr.Point Index	Meaningful if “Generic fault" " is different from “Not Used”	First free SP index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC address (Information Object Address) of the Single Point with/without Time Tag used for the communication to the centre of the diagnostic related to the communication with the Slave. Issuing and clearing of this alarm are managed by 4SC-MODBUS Unit
Description	None	Blank	Max 34 alphanumeric characters	Description associated to the Diagnostic digital. The *Description* field is not transferred to STCE/RTU equipment
Diagnostic Digital Treatment				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-48 - MODBUS DCS Master protocol – Link Status

The following figure reports the main form for the DCS Modbus Master when the 4SC dualized card is used.

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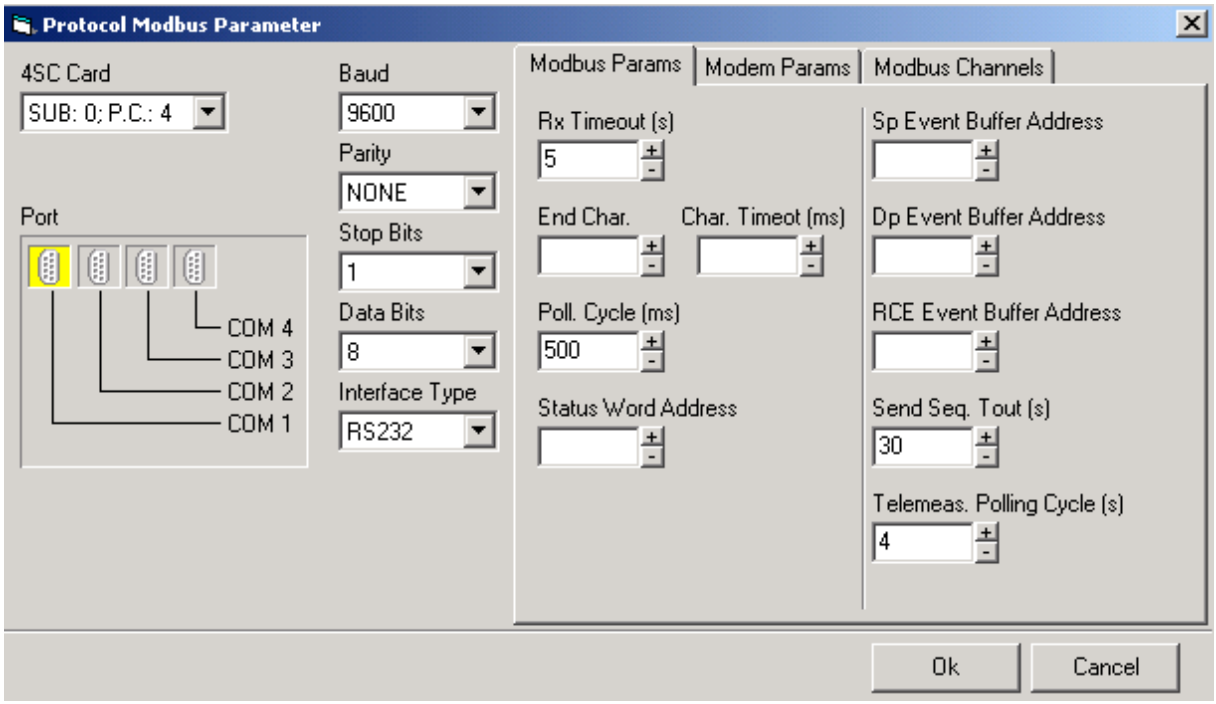

Figure 5-78 - MODBUS DCS Master protocol parameters – 4SC dualized card

The differences in comparison with the use of single 4SC card are the followings:

- In case of Dualized 4SC the double line on the card is not used, because the backup line is implicitly attested to the dual card (see the Figure 5-73);
- In case of Dualized 4SC the “Link Status” Tab Control is not present, because the Single Point reporting the line connection state is configured in the hardware card configuration session (equipping).

All the remaining configuration parameters are equal to those already described for the single 4SC card.

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5.5.4.2.11.2 Specific parameters of Modbus STD Master protocol

In this application the Modbus communication protocol has the purpose to interface the STCE/RTU equipment to one or more Slave equipments, typically PLC, when it is sufficient the use of functions and procedures scheduled by the standard.

For the connection with DCS equipments a point to point connection in single or redundant configuration; the redundancy type scheduled are the following:

- a 4SC card with two serial connections towards two DCS communication Server: a Server in the *Master* state, the other in the *Slave* state;

- two 4SC cards in *Master/Slave* configuration, each with a serial connection towards two DCS communication Server: a Server in the *Master* state and the other in the *Slave* state.

This protocol can be instanced on a RS232/RS422/RS485 port of the *I/O Serial* 4SC-MODBUS unit (COM1, COM2, COM3 or COM4). More instances of the same protocol are possible, up to the use of all the four serial ports present in the card.

On the same card the protocol with Master operation mode and the protocol with Slave operation mode can live together, obviously if they are instanced on different serial ports.

The following figure reports the main form for the Modbus STD Master protocol configuration:

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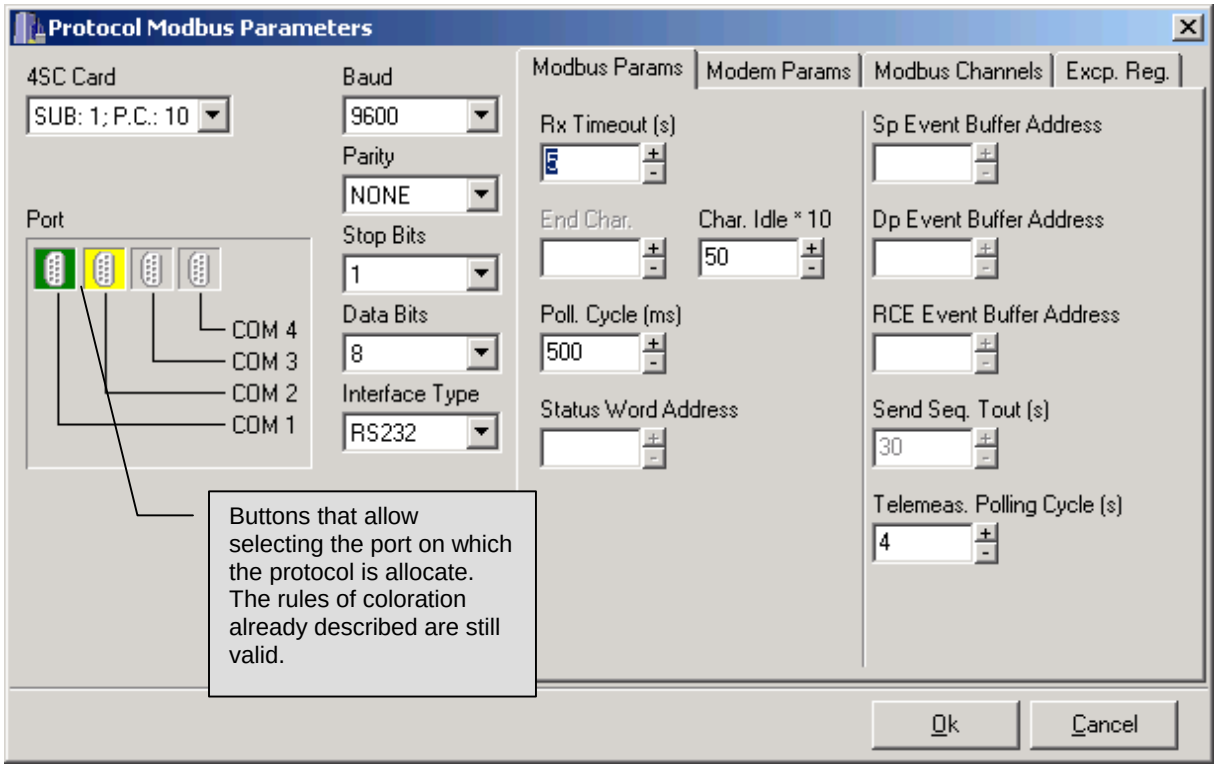

Figure 5-79 – Modbus STD Master protocol parameters – Serial port and Modbus

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MODBUS STD Master protocol – Serial Port and Protocol				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
4SC Card	The list of the 4SC MODBUS cards inserted during the configuration is displayed	Blank	The list of the 4SC MODBUS cards inserted during the configuration with format: SUB: x; P:C: y	It allows to choose the 4SC card among those inserted during the equipping The position of the equipped card is individuated by the following coordinates: SUB = 0÷15 Sub-rack index (0 = Base Sub-rack) (1 = Ext. Sub-rack 1) etc. P.C. = 0÷13 slot (Extension sub-rack) 0÷6 slot (Base Sub-rack) The field is mandatory.
Serial port parameters				
Baud	None	9600	• 50 • 100 • 110 • 150 • 200 • 300 • 400 • 600 • 1200 • 2400 • 4800 • 9600 • 19200 • 38400	Transmission rate is expressed in bit/s. Note: Front End STCR in the current version works with fixed rate of 19200 Bd.
Parity	None	NONE	NONE EVEN ODD	It allows defining the type of use of the Parity bit.
Stop Bits	None	1	1, 2	It allows defining the number of the stop bits to insert at the end of the character
Data Bits	None	8	7, 8	It allows defining the number of Data bit.
Interface Type	None	RS232	RS232 RS422 RS485	It allows defining the type of electric interface, which the selected serial port uses towards outside. The type of electrical interface can be modified replacing an hardware module sub-equipped on the 4SC card. Each serial port has an electrical interface independent from the other ones. The FW of the 4SC card signals the possible incongruence between the configured electrical interface and the equipped electrical interface by lighting the INC led.
Protocol parameters				
Rx Timeout (s)	None	5	1÷255 Step 1	Waiting time for the answer to a frame sending.
End Char (Hex)	None	Blank	1÷255 Step 1 Blank	In alternative, or in addition, to the “Timeout Interbyte” modality, if the type of transmitted information allows, the end of the frame in input can be individuated by acknowledging two given ending characters expressed in hexadecimal format (for instance CR=13, LF=10, etc.).

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MODBUS STD Master protocol – Serial Port and Protocol				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Char. Idle*10	None	Blank	1÷255 Step 1 Blank	Char Idle*10 is like Timeout Interbyte and allows acknowledging the end of a frame in input: the timer is re-activated at the reception of each Byte, at the end of timeout if no byte has been received the frame is declared ended. **Note:** it is mandatory to insert at least a termination modality for the reception: by Timeout Interbyte or by Ending Characters or by both modality
Polling Cycle (ms)	None	500	100÷2000 Step 100	It allows defining the polling cycle on the connection
Status Word Address	None	Blank	Blank	Disabled
SP Event Buffer Address	None	Blank	Blank	Disabled
SP Event Buffer Address	None	Blank	Blank	Disabled
SP Event Buffer Address	None	Blank	Blank	Disabled
Send Seq. Tout (s)	None	Blank	Blank	Disabled
Telemeas. Polling Cycle	None	4	3÷255 Step 1	Cycle time for the refresh of Telemeasures. Periodically, with period equal to the configured time, the master application of Modbus protocol reads all the Telemeasures present in DCS Data Base and sends to Center those changed respect to the previous cycle.

Table 5-49 - Modbus STD Master protocol parameters – Serial port and Protocol

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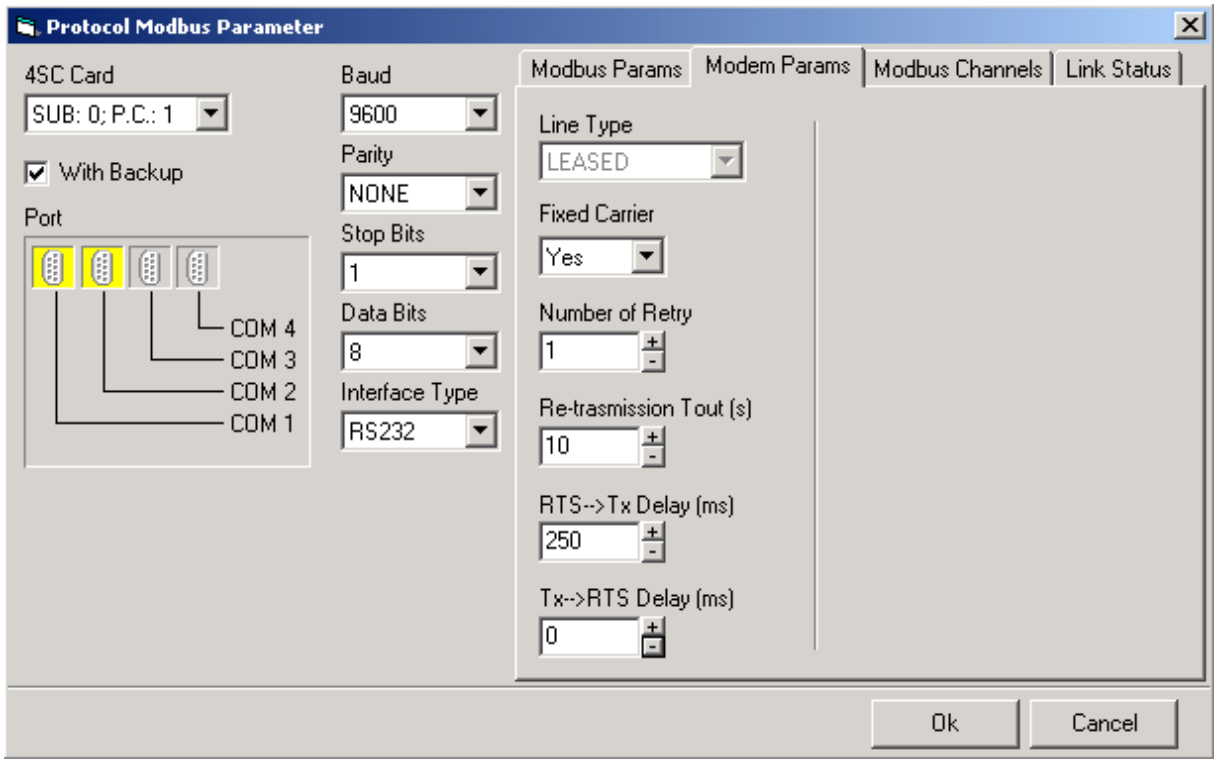

Figure 5-80 - Modbus STD Master protocol parameters – Modem

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MODBUS STD Master protocol – Modem				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Line Type	None	LEASED	LEASED	Read only field, it displays the type of used line. Currently the equipment manages only dedicated lines
Fixed Carrier	None	Enabled	Enabled/Disabled	It allows choosing between the operating modality with commanded carrier or fixed carrier. The user must configure the “commanded carrier” modality in the following cases: • point-to-point connection with 2-wire line • point-multipoint connection
Number of Retry	None	1	1÷10 step 1	It allows to configure the maximum number of re-transmissions to be made in case of failed transmission
Re-transmission Tout (s)	None	10	10÷100 step 10	It allows to configure the waiting period before executing the re-transmission
RTS→Tx Delay (ms)	None	0	0÷250 step 1	It sets the maximum waiting period, in ms, between the activation of the RTS criterion and the transmission of the first byte in line
Tx→RTS Delay (ms)	None	0	0÷250 step 1	It sets the maximum waiting period, in ms, between the transmission of the last byte in line and the deactivation of the RTS criterion

Table 5-50 - Modbus STD Master protocol parameters – Modem

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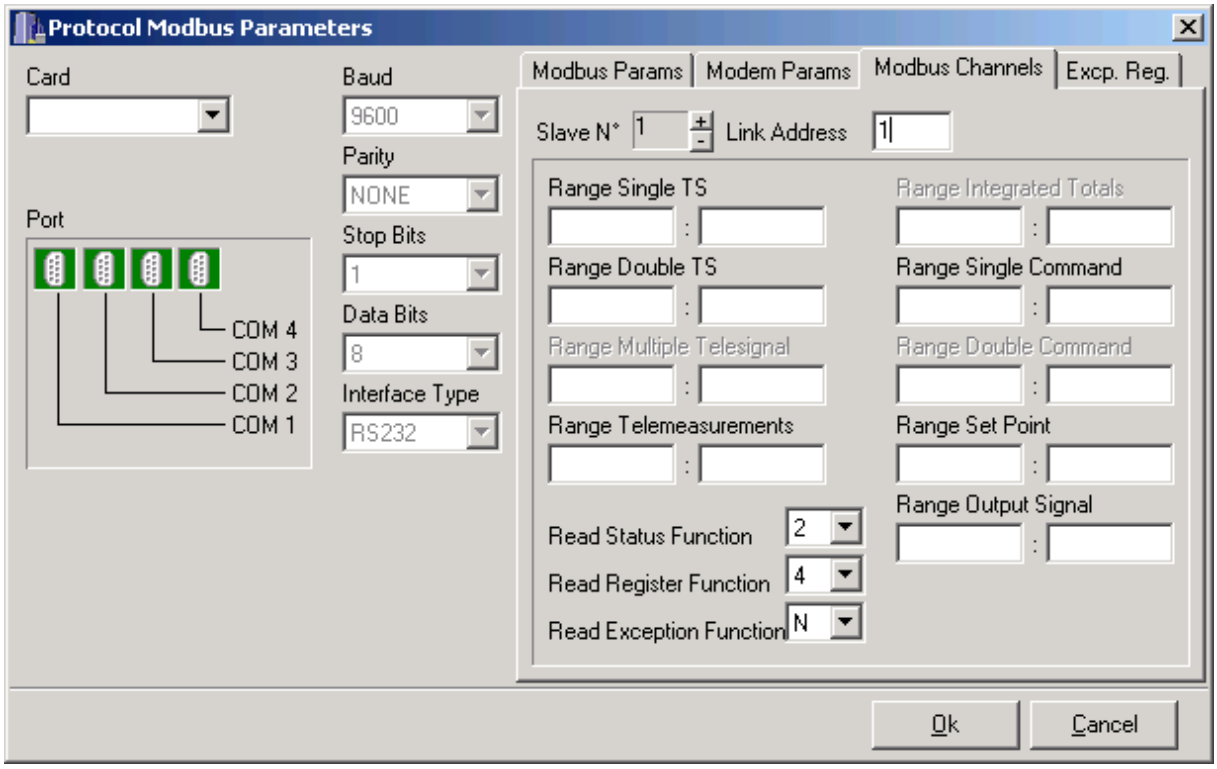

Figure 5-81 - Modbus STD Master protocol parameters – Modbus channels

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MODBUS STD Master protocol – Modbus channels				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Slave N°	None	Blank	1÷32 step 1	It allows selecting the Slave equipment to be configured on the line (logic progressive).
Link Address	None	Blank	1÷247 step 1 Blank	It allows configuring the address (expressed in decimal) of the Slave equipment to interface. The Blank field indicates that the Slave n (n=1÷32) is not connected. Up to 32 Slave equipments can be connected to the same serial line. The addresses of the Slave equipments connected to a line can coincide with those of the Slave equipments connected to another line.
Range Single TS				
From	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Lower bound of the memory range containing the Single TS (Single Point Information), with or without Time Tag. The bound is considered included.
To	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Higher bound of the memory range containing the Single TS, with or without Time Tag. The bound is considered included.
Range Double TS				
From	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Lower bound of the memory range containing the Double TS (Double Point Information), with or without Time Tag. The bound is considered included.
To	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Higher bound of the memory range containing the Double TS, with or without Time Tag. The bound is considered included.
Range Telemeasurement				
From	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Lower bound of the memory range containing the Telemeasurement (Measured Value), with or without Time Tag. The bound is considered included.
To	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Higher bound of the memory range containing the Telemeasurement, with or without Time Tag. The bound is considered included.
Range Single Command				
From	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Lower bound of the memory range containing the Single Command. The bound is considered included.
To	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Higher bound of the memory range containing the Single Command. The bound is considered included.
Range Set Point				
From	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Lower bound of the memory range containing the Set Point (Set Point Command). The bound is considered included.

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MODBUS STD Master protocol – Modbus channels				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
To	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Higher bound of the memory range containing the Set Point. The bound is considered included.
Range Output Signal				
From	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Lower bound of the memory range containing the Output Signal (Bit String of 32 bit). The bound is considered included.
To	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Higher bound of the memory range containing the Single Command. The bound is considered included.
Read Status Function	Field present only if the *Link Address* field is configured	2	1, 2	It allows configuring the Modbus function used to read digital information: 1 = Read Coil Status 2 = Read Input Status.
Read Register Function	Field present only if the *Link Address* field is configured	4	3, 4	It allows configuring the Modbus function used to read digital information: 3 = Read Holding Registers 4 = Read Input Registers.
Read Exception Function	None	N	N, Y	It allows configuring the Modbus function used to read the exception register

Table 5-51 - Modbus STD Master protocol parameters – Modbus channels

Filling the table, besides the limitations pointed out in the table itself, respect also the following limitations:

a. No overlapping, even if partial, must occur between the ranges of the different types of entities;

b. For each configured range, the higher bound must be ≥ lower one;

c. For each configured range, furthermore, the difference between the two bounds must be ≤ 4096 (decimal);

There are no relationships between the different Slave equipments, that can be however connected to the available serial ports, and there are no relationships between the addressing ranges inside an equipment and the equivalent ranges inside the other equipments.

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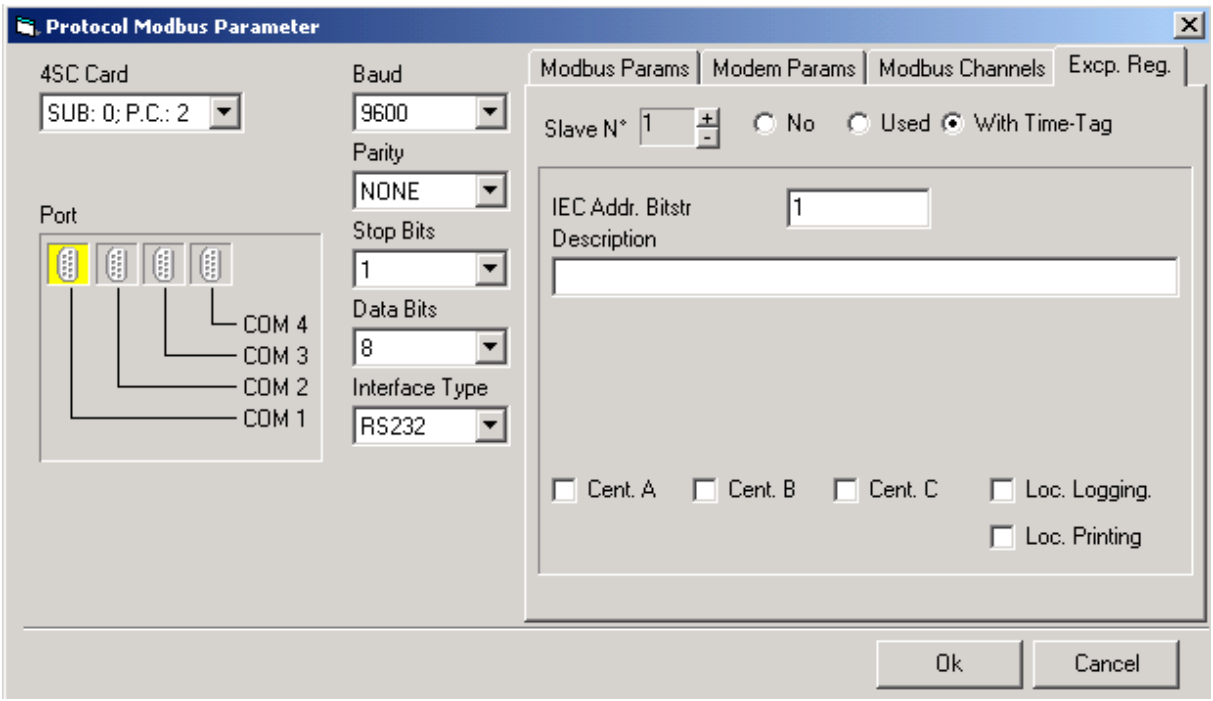

Figure 5-82 - Modbus STD Master protocol parameters - Exception Register

MODBUS STD Master protocol – Exception Register				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Excp. Reg.	Nessuna	Not Used	Not Used Used W. Time-Tag	It allows enabling the Exception Status register reading through the function 7 (Read Exception Status). The read register is recopied on a 32 bit Bit String, with hourly brand (W. Time-Tag) or without (Used), of which the eight less meaningful bit are used only. The meaning of the eight read bit depends on the interfaced PLC. In some PLC equipments the meaning is default in others and it is programmable from the user. STCE/RTU equipment allows to move to the Center these information in a totally transparent way.
IEC Addr. Bitstr	Enabled if "Excp. Reg." = Used with or without Time Tag	First free Bit String index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	IEC (Information Object Address) address of the 32 bit Bit String with/without Time Tag used for the communication to the centre of the Exception Status read bits.
Description	None	Blank	Max 34 alphanumeric characters	Description associated to the quantity. The *Description* field is not transferred to the STCE/RTU equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-52 - Modbus STD Master protocol - Exception Register

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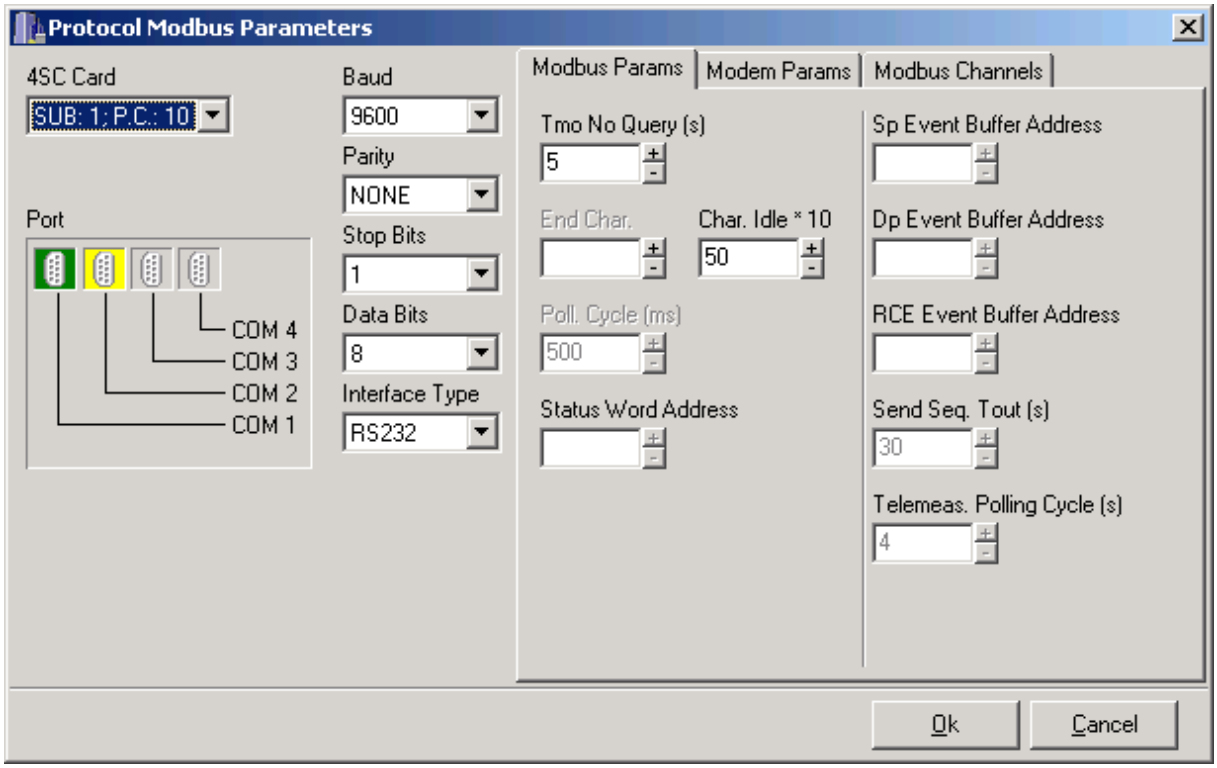
5.5.4.2.11.3 Specific parameters of Modbus STD Slave protocol

In this application the Modbus communication protocol has the purpose to interface the STCE/RTU equipment to a Master equipments, when it is sufficient the use of functions and procedures scheduled by the standard.

This protocol can be instanced on a RS232/RS422/RS485 port of the *I/O Serial* 4SC-MODBUS unit (COM1, COM2, COM3 or COM4). More instances of the same protocol are possible, up to the use of all the four serial ports present in the card.

On the same card the protocol with Master operation mode and the protocol with Slave operation mode can live together, obviously if they are instanced on different serial ports.

The following figure reports the main form for the Modbus STD Slave protocol configuration:



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MODBUS STD Slave protocol – Serial Port and Protocol				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
4SC Card	The list of the 4SC MODBUS cards inserted during the configuration is displayed	Blank	The list of the 4SC MODBUS STD cards inserted during the configuration with format: SUB: x; P:C: y	It allows to choose the 4SC card among those inserted during the equipping The position of the equipped card is individuated by the following coordinates: SUB = 0÷15 Sub-rack index (0 = Base Sub-rack) (1 = Ext. Sub-rack 1) etc. P.C. = 0÷13 slot (Extension sub-rack) 0÷6 slot (Base Sub-rack) The field is mandatory.
Serial port parameters				
Baud	None	9600	• 50 • 100 • 110 • 150 • 200 • 300 • 400 • 600 • 1200 • 2400 • 4800 • 9600 • 19200 • 38400	Transmission rate is expressed in bit/s.
Parity	None	NONE	NONE EVEN ODD	It allows defining the type of use of the Parity bit.
Stop Bits	None	1	1, 2	It allows defining the number of the stop bits to insert at the end of the character
Data Bits	None	8	7, 8	It allows defining the number of Data bit.
Interface Type	None	RS232	RS232 RS422 RS485	It allows defining the type of electric interface, which the selected serial port uses towards outside. The type of electrical interface can be modified replacing an hardware module sub-equipped on the 4SC card. Each serial port has an electrical interface independent from the other ones. The FW of the 4SC card signals the possible incongruence between the configured electrical interface and the equipped electrical interface by lighting the INC led.
Protocol parameters				
Tmo No Query (s)	None	5	1÷255 Step 1	Waiting time for the answer to a frame sending.
End Char (Hex)	None	Blank	Caratteri Alfanumerici Blank	In alternative, or in addition, to the “Timeout Interbyte” modality, if the type of transmitted information allows, the end of the frame in input can be individuated by acknowledging two given ending characters expressed in hexadecimal format (for instance CR=0D, LF=0A, etc.).

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MODBUS STD Slave protocol – Serial Port and Protocol				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Char. Idle*10	None	Blank	1÷255 Step 1 Blank	Char Idle*10 is like Timeout Interbyte and allows acknowledging the end of a frame in input: the timer is re-activated at the reception of each Byte, at the end of timeout if no byte has been received the frame is declared ended. **Note:** it is mandatory to insert at least a termination modality for the reception: by Timeout Interbyte or by Ending Characters or by both modality
Polling Cycle (ms)	None	500	500	Campo non utilizzato in modalità Slave
Status Word Address	None	Blank	Blank	Campo non utilizzato in modalità Slave
SP Event Buffer Address	None	Blank	Blank	Campo non utilizzato in modalità Slave
SP Event Buffer Address	None	Blank	Blank	Campo non utilizzato in modalità Slave
SP Event Buffer Address	None	Blank	Blank	Campo non utilizzato in modalità Slave
Send Seq. Tout (s)	None	30	30	Campo non utilizzato in modalità Slave
Telemeas. Polling Cycle	None	4	4	Campo non utilizzato in modalità Slave

Table 5-53 - MODBUS STD Slave protocol – Serial Port and Protocol

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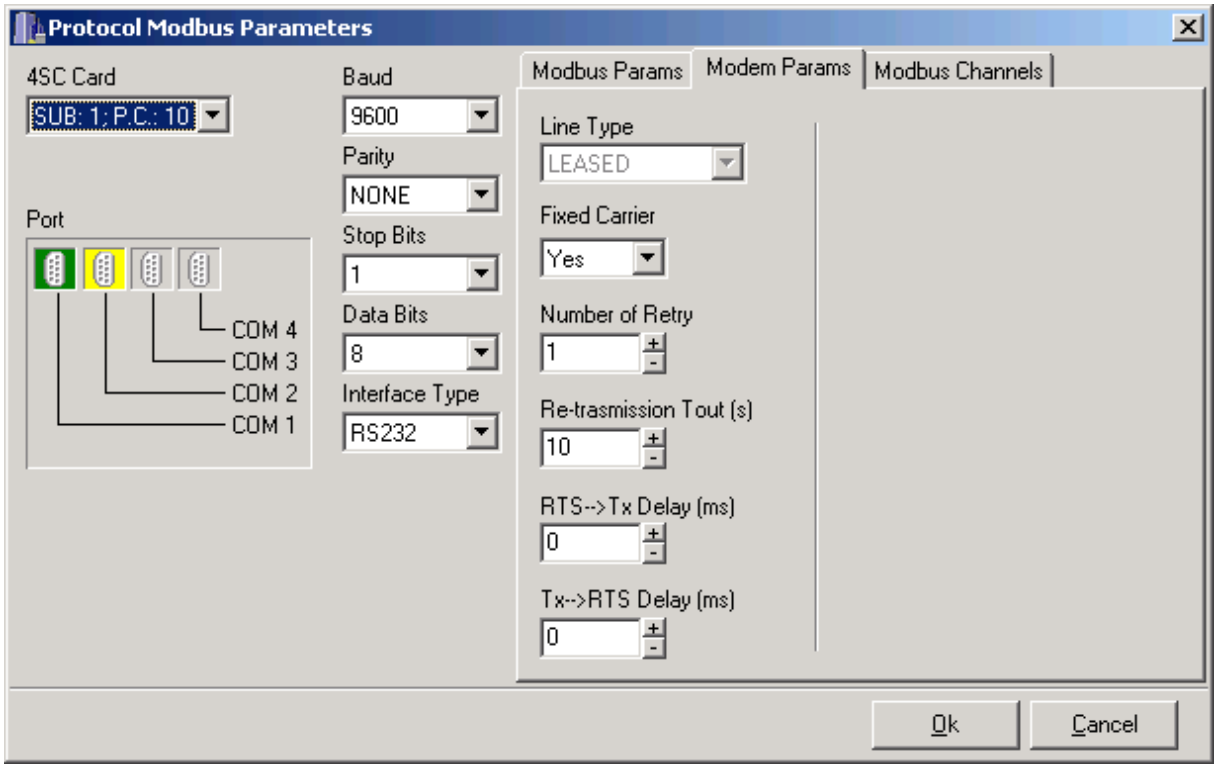

Figure 5-83 - MODBUS STD Slave protocol parameters – Modem

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MODBUS STD Slave protocol – Modem				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Line Type	None	LEASED	LEASED	Read only field, it displays the type of used line. Currently the equipment manages only dedicated lines
Fixed Carrier	None	Enabled	Enabled/Disabled	It allows choosing between the operating modality with commanded carrier or fixed carrier. The user must configure the “commanded carrier” modality in the following cases: • point-to-point connection with 2-wire line • point-multipoint connection
Number of Retry	None	1	1÷10 step 1	It allows to configure the maximum number of re-transmissions to be made in case of failed transmission
Re-transmission Tout (s)	None	10	10÷100 step 10	It allows to configure the waiting period before executing the re-transmission
RTS→Tx Delay (ms)	None	0	0÷250 step 1	It sets the maximum waiting period, in ms, between the activation of the RTS criterion and the transmission of the first byte in line
Tx→RTS Delay (ms)	None	0	0÷250 step 1	It sets the maximum waiting period, in ms, between the transmission of the last byte in line and the deactivation of the RTS criterion

Table 5-54 - MODBUS STD Slave protocol – Modem

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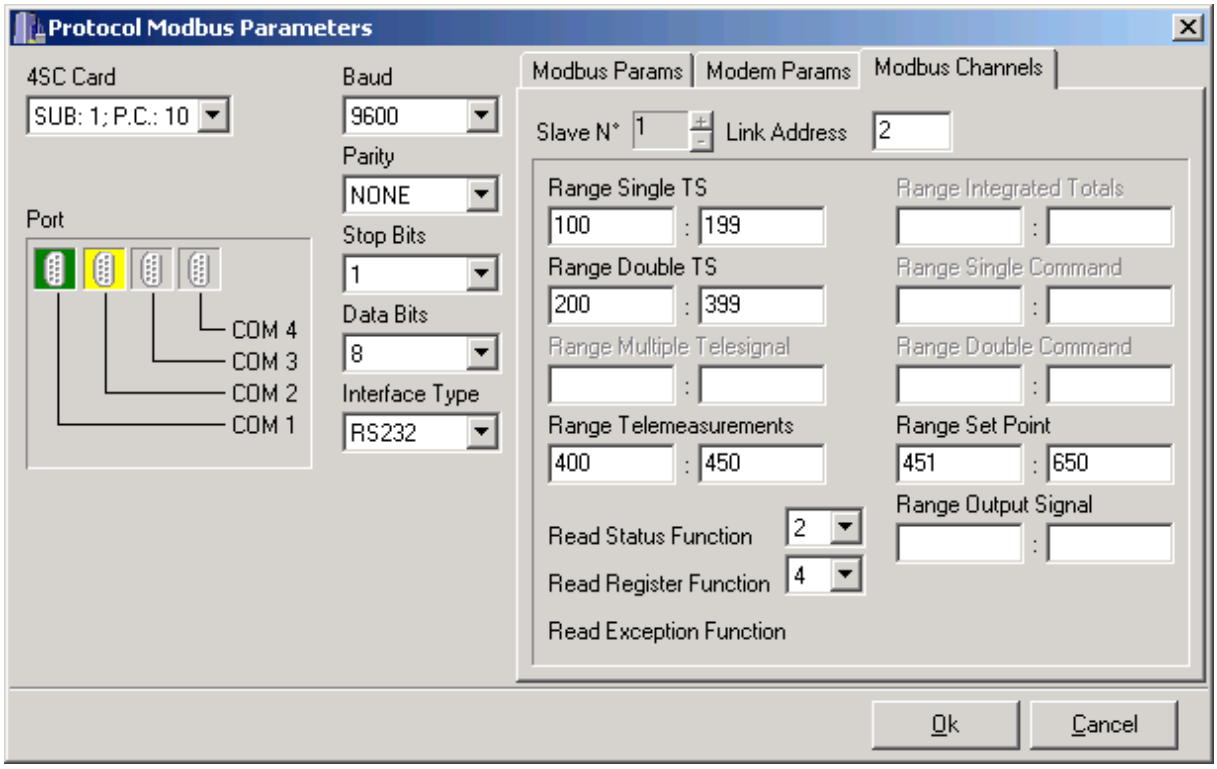

Figure 5-84 - MODBUS STD Slave protocol parameters – Modbus channels

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MODBUS STD Slave protocol – Modbus channels				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Link Address	None	Blank	1÷247 step 1 Blank	It allows configuring its own link address (expressed in decimal)
Range Single TS				
From	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Lower bound of the memory range containing the Single TS (Single Point Information), with or without Time Tag. The bound is considered included.
To	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Higher bound of the memory range containing the Single TS, with or without Time Tag. The bound is considered included.
Range Double TS				
From	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Lower bound of the memory range containing the Double TS (Double Point Information), with or without Time Tag. The bound is considered included.
To	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Higher bound of the memory range containing the Double TS, with or without Time Tag. The bound is considered included.
Range Telemeasurement				
From	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Lower bound of the memory range containing the Telemeasurement (Measured Value), with or without Time Tag. The bound is considered included.
To	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Higher bound of the memory range containing the Telemeasurement, with or without Time Tag. The bound is considered included.
Range Single Command				
From	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Lower bound of the memory range containing the Single Command. The bound is considered included.
To	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Higher bound of the memory range containing the Single Command. The bound is considered included.
Range Set Point				
From	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Lower bound of the memory range containing the Set Point (Set Point Command). The bound is considered included.
To	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Higher bound of the memory range containing the Set Point. The bound is considered included.
Range Output Signal				
From	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Lower bound of the memory range containing the Output Signal (Bit String of 32 bit). The bound is considered included.

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MODBUS STD Slave protocol – Modbus channels				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
To	Field present only if the *Link Address* field is configured	Blank	0÷65535 Blank	Higher bound of the memory range containing the Single Command. The bound is considered included.
Read Status Function	Field present only if the *Link Address* field is configured	2	1, 2	It allows configuring the Modbus function used to read digital information: 1 = Read Coil Status 2 = Read Input Status.
Read Register Function	Field present only if the *Link Address* field is configured	4	3, 4	It allows configuring the Modbus function used to read digital information: 3 = Read Holding Registers 4 = Read Input Registers.

Table 5-55 - MODBUS STD Slave protocol – Modbus channels

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5.5.4.2.12 Specific parameters of IEC 60870-5-103 Master protocol

The *IEC60870*-5-103 Master protocol is a *line protocol,* used for the communication with one or more remote equipments respect to the STCE/RTU equipment by means of a *dedicated line* (leased line).

This protocol can be instance independently on each of the four serial ports available on 4SC-103 card (COM1, COM2, COM3 and COM4)

The globally configurable parameters for the protocols are subdivided in for typologies:

- parameters of the communication serial port
- parameters typical of the IEC60870-5-103 Master protocol
- parameters for the use of the connected Modem (DCE)
- addresses of remote equipment connected to different lines

Each typology of parameters can be accessed from the unique editing window reported in the following figure, by the proper Tab controls.

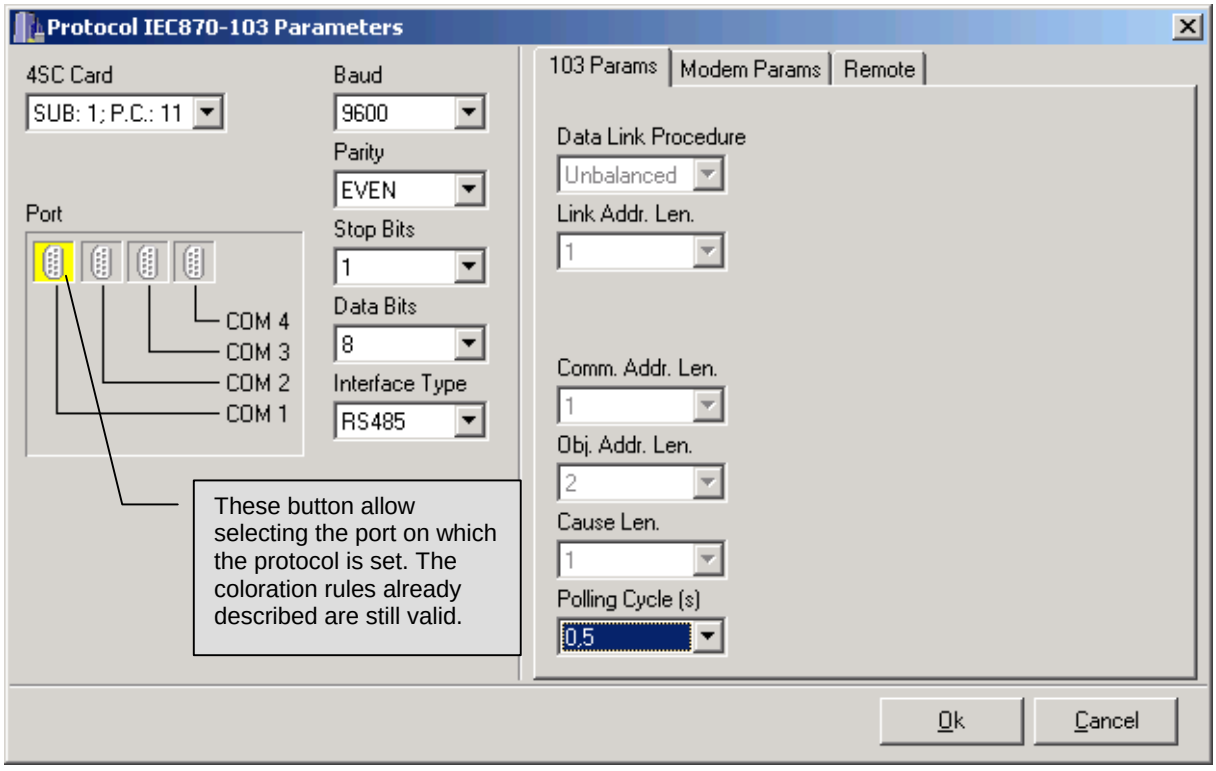

Figure 5-85 - IEC60870-5-103 Master protocol - Port Parameters e 103 Params

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IEC60870-5-103 Master protocol on 4SC –Serial port and protocol parameters				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
4SC Card	The list of the 4SC-103 cards inserted during the configuration is displayed	Blank	List of 4SC-103 cards inserted during the configuration with the format: SUB: x; P:C: y	It allows choosing the 4SC card among those inserted in equipping. The position of the equipped card is displayed with the following coordinates: SUB = 0÷15 Subrack index (0 = Base Subrack) (1 = Ext. Subrack 1) etc. P.C. = 0÷13 slot (Ext. Subrack) 0÷6 slot (Base Subrack) This field is mandatory.
Port	None	None	COM1 COM2 COM3 COM4	It allows to choose the serial port where the *IEC60870*-5-103 Master protocol is connected. **The user must remember to equip the desired interface module (RS232, RS422 or RS485) in correspondence of the selected COM** This field is mandatory.
Serial Port Parameters				
Baud	None	9600	• 50 • 100 • 110 • 150 • 200 • 300 • 400 • 600 • 1200 • 2400 • 4800 • 9600 • 19200	Line transmission rate expressed in bit/s
Parity	None	EVEN	NONE EVEN ODD	It allows to define the type of use of the Parity bit
Stop Bits	None	1	1, 2	It allows to define the number of the Stop bits to insert at the end of the character
Data Bits	None	8	8	Read only field, it displays the number of Data bits
Interface Type	None	RS232	RS232 RS422 RS485	It allows defining the type of electric interface, which the selected serial port presents outside. The type of electric interface can be modified with the substitution of an hardware module sub-equipped on the 4SC card. Each serial port has an electric interface independent from the other ones. The FW of the 4SC card signals the possible incongruence between the configured electric interface and the equipped electric interface by lighting the INC led. Note: The normal application, which allows the connection to a DCE for the transmission, is realized with RS232 interface.
Protocol parameters				

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IEC60870-5-103 Master protocol on 4SC –Serial port and protocol parameters				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Data Link Procedure	None	UNBALANCED	UNBALANCED	It allows configuring the used Data Link procedure.
Link Addr. Len.	None	1	1	Length of the Data Link address expressed in number of Bytes
Common Addr. Len.	None	1	1	It allows to define the Common Address length, expressed in number of Bytes
Obj. Addr. Len.	None	2	2	It allows defining the length of the Info Object Address field, in number of Bytes
Cause Lenght	None	1	1	It allows to define the Cause of Transmission field length expressed in number Bytes
Polling Cycle (s)	None	0,5	0,5÷10 Step 0,5	It allows defining the polling sequence on the connection.

Table 5-56 - IEC60870-5-103 Master protocol - Serial port and protocol

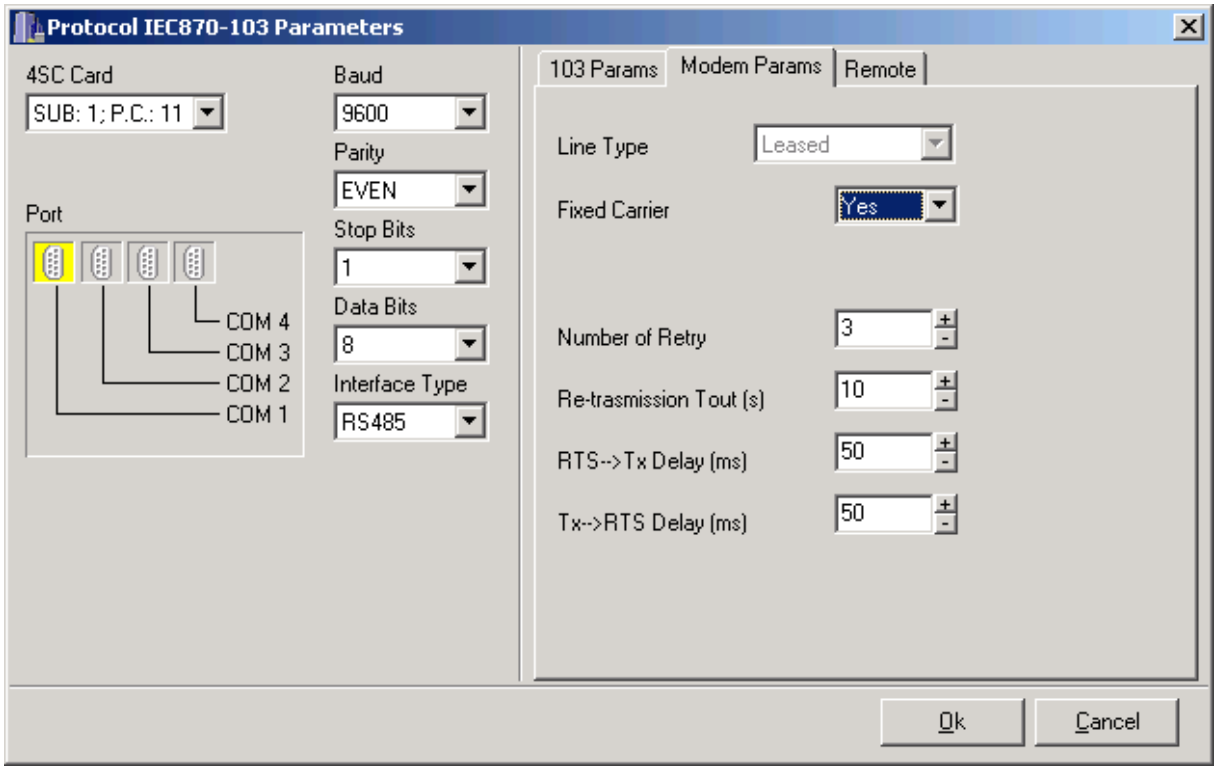

Figure 5-86 - IEC60870-5-103 Master protocol parameters – Modem

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IEC60870-5-103 Master protocol – Modem				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Line Type	None	LEASED	LEASED	Read only field, it displays the type of used line. Currently the equipment manages only dedicated lines
Fixed Carrier	None	YES	YES/NO	It allows choosing between the operating modality with commanded carrier or fixed carrier. The user must configure the “commanded carrier” modality in the following cases: • point-to-point connection with 2-wire line • point-multipoint connection
Number of Retry	None	1	1÷10 step 1	It allows to configure the maximum number of re-transmissions to be made in case of failed transmission
Re-transmission Tout (s)	None	10	10÷100 step 10	It allows to configure the waiting period before executing the re-transmission
RTS→Tx Delay (ms)	None	0	0÷250 step 1	It sets the maximum waiting period, in ms, between the activation of the RTS criterion and the transmission of the first byte in line
Tx→RTS Delay (ms)	None	0	0÷250 step 1	It sets the maximum waiting period, in ms, between the transmission of the last byte in line and the deactivation of the RTS criterion

Table 5-57 - IEC60870-5-103 Master protocol parameters – Modem

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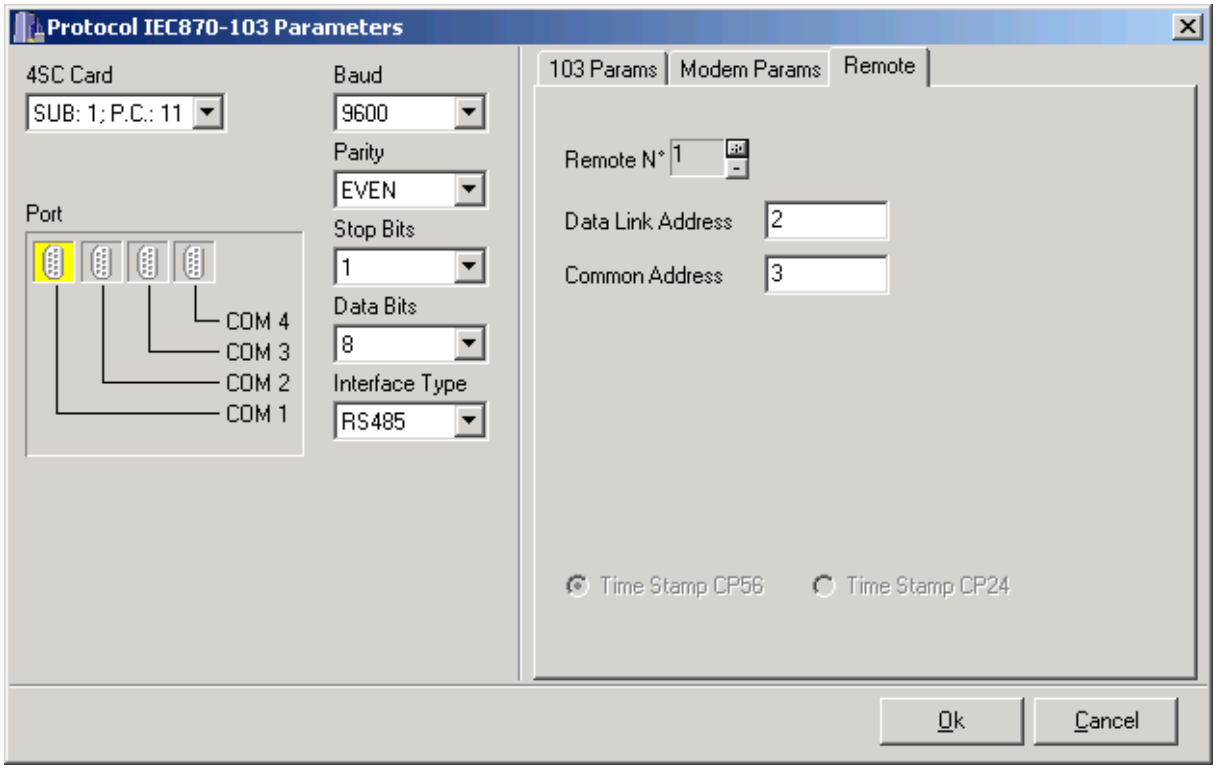

Figure 5-87 - IEC60870-5-103 Master protocol parameters – Remote equipment

IEC60870-5-103 Master protocol on 4SC-103 – Remote Equipments				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Data Link Address	It depends on the number of octets of Link Address	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the Slave equipment (Station IEC address). Slave Address can be omitted if the communication modality is of *Balanced* type. This field is mandatory.
Common Add.	It depends on the number of octets of Link Address	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of the Master ASDU. It is used in Control Direction to send the General Interrogation and the clock synchronization. This field is mandatory.

Table 5-58 - IEC60870-5-103 Master protocol – Remote equipment

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5.5.4.3 Services

"Services" form allows configuring the service serial ports reported in the following table:

Port (logic name)	Location	Interface type
Printer Serial Port	CPU2000 Central Unit (Connector C)	RS232 not insulated
Maintenance PC Serial Port	CPU2000 Central Unit (Connector PC)	RS232 not insulated (RJ45)
GPS Serial Port	CPU2000 Central Unit (internal port)	N.A.

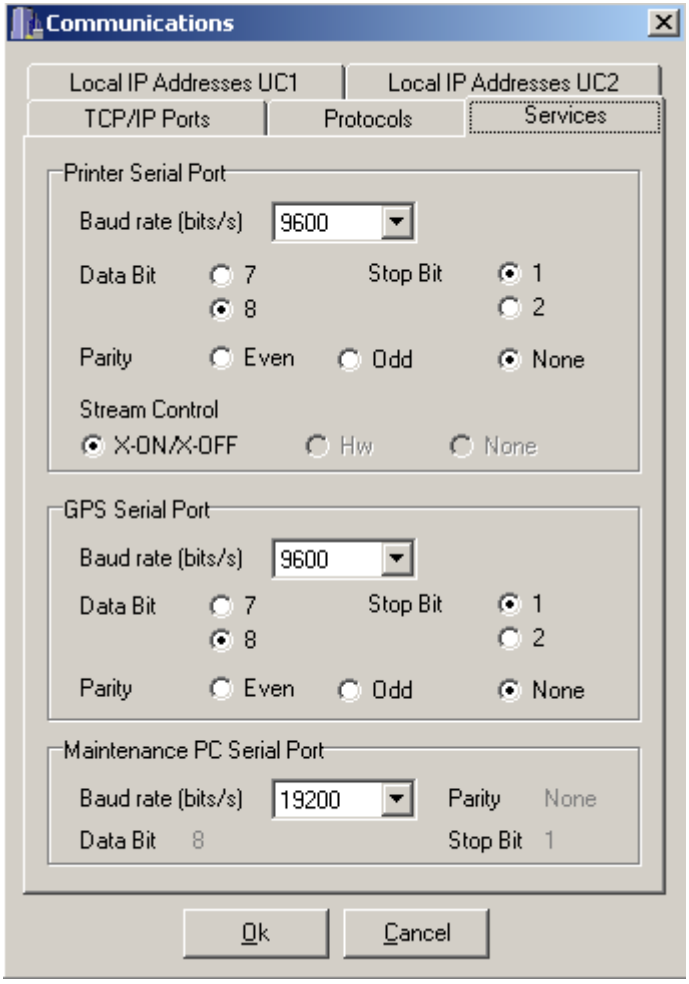

Figure 5-88 –Service ports configuration

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Service Ports parameters				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Printer Serial Port				
Baud rate (Bit/s)	None	9600	• 300 • 600 • 1200 • 2400 • 4800 • 9600 • 19200	Transmission rate is expressed in bit/s.
Data Bits	None	8	7, 8	It allows defining the number of Data bit.
Stop Bits	None	1	1, 2	It allows defining the number of the stop bits to insert at the end of the character
Parity	None	NONE	NONE EVEN ODD	It allows defining the type of use of the Parity bit.
Stream control	None	X-ON/X-OFF	X-ON/X-OFF	It defines the type of control flow used in the communication to the printer. Read only field.
GPS Serial Port				
Baud rate (Bit/s)	None	9600	• 2400 • 4800 • 9600 • 19200	Transmission rate is expressed in bit/s.
Data Bits	None	8	7, 8	It allows defining the number of Data bit.
Stop Bits	None	1	1, 2	It allows defining the number of the stop bits to insert at the end of the character
Parity	None	NONE	NONE EVEN ODD	It allows defining the type of use of the Parity bit.
Maintenance PC Serial Port				
Baud rate (Bit/s)	None	19200	19200 38400 57600	Transmission rate is expressed in bit/s. Read only field
Data Bits	None	8	8	Number of Data bit. Read only field.
Stop Bits	None	1	1	It allows defining the number of the stop bits to insert at the end of the character. Read only field.
Parity	None	NONE	NONE	It allows defining the type of use of the Parity bit. Read only field.

Table 5-59 - Service ports configuration

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5.5.4.4 Local IP Addresses

"Local IP Addresses UC1" form allows configuring to the STCE/RTU equipment the IP local addresses assigned to the Central Unit 1. "Local IP Addresses UC2" form allows configuring to the STCE/RTU equipment the IP local addresses assigned to the Central Unit 2.

The configured IP addresses are those that are used when IEC60870-5-104 is instanced as line protocol for the communication with the Center/s, both on serial and on Ethernet Interface.

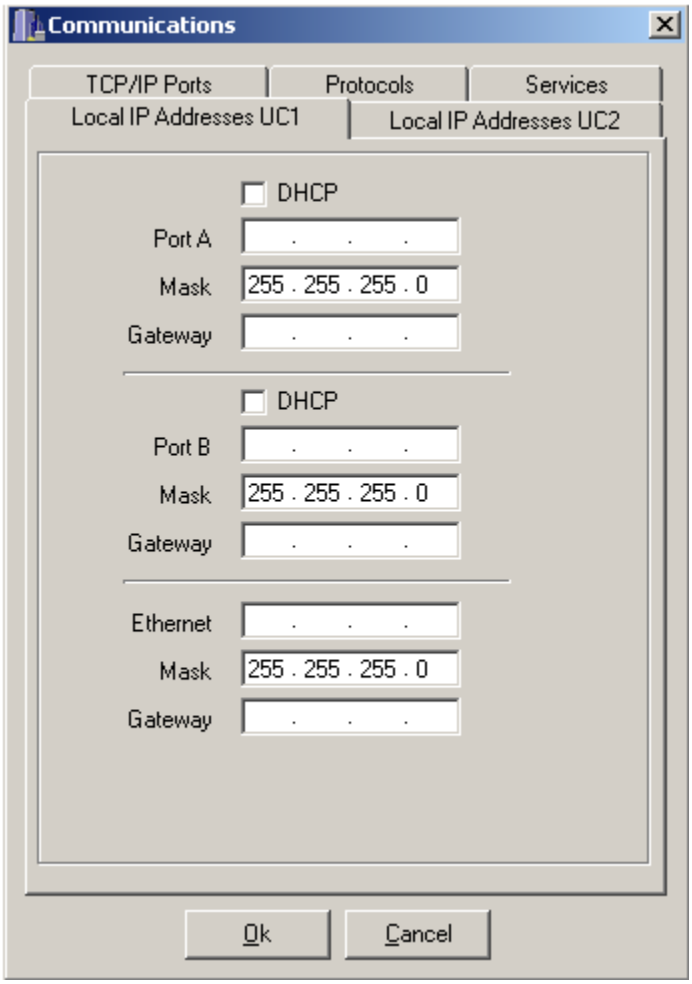

Figure 5-89 - Local IP Addresses configuration

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Local IP Addresses – UC1 / UC2				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Port A				
DHCP	None	Disabled	Enabled/Disabled	It is necessary to enable this field when, as in the case of connection to the GPRS network, the Central Unit IP address is dynamically assigned by the network.
Port A	Enabled only if DHCP=disabled	Blank	IP address valid with format: xxx.yyy.vvv.zzz	It allows configuring the IP address used to address the equipment on a SLIP/PPP connection on the Serial A port of CPU2000 in position 1. If this type of connection is used, the field is mandatory, unless the DHCP is enabled.
Mask	Enabled only if DHCP=disabled	Blank	Bit mask in the format: xxx.yyy.vvv.zzz	It allows configuring the bit mask on IP addressing.
Gateway	Enabled only if DHCP=disabled	Blank	IP address valid with format: xxx.yyy.vvv.zzz	It allows configuring the gateway IP address.
Port B				
DHCP	None	Disabled	Enabled/Disabled	It is necessary to enable this field when, as in the case of connection to the GPRS network, the Central Unit IP address is dynamically assigned by the network.
Port B	None	Blank	IP address valid with format: xxx.yyy.vvv.zzz	It allows configuring the IP address used to address the equipment on a SLIP/PPP connection on the Serial B port of CPU2000 in position 1. If this type of connection is used, the field is mandatory unless the DHCP is enabled.
Mask	Enabled only if DHCP=disabled	Blank	Bit mask in the format: xxx.yyy.vvv.zzz	It allows configuring the bit mask on IP addressing.
Gateway	Enabled only if DHCP=disabled	Blank	IP address valid with format: xxx.yyy.vvv.zzz	It allows configuring the gateway IP address.
Ethernet				
Ethernet	None	Blank	IP address valid with format: xxx.yyy.vvv.zzz	It allows configuring the IP address used to address the equipment on a TCP/IP connection on the Ethernet port of CPU2000 in position 1. If this type of connection is used, the field is mandatory
Mask	Enabled only if DHCP=disabled	Blank	Bit mask in the format: xxx.yyy.vvv.zzz	It allows configuring the bit mask on IP addressing.
Gateway	Enabled only if DHCP=disabled	Blank	IP address valid with format: xxx.yyy.vvv.zzz	It allows configuring the gateway IP address.

Table 5-60 - Local IP Addresses configuration

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5.5.5 Plant Zone

Using this technical form it is possible to configure up to 32 plant zones that can be associated to the Remote Commands (single and double) managed by the STCE/RTU equipment.

The consequent performance allows managing, in presence of a local supervision centre, the "*Local Command*" status or the "*Remote Command*" status of single plant zones.

It is possible to associate to each plant zone:

- the IEC index of a Telesignal (Single Point) that reports the "*Local/Remote Command*" current status associated to the zone.
- the IEC index of a Service Remote Command (Single Command) that allows modifying the "*Local/Remote Command*" current status associated to the zone; this service remote command can be sent only by the Center defined as "*Local Center*".

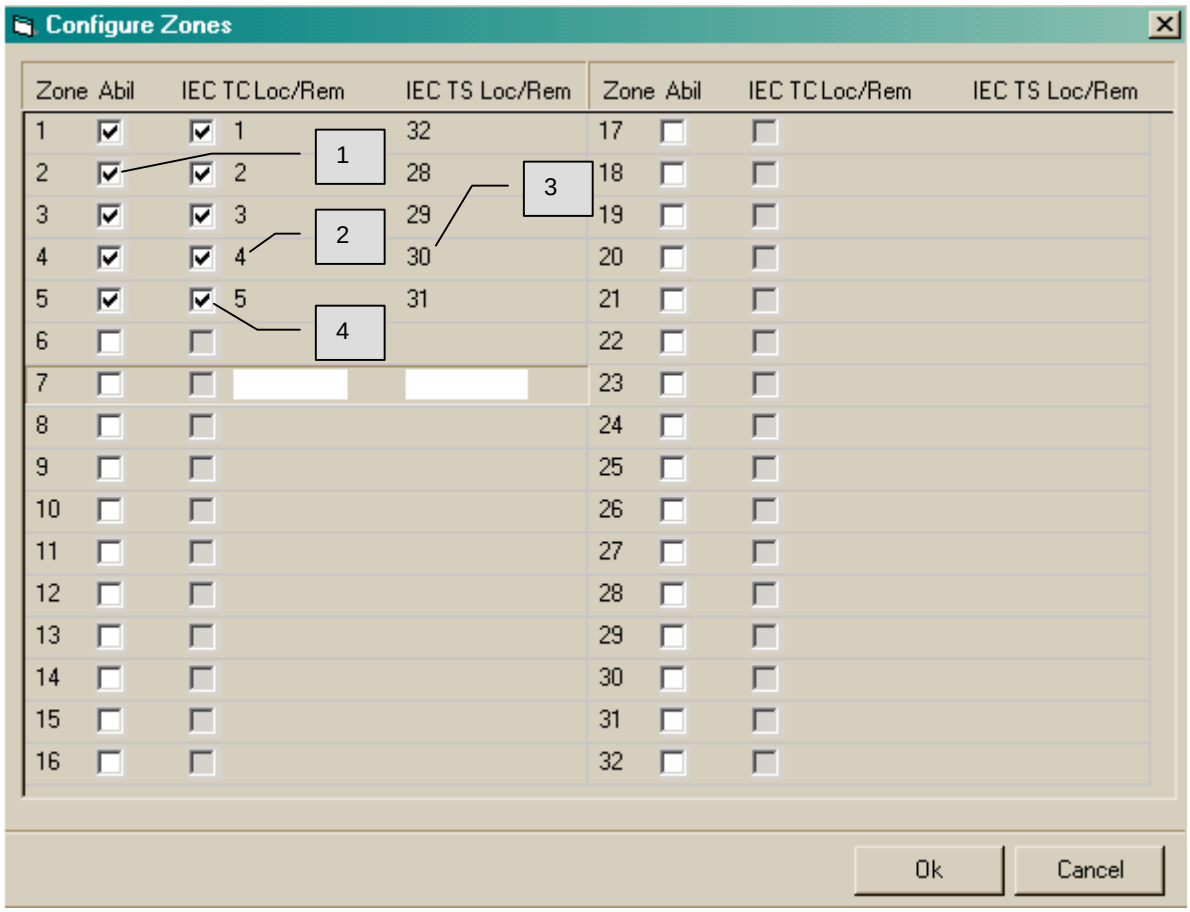

Figure 5-90 - Plant Zones configuration

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Plant Zones				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Zone	None	N.A.	1÷32 step 1	It allows selecting the plant zone to configure, up to a maximum of 32
Abil (1)	None	Disabled	Enabled/Disabled	It allows enabling the use of the Plant Zone
Abil (4)	None	Enabled	Enabled/Disabled	It allows enabling the use of the Remote Command used to set the Zone in Local or Remote Control (IEC TC Loc/Rem)
IEC TC Loc/Rem (2)	None	Blank	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC index of Remote Command (Single Command) that allows to set “In Local” or “In Remote Command” the Plant Zone which is associated to
IEC SP Loc/Rem (3)	None	Blank	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC index of the Telesignal (Single Point with Time Tag) that reports the “Local/Remote Command” status where the Plant Zone resides to the Supervision Center. When the Local/Remote Command is disabled, this field must be configured with IEC of Single Point acquired by a 64ODI card used as *Local/Remote* key.

Table 5-61 - Plant Zone configuration

When the use of the Plant Zone is enabled, field (1), the program automatically suggests the indexes for the fields (2) and (3) following the usual univocal rules. The field (4) is enabled at the same time too.

If the field (4) is disabled, in a second moment, the IEC index of the Remote Command, field (2), is deleted together with the index present in the field (3); in this condition, the Plant Zone cannot be set in “Local/Remote” by means of a Remote Command coming from the Supervision Center, but only by means of an input contact acquired by a 64ODI card. To complete the operation, the user must insert the index of a Single Point with Time Tag already configured on a 64ODI card into field (3) (the program executes the check, because this field is mandatory).

Re-enabling the Remote Command, field (4), the program automatically puts the IEC index of the Remote Command into field (2).

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5.5.6 IEC Procedure

This Technical card allows configuring some control procedures (IEC60870-5-101 e IEC60870-5-104) behavior.

The purpose is to obtain the maximum compliance with different providers Centers.

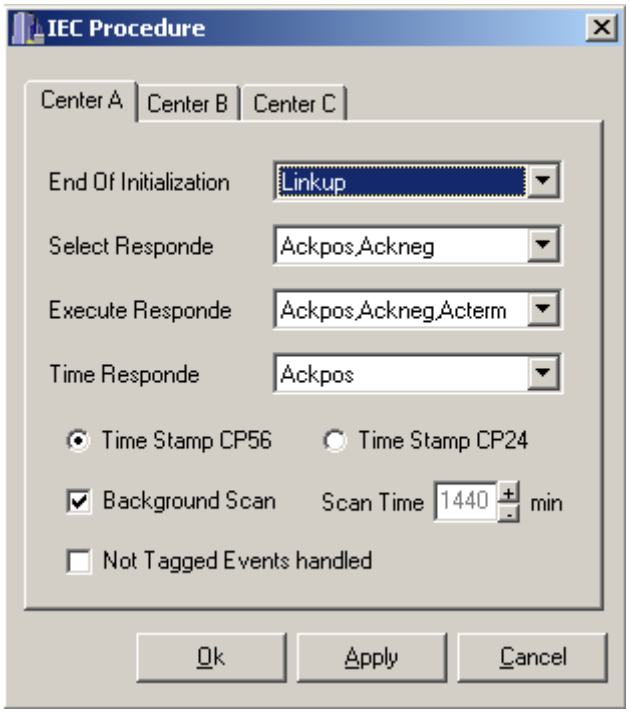

Figure 5-91 – IEC Procedures configuration

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IEC Procedures				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Center A – Center B – Center C				
End Of Initialization	None	Linkup	Linkup Only Restart Never	It allows configuring in which situations the STCE equipment sends the End Of Initialization message to the Center. Linkup: the EOI is sent to every protocol Linkup Only Restart: the EOI is sent only after an equipment restart Never: the EOI is never sent
Select Responde	None	Ackpos,Ackneg	Ackpos Ackpos,Ackneg	It allows configuring the answer type that STCE equipment can send to the Center when it receives a Select for a Remote control execution. Ackpos: positive Acknowledgement Ackneg: negative Acknowledgement
Execute Responde	None	Ackpos, Ackneg, Acterm	Ackpos Ackpos,Acterm Ackpos,Ackneg,Acterm Never	It allows configuring the answer type that STCE equipment can send to the Center when it receives a Select for an Execute execution. Ackpos: positive Acknowledgement Ackneg: negative Acknowledgement Acterm: Activation Termination Never: no Acknowledgement
Time Responde	None	Ackpos	Ackpos Never	It allows configuring the answer type that STCE equipment can send to the Center when it receives a *Time Synchronization* frame. Ackpos: positive Acknowledgement Never: No Acknowledgement
Time Stamp	None	CP56	CP56 CP24	It allows configuring the hourly brand type to use on the connection with the selected centre. CP56: 7 Byte Time stamp CP24: 3 Byte Time stamp This setting is valid for all the point destined to the Center. Note: the IEC60870-5-104 does not have the 24 bit (CP24) time tag format, so that option choice is not considered for centres with 104 protocol.
Background Scan	None	Disabled	Enabled/Disabled	It allows configuring the Background Scan use towards the selected Center.
Scan Time (min)	Enabled only if *Background Scan* is enabled	30	5 ÷ 1440 step 5	It allows configuring the Background Scan cyclic period (minutes).
Not Tagged Events handled	None	Disabled	Enabled/	It allows configuring the management type to execute on the events in case of connection with the not present Center. When the field is enabled the events without hourly brand are not inserted in the Events Buffer.

Table 5-62 – IEC Procedures configuration

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5.5.7 Structured Address Format

This Technical Card allows configuring the Information Object Address structure used in IEC60870-5-101 and 104 line protocols.

The structuring of this field allows to manage quantity addressing inside the equipment, giving if necessary an application meaning to the single byte that compose the address.

When the Information Object Address is composed of 3 byte (fixed dimension in case of IEC-104 protocol) it is possible to effect a structured visualization in which the byte are joined in base to an arranged rule.

The joining possibilities, expressed in number of bits, are the followings:

24	no joining, the value is express on three byte without any formatting. It is possible the introduction of a decimal number included in the interval: 1 ÷ 16.777.215.
8 + 16	The numerical value of the address is visualized in two distinct parts: the first is contained in the first byte and the second in the remainders two byte. It is possible the introduction of two distinct decimal numbers respectively included in the intervals: 1 ÷ 255 e 1 ÷ 65.535.
16 + 8	The numerical value of the address is visualized in two distinct parts: the first is contained in the first byte and the second in the remainders two byte. It is possible the introduction of two distinct decimal numbers respectively included in the intervals: 1 ÷ 65.535 e 1 ÷ 255.
8 + 8 + 8	The numerical value of the address is visualized in three distinct parts, each composed of one byte. It is possible the introduction of three distinct decimal numbers respectively included in the interval: 1 ÷ 255.

The choices related to Single Points with and without time tag are valid also for the Digital Diagnostic points.

