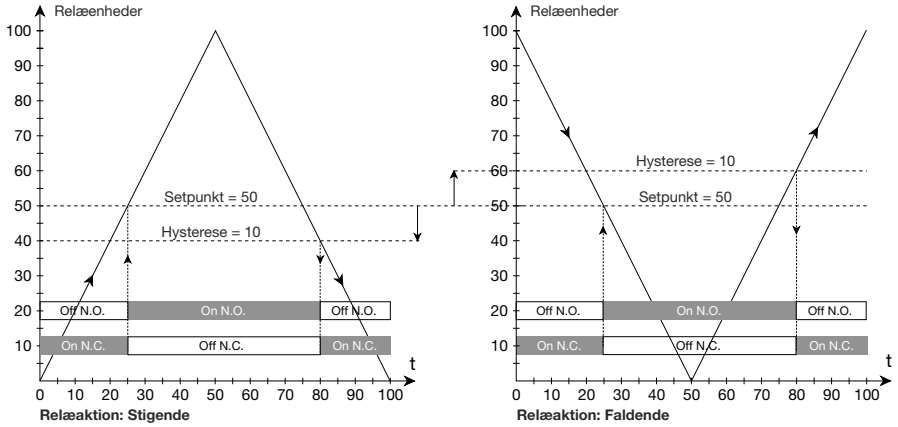
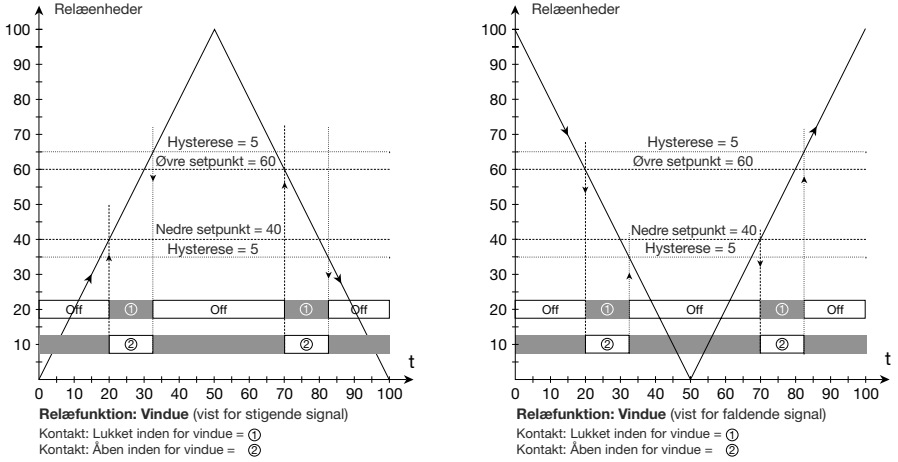
Grafisk afbildning af relæfunktionen setpunkt:



Grafisk afbildning af relæfunktionen vindue:



UNIVERSAL TRANSMITTER

PReasy 4116

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GENERAL

WARNING!

This module is designed for connection to hazardous electric voltages.
Ignoring this warning can result in severe personal injury or mechanical damage.
To avoid the risk of electric shock and fire, the safety instructions of this manual must be observed and the guidelines followed. The specifications must not be exceeded, and the module must only be applied as described in the following.
Prior to the commissioning of the module, this manual must be examined carefully.
Only qualified personnel (technicians) should install this module.
If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

HAZARD-OUS VOLTAGE



WARNING!

Until the module is fixed, do not connect hazardous voltages to the module.
The following operations should only be carried out on a disconnected module and under ESD safe conditions:

General mounting, connection and disconnection of wires.
Troubleshooting the module.

Repair of the module and replacement of circuit breakers must be done by PR electronics A/S only.

INSTAL-LATION

WARNING

To keep the safety distances, the relay contacts on the module must not be connected to both hazardous and non-hazardous voltages at the same time.
SYSTEM 4000 must be mounted on a DIN rail according to DIN 46277.

SYMBOL IDENTIFICATION

Triangle with an exclamation mark: Warning / demand. Potentially lethal situations.

The CE mark proves the compliance of the module with the essential requirements of the directives.

The double insulation symbol shows that the module is protected by double or reinforced insulation.

SAFETY INSTRUCTIONS

DEFINITIONS:
Hazardous voltages have been defined as the ranges: 75 to 1500 Volt DC, and 50 to 1000 Volt AC.
Technicians are qualified persons educated or trained to mount, operate, and also troubleshoot technically correct and in accordance with safety regulations.
Operators, being familiar with the contents of this manual, adjust and operate the knobs or potentiometers during normal operation.

