

MV network management

Easergy range

L500 V5.0

External devices management

Advanced user's manual

The image displays the Easergy L500 system software interface. On the left, a circular graphic contains four images of industrial and urban infrastructure. The main window shows a 3D perspective view of a power distribution system with various components like transformers, switchgear, and overhead lines. A status table is visible at the top of the interface, listing system parameters and alarm statuses.

Schneider Electric		Vue d'ensemble		
2303204	19.08.25.422	Alarme au réseau	Système alarmes équipements	1200 kVArh
2303204	19.08.25.422	Alarme au réseau	Système détecteur de défaut	1200 kVArh
2303204	19.08.25.422	Alarme au réseau	Système alarmes Appareils	4x RA 2
2303204	19.08.25.422	Alarme au réseau	Système détecteur de défaut	En veille
2303204	19.08.25.422	Alarme au réseau	Système alarmes équipements	En veille
2303204	19.08.25.422	Alarme au réseau	Système détecteur de défaut	En veille

CONTENTS

1	INTRODUCTION	3
2	MODIFYING T200 DEVICES IN FREE MODE (MODBUS PROTOCOL)	4
3	CREATING EXTERNAL DEVICE FRAMES (MODBUS PROTOCOL)	5
3.1	T200 in FREE mode	5
3.2	Frame format:	5
3.3	Access rights:	6
3.4	Address definition:	6
3.5	Frame operating mode:	7
4	CREATING EXTERNAL DEVICE VARIABLES (MODBUS PROTOCOL)	10
4.1	Variables selector:	10
4.2	Creating a variable:	10
5	CREATING EXTERNAL DEVICE VARIABLES (IEC PROTOCOL)	19
5.1	Variables selector:	19
5.2	Creating a variable:	19
6	LINKING SYMBOLS TO VARIABLES (MODBUS AND IEC PROTOCOLS)	28
6.1	Creation of a symbol linked to a TCD:	28
6.2	Creation of a symbol linked to a TSD:	30
6.3	Creation of a symbol linked to a TM (or AI):	31
6.4	Creation of a symbol linked to a TSS (or DI):	32

1 Introduction

The standard version of the L500 system was originally designed to be included only in devices of the Easergy product range (T200I, T200P, F200C, G200,...).

The Easergy L500 Configurator provided with the L500 Monitoring system makes it possible to generate automatically all the project components relating to these devices (variables, symbols, etc.), without necessarily needing to have a great knowledge of the basic supervision system from which the L500 was designed.

However, it is possible, as system expert, to incorporate external devices linked to T200 devices (e.g. SEPAM, OTB, PM800) accessible via local communication in Modbus protocol from the T200 via the RS232/RS485 dedicated port.

To do this it is necessary to perform a minimum of configuration and customization of the L500 project to manage these external devices.

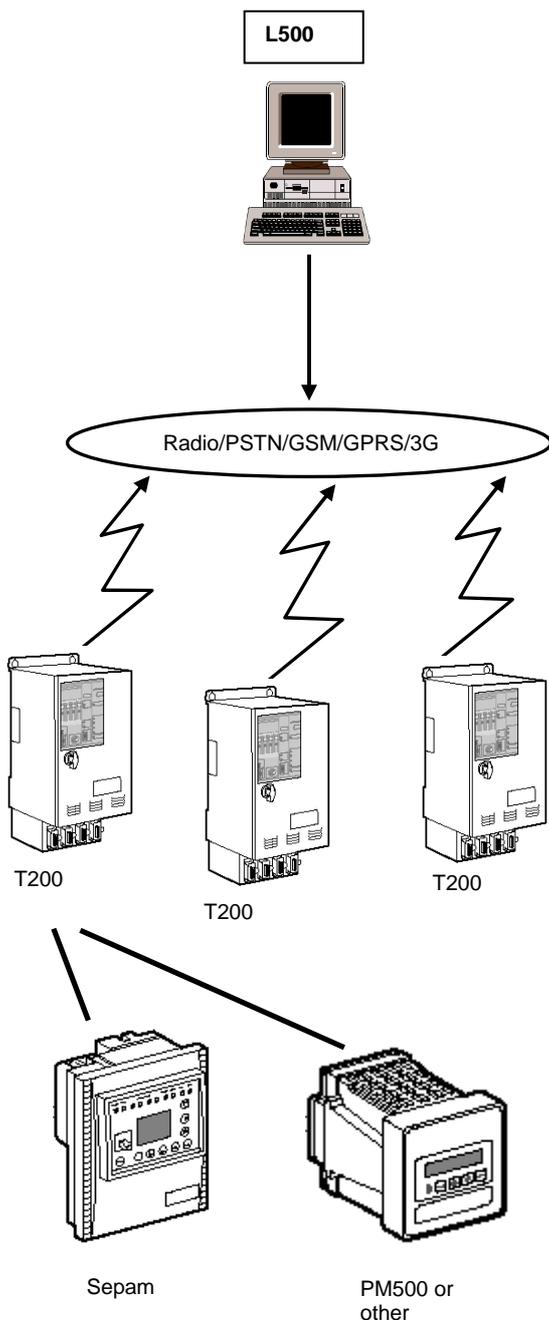
This manual describes the various operations for modification of the project in order to incorporate these external devices. To do so, simply follow the various instructions set out in the following chapters.

In this manual, we will take the example of a T200 to configure the L500 project to integrate external devices.

But, the method could also be applied to F200C which has the same possibilities in terms of management and communication regarding external devices.

The addition of auxiliary equipments in a L500 project is possible whatever the type of protocol supported by the L500 for the link with devices (T200, F200C, G200,...), is to say either Modbus/Modbus IP protocol or IEC101/104 protocol. The methods are however somewhat different depending on the type of protocol used. Both methods are described in this document.

Important note: Full details of the operation will not necessarily be explained in detail in this manual. Some functions (e.g. creation of symbols, addition of variables, etc.) in particular from part of basic knowledge of Supervision system and will not be described explicitly. An online help facility, that can be consulted on the L500 Monitoring system (access via the F1 key), is nevertheless available for any further information you might require on the basic system functions.



2 Modifying T200 devices in FREE mode (Modbus protocol)

Be careful : this chapter is not concerned by the IEC101/104 protocol of communication used for connection to remote equipments.

To be able to add the frames needed for interrogation of external devices, the T200 devices should be converted into FREE type equipment (instead of T200 type), i.e. the T200 should be made configurable in terms of adding frames.

2.1.1 Operating procedure:

■ In the "C:\Schneider electric\L500 Supervisor\Usr\NomProjet\C" directory, the following files should be modified :

□ COMM.dat

■ Open this file using Windows Notepad for example and modify the lines starting with "EQT" as follows (T200-> FREE):

Before modification:

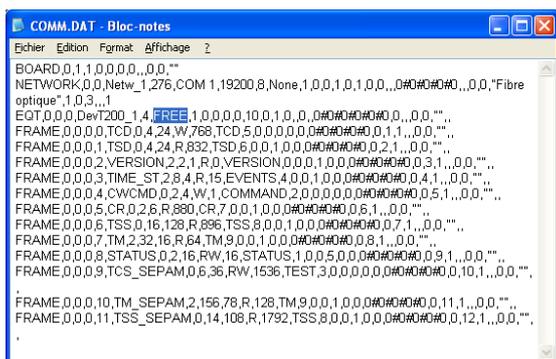
EQT,0,0,0,DevT200_1,4,T200,1,0,0,0,0,10,0,1,0,,0,0#0...

After modification :

EQT,0,0,0,DevT200_1,4,FREE,1,0,0,0,0,10,0,1,0,,0,0#0...

■ Save the file once the modification has been performed.

Note: Make sure you don't modify any other item in the file, since this could corrupt the file.

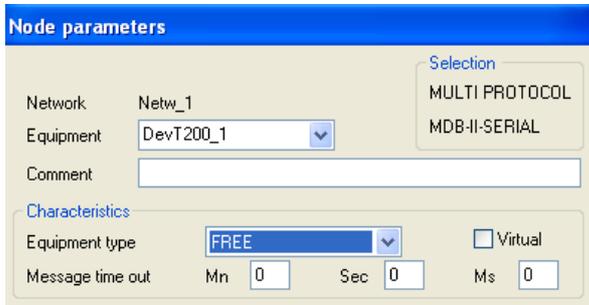


```

BOARD,0,1,1,0,0,0,0,,0,0,""
NETWORK,0,0,Netw_1,276,COM,1,19200,8,None,1,0,0,1,0,1,0,0,,0#0#0#0#0,,0,0,"Fibre
optique",1,0,3,,1
EQT,0,0,0,DevT200_1,4,FREE,1,0,0,0,0,10,0,1,0,,0,0#0#0#0#0,,0,0,""
FRAME,0,0,0,0,TCD,0,4,24,W,768,TCD,5,0,0,0,0,0,0#0#0#0#0,0,1,1,,0,0,""
FRAME,0,0,0,1,TSD,0,4,24,R,832,TSD,6,0,0,1,0,0,0#0#0#0#0,0,2,1,,0,0,""
FRAME,0,0,0,2,VERSION,2,2,1,R,0,VERSION,0,0,0,1,0,0,0#0#0#0#0,0,3,1,,0,0,""
FRAME,0,0,0,3,TIME_ST,2,8,4,R,15,EVENTS,4,0,0,1,0,0,0#0#0#0#0,0,4,1,,0,0,""
FRAME,0,0,0,4,CVCM,0,2,4,W,1,COMMAND,2,0,0,0,0,0,0#0#0#0#0,0,5,1,,0,0,""
FRAME,0,0,0,5,CR,0,2,8,R,880,CR,7,0,0,1,0,0,0#0#0#0#0,0,6,1,,0,0,""
FRAME,0,0,0,6,TSS,0,16,128,R,896,TSS,8,0,0,1,0,0,0#0#0#0#0,0,7,1,,0,0,""
FRAME,0,0,0,7,TM,2,32,16,R,64,TM,9,0,0,1,0,0,0#0#0#0#0,0,8,1,,0,0,""
FRAME,0,0,0,8,STATUS,0,2,16,RW,16,STATUS,1,0,0,5,0,0,0#0#0#0#0,0,9,1,,0,0,""
FRAME,0,0,0,9,TCS_SEPAM,0,6,36,RW,1636,TEST,3,0,0,0,0,0,0#0#0#0#0,0,10,1,,0,0,""
FRAME,0,0,0,10,TM_SEPAM,2,156,78,R,128,TM,9,0,0,1,0,0,0#0#0#0#0,0,11,1,,0,0,""
FRAME,0,0,0,11,TSS_SEPAM,0,14,108,R,1792,TSS,8,0,0,1,0,0,0#0#0#0#0,0,12,1,,0,0,""

```

3 Creating external device frames (Modbus protocol)



Be careful : this chapter is not concerned by the IEC101/104 protocol of communication used for connection to remote equipments.

- Start the L500 Supervisor and open the project to be modified.
- Open a session as administrator.
- Press the "F6" key to access the configuration menus.
- Open the "Configure -> Communication -> Equipment" menu.
- A "Select communication objects" window then opens on screen.

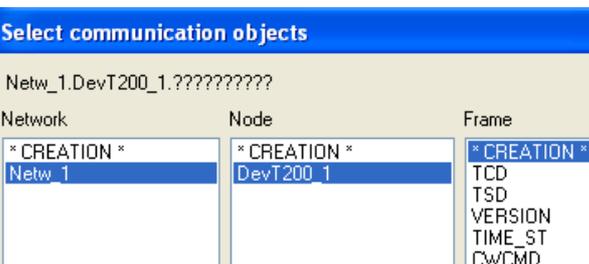
3.1 T200 in FREE mode



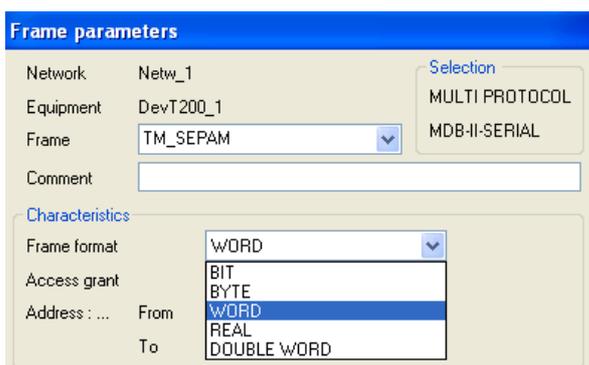
- Select the name of the network containing the device to be modified in the "Network" column.
- Double-click on the name of the device to be modified in the "Node" column.
- Check that the device type displayed is indeed "FREE".
- Click on "Cancel" to go back to the previous window.

