Protection unit MP2-MP4 DMX-SP

MP2: Item 6 682 90 - Item 6 682 91 - Item 6 682 92
MP4: Item 0 288 00 - Item 0 288 01 - Item 0 288 02

June 19

legrand®
LE11754AA

Contents

FW Version Display 2.7.X

Protection unit DMX-SP

1. MP2 and MP4 functions overview

	DMX-SP					
	MP2			MP4		
Functions	**LI**	**LSI**	**LSIg**	**LI**	**LSI**	**LSIg**
Overload protection (Ir - tr) setting	•	•	•	•	•	•
Short-circuit protection (Isd - tsd) setting	X	•	•	X	•	•
Instantaneous protection (Ii) setting	•	•	•	•	•	•
Ground fault protection (Ig - tg) setting	X	X	•	X	X	•
Neutral pole protection setting	•	•	•	•	•	•
Tripping test	•	•	•	•	•	•
USB programming and monitoring interface	•	•	•	•	•	•
External Neutral option	•	•	•	•	•	•
LCD display	X	X	X	•	•	•
Over-temperature protection	•	•	•	•	•	•
Local visualization of instantaneous currents	X	X	X	•	•	•
Communication option	X	X	X	•	•	•
Logical selectivity	X	X	X	•	•	•
Programmable contacts	X	X	X	•	•	•
Local visualization of the last 20 faults recorded	X	X	X	•	•	•
Local visualization of protection unit trips counters	X	X	X	•	•	•

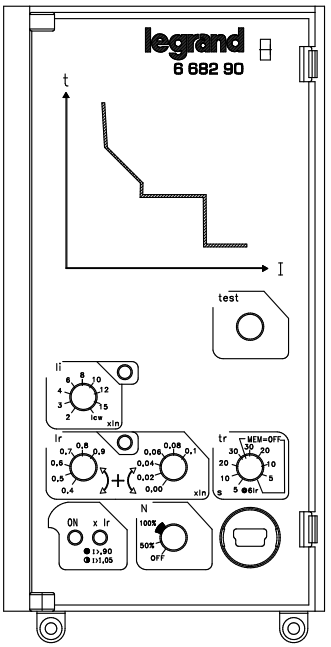
Protection unit DMX-SP

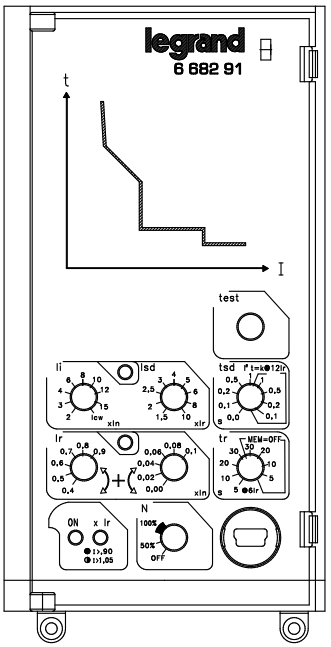
2. Identification and factory setting

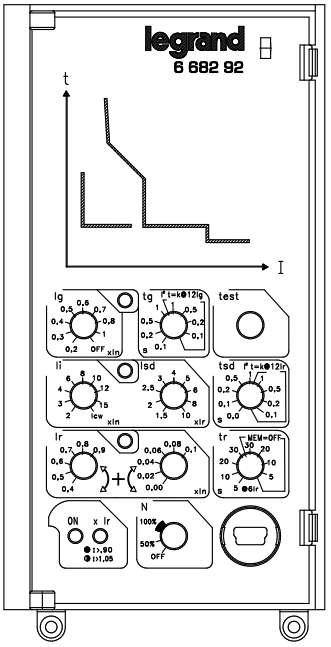
6 682 90
Factory setting
Ii=Icw;
Ir=(0.9+0.1) x In;
tr= 5s (MEM=OFF);
Isd=10Ir=fix
tsd=1s=fix;
N=100%

6 682 91
Factory setting
Ii=Icw;
Isd=10 x Ir;
tsd= 0.0s (t=const);
Ir=(0.9+0.1) x In;
tr= 5s (MEM=OFF);
N=100%

6 682 92
Factory setting
Ig= 0.2 x In,
tg= 0.1s (t=const),
Ii=Icw;
Isd=10 x In;
tsd= 0.0s (t=const)
Ir=(0.9+0.1) x In;
tr= 5s (MEM=OFF);
N=100%





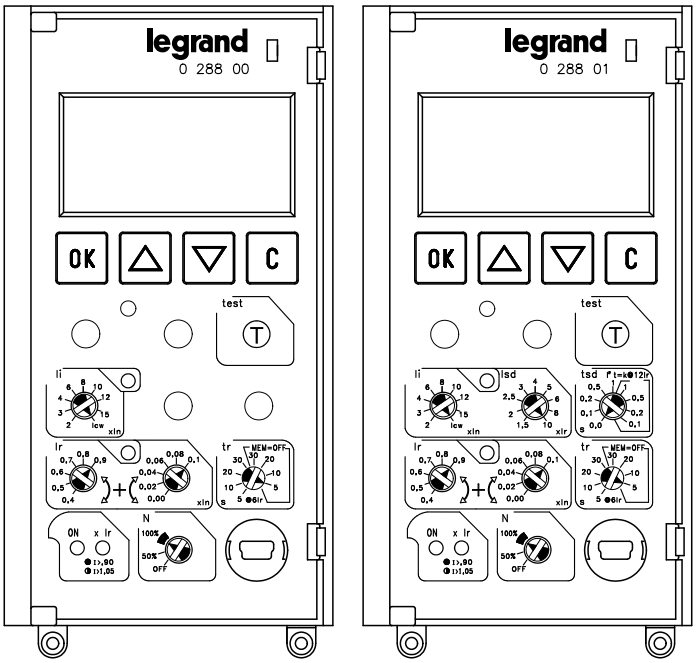


"MEM OFF" =
thermal memory off

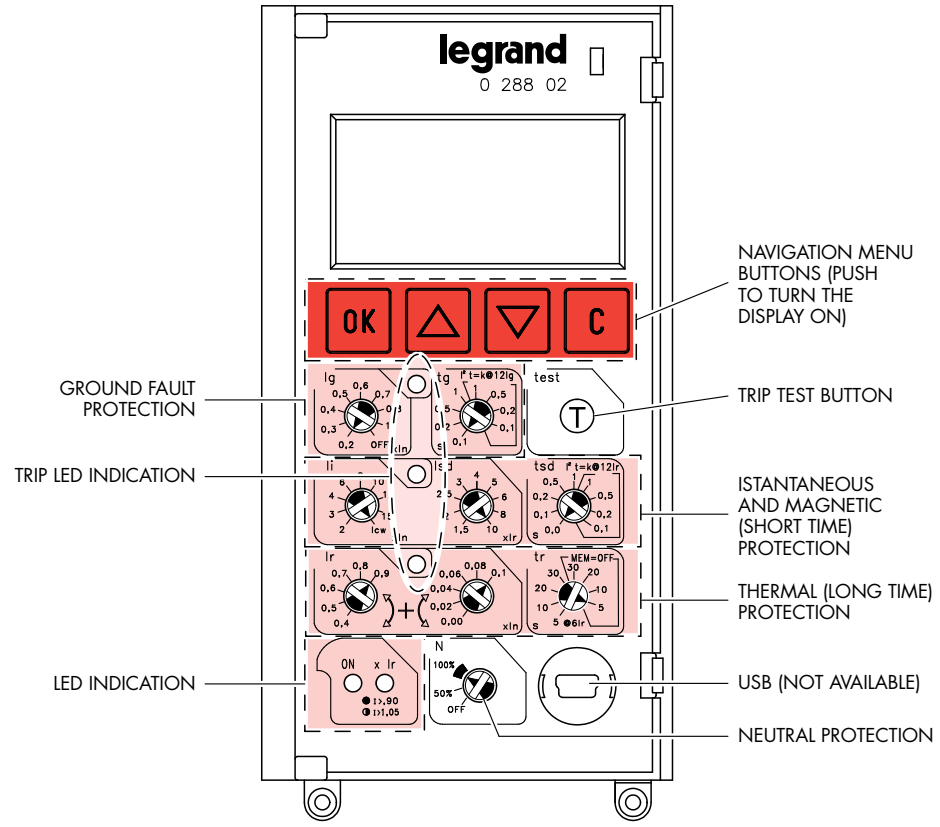
Protection unit DMX-SP

0 288 00
Factory setting
Ii=Icw;
Ir=(0.9+0.1) x In;
tr= 5s (MEM=OFF);
Isd=10Ir=fix
tsd=1s=fix;
N=100%

0 288 01
Factory setting
Ii=Icw;
Isd=10 x Ir;
tsd= 0.0s (t=const);
Ir=(0.9+0.1) x In;
tr= 5s (MEM=OFF);
N=100%



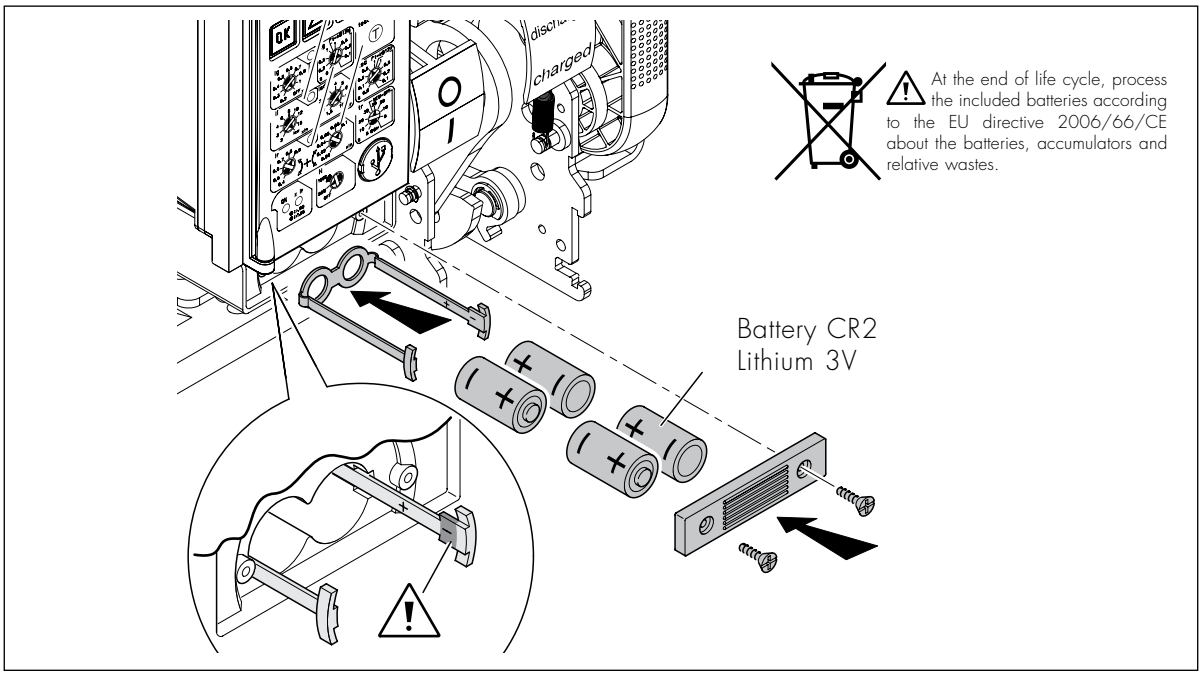
0 288 02
Factory setting
Ig= 0.2 x In,
tg= 0.1s (t=const),
Ii=Icw; Isd=10 x Ir;
tsd= 0.0s (t=const);
Ir=(0.9+0.1) x In;
tr= 5s (MEM=OFF);
N=100%