RECEIPT AND UNPACKING:
Unpack the module without damaging it and make sure that the manual always follows the module and is always available. The packing should always follow the module until this has been permanently mounted.
Check at the receipt of the module whether the type corresponds to the one ordered.

ENVIRONMENT:
Avoid direct sunlight, dust, high temperatures, mechanical vibrations and shock, as well as rain and heavy moisture. If necessary, heating in excess of the stated limits for ambient temperatures should be avoided by way of ventilation.
All modules fall under Installation Category II, Pollution Degree 1, and Insulation Class II.

MOUNTING:
Only technicians who are familiar with the technical terms, warnings, and instructions in the manual and who are able to follow these should connect the module.

Should there be any doubt as to the correct handling of the module, please contact your local distributor or, alternatively,

PR electronics A/S, Lerbakken 10, DK-8410 Rønde, Denmark,
tel: +45 86 37 26 77.

Mounting and connection of the module should comply with national legislation for mounting of electric materials, i.a. wire cross section, protective fuse, and location. Descriptions of input / output and supply connections are shown in the block diagram and side label.

The following apply to fixed hazardous voltages-connected modules:

The max. size of the protective fuse is 10 A and, together with a power switch, it should be easily accessible and close to the module. The power switch should be marked with a label indicating that it will switch off the voltage to the module.

CALIBRATION AND ADJUSTMENT:
During calibration and adjustment, the measuring and connection of external voltages must be carried out according to the specifications of this manual. The technician must use tools and instruments that are safe to use.

NORMAL OPERATION:
Operators are only allowed to adjust and operate modules that are safely fixed in panels, etc., thus avoiding the danger of personal injury and damage. This means there is no electrical shock hazard, and the module is easily accessible.

CLEANING:
When disconnected, the module may be cleaned with a cloth moistened with distilled water or ethyl alcohol.

LIABILITY:
To the extent that the instructions in this manual are not strictly observed, the customer cannot advance a demand against PR electronics A/S that would otherwise exist according to the concluded sales agreement.

DECLARATION OF CONFORMITY

As manufacturer

PR electronics A/S
Lerbakken 10
DK-8410 Rønde

hereby declares that the following product:

Type: 4116
Name: Universal transmitter

is in conformity with the following directives and standards:

The EMC Directive 2004/108/EC and later amendments

EN 61326

This declaration is issued in compliance with article 10, subclause 1 of the EMC directive. For specification of the acceptable EMC performance level, refer to the electrical specifications for the module.

The Low Voltage Directive 73/23/EEC and later amendments

EN 61010-1

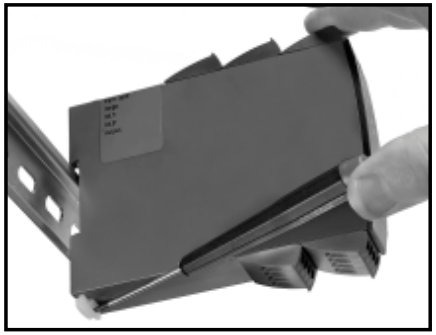


Rønde, 29 June 2005

Peter Rasmussen
Manufacturer's signature

HOW TO DISMANTLE SYSTEM 4000

First, remember to demount the connectors with hazardous voltages.



Picture 1:
Detach the module from the DIN rail by lifting the bottom lock.

UNIVERSAL TRANSMITTER
PReasy 4116

- *Input for RTD, TC, Ohm, potentiometer, mA and V*
- *2-wire supply > 16 V*
- *Programmable via display front*
- *Output for current, voltage and 2 relays*
- *Universal AC or DC supply*

Application:

- Linearised, electronic temperature measurement with RTD or TC sensor.
- Conversion of linear resistance variation to a standard analogue current / voltage signal, i.e. from solenoids and butterfly valves or linear movements with attached potentiometer.
- Power supply and signal isolator for 2-wire transmitters.
- Process control with 2 pairs of potential-free relay contacts and analogue output.
- Galvanic separation of analogue signals and measurement of floating signals.
- The 4116 is designed according to strict safety requirements and is thus suitable for application in SIL 2 installations.

Technical characteristics:

- When 4116 is used in combination with the 4501 display / programming front, all operational parameters can be modified to suit any application. As the 4116 is designed with electronic hardware switches, it is not necessary to open the module for setting of DIP switches.
- A green / red front LED indicates normal operation and malfunction. A yellow LED is ON for each active output relay.
- Continuous check of vital stored data for safety reasons.
- 4-port 2.3 kVAC galvanic isolation.