Note: It is possible to know the correspondence between the internal names of each object of the system and the titles defined by the person who created the project, by consulting the "ItemNamesCorrespondence.dat" file located in the "C:\Schneider Electric\L500 Supervisor\Usr\ProjectName\TP" directory, where "ProjectName" is the name of the project to be modified.

3.2 Frame format:



- Click on "* CREATION*" in the "Frame" column.
- In the "Frame" field, enter the name of the frame to be created. **Note:** In principle, to keep the terminology logical, give a name consisting of the frame type followed by the external device type (e.g. "TM_SEPAM", "TCS_SEPAM", "TSS_SEPAM" for the SEPAM frames of a T200).
- Choose the frame format wanted according to the associated frame type (see table below):



Frame type	Frame format
TCD	BIT
TCS	BIT
TSD	BIT
TSS	BIT
TM (and counter) 16 bits	WORD
TM (and counter) 32 bits	DOUBLE WORD

Frame parameters

Network: Netw_1
 Equipment: DevT200_1
 Frame: TCS_SEPAM
 Comment:

Selection: MULTI PROTOCOL
 MDB-II-SERIAL

Characteristics:
 Frame format: BIT
 Access grant: Read Write

Frame parameters

Network: Netw_1
 Equipment: DevT200_1
 Frame: TSS_SEPAM
 Comment:

Selection: MULTI PROTOCOL
 MDB-II-SERIAL

Characteristics:
 Frame format: BIT
 Access grant: Read Write

3.3 Access rights:

■ Choose the type of access by selecting the "Read" and "Write" options according to the frame type configured (see table below):

Frame type	Read	Write
TCD		X
TCS	X	X
TSD	X	
TSS	X	
TM (and counter) 16 bits	X	(X)*
TM (and counter) 32 bits	X	(X)*

* : for a set point command

3.4 Address definition:

■ Click on the green arrow in the "Address" area to enter the address configuration page.

■ Select the address type to be taken into account for each frame type configured (see table below):

Frame type	Address type	Addressing (example)	
		Starting address	Ending address
TCD	TCD00000 to TCD65532	1536 (DEC)	1791 (DEC)
TCS	TEST00000 to TEST65535	1536 (DEC)	1791 (DEC)
TSD	TSD00000 to TSD65535	1792 (DEC)	2047 (DEC)
TSS	TSS00000 to TSS65532	1792 (DEC)	2047 (DEC)
TM 16 / 32 bits	TM00000 to TM65532	128 (DEC)	383 (DEC)
TM 16 / 32 bits (consignes)	TEST00000 to TEST65535	128 (DEC)	383 (DEC)

■ Configure the number of BIT, WORD or DOUBLE WORD addresses (depending on the frame type) to be used for this frame type in the "Number of items" field.

In theory, the number should correspond to the number of equivalent frames configured on the T200 for these devices.

Note: The number of frames configured should not exceed the indicated "Maximum allowed".

■ Configure the starting address of the field to be read as a BIT or WORD address (depending on the frame type) expressed as a decimal in the "Starting address" field. This should correspond to the first equivalent frame address (converted in decimal bit addressing) configured on the T200 for these devices.

Important note: In the L500-compatible Modbus T200 table, the first address field available for external devices is 0x60 HEX (96x16 = 1536 DEC). The lower addresses are reserved for the basic frames of the T200. The maximum address is 0xFFFF HEX (65535 DEC). We proposed in the table here above an example of addressing for start and end fields. **It is strongly recommended to follow this proposal to define the starting and ending addresses for each type of variables to create.**

□ **Example 1:** In the screen opposite, a TCS 36-bit frame is configured with the address starting field at 96 HEX, i.e. in decimal bit addressing: 1536 DEC (1536 = 96x16).

Enter address and size

Address	Access mode
TEST00000 to TEST65535	I/O
STATUS00000 to STATUS65535	I/O
TSD00000 to TSD65535	I
CR00000 to CR65535	I
TSS00000 to TSS65535	I

Number of items: 36 BITs
 Maximum allowed: 2048 BITs
 Starting address: 1536 Decimal
 Information in the frame: Binary ASCII BCD compact

OK Cancel

Example 1: Address definition for TCS

Address	to	Access mode
TEST00000	TEST65535	I/O
STATUS00000	STATUS65535	I/O
TSD00000	TSD65535	I
CRO00000	CR65535	I
TSS00000	TSS65535	I

Number of items: 108 (Maximum allowed: 2048)
 Starting address: 1792 (Decimal)
 Information in the frame: Binary

Example 2: Address definition for TSS

Address	to	Access mode
COMMAND1	COMMAND4	O
TEST00000	TEST65535	I/O
STATUS00000	STATUS65535	I/O
TCD00000	TCD65535	O

Number of items: 24 (Maximum allowed: 1024)
 Starting address: 1536 (Decimal)
 Information in the frame: Binary

Example 3: Address definition for TCD

Address	to	Access mode
VERSION00000	VERSION65535	I
TEST00000	TEST65535	I/O
EVENTS00000	EVENTS65535	I
TM00000	TM65535	I
PARAMETER00000	PARAMETER65535	I/O

Number of items: 78 (Maximum allowed: 128)
 Starting address: 128 (Decimal)
 Information in the frame: Binary

Example 4: Address definition for TM

Network: Netw_1
 Equipment: DevT200_1
 Frame: TM_SEPAM
 Comment:
 Characteristics:
 Frame format: WORD
 Access grant: Read Write
 Address: From TM00128 To TM00205
 Operating mode:
 Priority mode
 Cyclic access Read Write
 Scan rate: Mn 0 Sec 1 Ms 0

❑ **Example 2:** In the screen opposite, a TSS 108-bit frame is configured with the address starting field at 112 HEX, i.e. in decimal bit addressing: 1792 DEC (1792 = 112x16).
Note: For a TSD frame, the configuration is identical.

❑ **Example 3:** In the screen opposite, a TCD 24-word frame is configured with the address starting field at 96 HEX, i.e. in decimal bit addressing: 1536 DEC (1536 = 96x16).
Note: A TCD is equal to 2 bits.

❑ **Example 4:** In the screen opposite, a 16-bit TM 78-word frame is configured with the address starting field at 80 HEX, i.e. in decimal word addressing: 128 DEC.
Note: For a 32-bit TM frame, the configuration is identical with DOUBLE WORD frame type.

■ Click on "Ok" once the address configuration is established.

3.5 Frame operating mode:

Once the frame addresses have been defined, two parameters remain to be configured in the "Operating mode" area of the "Frame parameters" menu:

■ Configure these parameters as shown in the following table according to the frame type:

Frame type	Priority mode	Repetitive access	Repetition interval
TCD	Not selected	Not selected	
TCS	Not selected	Not selected	
TSD	Not selected	Selected	1 s
TSS	Not selected	Selected	1 s
TM16, 32 bits	Not selected	Selected	1 s

■ Click on "Validate" and then "Ok" to accept the frame configuration, then on "Cancel" to return to the "Select communication objects" window.

■ Once all the frames have been created for all external devices and all T200 devices, click on "Validate" and then "Ok" to accept the entire frame configuration, then on "Cancel" to exit this window.

3.5.1 Saving the modification:

The customization that has been performed previously will be kept in the event of project generation by the L500 Configurator, but only in the case of a "Partial generation".

A "Complete generation" will erase all the personalization that has been made for frame creation or T200 modification to FREE mode. So, do not use this kind of generation.

3.5.2 Other frame creation methods:

It is possible to create frame copies, made by the method of the previous section, based on models of similar frames already created on a device, and this on all T200 devices including external devices. This operation must be done directly in the file including the frames already created ("...\Projet\C\COMM.dat").

Once these frames have been copied on all the T200 devices, they need then merely be modified to configure them according to the parameters of the other external devices. This is done by modifying the fields forming the frames in accordance with the table below.

Now, the configuration details of a frame can be identified from the content of the fields in each line.

In the following table we show only those fields that need to be identified or modified. The other non-specified fields remain the same as the original:

Structure table of a "Comm.dat" file frame:

1st field	3rd field	4th field	5th field	6th field	7th field	9th field	10th field	11th field	12th field	16th field
FRAME	Network internal No.	Device internal No.	Frame internal No.	Frame name	Frame format	Qty of info	Access mode	Frame address	Address type	Repetition period in seconds

Note: Each field is separated by a comma. The first field is that furthest left in the line representing the frame, the second field is the second from the left, etc.

We in fact find in this table the same configuration items as in section "3 - Creating external device frames".

In theory, the fields coloured light grey in the table do not need to be modified. They should remain identical to the frame model that was used to make the copy.

The "Frame internal No." (5th field) will be renumbered automatically the next time the project is started by the L500. There is therefore no need to modify it.

Notes:

- The "Frame format" (field 7) takes the following values:
 - 0 -> BIT
 - 1 -> BYTE
 - 2 -> WORD
 - 3 -> REAL
 - 4 -> DOUBLE WORD
- The "access mode" (field 10) takes the following values:
 - R -> Read
 - W -> Write
 - RW -> Read/Write

Example of frames:

FRAME,0,0,0,11,TM_SEPAM,2,156,78,R,128,TM,9,0,0,1,0,0,0#0#0#0#0,0,21,1,,0,0,""

The bold characters correspond to the items to be modified by comparison with the original frame.

4 Creating external device variables (Modbus Protocol)

The frames having been created on the L500, one should now create the variables that will provide a link with these frames.

4.1 Variables selector:

- Open the "Configure -> Variables -> Selector" menu.

- A "Select variables" window then opens on the screen with the list of all the existing variables corresponding to the devices of the application.

4.2 Creating a variable:

The "Status/Alarm" variables must be created to manage links with frames of the TSD, TCD, TCS or TSS type.

The "Measure" variables (register) must be created to manage links with frames of the TM type.

- The taskbar on the left part of the window lets you choose the type of variable to create.

- In the left column, click on the "DevT200_x" device, on which should be added the variable, to expand branches and to make appear associated variables of this device.

- In the taskbar on the left side, click on "Add a branch" and give the name of the external device to that branch (e.g. "SEPAM_1" for the first SEPAM on which we want to create the variable). Confirm by clicking "OK."

- In the right column, click on one of the variables of the T200 device which is the same type as the one that we want to create.

- In the taskbar, click "Copy."

- Click on the previously created branch then click on the taskbar "Paste DevT200_x...".

- A "Duplication item" window appears on screen.

- Enter a name for the new variable to be created and then click "OK" to confirm the creation.