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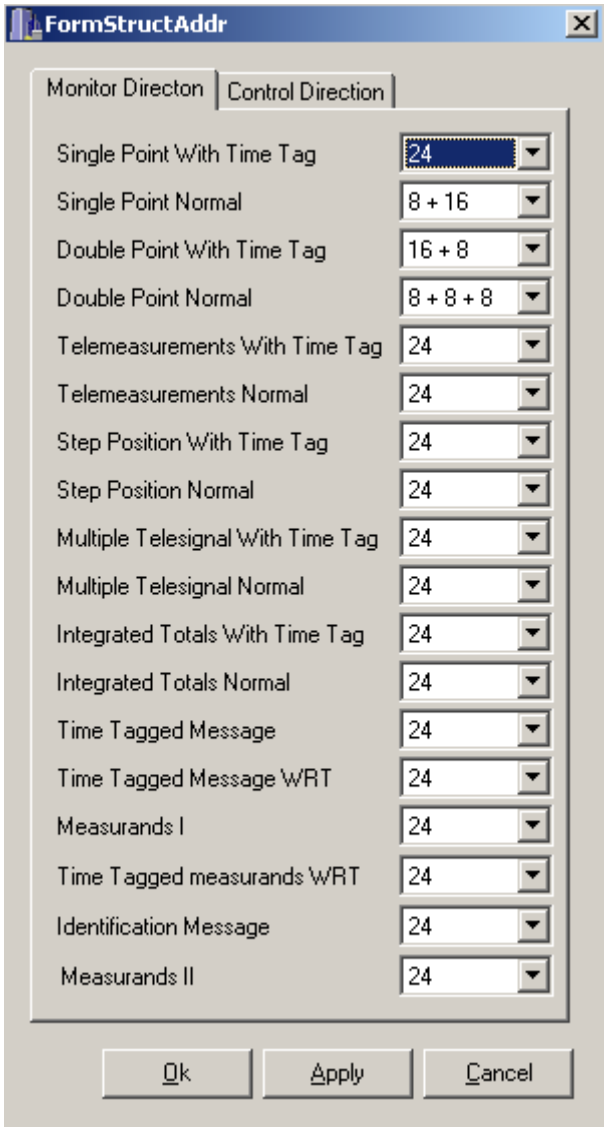

Figure 5-92 - Information Object Address Structuring

Information Object Address Structuring				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Monitor Direction				
Single Point With Time Tag	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Single Point Normal	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Double Point With Time Tag	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity

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Information Object Address Structuring				
FIELD NAME	DEPENDENCE	I. V.	P. V.	DESCRIPTION
Double Point Normal	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Telemeasurements With Time Tag	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Telemeasurements Normal	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Step Position With Time Tag	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Step Position Normal	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Multiple Telesignal With Time Tag	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Multiple Telesignal Normal	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Integrated Totals With Time Tag	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Integrated Totals Normal	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Time Tagged Message	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Time Tagged Message WRT	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Measurands I	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Time Tagged measurands WRT	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Identification Message	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Measurands II	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Control Direction				
Single Command	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Double Command	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Step Command	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Set Point	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity
Output Signal	None	24	8+8+8, 8+16, 16+8, 24	It allows choosing the structured visualization type for the quantity

Table 5-63 - Information Object Address Structuring

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5.5.8 Authentication

This Technical Card allows configuring up to three users to access in the STCE equipment maintenance, each individualized by its own User Name with its relevant Password and from an access level that can be Normal or Privileged.

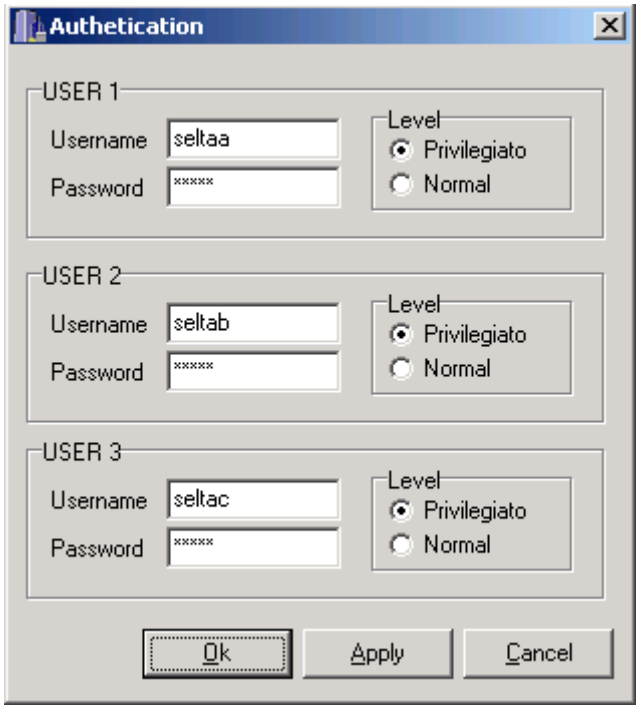

Figure 5-93 – User Authentication

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User Authentication				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
USER 1				
Username	None	seltaa	Max 9 alphanumeric characters	It allows modifying the first user name to enter the equipment
Password	None	selta	Max 7 caratteri alfanumerici	It allows modifying the password related to the first user name to enter the equipment. The editing is not in clear. The default password is “selta”.
Level	None	Privileged	Privileged Normal	It allows assigning privilege level to the user in the equipment management. Note: at the moment of the manual layout, the options related to the Privileged level are not implemented.
USER 2				
Username	None	seltab	Max 9 alphanumeric characters	It allows modifying the first user name to enter the equipment
Password	None	selta	Max 7 caratteri alfanumerici	It allows modifying the password related to the first user name to enter the equipment. The editing is not in clear. The default password is “selta”.
Level	None	Privileged	Privileged Normal	It allows assigning privilege level to the user in the equipment management. Note: at the moment of the manual layout, the options related to the Privileged level are not implemented.
USER 3				
Username	None	seltac	Max 9 alphanumeric characters	It allows modifying the first user name to enter the equipment
Password	None	selta	Max 7 caratteri alfanumerici	It allows modifying the password related to the first user name to enter the equipment. The editing is not in clear. The default password is “selta”.
Level	None	Privileged	Privileged Normal	It allows assigning privilege level to the user in the equipment management. Note: at the moment of the manual layout, the options related to the Privileged level are not implemented.

Table 5-64 – User Authentication configuration

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5.6 MONITOR DIRECTION

5.6.1 Treatment of the Monitor Direction points

All the points acquired by cards of local or Serial Input and destined to the Supervision Center or, more generally, to the different Centers (included the possible Local Center) are considered quantities in *Monitor Direction*.

For each single quantity in *Monitor Direction,* it is possible to configure the treatment that the application software present on the Central Unit of the STCE/RTU equipment must apply.

At single quantity level, therefore, it is possible to configure:

Destination Center	STCE/RTU equipment manages up to three fully independent Supervision Centers (included the possible Local Center). It is possible to configure which Center/s the acquired quantity must be sent to, in each combination (for instance, only to Center A, to Center A and to Center C, only to Center B, etc.).
Management modality	It is possible to configure if the quantity must be treated as *Event* or not. If the quantity is not treated as Event, it can be acquired by the Center only by means of *General Query* and by *Group Query* or as Class 2 data, if this management is allowed for this. In this case, improvised changes of the quantity are generally lost. If the quantity is treated as Event, it can be acquired by the Center by means of *General Query* and by *Group Query* yet, but its status changes are stored in a *Event Buffer* too, and then they are not lost. **Applicable only with switched network STCE/RTU Configurator :** in switched operation also the attribute of Spontaneous can be associated to the concept of Event . Because of state variation of a configured point as Spontaneous Event, STCE/RTU equipment will effect a spontaneous telephone call to the Center/Centers. From the protocol point of view , once established the telephone connection, it is valid how much described above.
Local Logging	It is possible to configure if the status changes of the quantity must be locally logged or not. The local Log of the quantities is made on RAM (possibly supported by battery), if they are quantities acquired on field, or on not volatile memory if they are equipment diagnostic information. The buffers of local Log can be read by the maintenance software of the equipment.
Local Printing	It is possible to configure if the status changes of the quantity must be

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locally printed or not.

The following figure shows the graphical part, common to all the windows concerning the quantities in Monitor Direction, where the described treatment is configured.

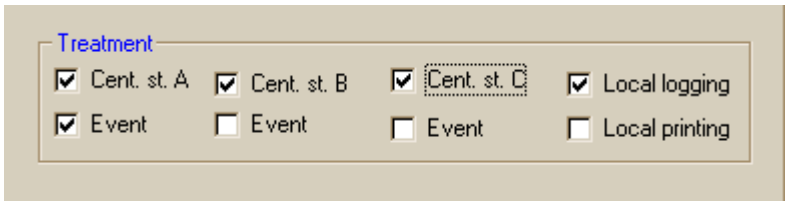

Figure 5-94 – Treatment of the quantities in *Monitor Direction*

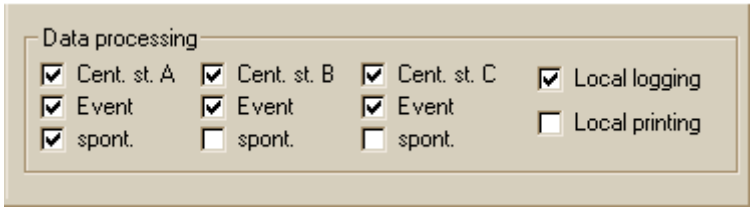

Figure 5-95 - Treatment of the quantities in *Monitor Direction – Switched*

To avoid useless repetitions, this paragraph will be referred in the document where the description of the treatment of the quantities in *Monitor Direction* is necessary.

All the information acquired by *serial* connections with the field are normalized and made homogeneous at equipment internal bus level: therefore, what described for the treatment of the quantities in Monitor Direction is the same both for those acquired by local I/O and for those acquired by serial I/O. This is valid also for the quantities acquired by LAN, already normalized at Local Network level.

At last, it is important to underline that all the quantities acquired by Serial or LAN, being normalized at internal bus level or Local Network, loss the “Analog” or “Digital” attribute concerning the acquisition modality.

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5.6.2 Management common to all the point typologies

The management, common to all the point typologies, is collected in this paragraph, for what concerns the interaction of the user with the configuration form, to avoid useless repetition.

The operations for the point configuration, independently from its typology, allow:

- inserting a new point
- modifying an existing point
- deleting a point
- scrolling the list of the configured points
- connecting a point on the I/O card or physical unit

All the sections common to the different point typology and that are not already described in the chapter related to the user interface, par. 5.2.4 Editing Window, are displayed in the following figure.

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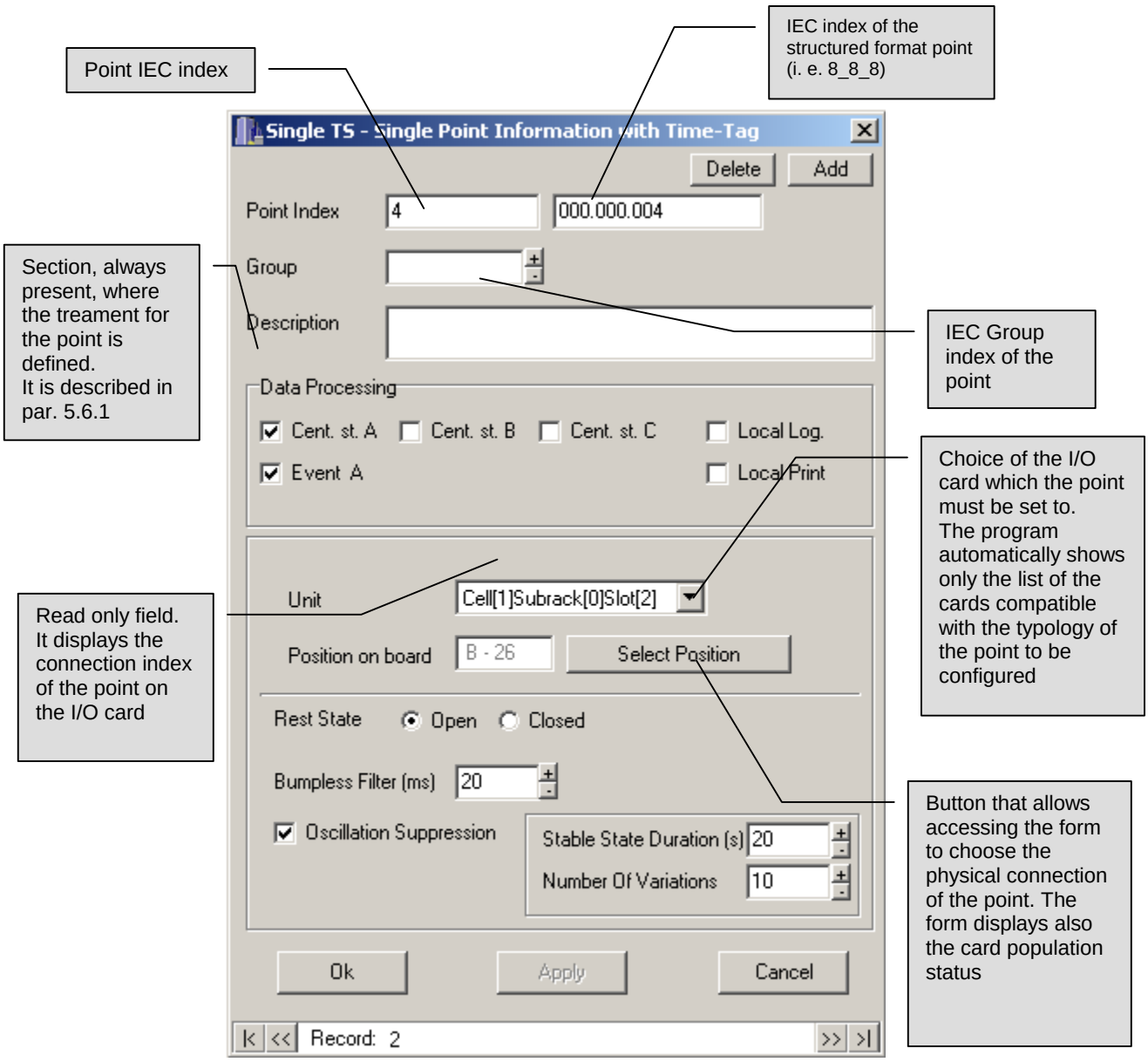

Figure 5-96 – Monitor Direction: common parts management

In all the Editing windows for the point configuration, the filling of the following fields is mandatory:

- IEC index of point (*Point index*)
- Physical unit of point connection (*Unit*)
- Position of the point inside the specific unit (*Select position..*)

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Each other possible mandatory parameter, specific for a typology, is pointed out in the related chapter.

The position of the physical unit for the point connection is individuated by the following coordinates:

- **Cell[ ]** 1÷16 Cell index (for RTU Stand Alone the Cell is fixed to 1)
- **Subrack[ ]** 0÷15 Subrack Number:
  0 = Base Subrack
  1÷15 Extension Subrack
- **Slot[ ]** 0÷6 Slot in Base Subrack
  0÷13 Slot in Extension Subrack

When a new point is inserted into Database (*ADD* function), the program automatically suggests a new IEC index; for the automatic assignment of this index and for the controls made on indexes manually inserted by the user, the program follows these rules:

- The automatically assigned index is always the first free higher one;
- For each point typology (for each ASDU type), the IEC index restarts from 1; the only exception is constituted by the Measured Value Normalized Value (M_ME_NA_1) and Measured Value, Normalized Value with Time Tag CP56Time2a (M_ME_TD_1) quantities, for which the indexes are not overlapped to allow the *Parameter Loading*; if the compatibility with IEC protocol Amendment 2 is enabled, the point addressing becomes univocal.
- A point typology without Time Tag has indexing independent from the same typology with Time Tag (for instance, Single Points with Time Tag can have indexes overlapped to Single Points without Time Tag, in other words they are considered different point typologies);
- An acquired physical point can be assigned to only one typology of “IEC” point: with Time Tag or without Time Tag;
- The index is surely univocal for point typology;
- The indexing range accepted by the program depends on the length of the *Information Object Address* field configured for the used IEC protocol:
  - 1 Byte IEC index within the 1÷254 range
  - 2 Bytes IEC index within the 1÷65.534 range
  - 3 Bytes IEC index within the 1÷16.777.214 range
- The user can modify the automatic IEC index, but the program will check if this index is compliant with the above described rules.

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The point positioning on the I/O card takes place by the *Select Position* form calling by the homonym button.

In the *Select Position* form, displayed in the following figure, the different positions state is graphically reported:

- Free position: circle with white background
- Occupied position: circle with red background
- Current position: circle with green background

To assign a specific position to a point, it is necessary to individuate a free position and press in correspondence with the left button of the mouse, the program will automatically occupy the number of available position for this point typology. If the number of free following positions is not enough, or if the starting connector index is wrong, the program will not make any selection.

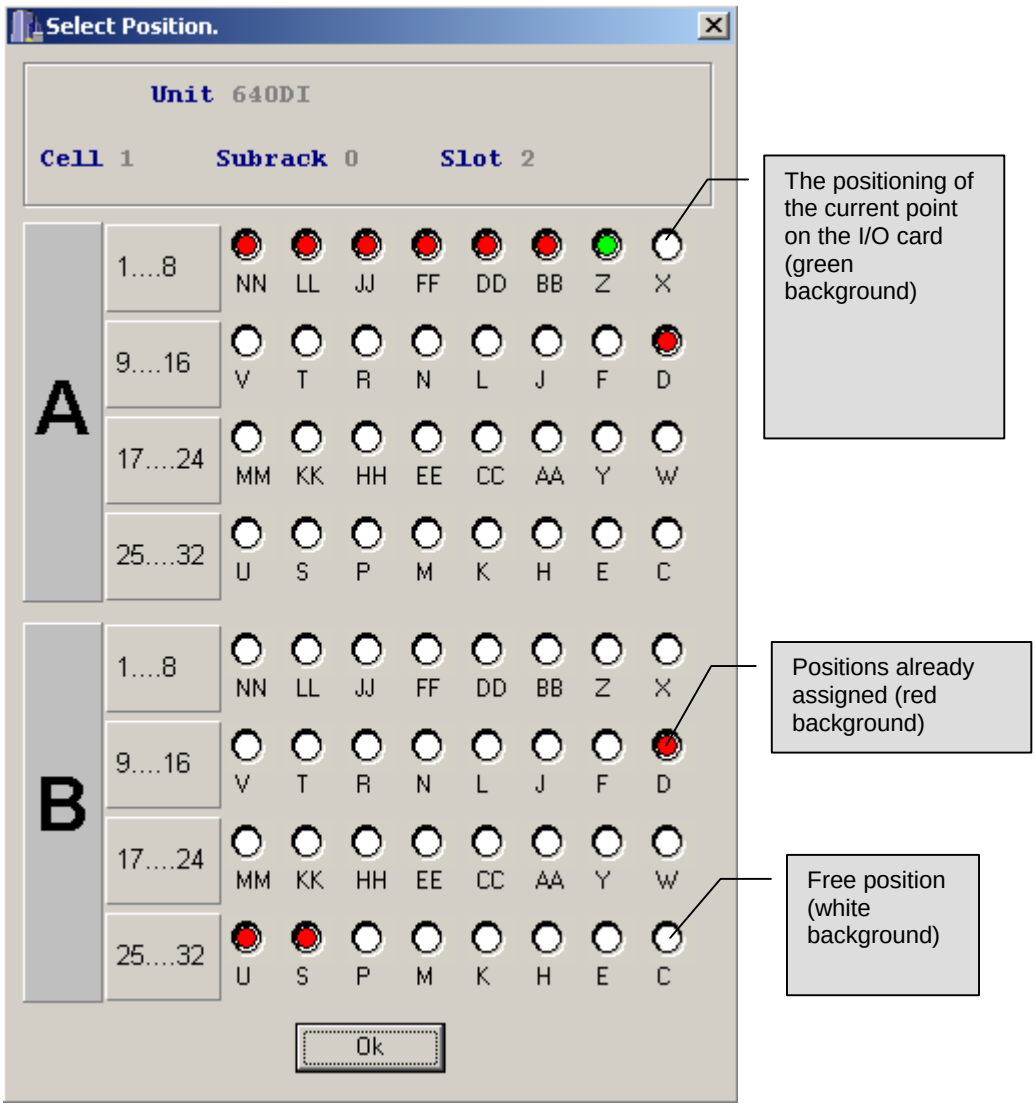

Figure 5-97 – Select Position

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5.6.3 From Local – Single Point

This option can be reached selecting *Monitor Direction* item of the main menu, *From Local* and then *Single Point*.

As additional option, the program allows choosing “With Time Tag” or “Normal”, that is, with or without time tag. The two cases are treated together in this paragraph because they don’t need differentiation at user interface, but only at Information Object Address assignment and source Data Base writing level.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Single Telesignals with and without Time Tag* acquired from field by means of one of the following cards:

- 64 Optoinsulated Digital Input (*64 ODI*) card
- 32 Opto Digital Input / 4 Opto Analog Input / 10 Digital Command Output (*32ODI/4OAI/10DCO*) mixed card

The Single Telesignals coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Single Point Information (M_SP_NA_1) if without time tag, and with the Single Point Information with Time Tag (M_SP_TA_1) e i Single Point Information with Time Tag CP56Time2a (M_SP_TB_1) if they have time tag.

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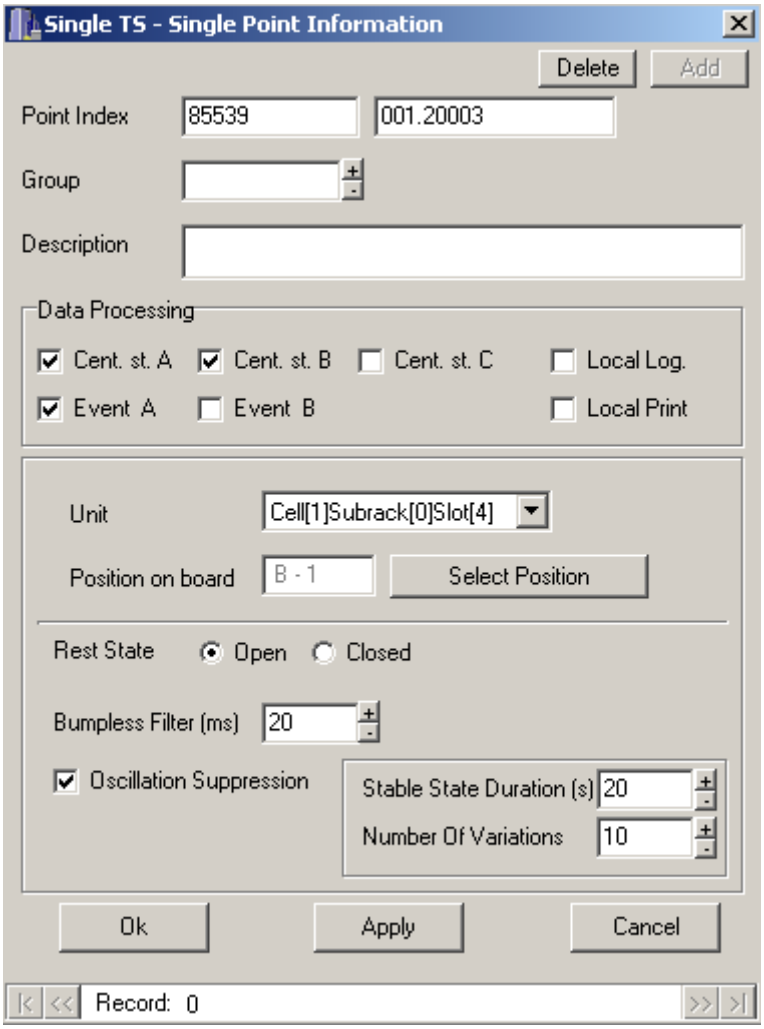

Figure 5-98 – Single Telesignal from Local I/O

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Single Telesignals from Local I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of Single Point. The field is mandatory.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				
Unit	None	Blank	List of the 64ODI and 32ODI/4OAI/10DCO cards inserted during configuration, presented in the format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Telesignal. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 64ODI and 32ODI/4OAI/10DCO type). This field is mandatory
Position on board	None	Blank	0÷63	The field displays the physical input, on the selected card, which the acquired quantity is connected to. The selection of the physical input on the card takes place pressing the “Select position ..” button and operating as described in par. 5.6.2
Rest state	None	OPEN	OPEN/CLOSED	It allows configuring the rest state of the Telesignal. OPEN = Normally Opened CLOSED = Normally Closed
Filtering				
Bumpless filter (ms)	None	20	10÷60 step 10	Duration of the bumpless filter applied to the Telesignal. For *Single Telesignal with Time Tag*, the time tag is assigned to the first input state variation, therefore not resulting affected by errors due to the filter time
Oscillation suppression	None	Disabled	Enabled/Disabled	It allows enabling the use of the filter for the oscillation suppression (periodic variation tipically due to the fault of a field device).
Stable state duration (s)	Field present only if the oscillation suppression filter is enabled	Blank	1÷600 step 1 Blank	Duration of the stable status
Number of variations	Field present only if the oscillation suppression filter is enabled	10	1÷64 step 1	Maximum number of Status Variations of the input after that the oscillation suppression filter becomes active

Table 5-65 – Configuration of Telesignals from Local I/O

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5.6.4 From Local – Single Point for RCE

This option can be reached selecting *Monitor Direction* item of the main menu, *From Local, Single Point* and then *For RCE*.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Single Telesignals for the Events Chronological Recording* acquired from field by means of one of the following units:

- 64 Optoinsulated Digital Input (*64 ODI*) card
- 32 Opto Digital Input / 4 Opto Analog Input / 10 Digital Command Output (*32ODI/4OAI/10DCO*) mixed card

The Single Telesignals coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Single Point Information (M_SP_NA_1) if without time tag and with the Single Point Information with Time Tag (M_SP_TA_1) and the Single Point Information with Time Tag CP56Time2a (M_SP_TB_1) if they have time tag.

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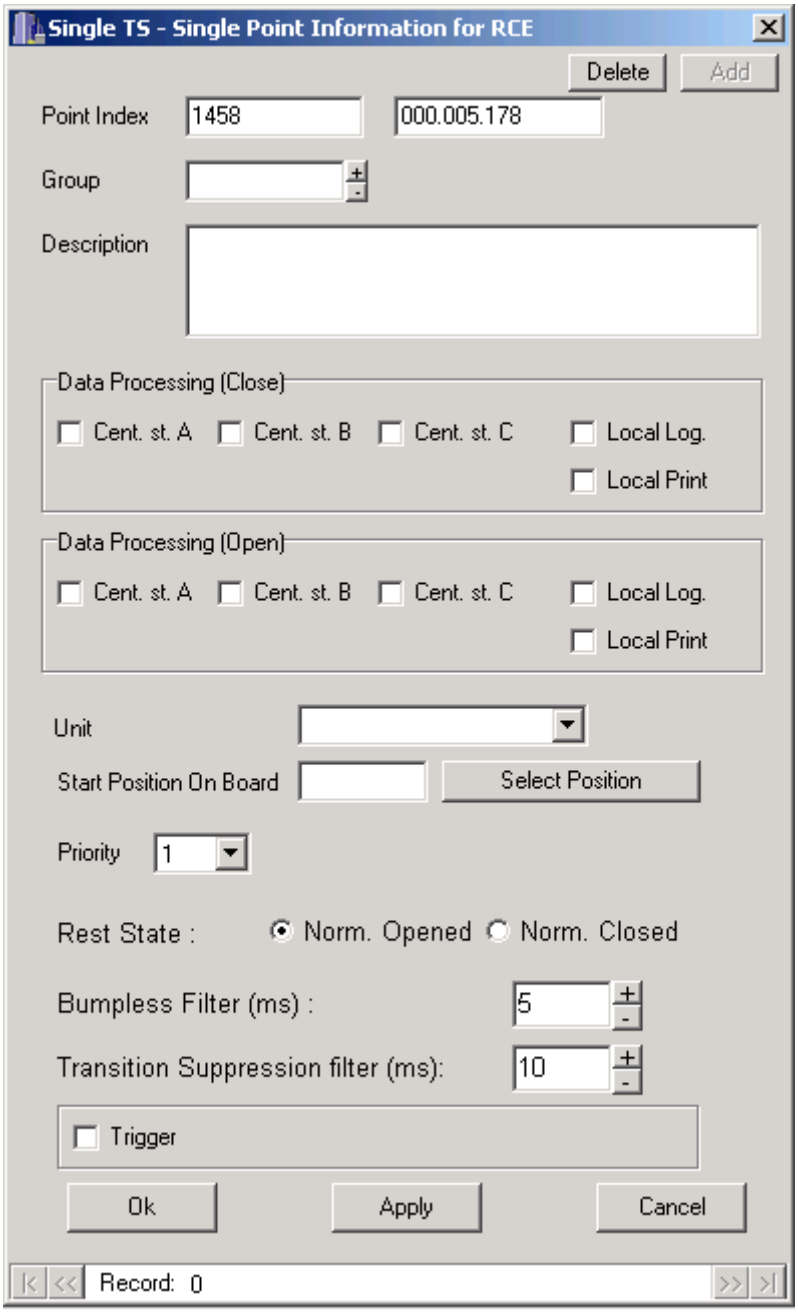

Figure 5-99 - Single Telesignal for the Chronological Event Recording from Local I/O

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Single Telesignals for the Chronological Event Recording from Local I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of Single Point. The field is mandatory.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1 for which, in case of the single Telesignals for the Chronological Events Recording, there is the distinction between open → closed entry switching and vice versa				
Unit	None	Blank	List of the 64ODI and 32ODI/4OAI/10DCO cards inserted during configuration, presented in the format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Double Telesignal. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 64ODI and 32ODI/4OAI/10DCO type). This field is mandatory
Position on board	None	Blank	A-1÷A-32 B-1÷B-32 for 64ODI card B-1÷B-32 for 32ODI/4OAI/10DCO card	The field displays the physical input, on the selected board, which the acquired entity is connected to. The selection of the physical input on the card takes place pressing the “Select position ..” button and operating as described in par. 5.6.2
Priority	None	1	1÷2	The performance is not implemented at the moment.
Rest state	None	Norm Opened	Opened/Closed	It allows configuring the rest state of the first digital input of the Double Telesignal. Norm.Opened = Normally Opened Norm.Closed = Normally Closed
Filtering				
Bumpless filter (ms)	None	5	10÷150 step 5	Duration of the bumpless filter applied to each of the two contributor digital inputs. For *Double Telesignal with Time Tag*, the time tag is assigned to the first input state variation, therefore not resulting affected by errors due to the filter time
Transition suppression filter (ms)	None	10	10÷200 step 10	Duration of the transitory states suppression filter, applied to the Telesignal
Trigger				
Trigger	None	Disabled	Enabled/Disabled	It allows configuring the treated point as trigger event , that is as an event whose switching causes the chronological recording of the configured events as RCE points. Note: it is necessary to configure at least a trigger event so that the chronological recording of the events can let loose

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Single Telesignals for the Chronological Event Recording from Local I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Abil. State	It appears only if Trigger treatment is configured	N.A.	Open/Close	It allows configuring the point as trigger in the input switching: open → closed closed → open both

Table 5-66 – Single Telesignal for the Chronological Event Recording from Local I/O

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5.6.5 From Local – Double Point

This option can be reached selecting *Monitor Direction* item of the main menu, *From Local* and then *Double Point*.

As additional option, the program allows choosing “With Time Tag” or “Normal”, that is, with or without time tag. The two cases are treated together in this paragraph because they don’t need differentiation at user interface, but only at Information Object Address assignment and source Data Base writing level.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Double Telesignals with and without Time Tag* acquired from field by means of one of the following groups:

- 64 Optoinsulated Digital Input (*64 ODI*) card
- 32 Opto Digital Input / 4 Opto Analog Input / 10 Digital Command Output (*32ODI/4OAI/10DCO*) mixed card

The Double Telesignals coincide, at IEC60870-5-101 and IEC60870-5-104 line protocol level, with the Double Point Information (M_DP_NA_1) if without time tag, and with Double Point Information with Time Tag (M_DP_TA_1) e i Double Point Information with Time Tag CP56Time2a (M_DP_TB_1) if they have time tag.

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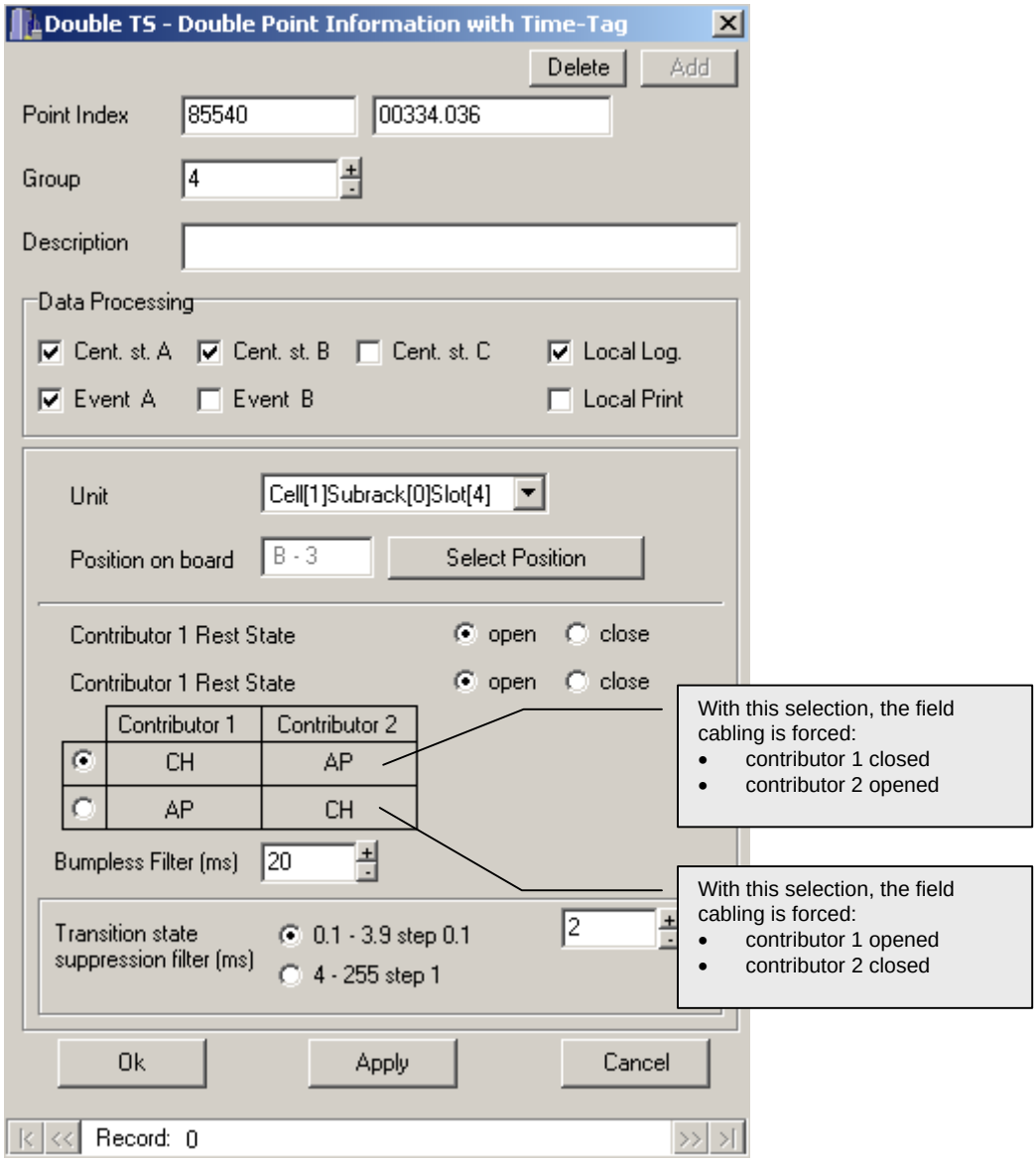

Figure 5-100 - Double Telesignal from Local I/O

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Double Telesignal from Local I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of Double Point. The field is mandatory.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				
Unit	None	Blank	List of the 64ODI or 32ODI/4OAI/10DCO cards inserted during configuration, presented in the format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Double Telesignal. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 64ODI or 32ODI/4OAI/10DCO type). This field is mandatory
Position on board	None	Blank	A-1÷A-31 B-1÷B-31 for 64ODI card B-1÷B-31 for 32ODI/4OAI/10DCO card	The field displays the first of the two physical inputs, on the selected board, which the acquired entity is connected to. The two inputs can be only consecutive; the user sets the position of the first one and the program sets consequently the second one. The selection of the physical input on the card takes place pressing the “Select position ..” button and operating as described in par. 5.6.2
Rest state signal used 1	None	OPEN	OPEN/CLOSED	It allows configuring the rest state of the first digital input of the Double Telesignal. OPEN = Normally Opened CLOSED = Normally Closed
Rest state signal used 2	None	OPEN	OPEN/CLOSED	It allows configuring the rest state of the second digital input of the Double Telesignal. OPEN = Normally Opened CLOSED = Normally Closed
Filtering				
Bumpless filter (ms)	None	20	10÷60 step 10	Duration of the bumpless filter applied to each of the two contributor digital inputs. For *Double Telesignal with Time Tag*, the time tag is assigned to the first input state variation, therefore not resulting affected by errors due to the filter time
Transition state suppression filter (s)	None	2	0,1÷3,9 step 0,1 4÷255 step 1	Duration of the filter of the transient statuses of the device associated to the two digital inputs. The application of this filter has the purpose to avoid the transmission of transient incongruent statuses to the Center

Table 5-67 – Double Telesignals from Local I/O Configuration

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5.6.6 From Local – Analog Telemeasurements

This option can be reached selecting *Monitor Direction* item of the main menu, *From Local* and then *Analog Telemeasurement*.

As additional option, the program allows choosing “With Time Tag” or “Normal”, that is, with or without time tag. The two cases are treated together in this paragraph because they don’t need differentiation at user interface, but only at Information Object Address assignment and source Data Base writing level.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Analog Telemeasurement with and without Time Tag* acquired from field by means of one of the following groups:

- 32 Optoinsulated Analog Input (*32 OAI*) card
- 8 Opto Analog Input / 8 Digital Command Output (*8OAI/8DCO*) mixed card
- 32 Opto Digital Input / 4 Opto Analog Input / 10 Digital Command Output (*32ODI/4OAI/10DCO*) mixed card

The Analog Telemeasurements coincide, at IEC60870-5-101 and IEC60870-5-104 line protocol level, with the following quantities:

- Measured Value, Normalized Value (M_ME_NA_1) if without time tag
- Measured Value, Normalized Value with Time Tag (M_ME_TA_1) and Measured Value, Normalized Value with Time Tag CP56Time2a (M_ME_TD_1) if they have time tag
- Measured Value, Scaled Value (M_ME_NB_1) if without time tag
- Measured Value, Scaled Value with Time Tag (M_ME_TB_1) and Measured Value, Scaled Value with Time Tag CP56Time2a (M_ME_TE_1) if without time tag.

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The Telemeasurements configuration form has got several configurable parameters that, in different combination, allow setting different treatments of the acquired inputs for the sending to the centre.

You can set the following principal parameters:

- Bipolar or unipolar measurement
- Normalized or scaled measurement
- Sending by threshold
- Cyclic sending
- Sending caused by limit overcoming

5.6.6.1 Bipolar Measurement and Unipolar Measurement

The measurement acquisition in *bipolar* mode involves that only the input values inclusive in the configured – A ÷ + A interval are sampled as valid.

The measurement acquisition in *unipolar* mode involves that only the *positive* input values inclusive in the configured – A ÷ + A interval are sampled as valid, that is only the values included in 0 ÷ + A interval.

5.6.6.2 Normalized Measurement

The conversion mode, and therefore the line transmission mode, of a normalized measurement requires that a value inclusive between –32768 ÷ + 32767 is associated to the input value acquired from field, for which the – A ÷ + A interval has been configured.

This assignment must respect the following correspondences:

INPUT RANGE	CORRESPONDENCES					Note
– A ÷ + A	< - A = - 32768 (Invalid)	– A = - 32768	0 = 0	+ A = + 32767	> A = + 32767 (Overflow)	Bipolar
– A ÷ + A	< – A = 0 (Invalid)	– A = 0 (Invalid)	0 = 0	+ A = + 32767	> A = + 32767 (Overflow)	Unipolar
4 ÷ 20 mA	< + 4 mA = - 32768 (Invalid)	+ 4 mA = - 32768	+ 12 mA = 0	+ 20 mA = + 32767	> 20 mA = + 32767 (Overflow)	Bipolar
4 ÷ 20 mA	< + 4 mA = 0 (Invalid)	+ 4 mA = 0	+ 12 mA = 16384	+ 20 mA = + 32767	> 20 mA = + 32767 (Overflow)	Unipolar

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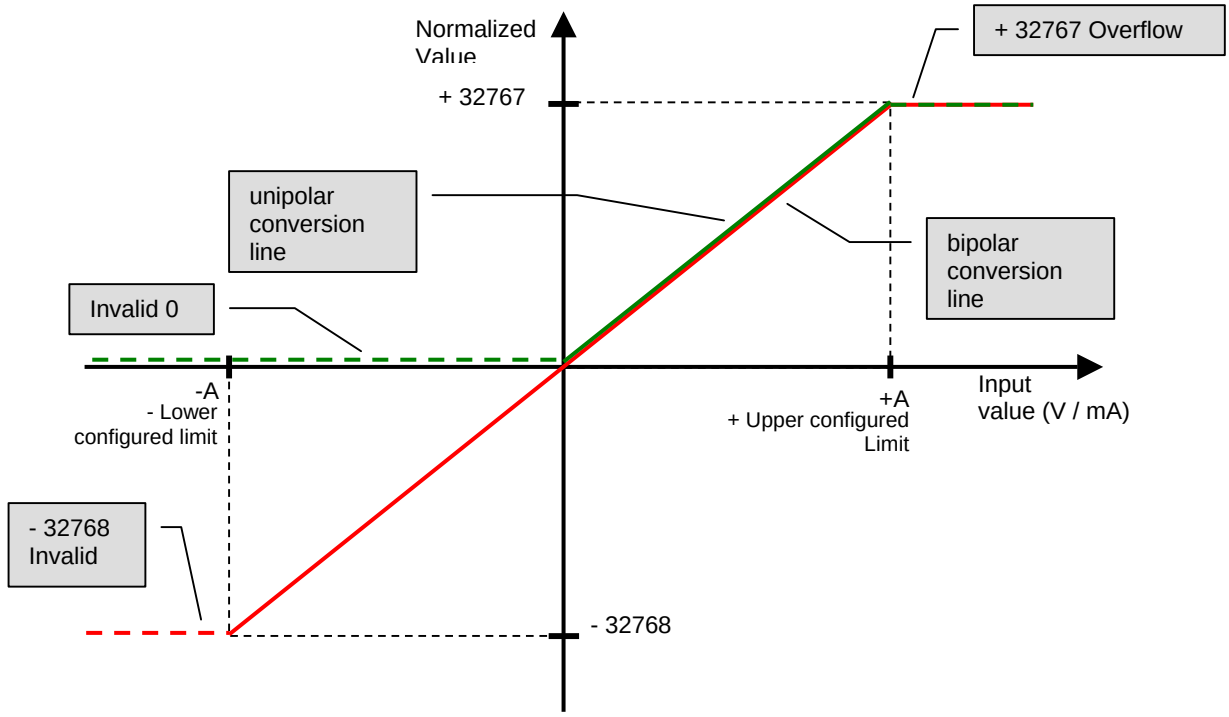

Figure 5-101 - – A ÷ + A normalized bipolar measurement

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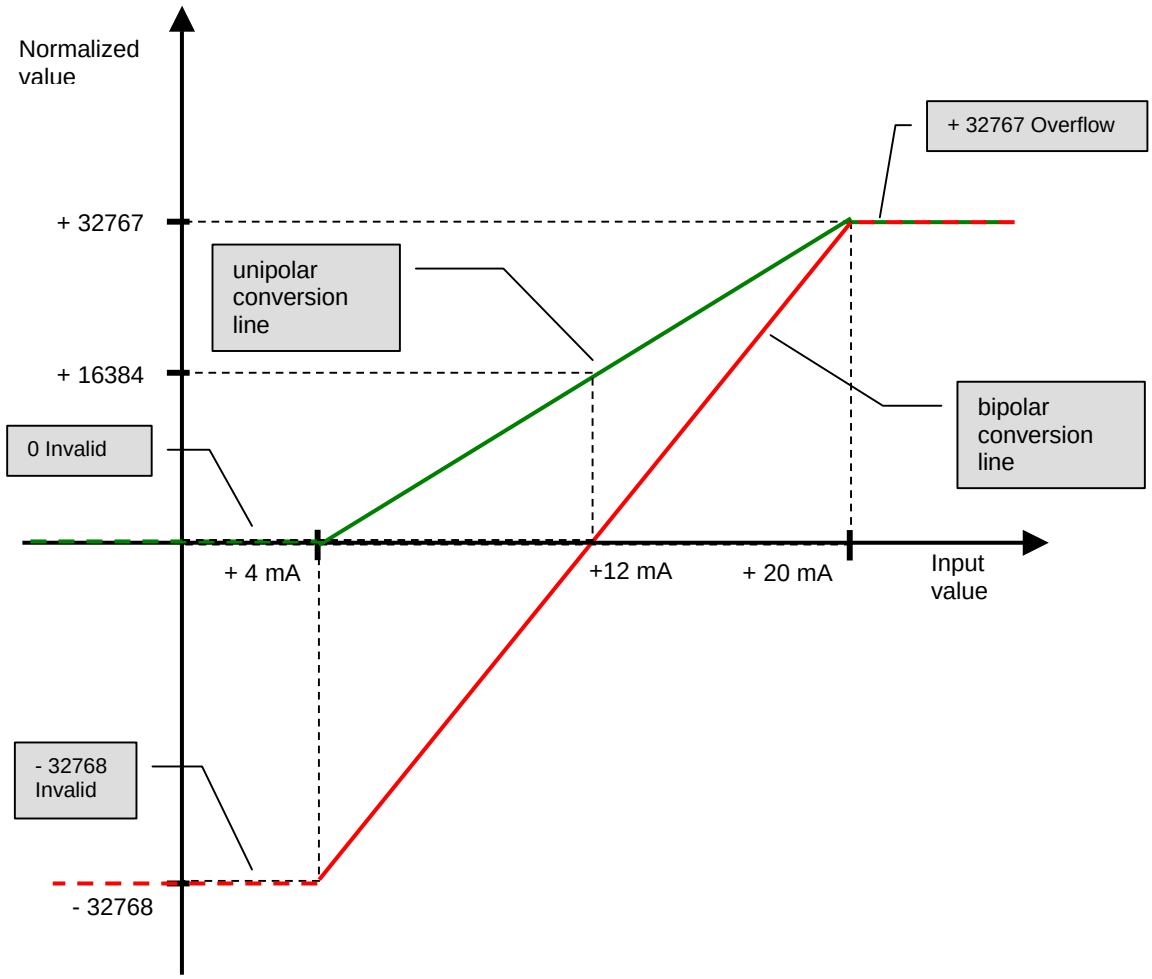

Figure 5-102 - 4 ÷ + 20 mA normalized measurement

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5.6.6.3 Scaled Measurement

The conversion mode, and therefore the line transmission mode, of a *scaled* measurement requires that a value inclusive in the M ÷ N[2] configured range is associated to the input value acquired from field, for which the – A ÷ + A interval has been configured.

This assignment must respect the following correspondences:

INPUT RANGE	CORRESPONDENCES					Note
– A ÷ + A	< - A = M (Invalid)	– A = M	0 = (M+N)/2	+ A = N	> A = N (Overflow)	Bipolar
– A ÷ + A	< – A = L (Invalid)	– A = L (Invalid)	0 = L	+ A = N	> A = N (Overflow)	Unipolar
4 ÷ 20 mA	< + 4 mA = M (Invalid)	+ 4 mA = M	+ 12 mA = (M+N)/2	+ 20 mA = N	> 20 mA = N (Overflow)	Bipolar
4 ÷ 20 mA	< + 4 mA = L (Invalid)	+ 4 mA = L	+ 12 mA = (L+N)/2	+ 20 mA = N	> 20 mA = N (Overflow)	Unipolar

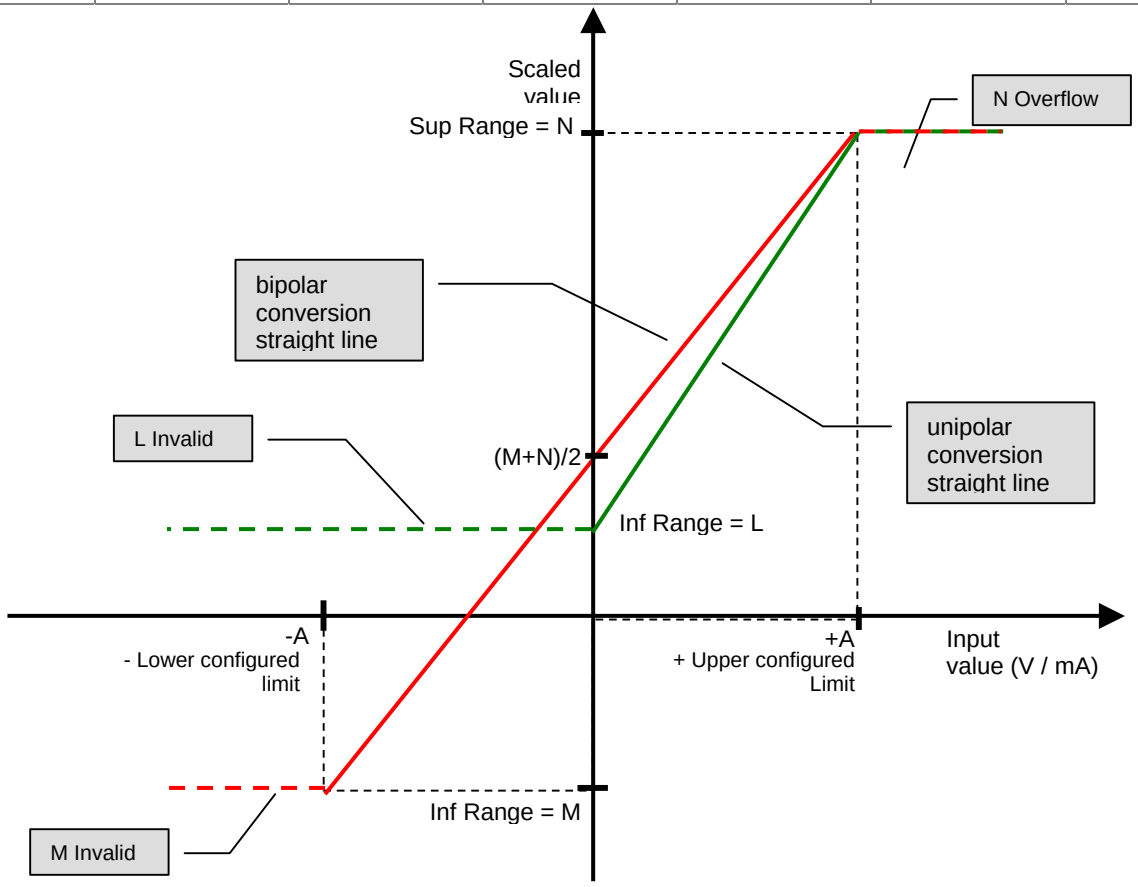

Figure 5-103 - – A ÷ + A scaled measurement

[2] where –32768 < M < N < + 32767 and 0<L< N < + 32767

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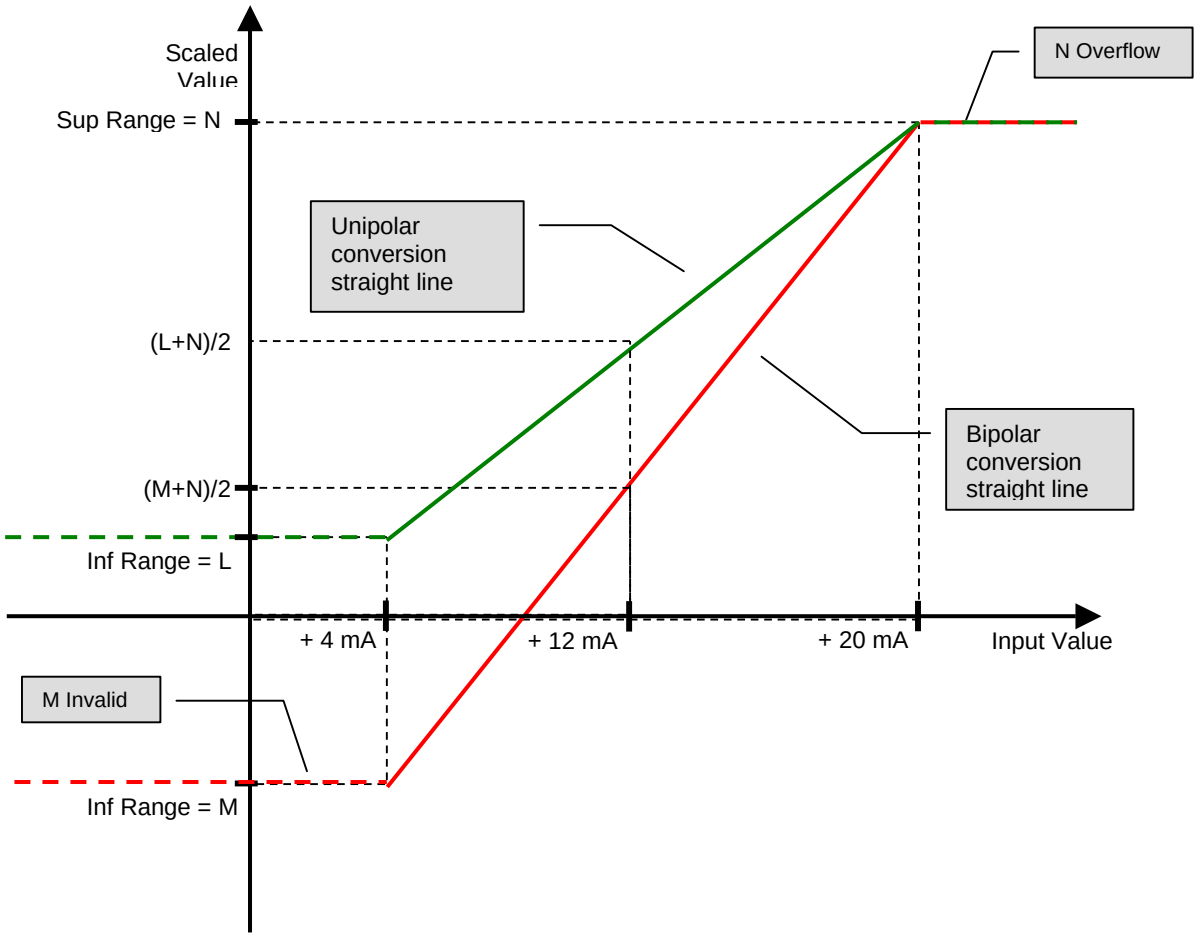

Figure 5-104 - 4 ÷ + 20 mA scaled measurement

5.6.6.4 Sending by Delta

A measurement is sent by threshold to the centre when the difference between the measurement current value and its value at time of last transmission (by threshold or alarm limits) is greater than the configured percentage (*Data Reduction*).

At every transmission the *Data Reduction* value is centered again on the transmitted value.

The transmission by delta is mutually exclusive with the operation of cyclic transmission.

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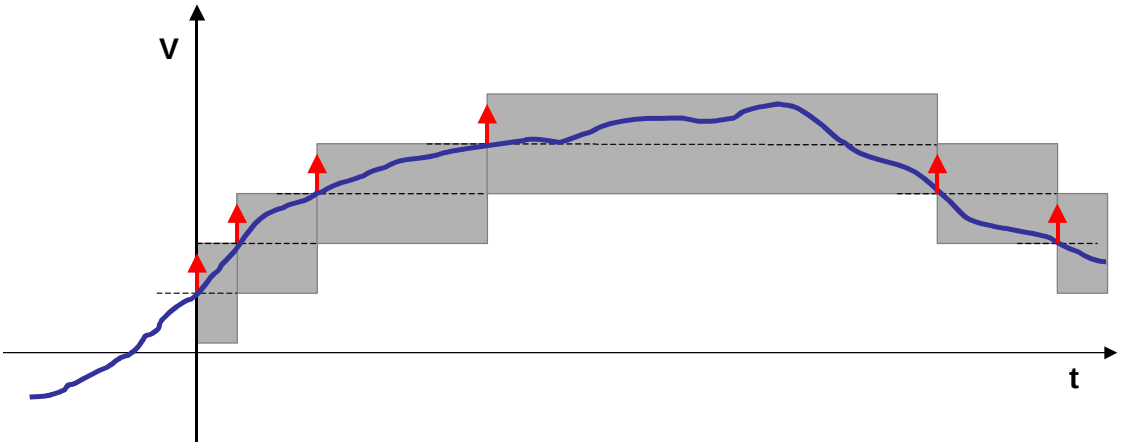

Figure 5-105 – Measurement Sending by threshold

5.6.6.5 Cyclic sending

To obtain the cyclic sending of a measurement to the centre (as a data of class 2) it is necessary to:

- enable the option in the configuration of *General Parameters* by setting a basic time (cycle time)
- enable the cyclic sending for every measurement by specifying the sending time as an integer multiple of the cycle time

The cyclic transmission is mutually exclusive with the operation of transmission by delta.

5.6.6.6Sending by limits

For every measurement it is possible to set alarm limits (HH, H, L, LL) and the relevant insensibility range (Hysteresis) around the limit values configured.

A measurement is sent *by limit* to the centre when:

- The sampled value in input is greater than one of the two values configured as high limit (H, HH)
- The sampled value in input becomes lower than one of the two values configured as low limit (L, LL)
- The sampled value in input becomes lower than one of the two re-entry values from the high limit (H-Hysteresis, HH-Hysteresis)
- The sampled value in input is greater than one of the two re-entry values from the low limit (L+Hysteresis, LL+Hysteresis)

The following figure reports the limits management executed by the group software for the acquisition of the measurement inputs.

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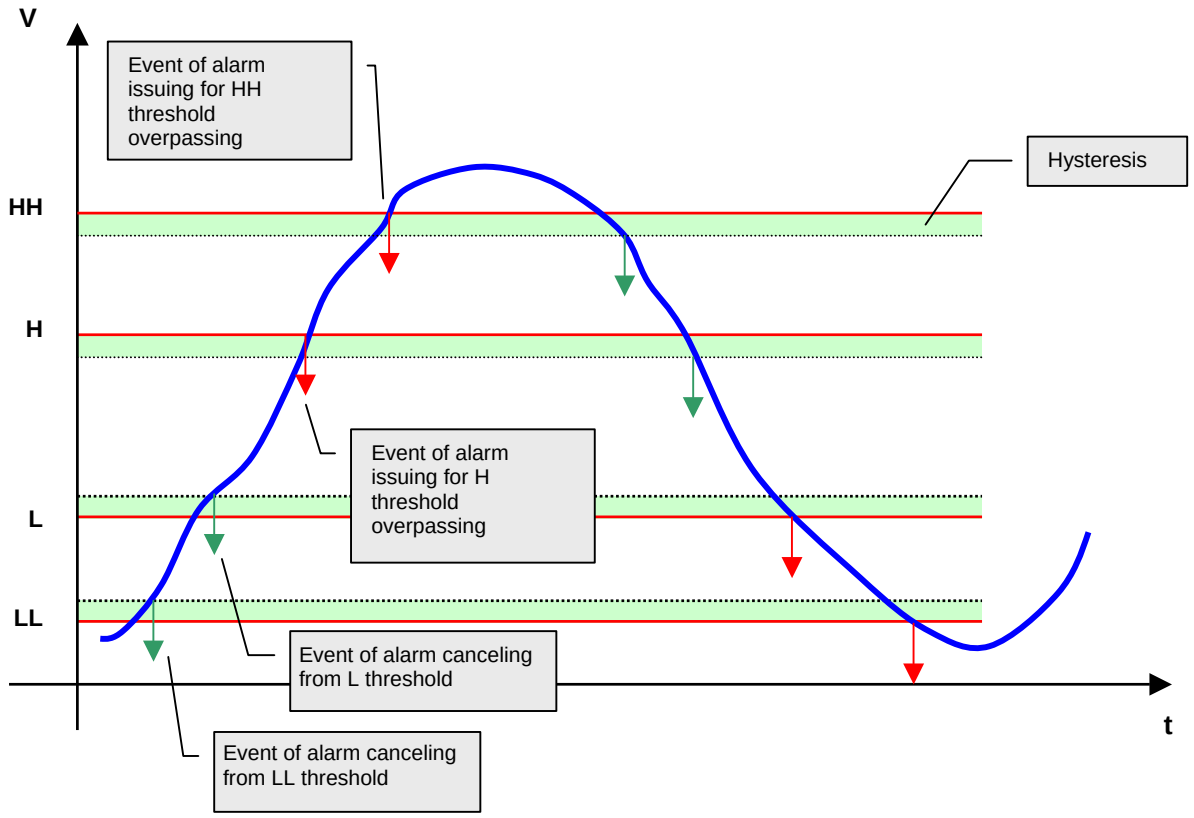

Figure 5-106 – Measurement Limits Management

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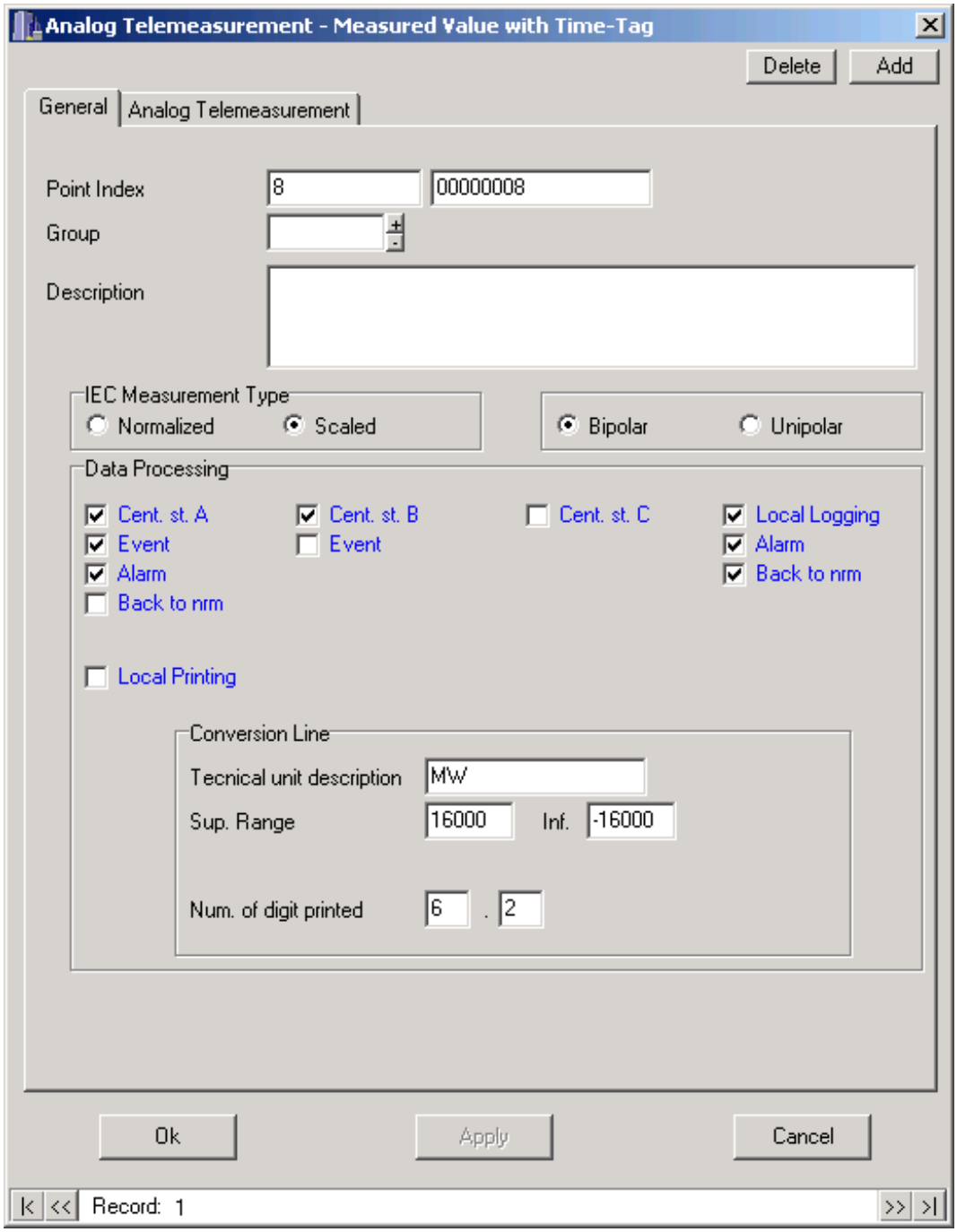

Figure 5-107 - Analog Telemeasurements from Local I/O - General

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Analog Telemeasurements from Local I/O - General				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Telemeasurement. The field is mandatory.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
IEC Measurement Type	None	Normalized	Normalized Scaled	It allows configuring the conversion type and therefore the on line transmission type that the equipment has to execute on the measurements acquired by the field.
Bipolar	*Bipolar* and *Unipolar* options are mutually exclusive	Enabled	Enabled/Disabled	It allows configuring the acquisition of the field measurement in bipolar mode.
Unipolar	*Bipolar* and *Unipolar* options are mutually exclusive	Disabled	Enabled/Disabled	It allows configuring the acquisition of the field measurement in unipolar mode.
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1. In case of Telemeasurements, the following fields are added				
Alarm	Displayed only if the treatment as *event* is configured	Disabled	Enabled/Disabled	It allows configuring the issuing of an event when the transition from normal status to alarmed status occurs (outcoming limit exceeding). The program verifies that in presence of the configured *Alarm* field at least one alarm limit has been configured
Back to nrm	Displayed only if the treatment as *event* is configured	Disabled	Enabled/Disabled	It allows configuring the issuing of an event when the transition from alarmed status to normal status occurs (incoming limit exceeding). The program verifies that in presence of the configured *Back to nrm* field at least one alarm limit has been configured
Local Printing	None	Disabled	Enabled/Disabled	It allows configuring the sending in press of the quantity state variation .
Back to nrm	Displayed only if the *Local printing is enabled*	Disabled	Enabled/Disabled	It allows configuring the state variation type that causes the issue in press (return to the normal state) The program verifies that in presence of the configured *Back to nrm* field at least one alarm limit has been configured
Alarm	Displayed only if the *Local printing* is enabled	Disabled	Enabled/Disabled	It allows configuring the state variation type that causes the issue in press (alarm) The program verifies that in presence of the configured *Alarm* field at least one alarm limit has been configured
Conversion line				

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Analog Telemeasurements from Local I/O - General				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Technical units description	Displayed only if the treatment as *Local printing* is configured or if the measurement is *Scaled*	Blank	6 alphanumeric characters Blank	It displays the measurement unit of the quantity (e.g. MW, KV, A, mq, etc.). The string is sent to the equipment and used for the local printing
SUP. range	Displayed only if the *Local printing* is configured or if the measurement is *Scaled*	0	-32768÷+32767 for bipolar measurement 0÷+32767 for unipolar measurement	Upper Limit of the measure. The upper limit of the measure is used, together with lower limit, to individuate the *conversion line* and print, or transmit on line the measurement events with engineering units. This field is mandatory for the measurements scale and/or sent by the printer.
Inf.	Displayed only if the treatment as *Local printing* is configured or if the measurement is *Scaled*	0	-32768÷+32767 for bipolar measurement 0÷+32767 for unipolar measurement	Lower Limit of the measure. The lower limit of the measure is used, together with upper limit, to individuate the *conversion line* and print, or transmit on line the measurement events with engineering units. The program verifies that the condition: Sup. Range > Inf and Inf>0 (in case of unipolar measurements), is always respected. This field is mandatory for the measurements scale and/or sent by the printer.
Number of digits printed	Displayed only if the treatment as *Local printing* is configured or if the measurement is *Scaled*	0	1÷6,1÷6	It allows configuring the number of digits before and after the point to be considered for the printing of the measure value

Table 5-68 – Configuration of Analog Telemeasurements from Local I/O– General

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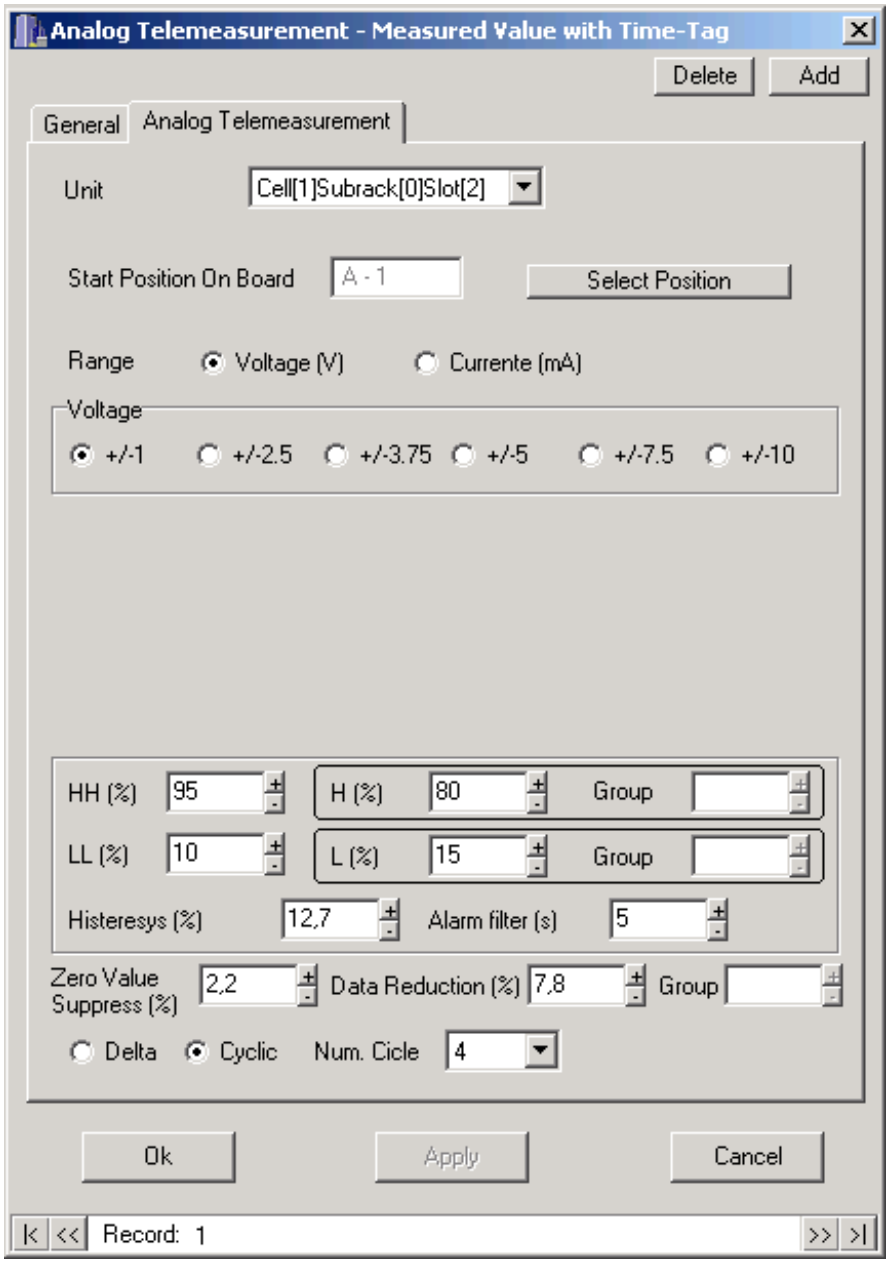

Figure 5-108 - Analog Telemeasurement from Local I/O

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Analog Telemeasurements from Local I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Unit	None	Blank	List of the 32OAI 8OAI/8DCO, 32ODI/4OAI/10DCO cards inserted during configuration, presented in the format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Analog Telemeasurement. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 32ODI or 8OAI/8DCO, 32ODI/4OAI/10DCO type). This field is mandatory
Position on board	None	Blank	A-1÷A-16 B-1÷B-16	The field displays the physical input, on the selected board, which the acquired quantity is connected to. The selection of the physical input on the card takes place pressing the “Select position ..” button and operating as described in par. 5.6.2
Range	None	Voltage (V) ±5	Voltage (V): ±1, ±2.5, ±3.75, ±5, ±7.5, ±10 Current (mA): ±1, ±2.5, ±3.75, ±5, ±6, ±7.5, ±10, ±20, 4÷20	It allows defining the type of electric input of the measure: voltage or current. It furthermore allows defining the limit value that depends on the type of selected input
HH (%)	None	Blank	0÷100 step 0,5 Blank	It allows configuring the safety limit value (very high) of the measure, expressed as % of the Full Range (ex. 50% = 0 for bipolar range and 50% = 12 mA for 4..20 mA range).
H (%)	None	Blank	0÷100 step 0,5 Blank	It allows configuring the conduction limit value (high) of the measure, expressed as % of the Full Range
LL (%)	None	Blank	0÷100 step 0,5 Blank	It allows configuring the safety limit value (very low) of the measure, expressed as % of the Full Range.
L (%)	None	Blank	0÷100 step 0,5 Blank	It allows configuring the conduction limit value (low) of the measure, expressed as % of the Full Range. The program checks the condition: HH > H > L > LL
Hysteresis (%)	Field meaningful only if at least a limit is configured	0,1	0,1÷12,7 step 0,1	It allows configuring the “dead band” under the limit (over if it is low limit), which, if exceeded, can generate the event associated to the alarm canceling. The configured hysteresis is unique for all the Limits and expressed as % of the Full Range.
Alarm filter (s)	Field meaningful only if at least a limit is configured	Blank	0,1÷255 step 0,1 Blank	It allows configuring the delay introduced on the alarm issuing for limit exceeding. This delay must considered as a filter: if the alarm disappears within the configured period, no issuing occurs. The delay is applied only to “H” and “L” limits.

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Analog Telemeasurements from Local I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Zero Value Suppress (%)	None	3	0÷12,7 step 0,1	It allows configuring a range of values around zero, within which the measure value is forced to zero. 0 value means the performance is not active. The supervision range of zero value is expressed as % of the full range selected.
Data reduction (%)	None	0,1	0÷12,7 step 0,1	It allows configuring the value of a “Delta” %. The transmission of the measure value (as Class 2 data) is issued when the difference between the current value of the measure and its value on the last transmission exceeds the configured percentage. The percentage is calculated respect to full range. If 0 value is configured the updating is continuous and the Data Reduction is not active.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, of the value configured for the threshold. **This performance is currently disabled.**
Measurement sending mode				
Delta	It appears only if in the *General Parameters* form the *Delta & Cyclic is enabled.* *Delta* and *Cyclic* options are mutually exclusive	Enabled	Enabled/Disabled	With this option the measurement is sent at every overcoming of the Delta (Data Reduction) configured threshold .
Cyclic	It appears only if in the *General Parameters* form the *Delta & Cyclic is enabled.* *Delta* and *Cyclic* options are mutually exclusive	Enabled	Enabled/Disabled	With this option the measurement is sent cyclically. The cycle interval, expressed in second, it is obtained multiplying the value configured in the *Cycle Time* field of the *General Parameters* form for the number configured in the following Cycle Num field. T he maximum cycle interval is given, for instance, by the product 300x30=9000 sec. (=150 mins.)
Num. Cicle	It appears only if *Cyclic* is enabled.	1	1÷30 step 1	It allows configuring the multiplier to apply to the base period (*Cycle Time*) to get the cycle interval expressed in second.

Table 5-69 – Analog Telemeasurements from Local I/O Configuration

Note: The *H (%)*, *L (%)*, *Data reduction (%)* and *Supervision value (%)* parameters can be configured also from remote by *Parameter Loading* standard procedure of the IEC60870-5-101 and IEC60870-5-104 protocols.