"MEM OFF" = thermal memory off

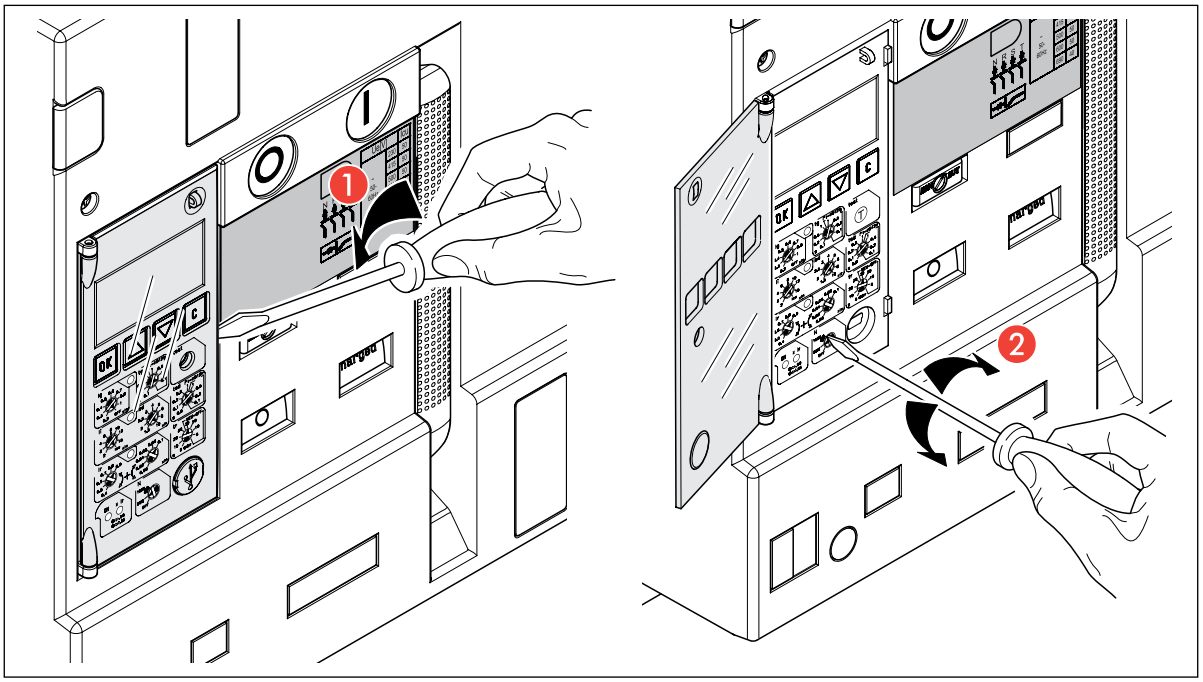
3. Battery insertion/replacement - for MP4 devices only

Remove frontal cover of the breaker. Insert the 4 batteries on the lower part of the protection unit keeping polarity and mounting order like shown on picture. Batteries are delivered outside the breaker.



4. Protection functions and trip threshold setting

Setting of trip thresholds is possibile operating the corresponding rotary switches. Execute setting with a flat screwdriver.



Protection unit DMX-SP

Ground fault protection (only for item 0 288 02 and 6 682 92)
Setting of current (9 steps) Ig=0.2-0.3-0.4-0.5-0.6-0.7-0.8-1 xIn - OFF
Setting of time delay (@12xIg) (4+4 steps) tg=0.1-0.2-0.5-1s (t=const)
tg=1-0.5-0.2-0.1s (I^2t=const)

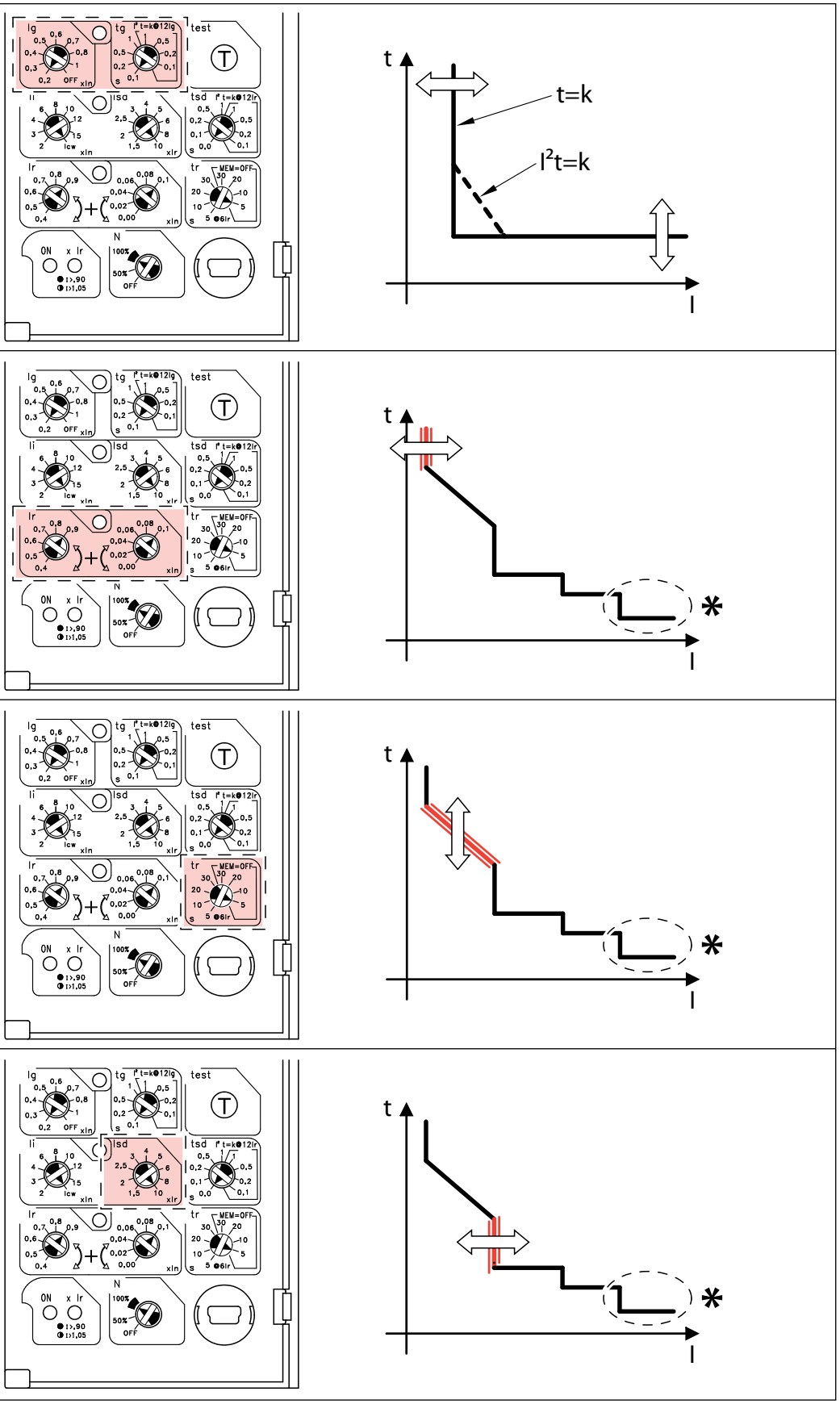
Overload protection (Long Time Protection)
Setting of current (2x6 steps)
Ir=0,4÷1 x In
With 2 switches (0,4÷0,9, steps of 0,1 0,0÷0,1, steps of 0,02)

Example:
Ir = 0.4+0.06
= 0.46 In

Setting of time delay (@6Ir)
(4+4 steps)
tr=5-10-20-30s (MEM ON)
tr= 30-20-10-5s (MEM OFF)

"MEM OFF" = thermal memory off
"MEM ON" = thermal memory on

Short Time Protection
Setting of current (9 steps)
Isd=1.5-2-2.5 3-4-5-6-8-10xIr

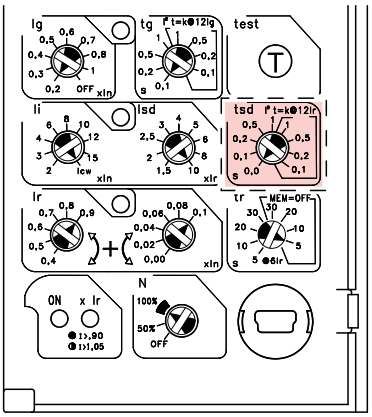


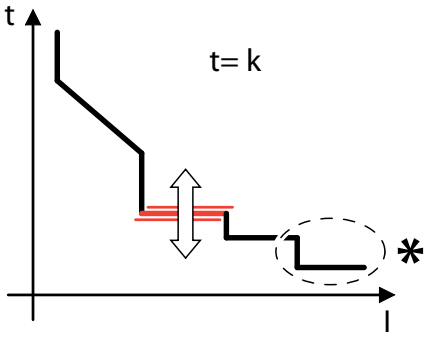
If Ii<Isd, then istantaneous setting prevails against the magnetic one.

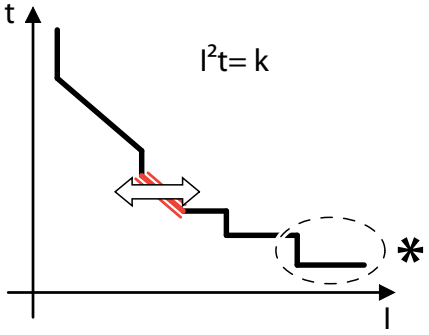
Fixed instantaneous override - Isf

Protection unit DMX-SP

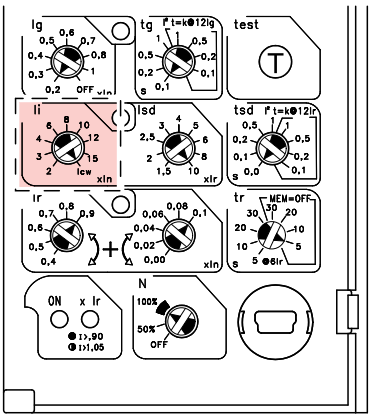
Setting of time delay
(5+4 steps)
tsd=0-0.1-0.2-
0.5-1s (t=const)
tsd=1-0.5.0.2-
0.1s (I^2t=const)

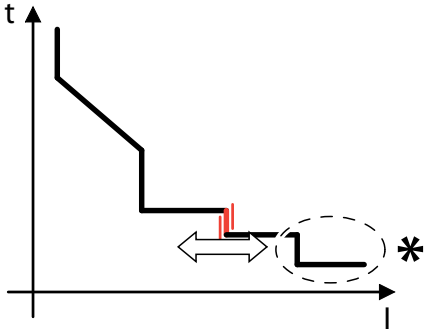




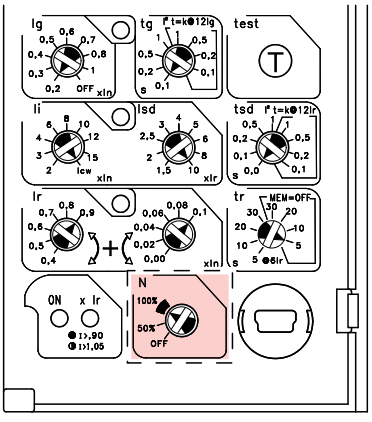


Adjustable instantaneous short time protection
Setting of current
(9 steps)
Ii=2-3-4-6-8
10-12-15x In-Icw





Neutral protection
Setting of current
(3 steps)
N=OFF-50%-100%



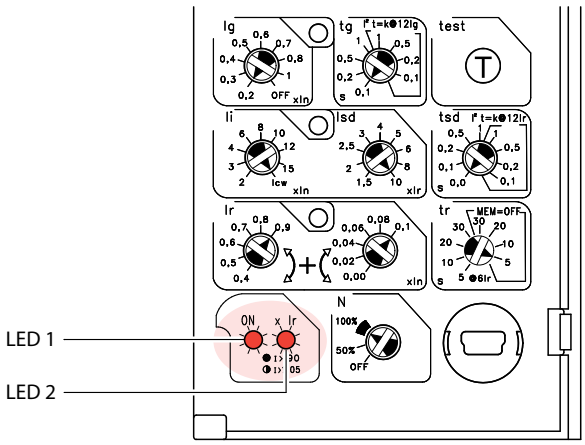
Neutral protection	
Position	**Protection**
OFF	Not protected
50%	Protected at 50% Ir-Isd-Ii
100%	Protected as Ir-Isd-Ii

Protection against over temperature
(not adjustable)
t>95°C

Fixed instantaneous override - Isf

5. Signaling of protection unit state

LED 1 and LED 2



The state of the protection unit is signaled through LED 1 and 2, according to the next table:

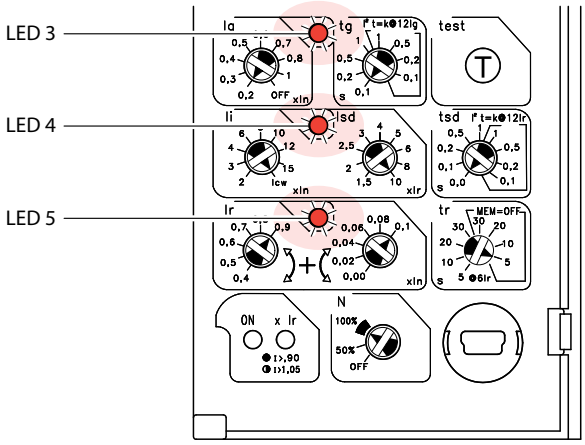
Protection	Led 1		Led 2	
Inactive		Switched off		Switched off
Active (I ≥100A or supplied)		Green		Switched off
Active: (overload pre alarm (I>0,9Ir)	Green	Fix	Red	Fix
Active: (overload alarm I>1,05Ir)	Green	Fix	Red	Flashing
Active: over temperature alarm (T>75°C)	Green	Flashing	Red	Flashing

Signaling:
An alarm is more important than a prealarm. The overload is more important than over temperature

LED 3:
Failure by earth fault (only for item 0 288 02 and 6 682 92)

LED 4:
Failure by short circuit/instantaneous short circuit

LED 5:
Failure by overload/ overtemperature



In case of breaker tripping the led corresponding to the protection that caused the tripping remains lighted, signalling the corresponding fault has occured (if auxiliary supply is present).