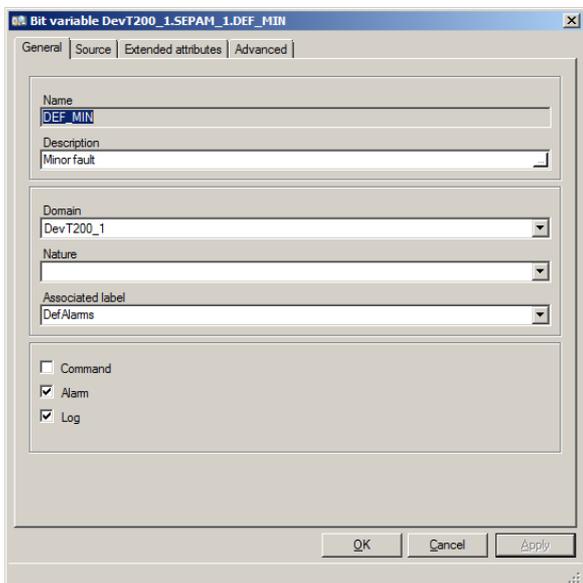
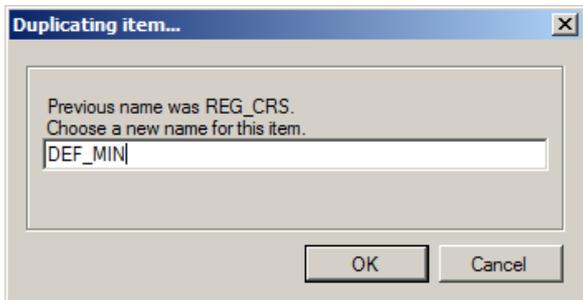
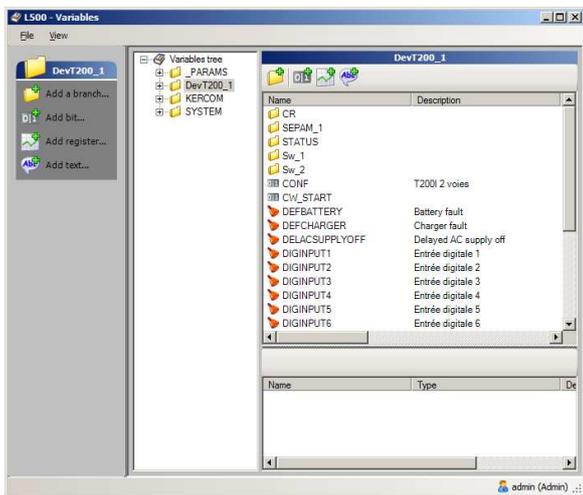
4.2.1 Setting of the variable:

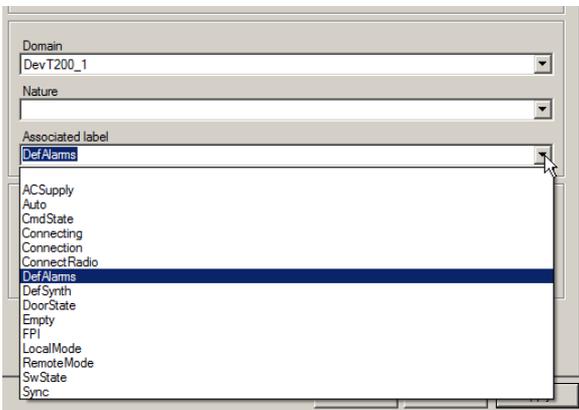
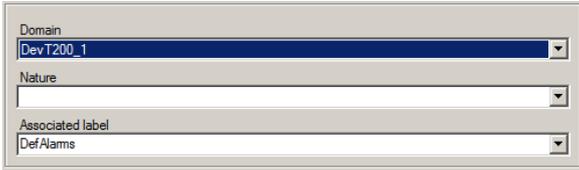
4.2.1.1 General tab

- Double click on the variable created previously.

- A properties window appears on screen with the same parameters as the one of the variable having served to the copy. They will have to be modified to match the parameters of the variable to create.

- In the "Description" field of the "General" tab, define a label for this variable (e.g. "minor fault").





■ In the "Domain" drop-down list, select the internal name of the T200 device associated with the external device (e.g. "DevT200_1").

■ In the "Associated label" drop-down list, select the standard type of associated labels which could be suitable for the variable to be created, on the basis of the following items:

Associated labels	Use	Example of labels on change of state, transition or operator action
ACSupply	Voltage	"Voltage ON" "Voltage OFF"
Auto	Automatic control	"Operated" "Deactivated" "In operation" "Deactivation" "Deactivate cmd" "Operate cmd"
CmdState	Activation/ deactivation command	"Disabled" "Enabled" "Deactivation" "Activation" "Deactivate cmd" "Activate cmd"
Connection	Communication	"Disconnected" "Connected" "Disconnection" "Connection established"
DefAlarms	Alarm	"Alarm on - not ack" "Alarm on - ack" "Alarm off - not ack" "Alarm off" "Invalid alarm" "User acknowledgement"
DefSynth	Fault	"No fault" "Fault presence" "Fault disappearance" "Fault appearance" "Cmd fault disappearance" "Cmd fault appearance"
DoorState	Door switch	"Door closed " "Door opened" "Door closing" "Door opening" "Cmd close door" "Cmd open door"
SwState	Switch or circuit breaker management	"Opened" "Closed" "Opening" "Closing" "Open cmd" "Close cmd"
FPI	Reset of fault detector	"Reset FPI cmd"
LocalMode	Local/Remote mode	"Remote" "Local" "Local --> Remote" "Remote --> Local" "Remote mode request" "Local mode request"
Sync	Synchronization	"Synchro failed" "Synchro succeeded" "Synchro failed" "Synchro succeeded"

Note: The associated labels are not to be configured for a measure type variable.

Comment: The associated labels are used especially to describe variable changes of state, transitions and operator actions, for continuous printing on printer or in the alarm window of the L500 (if the variable is configured as triggering an alarm).

Comment: If none of the T200 associated labels is suitable, let the associated label empty.
The labels generated in that case would be:

Associated label	Use	Example of labels on change of state, transition or operator action
empty	Other	"Log change to 1" "Log change to 0" "Bit send 1"

■ In the lower part of the "General tab", check the "Log" and "Alarm" box(es) depending on the type of variable to configure and according to the items of the following table:

Bit type	TSS	TCS, TCD	TSD	TM
Command/Control		X		X(*)
Alarm	X(*)			X(*)

Note (*): Some variables can be configured with or without certain options. To be determined as needed.

The table below helps to find the correspondence between the types of variable created on equipment side and the types of variable to be set on L500:

Equipment side	DI	DO	TCD/ DDO	TSD/ DDI	AI/AO
L500 side	TSS	TCS	TCD	TSD	TM

Comment: the way to set the alarms will be explained later (see chapter "Advanced tab").

■ Check the "Log" box if the variable must be logged continuously on a printer.

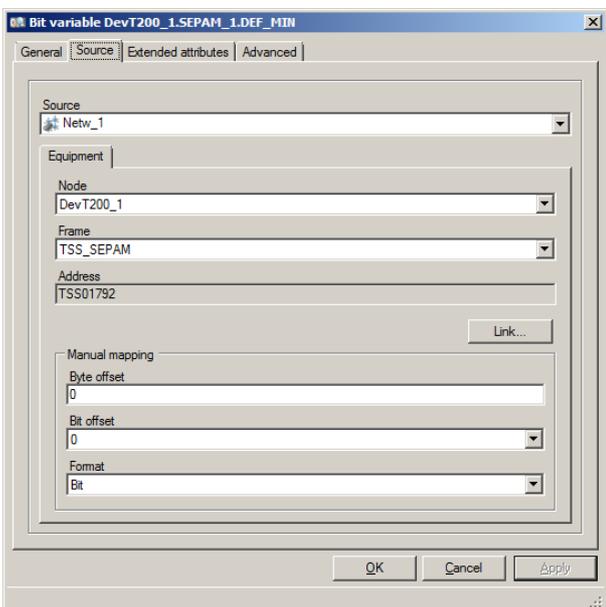
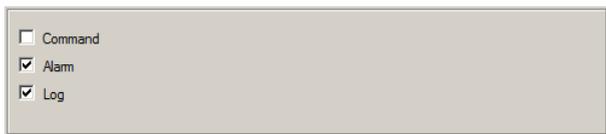
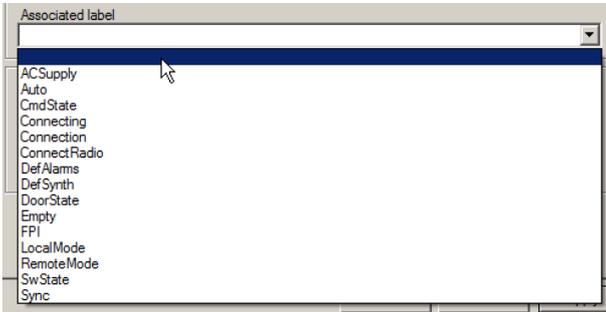
Comment: the way to set the alarms will be explained later (see chapter "Advanced tab").

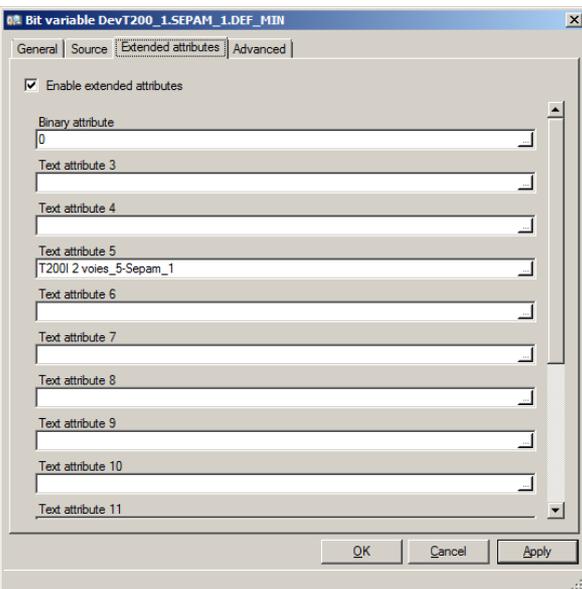
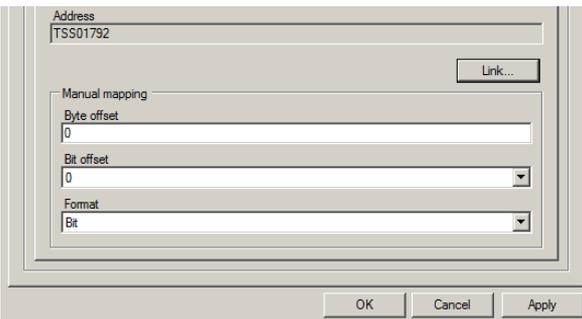
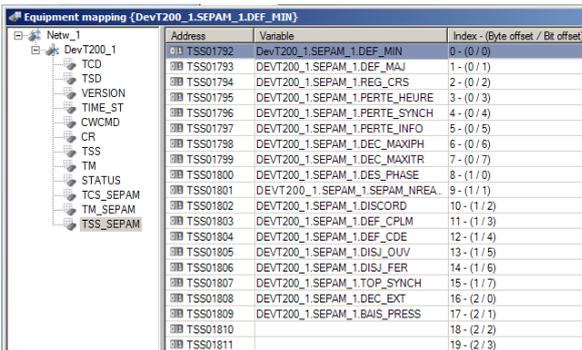
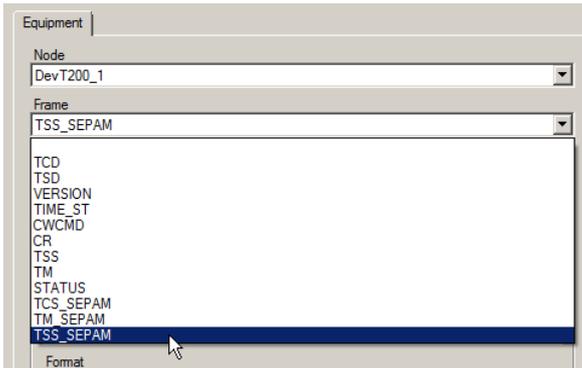
■ Click the "Apply" button to take into account the configuration.

4.2.1.2 Source tab

■ In the "Source" field of "Source" tab, select the network that is attached to the T200 device (e.g. "Netw_1"). This setting affects how to acquire the status of the variable
Do not select "Internal" because the variable to create is a "device" variable that will be queried via the T200 communication network and not a local variable at the supervisor level. This also applies for all variables to be created in Modbus protocol for external devices.

■ In the "Node" field associated to the network defined above, select the internal device name of T200 associated to the external device. (e.g. "DevT200_1").





■ In the field "Frame", select from the drop-down list proposed the name of the frame to be associated with this variable. (e.g. "TSS_SEPAM")

■ Click on the "Link" button to configure the connection of the variable associated with the frame.

■ A window "Equipment Mapping" appears with the branch of the variable as title. This branch includes the internal name of T200, the name of the external device and the variable name separated by dot (e.g. "DevT200_1.SEPAM_1.DEF_MIN").

The frame associated with that variable is also automatically preselected in the left column.

■ In the right column, select the line representing the frame address No. Associated to this variable, corresponding to what has already been configured on the T200 side for the same variable (⇒ external address). (e.g. "TSS01792")

■ Double-click on this line. The address is mapped to this variable and the "Equipment Mapping" window closes automatically.