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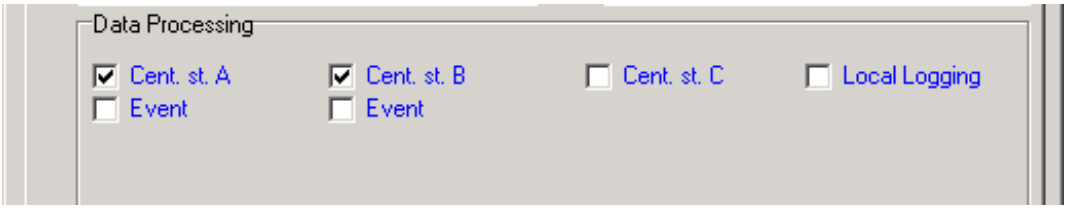
To simplify the form editing for Telemeasurements configuration, some examples are reported here above:

Sending by threshold (class 2)

To obtain Telemeasurement sending (class 2 with IEC60870-5-101 unbalanced protocol) exclusively by configured *Data Reduction* overpassing, it is necessary to set the configuration in the following mode:

- Choose the management centre/s



- Do not set any alarm limit
- Choose the *Delta* option and set the *Data Reduction* value

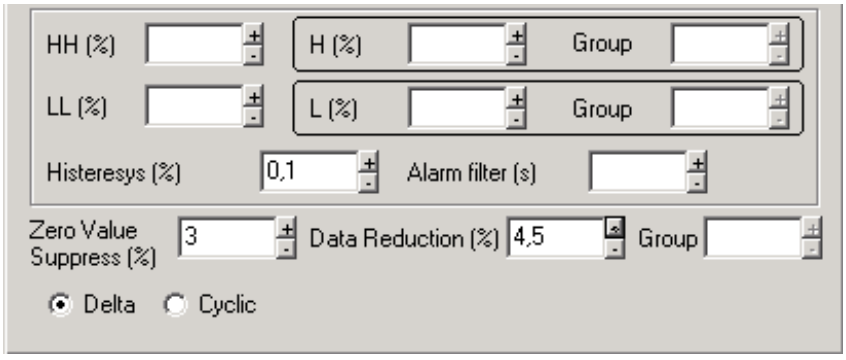


Figure 5-109 - Analog Telemeasurements from Local I/O: Sending by threshold (class 2)

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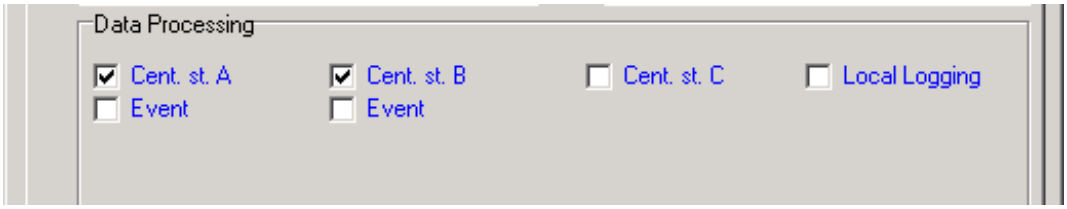
Sending by cycle (class 2)

To obtain Telemeasurement sending (class 2 with IEC60870-5-101 unbalanced protocol) exclusively by cycle it is necessary to set the configuration in the following mode:

- Choose the management centre/s



- Do not set any alarm limit
- Choose the *Cyclic* option and set the cycle time multiple configured in the *General* menu (remember that this option is enabled only if the *Delta&Cyclic* choice has been done in *General)*

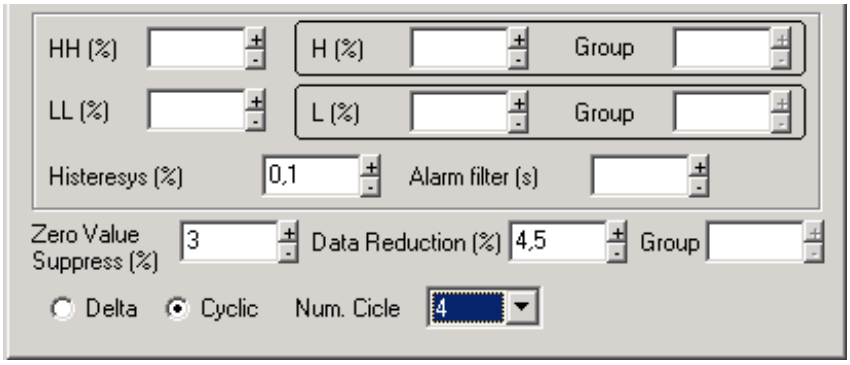


Figure 5-110 - Analog Telemeasurements from Local I/O: sending cyclic (class 2)

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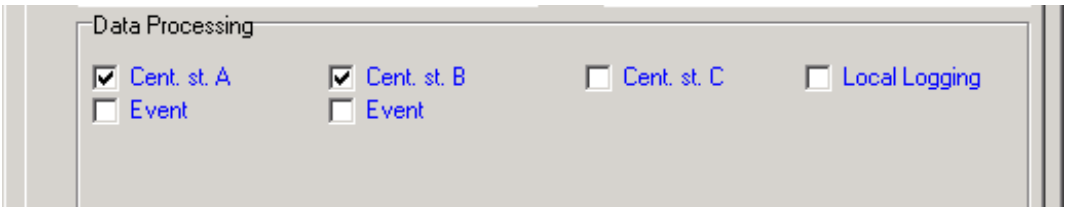
Sending by limits without spontaneous event generation (class 2)

To obtain Telemeasurement sending (class 2 with IEC60870-5-101 unbalanced protocol) by alarm limit overpassing it is necessary to set the configuration in the following mode:

- Choose the management centre/s



- Set at least one alarm limit

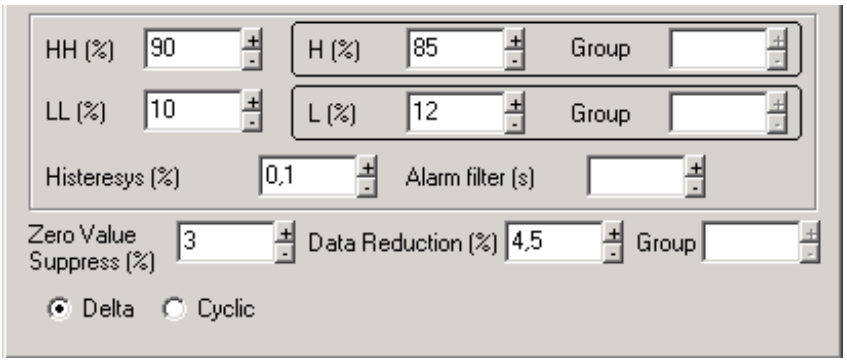


Figure 5-111 - Analog Telemeasurements from Local I/O: Sending by limits without spontaneous event generation

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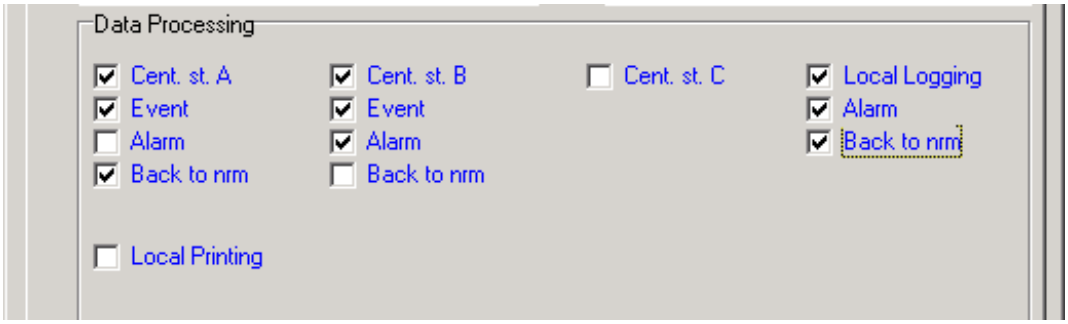
Sending by limits with spontaneous event generation (class 1)

To obtain Telemeasurement sending by alarm limit overpassing with spontaneous event generation (class 1 with IEC60870-5-101 sbilanciato), it is necessary to set the configuration in the following mode:

- Choose the management centre/s, enable the *Event* option and enable at least one of the two *Alarm* / *Back to nrm* options



- Set at least one alarm limit

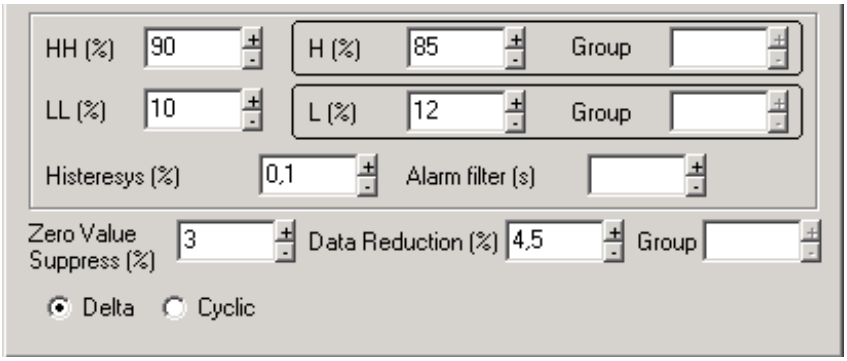


Figure 5-112 - Analog Telemeasurements from Local I/O: sending by limit with spontaneous event generation

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The modalities described above can be combined by following the settings listed in the table:

Cause of Transmission	Threshold class 2	Cyclic class 2	Limit class 2	Limit class 1
Only by Threshold (class 2)	X			
Only Cyclic (class 2)		X		
By Threshold and by Limit without spontaneous generation (class 2)	X		X	
By Threshold and by Limit with spontaneous generation (class 1)	X			X
Cyclic and by Limit without spontaneous generation (class 2)		X	X	
Cyclic (class 2) and by Limit with spontaneous generation (class 1)		X		X

Note: The transmission *by Limits* is necessarily associated to transmission *by Delta* or to *Cyclic* transmission.

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5.6.7 From Local – Digital Telemeasurement

This option can be reached selecting *Monitor Direction* item of the main menu, *From Local* and then *Digital Telemeasurement*.

As additional option, the program allows choosing “With Time Tag” or “Normal”, that is, with or without time tag. The two cases are treated together in this paragraph because they don’t need differentiation at user interface, but only at Information Object Address assignment and source Data Base writing level.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Digital Telemeasurement with and without Time Tag* acquired from field by means of one of the following groups:

- the 64 Optoinsulated Digital Input (*64 ODI*) card
- 32 Opto Digital Input / 4 Opto Analog Input / 10 Digital Command Output (*32ODI/4OAI/10DCO)* mixed card

The Digital Telemeasurement coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the following quantities:

- Measured Value, Normalized Value (M_ME_NA_1) if without time tag
- Measured Value, Normalized Value with Time Tag (M_ME_TA_1) and Measured Value, Normalized Value with Time Tag CP56Time2a (M_ME_TD_1) if they have time tag
- Measured Value, Scaled Value (M_ME_NB_1) if without time tag
- Measured Value, Scaled Value with Time Tag (M_ME_TB_1) and Measured Value, Scaled Value with Time Tag CP56Time2a (M_ME_TE_1) if they have time tag

For what is about the measurements treatment and configuration examples, see the paragraph 5.6.6

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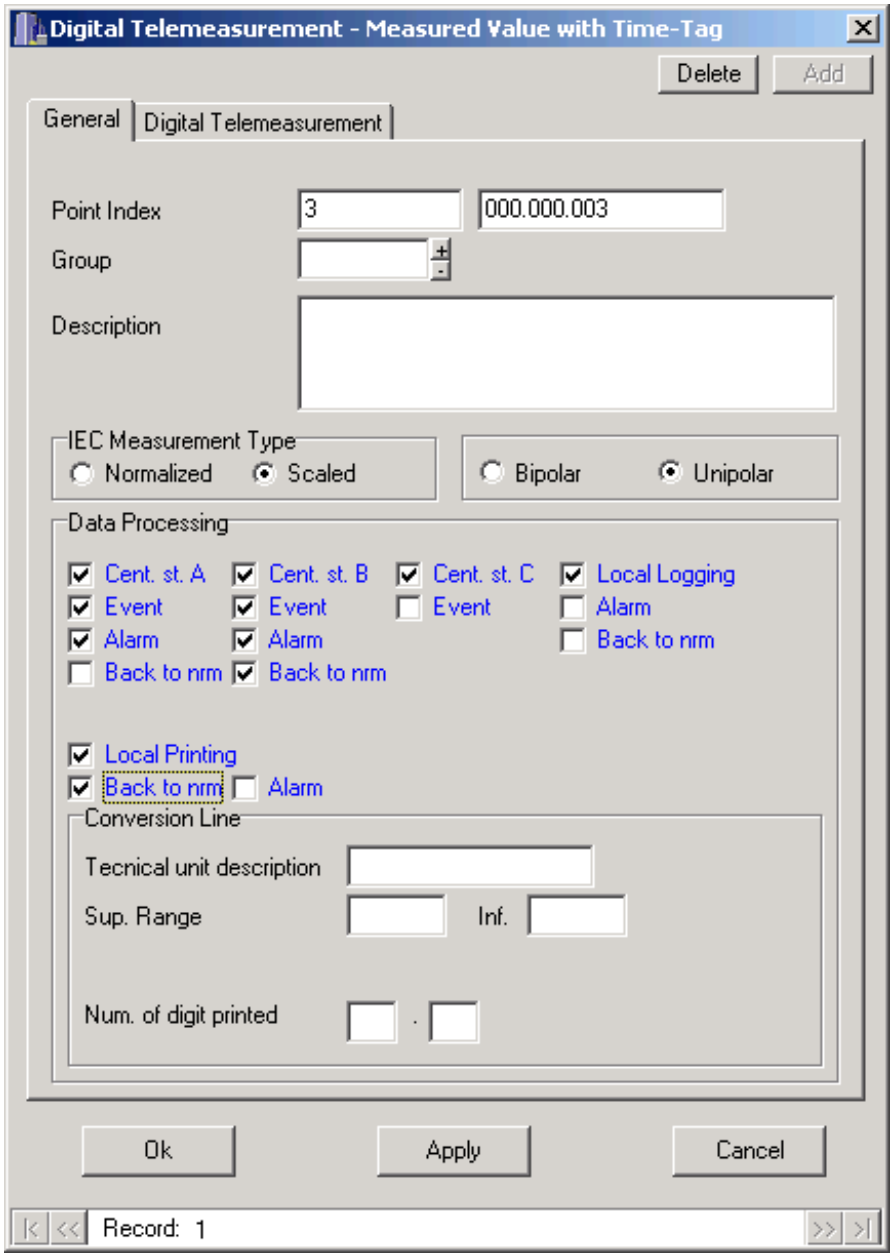

Figure 5-113 - Digital Telemeasurement from Local I/O - General

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Digital Telemeasurements from Local I/O - General				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Telemeasurement. The field is mandatory.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
IEC Measurement Type	None	Normalized	Normalized Scaled	It allows configuring the conversion type and therefore the on line transmission type that the equipment has to execute on the measurements acquired by the field.
Bipolar	*Bipolar* and *Unipolar* options are mutually exclusive	Enabled	Enabled/Disabled	It allows configuring the acquisition of the field measurement in bipolar mode.
Unipolar	*Bipolar* and *Unipolar* options are mutually exclusive	Disabled	Enabled/Disabled	It allows configuring the acquisition of the field measurement in unipolar mode.
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1. In case of Telemeasurements, the following fields are added				
Alarm	Displayed only if the treatment as *event* is configured	Disabled	Enabled/Disabled	It allows configuring the issuing of an event when the transition from normal status to alarmed status occurs (outcoming threshold exceeding). The program verifies that in presence of the configured *Alarm* field at least one alarm threshold has been configured
Back to nrm	Displayed only if the treatment as *event* is configured	Disabled	Enabled/Disabled	It allows configuring the issuing of an event when the transition from alarmed status to normal status occurs (incoming threshold exceeding). The program verifies that in presence of the configured *Back to nrm* field at least one alarm threshold has been configured
Local Printing	None	Disabled	Enabled/Disabled	It allows configuring the sending in press of the quantity state variation .
Back to nrm	Displayed only if the *Local printing* is enabled	Disabled	Enabled/Disabled	It allows configuring the state variation type that causes the issue in press (return to the normal state) The program verifies that in presence of the configured *Back to nrm* field at least one alarm threshold has been configured
Alarm	Displayed only if the *Local printing* is enabled	Disabled	Enabled/Disabled	It allows configuring the state variation type that causes the issue in press (alarm) The program verifies that in presence of the configured *Alarm* field at least one alarm threshold has been configured
Conversion line				

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Digital Telemeasurements from Local I/O - General				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Technical units description	Displayed only if the treatment as *Local printing* is configured or if the measurement is *Scaled*	Blank	6 alphanumeric characters Blank	It displays the measurement unit of the quantity (e.g. MW, KV, A, mq, etc.). The string is sent to the equipment and used for the local printing
SUP. range	Displayed only if the *Local printing* is configured or if the measurement is *Scaled*	0	-32768÷+32767 for bipolar measurement 0÷+32767 for unipolar measurement	Upper Limit of the measure. The upper limit of the measure is used, together with lower limit, to individuate the *conversion line* and print, or transmit on line the measurement events with engineering units. This field is mandatory for the measurements scale and/or sent by the printer.
Inf.	Displayed only if the treatment as *Local printing* is configured or if the measurement is *Scaled*	0	-32768÷+32767 for bipolar measurement 0÷+32767 for unipolar measurement	Lower Limit of the measure. The lower limit of the measure is used, together with upper limit, to individuate the *conversion line* and print, or transmit on line the measurement events with engineering units. The program verifies that the condition: Sup. Range > Inf and Inf>0 (in case of unipolar measurements), is always respected. This field is mandatory for the measurements scale and/or sent by the printer.
Number of digits printed	Displayed only if the treatment as *Local printing* is configured or if the measurement is *Scaled*	0	1÷6,1÷6	It allows configuring the number of digits before and after the point to be considered for the printing of the measure value

Table 5-70 –Digital Telemeasurements from Local I/O Configuration – General

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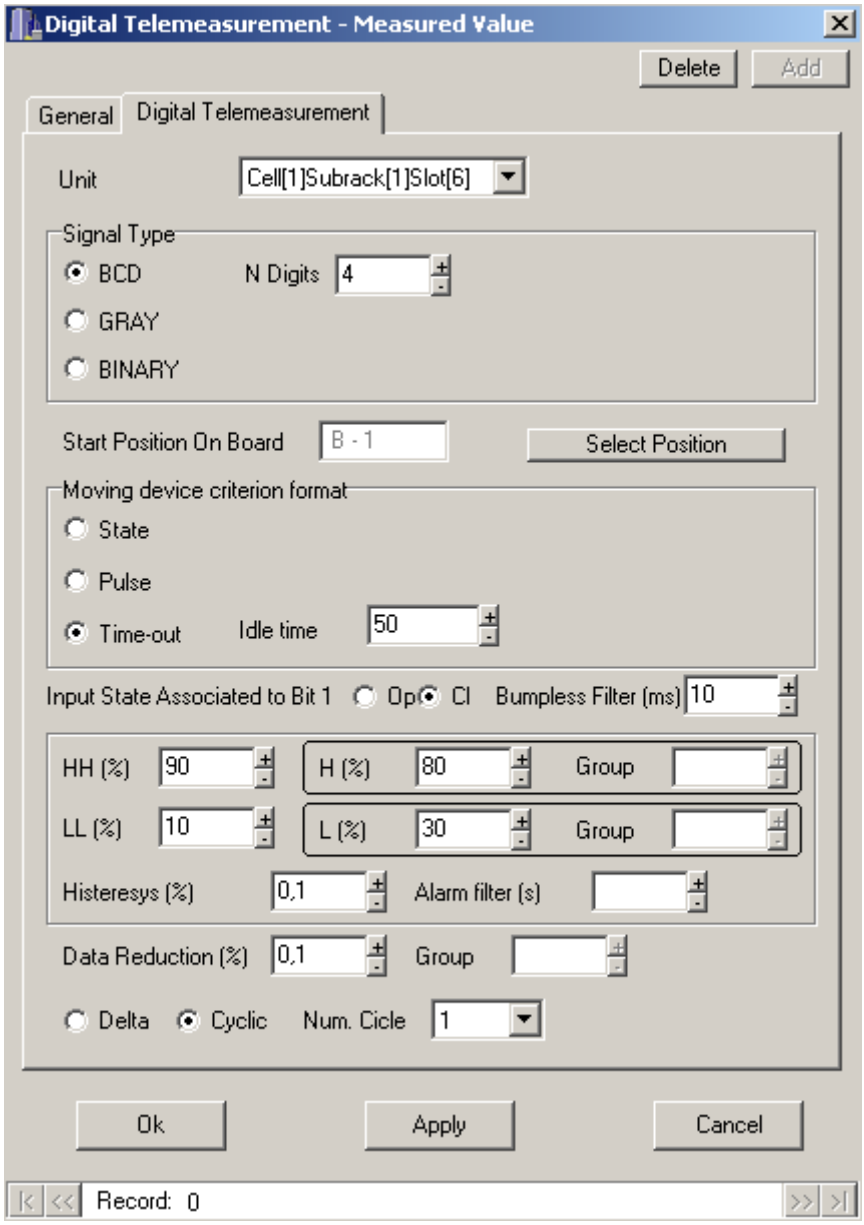

Figure 5-114 - Digital Telemeasurement from Local I/O

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Digital Telemeasurements from Local I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Unit	None	Blank	List of the 64ODI 32ODI/4OAI/10DCO cards inserted during configuration, presented in the format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Digital Telemeasurement. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 64ODI or 32ODI/4OAI/10DCO type). This field is mandatory
Start position on board	None	Blank	0÷n where “n” indicates the highest index which the first bit of the measure can be connected to, considering that the all the bits of the Digital Measurement plus 1 must be allocated on the remaining bits (up to 63)	The field displays the index of the physical input, on the selected board, which the first digital contributor of the Digital Measurement is connected to. N.B.: the first selected digital (that with lowest index among those that will constitute the Digital Telemeasurement) is always used to acquire the *Moving Device* criterion. The selection of the physical input on the card takes place pressing the “Select position ..” button and operating as described in par 5.6.2
Signal type	None	BCD	BCD GRAY BINARY	Coding type of the configured Digital Telemeasurement
N° of digits	Field enabled only if TMD is coded BCD	4	1÷4 step 1	Number of Digit to acquire for the Digital Telemeasurement with BCD code. The total number of bit to acquire is the number of BCD digit multiplied by four plus one bit for the acquisition of the *Moving Device* status. The program automatically configures the “Moving Device” bit before all the other ones, following bits are identified from left to right, from low significant (LSB) to most significant bit (MSB). Even when the *Moving Device* criterion is configured as TIMEOUT, however the correspondent bit is assigned
N° of bits	Field enabled only if TMD is coded GRAY	Blank	7÷14 step 1	Number of bits to acquire for the Digital Telemeasurement with GRAY code. The total number of bit to acquire is the number of bits of GRAY Measurement plus one for the acquisition of the *Moving Device* status. The program automatically configures the “Moving Device” bit before all the other ones, following bits are identified from left to right, from low significant (LSB) to most significant bit (MSB). Even when the *Moving Device* criterion is configured as TIMEOUT, however the correspondent bit is assigned

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Digital Telemeasurements from Local I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
N° of bits	Field enabled only if TMD is coded BINARY	Blank	8÷16 step 1	Number of bits to acquire for the Digital Telemeasurement with BINARY code. The total number of bit to acquire is the number of bits of BINARY Measurement plus one for the acquisition of the *Moving Device* status. The program automatically configures the “Moving Device” bit before all the other ones, following bits are identified from left to right, from low significant (LSB) to most significant bit (MSB). The measure acquisition is in 2's complement. Even when the *Moving Device* criterion is configured as TIMEOUT, however the correspondent bit is assigned
Moving device criterion format - State				
Rest state	Field enabled only if *Moving Device Criterion* is acquired as *Status*	Open	Open Close	It allows configuring, when the *Moving Device Criterion* is provided as STATE, the fixed state that the criterion assumes when the Digital Measurement is active
Moving device criterion format - Pulse				
Rest state	Field enabled only if *Moving Device Criterion* is acquired as *Pulse*	OP	OP (open) CL (close)	It allows configuring, when the *Moving Device Criterion* is provided as PULSE, the rest state of the pulse itself. If the rest state is defined, for instance, Open, it means that the pulse for the Measurement validation occurs with the transition from Open to Close and return.
Min. Pulse duration (ms)	None	100	50÷300 step 50	The minimum duration of the validation pulse of the Digital Measurement is configured. It must be greater than the duration of the Bumpless Filter.
Moving device criterion format - Timeout				
Idle time (ms)	Field enabled only if *Moving Device Criterion* is acquired as *TIMEOUT*	1000	50÷12750 step 50	The timeout to apply for the validation of the current Digital Measurement is configured. At each variation of any bit constituting the Digital Measurement, a digital timer is set to the *Idle time* value, at the end of this the current bit configuration is acquired as valid. The configured Timeout must be greater than the duration of the Bumpless Filter.
Input state associated to bit 1	None	CL	OP (open) CL (close)	It allows configuring the physical status of the single input (Open or Close), which the value 1 of the corresponding bit is associated to. The configured status is the same for all the bits of the Digital Measurement.
Bumpless filter (ms)	None	20	0÷60 step 10	Duration of the bumpless filter applied to each of the contributor signals in input.
Thresholds				
HH (%)	None	Blank	0÷100 step 0,5 Blank	It allows configuring the safety threshold value (very high) of the measure, expressed as % of the Upper Limit

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Digital Telemeasurements from Local I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
H (%)	None	Blank	0÷100 step 0,5 Blank	It allows configuring the conduction threshold value (high) of the measure, expressed as % of the Upper Limit
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, of the value configured for the threshold. **This performance is currently disabled**
L (%)	None	Blank	0÷100 step 0,5 Blank	It allows configuring the conduction threshold value (low) of the measure, expressed as % of the Upper Limit
LL (%)	None	Blank	0÷100 step 0,5 Blank	It allows configuring the safety threshold value (very low) of the measure, expressed as % of the Upper Limit. The program checks the condition: HH > H > L > LL
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, of the value configured for the threshold. **This performance is currently disabled**
Hysteresis (%)	Meaningful field if at least a threshold is configured	3	0,1÷12,7 step 0,1	It allows configuring the “dead band” under the threshold (over if it is low threshold), which, if exceeded, can generate the event associated to the alarm canceling. The configured hysteresis is unique for all the Thresholds and expressed as % of the Upper Limit
Alarm filter (s)	Meaningful field if at least a threshold is configured	Blank	0,1÷255 step 0,1 Blank	It allows configuring the delay introduced on the alarm issuing for threshold exceeding. This delay must considered as a filter: if the alarm disappears within the configured period, no issuing occurs. The delay is applied only to “H” and “L” thresholds.
Supervision value 0 (%)	Meaningful field if at least a threshold is configured	0	0÷12,7 step 0,1	It allows configuring a range of values around zero, within which the measure value is forced to zero. 0 value means the performance is not active. The supervision range of zero value is expressed as % of the Upper Limit.
Data reduction (%)	None	0,1	0÷12,7 step 0,1	It allows configuring the value of a “Delta” %. The transmission of the measure value (as Class 2 data) is issued when the difference between the current value of the measure and its value on the last transmission exceeds the configured percentage. The percentage is calculated respect to full range. If 0 value is configured the updating is continuous and the Data Reduction is not active.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, of the value configured for the threshold. **This performance is currently disabled.**

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Digital Telemeasurements from Local I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Measurement sending mode				
Delta	It appears only if in the *General Parameters* form the *Delta & Cyclic is enabled.* *Delta* and *Cyclic* options are mutually exclusive	Enabled	Enabled/Disabled	With this option the measurement is sent at every overcoming of the Delta (Data Reduction) configured threshold .
Cyclic	It appears only if in the *General Parameters* form the *Delta & Cyclic is enabled.* *Delta* and *Cyclic* options are mutually exclusive	Enabled	Enabled/Disabled	With this option the measurement is sent cyclically. The cycle interval, expressed in second, it is obtained multiplying the value configured in the *Cycle Time* field of the *General Parameters* form for the number configured in the following Cycle Num field. T he maximum cycle interval is given, for instance, by the product 300x30=9000 sec. (=150 mins.)
Num. Cicle	It appears only if *Cyclic* is enabled.	1	1÷30 step 1	It allows configuring the multiplier to apply to the base period (*Cycle Time*) to get the cycle interval expressed in second.

Table 5-71 – Digital Telemeasurements from Local I/O configuration

Note: The *H (%)*, *L (%)*, *Data reduction (%)* parameters can be configured also from remote by *Parameter Loading* standard procedure of the *IEC60870*-5-101 and *IEC60870*-5-104 protocols.

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5.6.8 From Local – Analog Step Position Information

This option can be reached selecting *Monitor Direction* item of the main menu, *From Local* and then *Analog Step Position Information*.

As additional option, the program allows choosing “With Time Tag” or “Normal”, that is, with or without time tag. The two cases are treated together in this paragraph because they don’t need differentiation at user interface, but only at Information Object Address assignment and source Data Base writing level.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Tap Changers with and without Time Tag* acquired from field in analog format by means of one of the following groups:

- the 32 Optoinsulated Analog Input (*32 OAI*) card
- 8 Opto Analog Input / 8 Digital Command Output (*8OAI/8DCO*) mixed card
- 32 Opto Digital Input / 4 Opto Analog Input / 10 Digital Command Output (*32ODI/4OAI/10DCO*) mixed card

The Tap Changers coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Step Position Information (M_ST_NA_1) if without time tag, and with Step Position Information with Time Tag (M_ST_TA_1) and Step Position Information with Time Tag CP56Time2a (M_ST_TB_1) if they have time tag.

An input variation causes an event generation (value between 1 and 63) toward the centre when:

- the sampled value in input enters in the valid band near a *step* value (valid event)
- the sampled value in input is greater than the configured input limit (invalid event and overflow)

The following figures report the step bands management, executed by the unit software, for the step position input acquisition.

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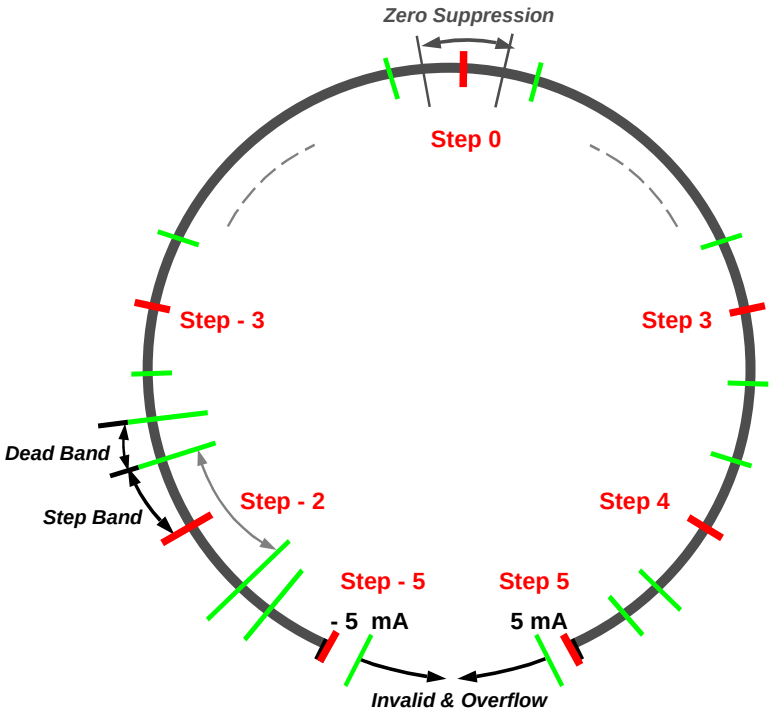

Example – Configuration Parameters: **Current Range = +/- 5 mA** **Max Count Range = 5**

Dead Band = 10 % di (Range/ 2 Max Count Range) = 0,05 mA

Step Band = 40 % di (Range/ 2 Max Count Range) = 0,2 mA

Figure 5-115 – Step management

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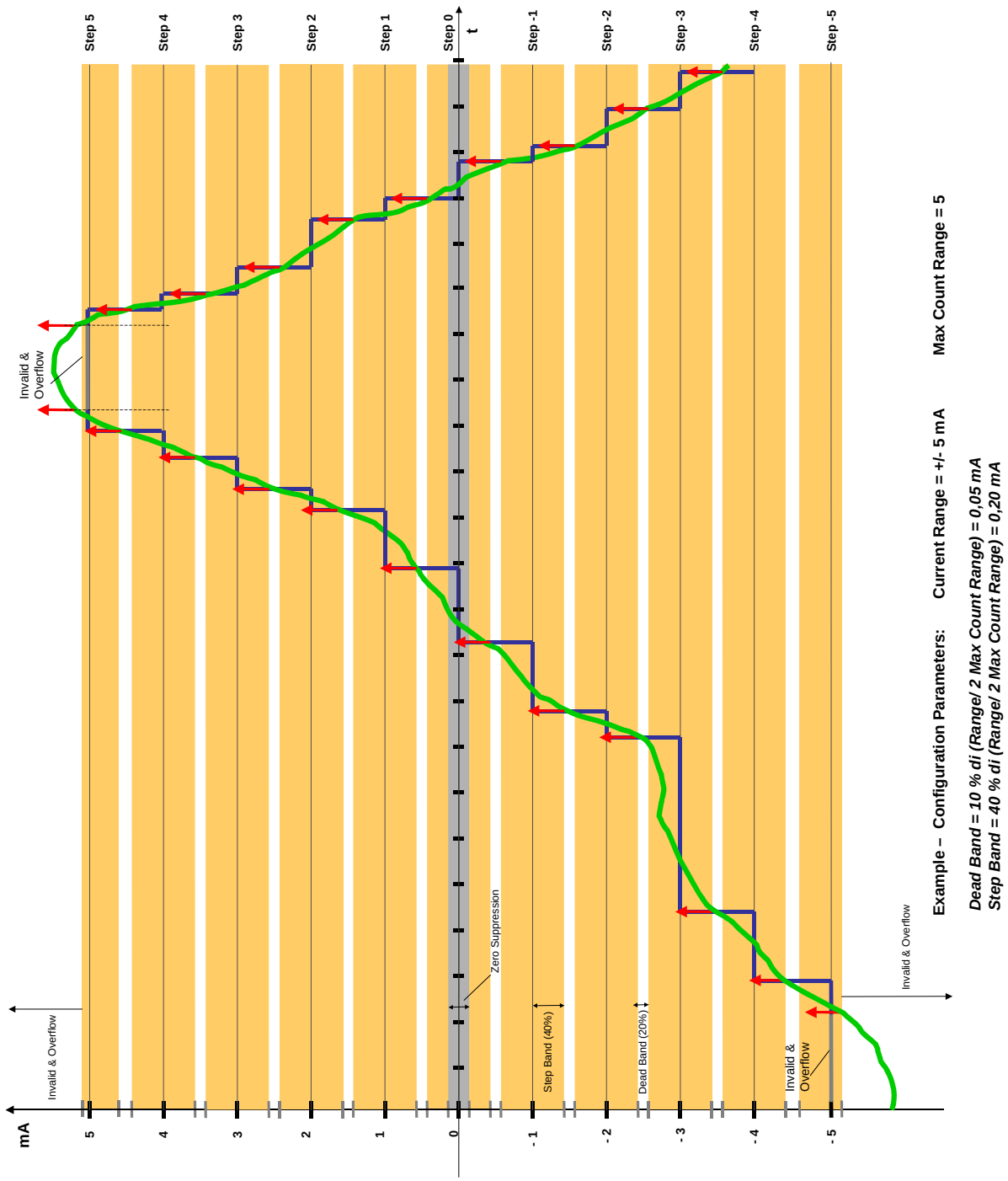

Figure 5-116 – Step management (by time)

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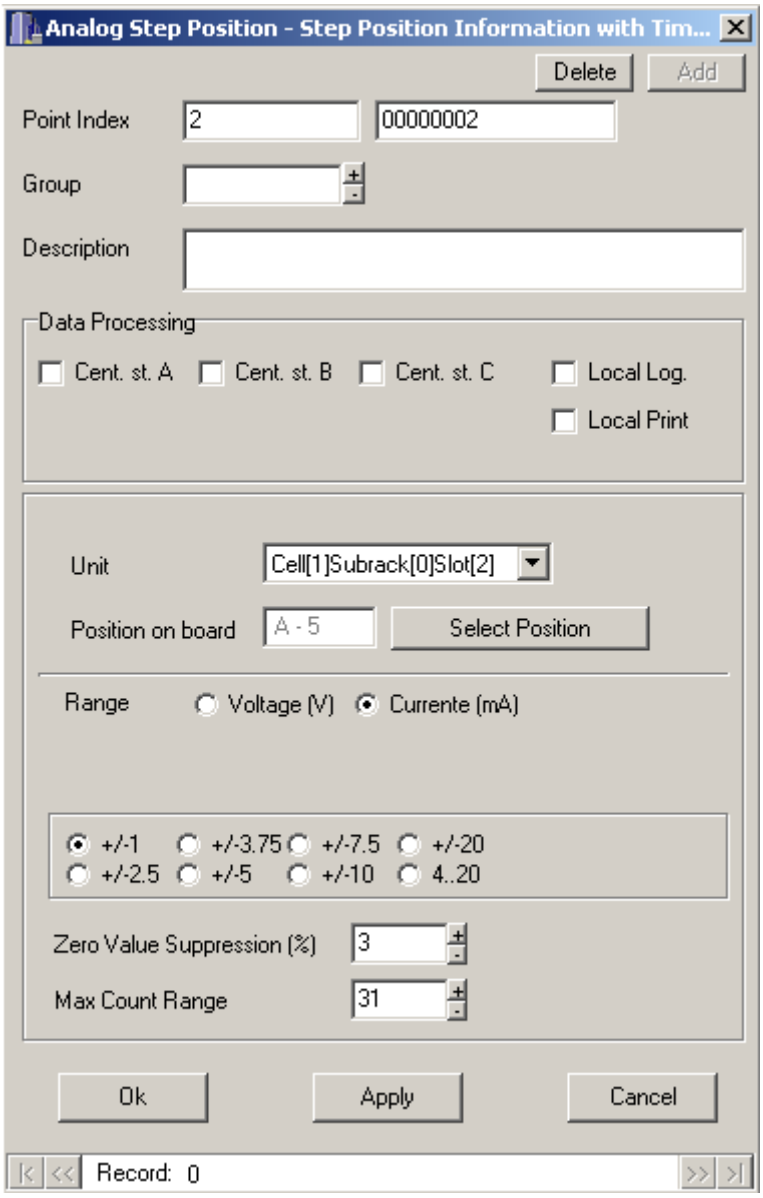

Figure 5-117 - Analog Tap Changer from Local I/O

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Analog Tap Changers from Local I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Tap Changer. The field is mandatory.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				
Unit	None	Blank	List of the 32ODI 32OAI, 8OAI/8DCO, 32ODI/4OAI/10DCO cards inserted during configuration, presented in the format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Analog Telemeasurement. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 32OAI, 8OAI/8DCO, 32ODI/4OAI/10DCO type). This field is mandatory
Position on board	None	Blank	A1÷A16 B1÷B16	The field displays the physical input, on the selected board, which the acquired quantity is connected to. The selection of the physical input on the card takes place pressing the “Select position ..” button and operating as described in par. 5.6.2
Range	None	Voltage (V) ±5	Voltage (V): ±1, ±2.5, ±3.75, ±5, ±7.5, ±10 Current (mA): ±1, ±2.5, ±3.75, ±5, ±6, ±7.5, ±10, ±20, 4÷20	It allows defining the type of electric input of the measure: voltage or current. It furthermore allows defining the limit value that depends on the type of selected input
Zero Value Suppression (%)	None	3	0÷12,7 step 0,1	It allows configuring a range of values around zero, within which the VSC measure value is forced to zero. 0 value means the performance is not active. The supervision range of zero value is expressed as % of full range selected.
Max Count Range	None	31	1÷63 step 1	It allows configuring the number of steps in which is subdivided the configured range.

Table 5-72– Configuration of Analog Tap Changers from Local I/O

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5.6.9 From Local – Digital Step Position Information

This option can be reached selecting *Monitor Direction* item of the main menu, *From Local* and then *Digital Step Position Information*.

As additional option, the program allows choosing “With Time Tag” or “Normal”, that is, with or without time tag. The two cases are treated together in this paragraph because they don’t need differentiation at user interface, but only at Information Object Address assignment and source Data Base writing level.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Tap Changers with and without Time Tag* acquired from field in digital format by means of the 64 Optoinsulated Digital Input (64 *ODI*) card.

The Tap Changers coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Step Position Information (M_ST_NA_1) if without time tag, and with Step Position Information with Time Tag (M_ST_TA_1) and Step Position Information with Time Tag CP56Time2a (M_ST_TB_1) if they have time tag.

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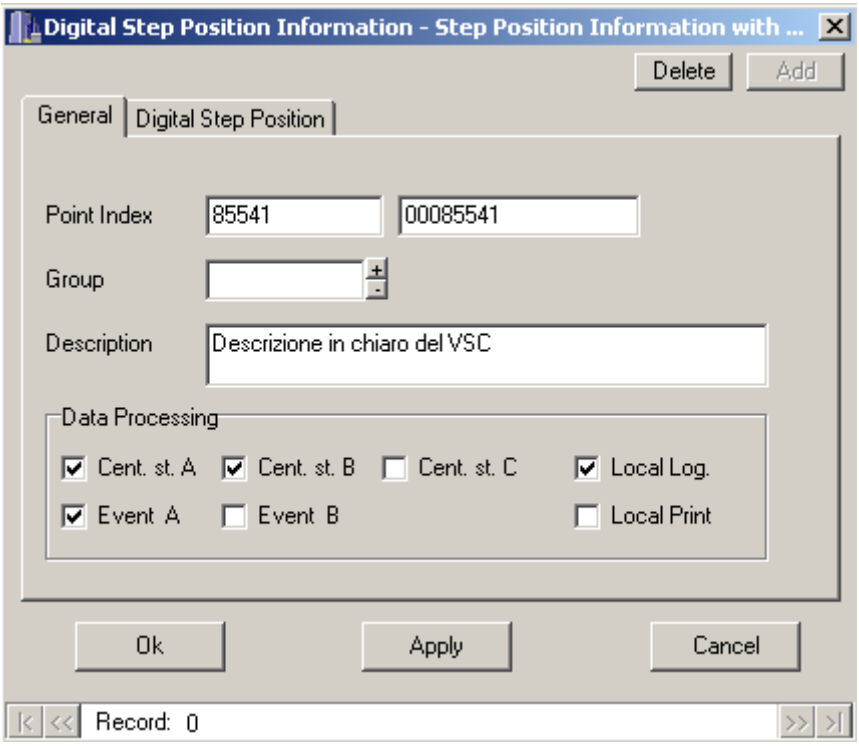

Figure 5-118 - Digital Tap Changer from Local I/O - General

Digital Tap Changers from Local I/O - General				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Tap Changer. The field is mandatory.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-73 – Configuration of Digital Tap Changers from Local I/O

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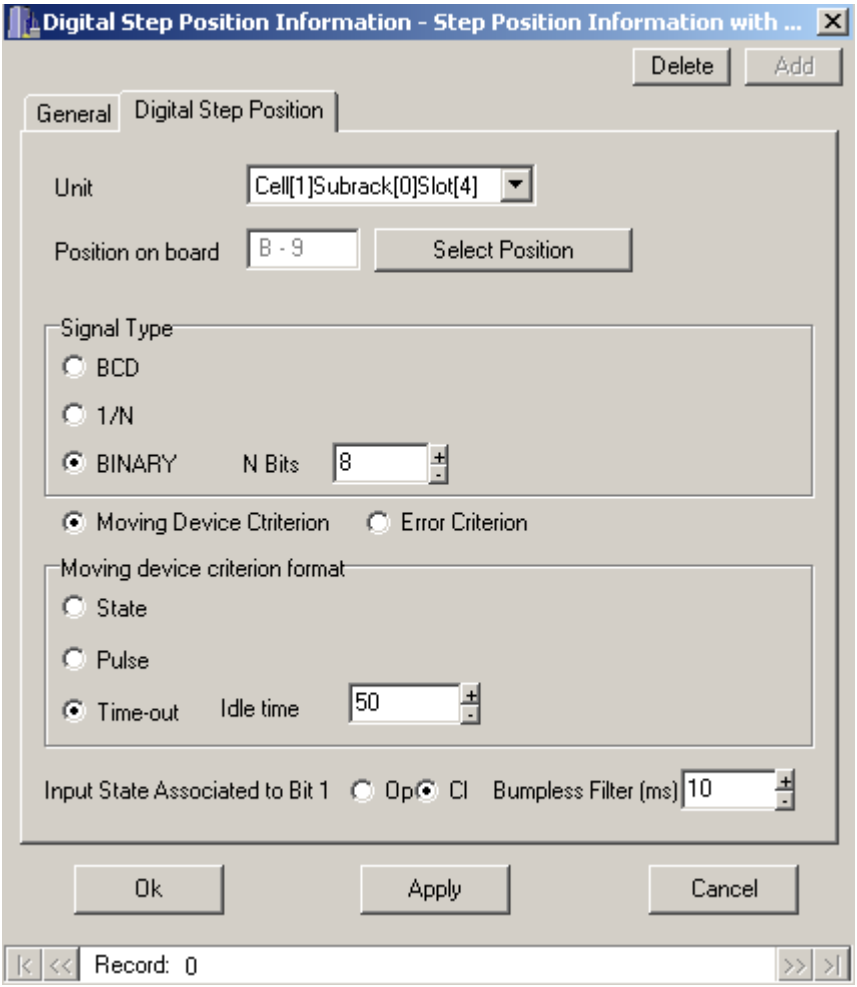

Figure 5-119 - Digital Tap Changer from Local I/O

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Digital Tap Changers from Local I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Unit	None	Blank	List of the 64ODI or 32ODI/4OAI/10DCO cards inserted during configuration, presented in the format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Digital Telemeasurement. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 64ODI or 32ODI/4OAI/10DCO type). This field is mandatory
Signal type	None	BCD	BCD 1 out of N BINARY	Coding type of the configured Tap Changer
N° of digits	Field enabled only if VSC is coded BCD	1	1÷2 step 1	Number of Digit to be acquired for the Digital Tap Changer with BCD code. The total number of bit to acquire is the number of BCD digit multiplied by four plus one bit for the acquisition of the *Moving Device* status. The program automatically configures the “Moving Device” bit before all the other ones. Even when the *Moving Device* criterion is configured as TIMEOUT, however the correspondent bit is assigned
N° of bits	Field enabled only if VSC is coded “1/N”	Blank	6÷30 step 1	Number of bits to be acquired for the Tap Changer with 1/N code. The total number of bit to acquire is the number of bits of 1/N code plus one for the acquisition of the *Moving Device* status. The program automatically configures the “Moving Device” bit before all the other ones. Even when the *Moving Device* criterion is configured as TIMEOUT, however the correspondent bit is assigned
N° of bits	Field enabled only if VSC is coded BINARY	Blank	8÷16 step 1	Number of bits to be acquired for the Tap Changer with BINARY code. The total number of bit to acquire is the number of bits of BINARY Measurement plus one for the acquisition of the *Moving Device* status. The program automatically configures the “Moving Device” bit before all the other ones. Even when the *Moving Device* criterion is configured as TIMEOUT, however the correspondent bit is assigned

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Digital Tap Changers from Local I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Start position on board	None	Blank	0÷n where “n” indicates the highest index which the first bit of the measure can be connected to, considering that the all the bits of the Digital VSC plus 1 must be allocated on the remaining bits (up to 63)	The field displays the index of the physical input, on the selected board, which the first digital contributor of the acquired Digital VSC is connected to. N.B.: the first digital (that with lowest index within the 64ODI card) is always used to acquire the *Moving Device* criterion. The selection of the physical input on the card takes place pressing the “Select position ..” button and operating as described in par 5.6.2
Moving device criterion format - State				
Rest state	Field enabled only if *Moving Device Criterion* is acquired as *Status*	Open	Open Close	It allows configuring, when the *Moving Device Criterion* is provided as STATE, the fixed state that the criterion assumes when the Digital Measurement is active
Moving device criterion format - Pulse				
Rest state	Field enabled only if *Moving Device Criterion* is acquired as *Pulse*	OP	OP (open) CL (close)	It allows configuring, when the *Moving Device Criterion* is provided as PULSE, the rest state of the pulse itself. If the rest state is defined, for instance, Open, it means that that the pulse for the VSC Measurement validation occurs with the transition from Open to Close
Min. Pulse duration (ms)	None	100	50÷300 step 50	The minimum duration of the validation pulse of the Digital VSC is configured. It must be greater than the duration of the Bumpless Filter.
Moving device criterion format - Timeout				
Idle time (ms)	Field enabled only if *Moving Device Criterion* is acquired as *TIMEOUT*	50	50÷12750 step 50	The timeout to apply for the validation of the current Digital VSC is configured. At each variation of any bit constituting the VSC, a timer is set to the *Idle time* value, at the end of this the current bit configuration is acquired as valid. The configured Timeout must be greater than the duration of the Bumpless Filter.
Input state associated to bit 1	None	CL	OP (open) CL (close)	It allows configuring the physical status of the single input (Open or Close), which the value 1 of the corresponding bit is associated to. The configured status is the same for all the bits of the Digital VSC.
Bumpless filter (ms)	None	10	0÷60 step 10	Duration of the bumpless filter applied to each of the contributor signals in input.

Table 5-74 – Configuration of Digital Tap Changer from Local I/O

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5.6.10 From Local – Multiple Telesignal

This option can be reached selecting *Monitor Direction* item of the main menu, *From Local* and then *Multiple Telesignal*.

As additional option, the program allows choosing “With Time Tag” or “Normal”, that is, with or without time tag. The two cases are treated together in this paragraph because they don’t need differentiation at user interface, but only at Information Object Address assignment and source Data Base writing level.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Multiple Telesignal with and without Time Tag* acquired from field by means of one of the following groups:

- the 64 Optoinsulated Digital Input (*64 ODI*) card
- 32 Opto Digital Input / 4 Opto Analog Input / 10 Digital Command Output (*32ODI/4OAI/10DCO)* mixed card

The Multiple Telesignals coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Bitstrings of 32 Bit (M_BO_NA_1) if without time tag, and with Bitstrings of 32 Bit with Time Tag (M_BO_TA_1) and the Bitstring of 32 Bit with Time Tag CP56Time2a (M_BO_TB_1) if they have time tag.

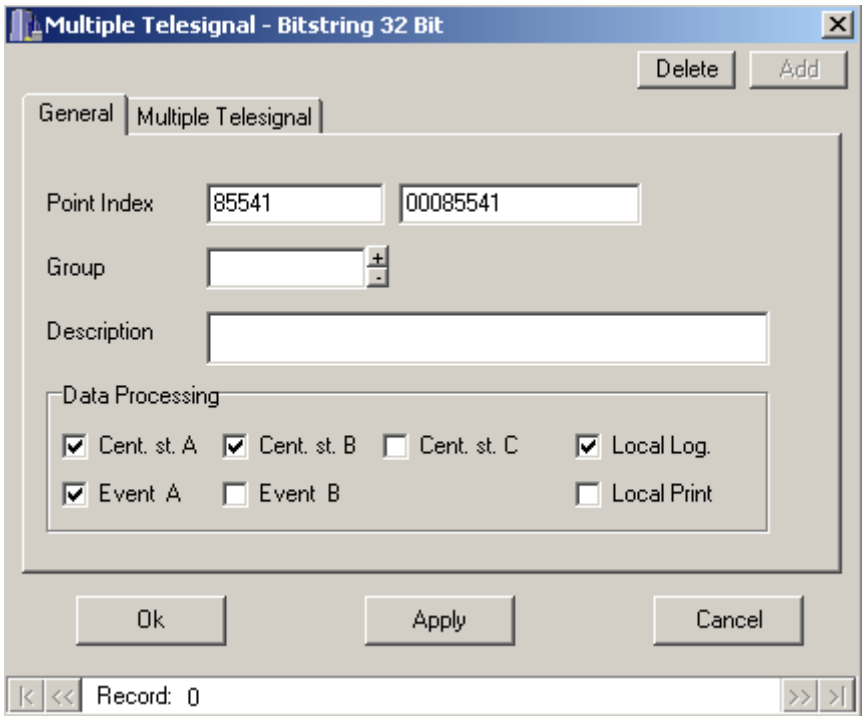

Figure 5-120 - Multiple Telesignal from Local I/O - General

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Multiple Telesignals from Local I/O - General				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Multiple Telesignal. The field is mandatory.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1.				

Table 5-75 – Configuration of Multiple Telesignals from Local I/O – General

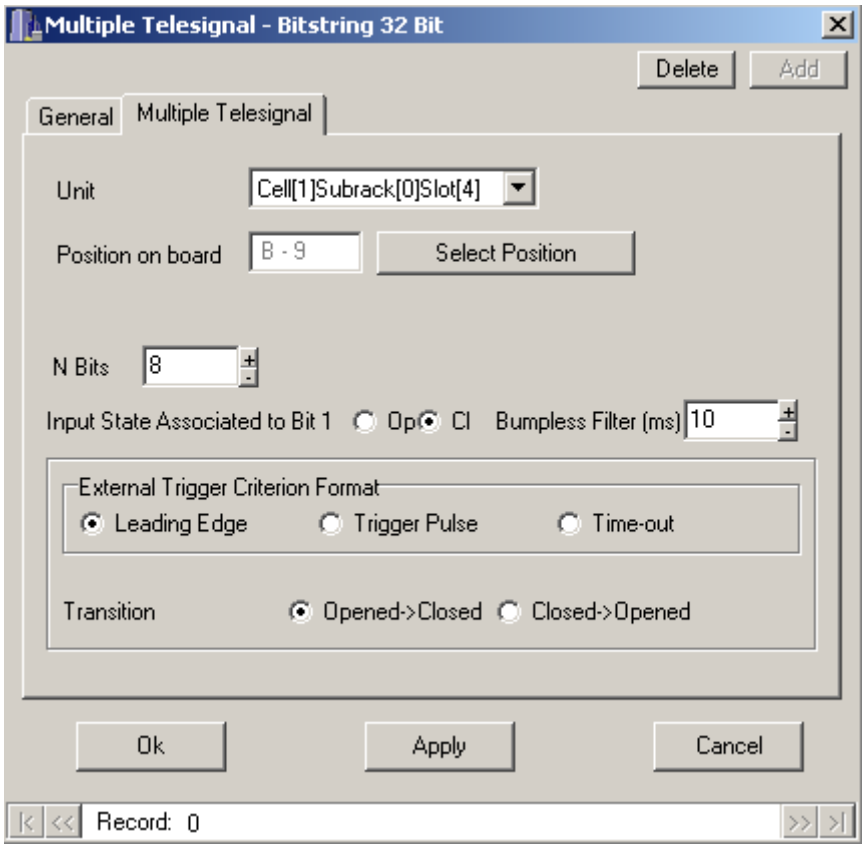

Figure 5-121 - Multiple Telesignal from Local I/O

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Multiple Telesignals from Local I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Unit	None	Blank	List of the 64ODI or 32ODI/4OAI/10DCO cards inserted during configuration, presented in the format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Multiple Telesignal. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in "Equipment" session and of 64ODI or 32ODI/4OAI/10DCO type). This field is mandatory
N° of bits	None	Blank	8÷32 step 8	Number of bits to acquire for the Multiple Telesignal. The total number of bit to acquire is the number of bits of Telesignal plus one for the acquisition of the *External Trigger*. The program automatically configures the "External Trigger" bit before all the other ones. Even when the *External Trigger* criterion is configured as TIMEOUT, however the correspondent bit is assigned
Start position on board	None	Blank	A1÷An B1÷Bn where "n" indicates the highest index which the first bit of the measure can be connected to, considering that the all the bits of the Digital VSC plus 1 must be allocated on the remaining bits (up to 63)	The field displays the index of the physical input, on the selected board, which the first digital contributor of the acquired Multiple Telesignal is connected to. N.B.: the first digital (that with lowest index among those will constitute the Multiple Telesignal) is always used to acquire the *External Trigger* criterion. The selection of the physical input on the card takes place pressing the "Select position .." button and operating as described in par 5.6.2
Bumpless filter (ms)	None	10	10÷60 step 10	Duration of the bumpless filter applied to each of the contributor signals in input.
External trigger criterion format – Leading edge				
Significant transition	Field enabled if the External Trigger type is configured is *Leading edge*	Open→Closed	Open→Closed Closed→Open	It allows configuring, if *External Trigger* is provided as LEADING EDGE, the meaningful transition of the leading edge itself.
External trigger criterion format – Trigger Pulse				
Rest state	Field enabled if the External Trigger type is configured is *Trigger Pulse*	Open	Open Closed	It allows configuring, if *External Trigger* is provided as PULSE, the rest state of the pulse itself. If the rest state is defined, for instance, Open, it means that that the pulse for the Multiple Telesignal validation occurs with the transition from Open to Close.
Min. Pulse duration (ms)	None	100	50÷300 step 50	The minimum duration of the validation pulse of the Multiple Telesignal is configured. It must be greater than the duration of the Bumpless Filter.

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Multiple Telesignals from Local I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
External trigger criterion format - Timeout				
Idle time (ms)	Field enabled if the External Trigger type is acquired is *TIMEOUT*	50	50÷12750 step 50	The timeout to apply for the validation of the current Multiple Telesignal is configured. At each variation of any bit constituting the Multiple Telesignal, a timer is set to the *Idle time* value, at the end of this the current bit configuration is acquired as valid. The configured Timeout must be greater than the duration of the Bumpless Filter.
Input state associated to bit 1	None	Closed	Open Closed	It allows configuring the physical status of the single input (Open or Close), which the value 1 of the corresponding bit is associated to. The configured status is the same for all the bits of the Multiple Telesignal.

Table 5-76 – Configuration of Multiple Telesignals from Local I/O

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5.6.11 From Local – Integrated Totals

This option can be reached selecting *Monitor Direction* item of the main menu, *From Local* and then *Integrated Totals*[3].

As additional option, the program allows choosing “With Time Tag” or “Normal”, that is, with or without time tag. The two cases are treated together in this paragraph because they don’t need differentiation at user interface, but only at Information Object Address assignment and source Data Base writing level.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Telecountings with and without Time Tag* acquired from field by means of one of the following groups:

- the 64 Optoinsulated Digital Input (*64 ODI*) card
- 32 Opto Digital Input / 4 Opto Analog Input / 10 Digital Command Output (*32ODI/4OAI/10DCO)* mixed card

The Telecountings coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Integrated Totals (M_IT_NA_1) if without time tag, and with Integrated Totals with Time Tag (M_IT_TA_1) the Integrated Totals with Time Tag CP56Time2a (M_IT_TB_1) if they have time tag.

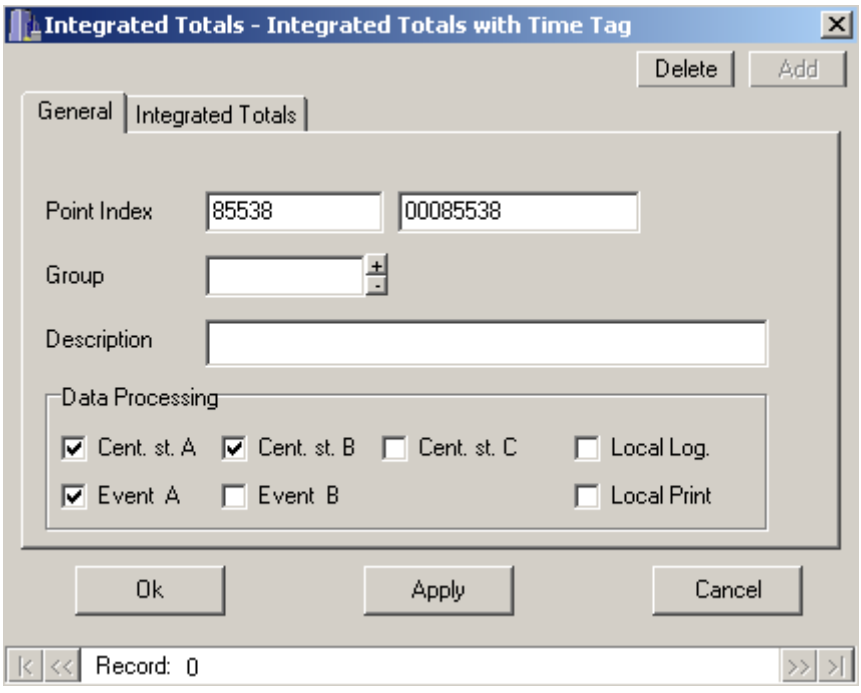

Figure 5-122 - Telecounting from Local I/O – General

[3] The following definitions are synonymous of *Integrated Totals*: *Telemetering*, *Telecountings*, *Energy counters*.

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Telecountings from Local I/O - General				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Telecounting. The field is mandatory.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1.				

Table 5-77 – Configuration of Telecountings from Local I/O– General

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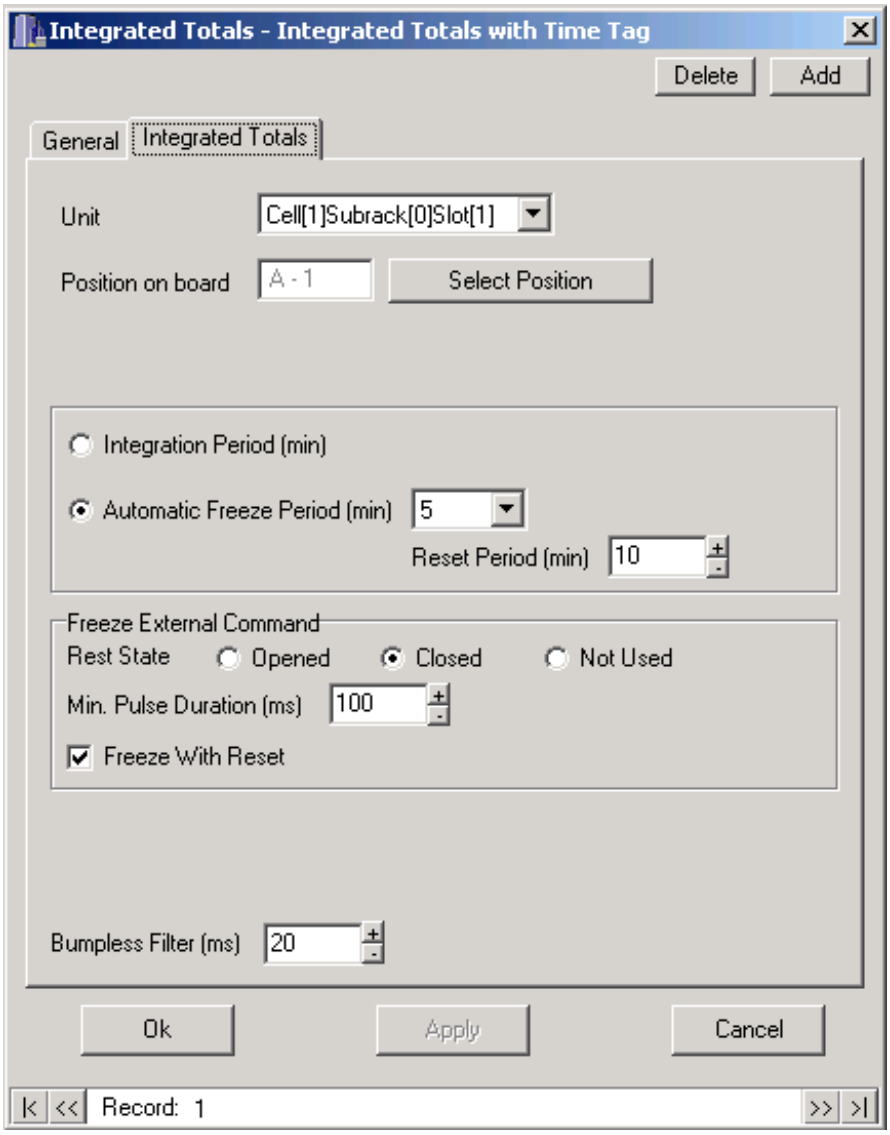

Figure 5-123 - Telecounting from Local I/O

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Telecountings from Local I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Unit	None	Blank	List of the 64ODI, 32ODI/4OAI/10DCO cards inserted during configuration, presented in the format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Telecounting. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 64ODI, 32ODI/4OAI/10DCO type). This field is mandatory
Position on board	None	Blank	A-1÷A-31 B-1÷B-31 for the 64ODI card B-1÷B-31 for the 32ODI/4OAI/10DCO card	The field displays the index of the physical input, on the selected board, which the first digital of the Telecounting is connected to. N.B.: the first digital (that with lowest index inside the 64ODI or 32ODI/4OAI/10DCO board) is always used to acquire the *External Freeze* criterion. The second digital is used to acquire the Telecounting (the STCE/RTU equipment manages the one-contact Telecountings). The selection of the physical input on the board takes place pressing the “Select position ..” button and operating as described in par 5.6.2
Integration period (min)	This field is enabled in alternative to “Automatic freeze period”	1	1÷59 step 1 Not applied	It allows defining the period of Integration of the Telecounting. At constant intervals of time, equal to the integration period , the current value reached by the Telecounting is memorized and transmitted as event (with or without schedule) to the Center. The Telecounting is managed to accumulation without reset
Automatic freeze period (min)	This field is enabled in alternative to “Integration period”	5	1, 2, 3, 5, 10, 15, 20, 30 Not applied	It allows defining the automatic Freeze Period of the Telecounting. The automatic freeze operation is executed by the applicative program of STCE/RTU equipment with the following modalities: • at the end of the configured period, the current value of Telecounting is stored and transmitted as event (with or without time tag) to Center/s; • if reset is configured, also the current value is reset.
Reset period	This field is meaningful only together with the use of “Automatic freeze period”	1	1÷1440 step 1 Not applied	It allows defining the reset period of the Telecounting as multiple of the Freeze period. The program verifies that the “Reset period” is an integer multipe of the “Automatic freeze period”.

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Telecountings from Local I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Freeze external command				
Rest state	None	Not Used	Open Closed Not Used	It allows configuring the use of the Freeze external command acquired on the first of the two digital inputs configured for Telecounting. The external Freeze command is provided as pulse, whose rest state is configured. If the rest state is defined, for instance, Open, it means that that the Freeze pulse occurs with the transition from Open to Closed and vice versa.
Min. Pulse duration (ms)	None	100	50÷300 step 50	The minimum duration of the Freeze pulse is configured to acknowledge it as valid. It must be greater than the duration of the Bumpless filter.
Freeze with reset	This field is meaningful only together with the use of the external Freeze command	Enabled	Enabled/Disabled	It allows associating the reset operation to the Freeze external command.
Filtering				
Bumpless filter (ms)	None	20	10÷60 step 10	Duration of the bumpless filter applied to each of the contributor signals in input.

Table 5-78 – Configuration of Telecountings from Local I/O

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5.6.12 From Serial – Single Point

This option can be reached selecting *Monitor Direction* item of the main menu, *From Serial* and then *Single Point*.

As additional option, the program allows choosing “With Time Tag” or “Normal”, that is, with or without time tag. The two cases are treated together in this paragraph because they don’t need differentiation at user interface, but only at Information Object Address assignment and source Data Base writing level.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Single Telesignals with and without Time Tag* acquired from field by means of one of the serial port connected to the 4 Serial Channel (*4 SC*) card.

The Single Telesignals coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Single Point Information (M_SP_NA_1) if without time tag, and with Single Point Information with Time Tag CP56Time2a (M_SP_TB_1) if they have time tag.

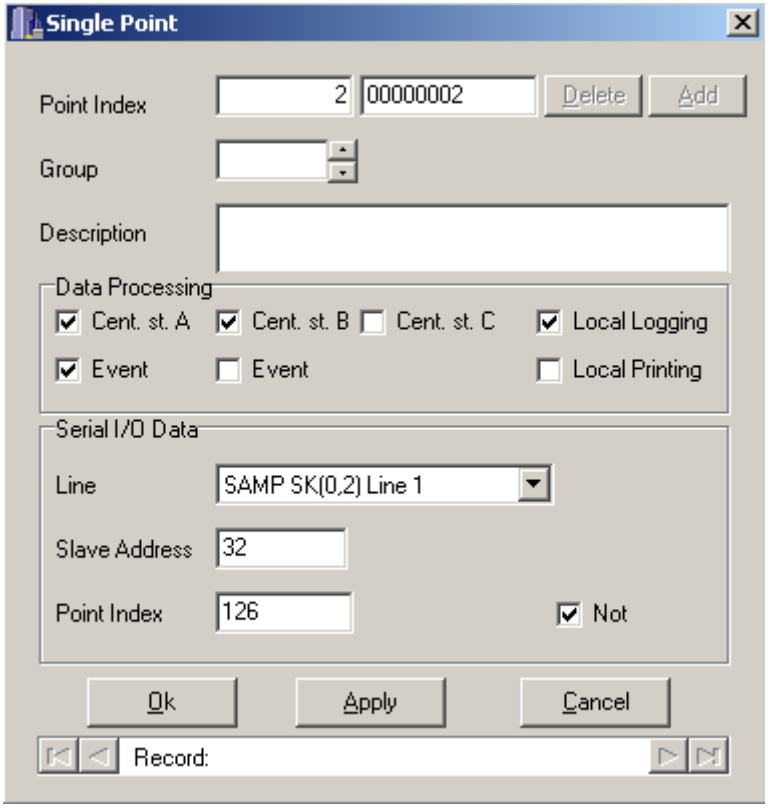

Figure 5-124 – Single Telesignal from Serial I/O – SAMP/SASP protocols

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Single telesignals from Serial I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Single Point. The field is mandatory.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				
Serial I/O Data – from 4SC-SAMP with SAMP Protocol				
Line	None	Blank	List of the 4SC-SAMP cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Telesignal is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 4SC-SAMP type). This field is mandatory
Slave Address	None	Blank	1÷255	It allows configuring the address of the *node* (Front End STCR) connected on the line. SAMP protocol is point-multipoint type and then allows the management of more nodes connected on the same line. This field is mandatory.
Point Index	None	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.
Not	None	Enabled	Enabled/Disabled	It allows to negate the digital on the acquisition from serial.
Serial I/O Data – from 4SC-SAMP with SASP Protocol				
Line	None	Blank	List of the 4SC-SAMP cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Telesignal is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 4SC-SAMP type). This field is mandatory
Point Index	None	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.

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Single telesignals from Serial I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Serial I/O Data – da 4SC-101 and 2SC+ETH with IEC60870-5-101 Master Protocol				
Line	None	Blank	List of the 4SC-101 **and 2SC+ETH** cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Telesignal is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in "Equipment" session and of 4SC-101 **and 2SC+ETH** type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory
Slave Address	It depends on the number of octets of Link Address	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the Slave equipment (Station IEC address). Slave Address can be omitted if the communication modality is of *Balanced* type. This field is mandatory.
Common Add.	It depends on the number of octets of Common Address	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of ASDU. **Normally it is set equal to Slave Address.** This field is mandatory.
Point Index	It depends on the number of octets of Information Object Address	Blank	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.
Serial I/O Data – from 2SC+ETH with IEC60870-5-104 Master Protocol				
Line	None	Blank	List of the **2SC+ETH** cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Telesignal is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in "Equipment" session **and of 2SC+ETH** type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory
RTU Index	None	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the Slave equipment (Station IEC address). This field is mandatory.
Common Add.	None	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of ASDU. **Normally it is set equal to Slave Address.** This field is mandatory.
Point Index	None	Blank	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.
Serial I/O Data – from 4SC-MODBUS with MODBUS-DCS Master protocol				

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Single telesignals from Serial I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Line	None	Blank	List of the 4SC-MODBUS cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Telesignal is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in "Equipment" session and of 4SC- MODBUS type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory
Slave Address	None	First node of the list	1÷247	It allows choosing the address of the *node* (Slave Modbus) connected to the line. MODBUS protocol is point-multipoint and then allows the management of more nodes connected to the same line. The program manages the list of Slave nodes already configured for the Modbus protocol in *Protocols* section, *Modbus Channels* subsection. This field is mandatory.
Point Index	Index of the point inside the related range.	Blank	1÷65535 LOW, HIGH	It allows configuring the index used to individuate the quantity inside the protocol. The quantity index must be within the *Range Single TS* configured for Modbus protocol in *Protocols* section, *Modbus Channels* subsection. As the acquisition uses logs and each log contains two quantities, the complete addressing includes also the specification, LOW or HIGH, of the related part of the log. This field is mandatory.
Serial I/O Data – da 4SC-MODBUS con Protocollo MODBUS-Standard Master				
Line	None	Blank	List of the 4SC-MODBUS cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Telesignal is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in "Equipment" session and of 4SC- MODBUS type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory

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Single telesignals from Serial I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Slave Address	None	First node of the list	1÷247	It allows choosing the address of the *node* (Slave Modbus) connected to the line. MODBUS protocol is point-multipoint and then allows the management of more nodes connected to the same line. The program manages the list of Slave nodes already configured for the Modbus protocol in *Protocols* section, *Modbus Channels* subsection. This field is mandatory.
Point Index	Index of the point inside the related range.	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. The quantity index must be within the *Range Single TS* configured for Modbus protocol in *Protocols* section, *Modbus Channels* subsection. This field is mandatory.

Table 5-79– Configuration of Single Telesignals from Serial I/O

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5.6.13 From Serial – Double Point

This option can be reached selecting *Monitor Direction* item of the main menu, *From Serial* and then *Double Point*.

As additional option, the program allows choosing “With Time Tag” or “Normal”, that is, with or without time tag. The two cases are treated together in this paragraph because they don’t need differentiation at user interface, but only at Information Object Address assignment and source Data Base writing level.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Double Telesignals with and without Time Tag* acquired from field by means of one of the serial ports connected to the 4 Serial Channel (*4 SC*) card.

The Double Telesignal coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Double Point Information (M_DP_NA_1) if without time tag, and with Double Point Information with Time Tag CP56Time2a (M_DP_TB_1) if they have time tag.