Mounting / installation:

- Mounted vertically or horizontally on a DIN rail. As the modules can be mounted without any distance between neighbouring units, up to 42 modules can be mounted per metre.

PR 4501 DISPLAY / PROGRAMMING FRONT



Application:

- Communications interface for modification of operational parameters in 4116.
- Can be moved from one 4116 module to another and download the configuration of the first transmitter to subsequent transmitters.
- Fixed display for visualisation of process data and status.

Technical characteristics:

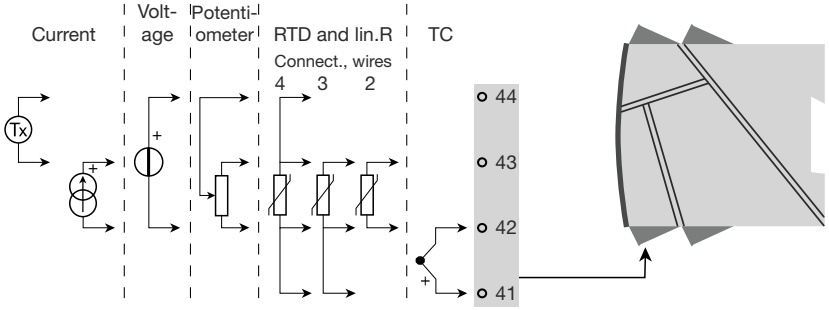
- LCD display with 4 lines; 1 line with the height 5.57 mm, 2 lines with the height 3.33 mm, and 1 line with fixed icons.
- Programming access can be blocked by assigning a password. The password is saved in the transmitter in order to ensure a high degree of protection against unauthorised modifications to the configuration.

Mounting / installation:

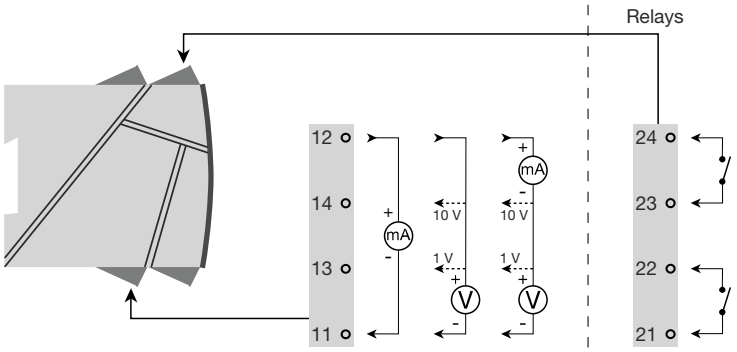
- Click 4501 onto the front of 4116.

Applications

Input signals:

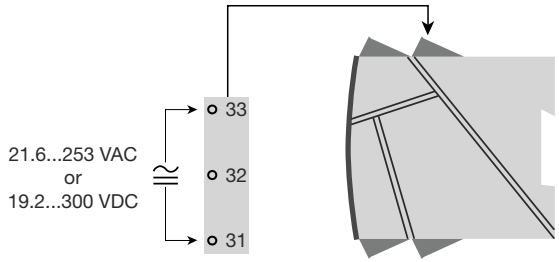


Output signals:



Analogue, 0/4...20 mA and voltage

Supply:



ORDER CODES:

4116 = Universal transmitter
4501 = Display / programming front

Electrical specifications:

Specifications range:
-20°C to +60°C

Common specifications:

Supply voltage, universal ..... 24...230 VAC ±10%
50...60 Hz
24...250 VDC ±20%
Max. consumption ..... ≤ 2.5 W
Fuse..... 400 mA SB / 250 VAC
Isolation voltage, test / operation ..... 2.3 kVAC / 250 VAC
Communications interface ..... Programming front 4501
Signal / noise ratio ..... Min. 60 dB (0...100 kHz)
Response time (0...90%, 100...10%):
Temperature input..... ≤ 1 s
mA / V input..... ≤ 400 ms
Calibration temperature ..... 20...28°C
Accuracy, the greater of the general and basic values:

General values		
Input type	Absolute accuracy	Temperature coefficient
All	≤ ±0.1% of span	≤ ±0.01% of span / °C

Basic values		
Input type	Basic accuracy	Temperature coefficient
mA	≤ ±4 µA	≤ ±0.4 µA / °C
Volt	≤ ±20 µV	≤ ±2 µV / °C
Pt100	≤ ±0.2°C	≤ ±0.01°C / °C
Lin. R	≤ ±0.1 Ω	≤ ±10mΩ / °C
Potentiometer	≤ ±0.1 Ω	≤ ±0.01 Ω / °C
TC type: E, J, K, L, N, T, U	≤ ±1°C	≤ ±0.05°C / °C
TC type: B, R, S, W3, W5, LR	≤ ±2°C	≤ ±0.2°C / °C