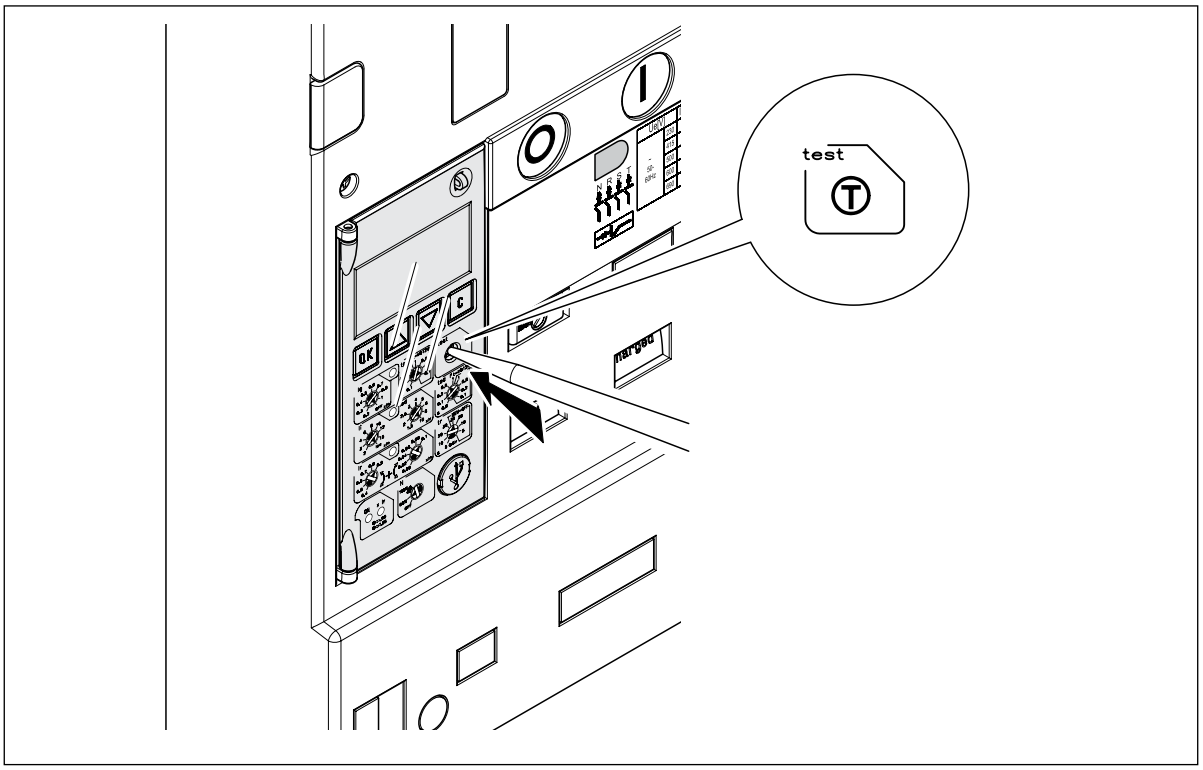
6. Test button

In order to perform the diagnostic trip test, the PU must be active (LED ON green fix) and the main contacts must be in closed (I) position.

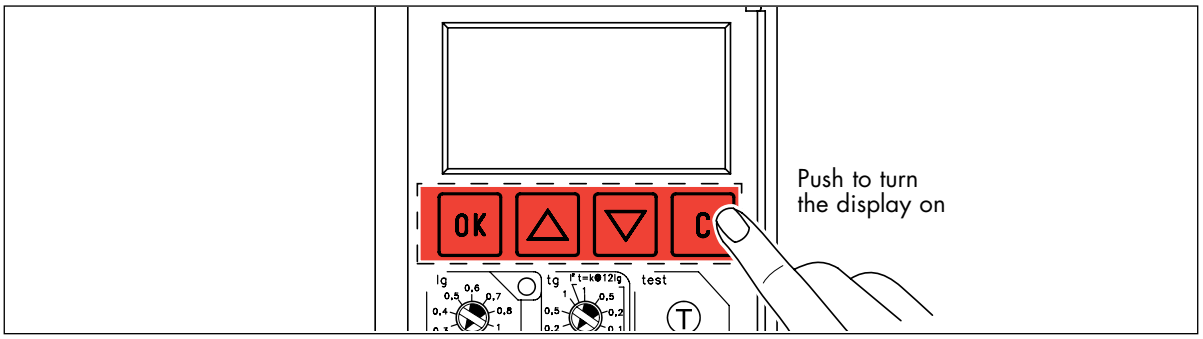
On the right side of the protection unit, below the navigation buttons, there's the TEST button.
This command allows to verify the correct functioning of breaker and protection unit. Pushing the TEST button for a time higher than 5 seconds makes the breaker trip and allows to verify the correct working of the protection device.

The tripping sequence is:
1. Push for at least 5 seconds the "T" button
2. All LEDs light on for1 second (ON LED on orange the others on red)
3. The breaker trips and each LEDs switch off.

The ON LED move from orange to green.



7. Visualisation and use of menus



It's possible to explore the menu using the OK, ▲, ▼, buttons.
It's possible to visualize 2 type of pages:

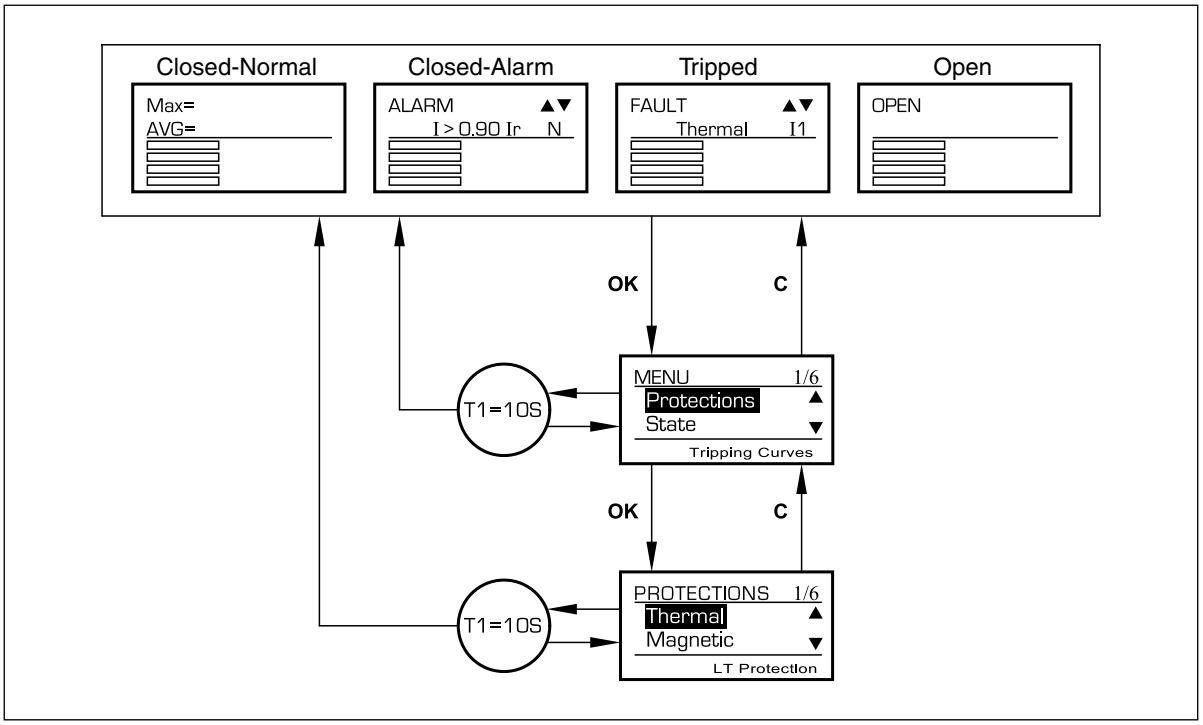
- **Default pages**: Show the state of the breaker in all the allowed uses (closed-normal, closed-alarm, tripped, open). It's shown every time that protection unit is turned on and it's automatically refreshed if, after a determinated time (fixed T1=10 seconds), there's no activity on the 4 navigation buttons. From this page it's possible to reach the Menu Page only by pushing OK button.
- **Menu pages:** these are the pages active when using the menu.

The exit from submenus pages that allow a parameter setting (Example: setting of brightness) is possible in three ways:

(1) Push OK button:
back to upper level **with** storage of the new parameter.

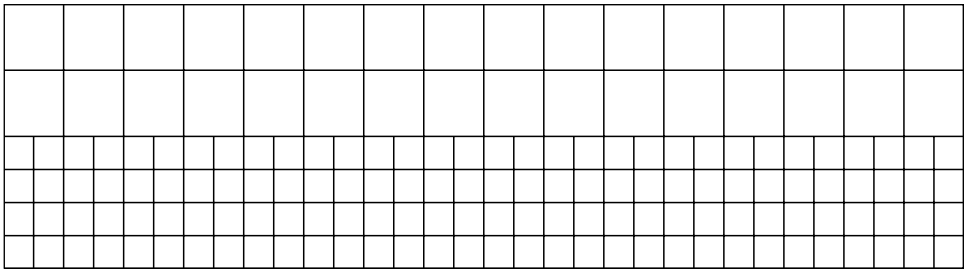
(2) Push C button:
back to upper level **without** storage of the new parameter.

(3) After time T1
back to main page **without** storage of the new parameter.



8. Default page

Like shown on the bottom, display have an "Upper part", of two lines, and a "Lower part", of four lines.



Four different layouts of the default page depending on breaker status.

1. **BREAKER CLOSED - NORMAL:** (no pre alarm or alarm signal). On upper side are shown maximum average currents.

Example: maximum value 1000A on 1 phase, average value 700A.

M	a	x	=	1	0	0	0	A					I	1	
A	V	G	=		7	0	0	A							

From this position (closed breaker and no alarms) it's possible to enter the main page by pushing **OK** button. MAX represents the maximum value among the currents (phase shown on side, I1, I2, I3 or N; this last one only if Neutral is present); AVG instead shows the average value obtained by:

$$AVG = \frac{\Sigma I_i}{n}$$

Where "n" is the number of phase detected by the breaker, so:
4 if Neutral is present (four poles or three poles with external neutral)
3 if Neutral is absent (3 poles without external neutral)
Phases I1, I2, and I3 are always considered in the sum; Neutral only if is present.

2. BREAKER CLOSED - ALARM: (protection unit in alarm position) Upper side of the display become like shown:

A	L	A	R	M									▲	▼
	(	d	e	s	c	r	i	p	t	i	o	n	)	

From this position (closed breaker and protection unit in alarm position) it's possible to enter the main page pushing one time the **OK** button.

Description: possible cases (I1 and I3 are an example of indications).

	I	>	0	.	9	0		I	r				I	1	
	I	>	1	.	0	5		I	r				I	3	
	T	>	7	5	°	C									

Indication on alarm type is shown on the second line; if there are several alarms, these can be visualized scrolling with ▲▼. If more than one phase is on alarm position (Example: I1 and I3> 1.05 Ir) two different descriptions are shown on different lines.