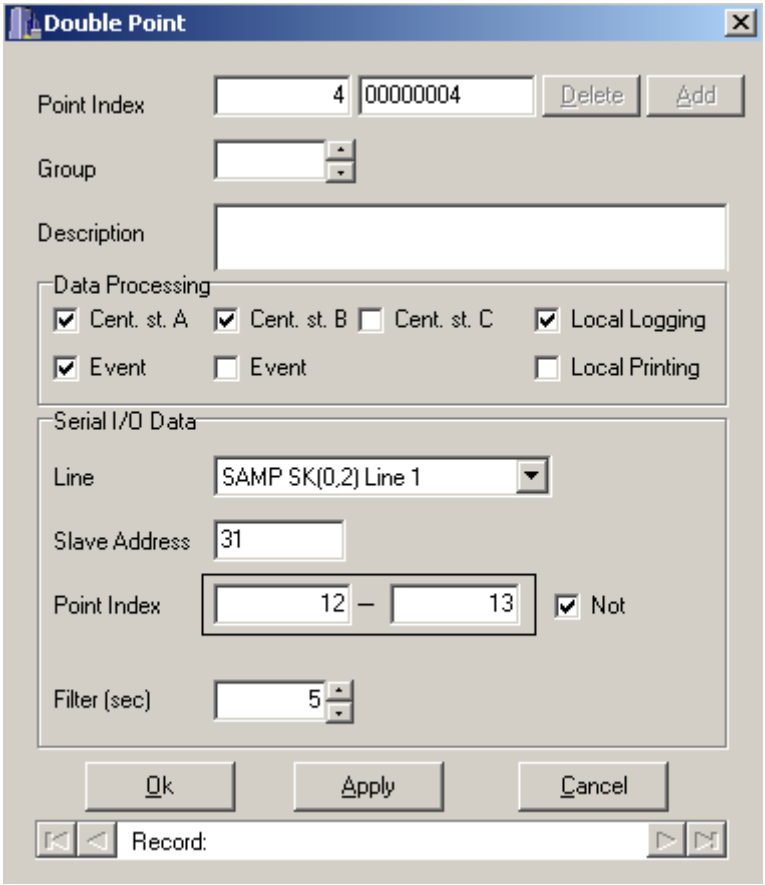

Figure 5-125 – Double Telesignal from Serial I/O – SAMP/SASP protocols

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Double Telesignals from Serial I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Double Point. The field is mandatory.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				
Serial I/O Data – from 4SC-SAMP with SAMP protocol				
Line	None	Blank	List of the 4SC-SAMP cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the two digitals that contribute to the status of the Double Telesignal are acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 4SC- SAMP). This field is mandatory
Slave Address	None	Blank	1÷255	It allows configuring the address of the *node* (Front End STCR) connected to the line. SAMP protocol is point-multipoint and then allows the management of more nodes connected to the same line. This field is mandatory.
Samp Index	None	Blank	1÷65535	It allows configuring the two indexes used to individuate the two digitals inside the protocol. This field is mandatory The two acquired digitals contribute to the status of the Double Telesignal. These fields are mandatory.
Not	None	Enabled	Enabled/Disabled	It allows negating both digitals on acquiring from serial line.
Filter (s)	None	5	1÷20 step 1	Duration of the filter of the transient of the device associated to the two digital inputs. The application of this filter has the purpose to avoid the transmission of transient incongruence statuses to the Centers

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Double Telesignals from Serial I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Serial I/O Data – from 4SC-SAMP with SASP protocol				
Line	None	Blank	List of the 4SC-SAMP cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the two digitals that contribute to the status of the Double Telesignal are acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in "Equipment" session and of 4SC- SAMP). This field is mandatory
Samp Index	None	Blank	1÷65535	It allows configuring the two indexes used to individuate the two digitals inside the protocol. This field is mandatory The two acquired digitals contribute to the status of the Double Telesignal. These fields are mandatory.
Filter (s)	None	5	1÷20 step 1	Duration of the filter of the transient of the device associated to the two digital inputs. The application of this filter has the purpose to avoid the transmission of transient incongruence statuses to the Centers
Serial I/O Data – from 4SC-101 and 2SC+ETH with *IEC60870*-5-101 Master Protocol				
Line	None	Blank	List of the 4SC-101 **and 2SC+ETH** cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, from which the two digitals are acquired that contribute to the status of the Double Telesignal. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in "Equipment" session and of 4SC-101 **and 2SC+ETH** type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory
Slave Address	It depends on the number of octets of Link Address	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the Slave equipment (Station IEC address). Slave Address can be omitted if the communication modality is of *Balanced* type. This field is mandatory.
Common Add.	It depends on the number of octets of Link Address	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of ASDU. **Normally it is set equal to Slave Address.** This field is mandatory.
Point Index	It depends on the number of octets of Information Object Address	Blank	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.

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Double Telesignals from Serial I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Serial I/O Data – from 2SC+ETH with IEC60870-5-104 Master Protocol				
Line	None	Blank	List of the **2SC+ETH** cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Telesignal is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in "Equipment" session **and of 2SC+ETH** type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory
RTU Index	None	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the Slave equipment (Station IEC address). This field is mandatory.
Common Add.	None	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of ASDU. **Normally it is set equal to Slave Address.** This field is mandatory.
Point Index	None	Blank	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.
Serial I/O Data – from 4SC-MODBUS with MODBUS-DCS Master Protocol				
Line	None	Blank	List of the 4SC-MODBUS cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Double Telesignal is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in "Equipment" session and of 4SC- MODBUS type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory
Slave Address	None	First node of the list	1÷247	It allows choosing the address of the *node* (Slave Modbus) connected to the line. MODBUS protocol is point-multipoint and then allows the management of more nodes connected to the same line. The program manages the list of Slave nodes already configured for the Modbus protocol in *Protocols* section, *Modbus Channels* subsection. This field is mandatory.

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Double Telesignals from Serial I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	Index of the point inside the related range.	Blank	1÷65535 LOW, HIGH	It allows configuring the index used to individuate the quantity inside the protocol. The quantity index must be withinh the *Range Double TS* configured for Modbus protocol in *Protocols* section, *Modbus Channels* subsection. As the acquisition uses logs and each log contains two quantities, the complete addressing includes also the specification, LOW or HIGH, of the related part of the log. This field is mandatory.
Serial I/O Data – from 4SC-MODBUS with MODBUS-Standard Master Protocol				
Line	None	Blank	List of the 4SC-MODBUS STD cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Double Telesignal is acquired from. The program displays, in a pull down menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 4SC- MODBUS Standard type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory
Slave Address	None	First node of the list	1÷247	It allows choosing the address of the *node* (Slave Modbus) connected to the line. MODBUS protocol is point-multipoint and then allows the management of more nodes connected to the same line. The program manages the list of Slave nodes already configured for the Modbus protocol in *Protocols* section, *Modbus Channels* subsection. This field is mandatory.
Point Index	Index of the point inside the related range.	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. The quantity index must be within the *Range Double TS* configured for Modbus protocol in *Protocols* section, *Modbus Channels* subsection. This field is mandatory.

Table 5-80 – Configuration of Double Telesignals from Serial I/O

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5.6.14 From Serial – Multiple Telesignal

This option can be reached selecting *Monitor Direction* item of the main menu, *From Serial I/O* and then *Multiple Telesignal*.

As additional option, the program allows choosing “With Time Tag” or “Normal”, that is, with or without time tag. The two cases are treated together in this paragraph because they don’t need differentiation at user interface, but only at Information Object Address assignment and source Data Base writing level.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Multiple Telesignals with and without Time Tag* acquired from field by one of the serial ways connected to 4 Serial Channel (*4 SC*) card.

The Double Telesignals coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Bitstring of 32 Bit (M_BO_NA_1) if without time tag, and with Bitstring of 32 Bit with Time Tag CP56Time2a (M_BO_TB_1) if they have time tag.

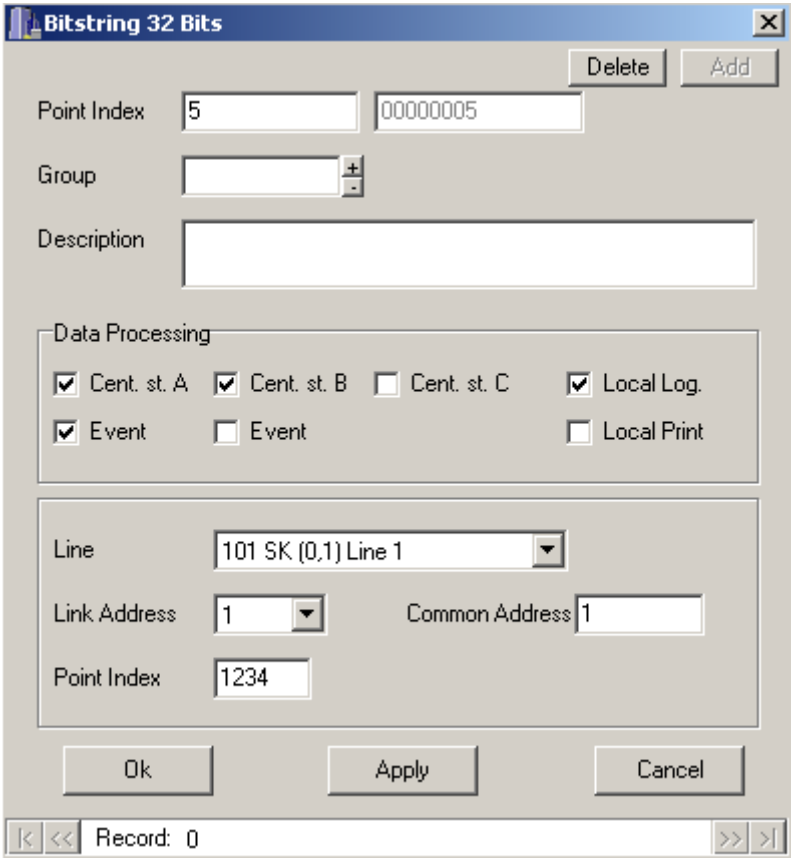

Figure 5-126 - Double Telesignal from Serial I/O– IEC60870-5-101 protocol

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Multiple Telesignals from Serial I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Single Point. The field is mandatory.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				
Serial I/O Data – from 4SC-101 and 2SC+ETH with *IEC60870*-5-101 Master Protocol				
Line	None	Blank	List of the 4SC-101 **and 2SC+ETH** cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, from which the Multiple Telesignal is acquired. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in "Equipment" session and of 4SC-101 **and 2SC+ETH** type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory
Slave Address	It depends on the number of octets of Link Address	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the Slave equipment (Station IEC address). Slave Address can be omitted if the communication modality is of *Balanced* type. This field is mandatory.
Common Add.	It depends on the number of octets of Link Address	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of ASDU. **Normally it is set equal to Slave Address.** This field is mandatory.
Point Index	It depends on the number of octets of Information Object Address	Blank	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.
Serial I/O Data – from 2SC+ETH with IEC60870-5-104 Master Protocol				
Line	None	Blank	List of the **2SC+ETH** cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Telesignal is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in "Equipment" session **and of 2SC+ETH** type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory

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Multiple Telesignals from Serial I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
RTU Index	None	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the Slave equipment (Station IEC address). This field is mandatory.
Common Add.	None	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of ASDU. **Normally it is set equal to Slave Address.** This field is mandatory.
Point Index	None	Blank	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.

Table 5-81 – Configuration of Multiple Telesignals from Serial I/O

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5.6.15 From Serial – Telemeasurement

This option can be reached selecting *Monitor Direction* item of the main menu, *From Serial* and then *Telemeasurement*.

As additional option, the program allows choosing “With Time Tag” or “Normal”, that is, with or without time tag. The two cases are treated together in this paragraph because they don’t need differentiation at user interface, but only at Information Object Address assignment and source Data Base writing level.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Telemeasurements with and without Time Tag* acquired from field by one of the serial ports connected to 4 Serial Channel (*4 SC*) card.

The Telemeasurements coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the following quantities:

- Measured Value, Normalized Value (M_ME_NA_1) if without time tag
- Measured Value, Normalized Value with Time Tag (M_ME_TA_1) and Measured Value, Normalized Value with Time Tag CP56Time2a (M_ME_TD_1) if they have time tag.
- Measured Value, Scaled Value (M_ME_NB_1), if without time tag
- Measured Value, Scaled Value with Time Tag (M_ME_TB_1) and Measured Value, Scaled Value with Time Tag CP56Time2a (M_ME_TE_1), if they have time tag.

The configuration form of the Measurements acquired by Serial is separated in two parts, the first one (General) it is common, while the second is specialized for Protocol typology.

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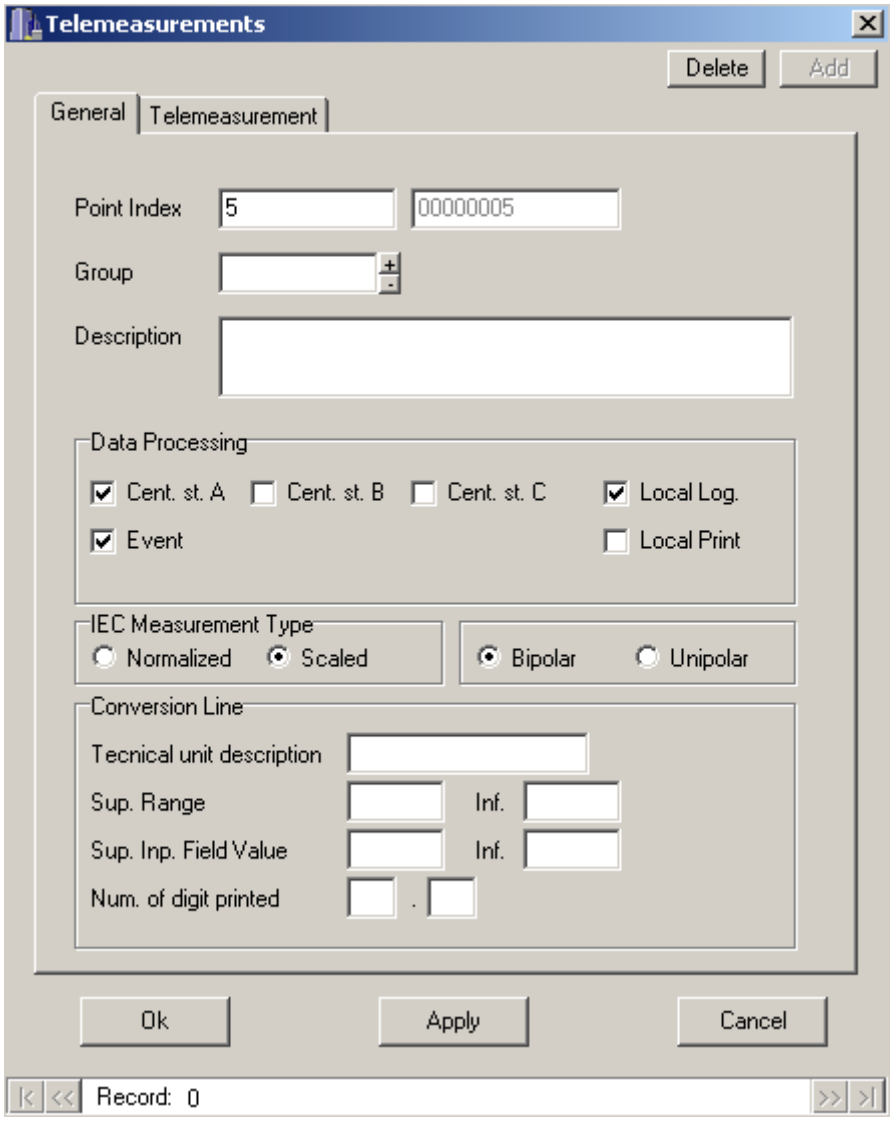

Figure 5-127 - Telemeasurement from Serial I/O – General

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Telemeasurements from Serial I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Telemeasurement. The field is mandatory.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				
IEC Measurement Type	None	Normalized	Normalized Scaled	It allows configuring the conversion type and therefore the on line transmission type that the equipment has to execute on the measurements acquired by the field.
IEC Measurement Type	None	Bipolar	Bipolar Unipolar	It allows configuring the acquisition type of the field measurement.
Conversion line				
Technical units description	Displayed only if the measurement is *Scaled*	Blank	6 alphanumeric characters Blank	It displays the measurement unit of the quantity (e.g. MW, KV, A, mq, ecc.). The string is sent to the equipment and used for the local printing
SUP. range	Displayed only if the measurement is *Scaled*	Blank	FLOAT	Upper Limit of the measure. The upper limit of the measure is used, together with lower limit, to individuate the *conversion line* and print the measure events with engineering units. This field is mandatory.
Inf.	Displayed only if the measurement is *Scaled*	Blank	FLOAT	Lower Limit of the measure. This field is mandatory.
SUP. input field value	Displayed only if the measurement is *Scaled*	Blank	FLOAT	This field is not managed
Inf.	Displayed only if the measurement is *Scaled*	Blank	FLOAT	This field is not managed
Number of digits printed	Displayed only if the measurement is *Scaled*	Blank	1÷6,1÷6	It allows configuring the number of digits before and after the point to be considered for the printing of the measure value

Table 5-82 - Telemeasurement from Serial I/O – General

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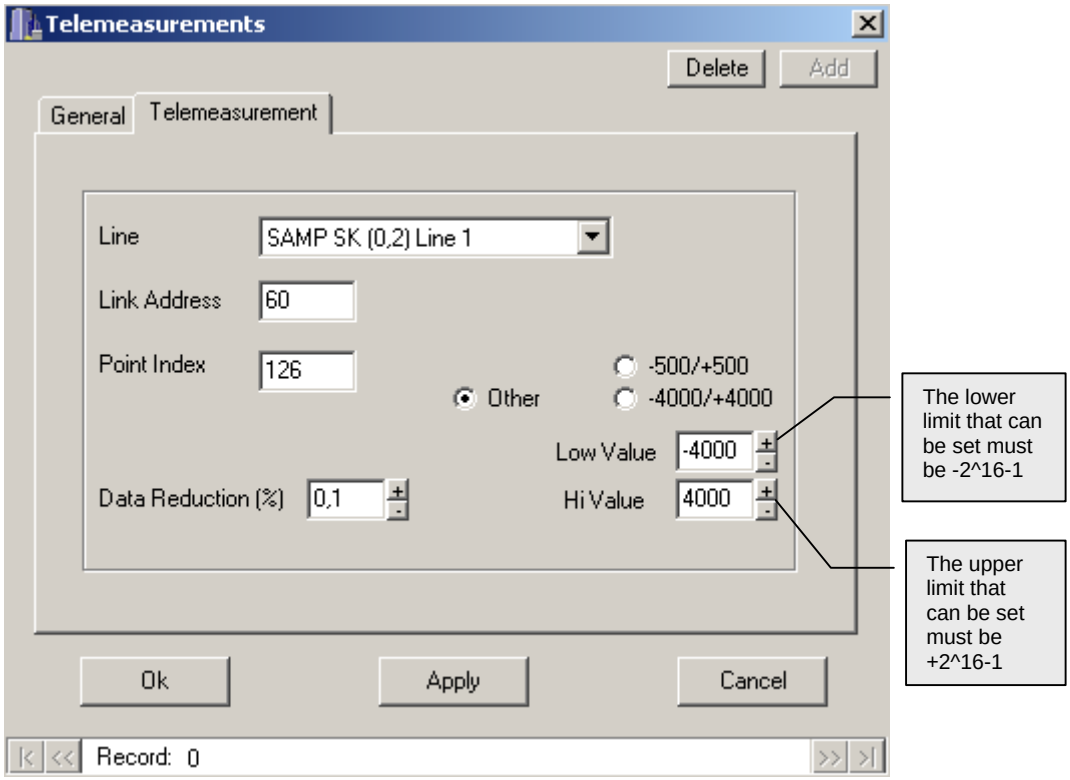

Figure 5-128 – Telemeasurement from Serial I/O – SAMP/SASP protocols

Telemeasurements from Serial I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Serial I/O Data – from 4SC-SAMP with SAMP Protocol				
Line	None	Blank	List of the 4SC-SAMP cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Telemeasurement is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 4SC- SAMP). This field is mandatory
Link Address	None	Blank	1÷255	It allows configuring the address of the *node* (Front End STCR) connected to the line. SAMP protocol is point-multipoint and then allows the management of more nodes connected to the same line. This field is mandatory.
Point Index	None	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.

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Telemeasurements from Serial I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Scale	None	-4000÷+4000	-500÷+500 -4000÷+4000 Low Value÷High Value	It allows configuring the bound of the conversion line to apply to the analogic quantities coming from Front End STCR. See following note and figures.
Data Red. (%)	None	0,1	0÷12,7 step 0,1	It allows configuring the value of a “Threshold” %. The measure value is transmitted when the difference between current measure value and its value at the moment of the last transmission is greater than the configured percentage. The percentage is calculated respect to the Upper Limit value. If 0 is configured, the updating is continue and the Data Reduction is not active.
Serial I/O Data – from 4SC-SAMP with SASP protocol				
Line	None	Blank	List of the 4SC-SAMP cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Telemeasurement is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 4SC- SAMP). This field is mandatory
Point Index	None	Blank	1÷65535	It allows configuring the two indexes used to individuate the two digitals inside the protocol. This field is mandatory
Scale	None	-4000÷+4000	-500÷+500 -4000÷+4000 Low Value÷High Value	It allows configuring the bound of the conversion line to apply to the analog quantities coming from Front End STCR. See following note and figures.
Data reduction (%)	None	0,1	0÷12,7 step 0,1	It allows configuring the value of a “Threshold” %. The measure value is transmitted when the difference between current measure value and its value at the moment of the last transmission is greater than the configured percentage. The percentage is calculated respect to the Upper Limit value. If 0 is configured, the updating is continue and the Data Reduction is not active.
Serial I/O Data – from 4SC-101 and 2SC+ETH with *IEC60870*-5-101 Master Protocol				
Line	None	Blank	List of the 4SC-101 and **2SC+ETH** cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, from which the Telemeasurement is acquired. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 4SC-101 and **2SC+ETH** type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory

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Telemeasurements from Serial I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Link Address	It depends on the number of octets of Link Address	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the Slave equipment (Station IEC address). Slave Address can be omitted if the communication modality is of *Balanced* type. This field is mandatory.
Common Add.	It depends on the number of octets of Link Address	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of ASDU. **Normally it is set equal to Slave Address.** This field is mandatory.
IEC Index	It depends on the number of octets of Information Object Address	Blank	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.
Serial I/O Data – from 2SC+ETH with IEC60870-5-104 Master Protocol				
Line	None	Blank	List of the **2SC+ETH** cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Telesignal is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session **and of 2SC+ETH** type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory
RTU Index	None	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the Slave equipment (Station IEC address). This field is mandatory.
Common Add.	None	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of ASDU. **Normally it is set equal to Slave Address.** This field is mandatory.
Point Index	None	Blank	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.
Serial I/O Data – from-MODBUS with US-DCS Master Protocol				
Line	None	Blank	List of the 4SC-MODBUS cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the measurement is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 4SC- MODBUS type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory

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Telemeasurements from Serial I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Link address	None	First node of the list	1÷247	It allows choosing the address of the *node* (Slave Modbus) connected to the line. MODBUS protocol is point-multipoint and then allows the management of more nodes connected to the same line. The program manages the list of Slave nodes already configured for the Modbus protocol in *Protocols* section, *Modbus Channels* subsection. This field is mandatory.
Point Index	Index of the point within the related range	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. The quantity index must be within the *Range Telemeasurement* configured for Modbus protocol in *Protocols* section, *Modbus Channels* subsection. This field is mandatory.
Data reduction (%)	None	0,1	0÷12,7 step 0,1	It allows configuring the value of a “Threshold” %. The measure value is transmitted when the difference between current measure value and its value at the moment of the last transmission is greater than the configured percentage. The percentage is calculated respect to the Upper Limit value. If 0 is configured, the updating occurs only if the value changed, but it is independent from the variation entity.

Table-5-83 Configuration of the Telemeasurements from Serial I/O

Note: In the conversion of the analog information, which are transported in normalized format on the internal bus of the STCE/RTU equipment (from –32768 to +32767), it is necessary to apply a series of conversion lines that consider the different coding modalities, in *Count,* applied by STCR-C and STCR-T Front Ends.

These conversion lines must generally be configured, that is, the following correspondences must be configured:

- 100% of Limit of the quantity in count must coincide with 100% of the normalized value (+32767);
- 0% of Limit of the quantity in count must coincide with 0% of the normalized value (-32768).

Respect to what described before, the exception is the conversion of the AI1 quantity that come from the Tap Changers (VS). The Tap Changers are coded, on STCR equipment, on 6 bits plus sign (from –39 to +39). The Tap Changers coincide with the Step Position, coded on 7 bits, from –64 to +63, in twos complement. No conversion is applied to the VS (unless the twos complement) and the value received with AI1 is directly copied on the Step Position.

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If the quantity is acquired by *IEC60870*-5-101 Master protocol, no conversion lines need, because the received value is already normalized and then can be directly transferred to CPU2000.

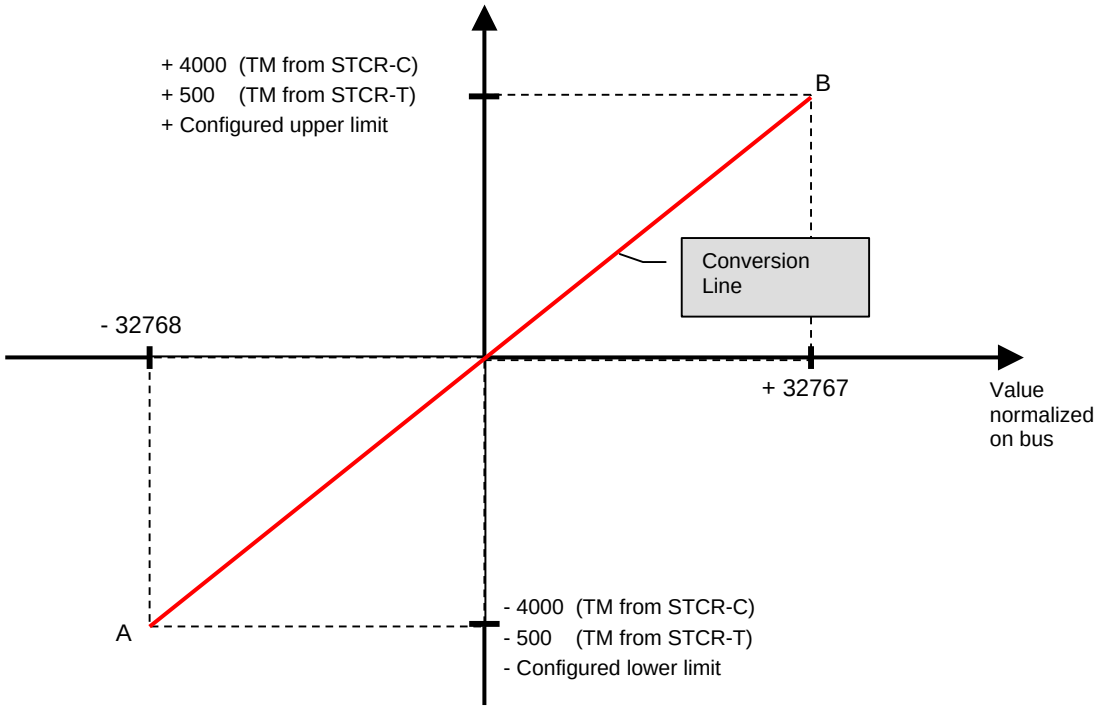

Figure 5-129 – Conversion of the information in Monitor Direction from F/E STCR

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5.6.16 From Serial – Step Position Information

This option can be reached selecting *Monitor Direction* item of the main menu, *From Serial* and then *Step Position Information*.

As additional option, the program allows choosing “With Time Tag” or “Normal”, that is, with or without time tag. The two cases are treated together in this paragraph because they don’t need differentiation at user interface, but only at Information Object Address assignment and source Data Base writing level.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Tap Changers with and without Time Tag* acquired from field in digital format by one of the serial ports connected to 4 Serial Channel (*4 SC*) card.

The Tap Changers coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Step Position Information (M_ST_NA_1) if without time tag, and with Step Position Information with Time Tag CP56Time2a (M_ST_TB_1) if they have time tag.

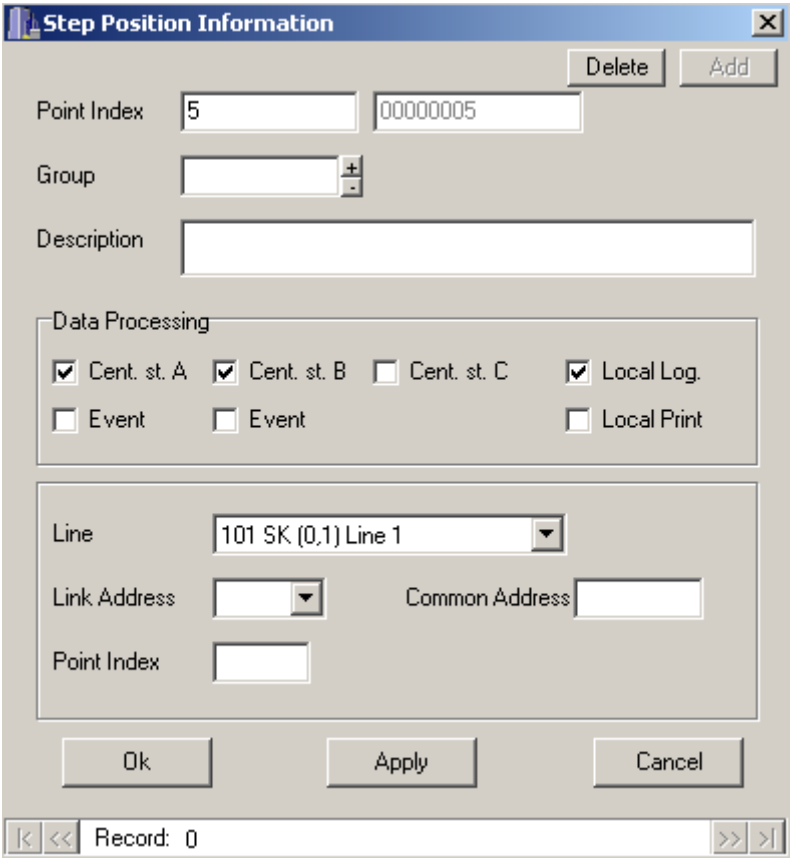

Figure 5-130 – Tap Changer from Serial I/O– IEC60870-5-101 protocol

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Tap Changers from Serial I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Tap Changer. The field is mandatory.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				
Serial I/O Data – from 4SC-SAMP with SAMP protocol				
Line	None	Blank	List of the 4SC-SAMP cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Tap Changer is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 4SC- SAMP). This field is mandatory
Link Address	None	Blank	1÷255	It allows configuring the address of the *node* (Front End STCR) connected to the line. SAMP protocol is point-multipoint and then allows the management of more nodes connected to the same line. This field is mandatory.
Point Index	None	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.
Serial I/O Data – from 4SC-SAMP with SASP protocol				
Line	None	Blank	List of the 4SC-SAMP cards inserted during configuration, presented in the format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Serial line, which the Tap Changer is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 4SC- SAMP). This field is mandatory
Point Index	None	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.

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Tap Changers da I/O Seriale				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Serial I/O Data – from 4SC-101 and 2SC+ETHwith *IEC60870*-5-101 Master Protocol				
Line	None	Blank	List of the 4SC-101 **and 2SC+ETH** cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, from which the Tap Changer is acquired. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in "Equipment" session and of 4SC-101 **and 2SC+ETH** type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory.
Link Address	It depends on the number of octects of Link Address	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the Slave equipment (Station IEC address). Slave Address can be omitted if the communication modality is of *Balanced* type. This field is mandatory.
Common Add.	It depends on the number of octects of Link Address	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of ASDU. **Normally it is set equal to Slave Address.** This field is mandatory.
Point Index	It depends on the number of octects of Information Object Address	Blank	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.
Serial I/O Data – from 2SC+ETH with IEC60870-5-104 Master Protocol				
Line	None	Blank	List of the **2SC+ETH** cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Telesignal is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in "Equipment" session **and of 2SC+ETH** type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory
RTU Index	None	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the Slave equipment (Station IEC address). This field is mandatory.
Common Add.	None	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of ASDU. **Normally it is set equal to Slave Address.** This field is mandatory.
Point Index	None	Blank	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.

Table 5-84 – Configuration of Tap Changers from Serial I/O

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5.6.17 From Serial – Integrated Totals

This option can be reached selecting *Monitor Direction* item of the main menu, *From Serial* and then *Integrated Totals*.

As additional option, the program allows choosing “With Time Tag” or “Normal”, that is, with or without time tag. The two cases are treated together in this paragraph because they don’t need differentiation at user interface, but only at Information Object Address assignment and source Data Base writing level.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Telecountings with and without Time Tag* acquired from field by one of the serial ports connected to 4 Serial Channel (*4 SC*) card.

The Telecountings coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Integrated Totals (M_IT_NA_1) if without time tag, and with Integrated Totals with Time Tag CP56Time2a (M_IT_TB_1) if they have time tag.

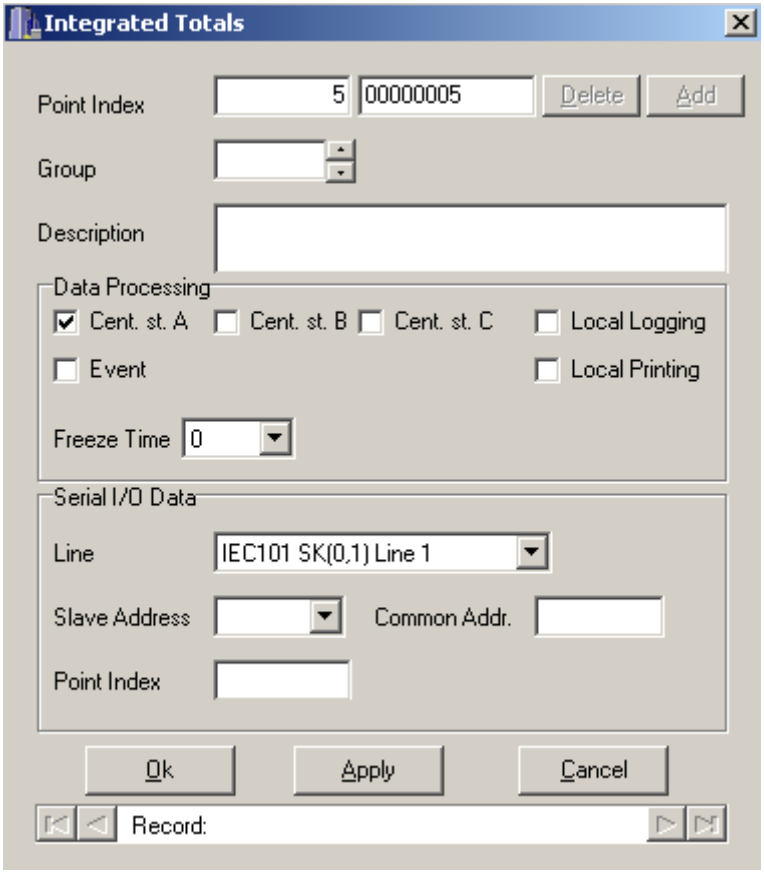

Figure 5-131 – Telecountings from Serial I/O – IEC60870-5-101 protocols

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Telecountings from Serial I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Telecounting. The field is mandatory.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				
Freeze Time (s)	None	0	0, 5, 10, 15, 30, 60	It allows configuring the Freeze period of the Telecounting. The 0 period means the performance is not applied.
Serial I/O Data – from 4SC-SAMP with SAMP Protocol				
Line	None	Blank	List of the 4SC-SAMP cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Telecounting is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 4SC- SAMP). This field is mandatory
Slave Address	None	Blank	1÷255	It allows configuring the address of the *node* (Front End STCR) connected to the line. SAMP protocol is point-multipoint and then allows the management of more nodes connected to the same line. This field is mandatory.
Point Index	None	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.
Serial I/O Data – from 4SC-SAMP with SASP Protocol				
Line	None	Blank	List of the 4SC-SAMP cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Telecounting is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 4SC- SAMP). This field is mandatory
Point Index	None	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.

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Telecountings from Serial I/O				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Serial I/O Data – from 4SC-101 and 2SC+ETH with *IEC60870*-5-101 Master Protocol				
Line	None	Blank	List of the 4SC-101 **and 2SC+ETH** cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, from which the Telecounting is acquired. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in "Equipment" session and of 4SC-101 **and 2SC+ETH** type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory.
Slave Address	It depends on the number of octects of Link Address	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the Slave equipment (Station IEC address). Slave Address can be omitted if the communication modality is of *Balanced* type. This field is mandatory.
Common Add.	It depends on the number of octects of Link Address	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of ASDU. **Normally it is set equal to Slave Address.** This field is mandatory.
Point Index	It depends on the number of octects of Information Object Address	Blank	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.
Serial I/O Data – from 2SC+ETH with IEC60870-5-104 Master Protocol				
Line	None	Blank	List of the **2SC+ETH** cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Telesignal is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in "Equipment" session **and of 2SC+ETH** type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory
RTU Index	None	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the Slave equipment (Station IEC address). This field is mandatory.
Common Add.	None	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of ASDU. **Normally it is set equal to Slave Address.** This field is mandatory.
Point Index	None	Blank	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.

Table 5-85 – Configuration of Telecountings from Serial I/O

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5.6.18 From Serial – Address Alarm

This option can be reached selecting *Monitor Direction* item of the main menu, *From Serial* and then *Address Alarm*.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Single Points with Time Tag* that report the *Address Alarm* (alarm for missed answer) to the Center of the following node types:

- Front-ends connected to the lines of the 4SC cards to SAMP or SASP Master protocols
- Remote telecontrol equipments connected to the lines of the 4SC and 2SC+ETH cards with *IEC60870*-5-101 Master protocol or connected to the lines of the 4SC and 2SC+ETH cards with *IEC60870*-5-104 Master
- DCS or RCE equipments connected to the lines of the 4SC cards with Rekron Master protocol

The Address Alarm is generated by the applicative Firmware present on 4 Serial Channels card when on a generic line the generic connected node, individuated by its address, does not answer and the maximum number of allowed retries has been passed.

To correctly associate the address alarm to the node, it is necessary to provide, as indications:

- the involved 4SC or 2SC+ETH card, individuated by the Subrack and slot numbers;
- the line which the node is connected to (line 1, 2, 3 or 4)
- node address

Therefore, the different records that can be read report all the nodes connected as *Slave* to lines of 4SC or 2SC+ETH card with SAMP Master, SASP Master, IEC60870-5-101 Master, IEC60870-5-104 Master or Rekron Master protocols.

Warning

To enable an alarm related to a line it is necessary to configure at least one point for that line.

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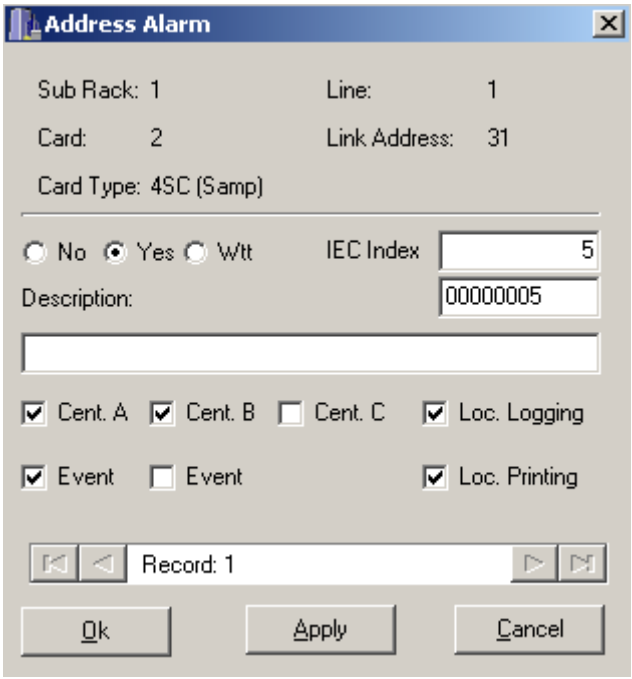

Figure 5-132 – Addresses alarms

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Address alarms on Serial acquisition				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Sub Rack	None	N.A.	1÷16	Read only field. It displays the number of the Subrack which the 4SC or 2SC+ETH card is connected to (1=Base Subrack).
Line	None	N.A.	1÷4	Read only field. It displays the number of the Serial Line on 4SC or 2SC+ETH which the Slave equipment, whose Address Alarm is in configuration, is connected to.
Slave Address	None	N.A.	1÷254 step 1 1÷65534 step 1	Read only field. It displays the number of the Data Link of the Slave equipment (Station IEC address).
Card	None	N.A.	1÷7 (Sub. Base) 1÷14 (Sub. Est.)	Read only field. It displays the number of the slot, inside the Subrack, where the 4SC is inserted.
Card Type	None	N.A.	4SC (Samp) 4SC (101) 4SC (Rekron) 4SC (Modbus STD) 4SC (Modbus DCS) 2SC ETH	Read only field. It displays the type of protocol, and then the type of 4SC or 2SC+ETH card, which the Slave equipment is connected to.
Alarm Present	None	No	No Yes Wtt	It allows enabling/disabling the alarm management for the Slave equipment, with time-tag (*Wtt*) or without (*Yes*).
IEC Index	Enabled only if “Alarm Present” = Enabled	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Single Point of Diagnostic (without time-tag) associated to the Alarm for missed answer of the Slave equipment. This field is mandatory.
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment.
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-86 – Configuration of alarms on Serial Acquisition

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5.6.19 From Automation – Single Point

This option can be reached selecting *Monitor Direction* item of the main menu, *From Automation* and then *Single TS*.

As additional option, the program allows choosing “With Time Tag” or “Normal”, that is, with or without time tag. The two cases are treated together in this paragraph because they don’t need differentiation at user interface, but only at Information Object Address assignment and source Data Base writing level.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Single Telesignals with and without Time Tag* generated by the Local Automations (PLC performance) configured on the CPU2000 Central Unit. This point is therefore not acquired from Local or Serial I/O, but it is generated as result of an elaboration or of a logic inside CPU2000.

The treatment applied to this typology of “calculated” points is the same of the other typologies of points treated by the CPU2000software.

The Single Telesignals coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Single Point Information (M_SP_NA_1) if without time tag, and with Single Point Information with Time Tag CP56Time2a (M_SP_TB_1) if they have time tag.

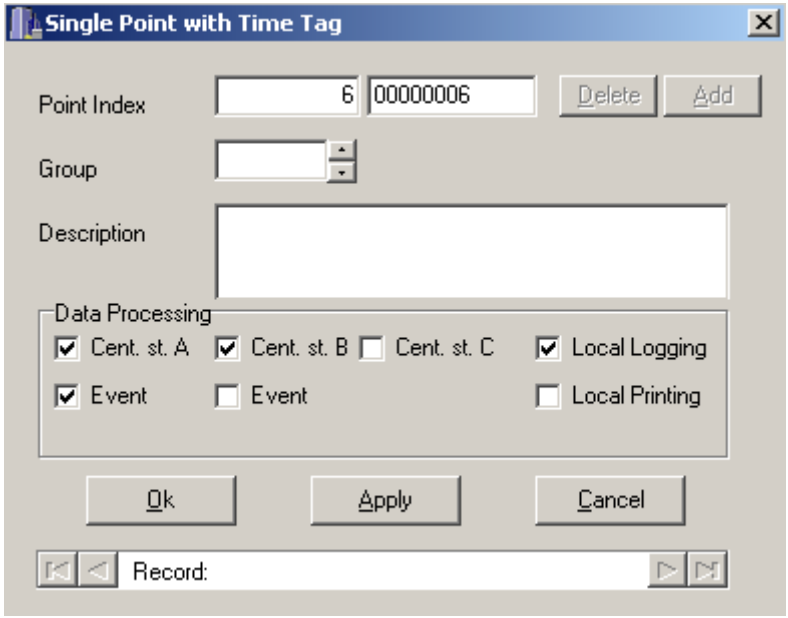

Figure 5-133 – Single Telesignal from Automation

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Single Telesignals from Automation				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the single Point to forward to the Center. The field is mandatory.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				

Table 5-87 – Configuration of Telesignals from Automations

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5.6.20 From Automation – Double Point

This option can be reached selecting *Monitor Direction* item of the main menu, *From Automation* and then *Double TS*.

As additional option, the program allows choosing “With Time Tag” or “Normal”, that is, with or without time tag. The two cases are treated together in this paragraph because they don’t need differentiation at user interface, but only at Information Object Address assignment and source Data Base writing level.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Double Telesignals with and without Time Tag* generated by the Local Automations (PLC performance) configured on the CPU2000 Central Unit. This point is therefore not acquired from Local or Serial I/O, but it is generated as result of an elaboration or of a logic inside CPU2000.

The treatment applied to this typology of “calculated” points is the same of the other typologies of points treated by the CPU2000 software.

The Double Telesignals coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Double Point Information (M_DP_NA_1) if without time tag, and with Double Point Information with Time Tag CP56Time2a (M_DP_TB_1) if they have time tag.

As the point acquisition from LAN takes place always and only knowing the IP address of the STCE/RTU equipment, whose Dynamic Database the required value is stored in, and the IEC index of the point itself, the reference form is the same of Figure 5-133 and the related description is reported in Table 5-87.

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5.6.21 From Automation – Telemeasurement

This option can be reached selecting *Monitor Direction* item of the main menu, *From Automation* and then *Telemeasurement*.

As additional option, the program allows choosing “With Time Tag” or “Normal”, that is, with or without time tag. The two cases are treated together in this paragraph because they don’t need differentiation at user interface, but only at Information Object Address assignment and source Data Base writing level.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Telemeasurements with and without Time Tag* generated by the Local Automations (PLC performance) configured on the CPU2000 Central Unit. This point is therefore not acquired from Local or Serial I/O, but it is generated as result of an elaboration or of a logic inside CPU2000.

The treatment applied to this typology of “calculated” points is the same of the other typologies of points treated by the CPU2000software.

The Telemeasurements coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Measured Value, Normalized Value (M_ME_NA_1) if without time tag, and with Measured Value, Normalized Value with Time Tag CP56Time2a (M_ME_TD_1) if they have time tag.

As for the point acquisition from Automation it is sufficient to know the IEC (Information Object Address) assigned to it, the reference form is the same of Figure 5-133 and the related description is reported in Table 5-87.

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5.6.22 From Automation – Multiple Telesignal

This option can be reached selecting *Monitor Direction* item of the main menu, *From Automation* and then *Multiple Telesignal*.

As additional option, the program allows choosing “With Time Tag” or “Normal”, that is, with or without time tag. The two cases are treated together in this paragraph because they don’t need differentiation at user interface, but only at Information Object Address assignment and source Data Base writing level.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Multiple Telesignals with and without Time Tag* generated by the Local Automations (PLC performance) configured on the CPU2000 Central Unit. This point is therefore not acquired from Local or Serial I/O, but it is generated as result of an elaboration or of a logic inside CPU2000.

The treatment applied to this typology of “calculated” points is the same of the other typologies of points treated by the CPU2000 software.

The Multiple Telesignals coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Bitstring of 32 Bit (M_BO_NA_1) if without time tag, and with Bitstring of 32 Bit with Time Tag CP56Time2a (M_BO_TB_1) if they have time tag.

As for the point acquisition from Automation it is sufficient to know the IEC (Information Object Address) assigned to it, the reference form is the same of Figure 5-133 and the relevant description is reported in Table 5-87.

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5.6.23 From Automation – Step Position Information

This option can be reached selecting *Monitor Direction* item of the main menu, *From Automation* and then *Step Position Information*.

As additional option, the program allows choosing “With Time Tag” or “Normal”, that is, with or without time tag. The two cases are treated together in this paragraph because they don’t need differentiation at user interface, but only at Information Object Address assignment and source Data Base writing level.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Tap Changers with and without Time Tag* generated by the Local Automations (PLC performance) configured on the CPU2000 Central Unit. This point is therefore not acquired from Local or Serial I/O, but it is generated as result of an elaboration or of a logic inside CPU2000.

The treatment applied to this typology of “calculated” points is the same of the other typologies of points treated by the CPU2000 software.

The Tap Changers coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Step Position Information (M_ST_NA_1) if without time tag, and with Step Position Information with Time Tag CP56Time2a (M_ST_TB_1) if they have time tag.

As for the point acquisition from Automation it is sufficient to know the IEC (Information Object Address) assigned to it, the reference form is the same of Figure 5-133 and the related description is reported in Table 5-87.

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5.6.24 From Automation – Integrated Totals

This option can be reached selecting *Monitor Direction* item of the main menu, *From Automation* and then *Integrated Totals*.

As additional option, the program allows choosing “With Time Tag” or “Normal”, that is, with or without time tag. The two cases are treated together in this paragraph because they don’t need differentiation at user interface, but only at Information Object Address assignment and source Data Base writing level.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Telecountings with and without Time Tag* generated by the Local Automations (PLC performance) configured on the CPU2000 Central Unit. This point is therefore not acquired from Local or Serial I/O, but it is generated as result of an elaboration or of a logic inside CPU2000.

The treatment applied to this typology of “calculated” points is the same of the other typologies of points treated by the CPU2000 software.

The Telecountings coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Integrated Totals (M_IT_NA_1) if without time tag, and with Integrated Totals with Time Tag CP56Time2a (M_IT_TB_1) if they have time tag.

As for the point acquisition from Automation it is sufficient to know the IEC (Information Object Address) assigned to it, the reference form is the same of Figure 5-133 and the related description is reported in Table 5-87.

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5.6.25 From Protection Equipment – Time-tagged Message

This option can be reached selecting *Monitor Direction* item of the main menu, *From Protection Equipment* and then *Time-tagged Message*.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Time-tagged Message* acquired from field by one of the serial ports connected to 4 Serial Channel (*4 SC*) card with IEC60870-5-103 (*4 SC-103*) protocol.

The normal process events generated by the IEDs (protections) and so acquired are converted, on the protocols IEC60870-5-101/104, in TI = 30 (Single Point Information with time tag CP56Time2a - M_SP_TB_1) messages type.

	IEC60870-5-103			**IEC60870-5-101/104**	
	TI: 1			**TI: 30**	**M_SP_TA_1**
	Time tagged messages			**Single point information with time tag CP56Time2a**	
	Information-Element /-Byte	**Reference**	**Action / Conversion in the RTU**	**Information-Element /-Byte**	**Reference**
1	DPI	7.2.6.5	conv. of DPI to SPI Qualifier: NT, BL, SB force = 0 IV = handled by RTU	SIQ	7.2.6.1
2	Time CP32Time2a	7.2.6.28	conv. to CP56Time 2a	Time CP56Time2a	

Note:

CP32Time2a := CP32 {Milliseconds, Minutes, RES1, Invalid, Hours, RES2, Summer time}

CP56Time2a := CP56 {Milliseconds, Minutes, RES1, Invalid, Hours, RES2, Summer time, Day of month, Day of week, Months, RES3, Years, RES4}

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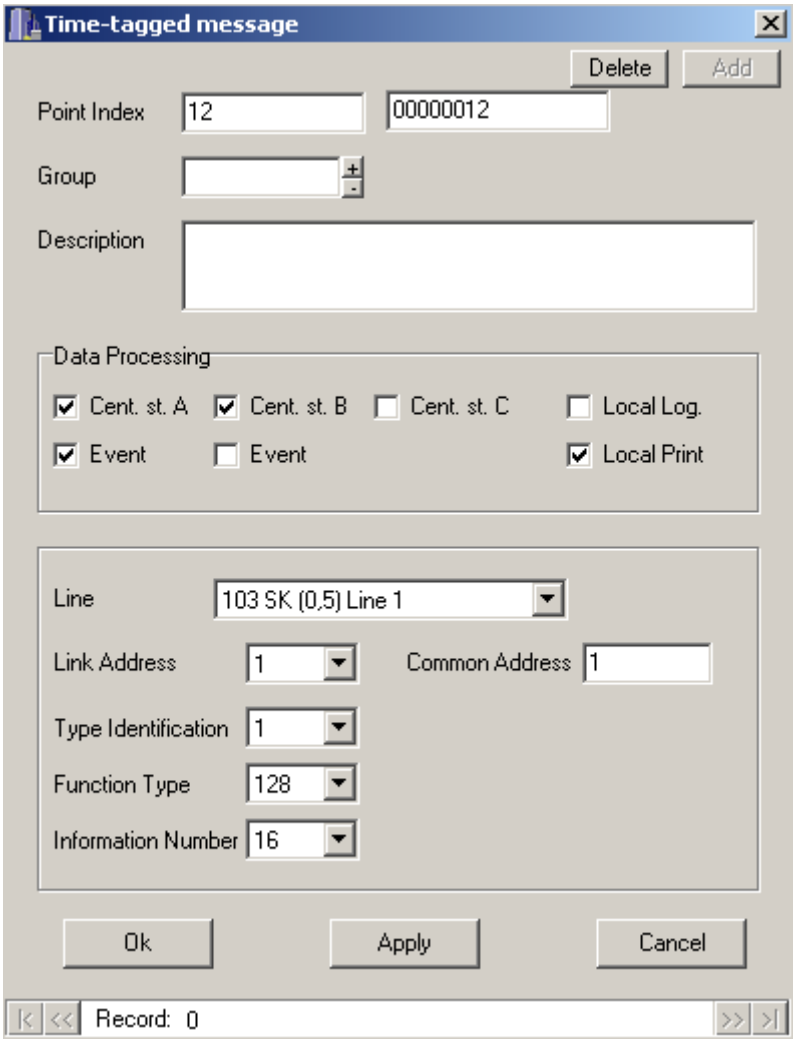

Figure 5-134 – From Protection Equipment - Time-tagged Message

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From Protection - Time-tagged Message				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Single Point. The field is mandatory.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				
Line	None	Blank	List of the 4SC-103 cards inserted during configuration, presented in the format: 103 SK(Subrack[],Slot[]) Line n	It allows configuring the physical connection of the Serial line, which the Telecounting is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 4SC- 103). This field is mandatory
Link address	None	Blank	1÷255	It allows configuring the address of the *node* (IED) connected to the line. IEC60870-5-103 protocol is point-multipoint and then allows the management of more nodes connected to the same line. This field is mandatory.
Common Add.	None	Blank	0÷254	It allows defining the Common Address of ASDU associated to the acquired point. This field is mandatory.
Type Identification	None	Blank	1	It allows configuring the type of identifier..
Function Type	None	Blank	128, 160, 176, 192, 254, 255	It allows configuring the function type. This field is mandatory.
Information Number	None	Blank	16÷30 32÷33 35÷39 46÷52 128÷130	It allows configuring the information number. This field is mandatory.

Table 5-88 - From Protection Equipment - Time-tagged Message configuration

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5.6.26 From Protection Equipment – Time-tagged Message with relative time

This option can be reached selecting *Monitor Direction* item of the main menu, *From Protection Equipment* and then *Time-tagged Message with relative time*.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Time-tagged Message with relative time* acquired from field by one of the serial ports connected to 4 Serial Channel (*4 SC*) card with IEC60870-5-103 (*4 SC-103*) protocol.

The normal process events generated by the IEDs (protections) and so acquired are converted, on the protocols IEC60870-5-101/104, in TI = 38 (Single Point Information with time tag CP56Time2a - M_EP_TD_1) messages type.

	IEC60870-5-103			**IEC60870-5-101/104**	
	TI: 2			**TI: 38**	**M_EP_TD_1**
	Time tagged messages with relative time			**Event of protection equipment with time tag CP56Time2a**	
	Information-Element /-Byte	**Reference**	**Action / Conversion in the RTU**	**Information-Element /-Byte**	**Reference**
1	DPI	7.2.6.5	conv. of DPI to ES Qualifier: NT, BL, SB, EI force = 0 IV = handled by RTU	SEP	7.2.6.1
2	RET	7.2.6.15	copy 1:1 to	CP16Time2a elapsed time	7.2.6.20
3	FAN	7.2.6.6	not copied	---------	---------
4	Time CP32Time2a	7.2.6.28	conv. to CP56Time 2a	Time CP56Time2a	

The point configuration form is the same described for the Time-tagged Message.

In comparison with the Time-tagged Message Function Type (=2) and the Information Number (=64÷72, 74÷93) change.

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5.6.27 From Protection Equipment – Measurands I

This option can be reached selecting *Monitor Direction* item of the main menu, *From Protection Equipment* and then *Measurands I*.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Measurands I*. acquired from field by one of the serial ports connected to 4 Serial Channel (*4 SC*) card with IEC60870-5-103 (*4 SC-103*) protocol.

The IEC60870-5-103 TI = 3 (Measurands I) messages are converted in IEC60870-5-101/104 TI = 9 (Measured value, normalized value – M_ME_NA_1) messages. For every MEA (up to a maximum of 6 measurements) measurements a distinct message is generated on the IEC60870-5-101/104 ,protocol.

	IEC60870-5-103			**IEC60870-5-101/104**	
	TI: 3		→	**TI: 9**	**M_ME_NA_1**
	Measurands I			**Measured value, normalized value (up to 4+2 measurands)**	
	Information-Element /-Byte	**Reference**	**Action / Conversion in the RTU**	**Information-Element /-Byte**	**Reference**
1	MEA up to 4 measurands	7.2.6.8	OV = shift to QDS Bit = OV ER = shift to QDS Bit = IV MVAL = extend to normalized value NVA IV is handled by RTU in addition	NVA QDS	7.2.6..6 7.2.6.3

Note: With ASDU3 up to 4 value can be received at the same time; alternatively, there is also the possibility to receive two other values (foe ASDU 3,4) distinct from the precedent ones.

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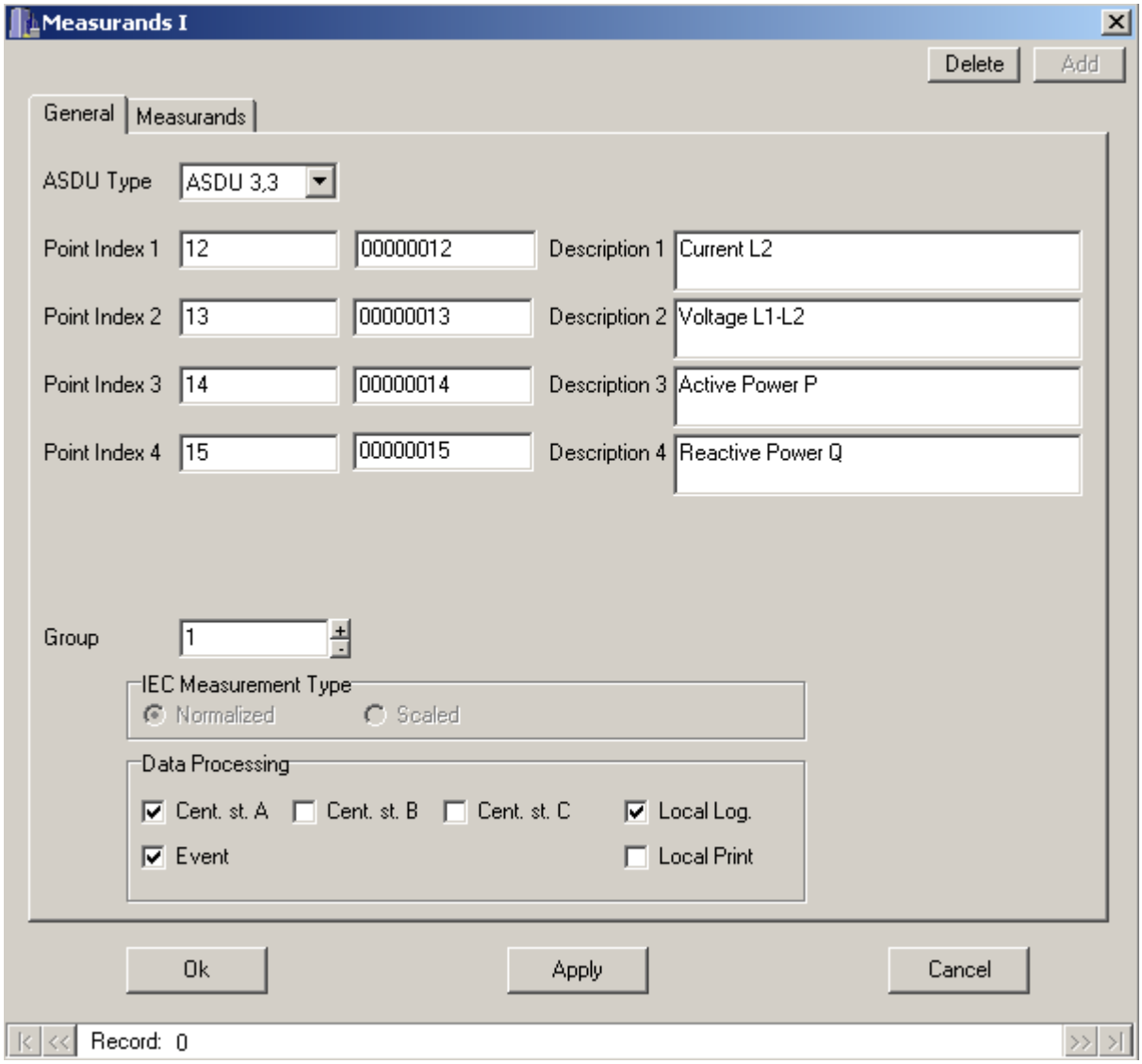

Figure 5-135 – From Protection Equipment – Measurands I

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From Protection – Measurands I				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
ASDU Type	None	ASDU 3,1	ASDU 3,1 ASDU 3,2 ASDU 3,3 ASDU 3,4	It allows configuring, in base of the ASDU type, the number and type of measurements acquired in a one only message: ASDU 3,1 = 1 measurement ASDU 3,2 = 2 measurements ASDU 3,3 = 4 measurements ASDU 3,4 = 2 measurements
Point Index 1	If ASDU 3,1 or ASDU 3,2 or ASDU 3,3	First free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the measurement. The field is mandatory.
Description 1	None	Current L2	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Point Index 2	If ASDU 3,2 or ASDU 3,3	First free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the measurement. The field is mandatory.
Description 2	None	Voltage L1-L2	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Point Index 3	If ASDU 3,3	First free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the measurement. The field is mandatory.
Description 3	None	Active Power P	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Point Index 4	If ASDU 3,3	First free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the measurement. The field is mandatory.
Description 4	None	Reactive Power Q	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Point Index 5	If ASDU 3,4	First free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the measurement. The field is mandatory.
Description 5	None	In	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Point Index 6	If ASDU 3,4	First free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the measurement. The field is mandatory.
Description 6	None	Ven	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query
IEC Measurement Type	None	Normalized	Normalized	It allows configuring the measurement format to send to the Center.

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From Protection – Measurands I				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				
Line	None	Blank	List of the 4SC-103 cards inserted during configuration, presented in the format: 103 SK(Subrack[],Slot[]) Line n	It allows configuring the physical connection of the Serial line, which the Telecounting is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in "Equipment" session and of 4SC- 103). This field is mandatory
Link address	None	Blank	1÷255	It allows configuring the address of the *node* (IED) connected to the line. IEC60870-5-103 protocol is point-multipoint and then allows the management of more nodes connected to the same line. This field is mandatory.
Common Add.	None	Blank	0÷254	It allows defining the Common Address of ASDU associated to the acquired point. This field is mandatory.
Type Identification	None	Blank	3	It allows configuring the type of identifier. This field is mandatory
Function Type	None	Blank	128, 160	It allows configuring the function type. This field is mandatory.
Information Number	None	Blank	144÷147	It allows configuring the information number. This field is mandatory.

Table 5-89 - From Protection Equipment – Measurands I – configuration

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5.6.28 From Protection Equipment – Time-tagged Measurands with relative time

This option can be reached selecting *Monitor Direction* item of the main menu, *From Protection Equipment* and then *Time-tagged measurands with relative time*.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Time-tagged measurands with relative time* acquired from field by one of the serial ports connected to 4 Serial Channel (*4 SC*) card with IEC60870-5-103 (*4 SC-103*) protocol.

The IEC60870-5-103 TI = 4 (Time-tagged measurands with relative time) message is used to transmit the short-circuit position (distance) expressed by an impedance measurement in ohm (SCL= Short-Circuit Location).

The relevant time (RET) and the correspondent Fault Number (FAN) are not reported, because on the 101/104 protocol equivalent fields are not scheduled.

The SCL field value is sent to the Center inside a IEC60870-5-101/104 message of type TI=9 (Measured value, short floating point – M_ME_NC_1).

	IEC60870-5-103			**IEC60870-5-101/104**	
	TI: 4			**TI: 13**	**M_ME_NC_1**
	Time tagged measurands with relative time			**Measured value, short floating point value**	
	Information-Element /-Byte	**Reference**	**Action / Conversion in the RTU**	**Information-Element /-Byte**	**Reference**
1	SCL	7.2.6.20	shift to value	Value IEEE STD 754	7.2.6.8
2	RET	7.2.6.15	not copied	----------	----------
3	FAN	7.2.6.6	not copied	----------	----------
4	Time CP32Time2a	7.2.6.28	not copied	----------	----------

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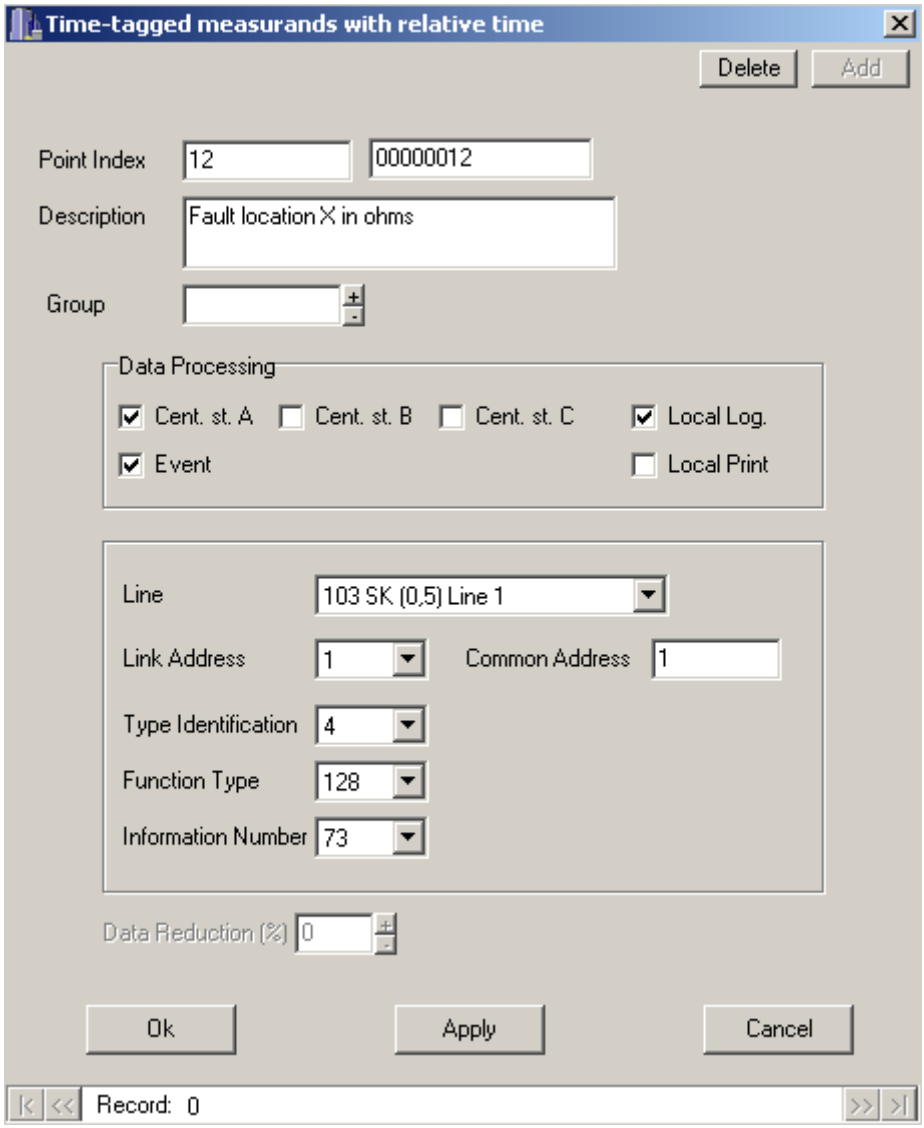

Figure 5-136 – From Protection Eq. - Time-tagged Measurands with relative time

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From Protection - Time-tagged Measurands with relative time				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Single Point. The field is mandatory.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query
Description	None	Fault location X in ohms	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				
Line	None	Blank	List of the 4SC-103 cards inserted during configuration, presented in the format: 103 SK(Subrack[],Slot[]) Line n	It allows configuring the physical connection of the Serial line, which the Telecounting is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 4SC- 103). This field is mandatory
Link address	None	Blank	1÷255	It allows configuring the address of the *node* (IED) connected to the line. IEC60870-5-103 protocol is point-multipoint and then allows the management of more nodes connected to the same line. This field is mandatory.
Common Add.	None	Blank	0÷254	It allows defining the Common Address of ASDU associated to the acquired point. This field is mandatory.
Type Identification	None	Blank	4	It allows configuring the type of identifier. This field is mandatory.
Function Type	None	Blank	128, 160	It allows configuring the function type. This field is mandatory.
Information Number	None	Blank	73	It allows configuring the information number. This field is mandatory.

Table 5-90 - From Protection Equipment. - Time-tagged Measurands with relative time Configuration

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5.6.29 From Protection Equipment – Identification Message

This option can be reached selecting *Monitor Direction* item of the main menu, *From Protection Equipment* and then *Identification Message*.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Identification Message* acquired from field by one of the serial ports connected to 4 Serial Channel (*4 SC*) card with IEC60870-5-103 (*4 SC-103*) protocol.

The IEC60870-5-103 TI = 5 (Identification message) message is used to transmit the Protection Producer name and the internal identifier of the Protection software

Only the second part of this identifier (Manufacturer's internal software/type identification) is sent to the Center by using three IEC60870-5-101/104 distinct messages of type TI = 7 (Bit String of 32 bit – M_BO_NA_1).

	IEC60870-5-103			**IEC60870-5-101/104**	
	TI: 5		→	**TI: 7**	**M_BO_NA_1**
	Identification			**Bit String of 32 bit (up to 3 Bit String)**	
	Information-Element /-Byte	**Reference**	**Action / Conversion in the RTU**	**Information-Element /-Byte**	**Reference**
1	COL compatibility level	7.2.6.3	Not copied	----------	----------
2	8 Char – Name of Manufacturer		shift to value (into two BitString)	BSI	7.2.6.13
3	4 Char – Manufacturer's internal software/type identification		shift to value (into one BitString) IV is handled by RTU in addition Qualifier: NT, SB, BL, OV force = 0	BSI	7.2.6.13

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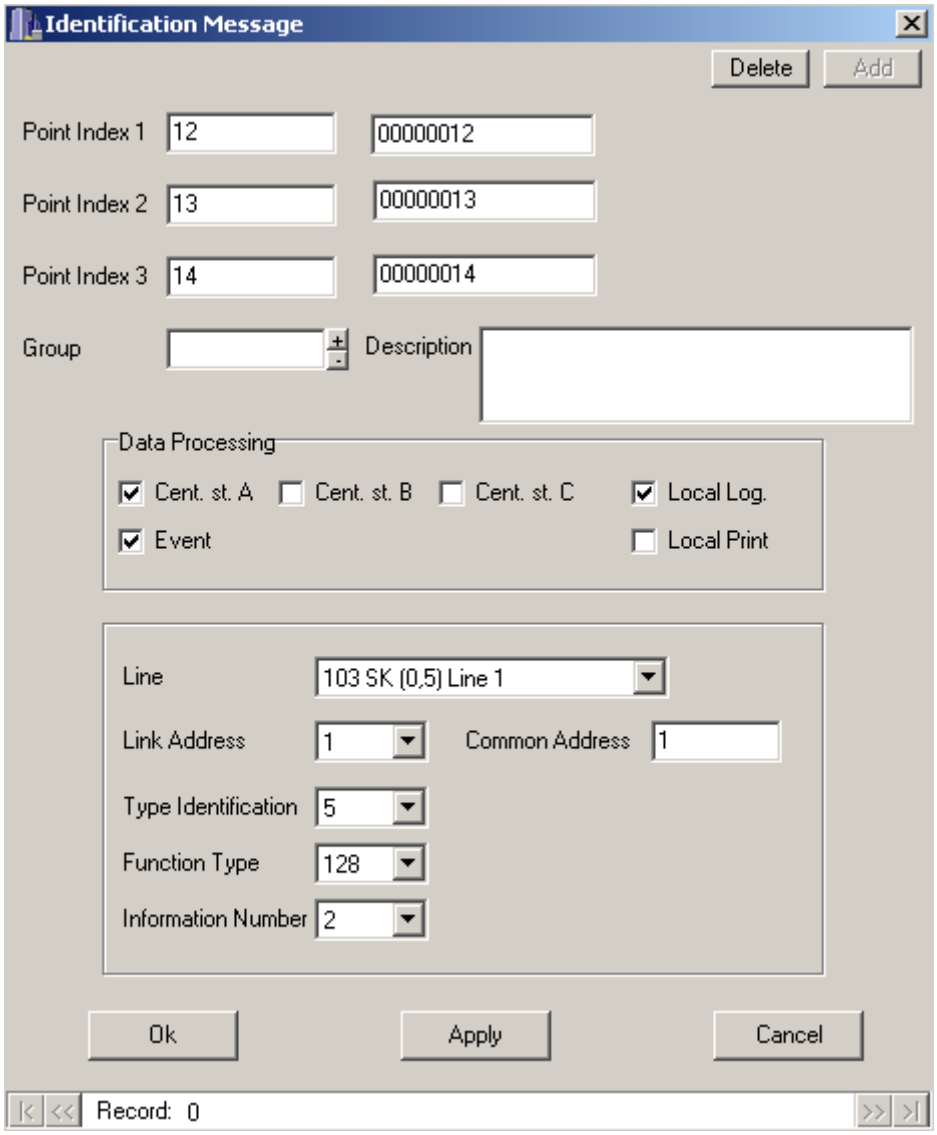

Figure 5-137 – From Equipment Protection – Identification Message

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From Protection - Identification Message				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index 1	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the first Bitstring. The field is mandatory.
Point Index 2	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the second Bitstring. The field is mandatory.
Point Index 3	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the third Bitstring. The field is mandatory.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query
Description	None	Fault location X in ohms	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				
Line	None	Blank	List of the 4SC-103 cards inserted during configuration, presented in the format: 103 SK(Subrack[],Slot[]) Line n	It allows configuring the physical connection of the Serial line, which the Telecounting is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 4SC- 103). This field is mandatory
Link address	None	Blank	1÷255	It allows configuring the address of the *node* (IED) connected to the line. IEC60870-5-103 protocol is point-multipoint and then allows the management of more nodes connected to the same line. This field is mandatory.
Common Add.	None	Blank	0÷254	It allows defining the Common Address of ASDU associated to the acquired point. This field is mandatory.
Type Identification	None	Blank	5	It allows configuring the type of identifier. This field is mandatory.
Function Type	None	Blank	128, 160, 176, 192, 254, 255	It allows configuring the function type. This field is mandatory.
Information Number	None	Blank	2÷5	It allows configuring the information number. This field is mandatory.

Table 5-91 - From Equipment Protection – Identification Message configuration

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5.6.30 From Protection Equipment – Measurands II

This option can be reached selecting *Monitor Direction* item of the main menu, *From Protection Equipment* and then *Measurands II*.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Measurands II*. acquired from field by one of the serial ports connected to 4 Serial Channel (*4 SC*) card with IEC60870-5-103 (*4 SC-103*) protocol.

The IEC60870-5-103 TI = 9 (Measurands I) messages are converted in IEC60870-5-101/104 TI = 9 (Measured value, normalized value – M_ME_NA_1) messages. For every MEA (up to a maximum of 6 measurements) measurements a distinct message is generated on the IEC60870-5-101/104 ,protocol.