■ The field "address" and the part "Manual mapping" of "Source" tab are automatically refreshed with data from the defined link ("Byte offset", "Bit offset" and "Format").

■ Click "Apply" to take into account the configuration.

IMPORTANT NOTE: It is absolutely essential to link at least one variable on an existing frame, because otherwise this could inhibit the link to the device interrogated using this frame.

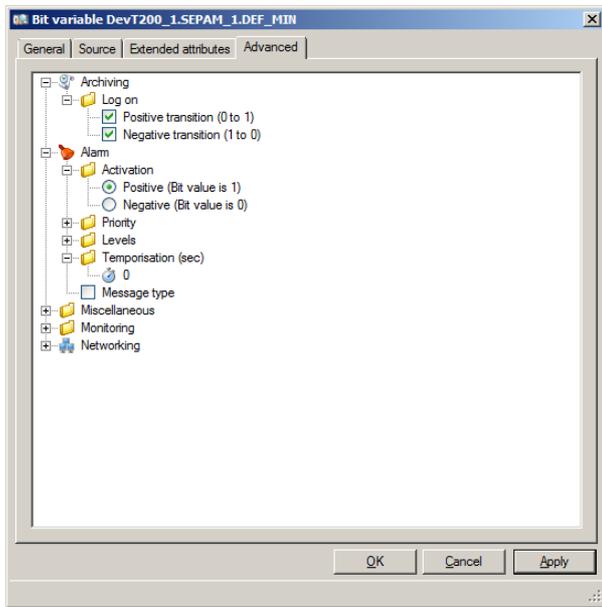
4.2.1.3 Extended attributes tab

■ Check the box "Enable extended Attributes" of the tab "Extended attributes".

■ In the field of the "Text attribute 5", enter a label with the following form: "T200Name-ExternalDevice Name" "e.g. T200I 2 voies_5-SEPAM 1".

Note: This attribute will be used as the label of the variable in the alarm, log and event windows of L500. Other attributes are not used.

■ Click "Apply" to take into account the configuration.



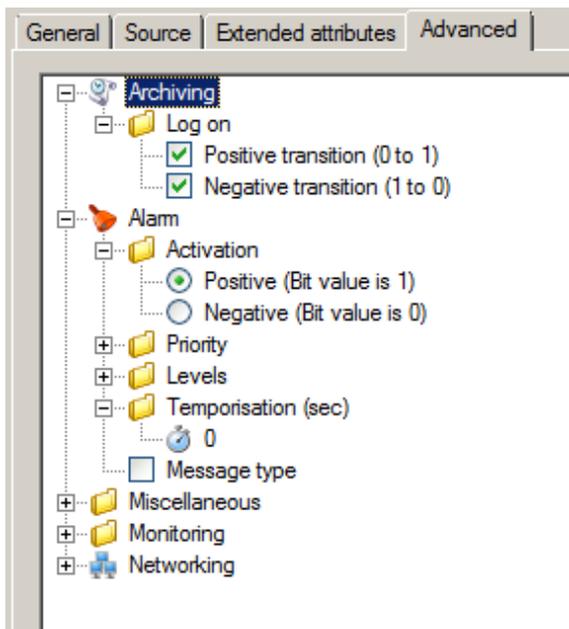
4.2.1.4 Advanced tab

- In the "Advanced" tab, click on "Archiving" to expand the associated parameters.
- Check the boxes "Positive / Negative transition..." depending on how the variable is to be recorded on a printer (see table below):

Configuration	Type of logging
0 -> 1	Appearance
1 -> 0	Disappearance
0 -> 1 and 1 -> 0	Appearance and disappearance

- If the variable was previously configured as alarmed, an additional part "Alarm" appears in the "Advanced" tab.
- In this case, click on "Alarm" to expand the setting of the alarm. Customize the alarm depending to the needs, for instance the delay before generating an alarm (field "Temporisation") and the type of activation to be considered for generating the alarm ("Activation" option: "Positive" or "Negative").

- You can also customize other options in the "Advanced" tab if necessary (consult the online help of Supervisor for that purpose).
- Then click on the "OK" button to save the entire variables configuration and close the window.
- Repeat the variables creation operation for all external devices of a T200, and then repeat the operation for all the T200 devices included in the project.



4.2.2 Specific case of Measure variables:

"Measure" type variables have additional configuration parameters by comparison with other types of variable.

These parameters setup differences relative to the other variable types are described below:

4.2.2.1 Unit:

The field "Unit" of "General" tab represent the label of the unit that will be displayed alongside the value representing the variable, when the "#u" command is used as format. (e.g. Units = "KA²").

4.2.2.2 Format:

The field "Format" of "General" tab can be used to define a default display format for the measure value.

Enter the required format using the following commands:

Cmd	Meaning	Example	
#	Represents a numerical digit	####	9999
.	Indicates the position of the decimal point	##.##	99.99
#u	Adds the unit to the display of the value	## #u	99 cm
#h	Converts the value into a text string in hour:minute:second format	#h	9999:59:59
#d	Converts the value into a text string in day:hour:minute:second format	#d	99:23:59:59
#b	If the value = 0, an empty string is displayed. Shall mandatorily be placed at the end of the format		

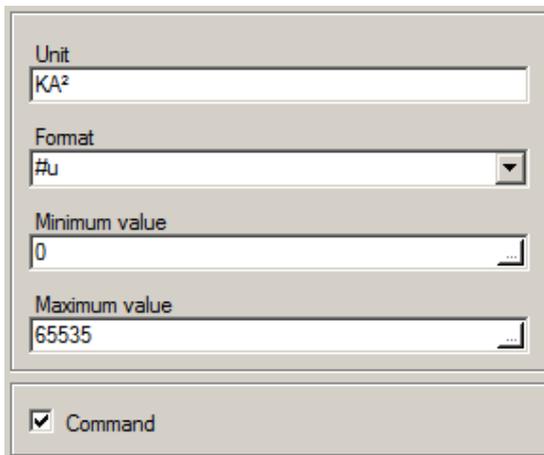
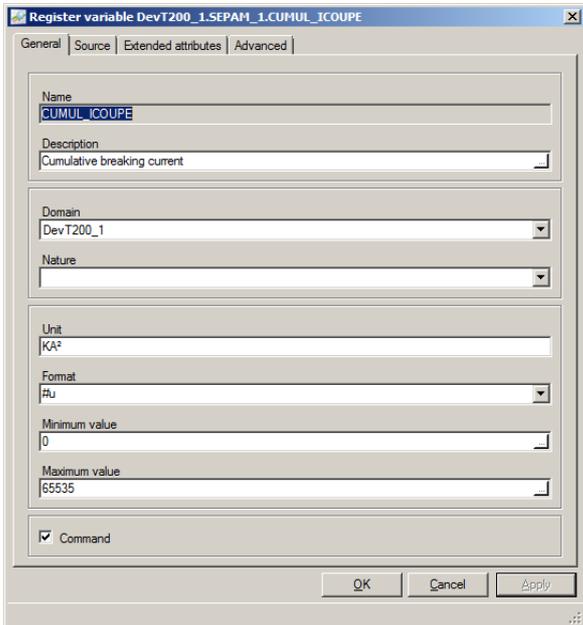
Note: Respect lower case and upper case when entering the format command. Most of the commands are cumulative.

4.2.2.3 Minimum and maximum value:

The range of a register variable is defined by the "Minimum Value" and "Maximum Value" properties of the "General" tab. The register range is used to set a minimum and a maximum to be applied to the value of the variable. These values will be used by default for the display of register animations.

If the register is outside of this range, the value is not displayed. The range can be entered either directly in numbers or as the names of other register variables.

If a variable name is entered, the value of the variable is used and the scale can be changed dynamically in run-time. If a value is entered directly, it can either be in number or in decimal notation (e.g. 1.234) or in exponential notation (e.g. 3E+18).



4.2.2.4 Command:

A register can be defined to be forced to a certain value defined by the operator (e.g. set-point value). In this case, the "Command" option should be selected in the "General" tab.

When the "Command" option is selected, additional parameters have to be configured in the "Advanced" tab:

- ❑ **Level:** Can be used to define the set point control level. There are 10 control levels (0 to 9). Only operators having this level may override the set point settings.
- ❑ **Minimum and Maximum:** Allows to set a range of Minimum and Maximum values that can be used to force the register. These limiting values must be within the Minimum and Maximum limits defined for the variable value. The command range can be entered either directly as a number or as the names of other register variables. If a variable name is entered, the value of the variable is used and the ranged can be changed dynamically in run-time.

4.2.2.5 Deadband:

The deadband is to be entered from the "Advanced" tab of the register variable setting window.

The deadband is the value as of which the source value of the variable must change before the change is recognized by the database (e.g. for a deadband of 30, the variable will be displayed in increments of 30: 100, 130, 160, etc.).

The deadband type must also be entered based on the following criteria:

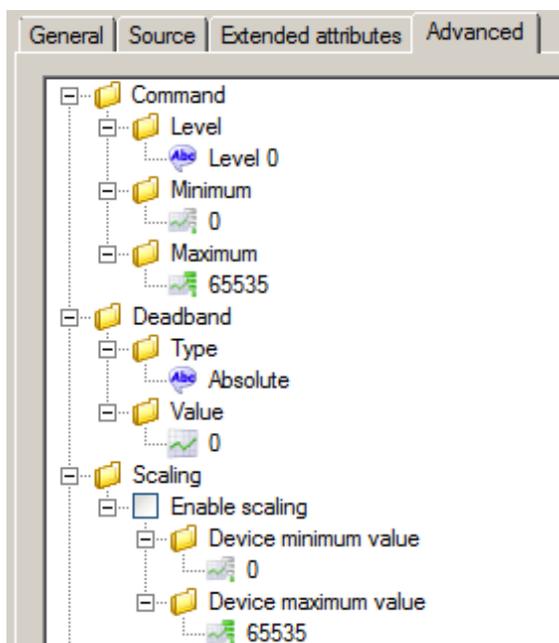
Type	Meaning
Absolute	The deadband is a variation of the value. e.g. if the deadband is 10, the current value of the variable must change by at least 10 for the change to be recognized.
Range percent	The deadband is a percentage of the range e.g. if the variable range is 0 to 4000 and the deadband is 10, the value of the variable must change by at least 400 for the change to be recognized.
Value percent	The deadband is a percentage of the value e.g. if the deadband is 10, the current value of the variable being 400, the value of the variable must change by at least 40 for the change to be recognized.

4.2.2.6 Scaling:

By activating the "Enable scaling" option in "Advanced" tab, the variable value can be expressed according to a range defined by the Min. and Max. values entered in this configuration. For calculation, the system will take a pro rata between the real Min. and Max. values of the variable value and those entered here.

Note: This scaling can be used in particular to convert an exclusively positive value into a positive/negative value:
E.g.: Source Min. and Max. values of the variable: 0 -> 65535
Min. and Max. values after scaling: -32768 -> 32767

- If required, you can also customize the other options in the "Advanced" tab (see the Supervisor's online help).
- Click "OK" to save the entire configuration.



Structure table of a Varexp.dat file variable:

1st field	2nd field	3rd field	4th field	5th field	10th field	11th field	35th field	36th field
Variable type	Variable rank	T200 internal name	External device intl name	Variable internal name	Variable title 1st language	Variable title 2nd language	Byte rank in frame	Bit rank in byte

Note: Each field is separated by a comma. The first field is that furthest left in the line representing the variable, the second field is the second from the left, etc.

Examples of Varexp.dat file line:

CMD,185,DEVT200_1,SEPAM_1,CMD_OUV,,,,,"T,I,commande d'ouverture","Open control",DevT200_1,,,,,E,0,0,0,0,0,1,0,0,0,0,,,1,NETW_1,DEVT200_1,TCS_SEPAM_1,B,0,0,1,,,CtrlState...

ALA,153,DEVT200_1,SEPAM_1,DEF_MIN,,,,,"D,faut mineur"," Partial fault",DevT200_1,,,,,E,0,0,0,0,0,1,0,0,0,0,,,1,NETW_1,DEVT200_1,TSS_SEPAM,B,0,0,1,,,DefAlarms...