3. BREAKER TRIPPED: Upper side of the display is like shown:

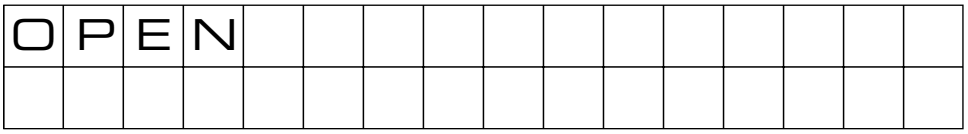
F	A	U	L	T									▲	▼
	(	d	e	s	c	r	i	p	t	i	o	n	)	

Indication on failure type is shown in the second line; if there are several events at the same time, these can be visualized scrolling with ▲▼. If more than one phase is on failure position (Example: Thermal I1 and Thermal I3) two different descriptions are shown on different lines. From this page is possible to reach the main page pushing one time the **OK** button.

Description: possible cases (I1,I2 and I3 are an example of indications).

	L	o	n	g		T	i	m	e				I	1
	S	h	o	r	t		T	i	m	e			I	2
	I	s	t	a	n	t	a	n	e	o	u	s	I	3
	F	i	x	.	I	s	t	.						
	G	r	o	u	n	d								
	O	v	e	r		t	e	m	p	.				
	T	e	s	t										

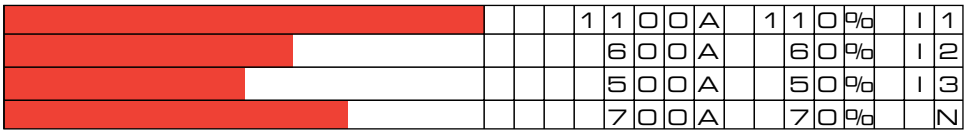
4. BREAKER OPEN: Upper side of the display is like shown:



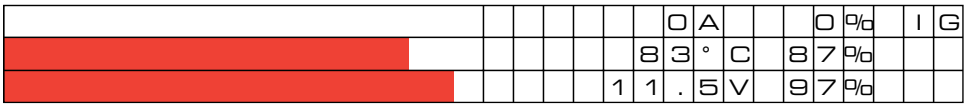
From this page is possible to reach the main page pushing one time the **OK** button.

In the lower side and for all the 4 types of main or default page, are shown the currents of each phase, if present, the earth fault/leakage current, temperature detected by the protection unit and the residual charge on the auxiliary batteries. If information to show are more than 4 two pages will be **automatically** shown alternatively every 10 seconds. It's also possible to manual switch pushing everyone of the buttons ▲, ▼ and **C**. (Example: four poles breaker with earth fault protection → phase currents + Ig).

Page 1:



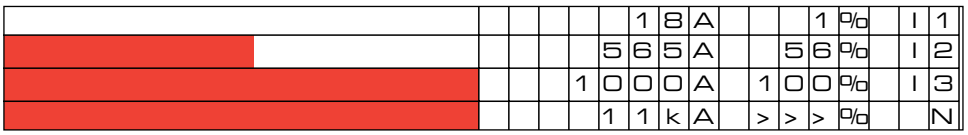
Page 2:



9. Setting of currents visualisation

1. Each current can be shown in 3 ways: an histogram, a value and a percentage; all calculated with the same accuracy rule:
   VALUE has no more than 6 spaces. If VALUE ≤ 9999 is shown on 4 digits plus the symbol "A", using so 5 spaces. If instead 9999 < VALUE < 99999 digits are only 3 with a decimal digit divided by a dot and followed by "k" and "A" symbols (so 6 spaces) and are obtained reducing VALUE to the nearest lower decimal (Example: 12550 A become 12500 and is shown as 12.5kA). If is VALUE≥99999 digits are still 3, but are hundred, decine and unit, obtained once more reducing to the nearest lower unit and followed by the symbols "k" and "A" (so 5 spaces). (Example: 245650 A become 246000 and is shown like 246kA).
   If PERCENTAGE > 999% is shown the symbol > > > %.

2. Histograms of currents can shown values among 0 and 1,2*I threshold [A], where I threshold is the threshold current for thermal protection (Ir); if detected current is higher than maximum value, the histogram is shown complete (so equivalent to a threshold of 120%).



10. Visualisation rules for temperature

3. Temperature is shown in 3 ways: an histogram, a value and a percentage; all calculated with the same accuracy rule. VALUE has no more than 5 spaces, 3 digits (only integer values) and the symbol "°C". If PERCENTAGE > 999% is shown the symbol > > > %.

4. Temperature histogram shows values among 0 and 95 [°C]; if detected temperature is higher than maximum value histogram is shown complete (so equivalent to 95°C).

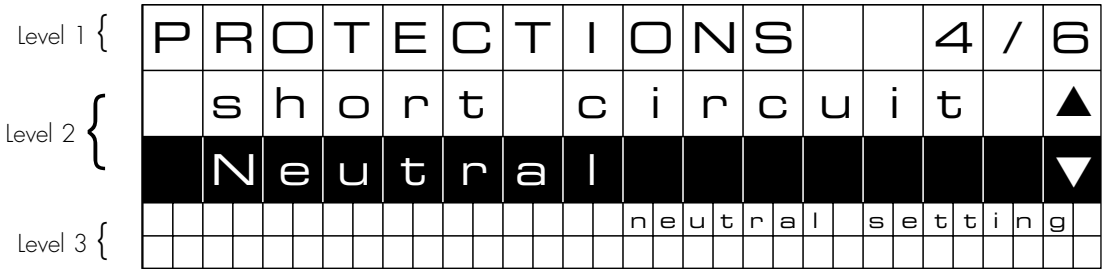
11. Visualisation rules for battery charge - only for MP4 devices

5. Residual charge on battery is shown in 3 ways: an histogram, a value and a percentage; all calculated with the same accuracy rule. VALUE has no more than 5 spaces, 3 digits (decine, unit and 1 decimal digit separated by a dot) and the symbol "V".

6. Histogram of residual charge on battery shows values among 0 and 12 [V]; if detected battery is higher than maximum value histogram is shown complete (so equivalent to 12V). Additionally, for **absolute values** of voltage ≤ Val. Min. Batt. (settable parameter, see Main page – System options), is shown an empty histogram and the message "Change battery" instead of the percentage value.

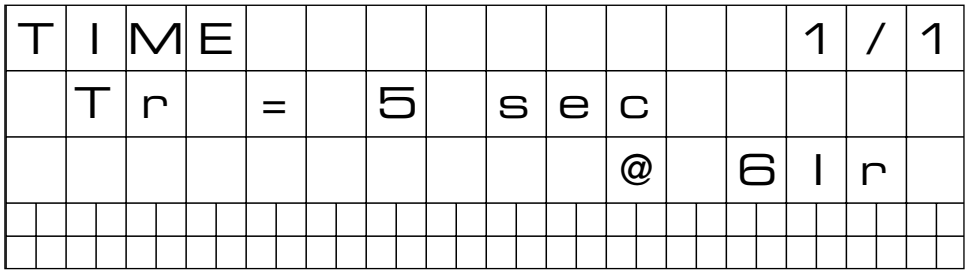
The defaul setting of Val. Min. Batt is 10.5 V.

12. Menu pages

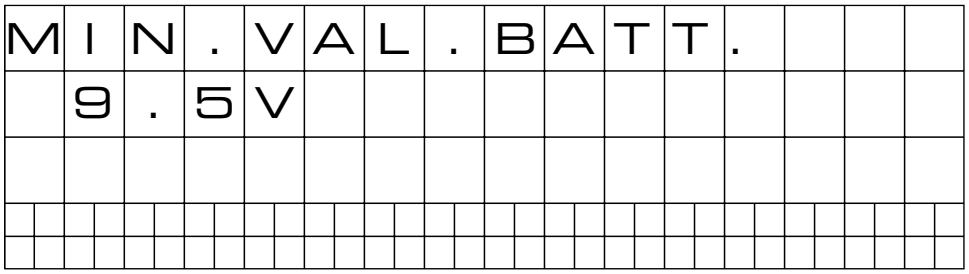


VISUALISATION:
Display has 3 levels, the central one is for exploring, the two others to show information:
- **Level 1: INFORMATION** - Menu name active.
- **Level 2: DESCRIPTION** (two lines) - possible pages on active menu; sequential number (N/M) is referred to the selected page (name on black background and white letters) and it's also present on the upper left part of the **level 1**. Using ▲ and ▼ buttons is possible to select other pages of the same level updating sequential number and information on level 3 (see below). Pushing **OK** is possible to activate the menu responding to the selected page; DESCRIPTION move to level 1 and are shown the pages available for the new menu, and a description of selected page (default first page); **C** button move up to previous level.
- **Level 3: INFORMATION** - description of content inside selected page.

Scrolling down to the last level available on the menu and pushing the "**OK**" button, it's possible to see on the screen the same structure explanied previously unless that the **level 3** is no more shown.



SETTING:
If page allow to set a parameter (Example: setting of contrast/brightness, setting of Modbus addresses, etc.) is possible to change the value using ▲ and ▼ buttons. New setting will be operative only if confirmed pushing the **OK** button.



13. Accessories

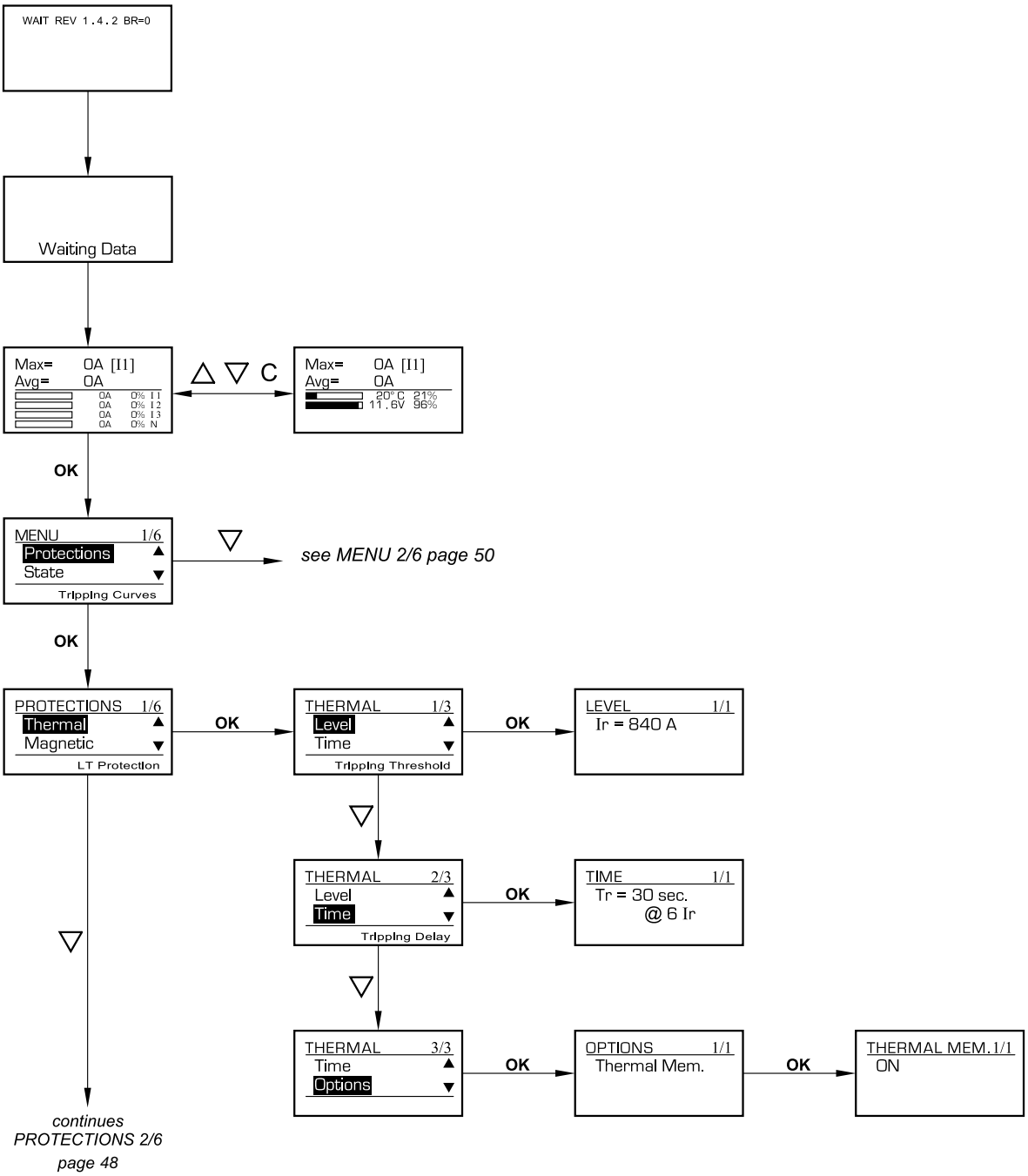
0 288 11 (factory assembled)
External current trasformer for ground fault and neutral protection (not disconnected).
It's possible to use it with 3 poles breakers and is installed on the neutral, in order to guarantee the following protections without disconnecting it in case of breaker trip:
- neutral protection
- ground fault protection (only for version 0 288 02 and 6 682 92)

0 288 06
External power supply module.
The accesory allows an uninterrupted supply of electronic protection unit, even if the circuit breaker is switched off/tripped.
The accessory allows to power up to 4 protection units MP4/MP2.