EMC immunity influence ..... < ±0.5% of span
Extended EMC immunity:
NAMUR NE 21, A criterion, burst ..... < ±1% of span

Auxiliary supplies:
2-wire supply (terminal 44...43)..... 25...16 VDC / 0...20 mA
Max. wire size..... 1 x 2.5 mm^2 stranded wire
Screw terminal torque..... 0.5 Nm
Relative humidity..... < 95% RH (non-cond.)
Dimensions, without display front (HxBxD).. 109 x 23.5 x 104 mm
Dimensions, with display front (HxBxD)..... 109 x 23.5 x 116 mm
Tightness (enclosure / terminals) ..... IP50 / IP20
Weight ..... 175 g

RTD, linear resistance and potentiometer input:

Input type	Min. value	Max. value	Norm
Pt100	-200°C	+850°C	IEC60751
Ni100	-60°C	+250°C	DIN 43760
Lin. R	0 Ω	10000 Ω	-
Potentiometer	10 Ω	100 kΩ	-

Cable resistance per wire (max.)..... 50 Ω
Sensor current, RTD..... Nom. 0.2 mA

Effect of sensor cable resistance
(3- / 4-wire), RTD..... < 0.002 Ω / Ω
Sensor error detection, RTD ..... Yes
Short circuit detection, RTD..... < 15 Ω

TC input:

Type	Min. value	Max. value	Norm
B	+400°C	+1820°C	IEC 60584-1
E	-100°C	+1000°C	IEC 60584-1
J	-100°C	+1200°C	IEC 60584-1
K	-180°C	+1372°C	IEC 60584-1
L	-200°C	+900°C	DIN 43710
N	-180°C	+1300°C	IEC 60584-1
R	-50°C	+1760°C	IEC 60584-1
S	-50°C	+1760°C	IEC 60584-1
T	-200°C	+400°C	IEC 60584-1
U	-200°C	+600°C	DIN 43710
W3	0°C	+2300°C	ASTM E988-90
W5	0°C	+2300°C	ASTM E988-90
LR	-200°C	+800°C	GOST 3044-84

Cold junction compensation (CJC) ..... < ±1.0 °C
Sensor error detection ..... Yes
Sensor error current:
when detecting ..... Nom. 2 µA
else..... 0 µA

Current input:
Measurement range ..... -1...25 mA
Programmable measurement ranges..... 0...20 and 4...20 mA
Input resistance..... Nom. 20 Ω + PTC 50 Ω

Voltage input:
Measurement rages ..... -20 mV...12 VDC
Programmable measurement ranges..... 0...1 / 0.2...1 / 0...5 / 1...5 / 0...10 and 2...10 VDC
Input resistance..... Nom. 10 MΩ

Current output:
Signal range (span)..... 0...20 mA
Programmable signal ranges ..... 0...20 / 4...20 / 20...0 and 20...4 mA
Load (max.)..... 20 mA / 800 Ω / 16 VDC
Load stability ..... ≤ 0.01% of span / 100 Ω
Sensor error detection ..... 0 / 3.5 / 23 mA / none
NAMUR NE 43 Upscale / Downscale..... 23 mA / 3.5 mA
Current limit..... ≤ 28 mA

Voltage output:
Signal range ..... 0...10 VDC
Programmable signal ranges ..... 0...1 / 0.2...1 / 0...10 / 0...5 / 1...5 / 2...10 / 1...0 / 1...0.2 / 5...0 / 5...1 / 10...0 og 10...2 V
Load (min.)..... 500 kΩ

Relay outputs:
Max. voltage..... 250 VRMS
Max. current ..... 2 A / AC or 1 A / DC
Max. AC power ..... 500 VA
Sensor error detection ..... Break / Make / Hold

Observed authority requirements:	**Standard:**
EMC 2004/108/EC:	
Emission and immunity	EN 61326
LVD 73/23/EEC.....	EN 61010-1
* UL, Standard for Safety	UL 508

* approval pending, expected autumn 2005

of span = of the currently selected measurement range

Visualisation in the 4501 of sensor error detection and input signal outside range

Sensor error check:		
Module:	Configuration	Sensor error detection:
4116	R1, ERR.ACT=NONE - R2, ERR.ACT=NONE, OUT.ERR=NONE.	OFF
	Else:	ON