BIT,156,DEVT200_1,SEPAM_1,DISJ_OUV,,,,,"Disjoncteur ouvert","Recloser open",DevT200_1,,,,,E,0,0,0,0,0,1,0,0,0,0,,,1,NETW_1,DEVT200_1,TSS_SEPAM,B,1,5,1,,,CtrlState...

REG,171,DEVT200_1,SEPAM_1,CNT,,,,,"Compteur de manoeuvres","Number of operations",DevT200_1,,,,,E,0,0,0,0,0,0,0,0,0,0,,,1,NETW_1,DEVT200_1,TM_SEPAM,U,22,0,16...

Notes: Fields 35 and 36 give the variable's address in the frame. This address is expressed as a byte number from the first frame address and a bit number in the byte (1st byte = 0 and 1st bit = 0):

Example:

The 1st byte of a TSS frame includes the addresses "TSS1792" to "TSS1799" and the byte rank equals "0".

The 2nd byte of a TSS frame includes the addresses "TSS1800" to "TSS1807" and the byte rank equals "1".

etc.

The 1st bit of the 1st byte of a TSS frame corresponds to the address "TSS1792".

The 2nd bit of the 1st byte of a TSS frame corresponds to the address "TSS1793".

etc.

The 8th bit of the 1st byte of a TSS frame corresponds to the address "TSS1799".

The 1st bit of the 2nd byte of a TSS frame corresponds to the address "TSS1800".

etc.

The principle is the same irrespective of the frame type (TSS, TM, TSD, TCD, etc.).

Example 1: The variable "DEF_MIN" (as defined in the section "Source" tab) has a frame address equal to "TSS1792" for a TSS start of frame equal to "TSS1792". This address therefore corresponds to the 1st bit of the 1st TSS frame byte (byte rank = "0" and bit rank = "0"). Fields 35 and 36 will therefore equal "0" and "0".

Example 2: The variable "DISJ_OUV" has a frame address equal to "TSS1805" for a TSS start of frame equal to "TSS1792". This address therefore corresponds to the 6th bit of the 2nd TSS frame byte (byte rank = "1" and bit rank = "5"). Fields 35 and 36 will therefore equal "1" and "5".

Example 3: The variable "CNT" has a frame address equal to "TM139" for a TM start of frame equal to "TM128". Since a TM frame contains 16 bits (2 bytes), this address therefore corresponds to the 22nd TM frame byte (byte rank = "22" and bit rank = "0"). Fields 35 and 36 will therefore equal "22" and "0".

4.2.4 Operating procedure:

- The L500 is stopped, open the "Varexp.dat" file using Windows Notepad.
- Deselect the "Word wrap" option in the "Format" menu of Notepad.
- Copy a line representing an existing variable already created, corresponding to the same type and the same device as the variable you want to create, then paste it at the end of the file.
- Modify the fields of this new line according to the information in the table given earlier.
- Save the "Varexp.dat" file.
- Repeat the operation for all the variables to be created.
- After the project is restarted, it will now include the new variables created.

NB: Windows Notepad does not manage accented characters. It is better not to use variable titles having accented characters, unless you replicate the character corresponding to that accented character, if it already exists in the "Varexp.dat" file.

5 Creating external device variables (IEC Protocol)

Variables associated to external devices have to be created.

5.1 Variables selector:

- Open the "Configure -> Variables -> Selector" menu.
- A "Select variables" window then opens on the screen with the list of all the existing variables corresponding to the devices of the application.

5.2 Creating a variable:

The "Status/Alarm" variables must correspond to the TSD, DDI, TCD, DDO, DI and DO variables type created in T200 for the external devices.

The "Measure" variables (register) must correspond to the AI type created in T200 for the external devices.

- The taskbar on the left part of the window lets you choose the type of variable to create.
- In the left column, click on the "DevT200_x" device, on which should be added the variable, to expand branches and to make appear associated variables of this device.
- In the taskbar on the left side, click on "Add a branch" and give the name of the external device to that branch (e.g. "SEPAM_1" for the first SEPAM on which we want to create the variable). Confirm by clicking "OK."
- In the right column, click on one of the variables of the T200 device which is the same type as the one that we want to create.
- In the taskbar, click "Copy."
- Click on the previously created branch then click on the taskbar "Paste DevT200_x...".
- A "Duplication item" window appears on screen.
- Enter a name for the new variable to be created and then click "OK" to confirm the creation.

5.2.1 Setting of the variable:

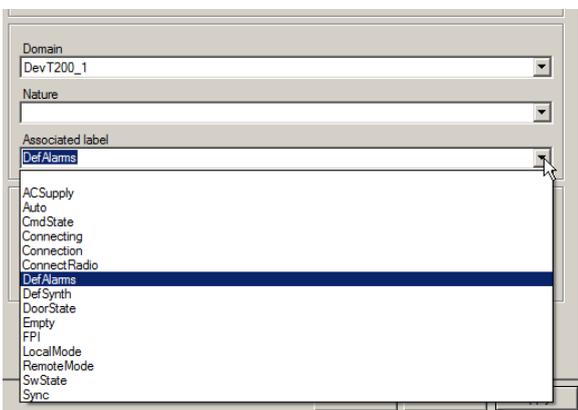
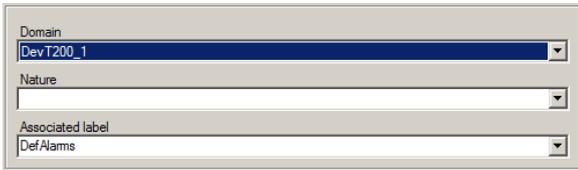
5.2.1.1 General tab

- Double click on the variable created previously.
- A properties window appears on screen with the same parameters as the one of the variable having served to the copy. They will have to be modified to match the parameters of the variable to create.

In the "Description" field of the "General" tab, define a label for this variable (e.g. "Minor fault").

■ In the "Domain" drop-down list, select the internal name of the T200 device associated with the external device (e.g. "DevT200_1").

■ In the "Associated label" drop-down list, select the standard type of associated labels which could be suitable for the variable to be created, on the basis of the following items:



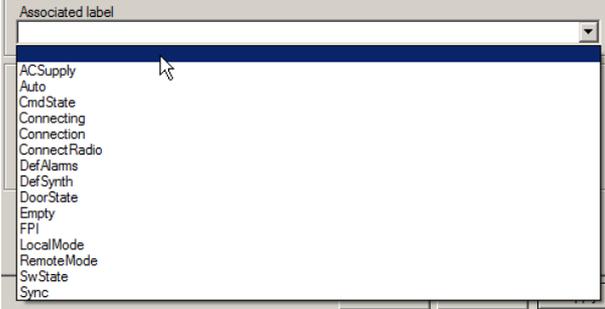
Associated labels	Use	Example of labels on change of state, transition or operator action
ACSupply	Voltage	"Voltage ON" "Voltage OFF"
Auto	Automatic control	"Operated" "Deactivated" "In operation" "Deactivation" "Deactivate cmd" "Operate cmd"
CmdState	Activation/ deactivation command	"Disabled" "Enabled" "Deactivation" "Activation" "Deactivate cmd" "Activate cmd"
Connection	Communication	"Disconnected" "Connected" "Disconnection" "Connection established"
DefAlarms	Alarm	"Alarm on - not ack" " Alarm on – ack" "Alarm off - not ack" "Alarm off" "Invalid alarm" "User acknowledgement"
DefSynth	Fault	"No fault" "Fault presence" "Fault disappearance" "Fault appearance" "Cmd fault disappearance" "Cmd fault appearance"
DoorState	Door switch	"Door closed " "Door opened" "Door closing" "Door opening" "Cmd close door" "Cmd open door"
SwState	Switch or circuit breaker management	"Opened" "Closed" "Opening" "Closing" "Open cmd" "Close cmd"
FPI	Reset of fault detector	"Reset FPI cmd"
LocalMode	Local/Remote mode	"Remote" "Local" "Local --> Remote" "Remote --> Local" "Remote mode request" "Local mode request"
Sync	Synchronization	"Synchro failed" "Synchro succeeded" "Synchro failed" "Synchro succeeded"

Note: The associated labels are not to be configured for a measure type variable.

Comment: The associated labels are used especially to describe variable changes of state, transitions and operator actions, for continuous printing on printer or in the alarm window of the L500 (if the variable is configured as triggering an alarm).

Comment: If none of the T200 associated labels is suitable, let the associated label empty.

The labels generated in that case would be:



Associated label	Use	Example of labels on change of state, transition or operator action
empty	Other	"Log change to 1" "Log change to 0" "Bit send 1"

■ In the lower part of the "General tab", check the "Log" and "Alarm" box(es) depending on the type of variable to configure and according to the items of the following table:

Bit type	DI	DO/DDO /TCD	DDI /TSD	AI/AO
Command		X		
Alarm	X(*)			X(*)

Note (*): Some variables can be configured with or without certain options. To be determined as needed.

Comment: the way to set the alarms will be explained later (see chapter "Advanced tab").

■ Check the "Log" box if the variable must be logged continuously on a printer.

Comment: the way to set the alarms will be explained later (see chapter "Advanced tab").

■ Click the "Apply" button to take into account the configuration.

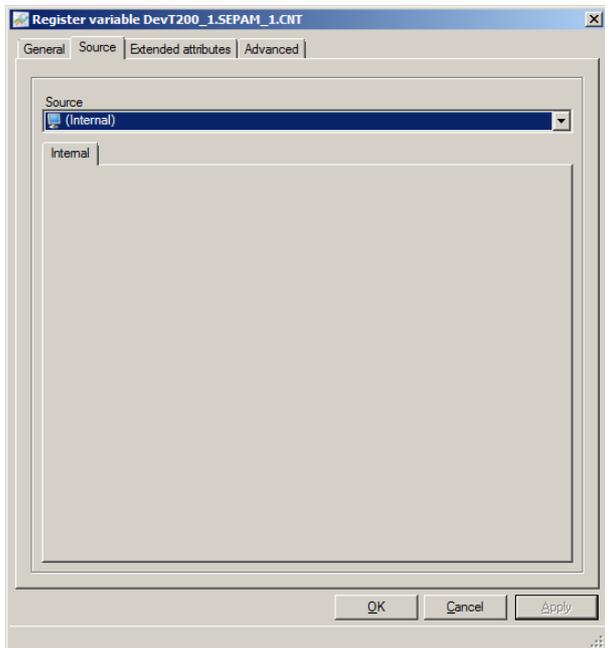


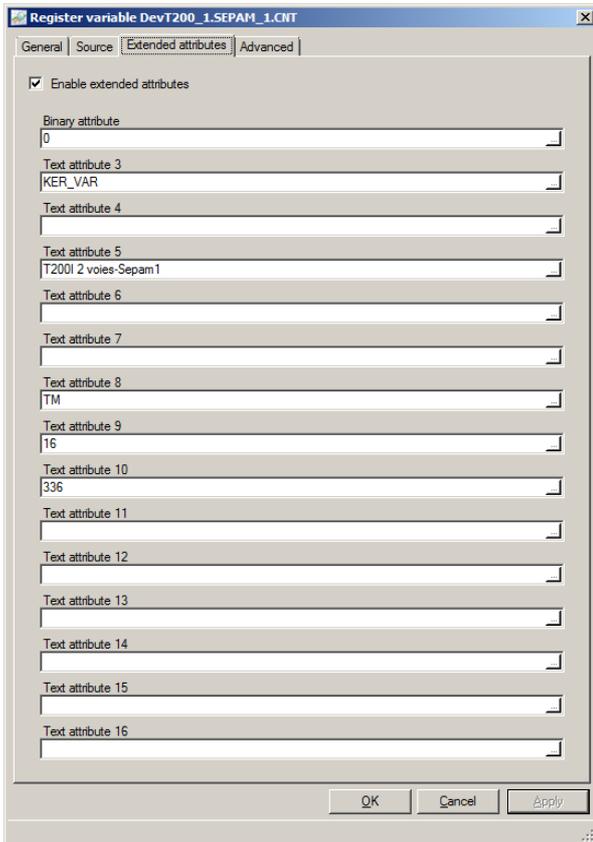
5.2.1.2 Source tab

■ In the "Source" field of "Source" tab, select "Internal".