0 288 12
Programmable contacts module - only for MP4 devices
This module is an accessory used to manage other external devices for signal/control.
Must be related to the protection unit, which allow its adjustment, and must be connected to the terminals on the upper part of the breaker.

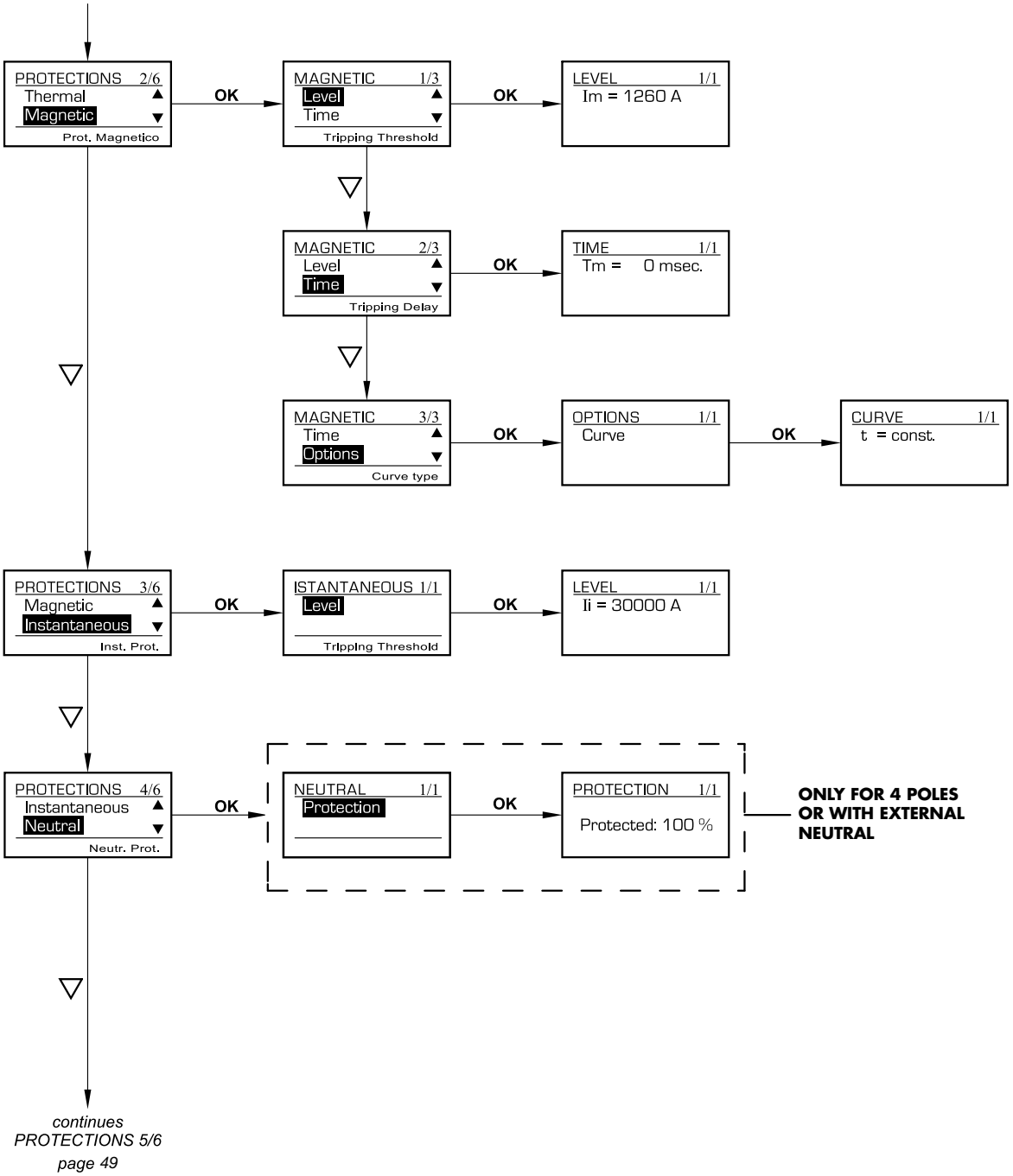
0 288 05 (factory assembled) only for MP4 devices
Communication option
Factory assembled this option allows to connect the breaker to a MODBUS RS485 supervision system.

14. Menu navigation



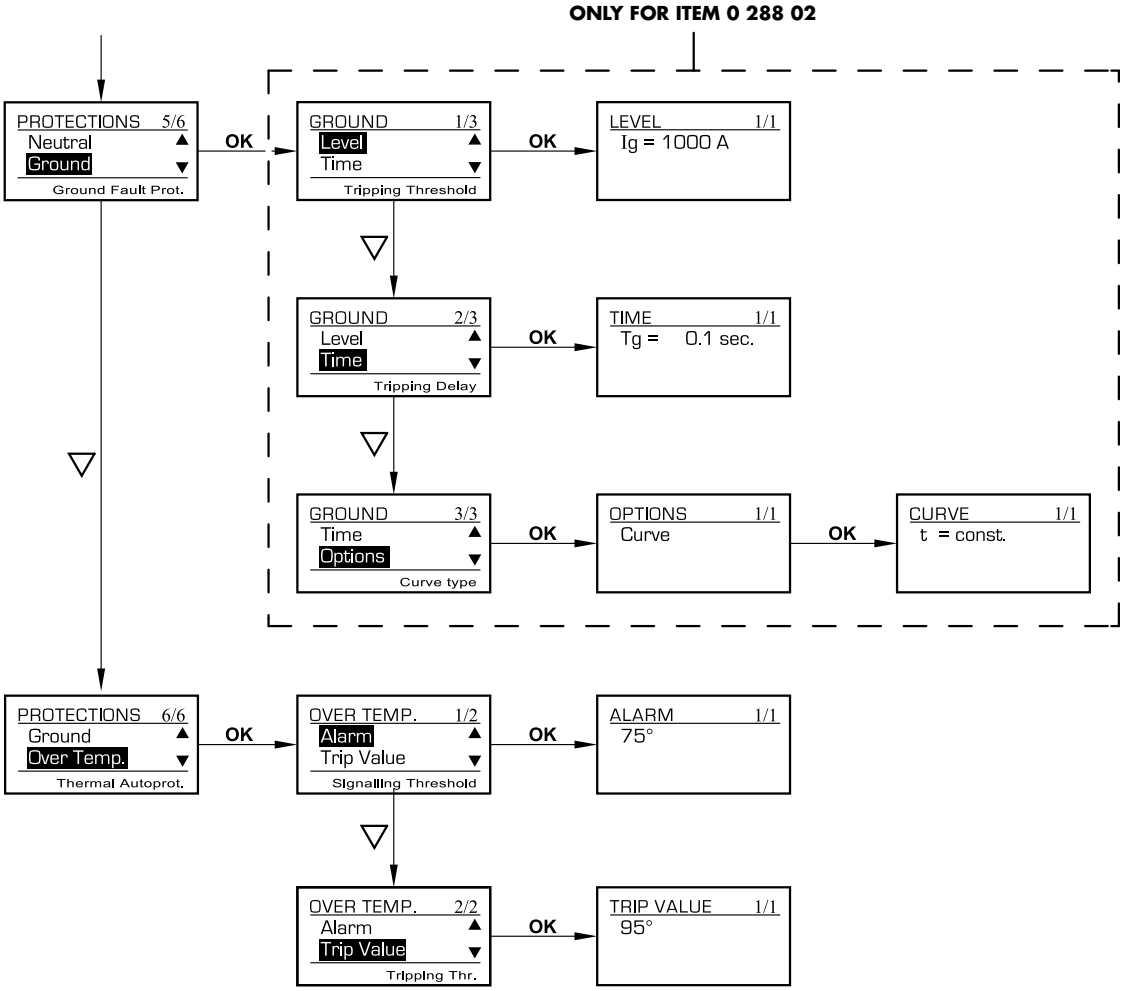
To come back to the upper level of menu push C - To scroll up push "△"

Protection unit DMX-SP



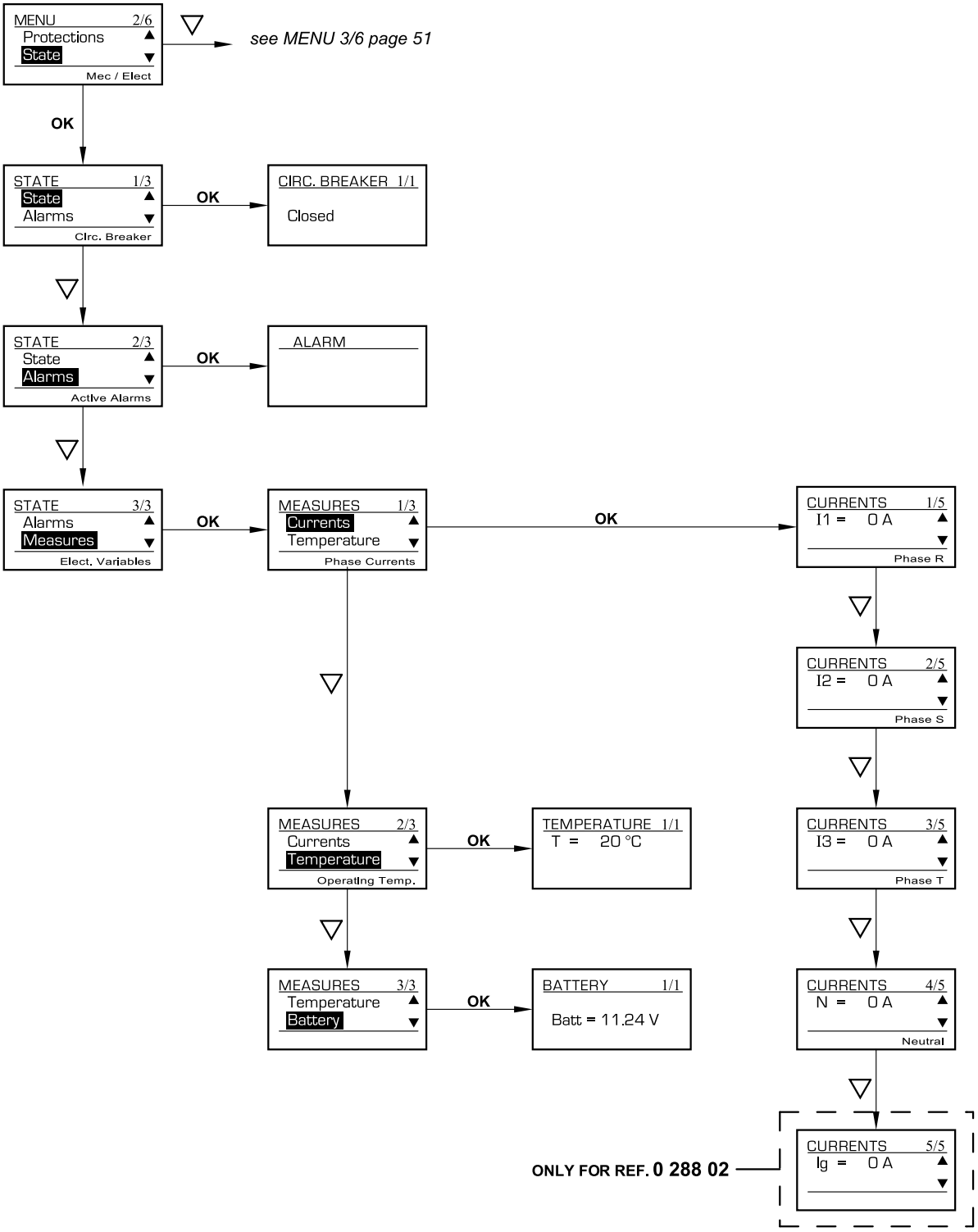
To come back to the upper level of menu push C - To scroll up push "△"