	IEC60870-5-103			**IEC60870-5-101/104**	
	TI: 9			**TI: 9**	**M_ME_NA_1**
	Measurands II			**Measured value, normalized value (up to 9 measurands)**	
	Information-Element /-Byte	**Reference**	**Action / Conversion in the RTU**	**Information-Element /-Byte**	**Reference**
1	MEA up to 9 measurands	7.2.6.8	OV = shift to QDS Bit = OV ER = shift to QDS Bit = IV MVAL = extend to normalized value NVA IV is handled by RTU in addition	NVA QDS	7.2.6..6 7.2.6.3

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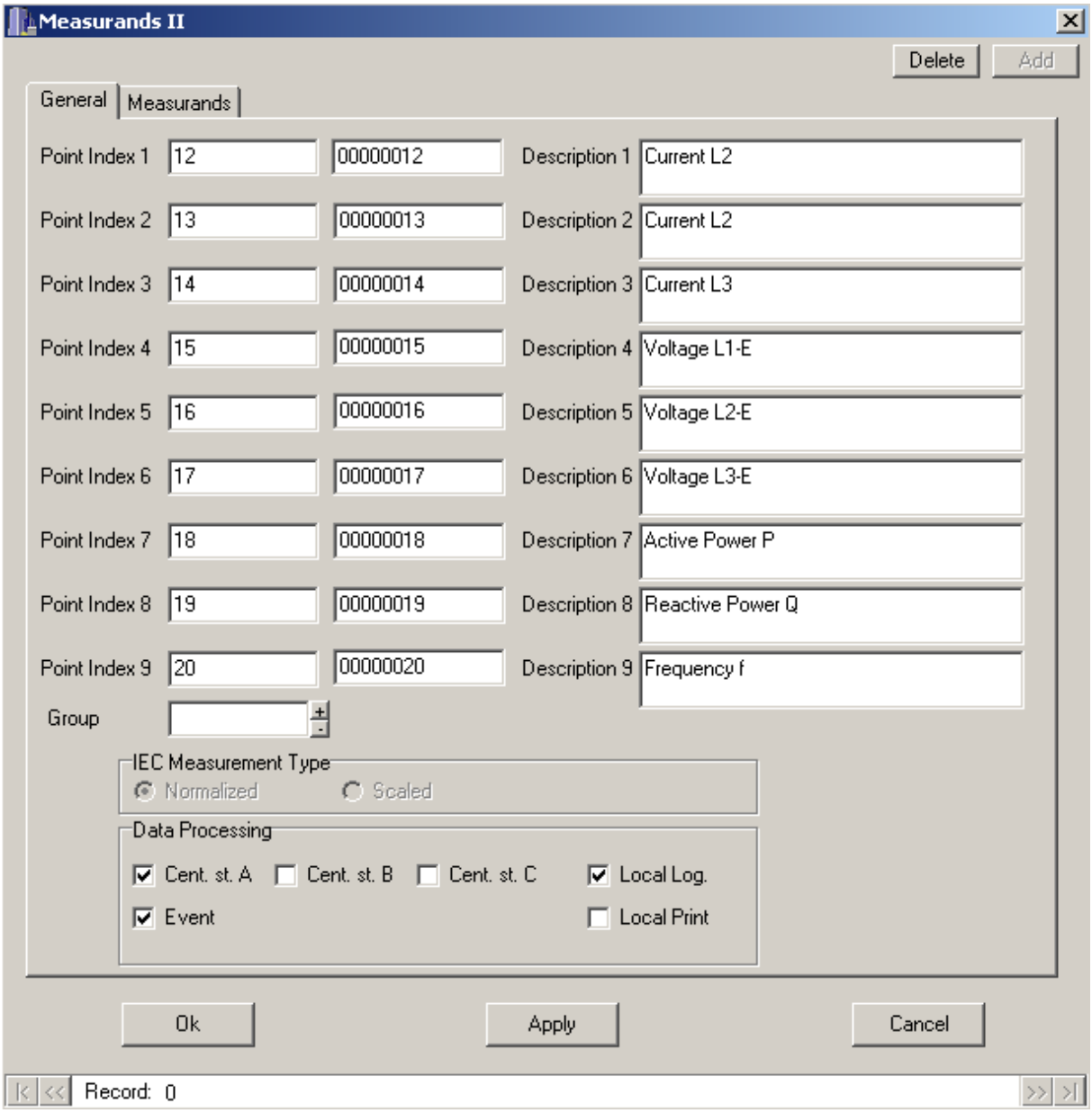

Figure 5-138 - From Protection Equipment - Measurands II

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From Protection Equipment - Measurands II				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index 1	None	First free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the measurement. The field is mandatory.
Description 1	None	Current L_1	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Point Index 2	None	First free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the measurement. The field is mandatory.
Description 2	None	Current L_2	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Point Index 3	None	First free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the measurement. The field is mandatory.
Description 3	None	Current L_3	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Point Index 4	None	First free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the measurement. The field is mandatory.
Description 4	None	Voltage L_{1-E}	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Point Index 5	None	First free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the measurement. The field is mandatory.
Description 5	None	Voltage L_{2-E}	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Point Index 6	None	First free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the measurement. The field is mandatory.
Description 6	None	Voltage L_{3-E}	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Point Index 7	None	First free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the measurement. The field is mandatory.
Description 7	None	Active Power P	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Point Index 8	None	First free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the measurement. The field is mandatory.
Description 8	None	Reactive Power Q	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment

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From Protection Equipment - Measurands II				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index 9	None	First free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the measurement. The field is mandatory.
Description 9	None	Frequency f	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible membership IEC Group to allow the acquisition, by the Center, by means of Group Query All the configured measurements belong to the same group
IEC Measurement Type	None	Normalized	Normalized	It allows configuring the measurement format to send to the Center.
Data Processing				
For the treatment of the quantity, refer to par. 5.6.1				
Line	None	Blank	List of the 4SC-103 cards inserted during configuration, presented in the format: 103 SK(Subrack[],Slot[]) Line n	It allows configuring the physical connection of the Serial line, which the Telecounting is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 4SC- 103). This field is mandatory
Link address	None	Blank	1÷255	It allows configuring the address of the *node* (IED) connected to the line. IEC60870-5-103 protocol is point-multipoint and then allows the management of more nodes connected to the same line. This field is mandatory.
Common Add.	None	Blank	0÷254	It allows defining the Common Address of ASDU associated to the acquired point. This field is mandatory.
Type Identification	None	Blank	9	It allows configuring the type of identifier. This field is mandatory
Function Type	None	Blank	128	It allows configuring the function type. This field is mandatory.
Information Number	None	Blank	148	It allows configuring the information number. This field is mandatory.

Table 5-92 - From Protection Equipment - Measurands II configuration

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5.7 CONTROL DIRECTION

5.7.1 Treatment of the points in Control Direction

All the points coming from the Supervision Center or, more generally, from the different Centers (included the possible Local Center) and sent to the cards of Local or Serial Output are considered quantities in *Control Direction*.

For each single quantity in *Control Direction*, it is possible to configure the treatment that the applicative software present on the Central Unit of the STCE/RTU equipment must apply.

At single quantity level, it is possible to configure:

Origin Center	STCE/RTU equipment manages up to three fully independent Supervision Centers (included the possible Local Center). It is possible to configure from which Center/s the quantity can be received, in any combination (for instance, only from Center A, from Center A and Center C, only from Center B, etc.).
Local Logging	It is possible to configure if the quantity reception event must be locally stored or not. The buffer of the local log used for *centrifugal* information is the same used for the *centripetal* ones.
Local Printing	It is possible to configure if the quantity reception event must be locally printed or not.

The following figure displays the graphical section, common to all the windows related to quantities in Control Direction, where the described treatment is configured.

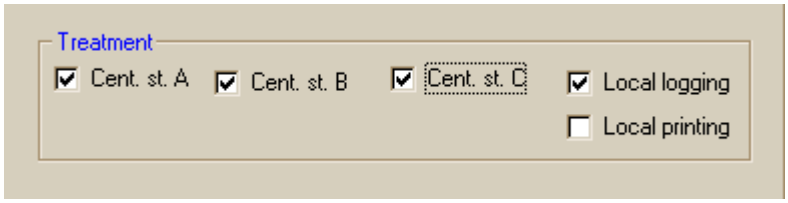

Figure 5-139 - Treatment of quantities in *Control Direction*

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5.7.2 To Local – 1 Contact Single Command

This option can be reached selecting *Control Direction* item of the main menu, *To Local* and then *1 contact single command*.

By this Technical Card, it is then possible to configure or to modify the configuration of the *1 Contact Single Command* set to the field by means of one of the following groups:

- 2x32 Digital Command Output (*2x32 DCO 1 pole and 1and ½ pole*) card
- 8 Opto Analog Input / 8 Digital Command Output (*8OAI/8DCO*) mixed card output section
- 32 Opto Digital Input / 4 Opto Analog Input / 10 Digital Command Output (*32ODI/4OAI/10DCO)* mixed card output section
- 2x16 Digital Continuous Command (*2x16 DCC*) card

The 2x16DCC card can be used for the imposition to the Continuous Commands field but it is particularly used for all the commands related to Automation procedures that need to impose to the field more commands contemporarily and/or cannot be delayed because of a precedent command in execution.

The Single Commands coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Single Command (C_SC_NA_1).

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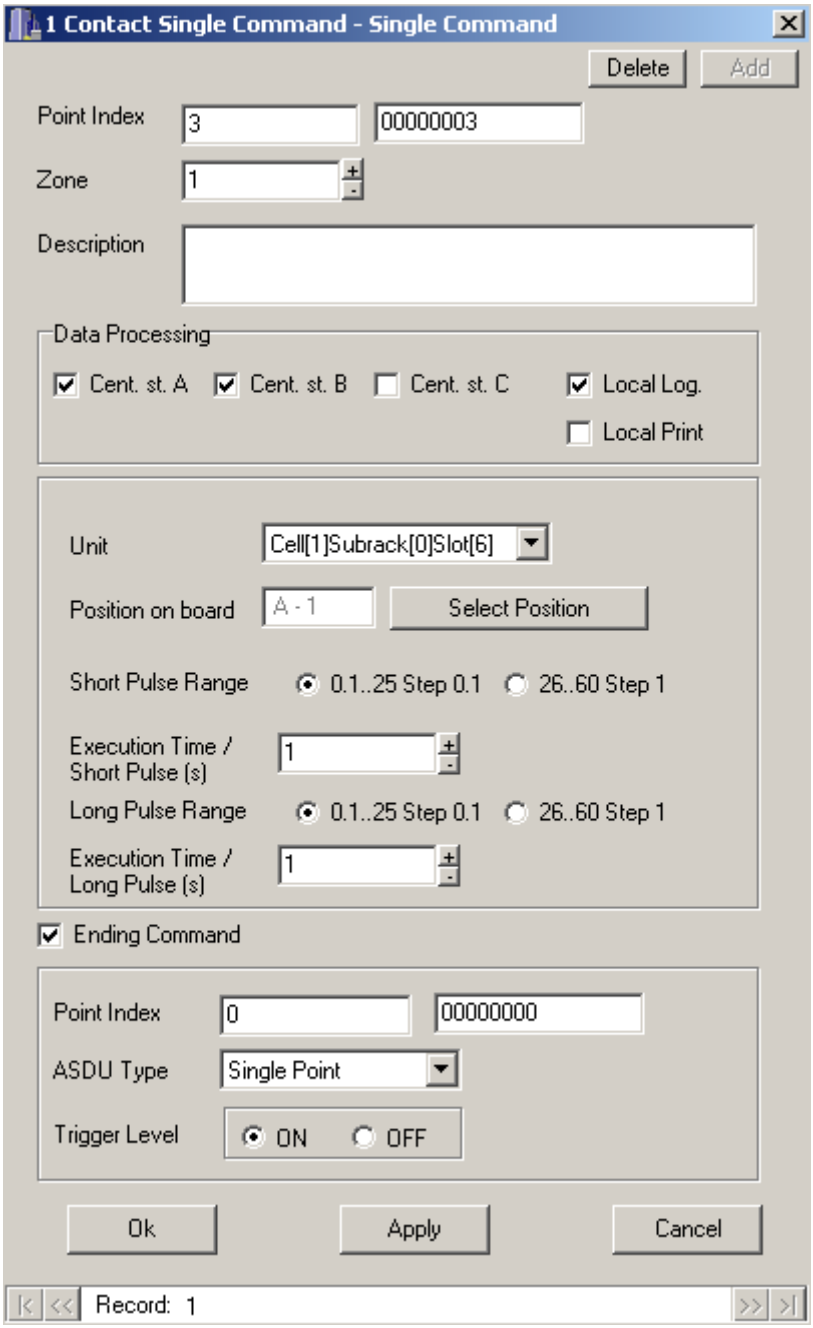

Figure 5-140 - 1 Contact Single Command to Local I/O

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1 Contact Single Command				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Single Command. The field is mandatory.
Zone	None	Blank	1÷32 step 1 Blank (not used)	It allows associating the Command to a *Plant Zone*. When the Plant Zone is not used, this means that no interblock is executed when the different Centers request the execution of TC (depending on the status of the Local/Command).
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.7.1.				
Unit	None	Blank	List of the 2x32DCO, 2x16DCC, 8OAI/8DCO, 32ODI/4OAI/10DCO cards inserted during configuration, presented in the format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Single Command. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 2x32DCO, 2x16DCC, 8OAI/8DCO, 32ODI/4OAI/10DCO). This field is mandatory
Position on board	None	Blank	A1÷A32 B1÷B32	The field displays the index of the physical output, on the selected board, which the Single Command to set to the field is connected to. The selection of the physical input on the board is issued by the “Select position ..” button, proceeding as described in paragraph 5.6.2
Short Pulse Range	None	0.1-25.0 sec	0.1-25.0 sec 26-60 sec	It allows defining in which range of values the TC duration of the Short Pulse is configured. The subdivision into two intervals allows defining, with a different granularity, the duration of the pulse to provide to the field. The two possible ranges are separated and then mutually exclusive.
Execution time / Short Pulse (s)	It depends on the range of values chosen for the Short Pulse	1	0.1÷25 step 0.1 26÷60 step 1	It allows defining the duration of TC with Short Pulse. The range of the possible values depends on choice made in the “Short Pulse Range”. The choice of a Short or Long Pulse is left to the Center (a proper parameter is provided inside the ASDU C_SC_NA_1).
Long Pulse Range	None	0.1-25.0 sec	0.1-25.0 sec 26-60 sec	It allows defining in which range of values the TC duration of the Long Pulse is configured. The subdivision into two intervals allows defining, with a different granularity, the duration of the pulse to provide to the field. The two possible ranges are separated and then mutually exclusive.

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1 Contact Single Command				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Execution time / Long Pulse (s)	It depends on the range of values chosen for the Long Pulse	1	0.1÷25 step 0.1 26÷60 step 1	It allows defining the duration of TC with Long Pulse. The range of the possible values depends on choice made in the "Long Pulse Range". The program imposes that the configured duration for the Short Pulse is lower than long Pulse one. The choice of a Short or Long Pulse is left to the Center (a proper parameter is provided inside the ASDU C_SC_NA_1).
Ending Command				
Ending Command	None	Enabled	Enabled/Disabled	It allows configuring a criterion for the immediate command termination (relays opening) caused by an occurred state variation of the associated input (for instance because of an occurred state variation of the controlled organ).
Point Index	Only if *Ending Command is enabled*	Firs free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the input used as termination criterion. The index inserted in this field must be related to an already configured quantity. The program executes the congruence check between configured index and ASDU typology chosen in the successive field. The field is mandatory.
ASDU Type	Only if *Ending Command is enabled*	Single Point	Single Point Single Point WTT Double Point Double Point WTT Analog Measure Analog Measure WTT Step Position Step Position WTT	It allows configuring which type of input quantity constitutes the termination criterion. . The program executes the congruence check between ASDU typology and the configured index chosen in the precedent field. The field is mandatory.
Trigger Level	if ASDU Type *Single Point* or *Double Point*	ON	ON OFF	It allows configuring which type of digital input variation causes the command terminaton.
Trigger Level	if ASDU Type *Normalized Value*	Blank MAX	-32768÷32767 MAX MIN	It allows configuring which type of analog input variation causes the command termination. The inserted value (-32768¸32767) constitutes a threshold value and it is related to the input normalized value. The MIN/MAX option allows to specify if the planned threshold constitutes an input variation for overcoming (Max) or for reentry (MIN)
Trigger Level	If ASDU Type *Step Position*	HIGHER	HIGHER LOWER	It allows configuring which type of analog input variation causes the command termination: increase (HIGHER) o decrease (LOWER)

Table 5-93 – Configuration of 1 Contact Single Command to Local I/O

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5.7.3 To Local – 2 Contacts Single Command

This option can be reached selecting *Control Direction* item of the main menu, *To Local I/O* and then *2 contacts single command*.

By this Technical Card, it is then possible to configure or to modify the configuration of the *2 Contacts Single Command* set to the field by means of the 2x32 Digital Command Output (*2x32 DCO*) card.

The Single Commands coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Single Command (C_SC_NA_1).

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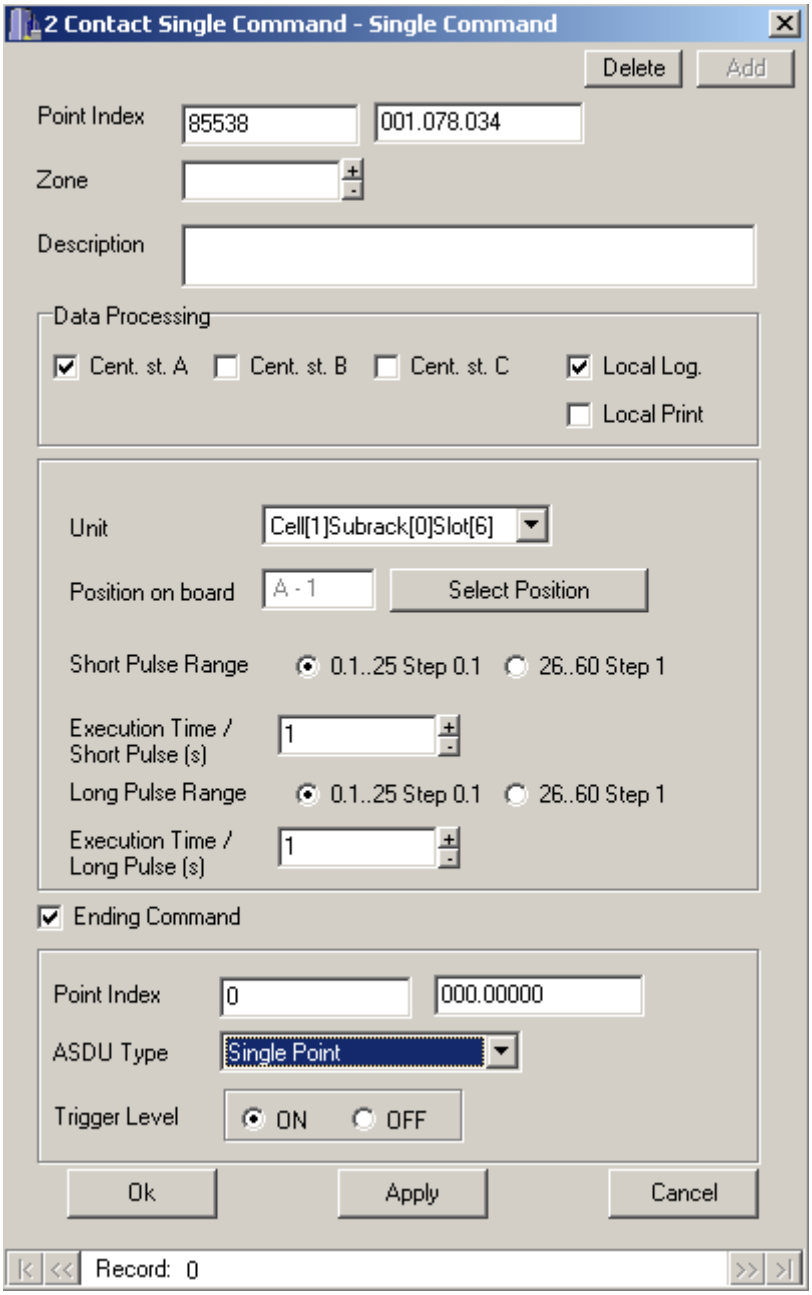

Figure 5-141 - 2 Contacts Single Commands to Local I/O

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2 Contacts Single Command				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Single Command. The field is mandatory.
Zone	None	Blank	1÷32 step 1 Blank (not used)	It allows associating the Command to a *Plant Zone*. When the Plant Zone is not used, this means that no interblock is executed when the different Centers request the execution of TC (depending on the status of the Local/Command).
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.7.1.				
Unit	None	Blank	List of the 2x32DCO cards inserted during configuration, presented in the format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Single Command. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 2x32DCO). This field is mandatory
Position on board	None	Blank	A1÷A31 B1÷B31	The field displays the index of the physical output, on the selected board, which the Single Command to set to the field is connected to. The selection of the physical input on the board is issued by the “Select position ..” button, proceeding as described in paragraph 5.6.2
Short Pulse Range	None	0.1..25 step 0.1	0.1..25 step 0.1 26..60 step 1	It allows defining in which range of values the TC duration of the Short Pulse is configured. The subdivision into two intervals allows defining, with a different granularity, the duration of the pulse to provide to the field. The two possible ranges are separated and then mutually exclusive.
Execution time / Short Pulse (s)	It depends on the range of values chosen for the Short Pulse	1	0.1÷25 step 0.1 26÷60 step 1	It allows defining the duration of TC with Short Pulse. The range of the possible values depends on choice made in the “Short Pulse Range”. The choice of a Short or Long Pulse is left to the Center (a proper parameter is provided inside the ASDU C_SC_NA_1).
Long Pulse Range	None	0.1..25 step 0.1	0.1..25 step 0.1 26..60 step 1	It allows defining in which range of values the TC duration of the Long Pulse is configured. The subdivision into two intervals allows defining, with a different granularity, the duration of the pulse to provide to the field. The two possible ranges are separated and then mutually exclusive.

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2 Contacts Single Command				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Execution Time / Long Pulse (s)	It depends on the range of values chosen for the Long Pulse	1	0.1÷25 step 0.1 26÷60 step 1	It allows defining the duration of TC with Long Pulse. The range of the possible values depends on choice made in the “Long Pulse Range”. The program imposes that the configured duration for the Short Pulse is lower than long Pulse one. The choice of a Short or Long Pulse is left to the Center (a proper parameter is provided inside the ASDU C_SC_NA_1).
Ending Command				
Ending Command	None	Enabled	Enabled/Disabled	It allows configuring a criterion for the immediate command termination (relays opening) caused by an occurred state variation of the associated input (for instance because of an occurred state variation of the controlled organ).
Point Index	Only if *Ending Command is enabled*	Firs free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the input used as termination criterion. The index inserted in this field must be related to an already configured quantity. The program executes the congruence check between configured index and ASDU typology chosen in the successive field. The field is mandatory.
ASDU Type	Only if *Ending Command is enabled*	Single Point	Single Point Single Point WTT Double Point Double Point WTT Analog Measure Analog Measure WTT Step Position Step Position WTT	It allows configuring which type of input quantity constitutes the termination criterion. . The program executes the congruence check between ASDU typology and the configured index chosen in the precedent field
Trigger Level	if ASDU Type *Single Point* or *Double Point*	ON	ON OFF	It allows configuring which type of digital input variation causes the command termination.
Trigger Level	if ASDU Type *Analog Measure*	Blank MAX	-32768÷32767 MAX MIN	It allows configuring which type of analog input variation causes the command termination. The inserted value (-32768¸32767) constitutes a threshold value and it is related to the input normalized value. The MIN/MAX option allows to specify if the planned threshold constitutes an input variation for overcoming (Max) or for reentry (MIN)
Trigger Level	If ASDU Type *Step Position*	HIGHER	HIGHER LOWER	It allows configuring which type of analog input variation causes the command termination: increase (HIGHER) o decrease (LOWER)

Table 5-94 – Configuration of 2 Contacts Single Command to Local I/O

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5.7.4 To Local – Single Command Continuous

This option can be reached selecting *Control Direction* item of the main menu, *To Local* and then *Single Command Continuous*..

By this Technical Card, it is then possible to configure or to modify the configuration of the *1 contact Single Commands* set to the field by means of the 2x16 Digital Command Continuous (*2x16 DCC*) card.

The particularity of the group 2x16DCC in comparison to the normal group of remote controls restitution (2x32DCO) it is due to the circuital difference that allows to set to the field also contemporary commands (1/N control is not scheduled).

The Single Commands Continuous coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Single Command (C_SC_NA_1).

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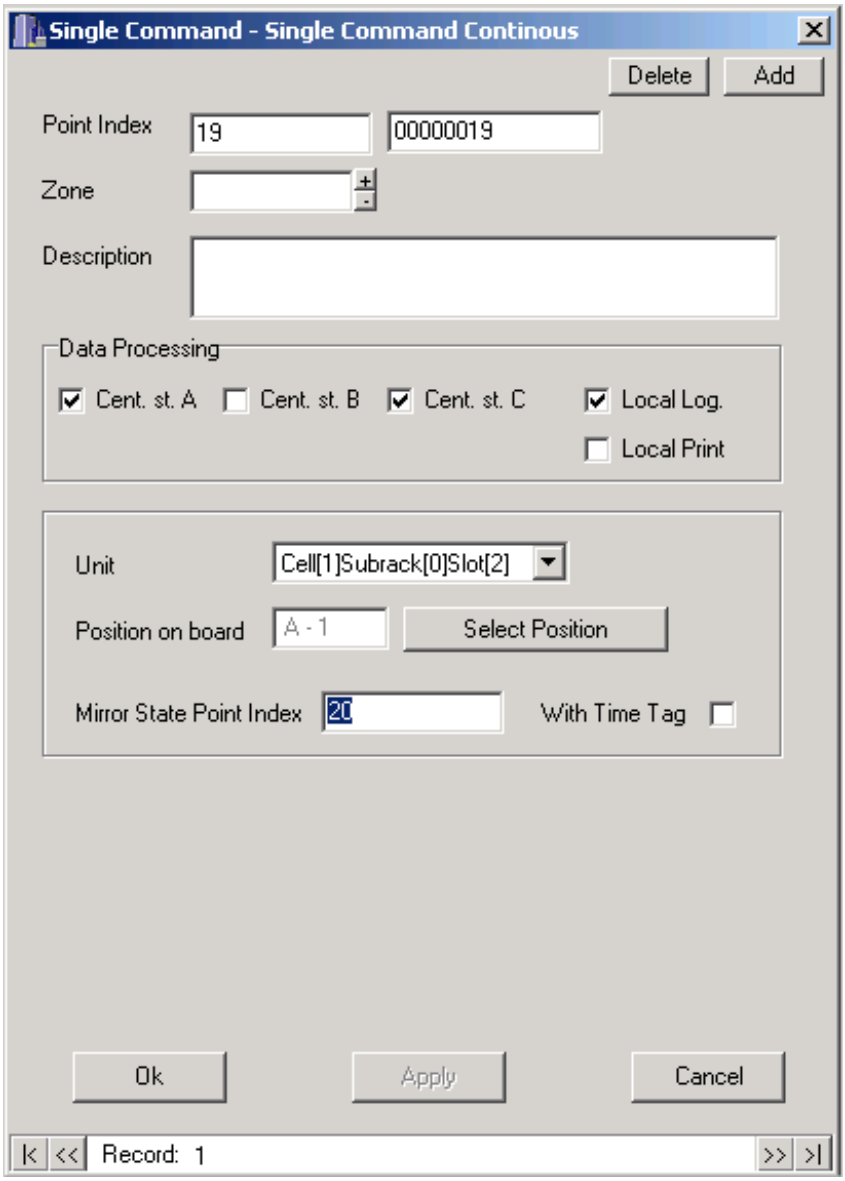

Figure 5-142 - Single Command Continuous to Local I/O

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Single Command Continuous				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Single Command. The field is mandatory.
Zone	None	Blank	1÷32 step 1 Blank (not used)	It allows associating the Command to a *Plant Zone*. When the Plant Zone is not used, this means that no interblock is executed when the different Centers request the execution of TC (depending on the status of the Local/Command).
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.7.1.				
Unit	None	Blank	List of the 2x16DCC cards inserted during configuration, presented in the format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Single Command. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 2x16DCC). This field is mandatory
Position on board	None	Blank	A1÷A16 B1÷B16	The field displays the index of the physical output, on the selected board, which the Single Command to set to the field is connected to. The selection of the physical input on the board is issued by the “Select position ..” button, proceeding as described in paragraph 5.6.2
Mirror State Point Index	None		1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Telesignal associated to the Single Command. That telesignal reports the output state and it is sent on variation
With Time Tag	None	Disabled	Enabled/Disabled	If enabled, it allows associating the time tag to the Mirror State Telesignal

Table 5-95 - Single Command Continuous to Local I/O - configuration

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5.7.5 To Local – 1 Contact Double Command

This option can be reached selecting *Control Direction* item of the main menu, *To Local* and then *1 Contact Double command*.

By this Technical Card, it is then possible to configure or to modify the configuration of the *1 Contact Double Command* set to the field by means of one of the following groups:

- 2x32 Digital Command Output (*2x32 DCO 1 pole and 1and ½ pole*) card
- 8 Opto Analog Input / 8 Digital Command Output (*8OAI/8DCO*) mixed card output section
- 32 Opto Digital Input / 4 Opto Analog Input / 10 Digital Command Output (*32ODI/4OAI/10DCO)* mixed card output section
- 2x16 Digital Continuous Command (*2x16 DCC*) card

The Double Commands coincide, at IEC60870-5-101 and IEC60870-5-104 line protocol level, with the Double Command (C_DC_NA_1).

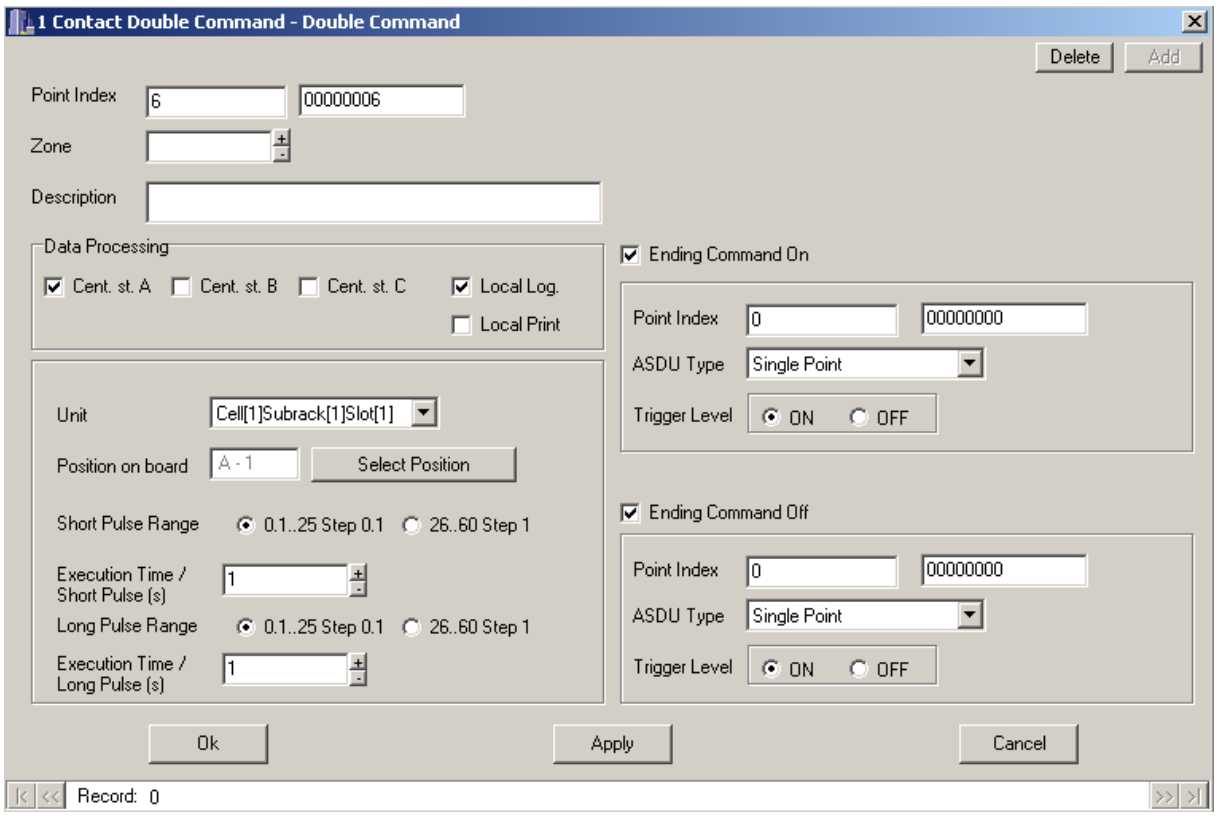

Figure 5-143 - To Local I/O – 1 Contact Double Command

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1 contact Double Command				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Double Command. The field is mandatory.
Zone	None	Blank	1÷32 step 1 Blank (not used)	It allows associating the Command to a *Plant Zone*. When the Plant Zone is not used, this means that no interblock is executed when the different Centers request the execution of TC (depending on the status of the Local/Command).
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.7.1.				
Unit	None	Blank	List of the 2x32DCO 2x16DCC, 8OAI/8DCO, 32ODI/4OAI/10DCO cards inserted during configuration, presented in the format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Double Command. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 2x32DCO 2x16DCC, 8OAI/8DCO, 32ODI/4OAI/10DCO). This field is mandatory
Position on board	None	Blank	A1÷A31 B1÷B31	The field displays the index of the physical output, on the selected board, which the Double Command to set to the field is connected to. The selection of the physical input on the board is issued by the “Select position ..” button, proceeding as described in paragraph 5.6.2
Short Pulse Range	None	0.1..25 step 0.1	0.1..25 step 0.1 26..60 step 1	It allows defining in which range of values the TC duration of the Short Pulse is configured. The subdivision into two intervals allows defining, with a different granularity, the duration of the pulse to provide to the field. The two possible ranges are separated and then mutually exclusive.
Execution time / Short Pulse (s)	It depends on the range of values chosen for the Short Pulse	1	0.1÷25 step 0.1 26÷60 step 1	It allows defining the duration of TC with Short Pulse. The range of the possible values depends on choice made in the “Short Pulse Range”. The choice of a Short or Long Pulse is left to the Center (a proper parameter is provided inside the ASDU C_DC_NA_1).
Long Pulse Range	None	0.1..25 step 0.1	0.1..25 step 0.1 26..60 step 1	It allows defining in which range of values the TC duration of the Long Pulse is configured. The subdivision into two intervals allows defining, with a different granularity, the duration of the pulse to provide to the field. The two possible ranges are separated and then mutually exclusive.

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1 contact Double Command				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Execution Time Long Pulse (s)	It depends on the range of values chosen for the Long Pulse	1	0.1÷25 step 0.1 26÷60 step 1	It allows defining the duration of TC with Long Pulse. The range of the possible values depends on choice made in the “Long Pulse Range”. The program imposes that the configured duration for the Short Pulse is lower than long Pulse one. The choice of a Short or Long Pulse is left to the Center (a proper parameter is provided inside the ASDU C_DC_NA_1).
Ending Command On				
Ending Command On	None	Enabled	Enabled/Disabled	It allows configuring a criterion for the immediate command termination (relays opening) caused by an occurred state variation of the associated input (for instance because of an occurred state variation of the controlled organ).
Point Index	Only if *Ending Command is enabled*	Firs free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the input used as termination criterion. The index inserted in this field must be related to an already configured quantity. The program executes the congruence check between configured index and ASDU typology chosen in the successive field. The field is mandatory.
ASDU Type	Only if *Ending Command is enabled*	Single Point	Single Point Single Point WTT Double Point Double Point WTT Analog Measure Analog Measure WTT	It allows configuring which type of input quantity constitutes the termination criterion. The program executes the congruence check between ASDU typology and the configured index chosen in the precedent field
Trigger Level	if ASDU Type *Single Point* or *Double Point*	ON	ON OFF	It allows configuring which type of input variation causes the command termination
Trigger Level	if ASDU Type *Normalized Value*	Blank MAX	-32768÷32767 MAX MIN	It allows configuring which type of analog input variation causes the command termination. The inserted value (-32768¸32767) constitutes a threshold value and it is related to the input normalized value. The MIN/MAX option allows to specify if the planned threshold constitutes an input variation for overcoming (Max) or for reentry (MIN)
Trigger Level	If ASDU Type *Step Position*	HIGHER	HIGHER LOWER	It allows configuring which type of analog input variation causes the command termination: increase (HIGHER) o decrease (LOWER)
Ending Command Off				
Ending Command Off	None	Enabled	Enabled/Disabled	It allows configuring a criterion for the immediate command termination (relays opening) caused by occurred state variation of the controlled organ.

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1 contact Double Command				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	Only if *Ending Command is enabled*	Firs free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the single command. The field is mandatory.
ASDU Type	Only if *Ending Command is enabled*	Single Point	Single Point Single Point WTT Double Point Double Point WTT Analog Measure Analog Measure WTT Step Position Step Position WTT	It allows configuring which type of quantity reports the organ state variation.
Trigger Level	if ASDU Type *Single Point* or *Double Point*	ON	ON OFF	It allows configuring which type of input variation causes the command termination
Trigger Level	if ASDU Type *Normalized Value*	Blank MAX	-32768÷32767 MAX MIN	It allows configuring which type of analog input variation causes the command termination. The inserted value (-32768¸32767) constitutes a threshold value and it is related to the input normalized value. The MIN/MAX option allows to specify if the planned threshold constitutes an input variation for overcoming (Max) or for reentry (MIN)
Trigger Level	If ASDU Type *Step Position*	HIGHER	HIGHER LOWER	It allows configuring which type of analog input variation causes the command termination: increase (HIGHER) o decrease (LOWER)

Table 5-96 – Configuration of 1 contact Double Commands to Local I/O

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5.7.6 To Local – 2 Contacts Double Command

This option can be reached selecting *Control Direction* item of the main menu, *To Local* and then *2 Contacts Double Command*.

By this Technical Card, it is then possible to configure or to modify the configuration of the *2 Contacts Double Command* set to the field by means of the 2x32 Digital Command Output (*2x32 DCO 2 poles*) card.

The Double Commands coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Double Command (C_DC_NA_1).

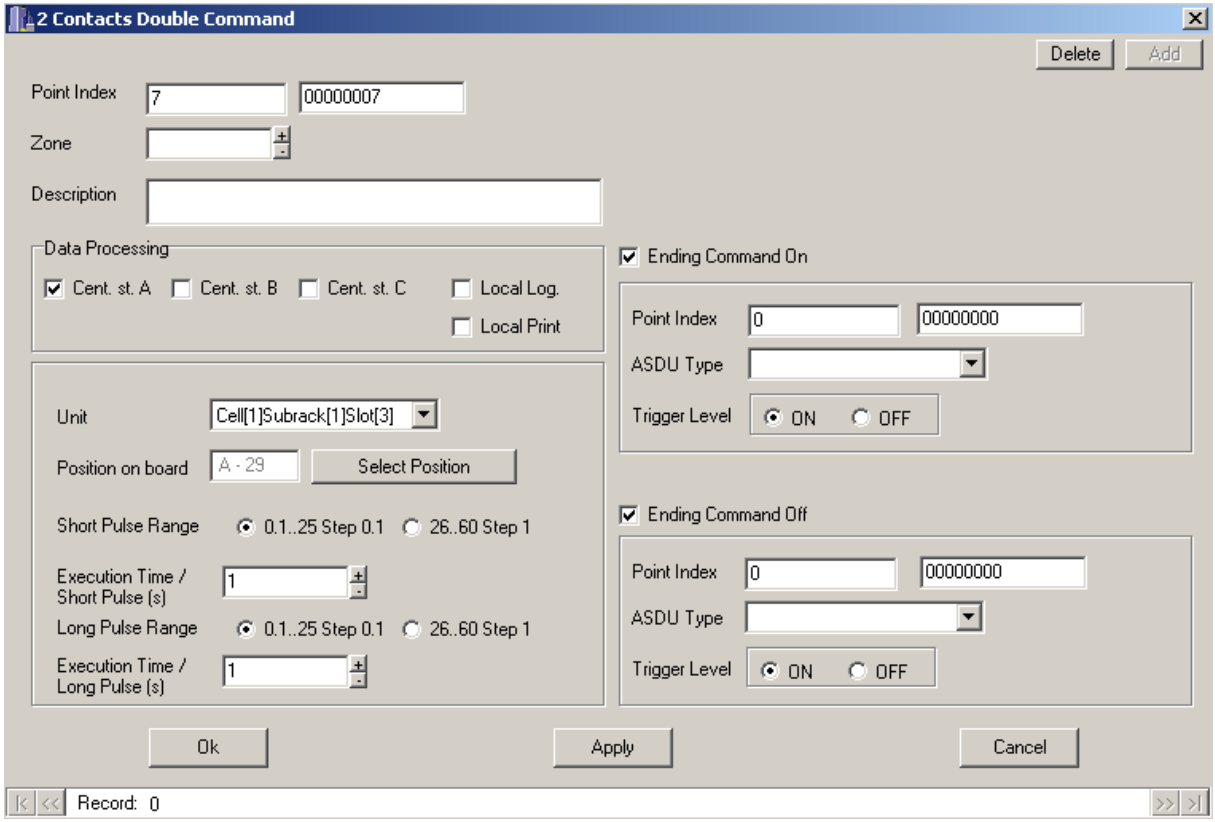

Figure 5-144 – To Local I/O 2 Contacts Double Commands

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2 contact Double Commands				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Double Command. The field is mandatory.
Zone	None	Blank	1÷32 step 1 Blank (not used)	It allows associating the Command to a *Plant Zone*. When the Plant Zone is not used, this means that no interblock is executed when the different Centers request the execution of TC (depending on the status of the Local/Command).
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.7.1.				
Unit	None	Blank	List of the 2x32DCO 2x16DCC, 8OAI/8DCO, 32ODI/4OAI/10DCO cards inserted during configuration, presented in the format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Double Command. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 2x32DCO 2x16DCC, 8OAI/8DCO, 32ODI/4OAI/10DCO). This field is mandatory
Position on board	None	Blank	A1÷A29 B1÷B29	The field displays the index of the physical output, on the selected board, which the Double Command to set to the field is connected to. The selection of the physical input on the board is issued by the “Select position ..” button, proceeding as described in paragraph 5.6.2
Short Pulse Range	None	0.1..25 step 0.1	0.1..25 step 0.1 26..60 step 1	It allows defining in which range of values the TC duration of the Short Pulse is configured. The subdivision into two intervals allows defining, with a different granularity, the duration of the pulse to provide to the field. The two possible ranges are separated and then mutually exclusive.
Execution time / Short Pulse (s)	It depends on the range of values chosen for the Short Pulse	1	0.1÷25 step 0.1 26÷60 step 1	It allows defining the duration of TC with Short Pulse. The range of the possible values depends on choice made in the “Short Pulse Range”. The choice of a Short or Long Pulse is left to the Center (a proper parameter is provided inside the ASDU C_DC_NA_1).
Long Pulse Range	None	0.1..25 step 0.1	0.1..25 step 0.1 26..60 step 1	It allows defining in which range of values the TC duration of the Long Pulse is configured. The subdivision into two intervals allows defining, with a different granularity, the duration of the pulse to provide to the field. The two possible ranges are separated and then mutually exclusive.

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2 contact Double Commands				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Execution Time Long Pulse (s)	It depends on the range of values chosen for the Long Pulse	1	0.1÷25 step 0.1 26÷60 step 1	It allows defining the duration of TC with Long Pulse. The range of the possible values depends on choice made in the “Long Pulse Range”. The program imposes that the configured duration for the Short Pulse is lower than long Pulse one. The choice of a Short or Long Pulse is left to the Center (a proper parameter is provided inside the ASDU C_DC_NA_1).
Ending Command On				
Ending Command On	None	Enabled	Enabled/Disabled	It allows configuring a criterion for the immediate command termination (relays opening) caused by an occurred state variation of the controlled organ.
Point Index	Only if *Ending Command is enabled*	Firs free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Single Command. The field is mandatory.
ASDU Type	Only if *Ending Command is enabled*	Single Point	Single Point Single Point WTT Double Point Double Point WTT Analog Measure Analog Measure WTT	It allows configuring which type of input quantity reports the organ state variation.
Trigger Level	if ASDU Type *Single Point* or *Double Point*	ON	ON OFF	It allows configuring which type of input variation causes the command termination
Trigger Level	if ASDU Type *Normalized Value*	Blank MAX	-32768÷32767 MAX MIN	It allows configuring which type of analog input variation causes the command termination. The inserted value (-32768¸32767) constitutes a threshold value and it is related to the input normalized value. The MIN/MAX option allows to specify if the planned threshold constitutes an input variation for overcoming (Max) or for reentry (MIN)
Trigger Level	If ASDU Type *Step Position*	HIGHER	HIGHER LOWER	It allows configuring which type of analog input variation causes the command termination: increase (HIGHER) o decrease (LOWER)
Ending Command Off				
Ending Command Off	None	Enabled	Enabled/Disabled	It allows configuring a criterion for the immediate command termination (relays opening) caused by an occurred state variation of the controlled organ.
Point Index	Only if *Ending Command is enabled*	Firs free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Single Command. The field is mandatory.

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2 contact Double Commands				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
ASDU Type	Only if *Ending Command is enabled*	Single Point	Single Point Single Point WTT Double Point Double Point WTT Analog Measure Analog Measure WTT Step Position Step Position WTT	It allows configuring which type of quantity reports the organ state variation.
Trigger Level	if ASDU Type *Normalized Value*	Blank MAX	-32768÷32767 MAX MIN	It allows configuring which type of analog input variation causes the command termination. The inserted value (-32768¸32767) constitutes a threshold value and it is related to the input normalized value. The MIN/MAX option allows to specify if the planned threshold constitutes an input variation for overcoming (Max) or for reentry (MIN)
Trigger Level	If ASDU Type *Step Position*	HIGHER	HIGHER LOWER	It allows configuring which type of analog input variation causes the command termination: increase (HIGHER) o decrease (LOWER)

Table 5-97 - To Local I/O 2 Contacts Double Commands Configuration

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5.7.7 To Local – Step Command

This option can be reached selecting *Control Direction* item of the main menu, *To Local* and then *Step command*.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Step Command* set to the field by means of one of the following groups:

- 2x32 Digital Command Output (*2x32 DCO*) card
- 2x16 Digital Continuous Command (*2x16 DCC*) card
- 32 Opto Digital Input / 4 Opto Analog Input / 10 Digital Command Output (*32ODI/4OAI/10DCO)* mixed card
- 8 Opto Analog Input / 8 Digital Command Output (*8OAI/8DCO*) mixed card

The Step Commands allow commanding field equipments, whose status can change in two directions by discrete steps.

The configuration of one Step Command hocks on the output Unit two relays, one for the Step Up command and the other for the Step Down command.

The Step Command coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Regulating Step Command (C_RC_NA_1).

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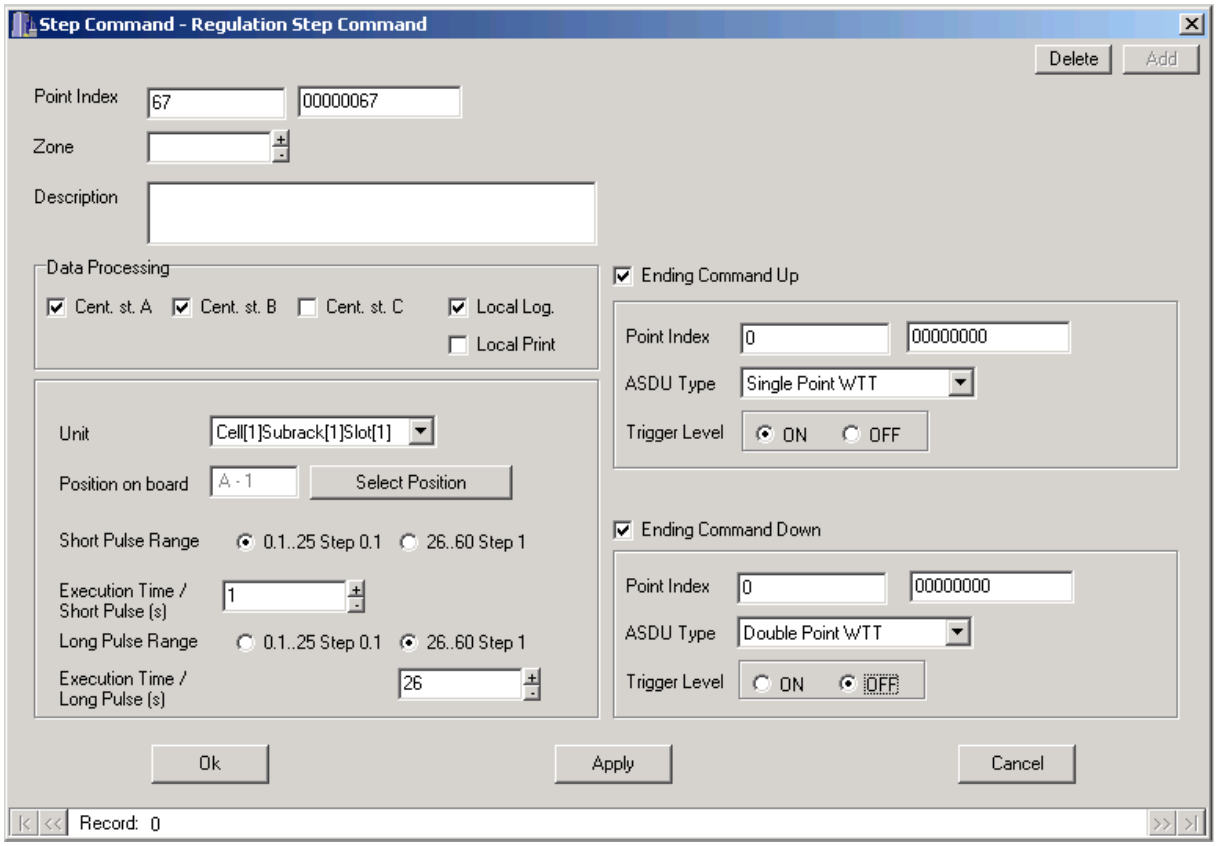

Figure 5-145 - Step Command to Local I/O

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Step Commands				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Step Command. The field is mandatory.
Zone	None	Blank	1÷32 step 1 Blank (not used)	It allows associating the Command to a *Plant Zone*. When the Plant Zone is not used, this means that no interblock is executed when the different Centers request the execution of TC (depending on the status of the Local/Command).
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.7.1.				
Unit	None	Blank	List of the cards inserted during configuration, presented in the format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Double Command. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 2x32DCO, 2x16DCC, *32ODI/4OAI/10DCO, 8OAI/8DCO*). This field is mandatory
Position on board	None	Blank	A1÷A31 B1÷B31	The field displays the index of the first of the two adjacent physical output, on the selected board, which the Step Command to set to the field is connected to. “Up” pulse is associated to one contact, “Down” pulse to the other one. The selection of the physical input on the board is issued by the “Select position ..” button, proceeding as described in paragraph 5.6.2
Short Pulse Range	None	0.1..25 step 0.1	0.1..25 step 0.1 26..60 step 1	It allows defining in which range of values the TC duration of the Short Pulse is configured. The subdivision into two intervals allows defining, with a different granularity, the duration of the pulse to provide to the field. The two possible ranges are separated and then mutually exclusive.
Execution time / Short Pulse (s)	It depends on the range of values chosen for the Short Pulse	0.2	0.1÷25 step 0.1 26÷60 step 1	It allows defining the duration of TC with Short Pulse. The range of the possible values depends on choice made in the “Short Pulse Range”. The choice of a Short or Long Pulse is left to the Center (a proper parameter is provided inside the ASDU C_RC_NA_1).
Long Pulse Range	None	0.1..25 step 0.1	0.1..25 step 0.1 26..60 step 1	It allows defining in which range of values the TC duration of the Long Pulse is configured. The subdivision into two intervals allows defining, with a different granularity, the duration of the pulse to provide to the field. The two possible ranges are separated and then mutually exclusive.

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Step Commands				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Execution time / Long Pulse (s)	It depends on the range of values chosen for the Long Pulse	0.5	0.1÷25 step 0.1 26÷60 step 1	It allows defining the duration of TC with Long Pulse. The range of the possible values depends on choice made in the “Long Pulse Range”. The program imposes that the configured duration for the Short Pulse is lower than long Pulse one. The choice of a Short or Long Pulse is left to the Center (a proper parameter is provided inside the ASDU C_RC_NA_1).
Ending Command Up				
Ending Command Up	None	Disabled	Enabled/Disabled	It allows configuring a criterion for the immediate command termination (relays opening) caused by an occurred state variation of the associated input (for instance because of an occurred state variation of the controlled organ).
Point Index	Only if *Ending Command is enabled*	Firs free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the input used as termination criterion. The index inserted in this field must be related to an already configured quantity. The program executes the congruence check between configured index and ASDU typology chosen in the successive field. The field is mandatory.
ASDU Type	Only if *Ending Command* is enabled	Single Point	Single Point Single Point WTT Double Point Double Point WTT Analog Measure Analog Measure WTT Step Position Step Position WTT	It allows configuring which type of input quantity constitutes the termination criterion. The program executes the congruence check between ASDU typology and the configured index chosen in the precedent field The field is mandatory. Note: by configuring *Step Position* HIGHER is automatically associated to Ending Command Up and LOWER to Ending Command Down
Trigger Level	if ASDU Type *Single Point* or *Double Point*	ON	ON OFF	It allows configuring which type of input variation causes the command termination
Trigger Level	if ASDU Type *Normalized Value*	Blank MAX	-32768÷32767 MAX MIN	It allows configuring which type of analog input variation causes the command termination. The inserted value (-32768¸32767) constitutes a threshold value and it is related to the input normalized value. The MIN/MAX option allows to specify if the planned threshold constitutes an input variation for overcoming (Max) or for reentry (MIN)
Trigger Level	If ASDU Type *Step Position*	HIGHER	HIGHER LOWER	It allows configuring which type of analog input variation causes the command termination: increase (HIGHER) o decrease (LOWER)
Ending Command Down				

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Step Commands				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Ending Command Down	None	Disabled	Enabled/Disabled	It allows configuring a criterion for the immediate command termination (relays opening) caused by an occurred state variation of the associated input (for instance because of an occurred state variation of the controlled organ).
Point Index	Only if *Ending Command is enabled*	Firs free index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the input used as termination criterion. The index inserted in this field must be related to an already configured quantity. The program executes the congruence check between configured index and ASDU typology chosen in the successive field. The field is mandatory.
ASDU Type	Only if *Ending Command* is enabled	Single Point	Single Point Single Point WTT Double Point Double Point WTT Analog Measure Analog Measure WTT	It allows configuring which type of input quantity constitutes the termination criterion. The program executes the congruence check between ASDU typology and the configured index chosen in the precedent field The field is mandatory.
Trigger Level	if ASDU Type *Single Point* or *Double Point*	ON	ON OFF	It allows configuring which type of input variation causes the command termination
Trigger Level	if ASDU Type *Normalized Value*	Blank MAX	-32768÷32767 MAX MIN	It allows configuring which type of analog input variation causes the command termination. The inserted value (-32768¸32767) constitutes a threshold value and it is related to the input normalized value. The MIN/MAX option allows to specify if the planned threshold constitutes an input variation for overcoming (Max) or for reentry (MIN)
Trigger Level	If ASDU Type *Step Position*	HIGHER	HIGHER LOWER	It allows configuring which type of analog input variation causes the command termination: increase (HIGHER) o decrease (LOWER)

Table 5-98 – Configuration of the Step Command to Local I/O

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5.7.8 To Local – Up/Down Set Point

This option can be reached selecting *Control Direction* item of the main menu, *To Local* and then *Up/Down Set Point*.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Up/Down Set Points* set to the field by means of the 2x8 Digital Regulating Output (*2x16DCC*) card.

This functionality allows commanding field equipments, whose location is fixed according to the closing time of two output contacts with opposite effect (increase/decrease). The characteristic of the 2x16DCC card, respect to the normal (2x32DCO) command restitution card, is due to the circuit difference that allows setting to field also contemporary commands (1/N control is not available and all the controls to assure the safety are replied at single output circuit level).

The closure of the output contacts is of impulsive type; the Set Point duration is contained in the related command sent by Center. To allow an additional local control, it is possible to configure the maximum duration of the Set Point besides which the program does not continue (the same max. value can be configured for *Up* and *Down*).

The Up/Down Set Points Command coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Set Point Command, Normalized Value (C_SE_NA_1).

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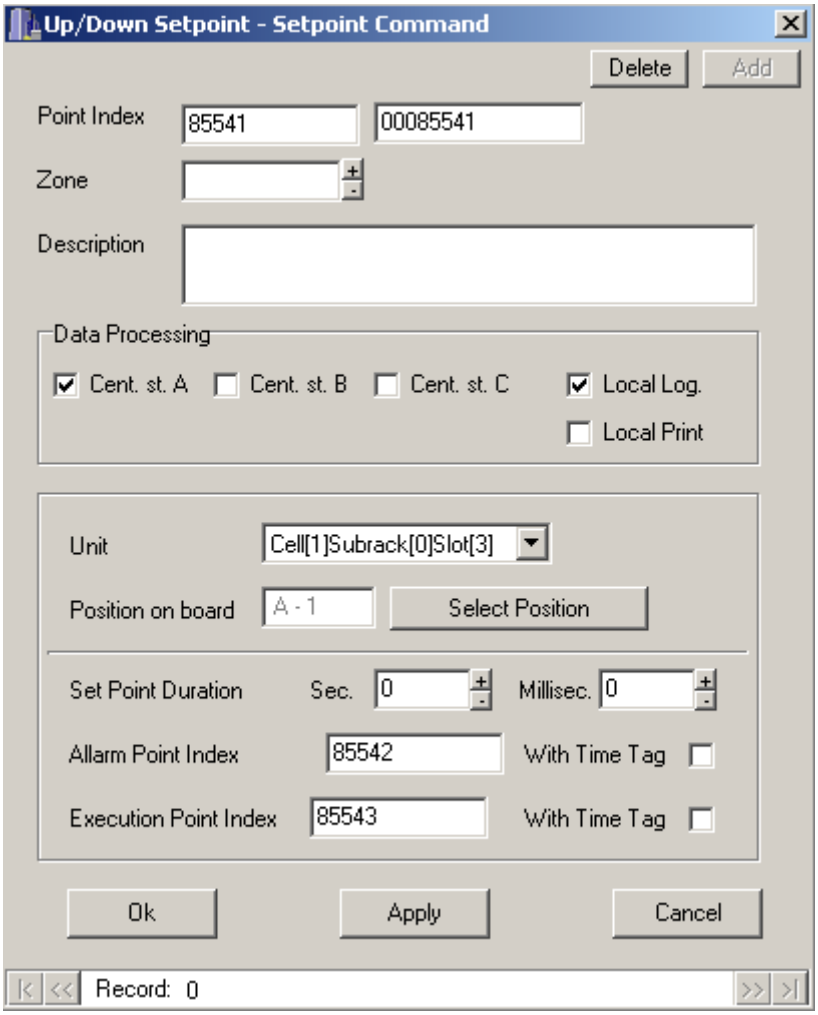

Figure 5-146 - Up/Down Set Point to Local I/O

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Up/Down Set Point				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Step Command. The field is mandatory.
Zone	None	Blank	1÷32 step 1 Blank (not used)	It allows associating the Command to a *Plant Zone*. When the Plant Zone is not used, this means that no interblock is executed when the different Centers request the execution of TC (depending on the status of the Local/Command).
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.7.1.				
Unit	None	Blank	List of the 2x16DCC cards inserted during configuration, presented in the format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Set Point. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session and of 2x16DCC). This field is mandatory
Position on board	None	Blank	A1÷A15 B1÷B15	The field displays the index of the first of the two adjacent physical output, on the selected board, which the Up/Down Set Point to set to the field is connected to. “Up” pulse is associated to one contact, “Down” pulse to the other one. The selection of the physical input on the board is issued by the “Select position ..” button, proceeding as described in paragraph 5.6.2
Set Point Duration (sec + ms)	None	0 sec 0 ms	0÷1637 step 1 sec 0÷999 step 1 ms	It allows defining the max. duration of the Set Point set to the field. The applicative program of STCE/RTU equipment controls that the max. duration of the Set Point received from Center is not greater than the max. allowed value.
Allarm Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the alarm Telesignal associated to the Set Point. The field is mandatory
With Time Tag	None	Disabled	Enabled/Disabled	If enabled, it allows associating the time tag to Alarm Point Telesignal.
Execution Point Index	Execution Point Index	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the alarm Telesignal associated to the Set Point. That Telesignal reports the output state and it is sent on variation. The field is mandatory

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Up/Down Set Point				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
With Time Tag	None	Disabled	Enabled/Disabled	If enabled, it allows associating the time tag to Execution Point Telesignal.

Table 5-99 – Configuration of Up/Down Set Point to Local I/O

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5.7.9 To Local – Digital Set Point

This option can be reached selecting *Control Direction* item of the main menu, *To Local* and then *Digital Set Point*.

By this Technical Card, it is then possible to configure or to modify the configuration of the *Digital Set Points* set to the field by means of the 64 Optoinsulated Digital Output (*64 ODO*) card.

This functionality allows setting on field a bit configuration that can be in BCD or binary format.

At configuration level, it is possible to associate, to the set of bits that return in output the value received by Center an additional digital output (Validity *Criterion*) that can assume, alternatively, one of the following meanings:

- *Local Alarm.* The alarm bit can be activated in case of missed refresh of Set Point by the Center within a configured interval, or in case of a Set Point value received from Center, whose difference respect to the previous updating, is greater than a configured value.
- *Valid Data.* The data bit can be set on field as status or as strobe pulse of configurable duration.

The Set Points Command coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Set Point Command, Normalized Value (C_SE_NA_1).

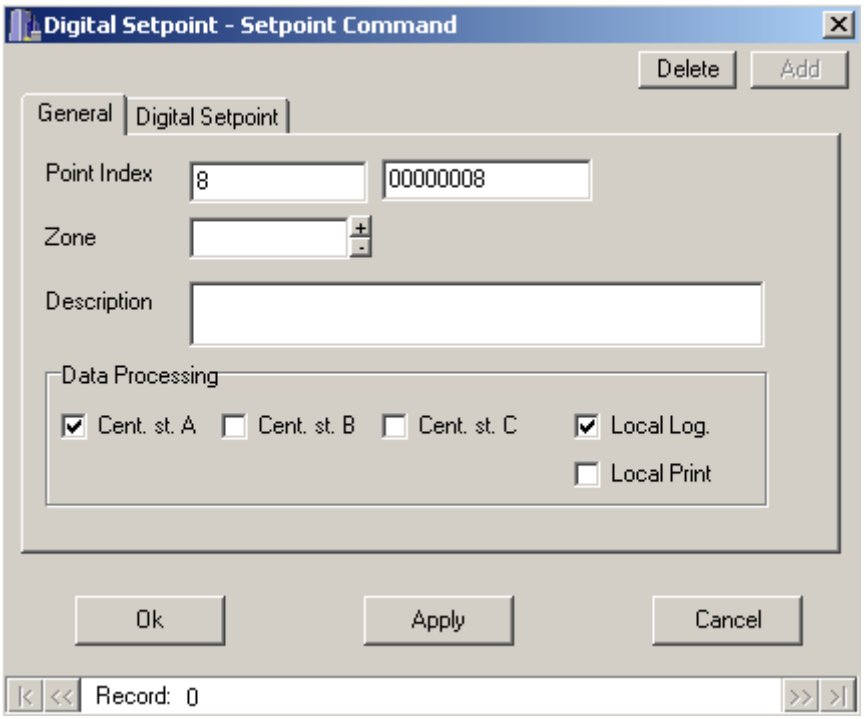

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Figure 5-147 - Digital Set Point to Local I/O - General

Digital Set Point				
FIELD NAME	**DEPENDENCE**	**I. V.**	**P. V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) index of the Digital Set Point. The field is mandatory.
Zone	None	Blank	1÷32 step 1 Blank (not used)	It allows associating the Command to a *Plant Zone*. When the Plant Zone is not used, this means that no interblock is executed when the different Centers request the execution of TC (depending on the status of the Local/Command).
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment
Data Processing				
For the treatment of the quantity, refer to par. 5.7.1.				

Table 5-100 – Configuration of Digital Set Point to Local I/O

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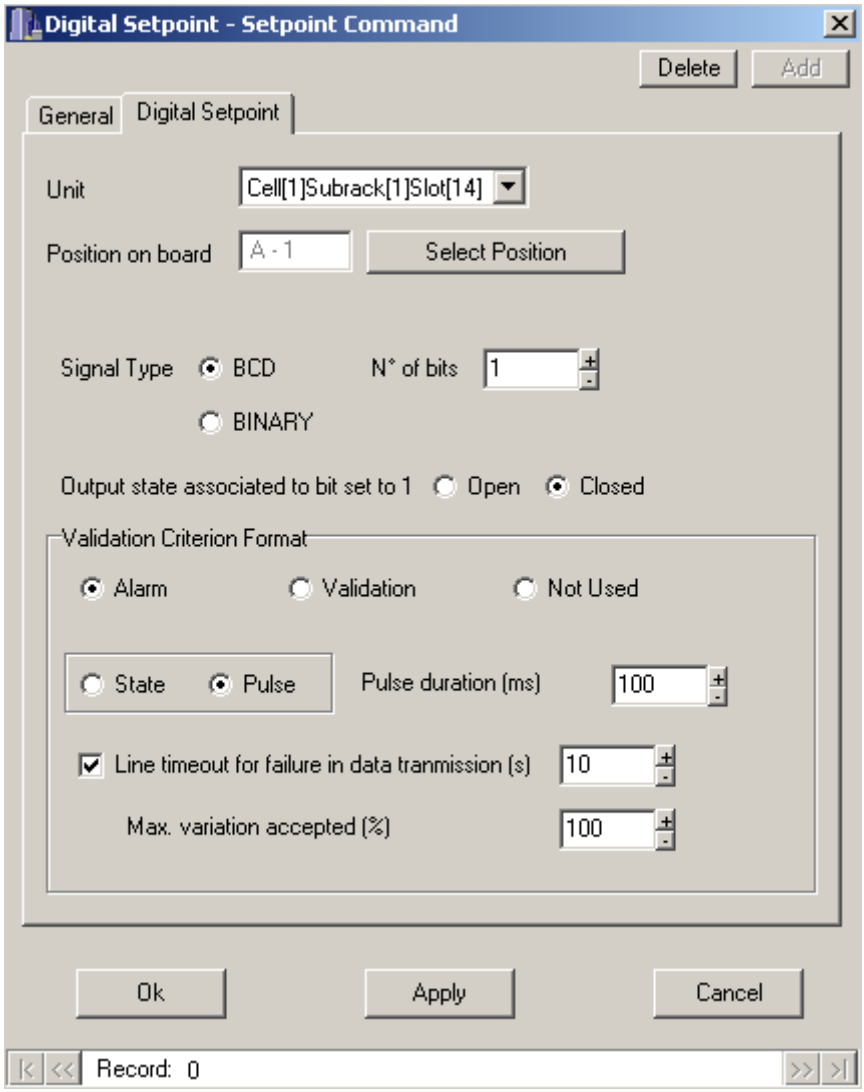

Figure 5-148 - Digital Set Point to Local I/O

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Digital Set Point				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
Unit	None	Blank	List of 64ODO cards inserted during the configuration in format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Digital Set Point. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the card already configured in “Equipment” session and of 64ODO type). The field is mandatory
Start position on board	None	Blank	A1÷An B1÷Bn where “n” stands for the higher index which the first byte of the Set Point can be connected to, considering that all the bits of the Digital Set Point plus one must be connected to the remaining bits (up to 63)	The field displays the index of the physical input, on the selected board, which the first digital constituting the Set Point is connected to. Note: the first selected digital (that with lowest index among those constituting the Digital Set Point) is always used to set the *Validation Criterion*. The selection of the physical input on the board is issued pressing the “Select position ..” button and proceeding as described in paragraph 5.6.2
Signal type	None	BCD	BCD BINARY	Type of coding used to set the Digital Set Point on field.
N° of digits	Field enabled only if Digital SP is coded BCD	Blank	1÷4 step 1	Number of Digits to set the Digital Set Point with BCD code. The total number of bits to set is fixed by the number of BCD digits multiplied by four plus one bit for the restitution of the *Validation Criterion*. The program automatically configures the bit that provides the *Validation Criterion* before all the other ones. Even if the *Validation Criterion* is configured as TIMEOUT, however the corresponding bit is allocated.
N° of bits	Field enabled only if Digital SP is coded BINARY	Blank	8÷16 step 1	Number of bits to set the Digital Set Point with BINARY code. The total number of bits to set is given by the number of configured bits plus one for the restitution of the *Validation Criterion*. The program automatically configures the bit that provides the *Validation Criterion* before all the other ones. Even if the *Validation Criterion* is configured as TIMEOUT, however the corresponding bit is allocated.
Output state associated to bit set to 1	None	Closed	Open Closed	It allows configuring the physical status (Open or Closed) associated to the single output in correspondence to the logic value 1. The configured status is the same for all the bits of the Digital Set Point.

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Digital Set Point				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
Validation criterion parameters – Validation (default)				
State	Field enabled only if the "Validation" option is selected and the criterion is set as *Status*	Disabled	Enabled/Disabled	It allows defining that the *Validation Criterion* assumes the meaning of "Valid Set Point" and it is set on field as *Status.* When the "Valid Set Point" criteria is restituted as STATUS, the following rule is applied: the condition of valid Set Point corresponds to the CLOSED output contact (considering that the solid state relè in absence of voltage is surely OPEN).
Pulse	Field enabled only if the "Validation" option is selected and the criterion is set as *Pulse*	Enabled	Enabled/Disabled	It allows defining that the *Validation Criterion* assumes the meaning of "Valid Set Point" and it is set on field as *Pulse.* The restitution of the criterion as Pulse is alternative to the restitution as fixed Status of the bit. When the "Valid Set Point" criterion is restituted as PULSE, the following rule is applied: the Valid Set Point condition is triggered by a pulse provided with the passage from OPEN status to CLOSED status for a configured period.
Pulse duration (ms)	Field enabled only if the "Pulse" option	100	50÷300 step 50	The minimum duration of the validation pulse of Set Point is configured.
Validation criterion parameters – Alarm				
State	Field enabled only if the "Alarm" option is selected and the criterion is set as *Status*	Disabled	Enabled/Disabled	It allows defining that the *Validation Criterion* assumes the meaning of "Invalid Set Point Alarm" and it is set on field as *Status.*
Pulse	Field enabled only if the "Alarm" option is selected and the criterion is set as *Pulse*	Enabled	Enabled/Disabled	It allows defining that the *Validation Criterion* assumes the meaning of "Invalid Set Point Alarm" and it is set on field as *Pulse.* The restitution of the criterion as Pulse is alternative to the restitution as fixed Status of the bit.
Min. Pulse duration (ms)	Field enabled only if the "Pulse" option	100	50÷300 step 50	The minimum duration of the alarm pulse of Set Point provided from outside is configured.
Line timeout for failure in data transmission (s)	Field enabled only if the "Alarm" option	Not applied	10÷60 step 1 Not applied	It allows defining the Timeout besides which, if the Center does not send a Set Point update, the same is declared invalid.
Max. Variation accepted (%)	Field enabled only if the "Alarm" option	100	1÷100 step 1	It allows configuring the maximum variation that can be allowed as Set Point command expressed as % of limit. If STCE equipment receives a Set Point value different from the current value for a quantity greater than the configured one, this is ignored and it is not set on field.

Table 5-101 – Configuration of the Digital Set Point to Local I/O

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5.7.10 To Local – Analog Set Point

This option can be reached selecting *Control Direction* item of the main menu, *To Local* and then *Analog Set Point*.

By this Technical Card, it is then possible to configure or modify the configuration of the *Analog Set Points* set to the field by 8 Optoinsulated Analog Output (*8 OAO*) card.

This functionality allows setting to field an analog value destined to pilot an instrument or a local equipment.

At configuration level, it is possible to associate, to each analog output, a digital output (*Validation Criterion*) that can assume, alternatively, one of the following meanings:

- *Local Alarm.* The alarm bit can be activated in case of missed refresh of Set Point by the Center within a configured interval, or in case of a Set Point value received from Center, whose difference respect to the previous updating, is greater than a configured value.

- *Valid Data.* The bit of valid data can be set on field as status or strobe pulse of configurable duration.

The Set Point Commands coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Set Point Command, Normalized Value (C_SE_NA_1).

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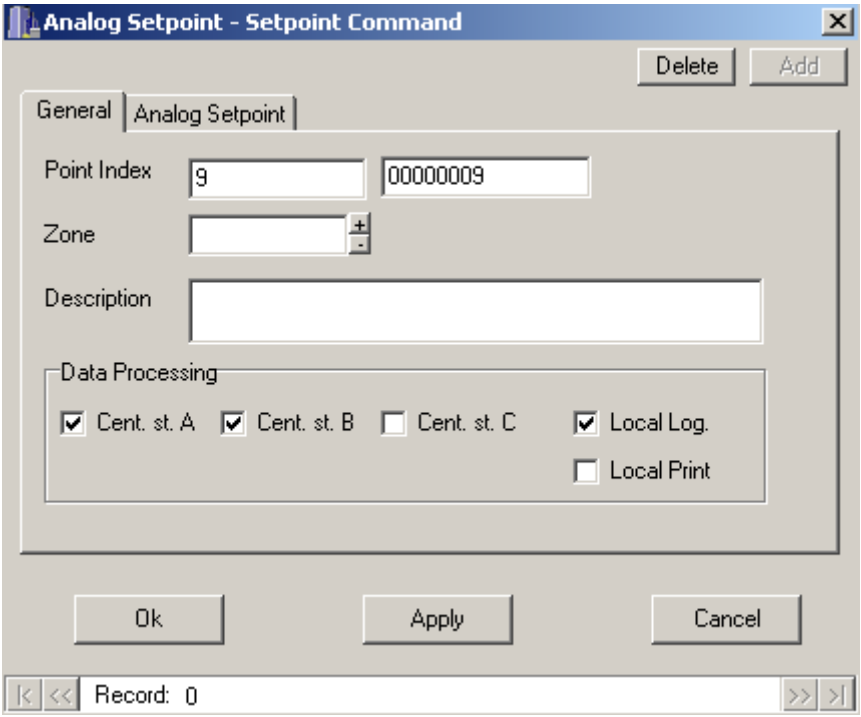

Figure 5-149 - Analog Set Point to Local I/O – General

Analog Set Point				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) of the Analog Set Point. This field is mandatory.
Zone	None	Blank	1÷32 step 1 Blank (not used)	It allows to associate the Set Point remote command to a *Plant Zone*. When the Plant Zone is not used, it means that no interblock is executed on the request of Set Point execution by the different Centers (depending on Local/Remote Command status).
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment.
Data Processing				
For the treatment of the quantity, refer to par. 5.7.1.				