The variable to create is considered as a local variable in the supervisor (internal). This variable will be read via the IEC101/104 protocol driver (KERCOM). This also applies for all variables to be created in IEC101/104 protocol for the external devices.

■ Click the "Apply" button to take into account the configuration.





5.2.1.3 Extended attributes tab

The link between the variable and the frame is made from the Text attributes via the KERCOM driver.

- Check the "Enable extended attributes" box of the "Extended attributes" tab.

In accordance with the table below, enter the following text attributes:

- In the field "Text attribute 3", enter "KER_VAR".
- In the field "Text attribute 5", enter a label with the following form: "T200Name-ExternalDevice Name" "e.g. T200I 2 voies_5-SEPAM 1".

Note: This attribute will be used as the label of the variable in the alarm, log and event windows of L500.

- In the field "Text attribute 8", enter the type of variable as defined in the device, with the following syntax:

Type of device's variable	DI	DO	TSD DDI	TCD DDO	AI	AO	CNT
Text attribute 8	TSS	TCS	TSD	TCD	TM		CPT

Note: "AO" cannot be managed by IEC protocol on the L500.

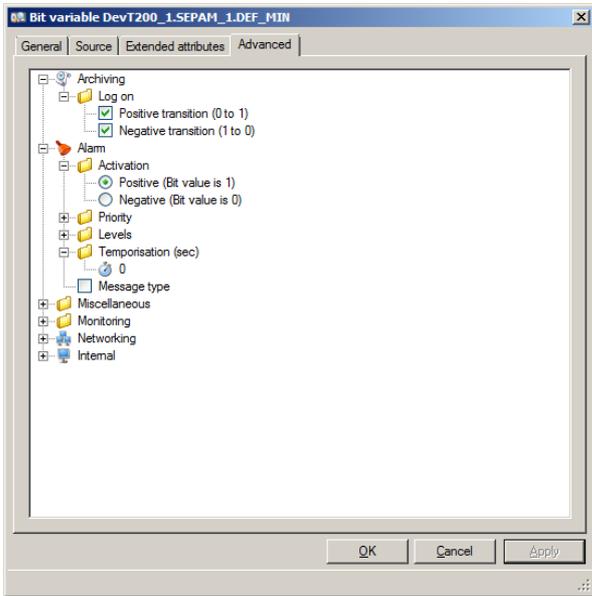
- In the field "Text attribute 9", enter the format of the variable, as defined in the device (16 bit, 32 bit or FLOAT). Applies only for variables including TM or CPT type.

- In the field "Text attribute 10", enter the address of the variable, as defined in the device (external address of the variable).
To avoid setting an address already defined in basic addressing of T200, addresses configured must be greater than 300. There is no particular constraint regarding the addressing areas for each type of variable, as in Modbus protocol. However, to define an address > 256, the parameter "Object info. Field length" has to be ≥ 2 in the "Protocol" page of T200 Web server (for IEC101 only but not for IEC104).

- In the "Text attribute 11", enter the type of conversion (only for the registers). If field is empty, the register is displayed as it is received from the device. If "Scale" is defined, the measure is converted (scaling conversion), depending on Min and Max defined in Text attribute 12 and 13.

- In the "Text attribute 12", enter the "Min" value of scaling conversion (only for registers and if text attribute 11 is "Scale").
- In the "Text attribute 13", enter the "Max" value of scaling conversion (only for registers and if text attribute 11 is "Scale").
- Click "Apply" to take into account the configuration.

Attribute	Definition	Comments
Text attribute 3	Tag	KER_VAR
Text attribute 5	Internal label of device	T200Name-ExternalEquipmentName
Text attribute 8	Type	TSS, TCS, TSD, TCD, TM, CPT
Text attribute 9	Sub-Type	16 bit, 32 bit, FLOAT (can be empty)
Text attribute 10	Protocol address	Bit address or word address depending on "Type"
Text attribute 11	Type of conversion	Empty or "Scale" (only for TM and CPT)
Text attribute 12	1st conversion parameter	If Text attribute 11 is "Scale", this field must contain the "Min" value configured on the device
Text attribute 13	2nd conversion parameter	If Text attribute 11 is "Scale", this field must contain the "Max" value configured on the device



5.2.1.4 Advanced tab

■ In the "Advanced" tab, click on "Archiving" to expand the associated parameters.

■ Check the boxes "Positive / Negative transition..." depending on how the variable is to be recorded on a printer (see table below):

Configuration	Type of logging
0 -> 1	Appearance
1 -> 0	Disappearance
0 -> 1 and 1 -> 0	Appearance and disappearance

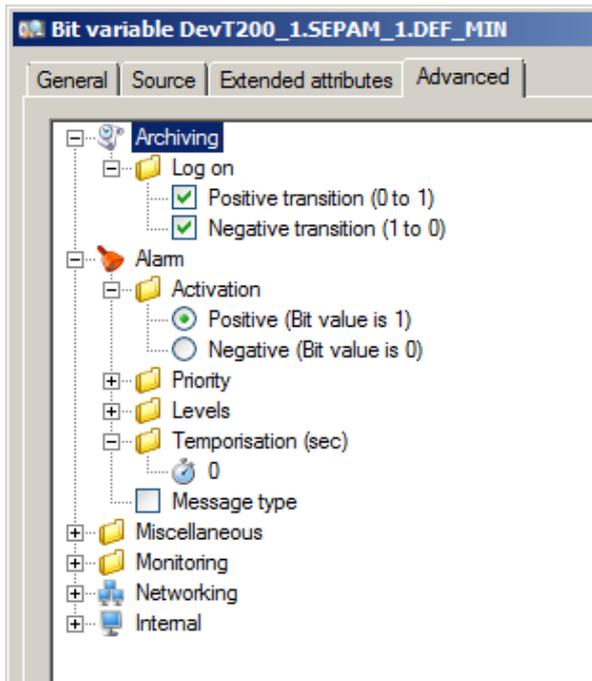
■ If the variable was previously configured as alarmed, an additional part "Alarm" appears in the "Advanced" tab.

■ In this case, click on "Alarm" to expand the setting of the alarm. Customize the alarm depending to the needs, for instance the delay before generating an alarm (field "Temporisation") and the type of activation to be considered for generating the alarm ("Activation" option: "Positive" or "Negative").

■ You can also customize other options in the "Advanced" tab if necessary (consult the online help of Supervisor for that purpose).

■ Then click on the "OK" button to save the entire variables configuration and close the window.

■ Repeat the variables creation operation for all external devices of a T200, and then repeat the operation for all the T200 devices included in the project.



5.2.2 Specific case of Measure variables:

"Measure" type variables (TM, CPT) have additional configuration parameters by comparison with other types of variable.

These parameters setup differences are described below:

5.2.2.1 Unit:

The field "Unit" of *General* tab represent the label of the unit that will be displayed alongside the value representing the variable, when the "#u" command is used as format. (e.g. Units = "KA²").

5.2.2.2 Format:

The field "Format" of "General" tab can be used to define a default display format for the measure value.

Enter the required format using the following commands:

Cmd	Meaning	Example	
#	Represents a numerical digit	####	9999
.	Indicates the position of the decimal point	##.##	99.99
#u	Adds the unit to the display of the value	## #u	99 cm
#h	Converts the value into a text string in hour:minute:second format	#h	9999:59:59
#d	Converts the value into a text string in day:hour:minute:second format	#d	99:23:59:59
#b	If the value = 0, an empty string is displayed. Shall mandatorily be placed at the end of the format		

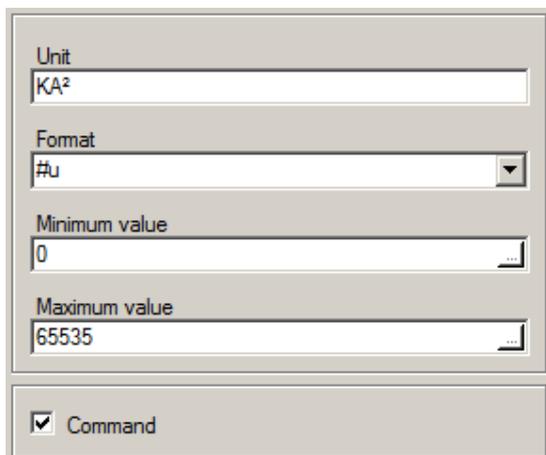
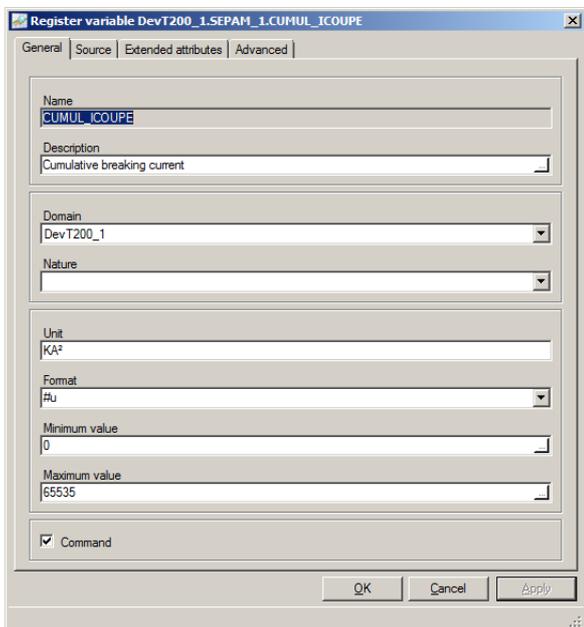
Note: Respect lower case and upper case when entering the format command. Most of the commands are cumulative.

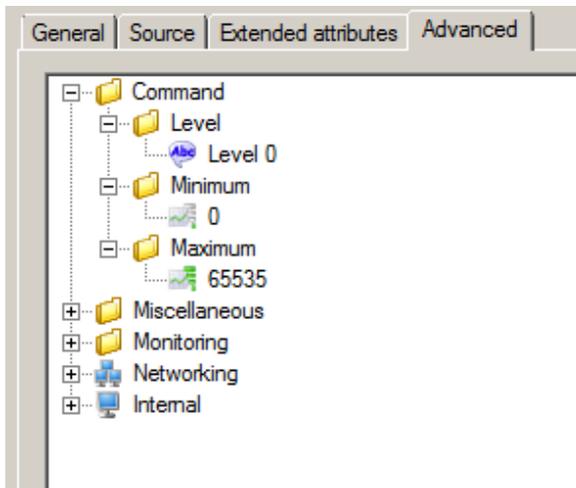
5.2.2.3 Minimum and maximum value:

The range of a register variable is defined by the "Minimum Value" and "Maximum Value" properties of the "General" tab. The register range is used to set a minimum and a maximum to be applied to the value of the variable. These values will be used by default for the display of register animations.

If the register is outside of this range, the value is not displayed. The range can be entered either directly in numbers or as the names of other register variables.

If a variable name is entered, the value of the variable is used and the scale can be changed dynamically in run-time. If a value is entered directly, it can either be in number or in decimal notation (e.g. 1.234) or in exponential notation (e.g. 3E+18).





5.2.2.4 Command:

A register can be defined to be forced to a certain value defined by the operator (e.g.: set-point value). In this case, the "Command" option should be selected in the "General" tab.

When the "Command" option is selected, additional parameters have to be configured in the "Advanced" tab:

- ❑ **Level:** Can be used to define the set point control level. There are 10 control levels (0 to 9). Only operators having this level may override the set point settings.
- ❑ **Minimum and Maximum:** Allows to set a range of Minimum and Maximum values that can be used to force the register. These limiting values must be within the Minimum and Maximum limits defined for the variable value. The command range can be entered either directly as a number or as the names of other register variables. If a variable name is entered, the value of the variable is used and the ranged can be changed dynamically in run-time.

■ If required, you can also customize the other options in the "Advanced" tab (see the Supervisor's online help).

■ Click "OK" to save the entire configuration.

5.2.3 Another method for creating variables:

Creating all the variables of a project via the variables Selector can be a long and tedious operation, not to mention the data entry errors it can lead to.

As soon as an example of each type of variable (State, Alarm, Measure, etc.) has been created in the project for an external device, it is possible to create the other variables for the same external device by making copies of existing variables that are of the same type, directly in one of the project's system files.