Protection unit DMX-SP

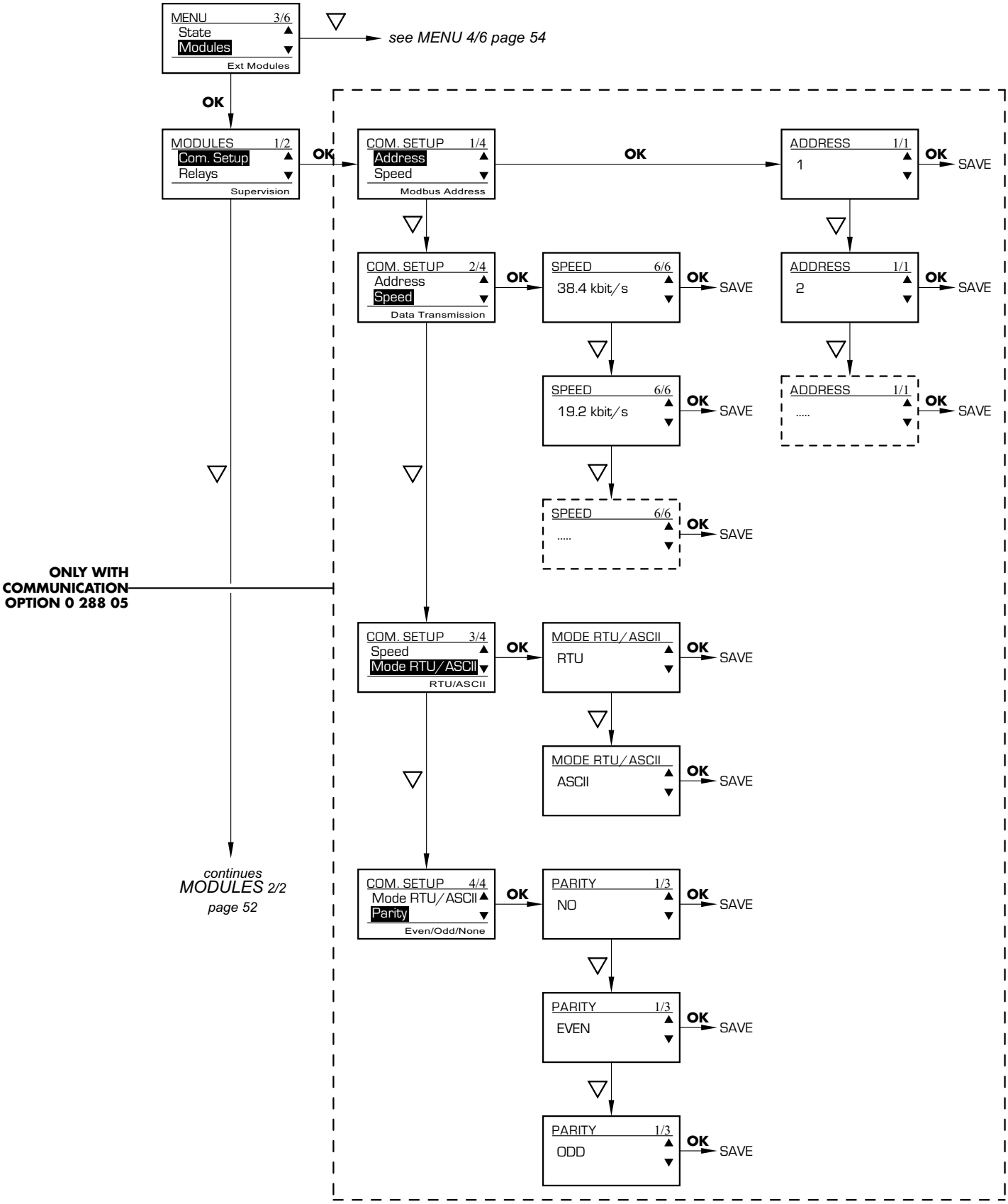


To come back to the upper level of menu push C - To scroll up push "△"

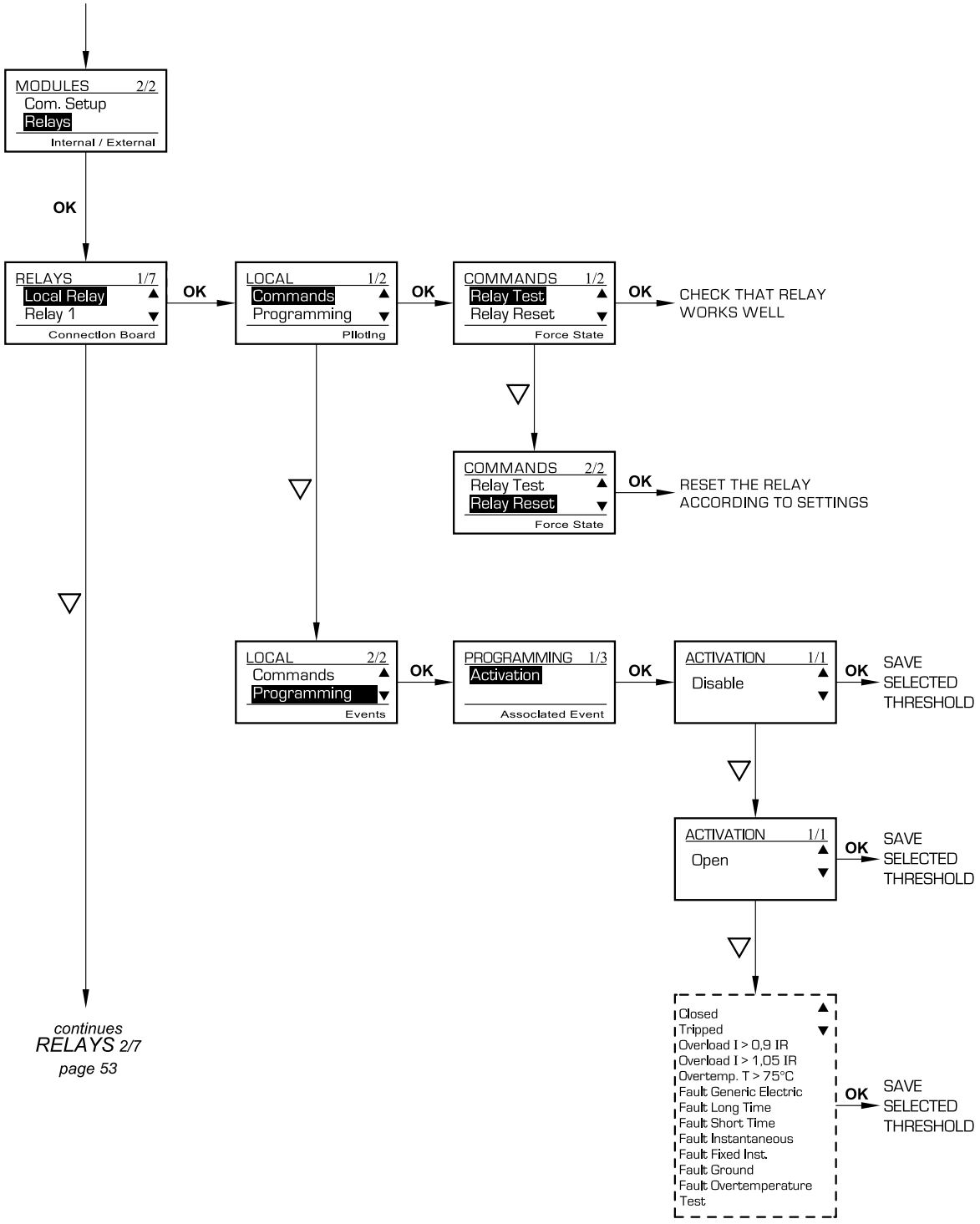
Protection unit DMX-SP



To come back to the upper level of menu push C - To scroll up push "△"

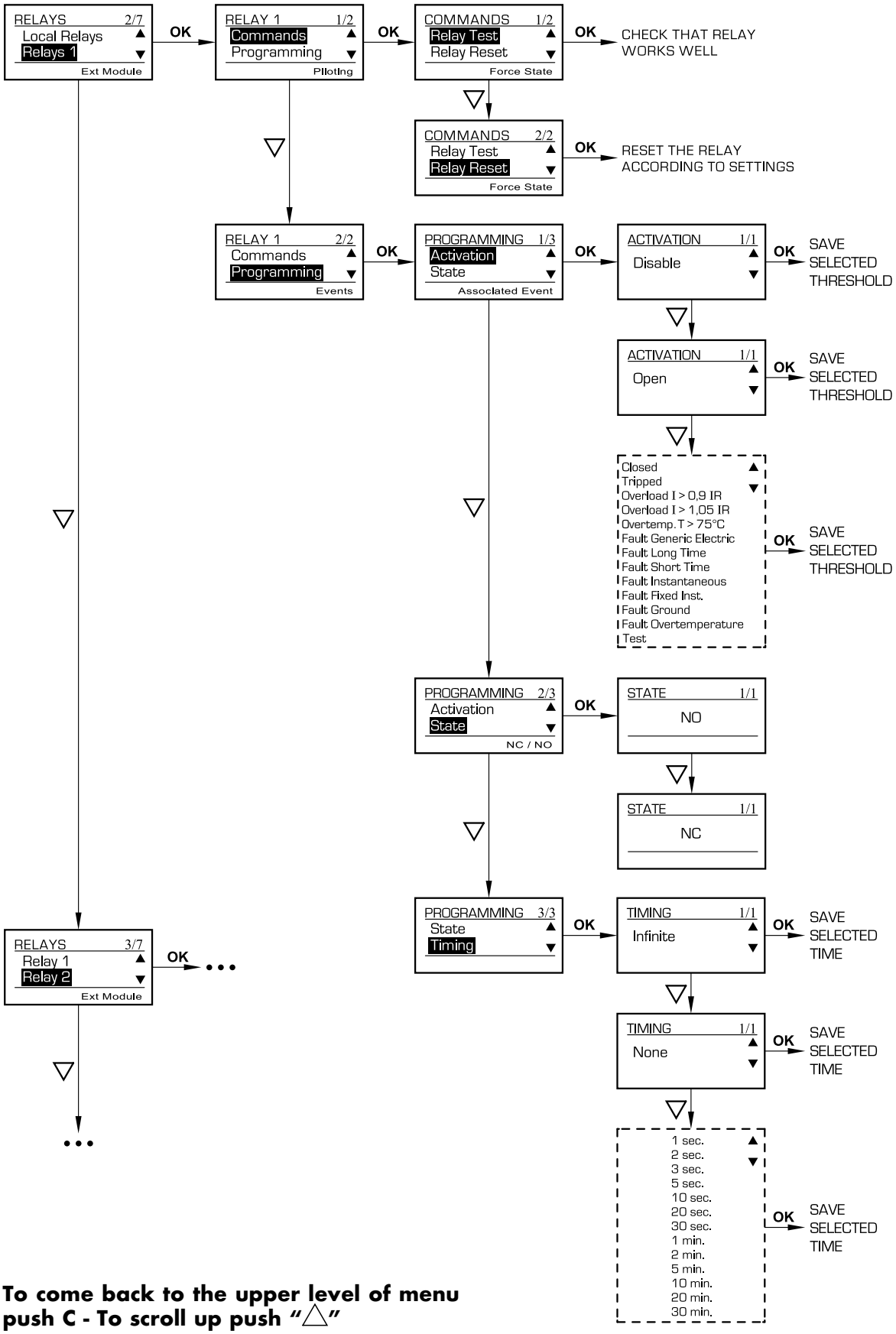


To come back to the upper level of menu push C - To scroll up push "△"