Table 5-102 – Configuration of Analog Set Point to Local I/O

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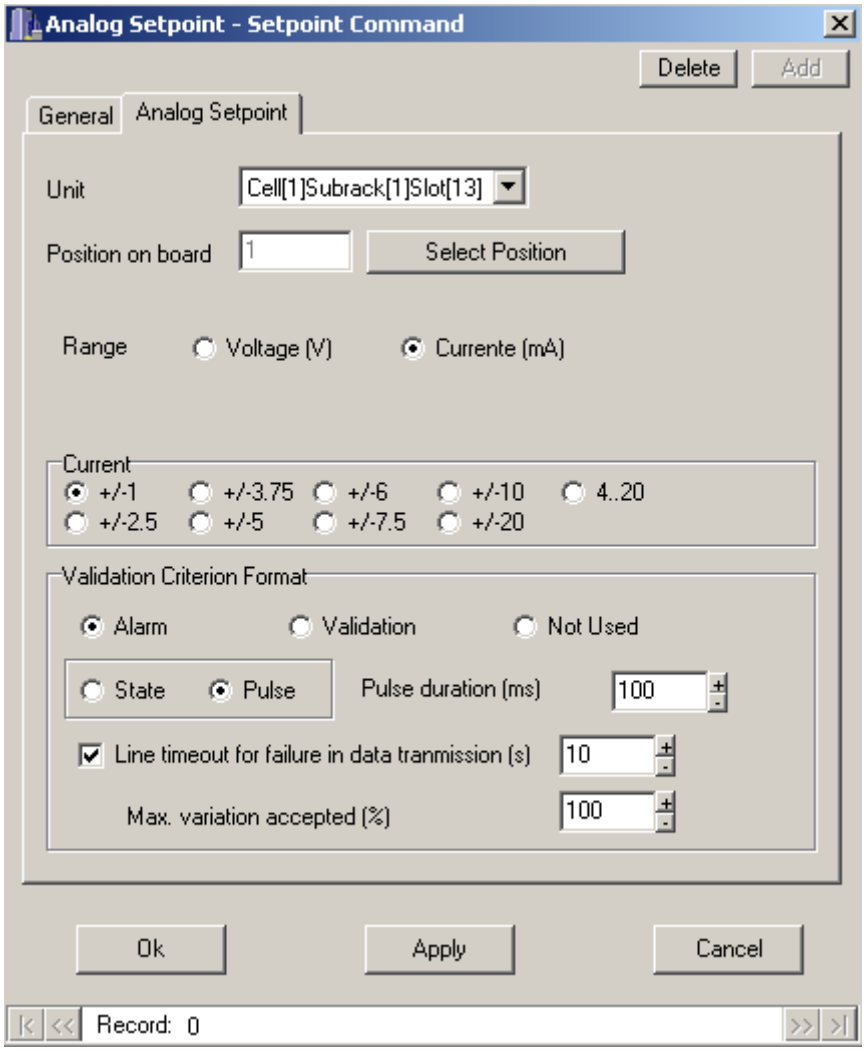

Figure 5-150 - Analog Set Point to Local I/O

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Analog Set Point				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
Unit	None	Blank	List of 8OAO cards inserted durinf the configuration in format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Analog Set Point. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the card already configured in "Equipment" session and of 8OAO type). The field is mandatory
Position on board	None	Blank	0÷7	The field displays the index of the physical input, on the selected board, which the Set Point is connected to. Note: the digital output associated to the Set Point to restitute the *Validation Criterion* is automatically chosen by the program: the output digital 1 corresponds to the analog output 1 and so on. The selection of the physical input on the board is issued pressing the "Select position .." button and proceeding as described in paragraph 5.6.2
Range	None	Voltage (V) ±1	Voltage (V): ±1, ±2.5, ±3.75, ±5, ±7.5, ±10 Current (mA): ±1, ±2.5, ±3.75, ±5, ±6, ±7.5, ±10, ±20, 4÷20	It allows defining the electric input type of the measure: in tension or in current. It also allows defining the lower bound value that depends on the selected input type
Validation criterion parameters – Validation (default)				
State	Field enabled only if the "Validation" option is selected and the criterion is set as *Status*	Disabled	Enabled/Disabled	It allows defining that the *Validation Criterion* assumes the meaning of "Valid Set Point" and it is set on field as *Status.* When the "Valid Set Point" criteria is restituted as STATUS, the following rule is applied: the condition of valid Set Point corresponds to the CLOSED output contact (considering that the solid state relè in absence of voltage is surely OPEN).
Pulse	Field enabled only if the "Validation" option is selected and the criterion is set as *Pulse*	Enabled	Enabled/Disabled	It allows defining that the *Validation Criterion* assumes the meaning of "Valid Set Point" and it is set on field as *Pulse.* The restitution of the criterion as Pulse is alternative to the restitution as fixed Status of the bit. When the "Valid Set Point" criterion is restituted as PULSE, the following rule is applied: the Valid Set Point condition is triggered by a pulse provided with the passage from OPEN status to CLOSED status for a configured period.
Pulse duration (ms)	Field enabled only if the "Pulse" option	100	50÷300 step 50	The minimum duration of the validation pulse of Set Point is configured.

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Analog Set Point				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
Validation criterion format – Alarm				
State	Field enabled only if the “Alarm” option is selected and the criterion is set as *Status*	Disabled	Enabled/Disabled	It allows defining that the *Validation Criterion* assumes the meaning of “Invalid Set Point Alarm” and it is set on field as *Status.*
Pulse	Field enabled only if the “Alarm” option is selected and the criterion is set as *Pulse*	Enabled	Enabled/Disabled	It allows defining that the *Validation Criterion* assumes the meaning of “Invalid Set Point Alarm” and it is set on field as *Pulse.* The restitution of the criterion as Pulse is alternative to the restitution as fixed Status of the bit.
Pulse duration (ms)	Field enabled only if the “Pulse” option	100	50÷300 step 50	The minimum duration of the alarm pulse of Set Point provided from outside is configured.
Line timeout for failure in data transmission (s)	Field enabled only if the “Alarm” option	Not applied	10÷60 step 1 Not applied	It allows defining the Timeout besides which, if the Center does not send a Set Point update, the setpoint is declared invalid (“Invalid Set Point Alarm).
Max. Variation accepted (%)	Field enabled only if the “Alarm” option	100	1÷100 step 1	It allows configuring the maximum variation that can be allowed as Set Point command expressed as % of limit. If STCE equipment receives a Set Point value different from the current value for a quantity greater than the configured one, this is ignored and it is not set on field, moreover the setpoint is declared invalid (“Invalid Set Point Alarm).

Table 5-103 – Configuration of Set Point Analog to I/O Local

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5.7.11 To Local – Output Signal

This option can be reached selecting *Control Direction* item of the main menu, *To Local* and then *Output signal*.

By this Technical Card, it is then possible to configure or modify the configuration of the *Output Signal* set to the field by 64 Optoinsulated Digital Output (*64 ODO*) card.

This functionality allows setting on field a bit configuration coming from Center.

Single, double and multiple signals are treated at the same time. The multiple signals, composed by homogeneous set of bit (from 2 to 32 depending on configuration), are set to the field respecting the limits of contemporaneity.

At configuration level, it is possible to associate, to the set of bits received from Center, an additional digital output that assumes the meaning of *Valid Data*. The bit of valid data can be set on field as status or as strobe pulse with configurable duration.

The Output Signals coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Bitstring of 32 bit (C_BO_NA_1).

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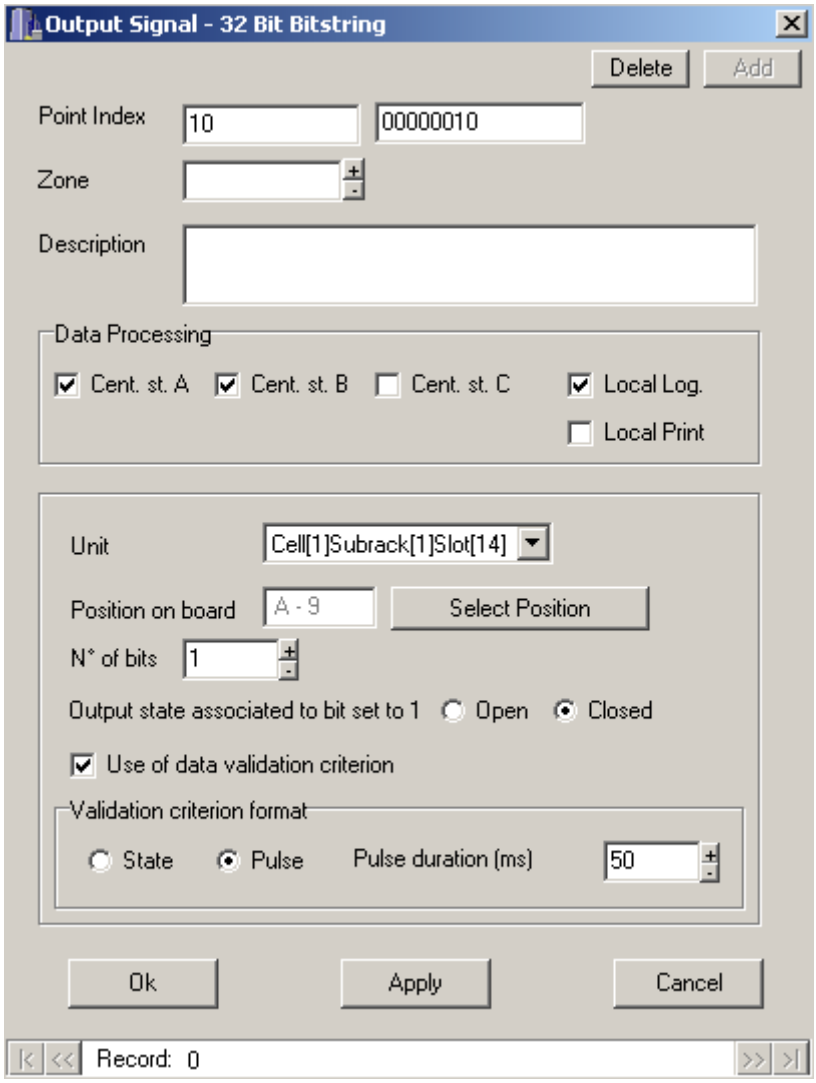

Figure 5-151 – Output signals to Local I/O

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Output Signals				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) of the Bit String. This field is mandatory.
Zone	None	Blank	1÷32 step 1 Blank (not used)	It allows to associate the Bit String remote command to a *Plant Zone*. When the Plant Zone is not used, it means that no interblock is executed on the request of Set Point execution by the different Centers (depending on Local/Remote Command status).
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment.
Data Processing				
For the treatment of the quantity, refer to par. 5.7.1.				
Unit	None	Blank	List of 64ODO cards inserted during the configuration in format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Digital Set Point. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the card already configured in “Equipment” session and of 64ODO type). The field is mandatory
N° of bits	None	Blank	1÷32 step 1	Number of bits to set on field. The total number of bits to set is given by the number of configured bits plus one for the restitution of the *Validation Criterion*. The program automatically configures the *Validation Criterion* before all the other ones. Even if the *Validation Criterion* is not used, the corresponding bit is not allocated.
Position on board	None	Blank	A1÷An B1÷Bn where “n” stands for the higher index which the first byte of the Set Point can be connected to, considering that all the configured bits plus one must be connected to the remaining bits (up to 63)	The field displays the index of the physical input, on the selected board, which the first digital constituting the bit set. Note: the first selected digital (that with lowest index among those constituting the bit set) is always used to set the *Validation Criterion*. (if configured) The selection of the physical input on the board is issued pressing the “Select position ..” button and proceeding as described in paragraph 5.6.2
Output state associated to bit set to 1	None	Closed	Open Closed	It allows configuring the physical status (Open or Closed) that is associated to the single output in correspondence to logic value 1. The configured status is the same for all the bits of the string.

Validation criterion format

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Output Signals				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
State	Field enabled only if the "Validation" option is selected and the criterion is set as *Status*	Disabled	Enabled/Disabled	It allows defining that the *Validation Criterion* assumes the meaning of "Valid Set Point" and it is set on field as *Status.* When the "Valid Set Point" criteria is restituted as STATUS, the following rule is applied: the condition of valid Set Point corresponds to the CLOSED output contact (considering that the solid state relè in absence of voltage is surely OPEN).
Pulse	Field enabled only if the "Validation" option is selected and the criterion is set as *Pulse*	Enabled	Enabled/Disabled	It allows defining that the *Validation Criterion* assumes the meaning of "Valid Set Point" and it is set on field as *Pulse.* The restitution of the criterion as Pulse is alternative to the restitution as fixed Status of the bit. When the "Valid Set Point" criterion is restituted as PULSE, the following rule is applied: the Valid Set Point condition is triggered by a pulse provided with the passage from OPEN status to CLOSED status for a configured period.
Min. Pulse duration (ms)	Field enabled only if the "Pulse" option	100	50÷300 step 50	The minimum duration of the validation pulse of Set Point is configured.

Table 5-104 – Configuration of Output Signals to Local I/O

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5.7.12 To Serial – Single Command

This option can be reached selecting *Control Direction* item of the main menu, *To Serial* and then *Single command*.

By this Technical Card, it is then possible to configure or modify the configuration of the *Single Commands* set to the field by one of the serial ports connected to the 4 Serial Channel (*4 SC*) card.

The Single Commands coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Single Command (C_SC_NA_1).

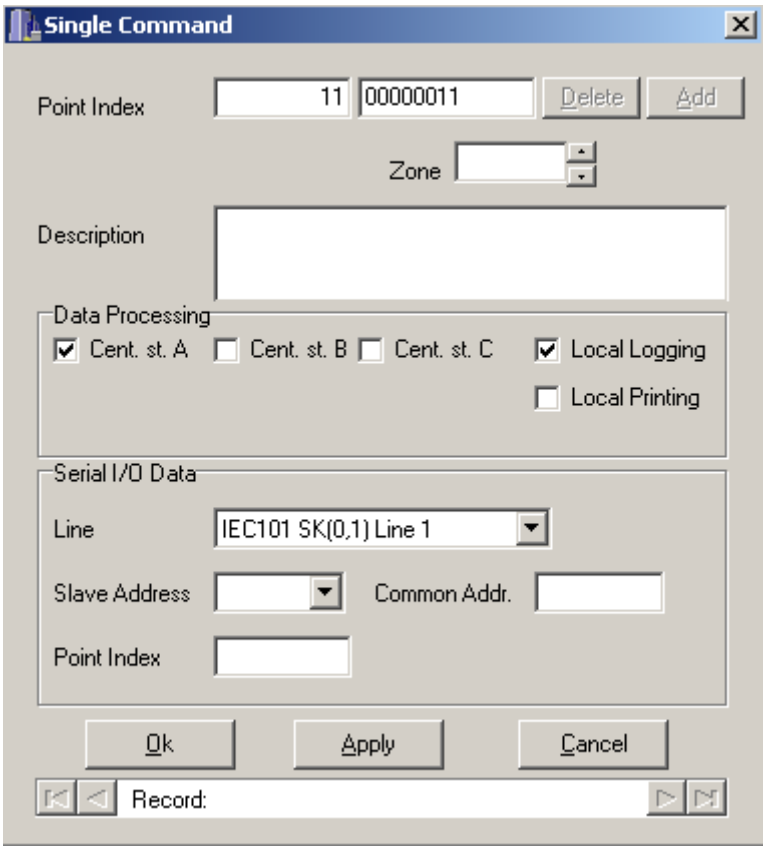

Figure 5-152 – Single Command to Serial I/O

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Single Command to Serial I/O				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) of the Single Command. This field is mandatory.
Zone	None	Blank	1÷32 step 1 Blank (not used)	It allows to associate the Bit String remote command to a *Plant Zone*. When the Plant Zone is not used, it means that no interblock is executed on the request of TC execution by the different Centers (depending on Local/Remote Command status).
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment.
Data Processing				
For the treatment of the quantity, refer to 5.7.1				
Serial I/O Data – to 4SC-SAMP with SAMP protocol				
Line	None	Blank	List of 4SC-SAMP cards inserted during the configuration in format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line which the Single Command is sent to. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the card already configured in “Equipment” session and of 4SC-SAMP type). The field is mandatory
Slave Address	None	Blank	1÷255	It allows configuring the *node* address (Front End STCR) connected to the line. SAMP protocol is of point-multipoint type and therefore allows the management of more nodes connected to the same line. The field is mandatory.
Point Index	None	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. The field is mandatory.
Serial I/O Data – to 4SC-SAMP with SASP protocol				
Line	None	Blank	List of 4SC-SAMP cards inserted during the configuration in format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line which the Single Command is sent to. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the card already configured in “Equipment” session and of 4SC-SAMP type). The field is mandatory
Point Index	None	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. The field is mandatory.
Serial I/O Data – to 4SC-101 and 2SC+ETH with *IEC60870*-5-101 protocol				

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Single Command to Serial I/O				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
Line	None	Blank	List of 4SC-101 **and 2SC+ETH** cards inserted during the configuration in format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line which the Single Command is sent to. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the card already configured in "Equipment" session and of 4SC-101 **and 2SC+ETH** type). The field is mandatory
Slave Address	It depends on the number of octets of Link Address	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows to choose the Data Link Address of the Slave equipment (Station IEC address). The Slave Address can be omitted if the communication modality is *Balanced*. The field is mandatory.
Common Add.	It depends on the number of octets of Link Address	Blank	1÷254 step 1 1÷65534 step 1	It allows to define the ASDU Common Address. **Normally it is set equal to Slave Address.** The field is mandatory.
Point Index	None	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. The field is mandatory.
Serial I/O Data – to 2SC+ETH with IEC60870-5-104 Master Protocol				
Line	None	Blank	List of the **2SC+ETH** cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Telesignal is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in "Equipment" session **and of 2SC+ETH** type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory
RTU Index	None	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the Slave equipment (Station IEC address). This field is mandatory.
Common Add.	None	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of ASDU. **Normally it is set equal to Slave Address.** This field is mandatory.
Point Index	None	Blank	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.

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Single Command to Serial I/O				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
Serial I/O Data – to 4SC-MODBUS with MODBUS-Standard Master Protocol				
Line	None	Blank	List of 4SC-MODBUS STD cards inserted during the configuration in format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line which the Single Command is sent to. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the card already configured in “Equipment” session and of 4SC-MODBUS-Standard type and the lines already configured in *Communications* Section-*Protocol* Subsection). The field is mandatory
Slave Address	None	First node of the list	1÷247	It allows choosing the address of the *node* (Slave Modbus) connected to the line. MODBUS protocol is point-multipoint and then allows the management of more nodes connected to the same line. The program manages the list of Slave nodes already configured for the Modbus protocol in *Protocols* section, *Modbus Channels* subsection. This field is mandatory.
Point Index	Index of the point enclosed in the relevant interval	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. The quantity index must be enclosed in the *Range Single TS* interval configured for the Modbus protocol in the *Protocols* section-*Modbus Channels* subsection The field is mandatory.

Table 5-105 – Configuration of Single Command to Serial I/O

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5.7.13 To Serial – Double Command

This option can be reached selecting *Control Direction* item of the main menu, *To Serial* and then *Double command*.

By this Technical Card, it is then possible to configure or modify the configuration of the *Double Commands* set to the field by one of the serial ports connected to the 4 Serial Channel (*4 SC*) card.

The Double Commands coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Double Command (C_DC_NA_1).

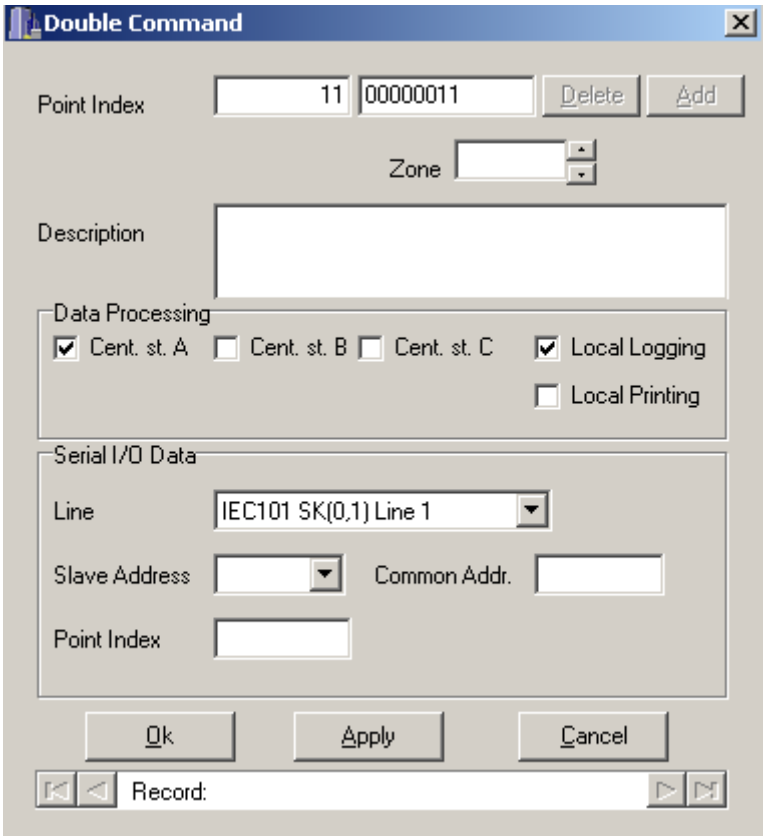

Figure 5-153 – Double Command to Serial I/O

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Double Commands to Serial I/O				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) of the Double Command. This field is mandatory.
Zone	None	Blank	1÷32 step 1 Blank (not used)	It allows to associate the Remote Command to a *Plant Zone*. When the Plant Zone is not used, it means that no interblock is executed on the request of TC execution by the different Centers (depending on Local/Remote Command status).
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment.
Data Processing				
For the treatment of the quantity, refer to 5.7.1				
Serial I/O Data – to 4SC-101 and 2SC+ETH with *IEC60870*-5-101 protocol				
Line	None	Blank	List of 4SC-101 **and 2SC+ETH** cards inserted during the configuration in format: Cell[]Subrack[]Slot[]	It allows configuring the physical connection of the Serial line which the Double Command is sent to. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the card already configured in "Equipment" session and of 4SC-101 **and 2SC+ETH** type). The field is mandatory
Slave Address	It depends on the number of octets of Link Address	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows to choose the Data Link Address of the Slave equipment (Station IEC address). The Slave Address can be omitted if the communication modality is *Balanced*. The field is mandatory.
Common Add.	It depends on the number of octets of Link Address	Blank	1÷254 step 1 1÷65534 step 1	It allows to define the ASDU Common Address. **Normally it is set equal to Slave Address.** The field is mandatory.
Point Index	None	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. The field is mandatory.
Serial I/O Data – to 2SC+ETH with IEC60870-5-104 Protocol				
Line	None	Blank	List of the **2SC+ETH** cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Telesignal is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in "Equipment" session **and of 2SC+ETH** type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory
RTU Index	None	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the Slave equipment (Station IEC address). This field is mandatory.

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Double Commands to Serial I/O				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
Common Add.	None	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of ASDU. **Normally it is set equal to Slave Address.** This field is mandatory.
Point Index	None	Blank	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.
Serial I/O Data – to 4SC-MODBUS with MODBUS-Standard Master Protocol				
Line	None	Blank	List of 4SC-MODBUS STD cards inserted during the configuration in format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line which the Single Command is sent to. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the card already configured in “Equipment” session and of 4SC-MODBUS-Standard type and the lines already configured in *Communications* Section-*Protocol* Subsection). The field is mandatory
Slave Address	None	Blank	1÷247	It allows configuring the *node* address (Front End STCR) connected to the line. The field is mandatory.
Point Index	Index of the point enclosed in the relevant interval	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. The quantity index must be enclosed in the *Range Single TS* interval configured for the l Modbus protocol in the *Protocols* section-*Modbus Channels* subsection The field is mandatory.

Table 5-106 – Configuration of Double Commands to Serial I/O

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5.7.14 To Serial – Step Command

This option can be reached selecting *Control Direction* item of the main menu, *To Serial* and then *Step command*.

By this Technical Card, it is then possible to configure or modify the configuration of the *Step command* set to the field by one of the serial ports connected to the 4 Serial Channel (*4 SC*) card.

The Step Commands coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Regulating Step Command (C_RC_NA_1).

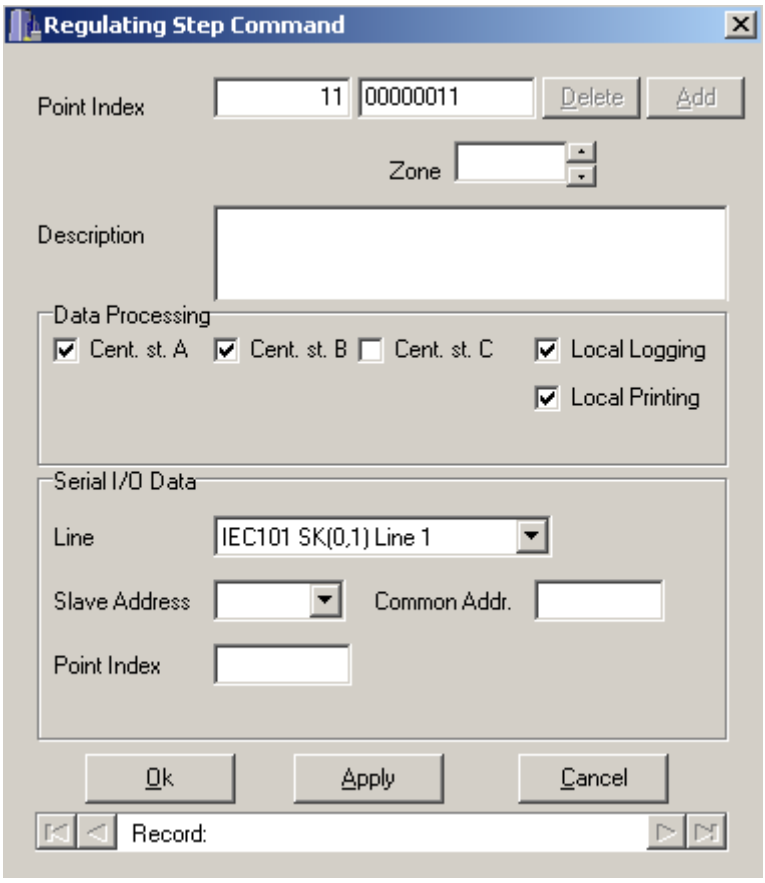

Figure 5-154 – Step Command to Serial I/O

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Step Commands to Serial I/O				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) of the Step Command. This field is mandatory.
Zone	None	Blank	1÷32 step 1 Blank (not used)	It allows to associate the Remote Command to a *Plant Zone*. When the Plant Zone is not used, it means that no interblock is executed on the request of TC execution by the different Centers (depending on Local/Remote Command status).
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment.
Data Processing				
For the treatment of the quantity, refer to5.7.1				
Serial I/O Data – to 4SC-101 and 2SC+ETH with *IEC60870*-5-101 protocol				
Line	None	Blank	List of 4SC-101 **and 2SC+ETH** cards inserted during the configuration in format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line which the Step Command is sent to. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the card already configured in "Equipment" session and of 4SC-101 **and 2SC+ETH** type). The field is mandatory
Slave Address	It depends on the number of octets of Link Address	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows to choose the Data Link Address of the Slave equipment (Station IEC address). The Slave Address can be omitted if the communication modality is *Balanced*. The field is mandatory.
Common Add.	It depends on the number of octets of Link Address	Blank	1÷254 step 1 1÷65534 step 1	It allows to define the ASDU Common Address. **Normally it is set equal to Slave Address.** The field is mandatory.
Point Index	None	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. The field is mandatory.
Serial I/O Data – to 2SC+ETH with IEC60870-5-104 Protocol				
Line	None	Blank	List of the **2SC+ETH** cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Telesignal is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in "Equipment" session **and of 2SC+ETH** type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory
RTU Index	None	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the Slave equipment (Station IEC address). This field is mandatory.

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Step Commands to Serial I/O				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
Common Add.	None	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of ASDU. **Normally it is set equal to Slave Address.** This field is mandatory.
Point Index	None	Blank	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.

Table 5-107 – Configuration of Step Commands to Serial I/O

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5.7.15 To Serial – Output Signal

This option can be reached selecting *Control Direction* item of the main menu, *To Serial* and then *Output Signal*.

By this Technical Card, it is then possible to configure or modify the configuration of the *Output Signal* set to the field by one of the serial ports connected to the 4 Serial Channel (*4 SC*) card.

This function allows setting, on field connected to the serial port, a bit configuration coming from Center; single, double and multiple signals are contemporarily treated.

The Output Signal coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Bitstring of 32 bit (C_BO_NA_1).

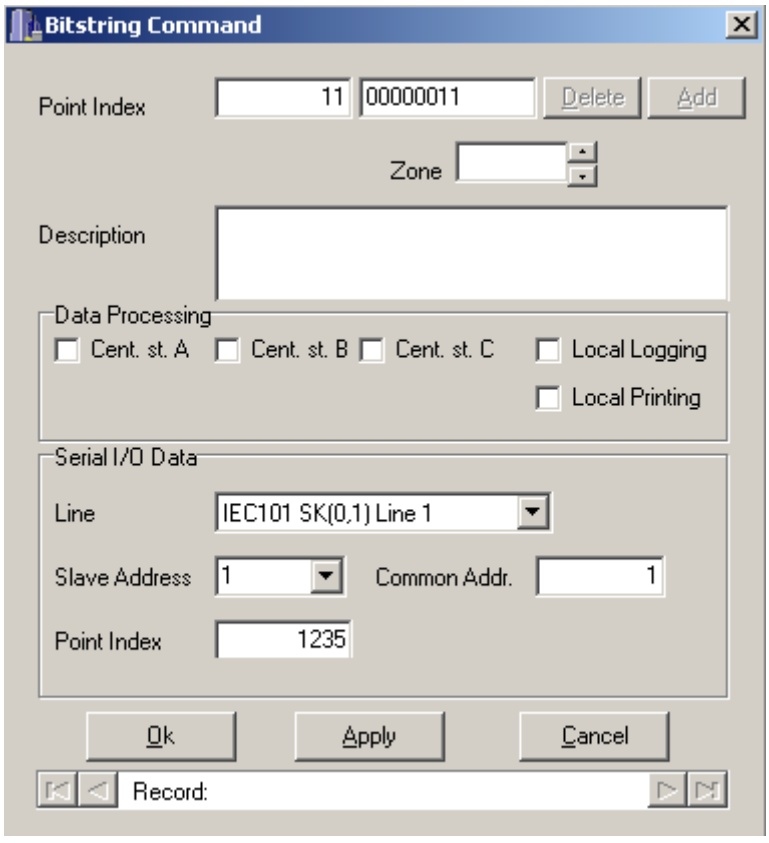

Figure 5-155 – Output Signals to Serial I/O

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Output Signals to Serial I/O				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) of the Single Command. This field is mandatory.
Zone	None	Blank	1÷32 step 1 Blank (not used)	It allows to associate the Remote Command to a *Plant Zone*. When the Plant Zone is not used, it means that no interblock is executed on the request of TC execution by the different Centers (depending on Local/Remote Command status).
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment.
Data Processing				
For the treatment of the quantity, refer to 5.7.1				
Serial I/O Data – to 4SC-SAMP with SAMP protocol				
Line	None	Blank	List of 4SC-SAMP cards inserted during the configuration in format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line which the Output Signal is sent to. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the card already configured in “Equipment” session and of 4SC- SAMP type). The field is mandatory
Slave Address	None	Blank	1÷255	It allows configuring the *node* address (Front End STCR) connected to the line. SAMP protocol is of point-multipoint type and therefore allows the management of more nodes connected to the same line. The field is mandatory.
Point Index	None	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. The field is mandatory.

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Single Command to Serial I/O				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
Serial I/O Data – to 4SC-SAMP with SASP protocol				
Line	None	Blank	List of 4SC-SAMP cards inserted durinf the configuration in format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line which the Output Signal is sent to. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the card already configured in “Equipment” session and of 4SC- SAMP type). The field is mandatory
Point Index	None	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. The field is mandatory.
Serial I/O Data – to 4SC-101 and 2SC+ETH with *IEC60870*-5-101 protocol				
Line	None	Blank	List of 4SC-101 **and 2SC+ETH** cards inserted during the configuration in format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line which the Output Signal is sent to. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the card already configured in “Equipment” session and of 4SC- 101 **and 2SC+ETH t**ype). The field is mandatory
Slave Address	It depends on the number of octets of Link Address	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows to choose the Data Link Address of the Slave equipment (Station IEC address). The Slave Address can be omitted if the communication modality is *Balanced*. The field is mandatory.
Common Add.	It depends on the number of octets of Link Address	Blank	1÷254 step 1 1÷65534 step 1	It allows to define the ASDU Common Address. **Normally it is set equal to Slave Address.** The field is mandatory.
Point Index	None	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. The field is mandatory.
Serial I/O Data – to 2SC+ETH with IEC60870-5-104 Protocol				
Line	None	Blank	List of the **2SC+ETH** cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Telesignal is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in “Equipment” session **and of 2SC+ETH** type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory
RTU Index	None	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the Slave equipment (Station IEC address). This field is mandatory.

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Single Command to Serial I/O				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
Common Add.	None	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of ASDU. **Normally it is set equal to Slave Address.** This field is mandatory.
Point Index	None	Blank	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.

Table 5-108 – Configuration of Output Signals to Serial I/O

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5.7.16 To Serial – Set Point

This option can be reached selecting *Control Direction* item of the main menu, *To Serial* and then *Set Point*.

By this Technical Card, it is then possible to configure or modify the configuration of the *Set Point* set to the field by one of the serial ports connected to the 4 Serial Channel (*4 SC*) card.

This function allows setting, on field connected to the serial port, an analog value destined to pilot an instrument or a local equipment.

The Set Point Commands coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Set Point Command, Normalized Value (C_SE_NA_1).

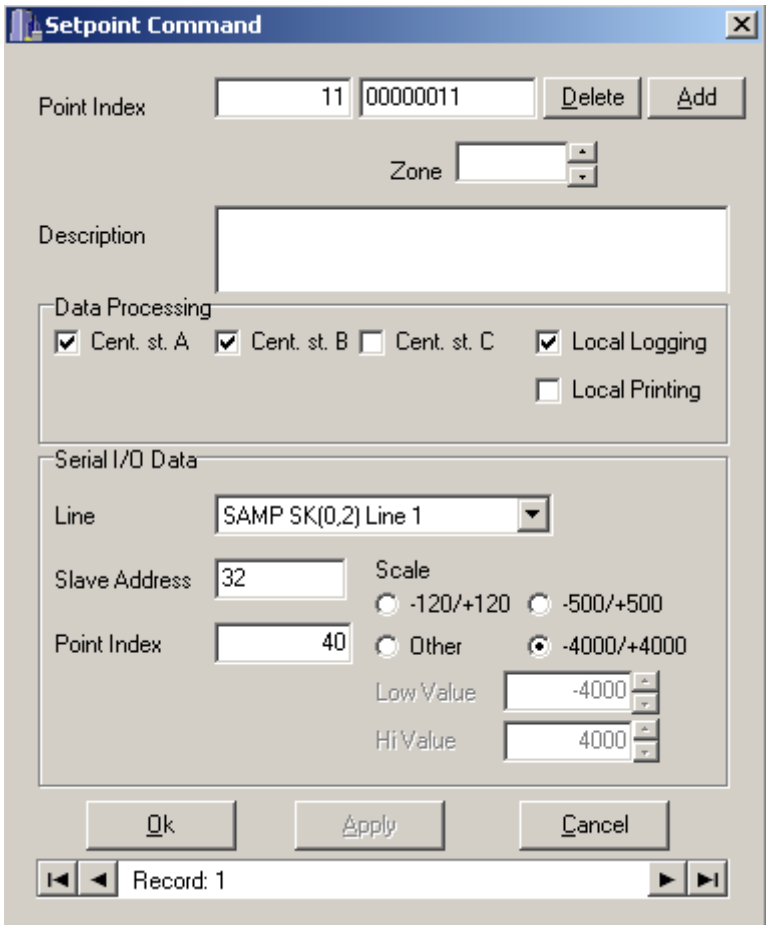

Figure 5-156 – Set Point to Serial I/O

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Set Point to Serial I/O				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) of the Set Point. This field is mandatory.
Group	None	Blank	1÷16 step 1 Blank	It allows configuring a possible belonging IEC Group to allow the acquisition, by Center, by means of Group query.
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment.
Data Processing				
For the treatment of the quantity, refer to 5.7.1				
Serial I/O Data – to 4SC-SAMP with SAMP protocol				
Line	None	Blank	List of 4SC-SAMP cards inserted durinf the configuration in format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line which the Set Point is sent to. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the card already configured in “Equipment” session and of 4SC- SAMP type). The field is mandatory
Slave Address	None	Blank	1÷255	It allows configuring the *node* address (Front End STCR) connected to the line. SAMP protocol is of point-multipoint type and therefore allows the management of more nodes connected to the same line. The field is mandatory.
Samp Index	None	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. The field is mandatory.
Scale	None	-4000÷+4000	-120÷+120 -500÷+500 -4000÷+4000 Low Value÷High Value	It allows configuring the bound of the conversion line to apply to the analog quantities to sent to Front End STCR. See note and following figure.
Serial I/O Data – to 4SC-SAMP with SASP protocol				
Line	None	Blank	List of 4SC-SAMP cards inserted during the configuration in format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line which the Set Point is sent to. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the card already configured in “Equipment” session and of 4SC- SAMP type). The field is mandatory
Point Index	None	Blank	1÷65535	It allows configuring the two indexes used to individuate the two digitals within the protocol. The two acquired digitals contributes to the state of Double Signal. These fields are mandatory.

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Set Point to Serial I/O				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
Scale	None	-4000÷+4000	-120÷+120 -500÷+500 -4000÷+4000 Low Value÷High Value	It allows configuring the bound of the conversion line to apply to the analog quantities to sent to Front End STCR. See note and following figure.
Serial I/O Data – to 4SC-101 and 2SC+ETH with *IEC60870*-5-101 protocol				
Line	None	Blank	List of 4SC-101 **and 2SC+ETH** cards inserted during the configuration in format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line which the Set Point is sent to. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the card already configured in "Equipment" session and of 4SC- 101 **and 2SC+ETH** type). The field is mandatory
Slave Address	It depends on the number of octets of Link Address	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows to choose the Data Link Address of the Slave equipment (Station IEC address). The Slave Address can be omitted if the communication modality is *Balanced*. The field is mandatory.
Common Add.	It depends on the number of octets of Link Address	Blank	1÷254 step 1 1÷65534 step 1	It allows to define the ASDU Common Address. **Normally it is set equal to Slave Address.** The field is mandatory.
Point Index	None	Blank	1÷65535	It allows configuring the index used to individuate the quantity inside the protocol. The field is mandatory.
Serial I/O Data – to 2SC+ETH with IEC60870-5-104 Protocol				
Line	None	Blank	List of the **2SC+ETH** cards inserted during configuration, presented in the format: PROT Subrack[]Line	It allows configuring the physical connection of the Serial line, which the Telesignal is acquired from. The program displays, in a pulldown menu, the list of cards inserted during equipping to allow a choice (the program shows only the cards already configured in "Equipment" session **and of 2SC+ETH** type and the lines already configured in *Communication* section, *Protocols* subsection). This field is mandatory
RTU Index	None	Blank	Blank 1÷254 step 1 1÷65534 step 1	It allows choosing the Data Link address of the Slave equipment (Station IEC address). This field is mandatory.
Common Add.	None	Blank	1÷254 step 1 1÷65534 step 1	It allows defining the Common Address of ASDU. **Normally it is set equal to Slave Address.** This field is mandatory.
Point Index	None	Blank	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the index used to individuate the quantity inside the protocol. This field is mandatory.

Table 5-109 – Configuration of Set Point to Serial I/O

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Note: In the conversion of the analog information, which are transported if normalized format (from –32768 to +32767) on the internal Bus inside the STCE/RTU equipment, it is necessary to apply a series of conversion lines that take in account the different coding modalities, in *Count,* applied by STCR-C and STCR-T Front Ends.

This conversion line must, generally, be configured; that is, the following correspondences must be configured:

- 100% of Limit of the quantity in count must coincide with the 100% of the normalized value (+32767);
- 0% of Limit of the quantity in count must coincide with 0% of the normalized value (-32768).

It is necessary to consider the difference of coding in Count of the quantity between the STCR-C equipment and the STCR-C equipment; this too is adjusted at coding level as more clearly displayed in the following figure.

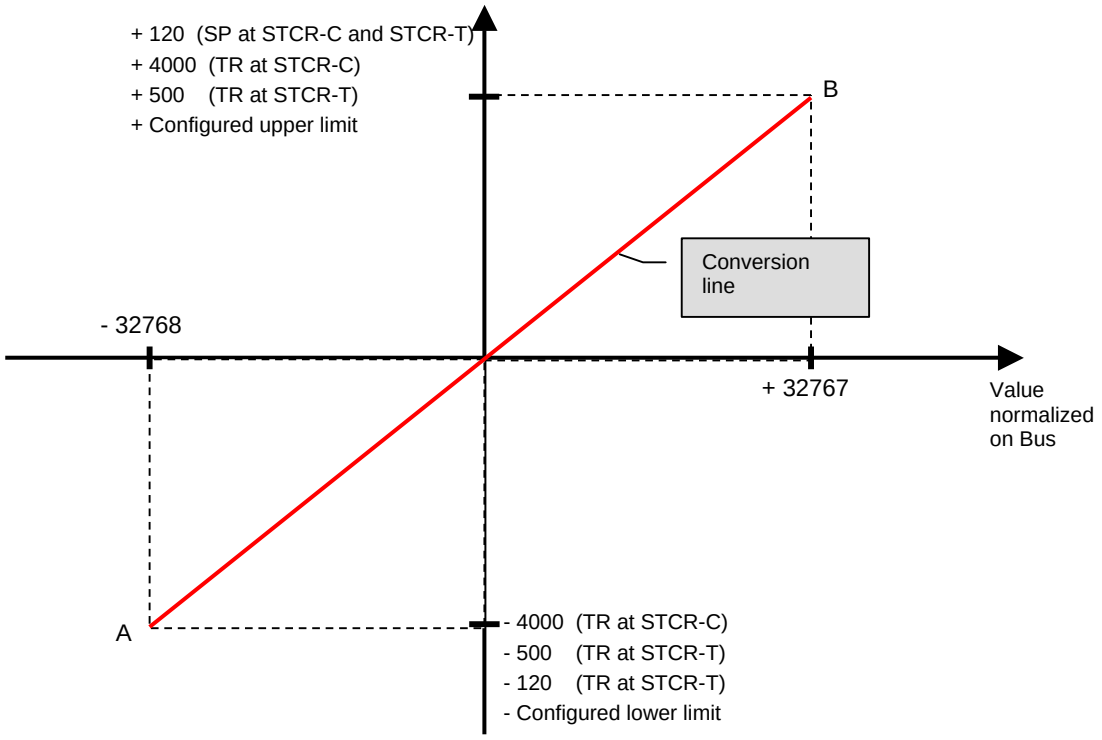

Figure 5-157 – Conversion of information in Control Direction at F/E STCR

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5.7.17 To Automation – Single Command

This option can be reached selecting *Control Direction* item of the main menu, *To Automation* and then *Single Command*.

By this Technical Card, it is then possible to configure or modify the configuration of the *Single Command* directly destined to the Local Automations (PLC performances) configured on CPU2000 Central Unit. This point is therefore not sent to the Local or Serial I/O, but it is used as service command for an elaboration or a logic inside to CPU2000.

The Single Commands coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Single Command (C_SC_NA_1).

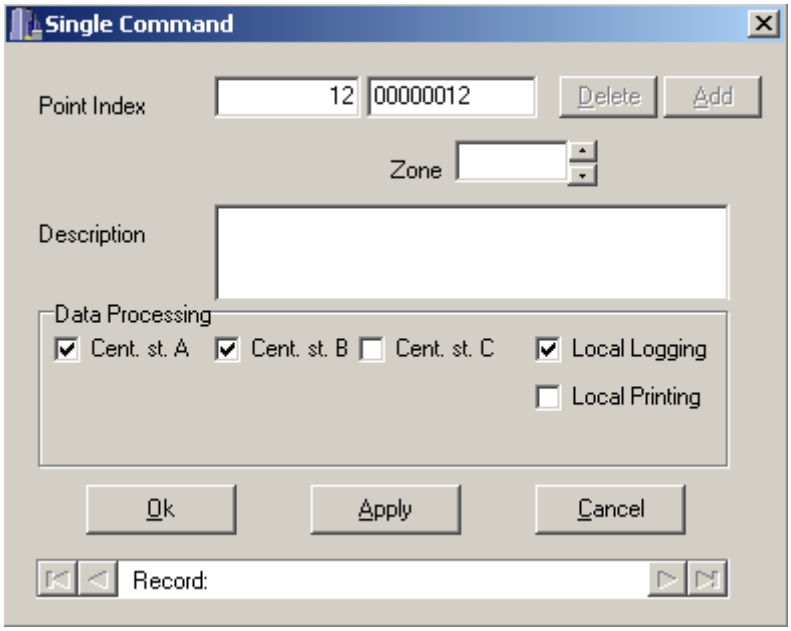

Figure 5-158 – Single Command to Automation

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Single Commands to Automation				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
Point Index	None	First available index	1÷254 step 1 1÷65534 step 1 1÷16777214 step 1	It allows configuring the IEC (Information Object Address) of the Single Command. This field is mandatory.
Zone	None	Blank	1÷32 step 1 Blank (not used)	It allows to associate the Remote Command to a *Plant Zone*. When the Plant Zone is not used, it means that no interblock is executed on the request of TC execution by the different Centers (depending on Local/Remote Command status).
Description	None	Blank	34 alphanumeric characters Blank	Description associated to the quantity. The Description field is not transferred to the equipment.
Data Processing				
For the treatment of the quantity, refer to 5.7.1				

Table 5-110 – Configuration of Single Command to Automation

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5.7.18 To Automation – Double Command

This option can be reached selecting *Control Direction* item of the main menu, *To Automation* and then *Double Command*.

By this Technical Card, it is then possible to configure or modify the configuration of the *Double Command* directly destined to the Local Automations (PLC performances) configured on CPU2000 Central Unit. This point is therefore not sent to the Local or Serial I/O, but it is used as service command for an elaboration or a logic inside to CPU2000.

The Double Commands coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Double Command (C_DC_NA_1).

As for the management of the point destined only to Automation is sufficient to know the IEC (Information Object Address) index assigned to it, the reference form for its configuration is the same of Figure 5-158 and the corresponding description is that of Table 5-110.

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5.7.19 To Automation – Step Command

This option can be reached selecting Control Direction item of the main menu, To Automation and then Step Command.

By this Technical Card, it is then possible to configure or modify the configuration of the Step Command directly destined to the Local Automations (PLC performances) configured on CPU2000 Central Unit. This point is therefore not sent to the Local or Serial I/O, but it is used as service command for an elaboration or a logic inside to CPU2000.

The Step Commands coincide, at IEC60870-5-101 and IEC60870-5-104 line protocol level, with the Regulating Step Command (C_RC_NA_1).

As for the management of the point destined only to Automation is sufficient to know the IEC (Information Object Address) index assigned to it, the reference form for its configuration is the same of Figure 5-158 and the corresponding description is that of Table 5-110.

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5.7.20 To Automation – Output Signal

This option can be reached selecting *Control Direction* item of the main menu, *To Automation* and then *Output Signal*.

By this Technical Card, it is then possible to configure or modify the configuration of the *Output Signal* directly destined to the Local Automations (PLC performances) configured on CPU2000 Central Unit. This point is therefore not sent to the Local or Serial I/O, but it is used as service command for an elaboration or a logic inside to CPU2000.

The Output Signals coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Bitstring of 32 bit (C_BO_NA_1).

As for the management of the point destined only to Automation is sufficient to know the IEC (Information Object Address) index assigned to it, the reference form for its configuration is the same of Figure 5-158 and the corresponding description is that of Table 5-110.

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5.7.21 To Automation – Set Point

This option can be reached selecting *Control Direction* item of the main menu, *To Automation* and then *Set Point*.

By this Technical Card, it is then possible to configure or modify the configuration of the *Set Point* directly destined to the Local Automations (PLC performances) configured on CPU2000 Central Unit. This point is therefore not sent to the Local or Serial I/O, but it is used as service command for an elaboration or a logic inside to CPU2000.

The Set Point Commands coincide, at *IEC60870*-5-101 and *IEC60870*-5-104 line protocol level, with the Set Point Command, Normalized Value (C_SE_NA_1).

As for the management of the point destined only to Automation is sufficient to know the IEC (Information Object Address) index assigned to it, the reference form for its configuration is the same of Figure 5-158 and the corresponding description is that of Table 5-110.

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5.8 SERVICES

5.8.1 Find …

This option can be reached selecting the *Services* item of the main menu and then *Find*….

This function allows executing searches on the configuration data already present in the configuration Database.

The form displayed on video provides two different sections that can be accessed by Tab Controls: one, more general, that allows detailed search on the stored data (*Find*) and the other that allows displaying the stored information in summarized format (*Resume*).

The operation available by *Find* Tab Control allows executing a search that can be aimed setting a series of filters before the operation itself.

The available filters are related to:

- type of quantity
- type of I/O card

The result of a search is displayed in a proper window and can be exported (*Export* function) to a Microsoft Excel format file (extension *.CSV*).

> Note: The file in Excel format, generated by Export function, must not be opened by a “double click” on its icon, because the subdivision of fields in columns won’t be correctly managed. It is necessary before running the Excel program and then, from inside, open the file.

Copy function (as <Ctrl><C>) allows to copy a set of selected rows; the next opening of Excel allows, after the selection of a cell, to paste the selected rows by <Ctrl><V>, and obtain the columns formatting.

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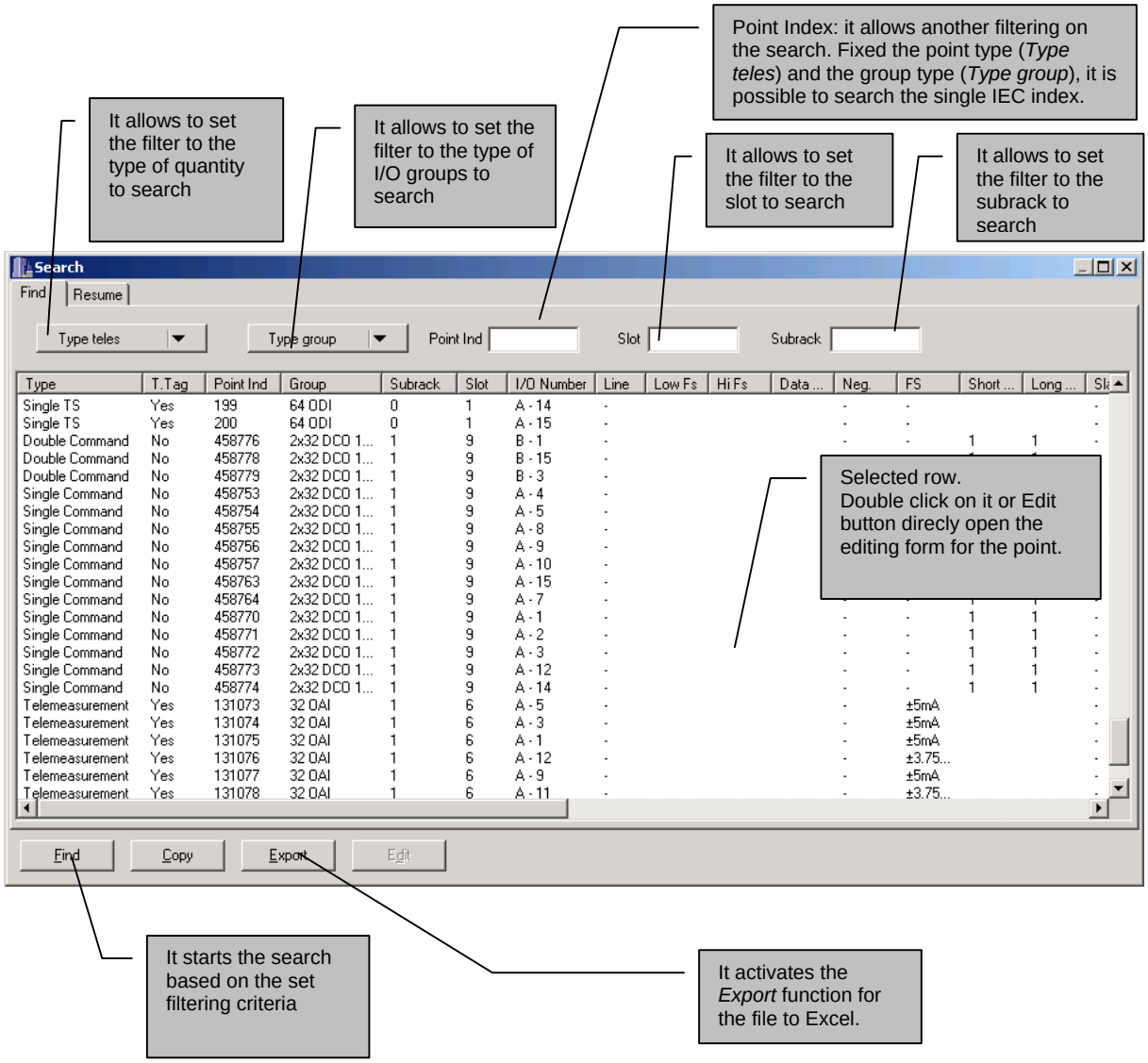

Figure 5-159 – Search of the configured information

The *Edit* function allows opening directly the Editing form for the selected point of the list. From the opened form, it is possible to set possible modifications to the point configuration.

Edit function is not active for the Diagnostic points of the cards.

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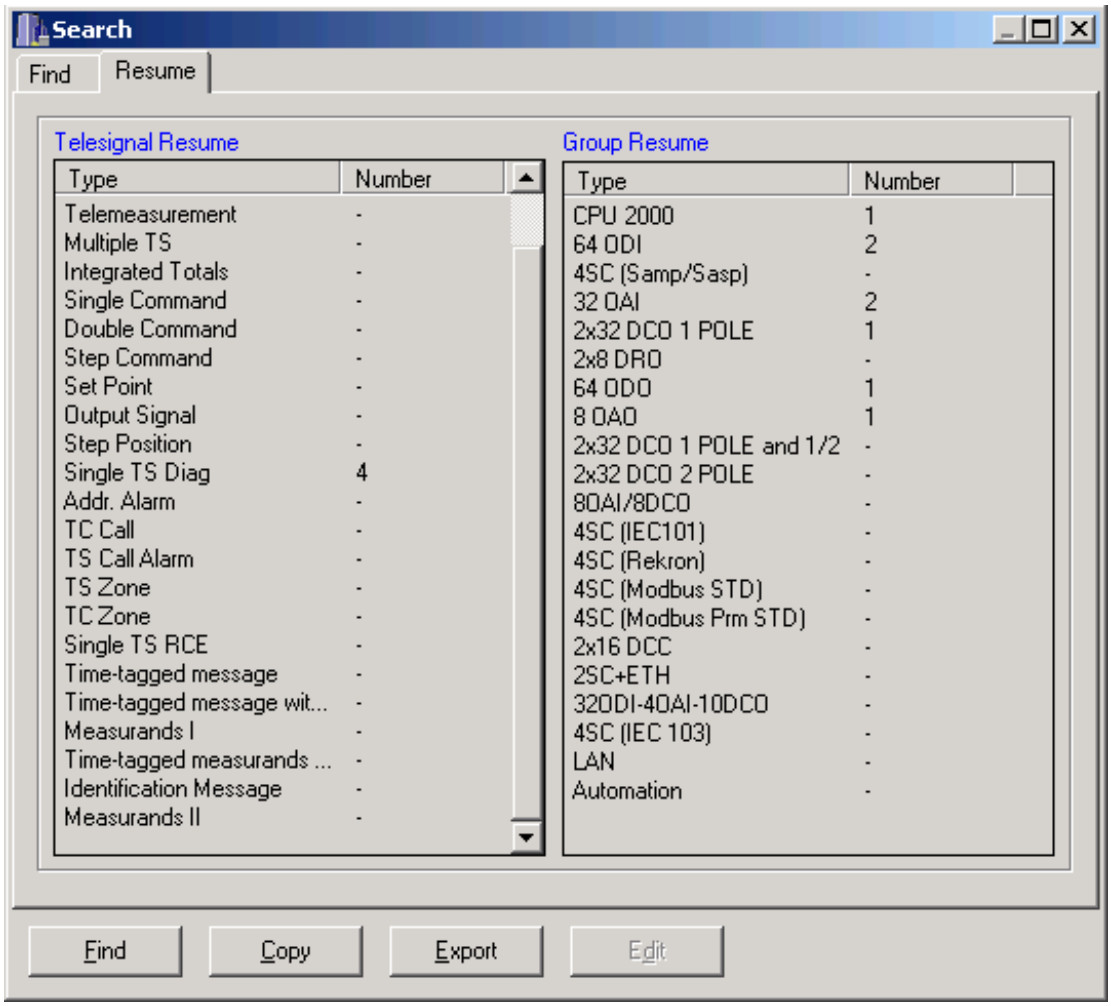

Figure 5-160 – Summary information

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5.8.2 Power Consumption

This option can be reached selecting the *Services* item of the main menu and then *Power Consumption.*

This function provides the power consumption of the equipment according the the set configuration.

As result of the operation, the program provides a summary window that reports, as fixed data, the current (in mA) that the DC/DC converter is able to provide for each voltage (+5 Vcc, +12 Vcc, -12 Vcc and + 24 Vcc) and the given power consumption for each card type and input/output point type.

The currents provided to the cards are reported with negative sign because they have to be considered, from algebraic point of view, as current values to be subtracted from the available total amount.

The program, on the basis of the data above described, calculates the total power consumption foresees for each voltage and, then, depending on this, it calculates the total power provided by the converter.

Considering the converter efficiency, the program calculates the total absorbed power by the main power supply.

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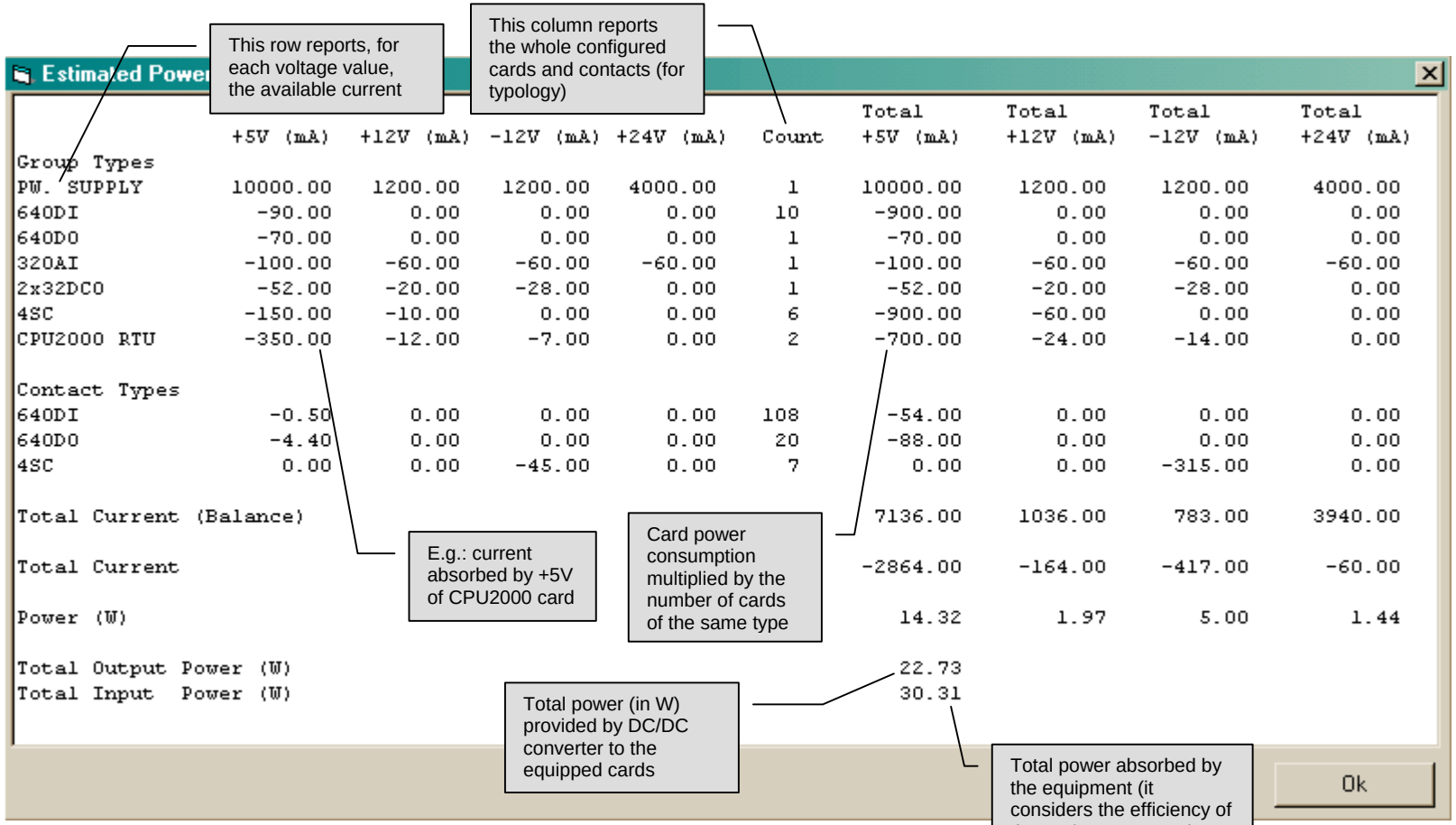

Figure 5-161 – Total consumption

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5.8.3 Modify Password

This option can be reached selecting the *Services* item of the main menu and then *Modify Password*.

This performance allows the user to modifying the program access password.

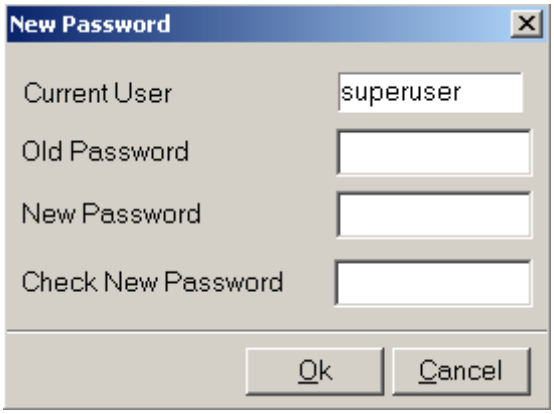

Figure 5-162 – Modify Password

Modify Password				
FIELD NAME	**DEPENDENCE**	**I.V..**	**P.V.**	**DESCRIPTION**
Current User	None	Access level (*user* or *superuser*)	user superuser	The field is read only, it displays the user level indication used to enter the program
Old Password	None	Blank	Max. 9 alphanumeric characters	The same password used to enter the program is edited. The password modification is allowed to who knows the current password only.
New Password	None	Blank	Max. 9 alphanumeric characters	The new password used to enter the program is edited (it becomes active at the next access to the program)
Check New Password	None	Blank	Max. 9 alphanumeric characters	The new password must be edited to allow the program to verify its correctness. The program notify if the reedited password is different from that inserted in the precedent field.

Table 5-111 - Modify Password

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5.8.4 Download Conf.

This option can be reached selecting the *Services* item of the main menu and then *Modify Password*.

The performance allows to recall the DownloadRTU or DownloadRTU-PSTN program, depending on the initial choice in the New window.

This program presents two principal functions:

- Download: it allows transmitting to a STCE/RTU equipment a plan configuration present on the PC
- Upload: it allows transferring to PC the configuration present on STCE/RTU equipment.

For more details see the specific CONFIGURATION DOWNLOAD AND UPLOAD chapter 7.

5.8.5 MonitorRTU

This option can be reached selecting the *Services* item of the main menu and then *MonitorRTU*.

The performance allows to recall the Monitor RTU program to consult, in real time, the information related to the equipment state.

For more details see the specific MONITOR chapter 8.

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5.9 HELP

5.9.1 About …

This option can be reached selecting the Help item of the main menu and then *About….*

This option allows displaying some general information about the program, as the version and the identifying Selta code.

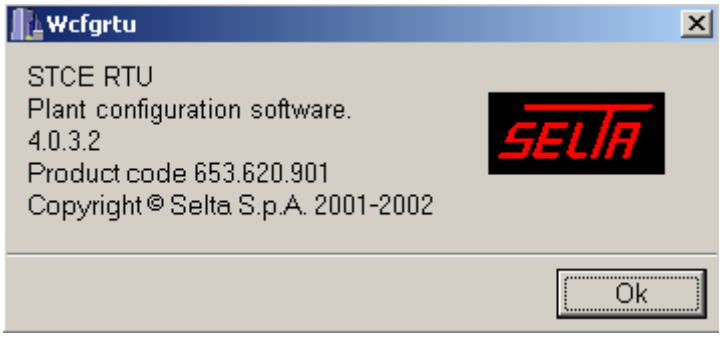

Figure 5-163 – Information about the program

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6. AGGIMP

Contextually to the configuration program, through the application Setup the tool of database conversion, called Aggimp, is installed on the terminal of maintenance. Such application allows the updating, to the current format, of configuration files created with precedents configuration software.

To start the program click on the "*Selta WCfgStceRTU*" group of the "Avvio/Programmi" menu and select the "A*ggimp*" option.

A simple window appears, in which it is possible reading informative data about the program.

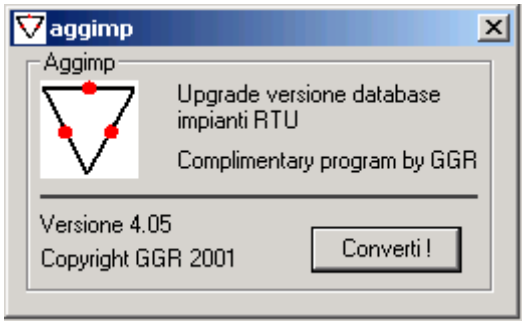

Figure 6-1 – Aggimp program start window

In this window you can see the *Converti!* Button; if you press it, a window of file searching appears, to select the configuration database of the plant you want to update.

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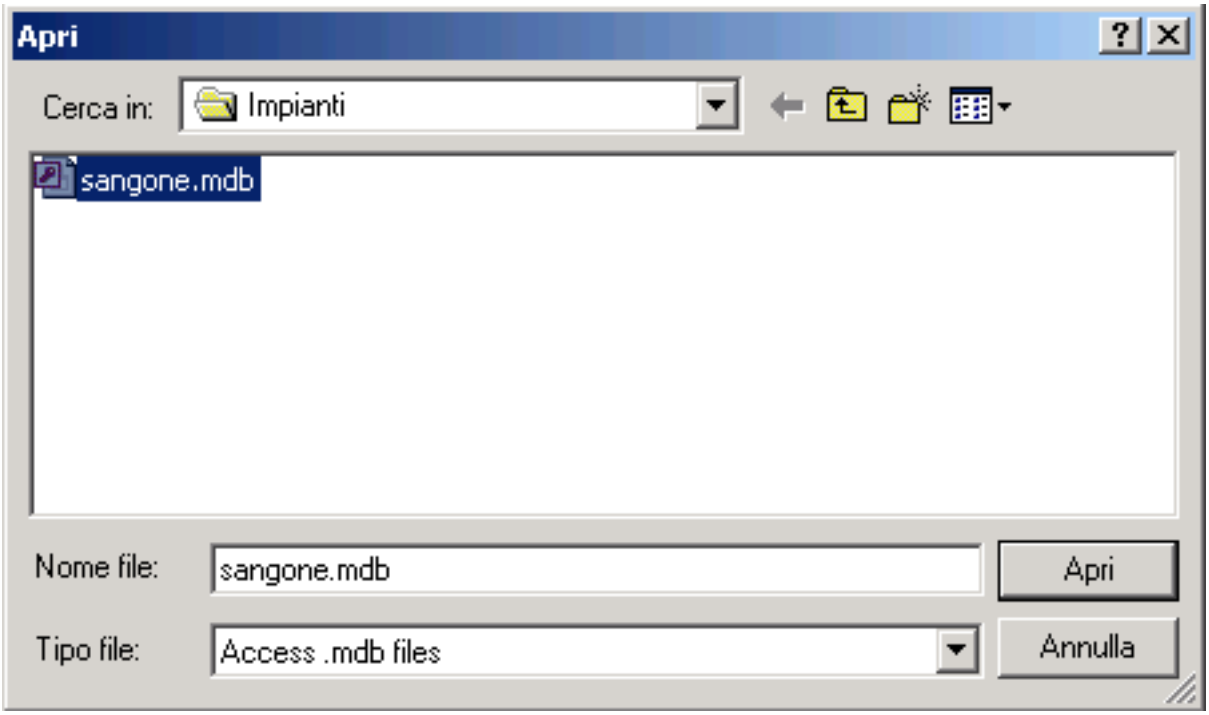

Figure 6-2 – Plant configuration file selection window

Through such window of search, once the database in old format of which is wanted to effect the conversion is selected, pressing the key Apri the conversion of the selected file is automatically started.

At the end of the conversion a confirmation window of the executed operation appears.

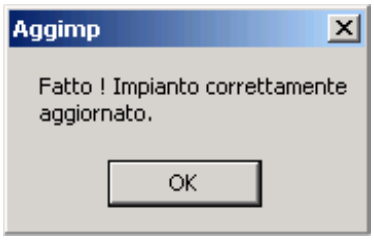

Figure 6-3 – Confirmation window of executed conversion

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7. CONFIGURATION DOWNLOAD AND UPLOAD

Contextually to the configuration program, through the application Setup the tool of database configuration transfer from and to the equipment, is installed on the terminal of maintenance.

The *Download* functionality allows to transmit a system configuration present on Personal Computer to a STCE/RTU equipment, while the *Upload* configuration allows executing the inverse operation, that is, to transferring the configuration present on a STCE/RTU equipment to a Personal Computer.

To activate the Download/Upload program, there are two ways:

- By selecting in sequence the *Services* item of the main menu and the *Download Conf*, < downloadRTU> or <downloadRTU-PSTN> is recalled, depending on the initial choice in the *New* window

- By selecting in sequence from the Start menu of the PC the items:

  <Programs>

  < Selta WCfgStceRTU >

  <downloadRtu> or <downloadRTU-PSTN>

At the start, a window is shown for the selection of the connection type that the user want to use:

- SLIP it recalls the SLIP RTU local connection configured as described in "Personal Computer initialization" A1 Appendix; it is necessary to locally connect the maintenance terminal by using the *Supervision Terminal Cable* code 154081006, connected between the Personal COM1 and the proper *Plug Jack 8 poles connector* present on the front panel of the Central Unit (CPU2000) and individualized by the label PC.

- Ethernet for this connection type it is necessary to specify the IP address assigned to the STCE/RTU equipment that you want to monitor; the equipment and the maintenance terminal must be connected to the LAN through a standard cable suited for the used connection type.
  If the Ethernet connection between C and the equipment is direct, it is necessary to use a cross cable provided wit RJ45 connectors

The configuration modality of the Personal Computer for the connection to STCE/RTU equipment are reported in appendix A1 "Personal Computer initialization".

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The following figure displays the main window of the program with *File* menu opened, which allows accessing both to the Download function and to Upload function.

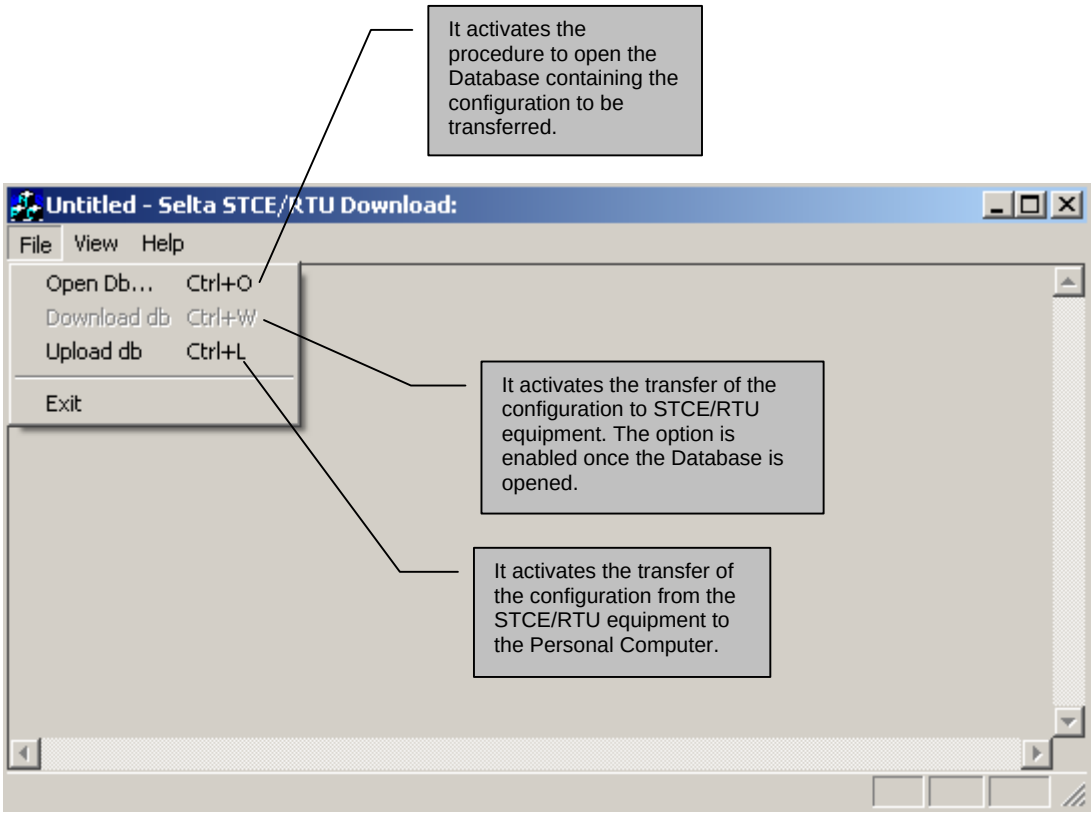

Figure 7-1 – DownloadRTU: main window

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7.1 DOWNLOAD PROCEDURE

To get the configuration transfer, it is necessary first select the *Open Db…* item from *File* menu.

This function allows selecting the configuration file to be transferred.

The following figure displays the window that allows the opening of the configuration Database.