The following method that we shall describe is reserved for experts, because it involves modifying the characters present in the system file, each of which has its significance. You should therefore be very careful not to modify the structure of the modified files, nor to modify or delete an existing character.

5.2.3.1 Varexp.dat file structure:

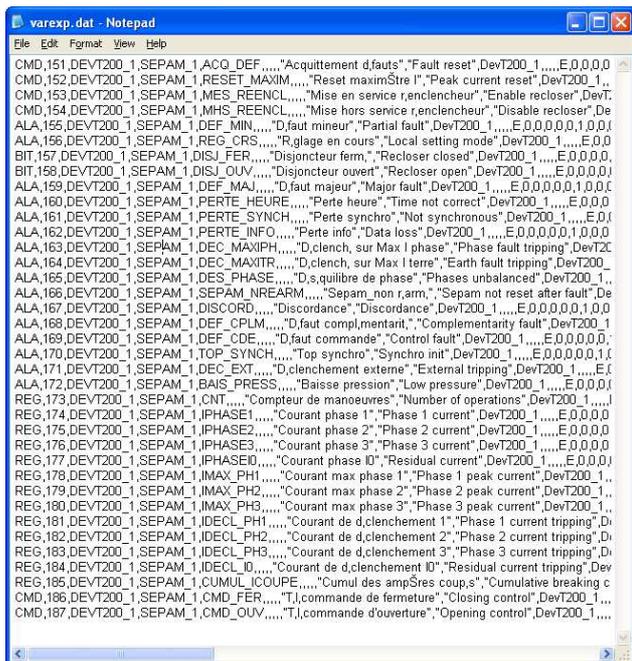
The Varexp.dat file is the project system file which contains (*inter alia*) all the project variables.

This file is located in the following directory:

"C:\Schneider electric\L500 Supervisor\Usr\ProjectName\C"

At the end of this file can be found grouped together all the project variables created manually by means of the L500's variables selector.

The following table can be used to define the type of variable present in this file on the basis of the 1st field (furthest left) in each line of the file defining a variable:



1st field	L500 variable type	Type of variable created
CMD	Command of bit	TCD, TCS
ALA	Bit alarmed	TSS
BIT	BIT	TSD
REG	Register	TM, CPT

The configuration details of a variable can be easily identified from the content of the fields in each line.

In the following table we show only those fields that need to be identified (fields 5, 10, 11, 131 to 141) or modified (fields 10, 11, 35 and 36) on the basis of the existing variables during a copy operation. We shall assume that the other non-specified fields remain identical to the original:

Note: In theory, the fields coloured light grey in the table do not need to be modified if the copy is made from a variable of the same type and coming from the same device.

Also, the variable's rank (2nd field) will be renumbered automatically the next time the project is started by the L500. There is therefore no need to modify it.

6 Linking symbols to variables (Modbus and IEC protocols)

The frames and variables being created, you should now create symbols (or use existing symbols) and link them to the variables created earlier.

In this chapter we shall not explain in detail how to create a symbol, because there are numerous possibilities and options in this area. This chiefly involves knowledge of supervision system which is the base of L500.

To obtain useful information concerning the definition of animations and symbols, you can refer to the system's online help facility at any time. The online help facility can be accessed via the "F1" key on the keyboard, in any project diagram. Then choose in the "Contents" tab one of the headings that could interest you, for example "Developing the HMI" and then the sections "Creating and using symbols" or "Animation" or "Drawing".

To understand how to proceed, we shall take three examples of linking of variables, creation of animations and symbols corresponding to a SEPAM type device with the following cases:

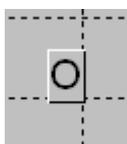
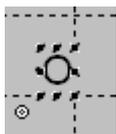
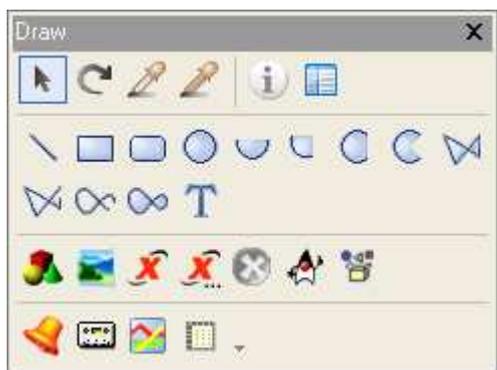
- Creation of a symbol linked to a TCD
- Creation of a symbol linked to a TSD
- Creation of a symbol linked to a TM
- Creation of a symbol linked to a TSS

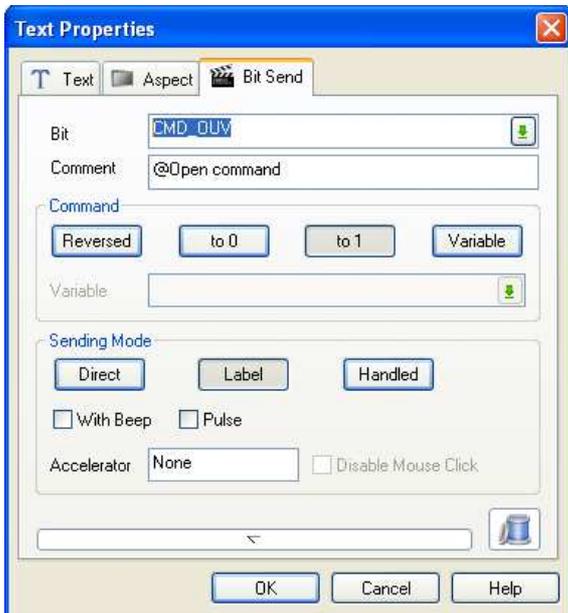
6.1 Creation of a symbol linked to a TCD:

We shall take the case of a circuit-breaker remote control in the following example.

6.1.1 Creating drawings:

- From the detail view of a T200, go to "Edit" mode via the "Mode/Design" menu.
- Click with the right mouse button on the menu, then click on the "Draw" option to show the corresponding toolbox.
- With the "Text" tool, create a text anywhere on the diagram (e.g. "O" or "C").
- Click with the right mouse button on the text created and select the "Properties" option.
- Where necessary change the font or text size by clicking on the icon alongside the title.
- In the "Aspect" tab, select the "Inverse relief" appearance.
- Click on "Ok" to accept the text.

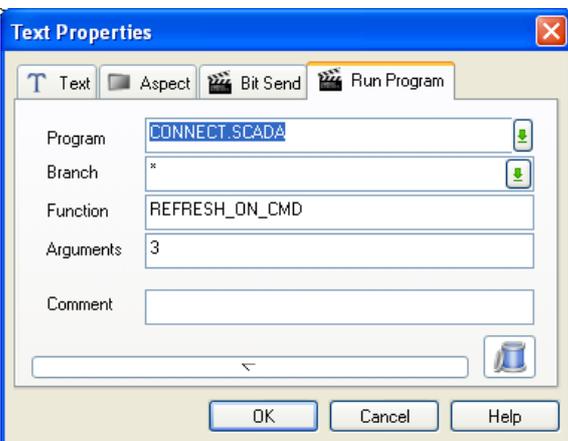




6.1.2 Creating animations:

- ❑ Click on the text with the right mouse button and select the "Animate / Send / Bit" option.
- ❑ In the displayed "Bit send" tab, insert the name of the variable to be linked for this animation. You can click on the drop-down list to select the name of the variable directly from the variables selector. This variable must of course have been created previously with a state type corresponding to "Command" (e.g. "CMD_OUV").
Note: The name of the variable should appear alone in the field, i.e. without the name of the T200 device and without the name of the external device so as to make the symbol generic.
- ❑ Select the "to 1" option in the "Command" area to set the bit to "1" when the button is selected.
- ❑ Select the "Label" option in the "Sending mode" area. The title of the command will thus correspond to the title of the variable. Then click on "Ok" to accept.

IMPORTANT NOTE: If L500-T200 dialogue is via a non-permanent type connection (e.g. radio), a second animation must be created to initiate communication toward the T200 automatically when the TCD is activated, thereby avoiding having to do so manually after remote control.

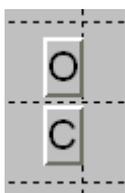


- In this case, perform the following operations:
- ❑ Click on the created text object with the right mouse button and select the "Animate / Run / Program" option.
 - ❑ Enter "CONNECT.SCADA" as program name, "*" as branch value, "REFRESH_ON_CMD" as Function and "3" as argument.
 - ❑ Click on "Ok" to accept the animation configuration.
 - ❑ Create another text and animations, repeating the same operations from the beginning with as text "C" and as variable name (e.g. "CMD_FER").

6.1.3 Creating the symbol:

It is always preferable to use symbols rather than animations so as to make them generic.

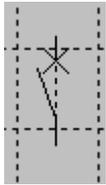
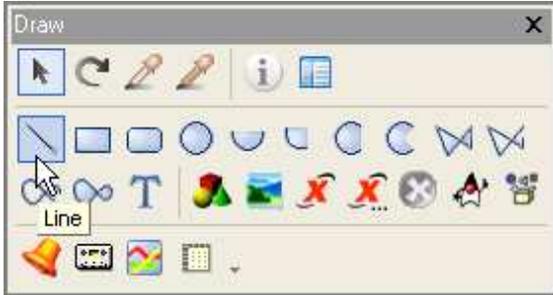
- ❑ Select the created objects, then with the right mouse button select the "Group" option.
- ❑ Click on the created object group with the right mouse button and select the "Create symbol" option.
- ❑ Give a name to the symbol to be created (e.g. "TCD_DISJ_SEPAM"), then save it to the project "LOCAL" library.
- ❑ The symbol is created and operational. Repeat the operation for all variables of the same type and for all external devices of the same T200.



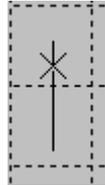
6.2 Creation of a symbol linked to a TSD:

We shall take the case of a circuit-breaker open/closed state indication in the following example.

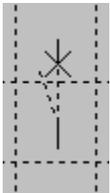
6.2.1 Creating drawings:



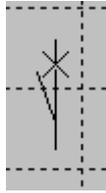
DISJ_OUV symbol



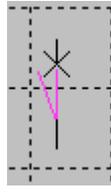
DISJ_FER symbol



DISJ_NI_OUV_NI_FER symbol



DISJ_OUV_FER symbol



DISJ_INVALID symbol

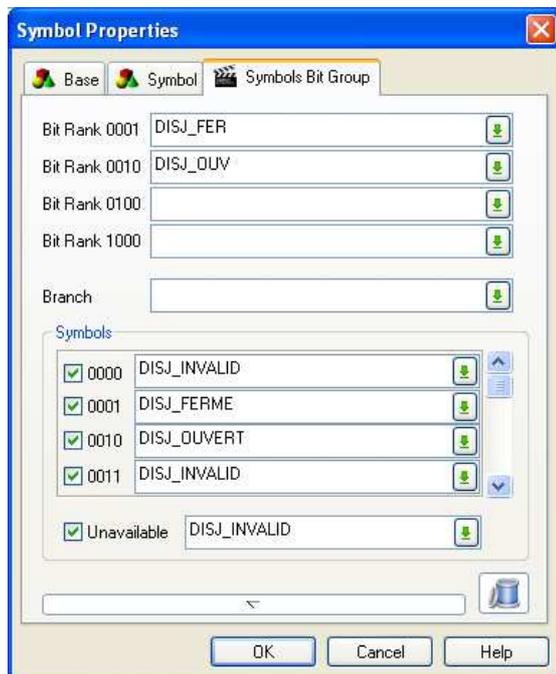
- ❑ From the detail view of a T200, go to "Edit" mode via the "Mode/Design" menu.
- ❑ Click with the right mouse button on the menu, then click on the "Draw" option to show the corresponding toolbox.
- ❑ With the "Line" tool, draw a circuit breaker in open position, then, in the same way as for a TCD, group the objects together and create a symbol, giving it a name (e.g. "DISJ_OUV").
Note: The discontinuous line part is a straight line segment with a line style defined as "Discontinuous".
- ❑ Repeat the operation but with a representation of the circuit breaker in closed state (e.g. "DISJ_FER").
- ❑ Repeat the operation but this time with a representation of the circuit breaker in neither open nor closed state (e.g. "DISJ_NI_OUV_NI_FER").
- ❑ Repeat the operation but this time with a representation of the circuit breaker in open and closed state simultaneously (e.g. "DISJ_OUV_FER").
- ❑ Repeat the operation but this time with a representation of the circuit breaker in invalid state, pink coloured (e.g. "DISJ_INVALID").