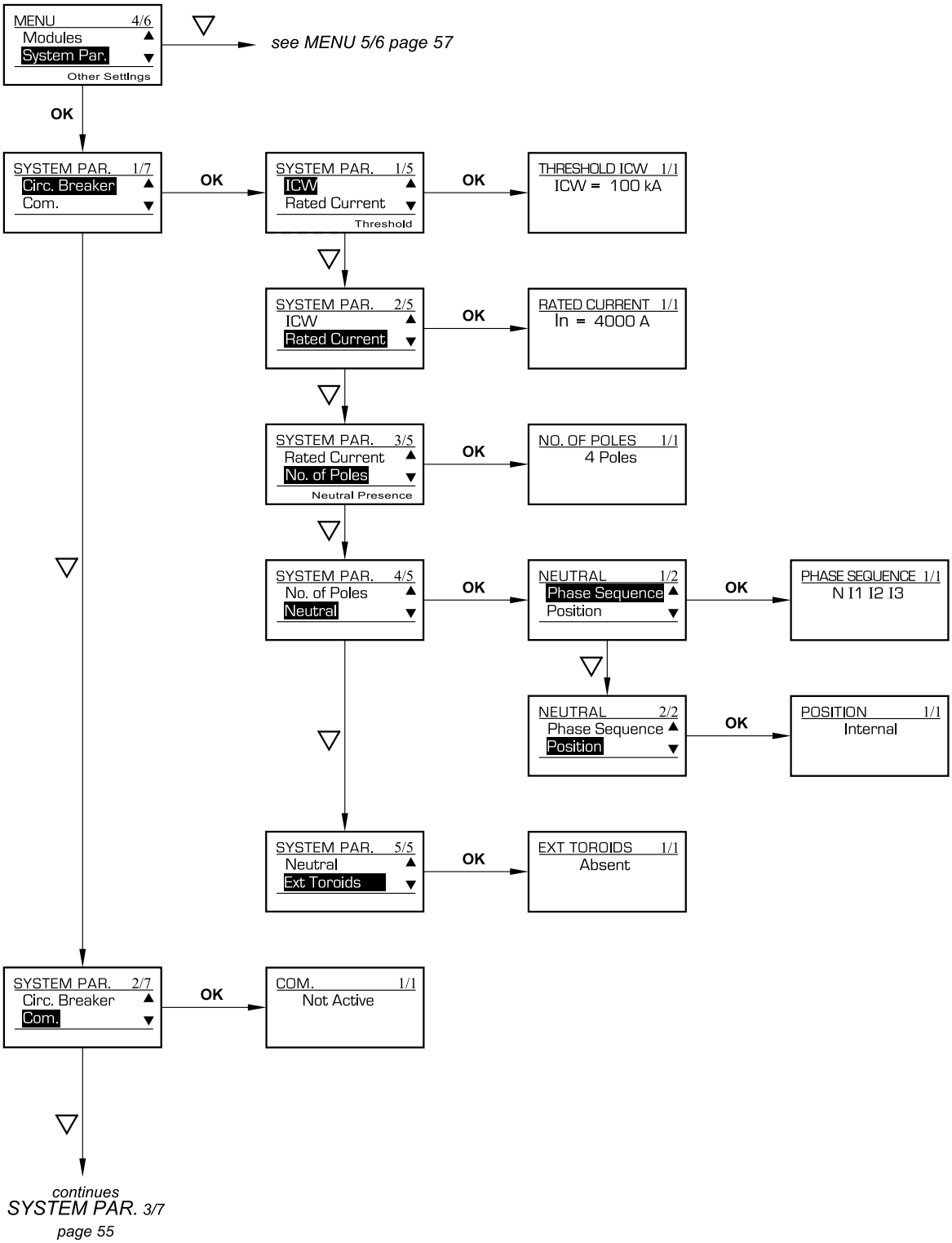


To come back to the upper level of menu push C - To scroll up push "△"

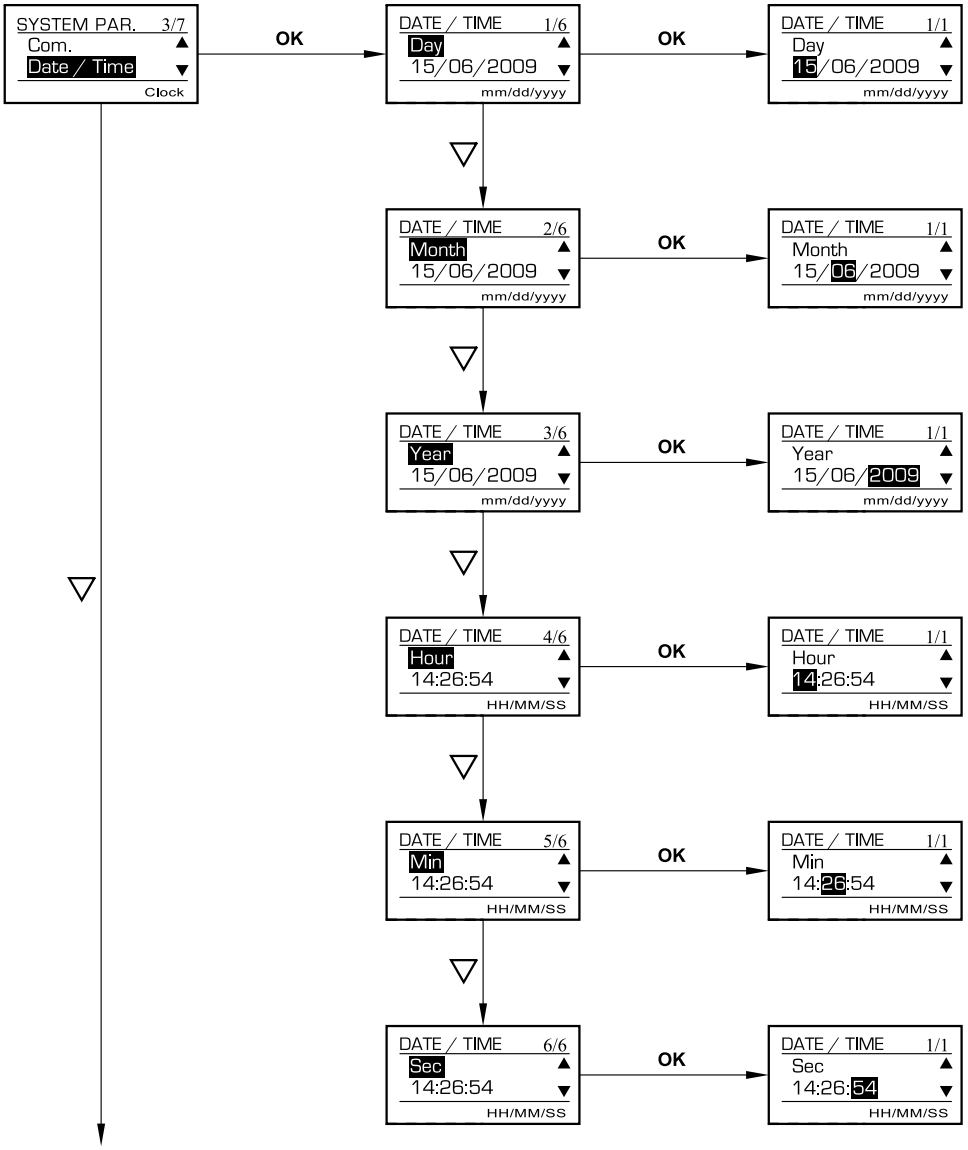
Protection unit DMX-SP



To come back to the upper level of menu push C - To scroll up push "△"



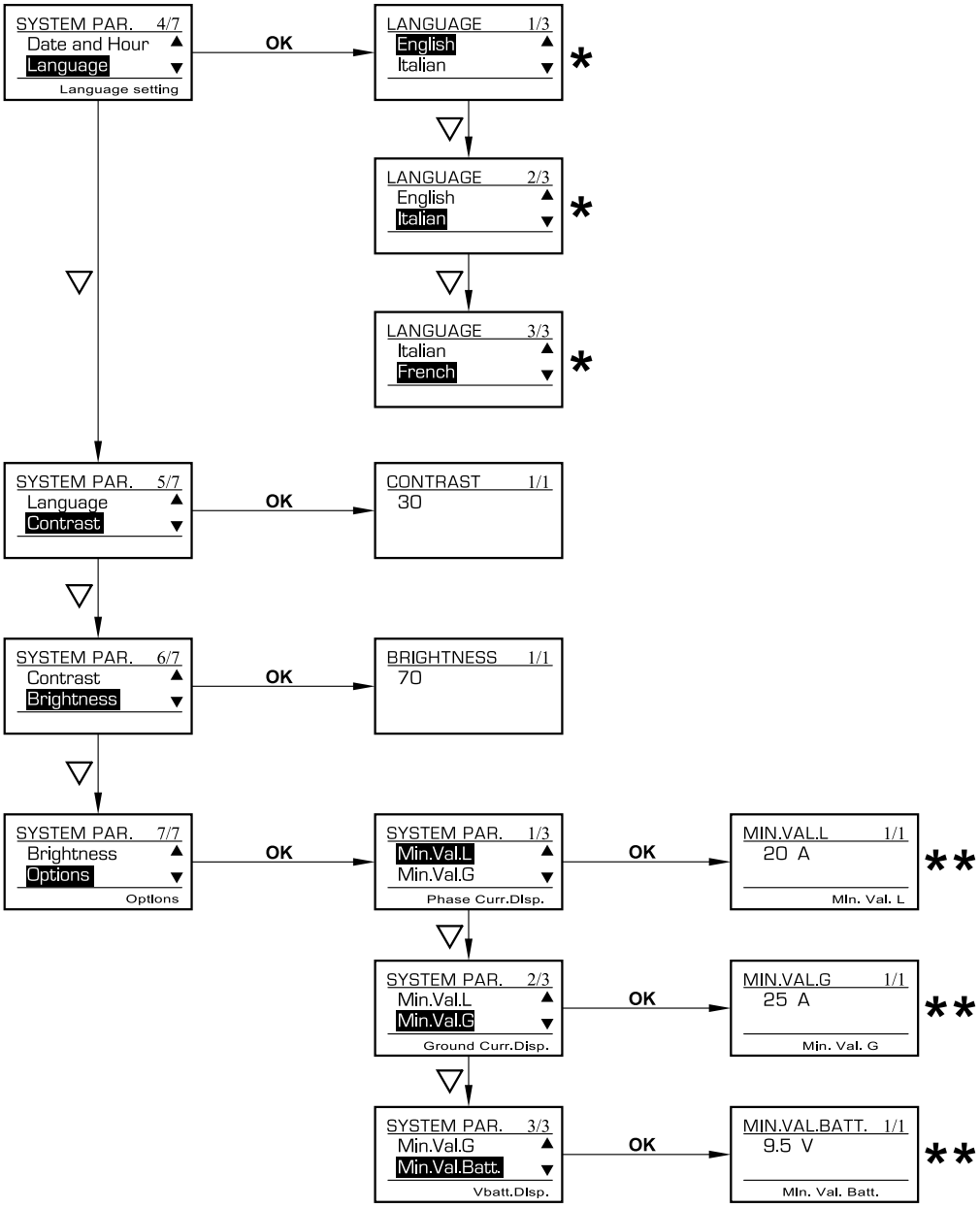
To come back to the upper level of menu push C - To scroll up push "△"



continues
SYSTEM PAR. 4/7
page 56

To come back to the upper level of menu push C - To scroll up push "△"