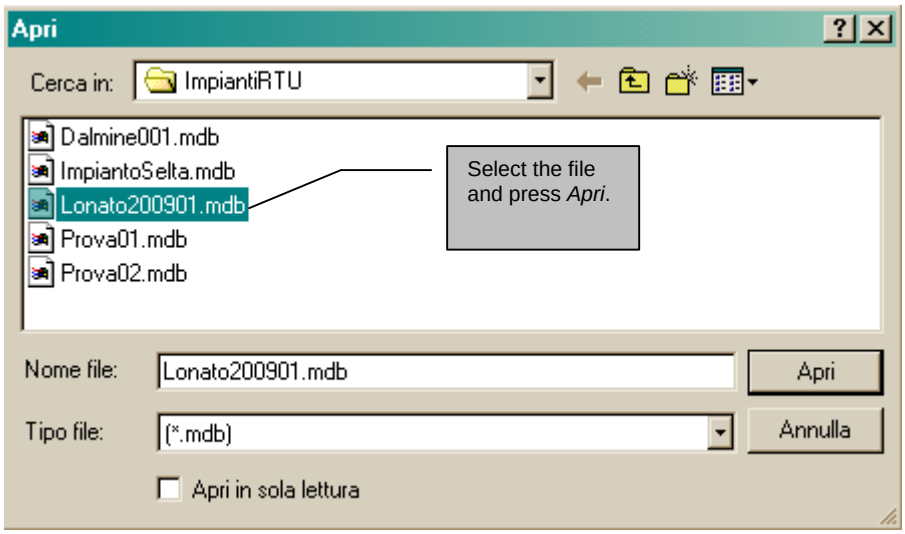

Figure 7-2 – DownloadRTU: configuration database opening

Once the configuration database has been opened, its name is displayed on the title bar of the program.

When the plant database has been opened, it is possible to proceed to its transfer to STCE/RTU equipment activating the *Download Db* item of the File menu.

The transfer of the configuration is preceded by a *congruence check* that allows finding possible cross errors, not individualizable executing the controls at single editing window level; in case of errors, the procedure ends before arriving to the transfer.

Once the congruence check has been passed, the *compiling* of the configuration takes place. C*ompiling* means the set of operations that allow, starting from the “source data” contained in the Access Database, to obtain the binary file to be transferred to the STCE/RTU equipment. Obviously, the generation of the binary file takes place only if, during this elaboration, no incongruence in the data is found.

At the end of the compiling, the configuration CRC in binary format is displayed in a proper dialog window. The user, then, can send the configuration acting on the confirmation button

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located on the display window of the calculated CRC (it is a good rule to note the CRC that univocally identifies the equipment configuration, the CRC is however written in the transmission log file).

The following figure shows the windows displayed by the program during the phase of transfer of the STCE/RTU equipment configuration.

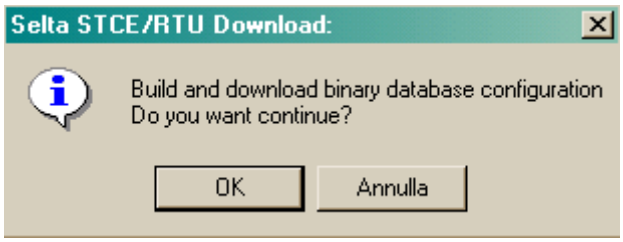

Figure 7-3 – DownloadRTU: database compiling

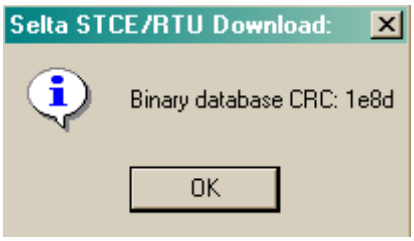

Figure 7-4 – DownloadRTU: CRC displaying

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The phase of the file transfer to STCE equipment is preceded by the request of connection towards the equipment itself. This connection can be:

- A local serial connection (*SLIP Connection*)
- A connection in local network (*Ethernet*)

In case of connection by Ethernet network, it is necessary to provide the IP address of the Central Unit in position A or B destination of the connection. In the same form it is possible to decide if the configuration download must cancel or not the possible Automation present on the CPU (*Erase Automation* option).

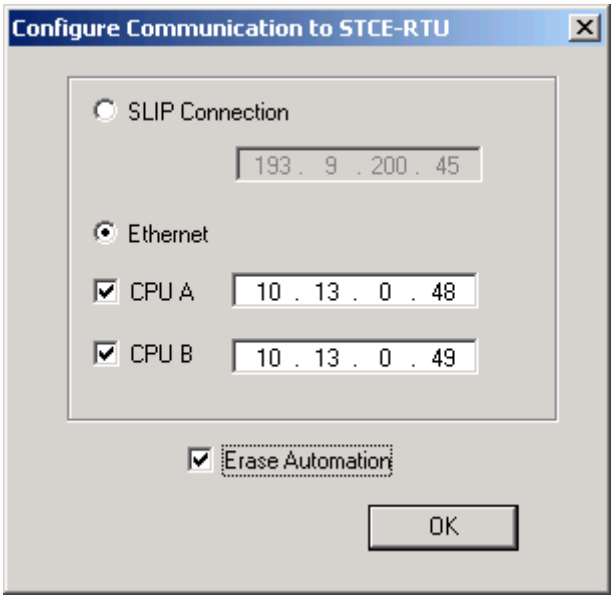

Figure 7-5 – DownloadRTU: connection to the equipment

By confirming the IP address inserted, a window appears in which the configuration characteristics present on Central Unit to which you are connected are shown. (see Figure 7-7)

Figure 7-6 – DownloadRTU: connection to one only Central Unit in slave mode

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In this phase is jet possible to stop the download procedure, by pressing the *Cance*l button.

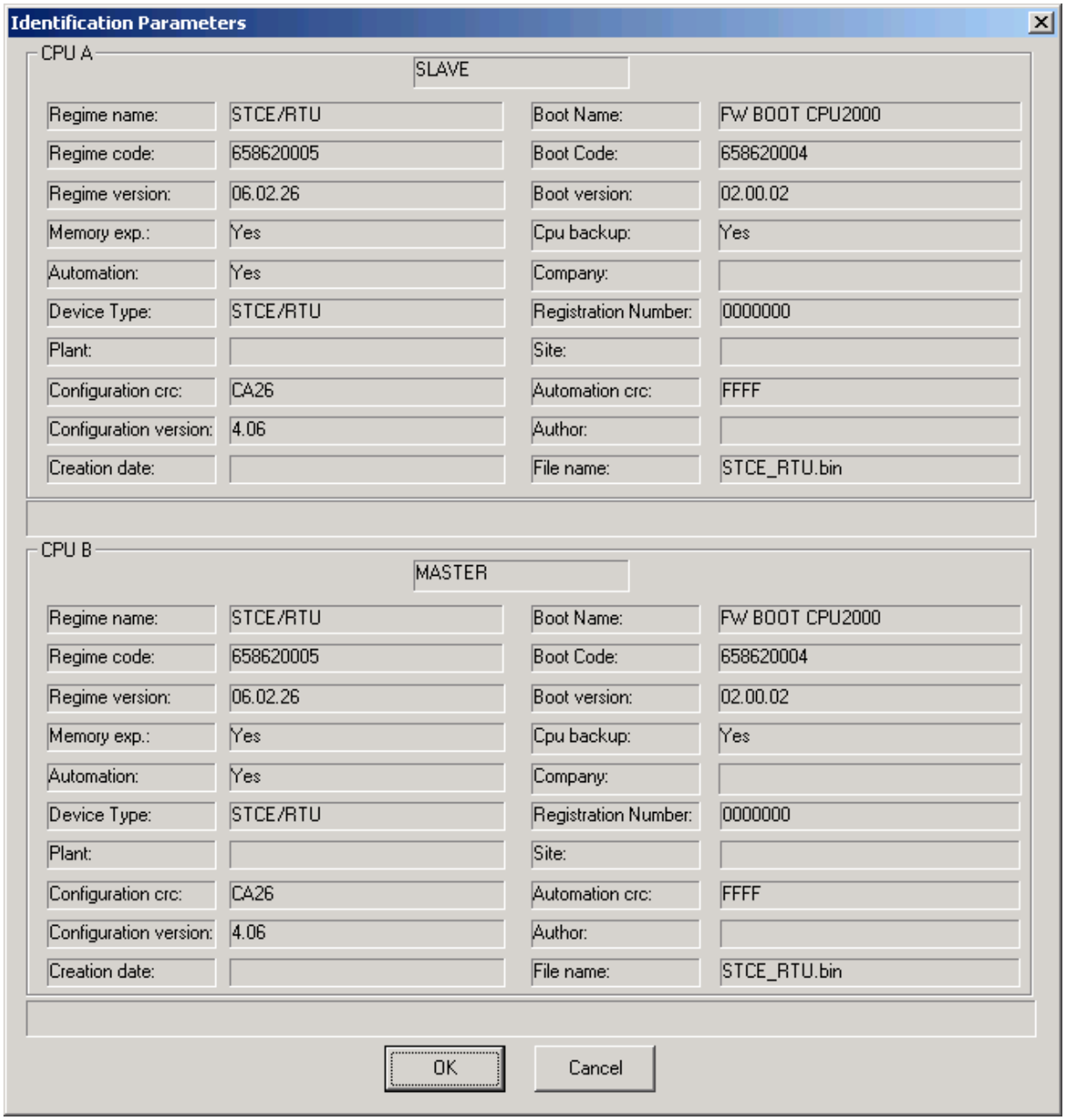

Figure 7-7 – DownloadRTU: displaying of the current configuration characteristics

By pressing the button the procedure goes on and requires the user authentication.

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Figure 7-8 – DownloadRTU: user authentication

A dynamic window displays the transfer time.

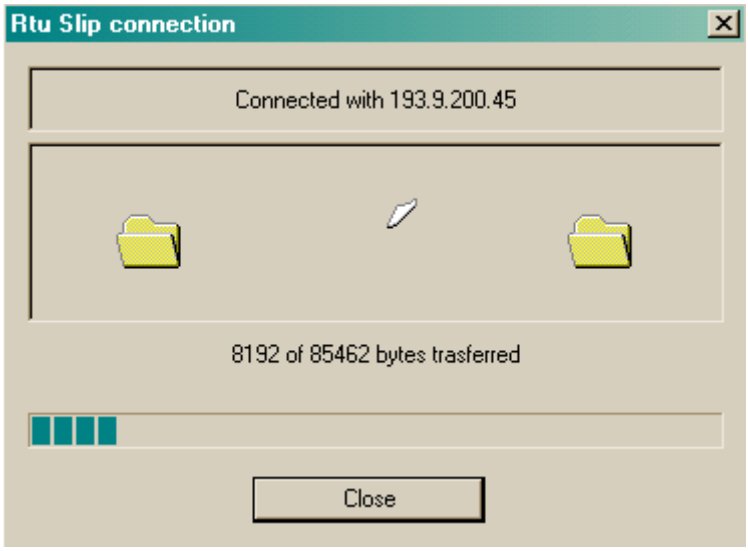

Figure 7-9 – DownloadRTU: configuration transfer in progress window

The procedure takes back from the authentication phase for the second CPU.

During the download phase, a log file of transmission is created, which will be stored in the same directory of the plant configuration database and will have the same name of this one but with extension *.LOG*. The log file can be read using any text editor.

The end of transfer is confirmed with the following proper message:

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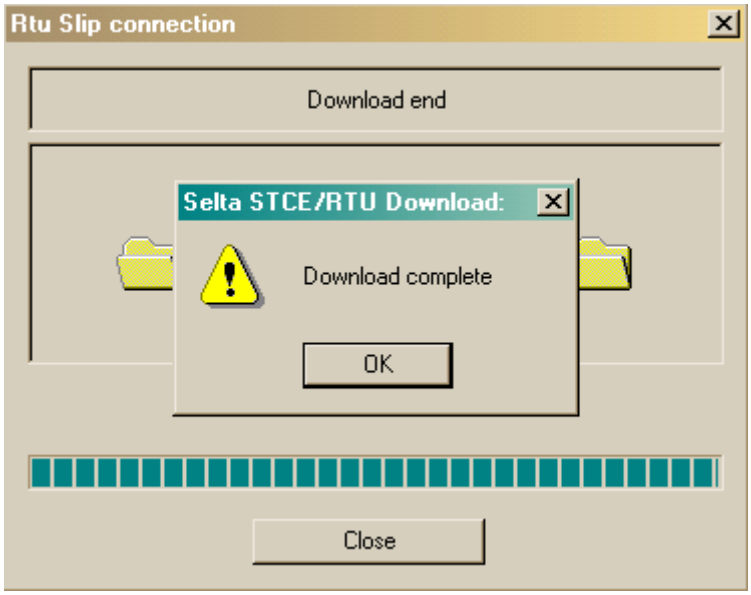

Figure 7-10 – DownloadRTU: download procedure end window

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7.2 UPLOAD PROCEDURE

This option can be invoked selecting *File* item of the main menu and then *Upload Db*.

The performance allows to receive the configuration of STCE/RTU equipment and to save on the hard disk of Personal Computer after it has been transformed, by means of the *Inverse Compiling* procedure, to the *source* format stored on Access Data Base.

With this operation, the program re-generates the Data Base configuration file with the specified name under the *ImpiantiRTU* default directory, or in a different directory chosen by the user.

This configuration can be modified in a second moment and, if necessary, re-transferred to STCE equipment, as any other configuration directly generated by *WCfgRTU* software.

The first form displayed at start-up of Upload procedure allows then to specify, similarly to what required in the generation of a new configuration, the Data Base file destined to the storing of the received parameters.

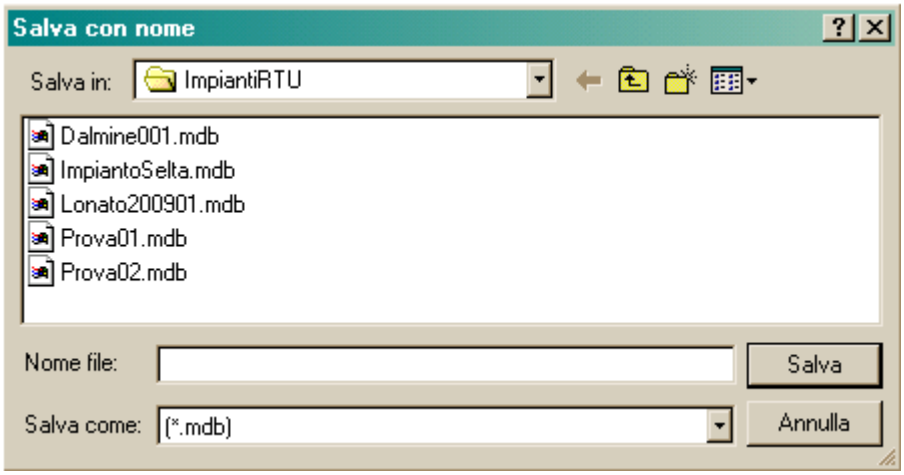

Figure 7-11 – UploadRTU: destination Data Base creation

Once the name of the destination Data Base has been chosen, the procedure for the transfer of the configuration parameters from STCE to PC starts, preceded, as for Download, from the request of the type of connection to be executed with the equipment itself that can be yet:

- a local serial connection (*SLIP Connection*)
- a local network connection (*Ethernet*)

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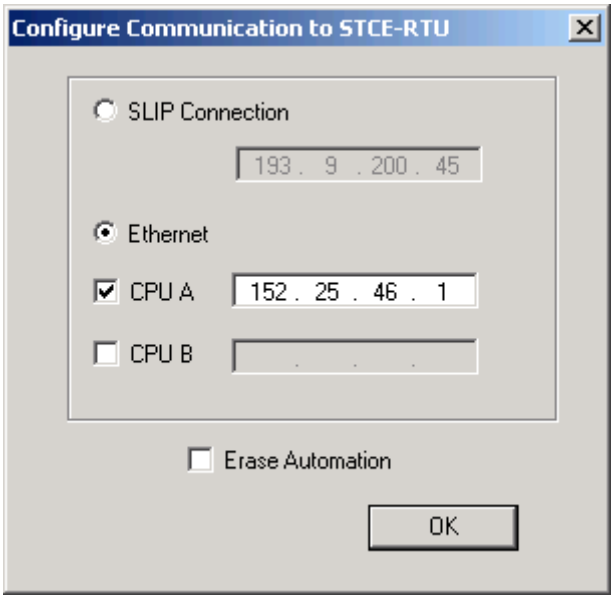
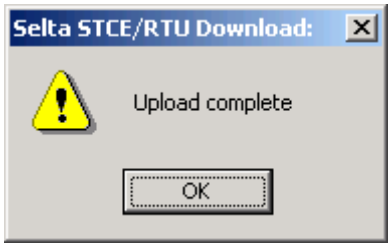


Figure 7-12 – UploadRTU: connection to the equipment

In case of connection by Ethernet network, it is necessary to provide the IP address of the Central Unit, from which you want to execute the configuration upload.

> **Warning**
>
> **In case of UPLOAD functionality the *CPU B* and *Erase Automation* options are disabled.**
> **The configuration transfer procedure from every CPU must be separately executed by modifying the IP address in the CPU A box.**

By confirming the IP address inserted, the program begins the configuration file transfer from the equipment. At the end of the procedure it displays in sequence the following messages of database loading and reconstruction.



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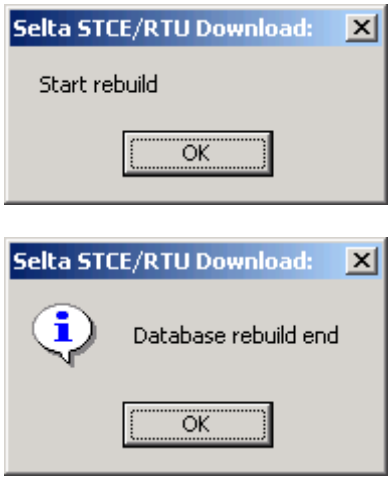

Figure 7-13 – UploadRTU: Data Base reconstruction

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8. MONITOR

Contextually to the configuration program, through the application Setup the display tool called *MonitorRTU*, is installed on the terminal of maintenance.

This functionality allows consulting, in real time, the information related to the equipment state. Particularly it is possible to display:

- Information about equipment personalization
- Diagnostic information about single cards
- Hourly synchronization diagnostic form
- Information about single point state and the associated information.

To activate the Download/Upload program, there are two ways:

- By selecting in sequence the Services item of the main menu and the MonitorRTU option
- By selecting in sequence from the Start menu the items:

  <Programs>

  < Selta WCfgStceRTU >

  <MonitorRTU>

At the start, a window is shown for the selection of the connection type that the user want to use:

- SLIP it recalls the SLIP RTU local connection configured as described in "Personal Computer initialization" A1 Appendix; it is necessary to locally connect the maintenance terminal by using the *Supervision Terminal Cable* code 154081006, connected between the Personal COM1 and the proper *Plug Jack 8 poles connector* present on the front panel of the Central Unit (CPU2000) and individualized by the label PC.

- Ethernet for this connection type it is necessary to specify the IP address assigned to the STCE/RTU equipment that you want to monitor; the equipment and the maintenance terminal must be connected to the LAN through a standard cable suited for the used connection type.
  If the Ethernet connection between C and the equipment is direct, it is necessary to use a cross cable provided wit RJ45 connectors

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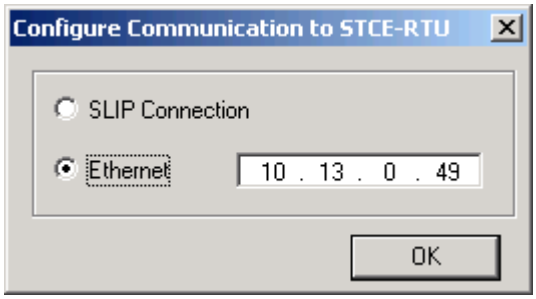

Figure 8-1 - Connection start

The *MonitorRTU* program provides the communication with the Central Unit only, in Master mode. In case of connection attempt with the Central Unit in Slave mode, the program interrupts the connection procedure and displays the following messages:

Figure 8-2 – Monitor RTU: connection attempt with CPU2000 in Slave mode

Figure 8-3 – MonitorRTU: Connection broken

From the main window of the program (see Figure 8-4) it is possible to display tha data related to the different sub-racks that compose the equipment.

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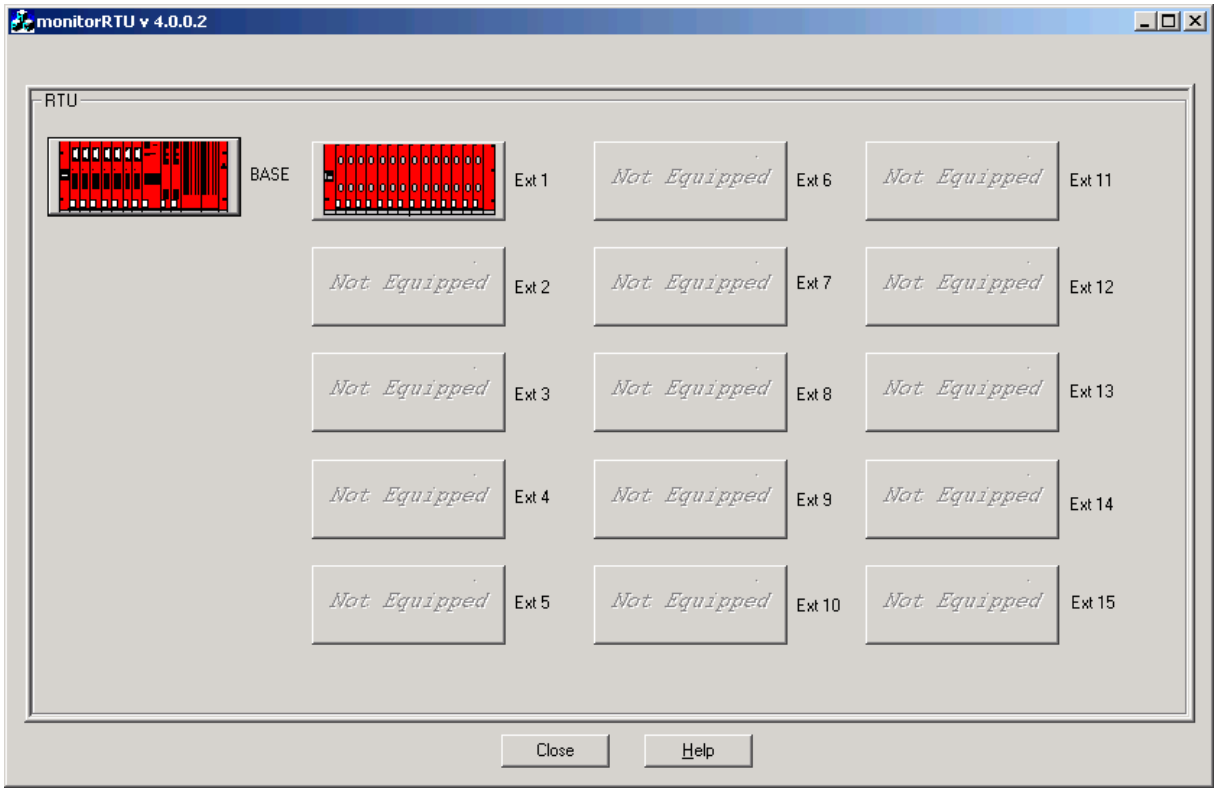

Figure 8-4 – MonitorRTU: main window

When one of the Sub-Racks is selected, the window in Figure 8-5 appears, in which the hardware personalization of the equipment (equipped cards) is shown and from which it is possible to enter the information about every card by selecting the card itself. If a Subrack is red, an alarm is active in that Subrack.

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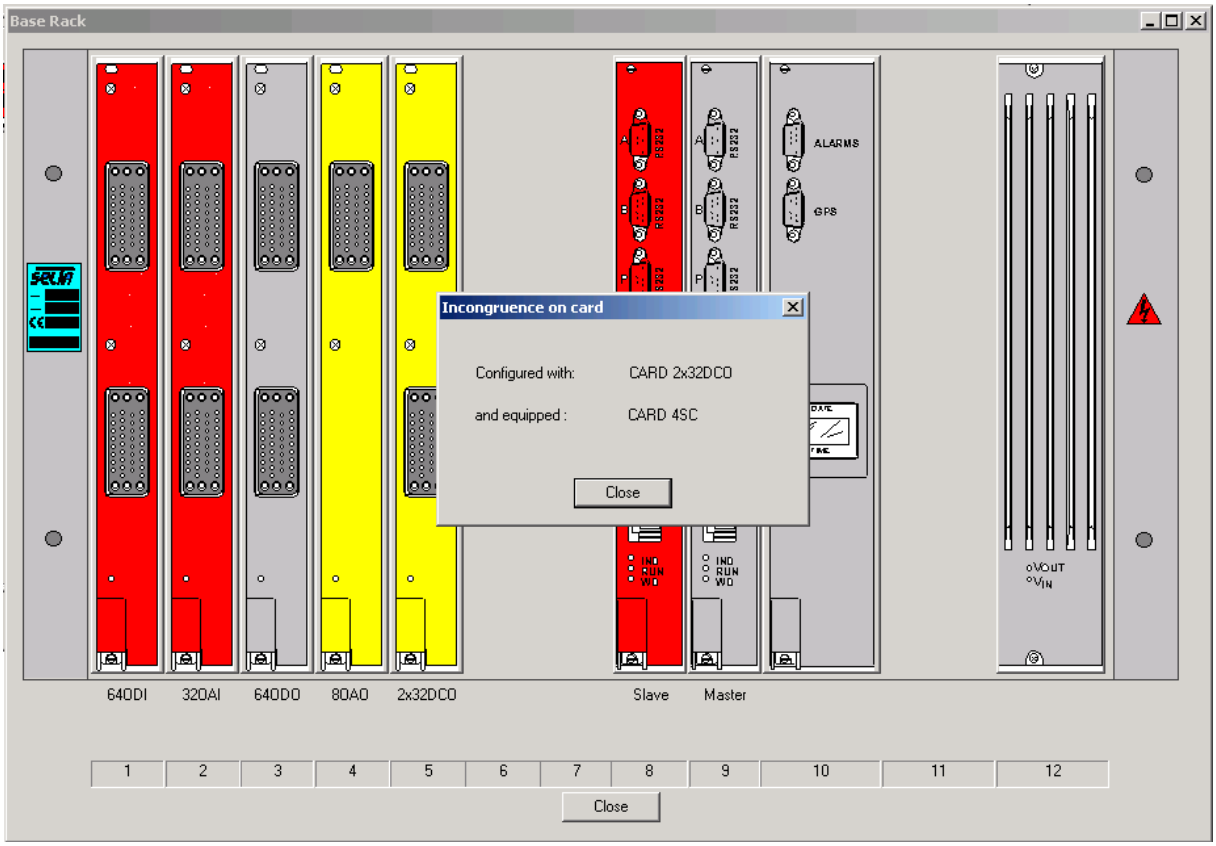

Figure 8-5 – MonitorRTU: base sub-rack equipping

If a card is yellow, the unit equipped on the subrack does not belong to the typology indicated in configuration. Through a double click on the unit a message is displayed in which the configured and equipped unit type are specified.

If a card is red, at least one alarm is active on that card (the alarms detail can be displayed by a double click on the unit itself).

When CPU2000 card is selected information are displayed related to:

- Statistic data, descriptive of the plant, card Firmware versions, configuration present on the equipment
- CPU state
- Connection with GPS state
- Communication with the printer state

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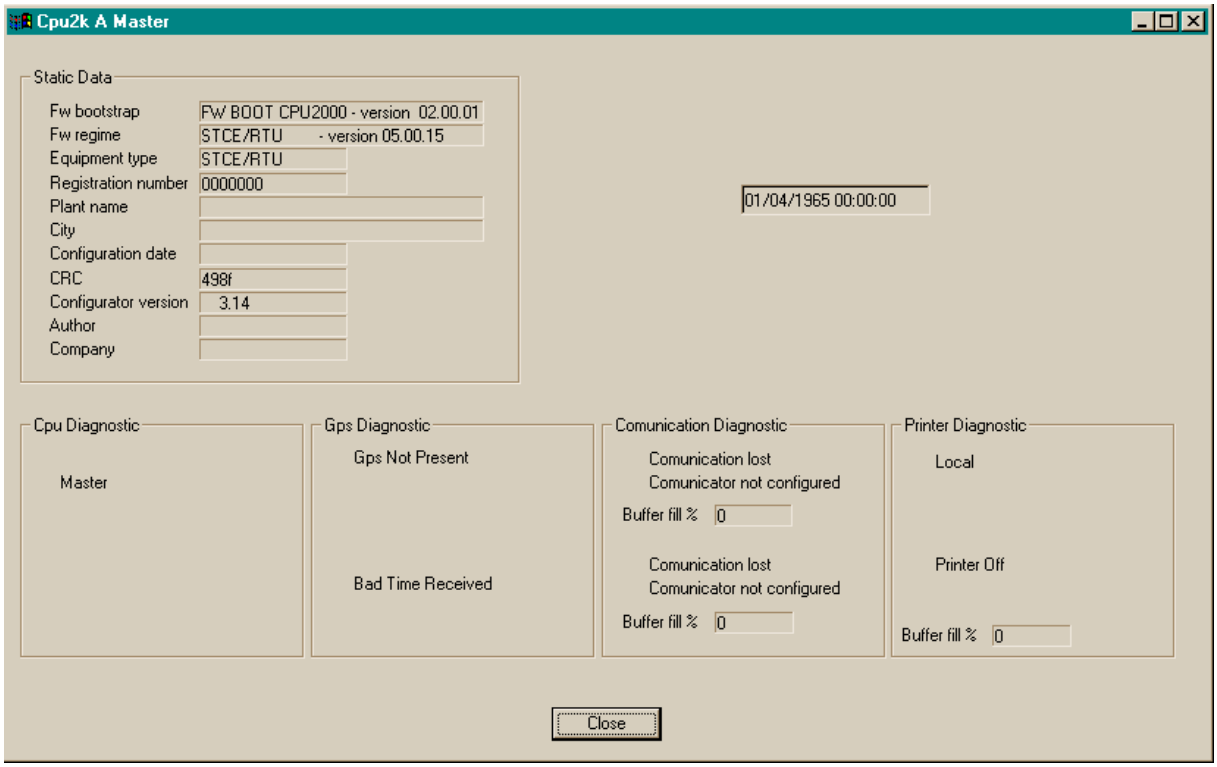

Figure 8-6 – MonitorRTU: CPU2000 card

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For every I/O card the following information are displayed:

- Information related to the code and the version of the current firmware
- Diagnostic information related to the card
- Input and output current state

In Figure 8-7 is shown as an example, the 64ODI card displaying window:

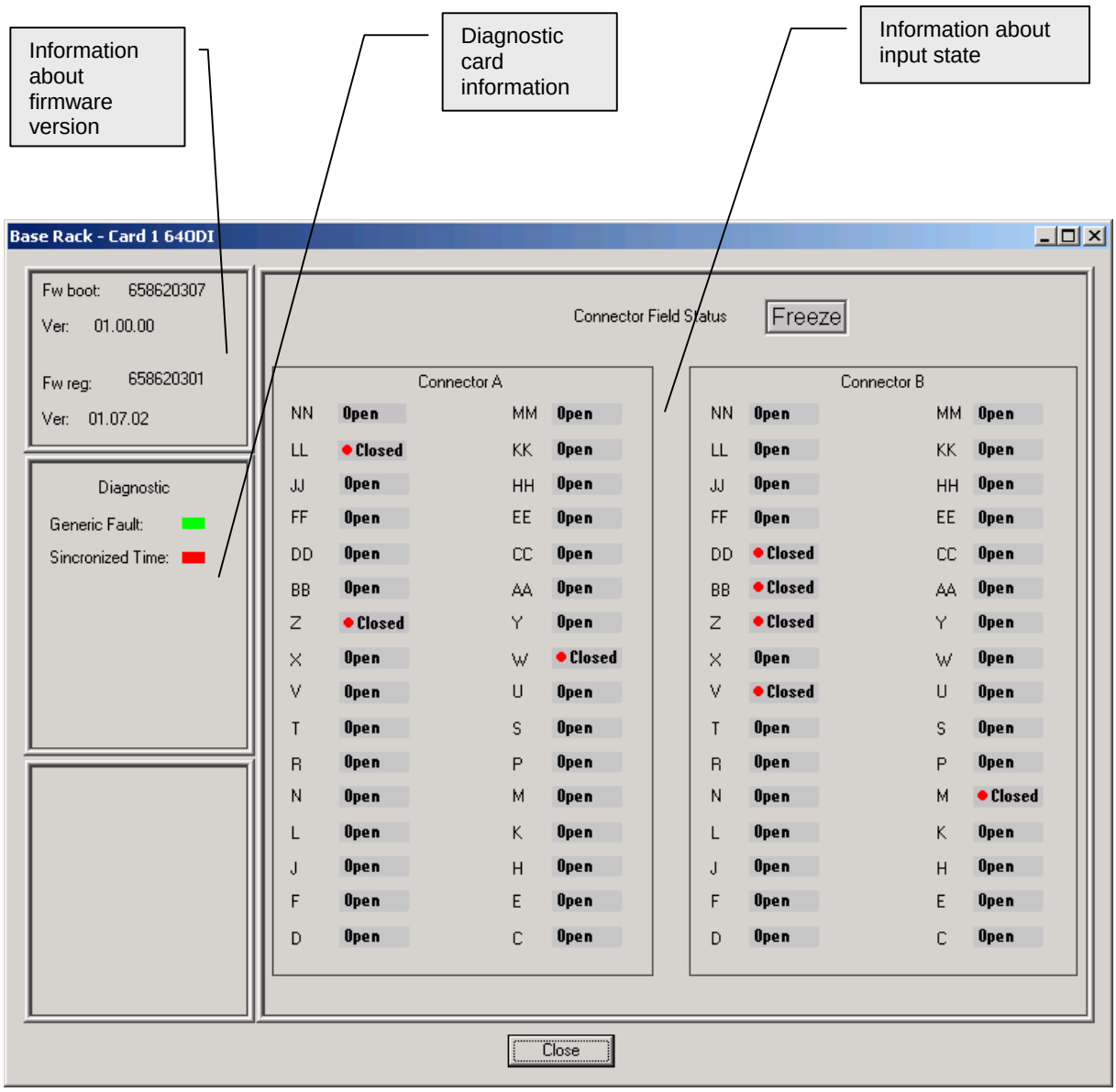

Figure 8-7 – Monitor RTU: 64ODI card

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In Figure 8-8 is shown the 8OAI/8DCO card displaying window:

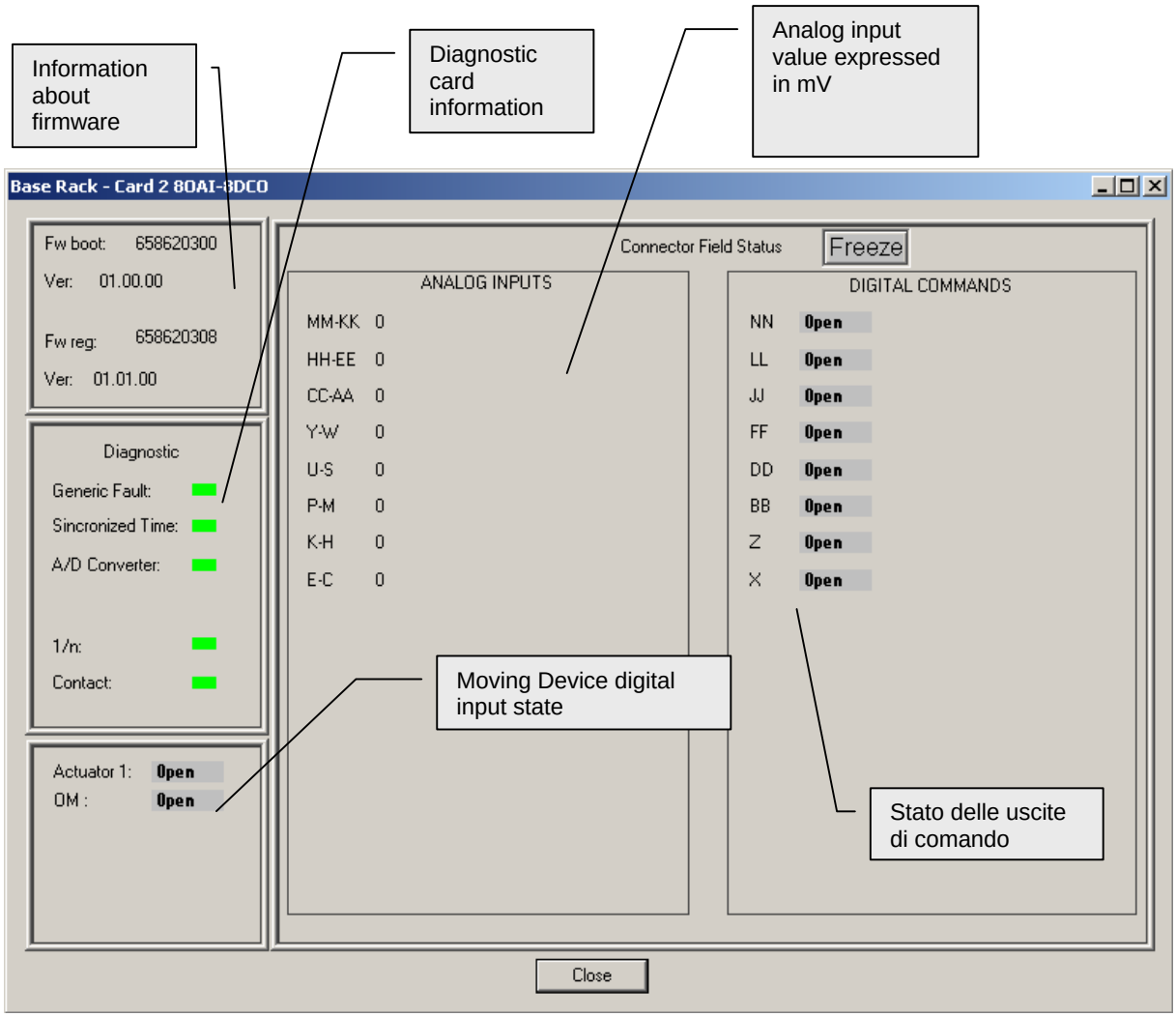

Figure 8-8 –MonitorRTU: 8OAI/8DCO card

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APPENDIXES

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A1. PERSONAL COMPUTER INITIALIZATION

This appendix describes the procedures necessary for the initialization of the operative environment of the Personal Computer, equipped with Windows Operating system, which hosts the configuration program of STCE/RTU equipments, as regards the protocol between the program itself and the equipments. For the communication between the configuration program and the STCE/RTU equipment, a TCP/IP connection on serial line is used (Serial Line Internet Protocol).

It is then necessary:

- to insert TCP/IP among the managed protocol.
- to define and configure a remote access connection.

The TCP/IP address to configure on personal computer, to make this acknowledged by STCE/RTU equipment, is the following:

IP Address: **193.9.200.44**

Depending on the version of Windows Operating system, the configuration of the network protocol and the remote access connection can be made by different dialog windows and/or reachable by different selections described in the following paragraphs.

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A1.1 WINDOWS 95 AND WINDOWS 98 OPERATING SYSTEM

Modem configuration

For a correct installation of the communication modem, it is necessary before to configure the equipment configuration software on the equipment (code 653620901).

Power up the personal computer and wait until Windows operating system is correctly started.

Open the modem configuration window by:

<Start>
<Settings>
<Control Panel>

Double click on Modem icon

Press <Add>

Enable the option: <Don't detect my modem; I will select it from a list>

Press <Next>

Press <Disk> button in the driver selection window

Enter the path <C:\SELTARTU\BIN\ccselta.inf> and press <OK>

The <Connessione diretta RCE $Revision:1.1$-3> driver is detected

Press <Next>

Select the COM1 or COM2 communication serial port

Creation of the SLIP RTU remote access connection

Check the access remote card is present and the TCP/IP protocol settings by the path:

<Start>
<Settings>
<Control Panel>

Press the <Network> icon with the mouse right button, enter the *Properties* menu and check that the Dial-up Driver item is present in *Scheda* menu and that the *Protocol* TCP/IP item is present in *Protocol* menu.

If they are not present, select

- <Card>, then press <Add> key, double click on → <Microsoft> → <Dial-up Driver>
- <Protocol>, then press <Aggiungi> key, double click on <Microsoft> → <TCP/IP>

In this configuration phase, the CD of the operating system installation could be required.

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Open the window for the creation of a new remote access connection by:

<Start>

<Programs>

<Accessories> or <Communications>

<Dial-up Networking>

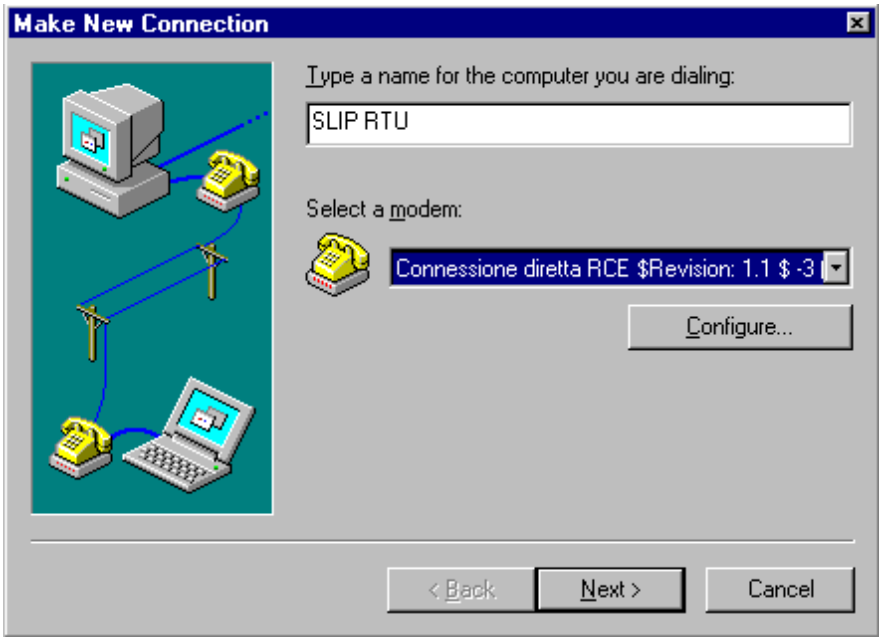
Start the guided creation of a new connection by double click on <Make New Connection> icon

Name this connection as SLIP RTU

Press <Next>

Select the previously installed <Connessione diretta RCE $Revision:1.1$-3> modem

Press <Next>



In the new window do not insert any data related to the telephone number necessary for the connection (or insert 0)

Press <Finish>.

The new SLIP RTU connection is displayed in the Remote Access window.

If a remote access card is not installed on PC, at the end of the procedure for the connection creation, the following window opens to signal its absence.

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Pressing <OK>, a remote access card is automatically installed on PC.

Configuration of the SLIP RTU remote access connection

Pressing the mouse right icon on the SLIP RTU connection icon, open the Properties window and configure as follows:

- Tipi di Server: select the <SLIP Connessione UNIX> connection type
  Deselect the <Log on to network> option
  Select <TCP/IP> protocol
  Press <TCP/IP Settings> button and, in this menu, select <IP address>, then specify the <193.9.200.44> IP address
- Procedura: deselect <Apri schermata…> option

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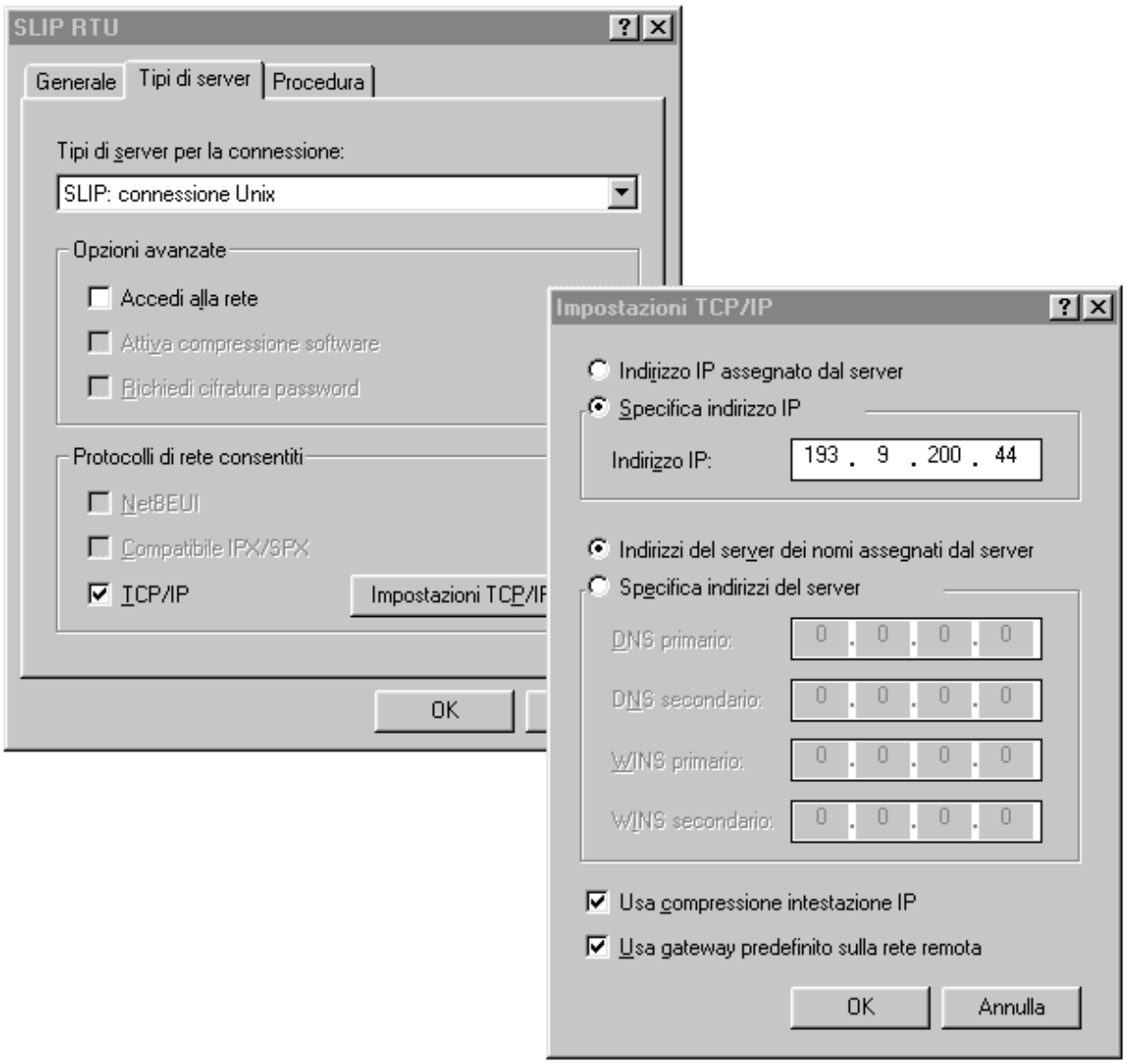

Restart the personal computer.

Connection procedure

Access the connection by double click of the mouse on the SLIP RTU icon in the Remote Access window.

A connection window opens; no password is required, but it is sufficient to press <Dial> button.

If the terminal window opens, press <Next>.

The remote connection icontray appears on the Windows bar.

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A1.2 WINDOWS 2000 OPERATING SYSTEM

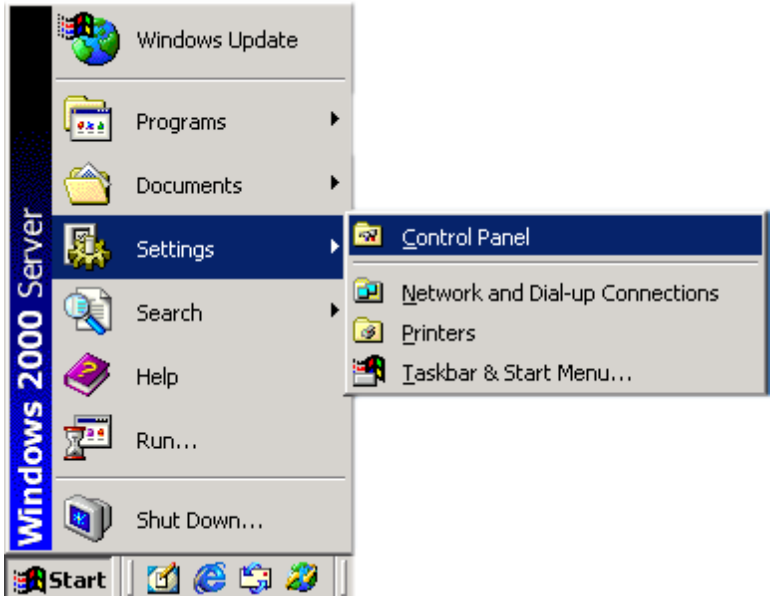
Modem configuration

For a correct installation of the communication modem, it is necessary before to configure the equipment configuration software on the equipment (code 653620901).

Power up the personal computer and wait until Windows operating system is correctly started.

Open the modem configuration window by:

<Start>
<Settings>
<Control Panel>



Double click on “Phone and Modem Options” icon

Press <Add>

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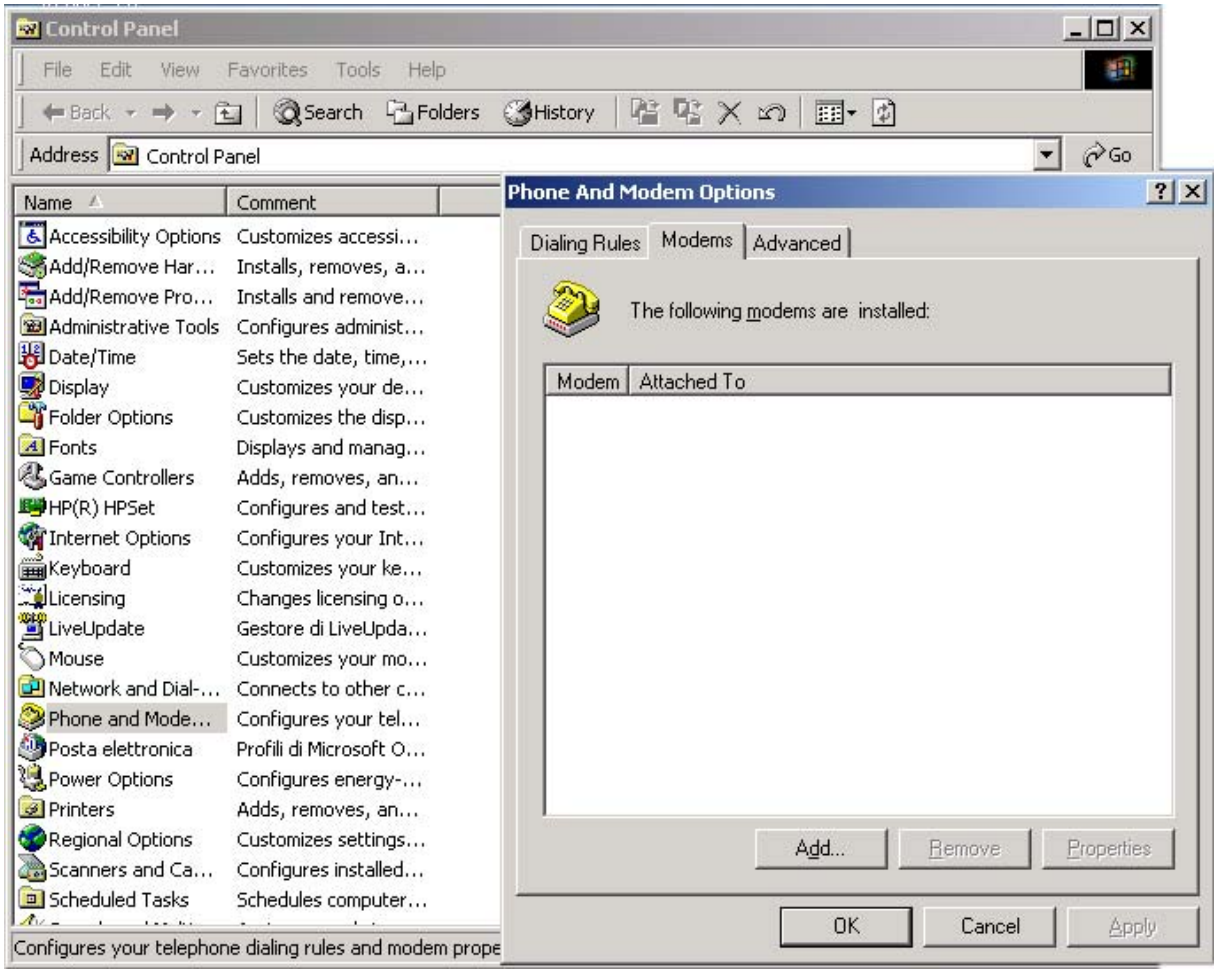

Enable the option: <Don't detect my modem; I will select it from a list>

Press <Next>

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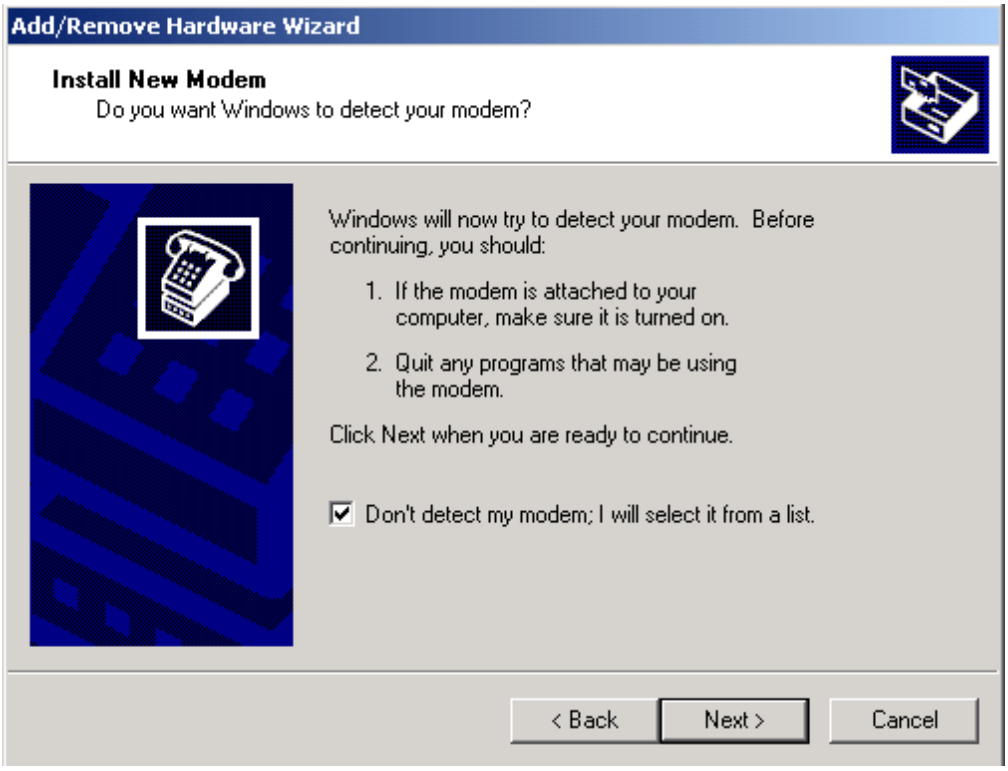
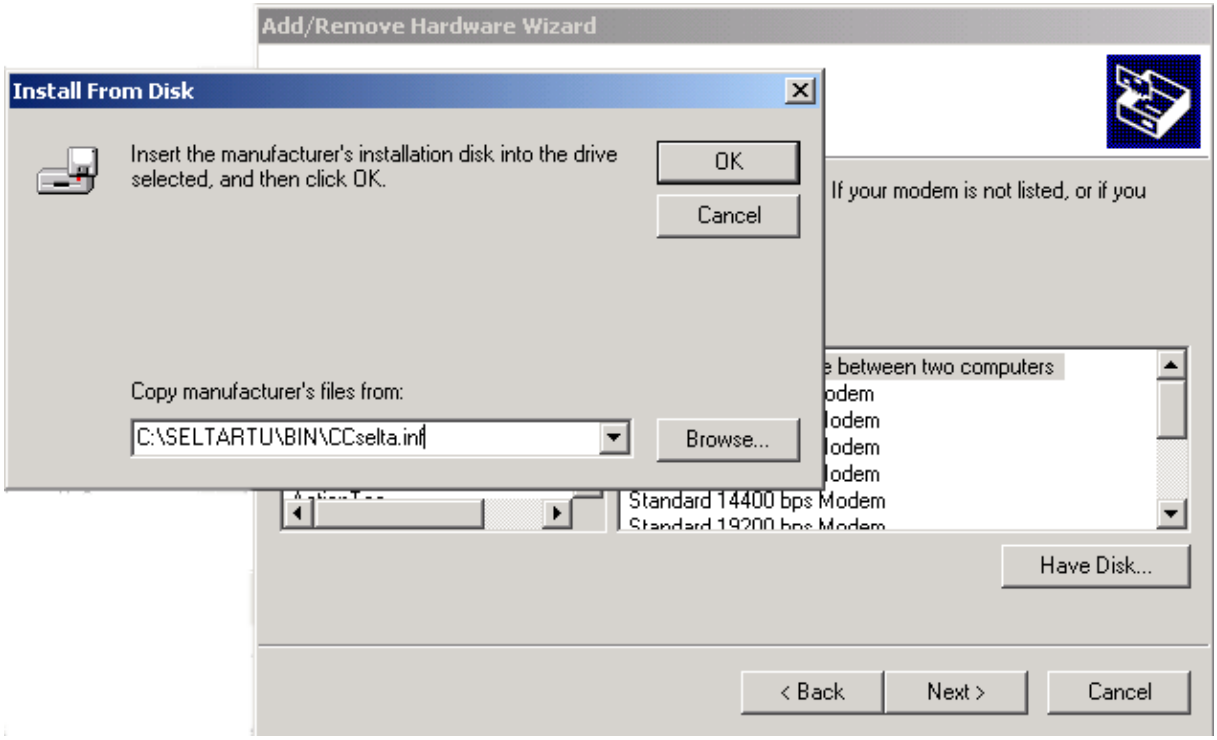


In the driver selection window, press <Driver disk>
Insert the path <C:\SELTARTU\BIN\ccselta.inf> and press <OK>



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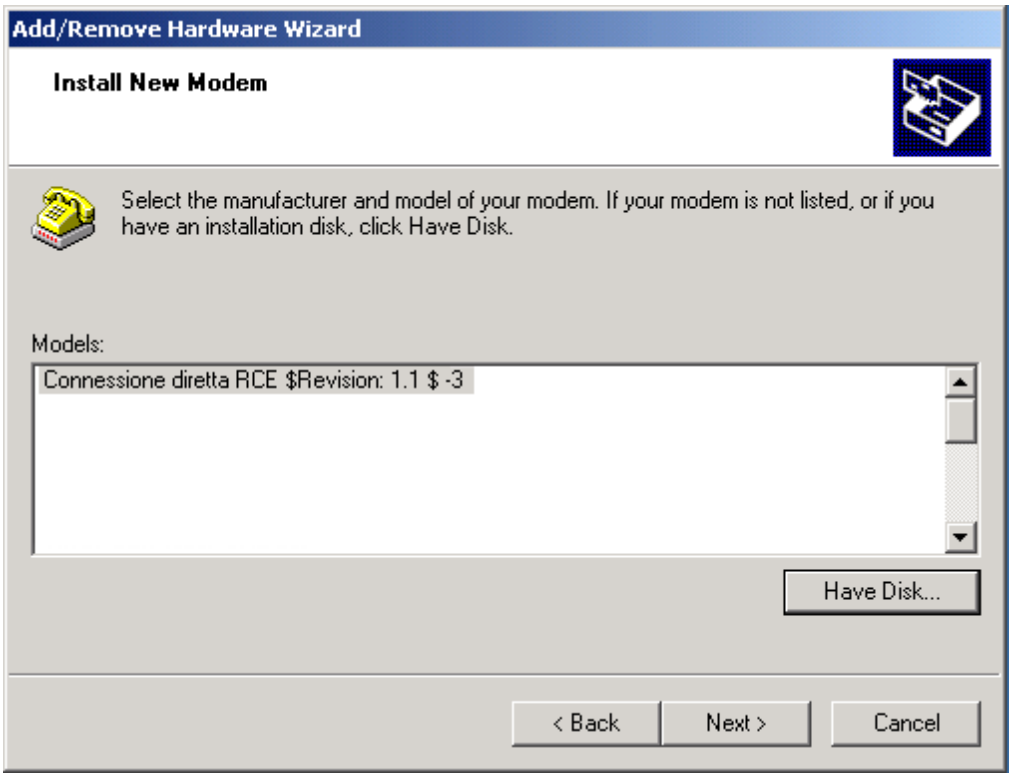
The <Connessione diretta RCE $Revision:1.1 $-3> is detected
Press <Next>



Select the COM1 or COM2 serial communication port
Press <Next>

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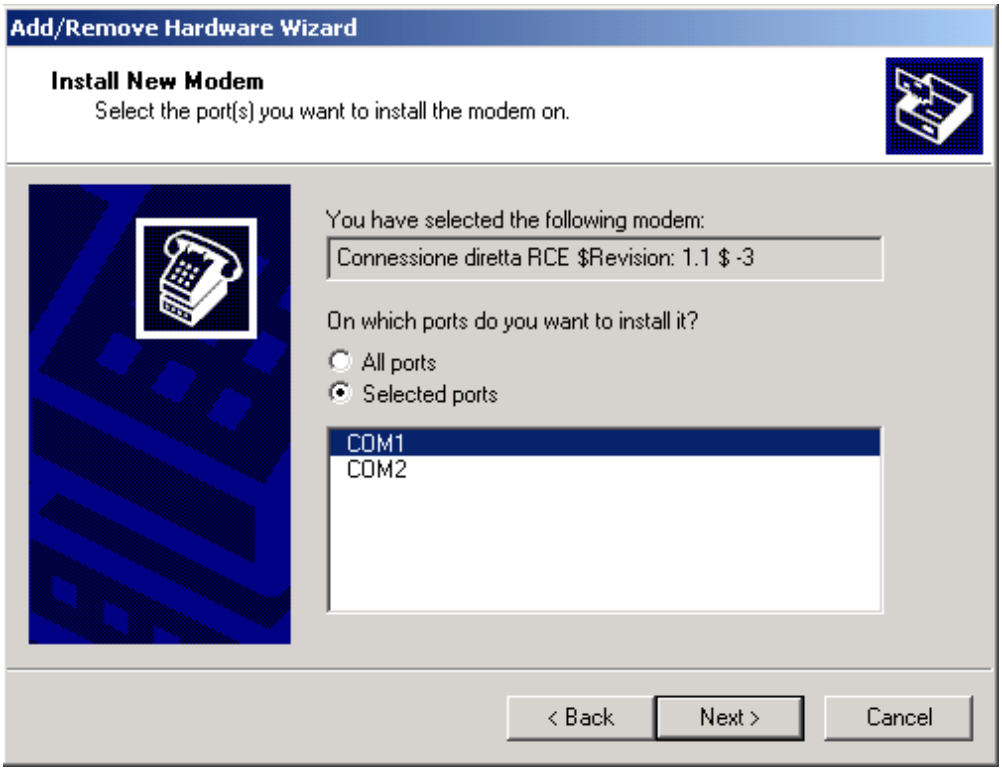

The page of the correct modem installation is displayed. Press <Finish> button.

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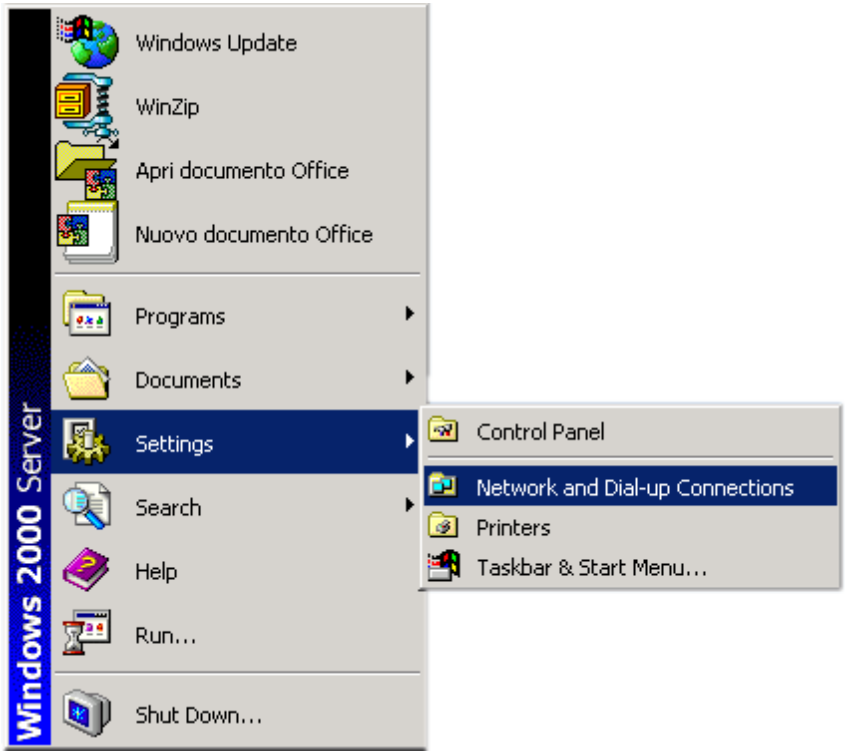
Creation of the SLIP RTU remote access creation

To start the creation of a new remote access connection, open the Network connection by:

<Start>

<Settings>

<Network and Dial-up Connections>



Double click on <Make New Connection> icon: the guided procedure starts; press <Next>.
In the next window, select <Dial-up to private network> and press <Next>.

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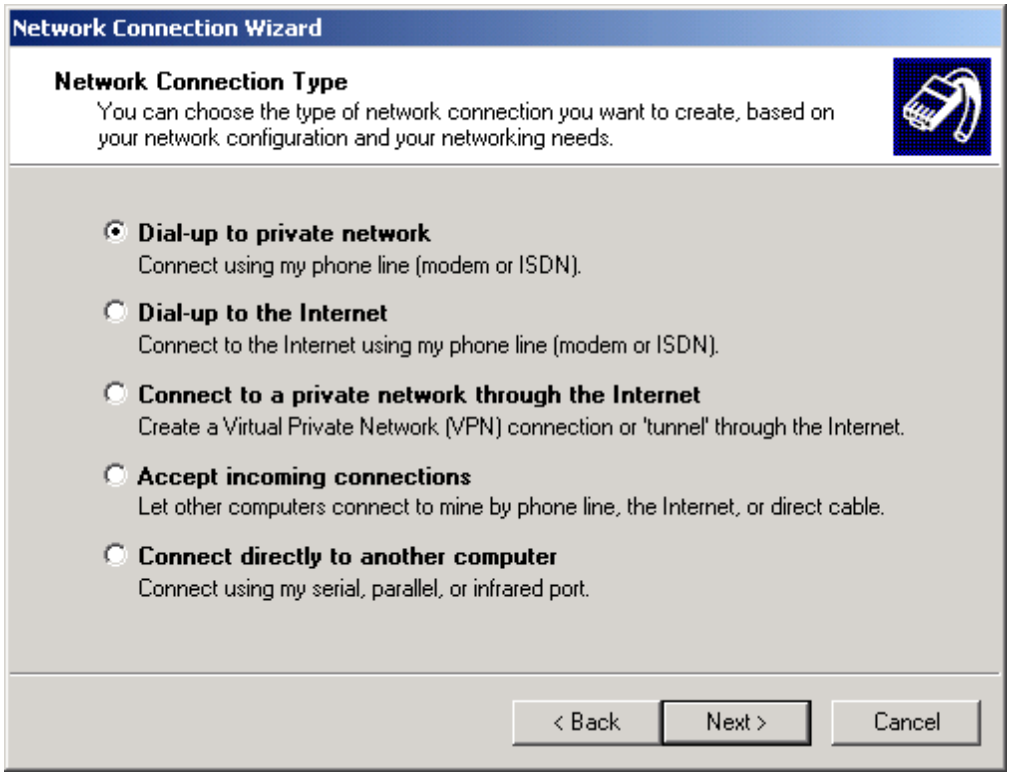

In the modem selection window, select the <Connessione diretta RCE $Revision:1.1 $-3> modem configured before and press <Next>.

In the window for the setting of the telephone number, enter 0 or let the field empty and press <Next>.

In the window for the setting of the connection availability, select the <For all users> option and press <Next>.

Complete the configuration of the remote connection naming the connection as <SELTA RTU>, then press <Finish>.

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The new SLIP RTU connection is displayed in "Network and Dial-up Connection" window.

Configuration of the SLIP RTU remote access connection

Pressing the mouse right button on the SLIP RTU connection, access to the Properties window and configure as follows:

Networking

- select the <SLIP: UNIX connection> connection server
- select the <TCP/IP> protocol
- press the <TCP/IP Setting> button and, in this menu,
    - select <Use this IP address>, then specify the <193.9.200.44> IP address
    - do not fill the DNS field

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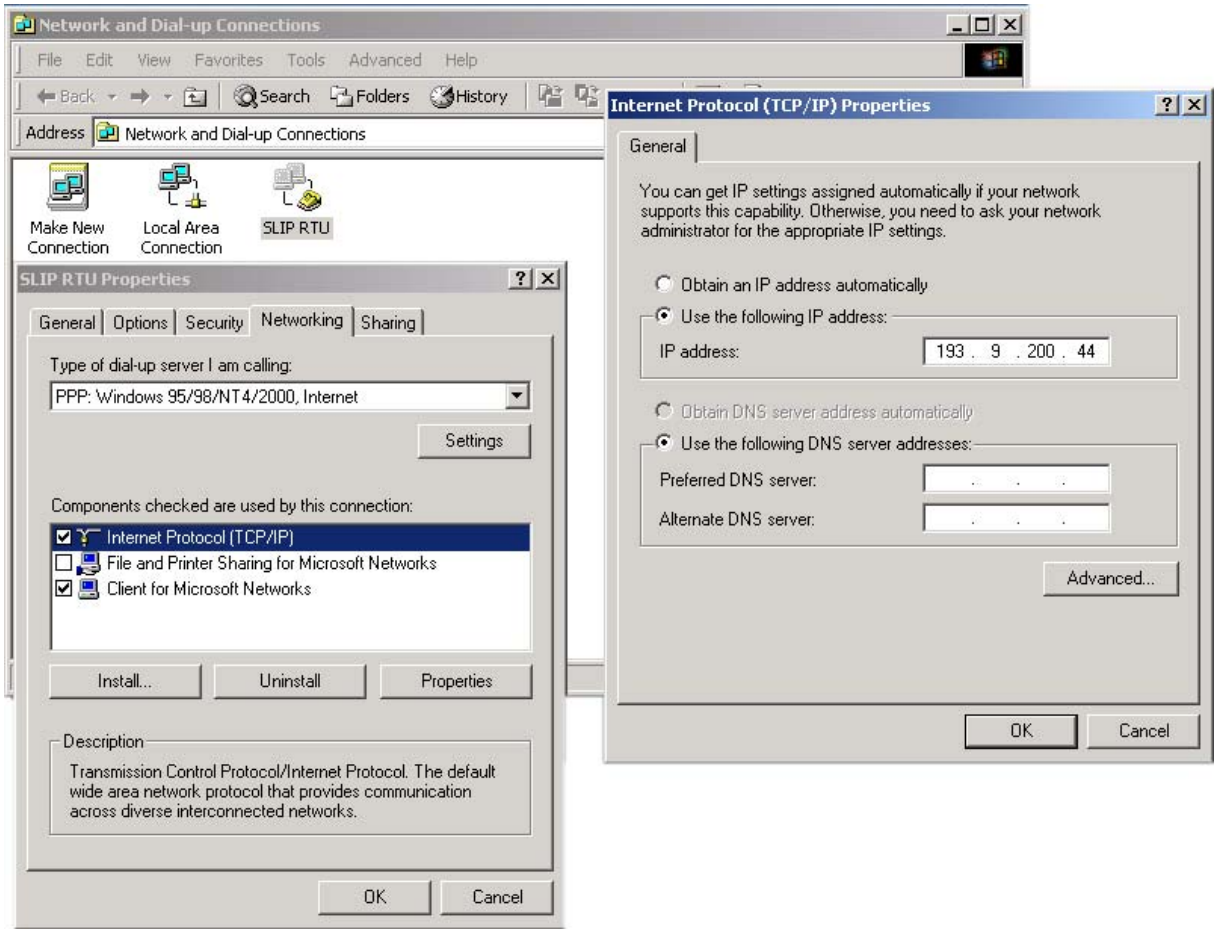
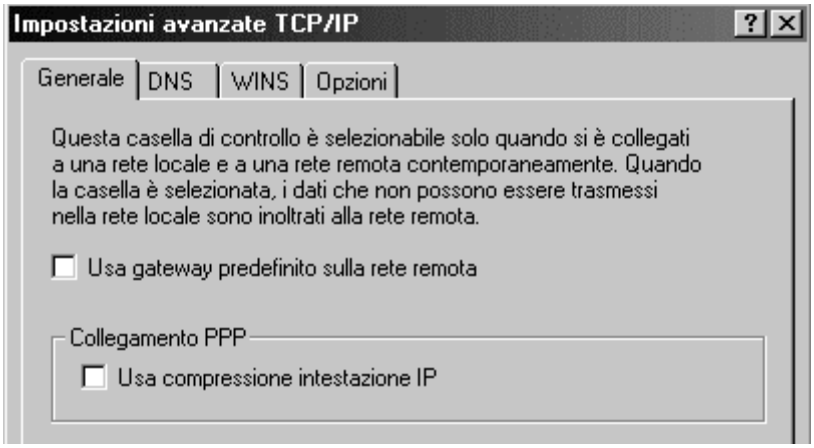


- in the <Advanced> window deselect the < Usa compressione intestazione IP> and <Usa gateway predefinito sulla rete remota>



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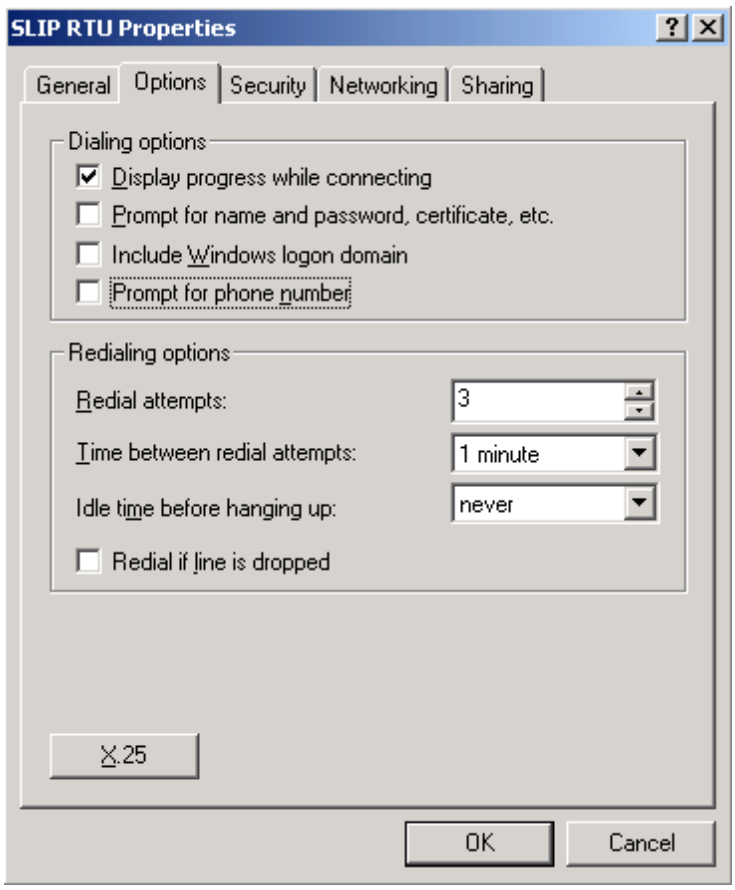
Options

- deselect the <Prompt for name and password, certificate, etc...> and <Prompt for phone number> fields



Press <OK> to correctly finish the configuration of SLIP RTU remote access.