6.2.2 Creating animations:

- ❑ Click with the right mouse button on one of the symbols created previously, then select the "Animate / Symbols / Bit group" option.
- ❑ Enter the following parameters in the "Symbols Bit Group" tab:

Parameter	Link variable
Bit Rank 0001	DISJ_FER
Bit Rank 0010	DISJ_OUV
0000	DISJ_NI_OUV_NI_FER
0001	DISJ_FERME
0010	DISJ_OUVERT
0011	DISJ_OUV_FER
Unavailable	DISJ_INVALID

- ❑ Click on "Ok" to accept the configuration.



6.2.3 Creating the symbol:

It is always preferable to use symbols rather than animations so as to make them generic.

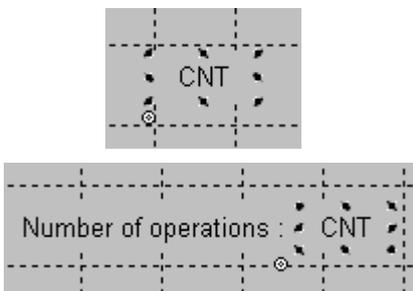
- ❑ Select the symbol from which the animations were created, then with the right mouse button select the "Create symbol" option.
- ❑ Give a name to the symbol to be created (e.g. "DISJONCTEUR_SEPAM") then save it in the project "LOCAL" library.
- ❑ The symbol is created and operational.
- ❑ Repeat the operation for all variables of the same type and for all external devices of the same T200.

6.3 Creation of a symbol linked to a TM (or AI):

We shall take the case of an operation counting measure on a circuit breaker in the following example.

6.3.1 Creating drawings:

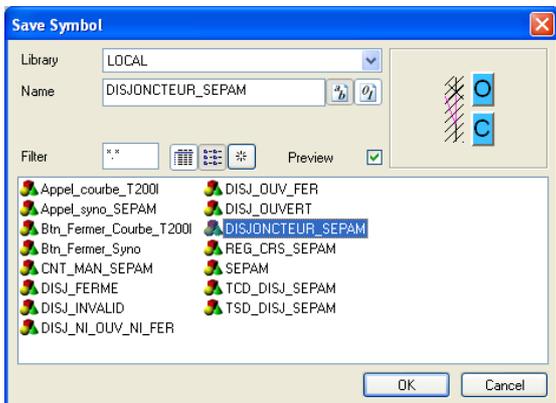
From the detail view of a T200, go to "Edit" mode via the "Mode/Design" menu.



- ❑ Click with the right mouse button on the menu, then click on the "Draw" option to show the corresponding toolbox.
- ❑ With the "Text" tool, create a text anywhere in the diagram (e.g. "CNT").
- ❑ Click with the right mouse button on the text created and select the "Properties" option.
- ❑ Where necessary change the font or text size by clicking on the icon alongside the text title.
- ❑ Click on "Ok" to accept the text.
- ❑ Repeat the operation by creating a text alongside the first one, with as text the title of the measure variable. (e.g. "Number of operations").

6.3.2 Creating animations:

- ❑ Click on the "CNT" text with the right mouse button and select the "Animate / Text / Display Register" option.
- ❑ In the displayed "Display Register" tab, insert the name of the measure variable to be linked for this animation. You can click on the drop-down list to select the name of the variable directly from the variables selector. This variable must of course have been created previously with a state type corresponding to "Register" (e.g. "CNT").
Note: The name of the variable should appear alone in the field, i.e. without the name of the T200 device.

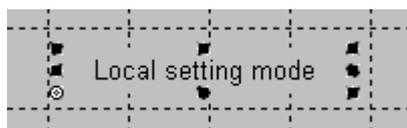
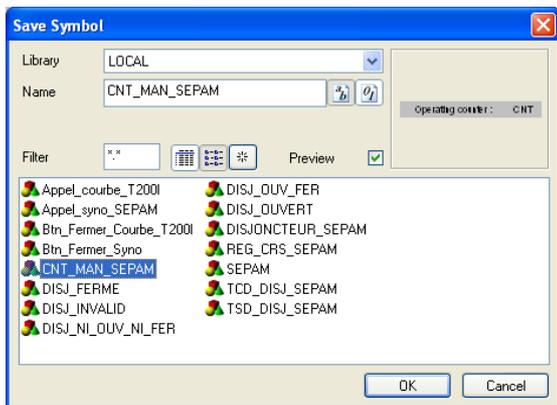


- ❑ Click on "Ok" to accept the animation configuration.

6.3.3 Creating the symbol:

It is always preferable to use symbols rather than animations so as to make them generic.

- ❑ Select the text objects created previously, then with the right mouse button select the "Group" option.
- ❑ Click on the object group with the right mouse button and select the "Create symbol" option.
- ❑ Give a name to the symbol to be created (e.g. "CNT_MAN_SEPAM"), then save it to the project "LOCAL" library.
- ❑ The symbol is created and operational.
- ❑ Repeat the operation for all variables of the same type and for all external devices of the same T200.

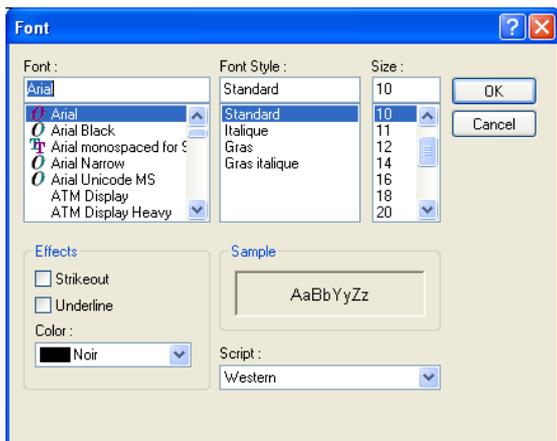


6.4 Creation of a symbol linked to a TSS (or DI):

We shall take the case of an indication of setting in progress on a SEPAM type external device in the following example.

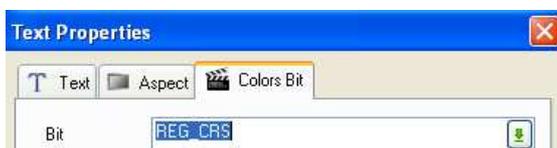
6.4.1 Creating drawings:

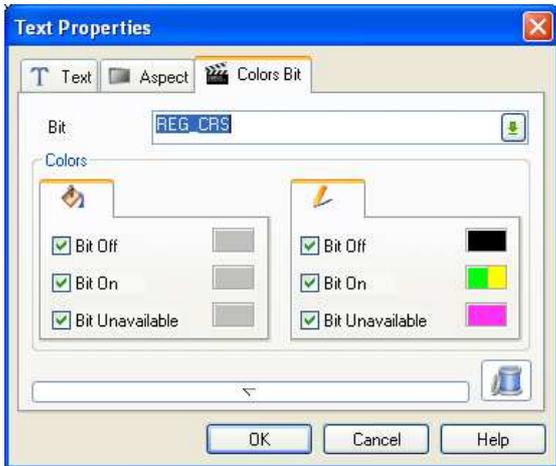
- ❑ From the detail view of a T200, go to "Edit" mode via the "Mode/Design" menu.
- ❑ Click with the right mouse button on the menu, then click on the "Draw" option to show the corresponding toolbox.
- ❑ With the "Text" tool, create a text representing the name of the variable anywhere in the diagram (e.g. "Local setting mode").
- ❑ Where necessary change the font or text size by clicking on the icon alongside the name.
- ❑ Click on "Ok" to accept the text.



6.4.2 Creating animations:

- ❑ Click on the "Local setting mode" text with the right mouse button and select the "Animate / Color / Bit" option.
- ❑ In the displayed "Colors Bit" tab, insert the name of the measure variable to be linked for this animation. You can click on the drop-down list to select the name of the variable directly from the variables selector. This variable must of course have been created previously with a state type corresponding to "Bit" (e.g. "REG_CRS").
Note: The name of the variable should appear alone in the field, i.e. without the name of the T200 device.





- Again in the "Colors Bit" tab, define the background colours and text colours to be used for "Bit Off", "Bit On" and "Bit Unavailable".

Note: To have the same display for the states as for the T200 variables, it is recommended to use the following colours:

Background	Colour	Text	Colour
Bit Off	Light grey	State at 0	Black
Bit Off	Light grey	State at 1	Yellow/green
Bit Unavailable	Light grey	Invalid state	Pink

Note: The "light grey" colour corresponds literally to the "background full screen mimics" colour of the colour palette.

- Click on "Ok" to accept the animation configuration.
- Click once again on the "Local setting mode" text with the right mouse button and select the "Animate / Text / Label" option.
- In the displayed "Label Display" tab, insert the name of the measure variable to be linked for this animation in the same way as for the preceding animation.
- Again in the "Label Display" tab, select "Title" as label type. **Note:** The "Title" label represents the label defined for the variable during the configuration operations by the variable selector. It is this label that will be used to display the variable's state in the detail view of the item.
- Click on "Ok" to accept the animation configuration.

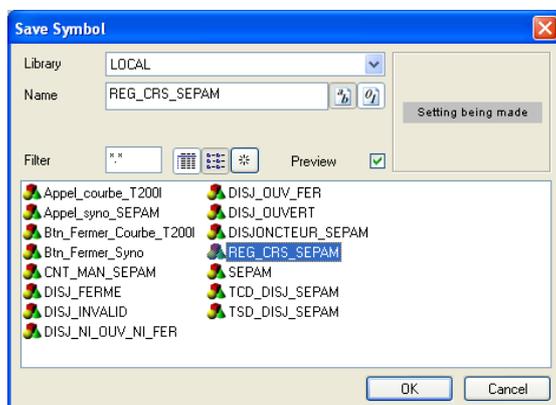


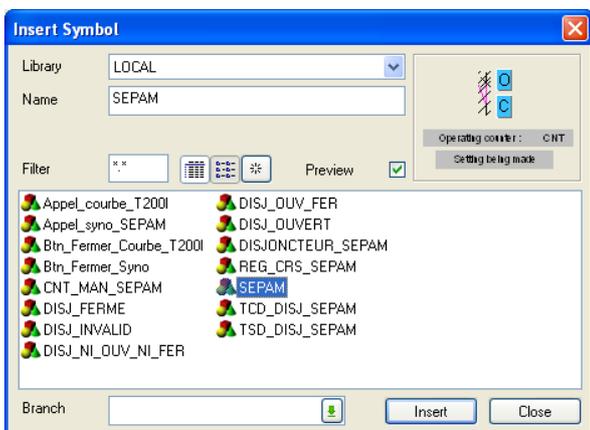
6.4.3 Creating the symbol:

It is always preferable to use symbols rather than animations so as to make them generic.

- Select the "Local setting mode" text object created previously with the right mouse button and select the "Create symbol" option.
- Give a name to the symbol to be created (e.g. "REG_CRS_SEPAM"), then save it to the project "LOCAL" library.
- The symbol is created and operational.
- Repeat the operation for all variables of the same type and for all external devices of the same T200.

The project now includes all the items necessary to take into account the variables of the external devices associated with a given T200.





6.4.4 Using the symbols for other T200 devices:

Once all the symbols corresponding to the external devices have been created for a given T200 device, the same symbols can be inserted and used in the detail views of other T200 devices including the same types of external devices.

To do so, use the "*Insert / symbol*" menu option, then select the symbol to be inserted in the detail view according to the items to be included in that view, then click on "Insert".

The project will then include all the items necessary to take into account the variables of all the external devices, for all the project's T200 devices.

Schneider Electric Industries SAS

Schneider Electric Telecontrol
839 chemin des Batterses
Z.I. Ouest
F-01700 St Maurice de Beynost
Tel.: +33 (0)4 78 55 13 13
Fax: +33 (0)4 78 55 50 00

<http://www.schneider-electric.com>
E-mail: telecontrol@schneider-electric.com

As standards, specifications and designs change from time to time,
please ask for confirmation of the information given in this publication.