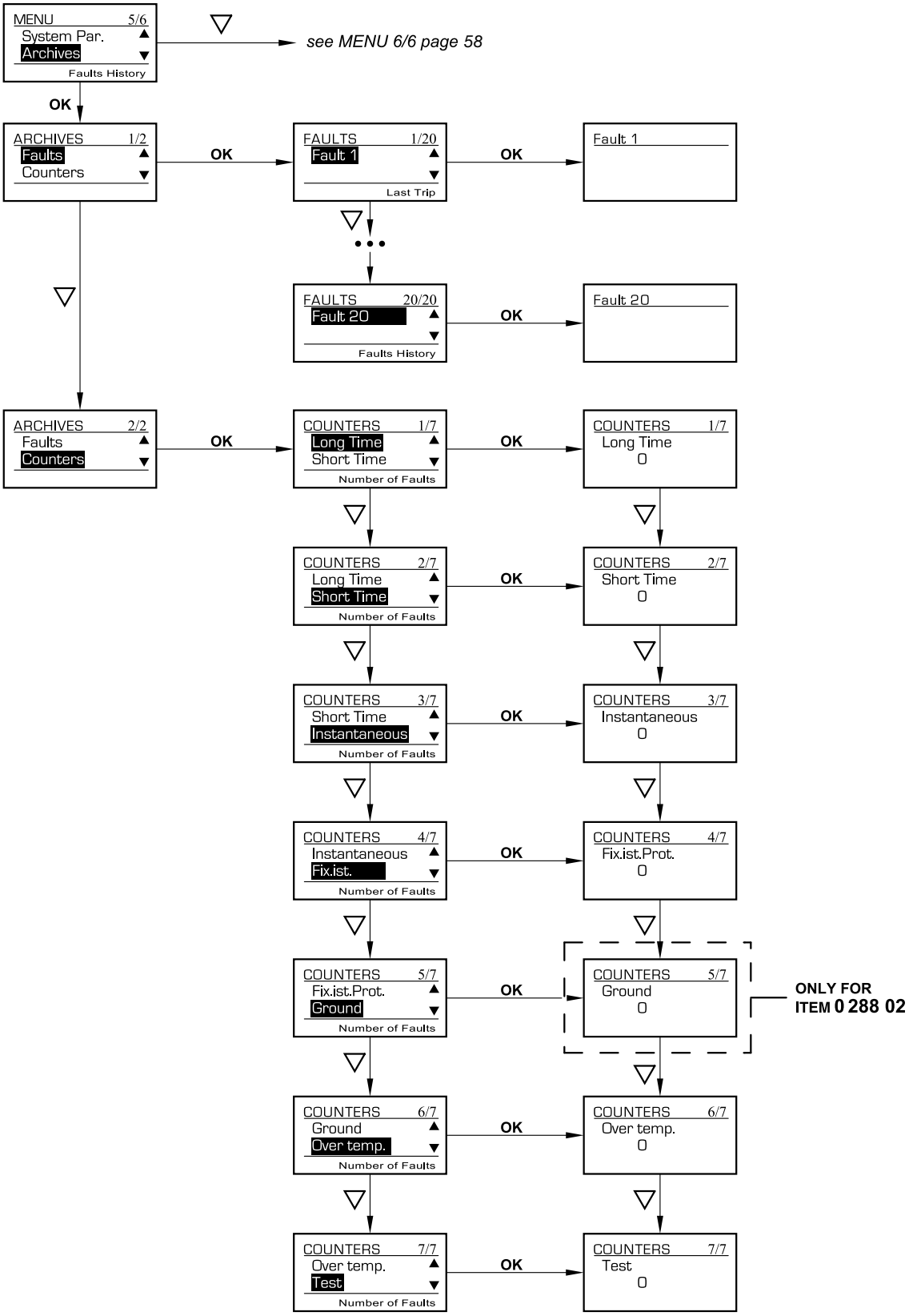
Protection unit DMX-SP



* The languages available could change on the base of firmware (Language pack) installed

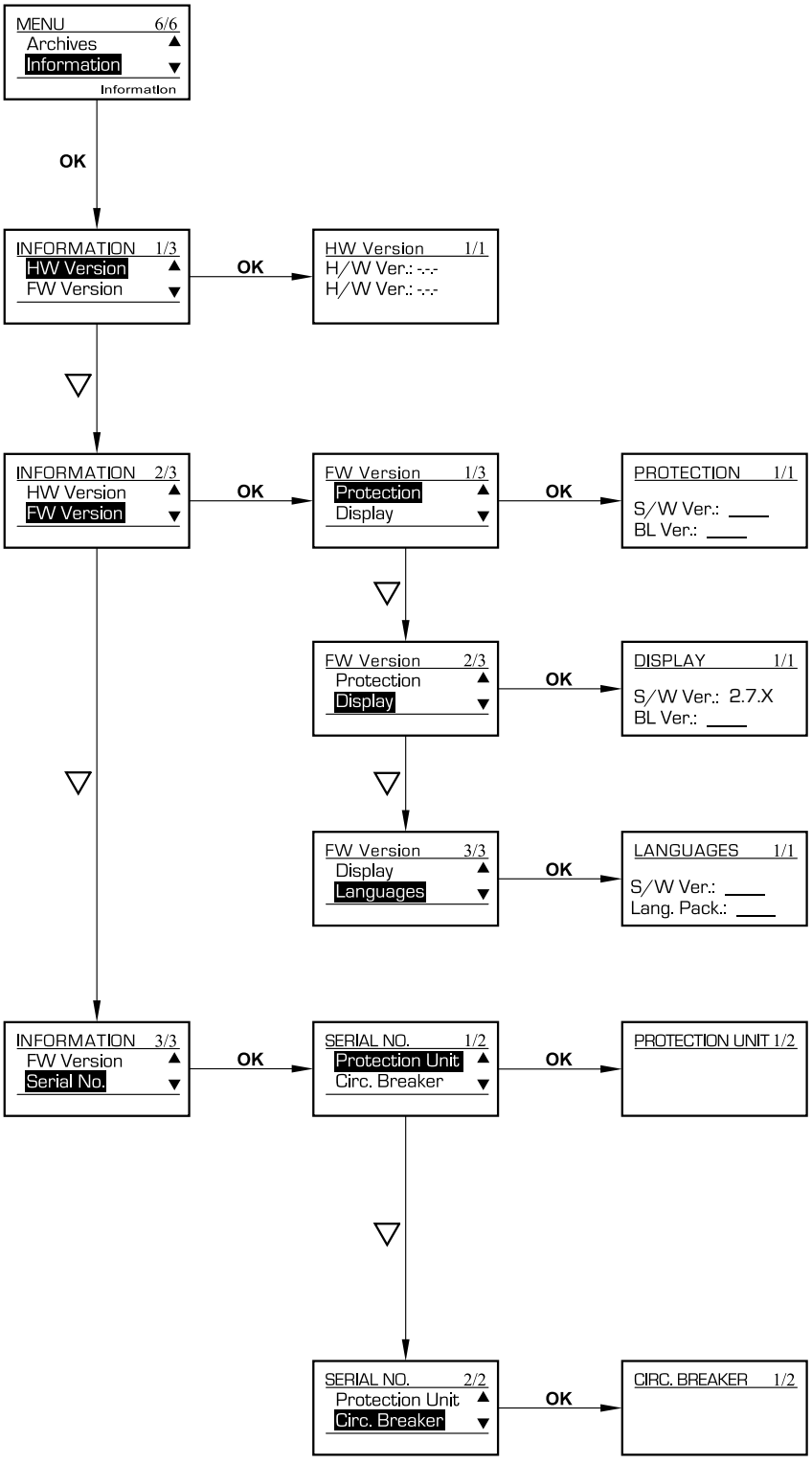
** Minimum value shown on display

To come back to the upper level of menu push C - To scroll up push "△"



To come back to the upper level of menu push C - To scroll up push "△"

Protection unit DMX-SP



To come back to the upper level of menu push C - To scroll up push "△"

15. Menu structure

Level 1 Menu	Level 2 Menu	Level 3 Menu	Level 4 Menu
Protection	Long Time	Level	
		Time	
		Options	Thermal memory (ON/OFF)
	Short Time	Level	
		Time	
		Options	Curve
	Instantaneous	Level	
	Neutral	Protection	
	Ground	Level	
		Time	
		Options	Curve
	Overtemperature	Alarm	75°C
		Trip value	95°C
State	State	e.g. closed	
	Alarms		
	Measures	current	I1
			I2
			I3
			N
			Ig
		Temperature	
		Battery	
Modules	Com. Setup	Address	1,2....
		Speed	
		Mode RTU-ASCII	RTU
			ASCII
		Parity	No
			Even
			Odd
	Relays *	local relay	Commands (test; reset)
			Programming
		relay1	Commands (test; reset)
			Programming
		....	
		relay 6	Commands (test; reset)
			Programming

*Local relay: terminal block W on breaker Relay1..Relay6: external programmable module 0 288 12 (optional accessory)

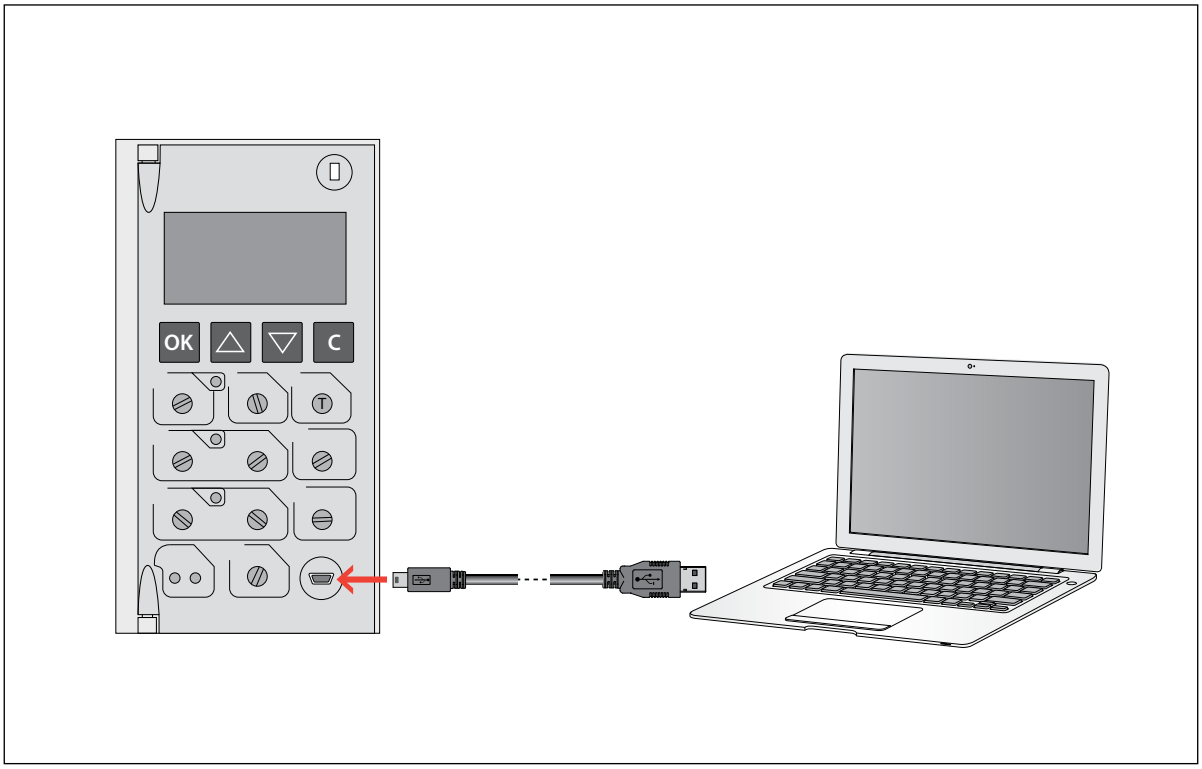
Protection unit DMX-SP

Level 1 Menu	Level 2 Menu	Level 3 Menu	Level 4 Menu
System Parameter	circuit breaker	Icw	
		rated current	
		n° of poles	
		Neutral	phase sequence
			position (ext/int/absent)
		external toroids	(present/absent)
	COM	(Active/NoActive)	
	date/time		
	Language		
	Contrast		
	Brightness		
	Options	val min L	
		Val Min G	
		Val Min Batt	
Archives	Faults	history of last 20 trips	
	Counters	Long Time	
		Short Time	
		Instantaneous	
		Fix Instantaneous	
		Ground	
		Overtemperature	
		Test	
Information	FW version *	Protection	S/W version
			BL version ***
		Display	S/W version
			BL version
		Languages	version S/W
			Lang. pack
	HW version **	H/W version	
		H/W version	
	Serial Number	Protection Unit	
		Circuit Breaker	

* FW: software
** HW: hardware
*** BL: boot loader

16. Power Control Station

Power Control Station is a software application for personal computers equipped with Microsoft Windows® operating system that allows to exchange data with the protection unit of the power breaker through the appropriate USB port.



The software supports connection to the power breaker in order to:

- Monitor the status of the automatic breaker;
- Read information (firmware versions, device version, alarms, measurements, parameters, fault history);
- View the trip curve characteristics set by the user;
- Update the firmware of the protection unit (for Service personnel);
- Generate reports based on the data stored and read by the protection unit;
- Command diagnostic tests.

Thanks to the possibility to save the protection parameters, the configuration and the faults history of the protection unit, it also facilitates the operation of an electrical panel board test before commissioning.

Power Control Station is free software and is available on the manufacturer's website.

Protection unit DMX-SP

Notes

Notes

legrand®

LE11754AA