Connection Procedure

Access the connection by double click of the mouse on the SLIP RTU icon in the “Network and Dial-up Connections” window
A connection window opens; no password is required, but it is sufficient to press <Connect> button.

The remote connection icontray appears on the Windows bar

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A1.3 WINDOWS XP OPERATING SYSTEM

Modem configuration

As for Windows 2000.

Note at the end of the installation the operating system can display a warning like that shown in the following figure. Go on by pressing the “next” button and finish the installation in this way.

Creation of the SLIP RTU remote access connection

To start the creation of a new remote access connection access to the Networking window through the path:

<Start>
<Settings>
<Network and Dial-up Connections>

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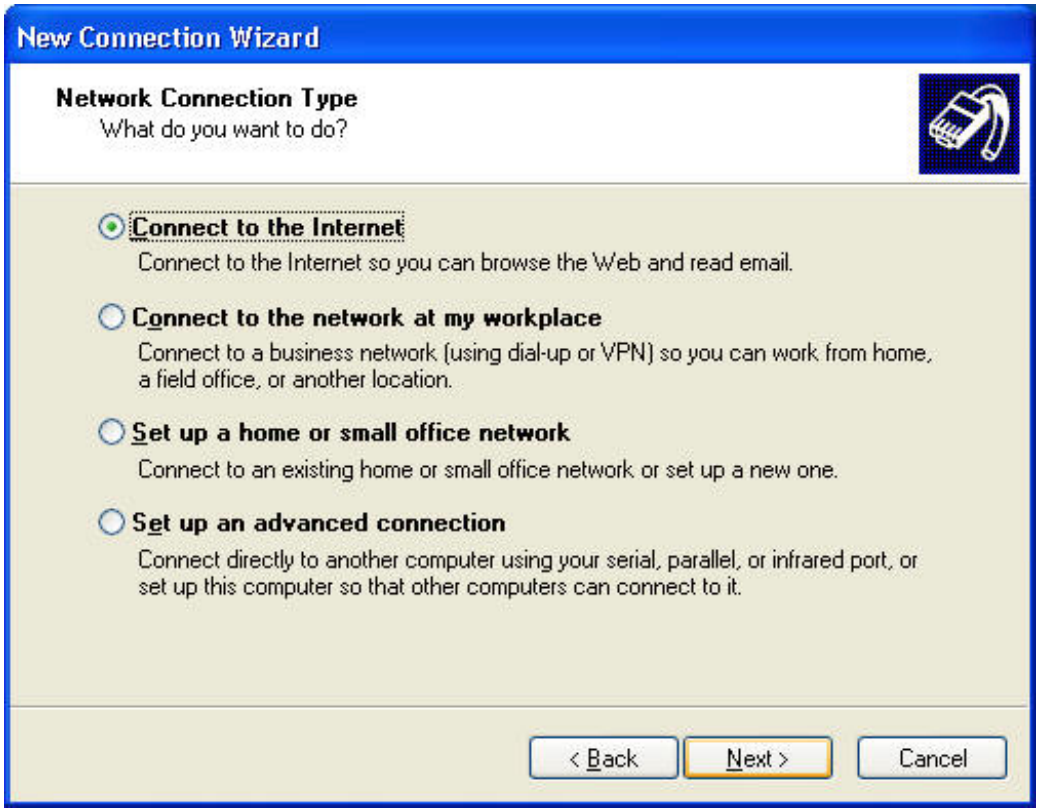
A double click on < Make New Connection > icon starts the driven-procedure; press <Next>.
At the successive window select <Dial-up to Internet> and press <Next>.



At the successive window select <Set up my connection manually> and press <Next>.

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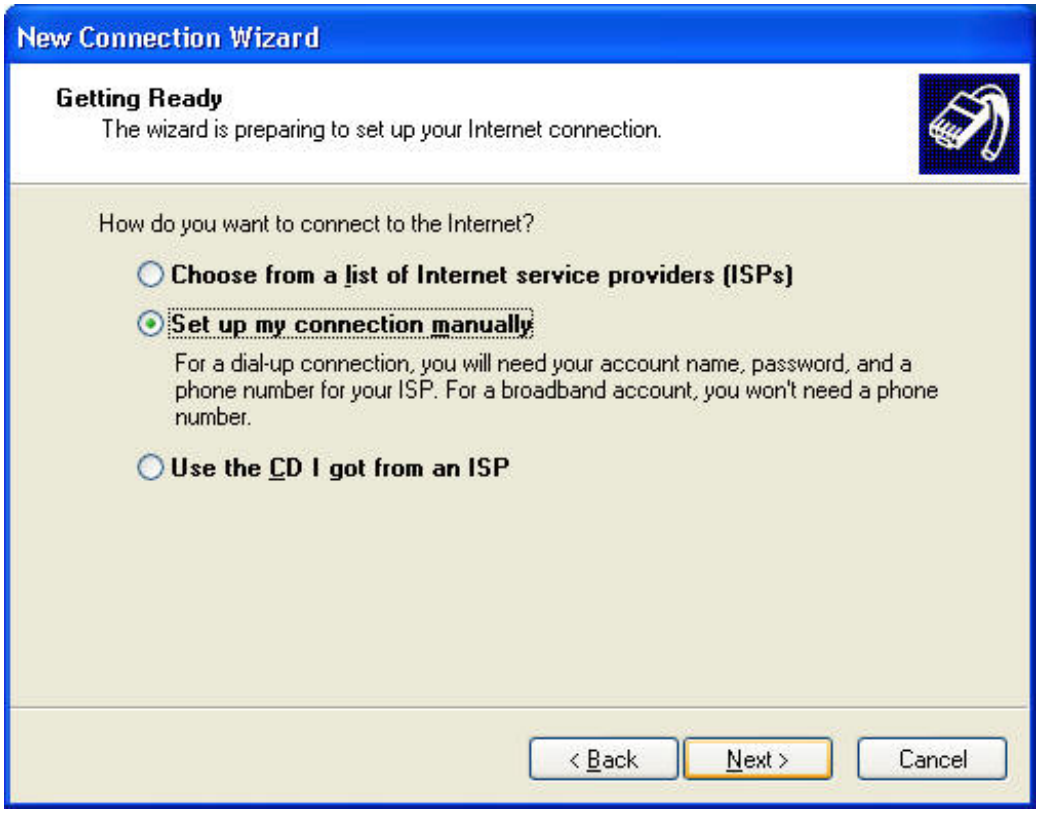

At the successive window select <Connect using a dial-up modem> and press <Next>.

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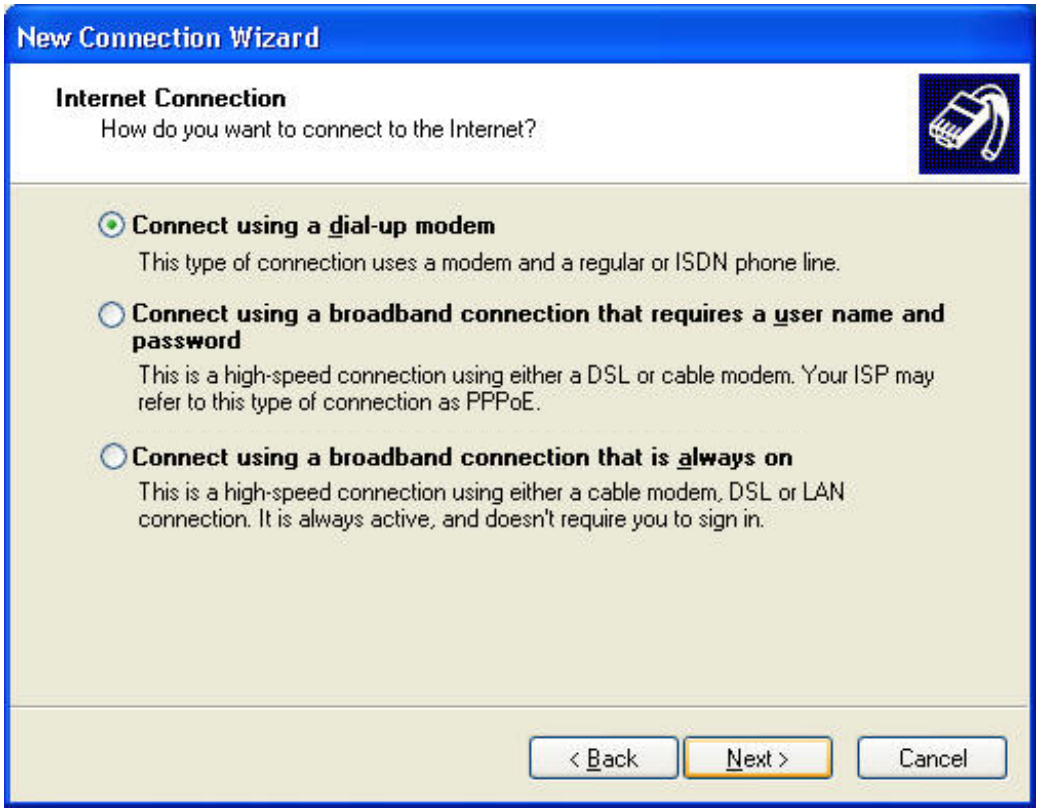

In the modem choice window to use for the connection, select the modem <Connessione diretta RCE $Revision:1.1 $-3> previously configured and press <Next>.

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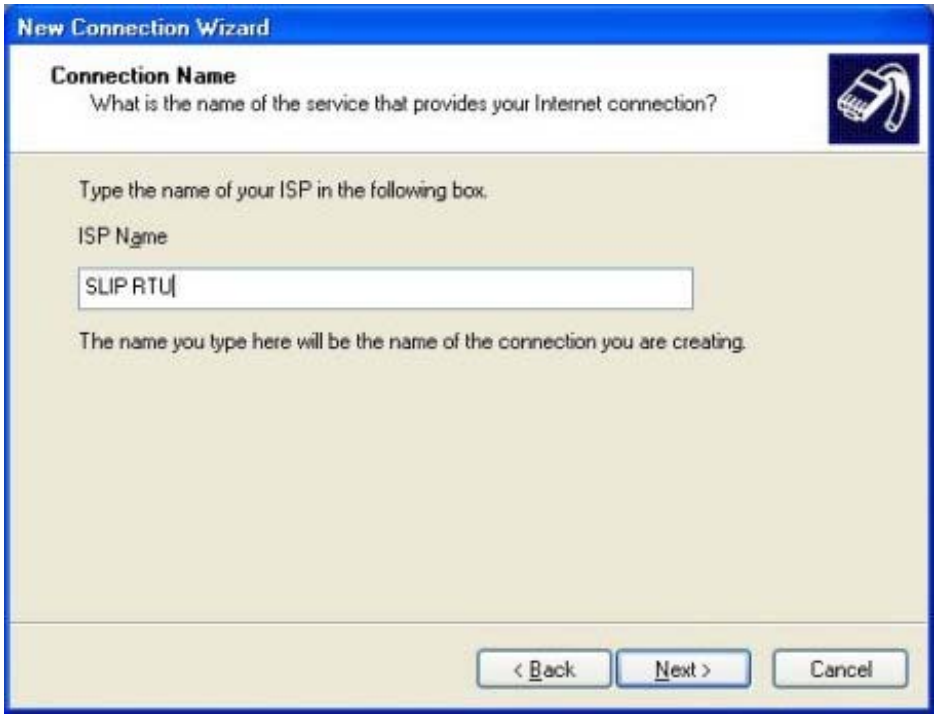
At the successive window call the connection <SLIP RTU> and press <Next>.



In the "Phone number to dial" setting window, edit 0 or leave the field empty and press <Next>.

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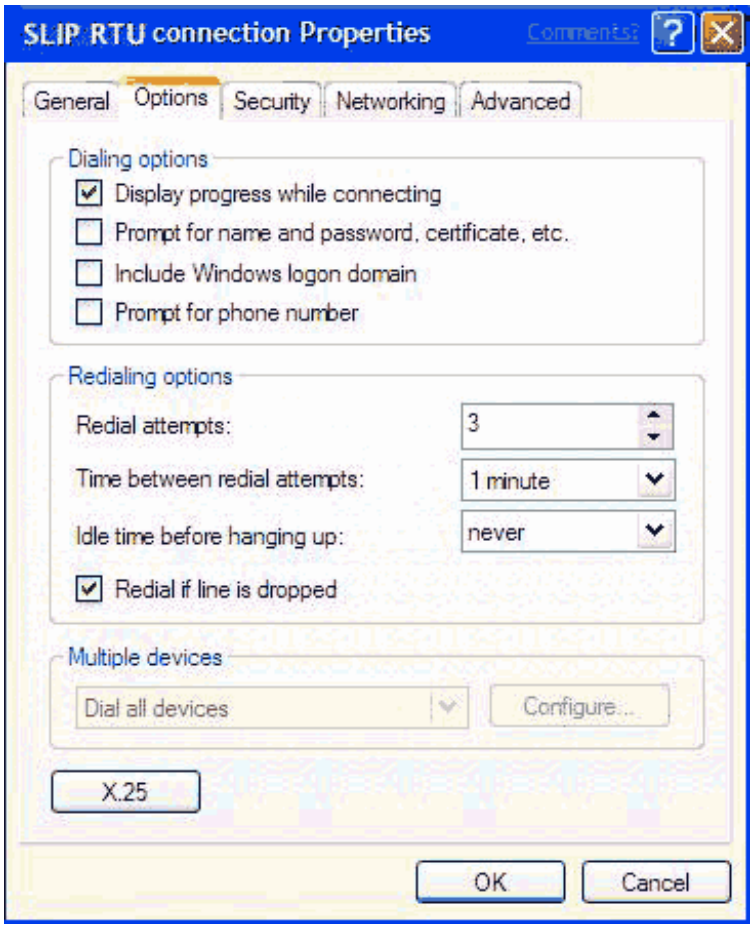
In the "Connection Availability" setting window select <Anyone's use> options and press <Next>.
Finish the remote connection configuration by verifying the displayed data on the last window, then press <Fine>.
The new SLIP RTU connection is displayed in the “Networking” window.

SLIP RTU remote access connection configuration

By pressing the R.H. push-button of the mouse on the SLIP RTU connection enter the *Properties* window and configure as follows:

Options

- Deselect < Prompt for name and password, certificate, etc...> and <Prompt for phone number> fields



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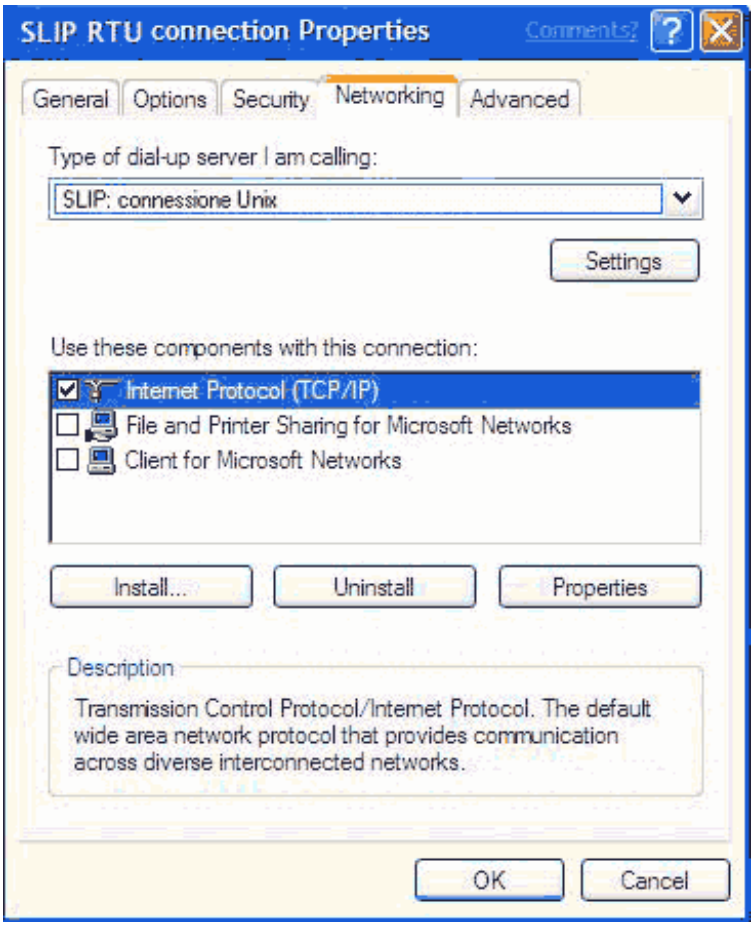
Networking

- Select the connection server <SLIP: UNIX connection>
- Select the <TCP/IP> protocol



- Press the < TCP/IP Properties> and inside this menu:
  - Select <Use the following IP address>
  - Specify <193.9.200.44> as IP address
  - Don't edit the DNS fields

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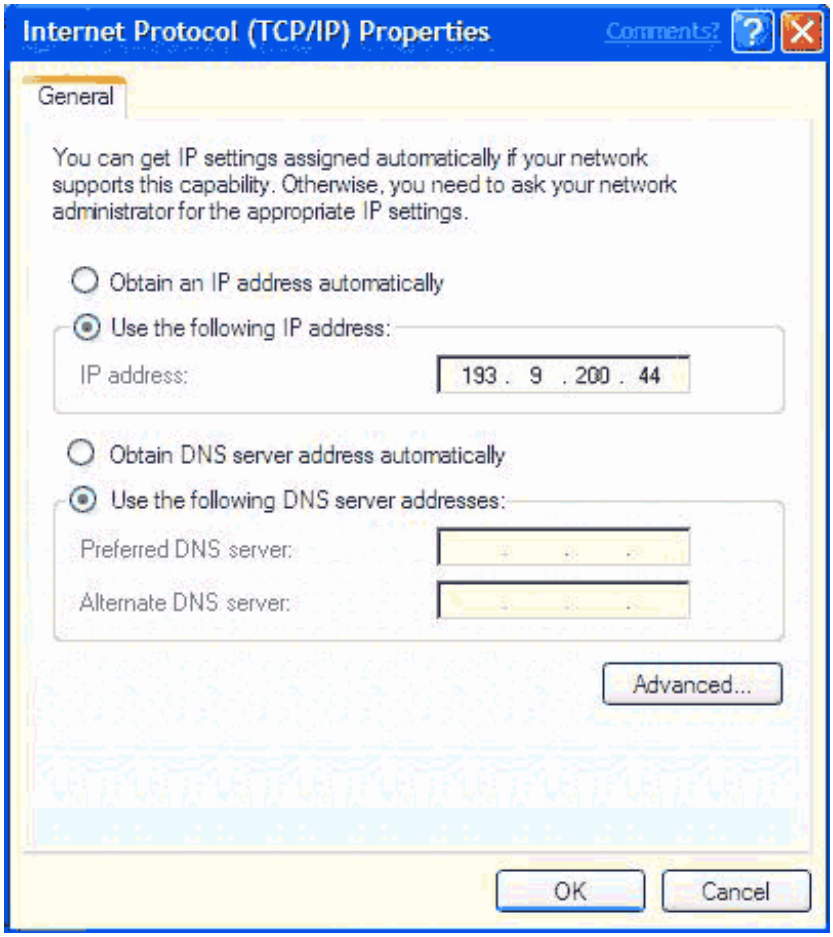

- in the <Advanced> window deselect the options <Use IP header compression> and <Use default gateway on remote network>

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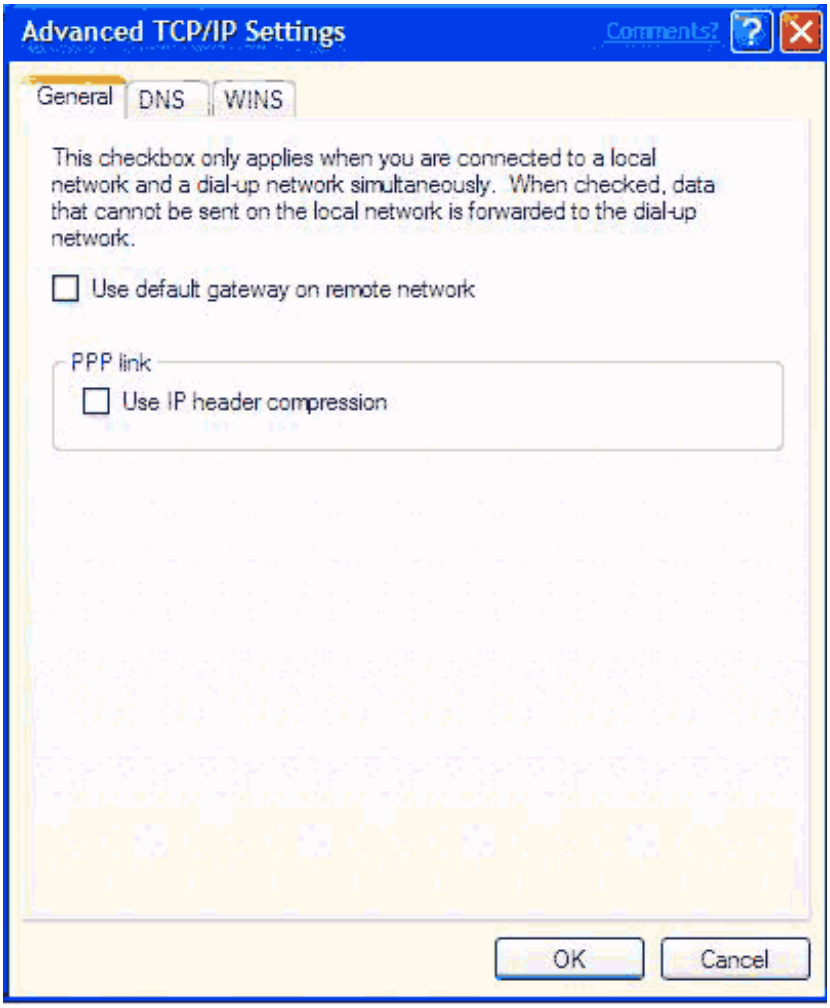

Press <OK> to correctly finish the SLIP RTU remote access.

Connection procedure

Enter the connection with a double click on the SLIP RTU icon in the “Network and Dial-up Connections” window.

A connection window opens, it is not necessary to edit any password, but it is sufficient to press the <Connect> button.

The icontray of remote connection in progress appears on the Windows bar.

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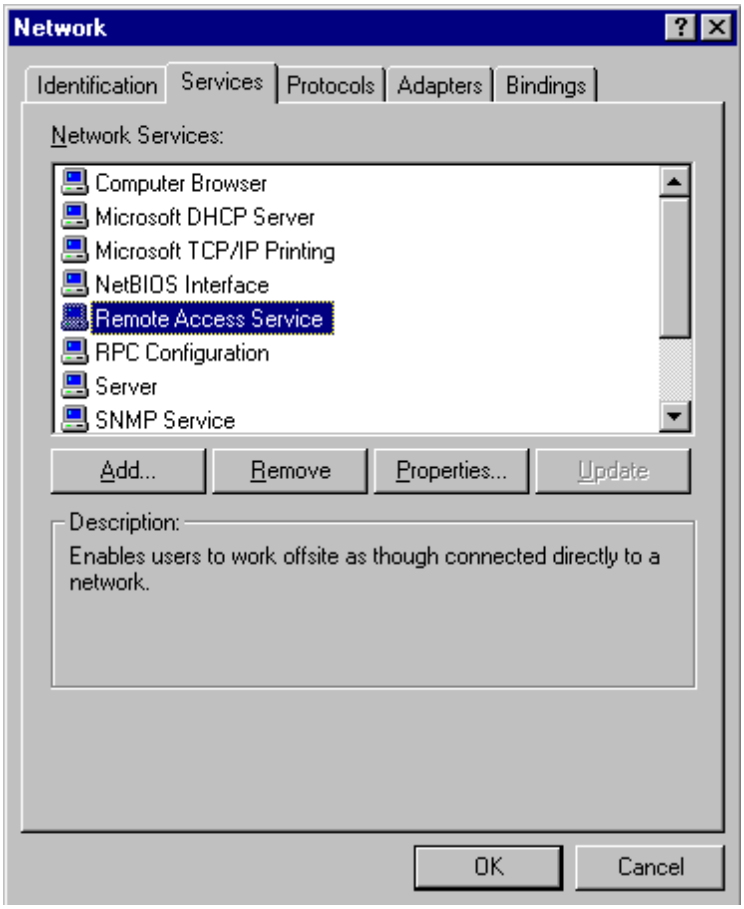
A1.4 WINDOWS NT OPERATING SYSTEM

Modem configuration

As for Windows 2000.

Creation of the SLIP RTU remote access connection

Access to <Network> window, then enter in <Properties> menu and check that the <Remote Access Services (RAS)> item is present in Services; if not, install it from Administrator profile.



Create a new connection by:

<Start>
<Programs>
<Accessories>
<Remote Access>

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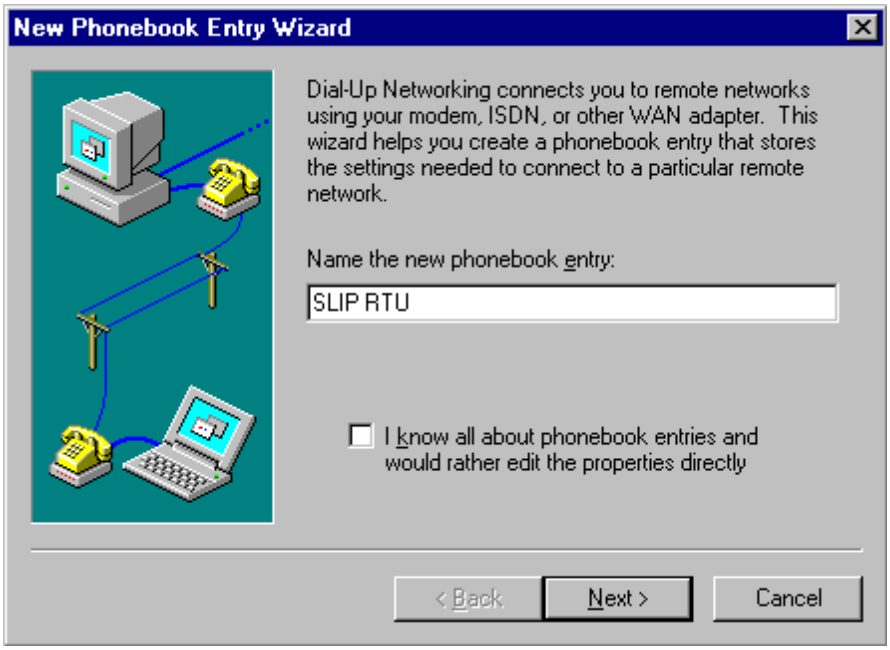
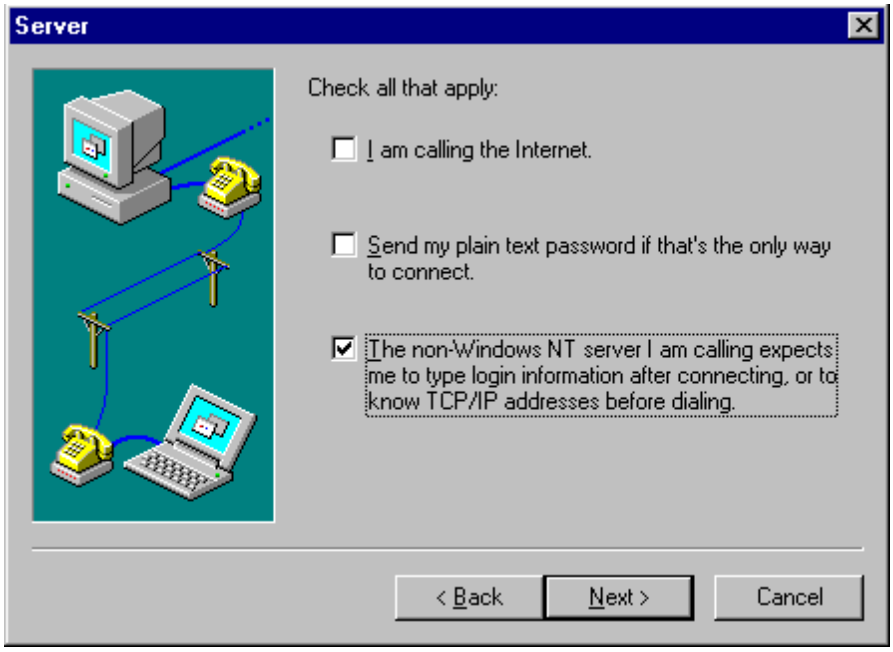
At the opening of the new window, select <New> and name the connection as SLIP RTU, then press <Next>



Select the <The non-Windows NT server I am calling...> option and press <Next>



In the modem selection window, select the <Connessione diretta RCE $Revision:1.1 $-3> modem configured before and press <Next>.

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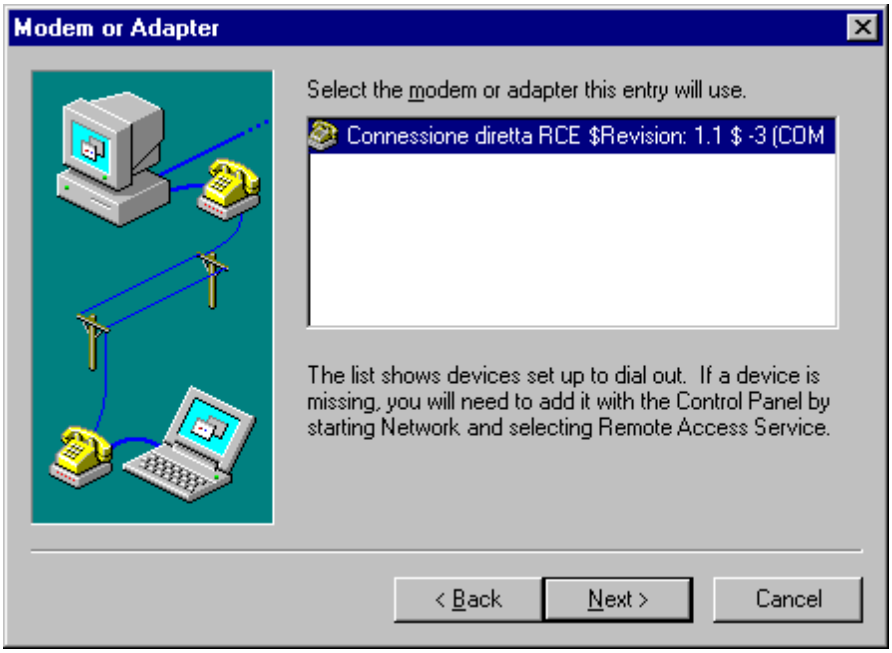

At the request of the telephone number for the connection, do not insert any data.

Press <Next>

In the window for the setting of the communication protocol on the serial line, select the <SLIP> option

Press <Next>

Select the <Non eseguire nessuna procedura> option

Press <Next>

In the window for the configuration of the IP address, enter the <193.9.200.44> address and press <Next>.

Do not fill the next addressing window and press <Next>.

The creation of the remote connection is complete, press <Finish>.

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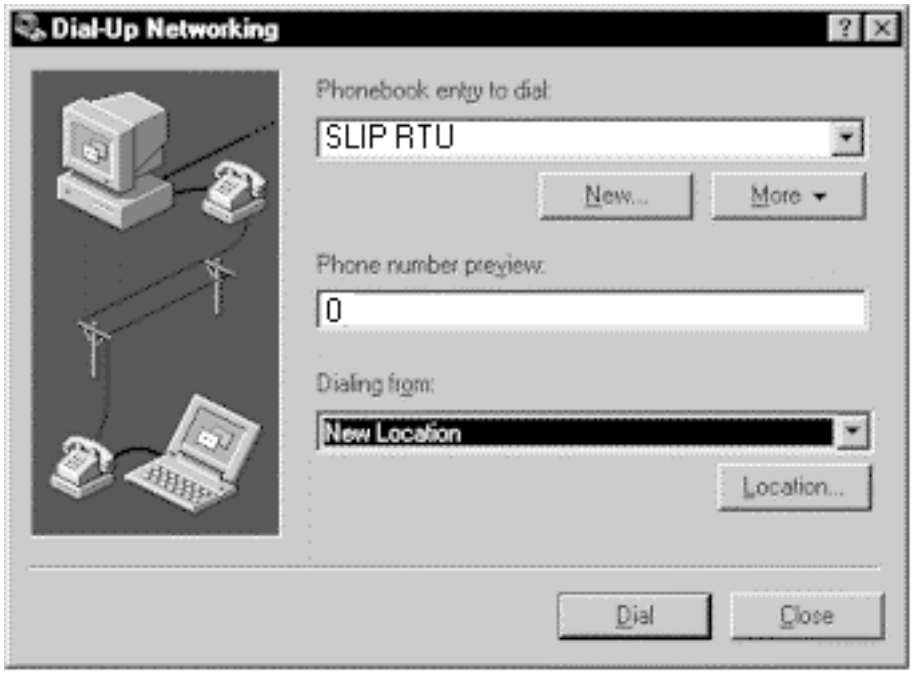
Connection procedure

Access the connection by double click of the mouse on SLIP RTU icon in the “Dial-Up Networking” window.
Verify that “Phonebook entry to dial” is SLIP RTU
Press <Dial>



Note: *It is possible to check the operation of the SLIP RTU remote connection even through a common browser. Typing the **193.9.200.45** IP address in browser address field, it is possible to access to Web Server of STCE/RTU equipment.*

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A2. CORRESPONDENCE BETWEEN ASDU AND ACQUIRED QUANTITIES

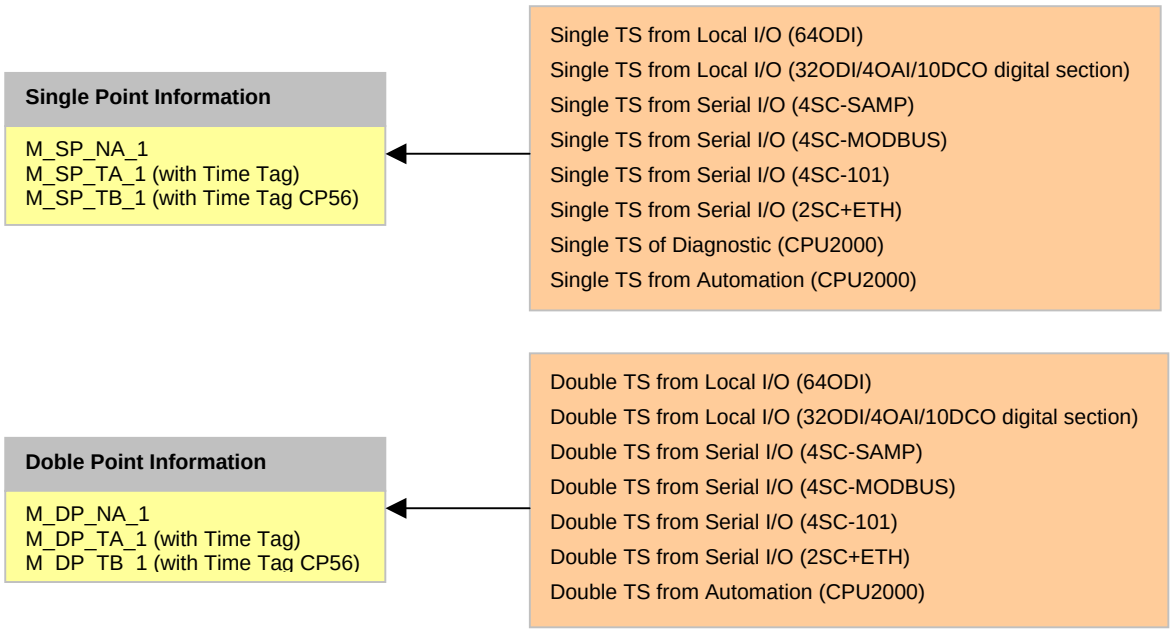
This appendix reports the correspondence between the Application Service Data Unit (ASDU) quantities, which are the applicative quantities used by protocols for the communication with the *IEC60870-5-101* and *IEC60870-5-104* Center, and all the quantities acquired from Local I/O, from Serial I/O, from LAN and calculated or generated inside the equipment.

All the reported ASDUs are meant to be with Time Tag or without Time Tag; furthermore, the *Diagnostic* quantities, related to the equipment diagnostic checked run-time by main CPU, and the *Calculated* quantities are meant to be as result of internal elaborations or of *Automation Logics*.

The following figures display, in brackets, the acronyms of the I/O cards which the quantities are generated from or which the quantities are destined to.

The Time Tag transferred by the equipment is composed by 3 bytes (IEC 60870-5-101 protocol) or in extended format is composed by 7 bytes (*CP56Time2a* IEC 60870-5-101 protocol and IEC 60870-5-104 protocol).

A2.1 QUANTITIES IN MONITOR DIRECTION



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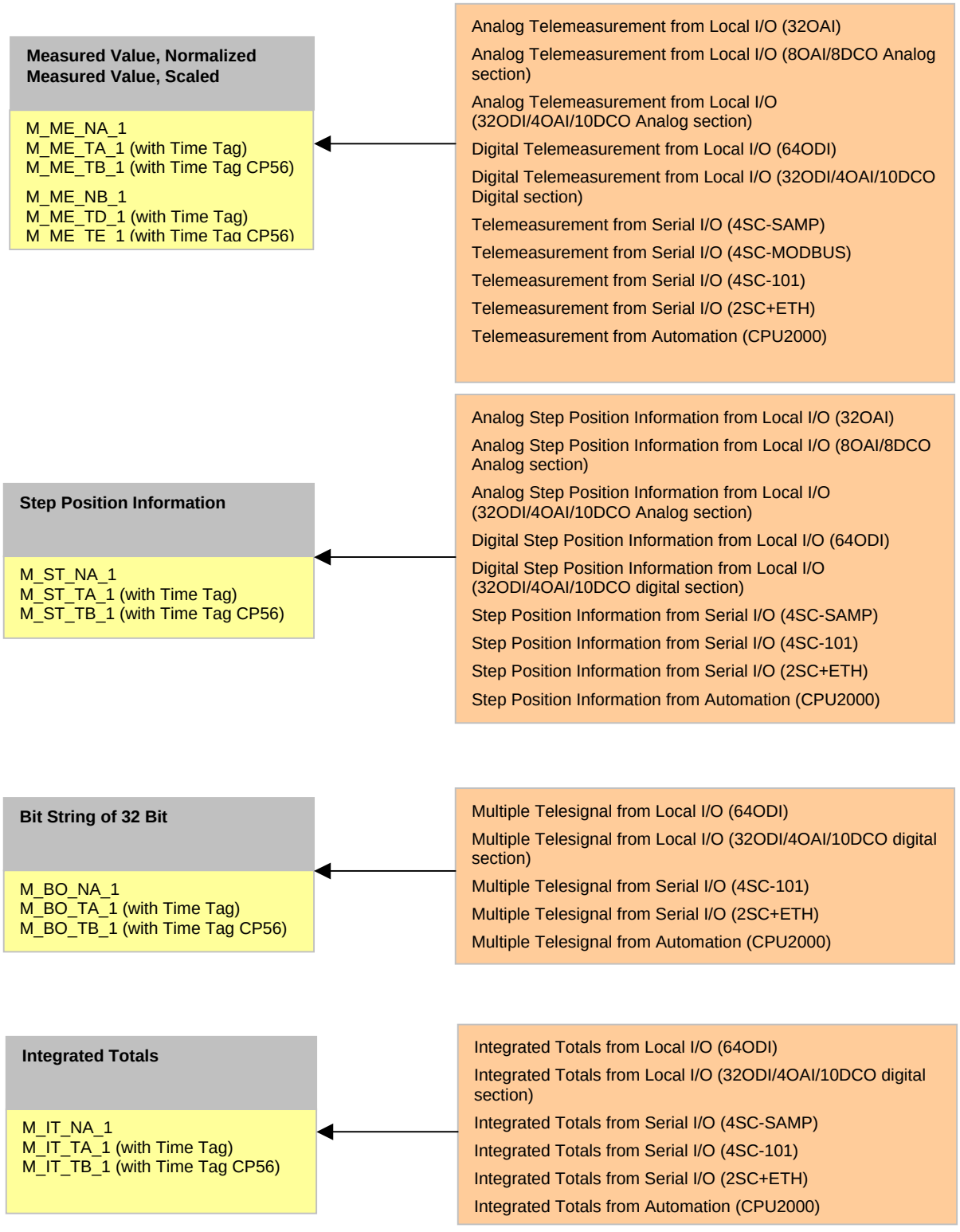

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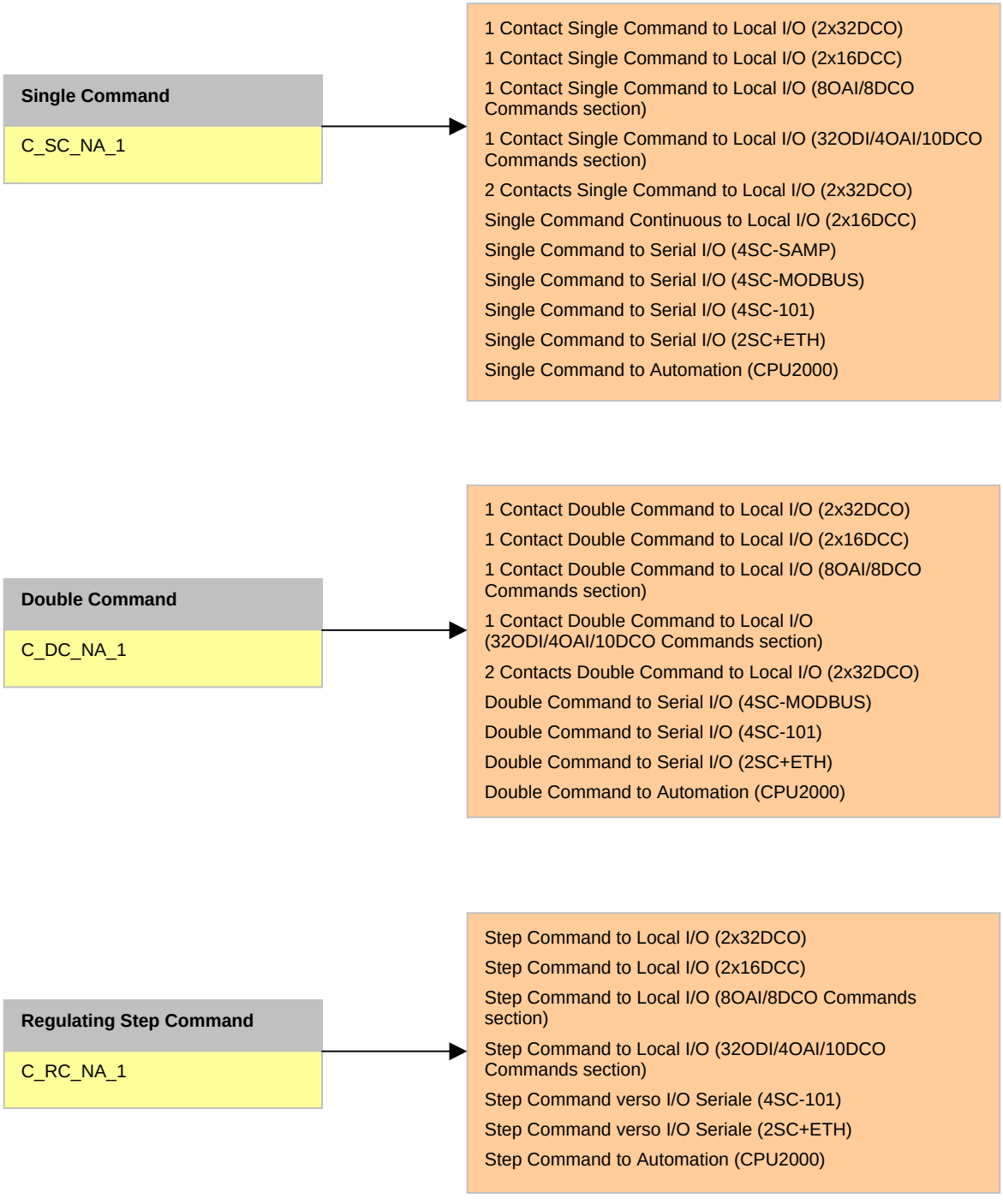
A2.2 QUANTITIES IN CONTROL DIRECTION



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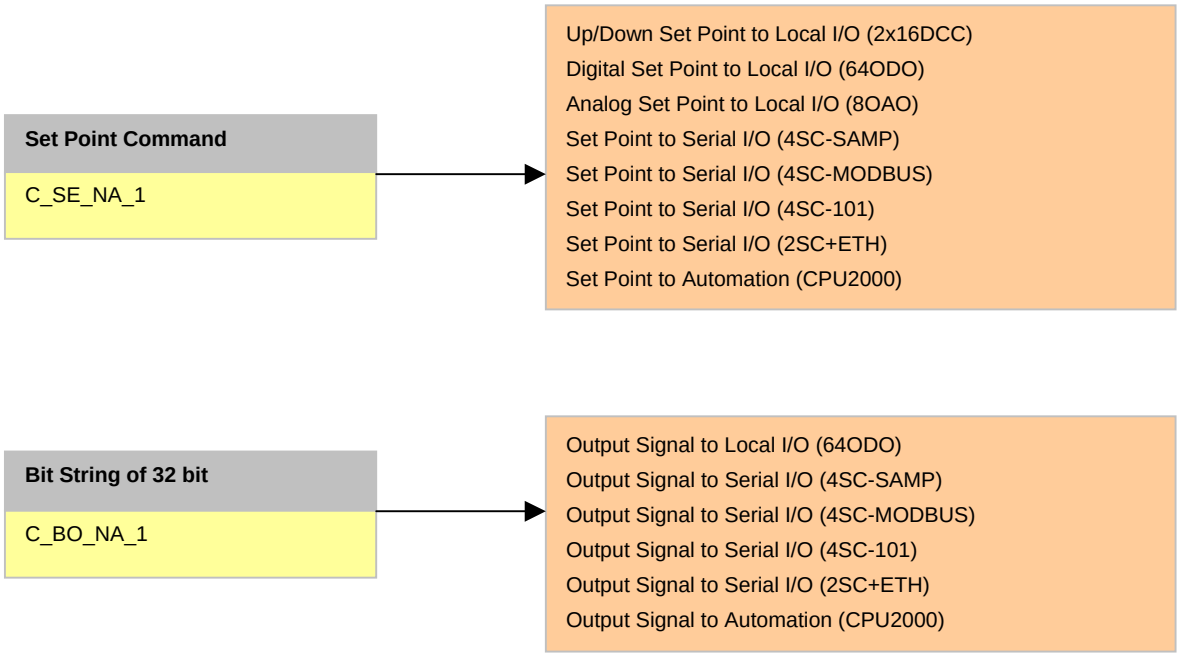

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A3. CORRESPONDENCE BETWEEN LOGIC I/O AND PIN OF OUTPUT CONNECTORS

This appendix reports the correspondence between the logic index of connection of the field points on the I/O cards (see Figure 5-97) and the physical connection of the connectors present on the card frontal.

The details of these connections is reported in DTG.

The following figure displays the pin numeration of the field connectors present on I/O cards, remember that the two connectors are individuated as *Connector A*, the upper one, and *Connector B*, the lower one.

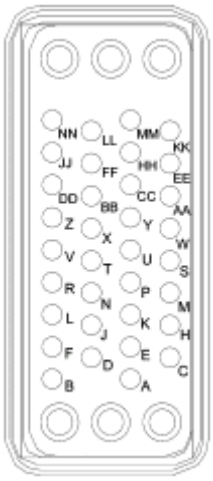

Figure A-1 – 34 Poles connector

The following tables reports the correspondence, for each I/O card, between logic index inside the card and physical connection.

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64ODI unit			
Connector A		**Connector B**	
Logic index	**Pin**	**Logic index**	**Pin**
1	NN	1	NN
2	LL	2	LL
3	JJ	3	JJ
4	FF	4	FF
5	DD	5	DD
6	BB	6	BB
7	Z	7	Z
8	X	8	X
9	V	9	V
10	T	10	T
11	R	11	R
12	N	12	N
13	L	13	L
14	J	14	J
15	F	15	F
16	D	16	D
17	MM	17	MM
18	KK	18	KK
19	HH	19	HH
20	EE	20	EE
21	CC	21	CC
22	AA	22	AA
23	Y	23	Y
24	W	24	W
25	U	25	U
26	S	26	S
27	P	27	P
28	M	28	M
29	K	29	K
30	H	30	H
31	E	31	E
32	C	32	C

64ODO unit			
Connector A		**Connector B**	
Logic index	**Pin**	**Logic index**	**Pin**
1	NN	1	NN
2	LL	2	LL
3	JJ	3	JJ
4	FF	4	FF
5	DD	5	DD
6	BB	6	BB
7	Z	7	Z
8	X	8	X
9	V	9	V
10	T	10	T
11	R	11	R
12	N	12	N
13	L	13	L
14	J	14	J
15	F	15	F
16	D	16	D
17	MM	17	MM
18	KK	18	KK
19	HH	19	HH
20	EE	20	EE
21	CC	21	CC
22	AA	22	AA
23	Y	23	Y
24	W	24	W
25	U	25	U
26	S	26	S
27	P	27	P
28	M	28	M
29	K	29	K
30	H	30	H
31	E	31	E
32	C	32	C

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2x32DCO unit			
Connector A		**Connector B**	
Logic index	**Pin**	**Logic index**	**Pin**
1	NN	1	NN
2	LL	2	LL
3	JJ	3	JJ
4	FF	4	FF
5	DD	5	DD
6	BB	6	BB
7	Z	7	Z
8	X	8	X
9	V	9	V
10	T	10	T
11	R	11	R
12	N	12	N
13	L	13	L
14	J	14	J
15	F	15	F
16	D	16	D
17	MM	17	MM
18	KK	18	KK
19	HH	19	HH
20	EE	20	EE
21	CC	21	CC
22	AA	22	AA
23	Y	23	Y
24	W	24	W
25	U	25	U
26	S	26	S
27	P	27	P
28	M	28	M
29	K	29	K
30	H	30	H
31	E	31	E
32	C	32	C

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2x16DCC unit			
Connector A		**Connector B**	
Logic Index	**Pin**	**Logic Index**	**Pin**
1	NN	1	NN
2	LL	2	LL
3	DD	3	DD
4	BB	4	BB
5	V	5	V
6	T	6	T
7	L	7	L
8	J	8	J
9	MM	9	MM
10	KK	10	KK
11	CC	11	CC
12	AA	12	AA
13	U	13	U
14	S	14	S
15	K	15	K
16	H	16	H

32OAI unit			
Connector A		**Connector B**	
Logic index	**Pin**	**Logic index**	**Pin**
1	NN-LL	1	NN-LL
2	JJ-FF	2	JJ-FF
3	DD-BB	3	DD-BB
4	Z-X	4	Z-X
5	V-T	5	V-T
6	R-N	6	R-N
7	L-J	7	L-J
8	F-D	8	F-D
9	MM-KK	9	MM-KK
10	HH-EE	10	HH-EE
11	CC-AA	11	CC-AA
12	Y-W	12	Y-W
13	U-S	13	U-S
14	P-M	14	P-M
15	K-H	15	K-H
16	E-C	16	E-C

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8OAO unit	
Connector A	
Logic Index	**Pin**
1	NN-LL
2	JJ-FF
3	DD-BB
4	Z-X
5	V-T
6	R-N
7	L-J
8	F-D

8OAI/8DCO unit		
Connector A		
	Logic Index	**Pin**
MEASUREMENTS	1	MM-KK
	2	HH-EE
	3	CC-AA
	4	Y-W
	5	U-S
	6	P-M
	7	K-H
	8	E-C
COMMANDS	1	NN
	2	LL
	3	JJ
	4	FF
	5	DD
	6	BB
	7	Z
	8	X

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32ODI/4OAI/10DCO unit					
Connector A			Connector A		
	Logic Index	Pin		Logic Index	Pin
COMMANDS	1	NN	SIGNALS	1	NN
	2	LL		2	LL
	3	JJ		3	JJ
	4	FF		4	FF
	5	DD		5	DD
	6	BB		6	BB
	7	Z		7	Z
	8	X		8	X
	9	V		9	V
	10	T		10	T
				11	R
				12	N
				13	L
				14	J
				15	F
				16	D
MEASUREMENTS	1	MM-KK		17	MM
	2	HH-EE		18	KK
	3	CC-AA		19	HH
	4	Y-W		20	EE
	5	*U-S*[4]		21	CC
	6	*P-M*		22	AA
	7	*K-H*		23	Y
	8	*E-C*		24	W
				25	U
				26	S
				27	P
				28	M
				29	K
				30	H
				31	E
				32	C

[4] The couplet of Pin U-S, P-M, K-H, E-C are not configurable at the moment

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A4. SAMP/SASP PROTOCOL ON 4SC

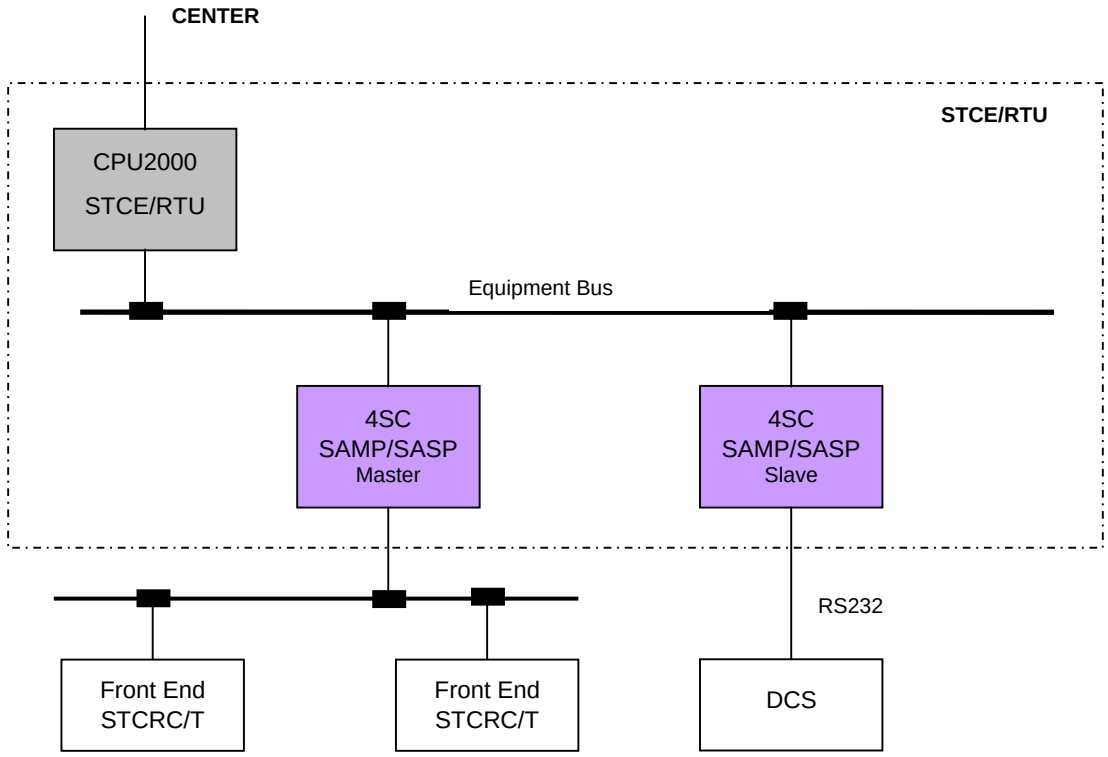
A4.1 OVERVIEW

The software of the 4SC-SAMP card realizes, depending on the configuration, the following proprietary protocols of Selta S.p.A.:

- SAMP Master protocol
- SAMP Slave protocol
- SASP Master protocol
- SASP Slave protocol

The four protocols can be instanced, in fully independent way, on each one of the four available serial ports of the card.

The following figure displays the system configurations that can be implemented.



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A4.2 SAMP MASTER PROTOCOL

The SAMP (Selta Asynchronous Multi-point Protocol) communication protocol has the purpose to connect, generally by a multidrop connection, the STCE/RTU equipments to the different SELTA Front-Ends (STCR-T and STCR-C).

The proposed multidrop connection realizes, from the functional point of view, a mini local network, with a lot of restrictions due both to the hardware characteristics of the connection and to the need not to make heavy the software protocol that must be implemented and to maintain a good network efficiency.

The characteristics of this mini-network allow an high number of interfaceable F/E (up to 32).

At physical level, the protocol uses the RS422 standard in Half Duplex configuration. In this configuration, the 4SC node is connected in transmission and in reception to all the STCR nodes. The connection allows the connection of the Rx and Tx lines and of two control lines, one in output and one in input to each network node.
The configuration to set on the serial line is the following:

- Asynchronous Protocol
- 8 bits data
- Even parity
- 1 Stop bit
- 19.200 Baud

A4.3 SAMP SLAVE PROTOCOL

The SAMP communication protocol has in this application the purpose to connect, generally by a point-to-point connection, the STCE/RTU equipment to a DCS that assumes the Master Station role.

At physical level, the protocol uses the RS232 standard in Half Duplex configuration.
The connection allows the connection of the Rx and Tx lines and of two control lines, one in output and one in input to each network node.

The configuration to set on the serial line is the following:

- Asynchronous Protocol
- 8 bits data
- Even parity
- 1 Stop bit
- 19.200 Baud

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A4.4 SASP MASTER PROTOCOL

The SASP (Selta Asynchronous Single-point Protocol) communication protocol in this application has the purpose to connect, by a bi-directional point-to-point connection, the STCE/RTU equipment to a STCR-T Peripheral Point or to the different types of SELTA Front-End (STCR-T and STCR-C) configured to operate with SASP Slave protocol.

The connection allows that STCE/RTU equipment, and more precisely its 4SC card, operates as Master and the STCR equipment acts as Slave.

At physical level, the protocol uses the RS232 standard in Half Duplex configuration.
The connection allows only the connection of the Rx and Tx lines, no control signals are available.

The configuration to set on the serial line is the following:

- Asynchronous Protocol
- 8 bits data
- Even parity
- 1 Stop bit
- 9.600 Baud

A4.5 SASP SLAVE PROTOCOL

The SASP communication protocol in this application has the purpose to connect, by a bi-directional point-to-point connection, the STCE/RTU equipment to a DCS that assume the role of Master Station.

The SASP protocol on the 4SC card assumes the Slave role only as what regards the information transmission modality (the protocol on DCS determines the connection and executes the polling), while it operates as centre respect to the telecontrol information flow.

At physical level, the protocol uses the RS232 standard in Half Duplex configuration.
The connection allows only the connection of the Rx and Tx lines, no control signals are available.

The configuration to set on the serial line is the following:

- Asynchronous Protocol
- 8 bits data
- Even parity
- 1 Stop bit
- 9.600 Baud

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A4.6 RE-MAPPING OF THE APPLICATIVE INFORMATION

The telecontrol applicative on the 4SC-SAMP card must translate the applicative information acquired by SAMP/SASP protocol to the format used on the equipment internal bus and vice versa.

On the internal Bus, the information are transported as ASDU, in a format very similar to that used in the IEC60870-5-101 and IEC60870-5-104 standard protocols while on the SAMP/SASP protocols the information format is proprietary and described in the related documentation.

Each information on the internal Bus, and in the Database of the STCE/RTU equipment, is univocally individuated by its own *Information Object Address (Point Index).*
Each information inside the SAMP/SASP protocols is univocally individuated by its own [5] *SAMP Index*.
For each different information typology, both *Information Object Address* and *SAMP Index* restart from zero.

The configuration to set for each serial connection on 4SC with SAMP or SASP protocol consists mainly in realizing the correspondence between the SA*MP Index* and the *Information Object Address*.

The following figure shows the correspondence between the applicative information transported on the equipment internal Bus and those transported by the SAMP/SASP protocols when the 4SC card operates as Master Station/ SAMP/SASP Master protocols).

[5] Even for the information exchanged with SASP protocol, *SAMP Index* always rules.

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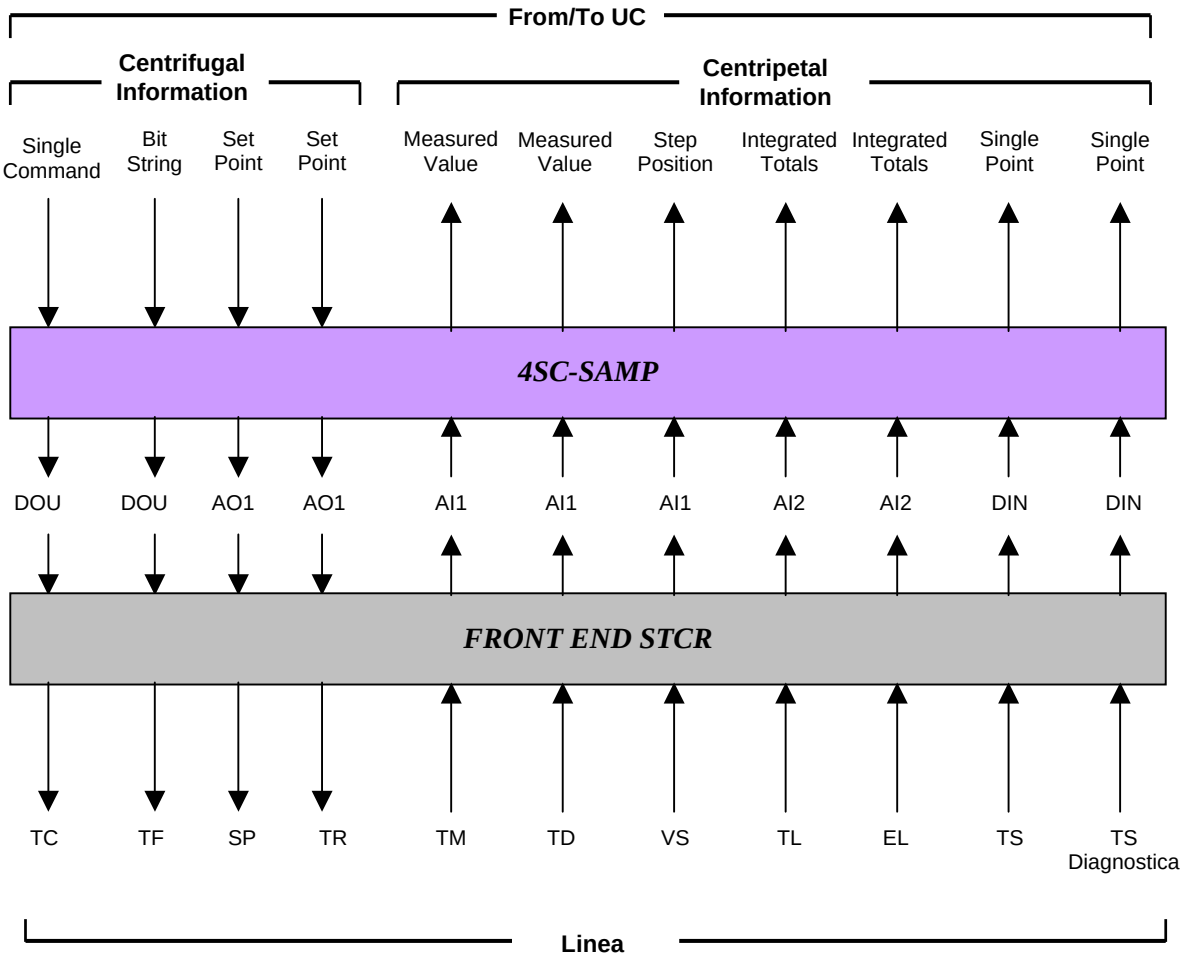

Where: The *Centrifugal Information* coincide with those in *Control Direction*;
The *Centripetal Information* coincide with those in *Monitor Direction*.

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A5. IEC60870-5-101 MASTER PROTOCOL AND IEC60870-5-104 MASTER ON 4SC AND 2SC+ETH

A5.1 SYSTEM ARCHITECTURE

The software of 4SC-101 card realizes the *IEC60870*-5-101 standard protocol that can be instanced, in fully independent way, on each one of the four available serial ports of the card (COM1, COM2, COM3 and COM4).

The software of 2SC+ETH card realizes:

- the IEC60870-5-101 standard protocol that can be instanced, in fully independent way, on each one of the two available serial ports of the card (COM1, COM2)
- the IEC60870-5-104 standard protocol that can be instance don the serial ETH port available on the card

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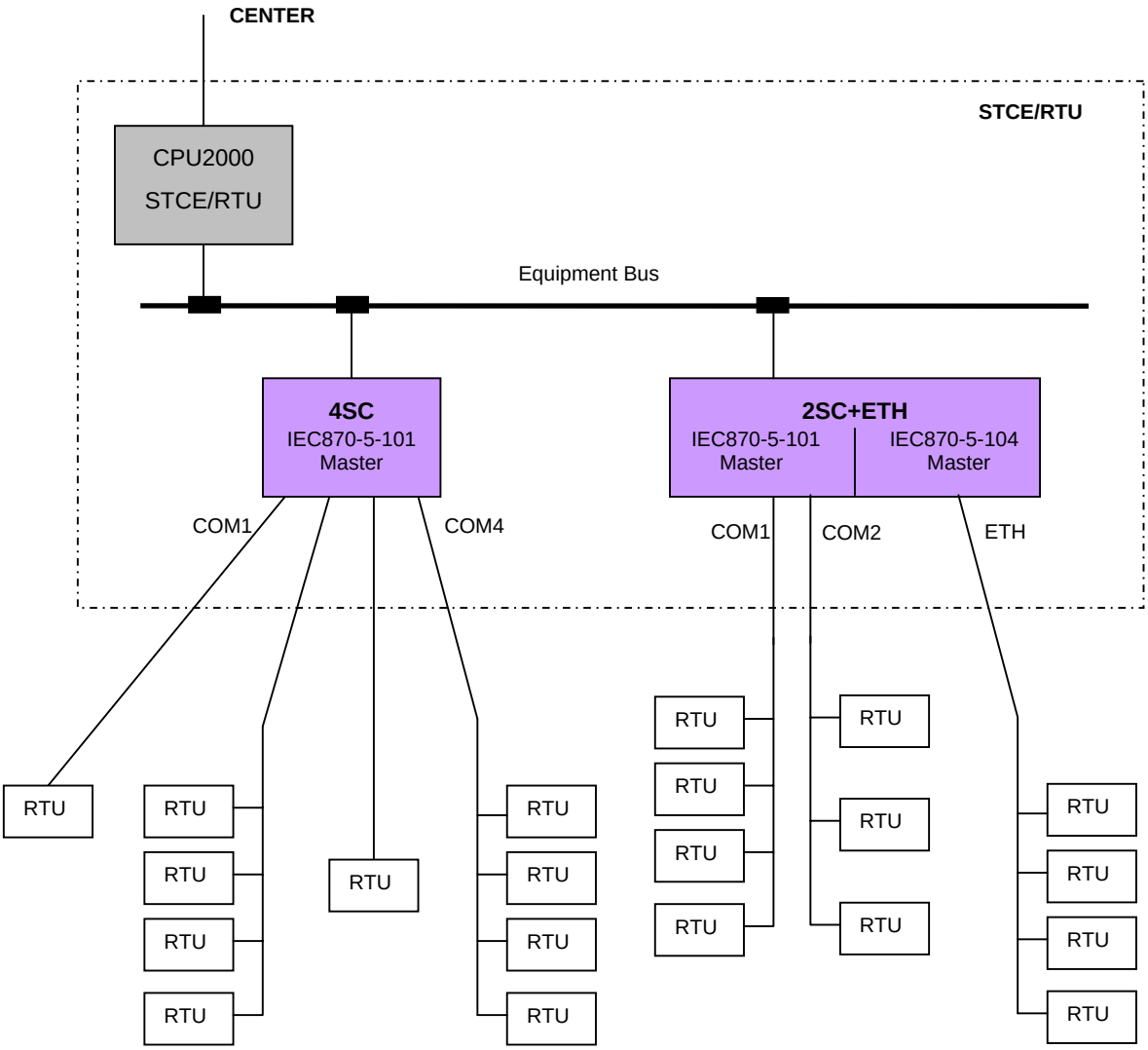
The following figure displays the system configuration that can be realized.



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A5.2 RE-MAPPING OF THE APPLICATIVE INFORMATION

The remote control applications present on the 4SC-101 and 2SC+ETH cards must traduce applicative information acquired by the IEC60870-5-101 Master and IEC60870-5-104 Master protocols in the format used on the internal equipment Bus and vice versa.

On the internal Bus, the information are transported as ASDU, in a format very similar to that used in the IEC60870-5-101 and IEC60870-5-104 standard protocols, therefore there is a univocal correspondence of the information.

Each information on the internal Bus, and in the Database of the STCE/RTU equipment, is univocally individuated by its own *Information Object Address (Point Index)* related to the protocol for the communication towards the Center.
Each information inside the *IEC60870*-5-101 Master and IEC60870-5-104 Master protocol of 4SC-101 and 2SC+ETH is univocally individuated by its own *Information Object Address (IEC Index)* related to the protocol for the communication with the remote equipment (Slave).

For each different information typology, both *Information Object Address* and *SAMP Index* restart from zero.

The configuration to set for each serial connection on 4SC and 2SC+ETH with *IEC60870*-5-101 Master and IEC60870-5-104 Master protocol consists mainly in realizing the correspondence between the *Information Object Address* related to the two protocols.

The following figure shows the correspondence between the applicative information transported on the serial connection realized with *IEC60870*-5-101 Master and IEC60870-5-104 Master protocol.

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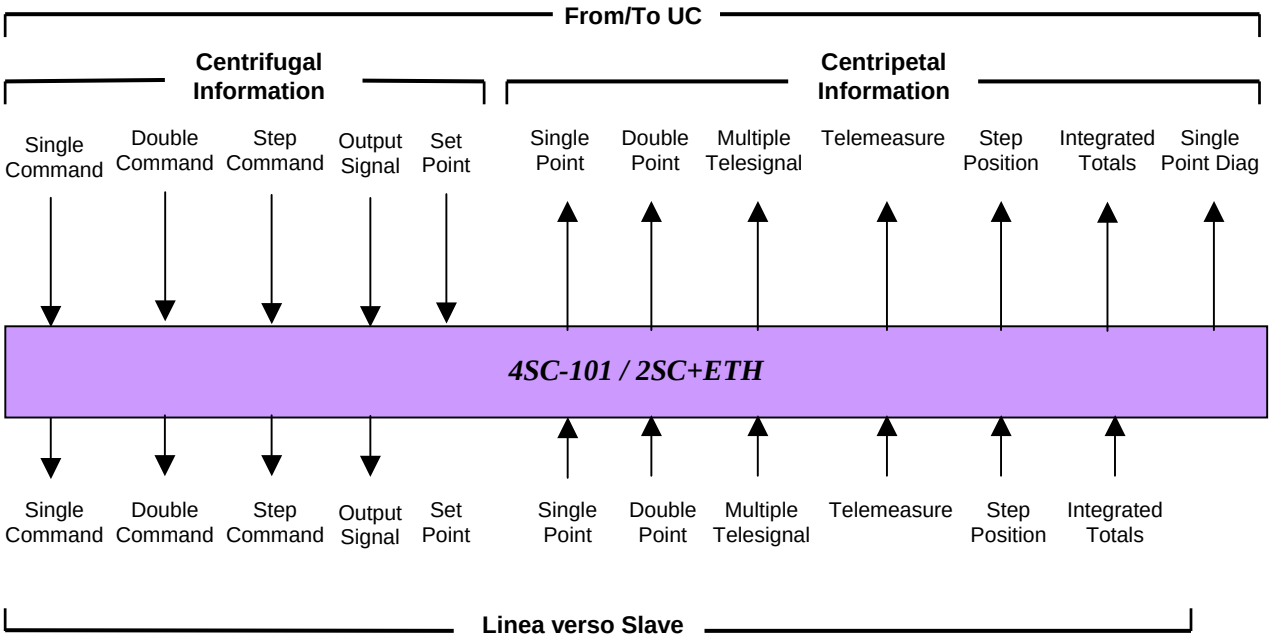

Where: The *Centrifugal Information* coincide with those in *Control Direction*;
The *Centripetal Information* coincide with those in *Monitor Direction*.

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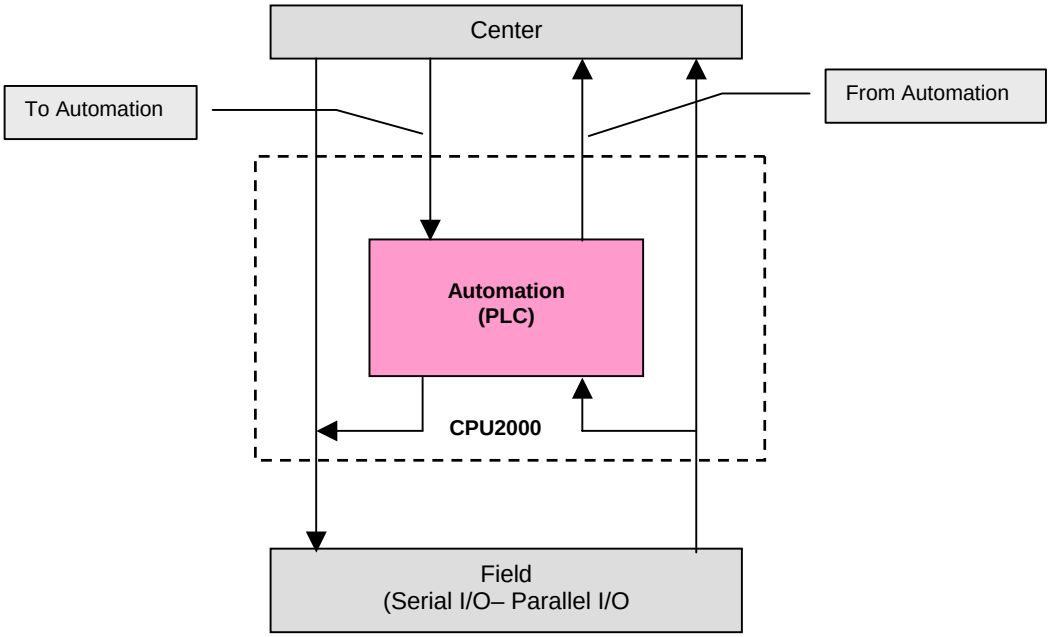
A6. AUTOMATIONS

"Automations" stands for the PLC performance that can be configured in the Central Unit software of STCE/RTU Equipment.

In the relationship among the information exchanged with the Center, information exchanged with the Field and information managed by the Automations, we can individuate the following cases:

- Information coming from Center and destined only to Automations
- Information, coming from Center, destined to the field and that can interest also the Automations
- Information generated by Automations and destined only to Center
- Information generated by Field destined both to Center and to Automations

What described before is displayed in the following figure.



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