Outside range readout (IN.LO, IN.HI): If the valid range of the A/D converter or the polynomial is exceeded			
Input	Range	Readout	Limit
VOLT	0...1 V / 0.2...1 V	IN.LO	< -25 mV
		IN.HI	> 1.2 V
	0...10 V / 2...10 V	IN.LO	< -25 mV
		IN.HI	> 12 V
CURR	0...20 mA / 4...20 mA	IN.LO	< -1.05 mA
		IN.HI	> 25.05 mA
LIN.R	0...800 Ω	IN.LO	< -10 Ω
		IN.HI	> 1075 Ω
	0...10 kΩ	IN.LO	< -10 Ω
		IN.HI	< 110 kΩ
POTM	-	IN.LO	< -0.5 %
		IN.HI	> 100.5 %
TEMP	TC / RTD	IN.LO	< temperature range -2°C
		IN.HI	> temperature range +2°C

Sensor error detection (SE.BR, SE.SH):			
Input	Range	Readout	Limit
CURR	Loop break (4..20 mA)	SE.BR	<= 3.6 mA; > = 21 mA
POTM	All	SE.BR	> ca. 126 kΩ
LIN.R	0...800 Ω	SE.BR	> ca. 875 Ω
	0...10 kΩ	SE.BR	> ca. 11 kΩ
TEMP	TC	SE.BR	> ca. 750 kΩ / (1.25 V)
	Pt100 2-wire	SE.BR	> ca. 15 kΩ
		SE.SH	< ca. 15 Ω
	Pt100 3-wire	SE.BR	> ca. 15 kΩ
		SE.SH	< ca. 15 Ω
	Pt100 4-wire	SE.BR	> ca. 15 kΩ
		SE.SH	< ca. 15 Ω

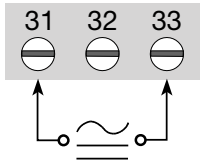
Display readout below min.- / above max. (-1999, 9999):			
Input	Range	Readout	Limit
All	All	-1999	Display readout <-1999
		9999	Display readout >9999

Readout at hardware error		
Error search	Readout	Error cause
Test of internal communication uC / ADC	HW.ER	Permanent error in ADC
Test of internal CJC sensor	CJ.ER	CJC sensor defect
Checksum test of the configuration in RAM	RA.ER	Error in RAM
Checksum test of the configuration in FLASH	FL.ER	Error in FLASH
Check measurement of analogue output	AO.ER	Error on analogue output
Check that saved configuration in 4501 match module	TY.ER	Configuration is not 4116
Communications test 4501 / 4116	CO.ER	Connection error

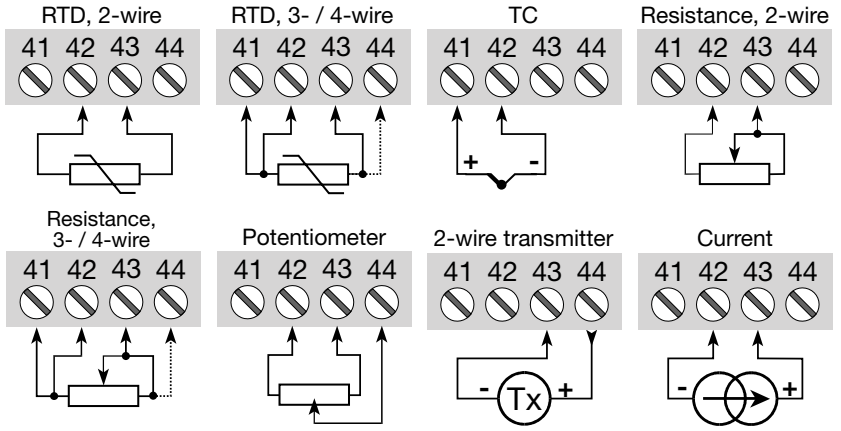
! Error indications in the display blink once a second. The help text explains the error.

CONNECTIONS:

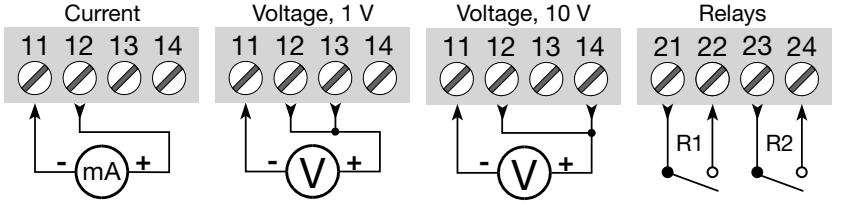
Supply:



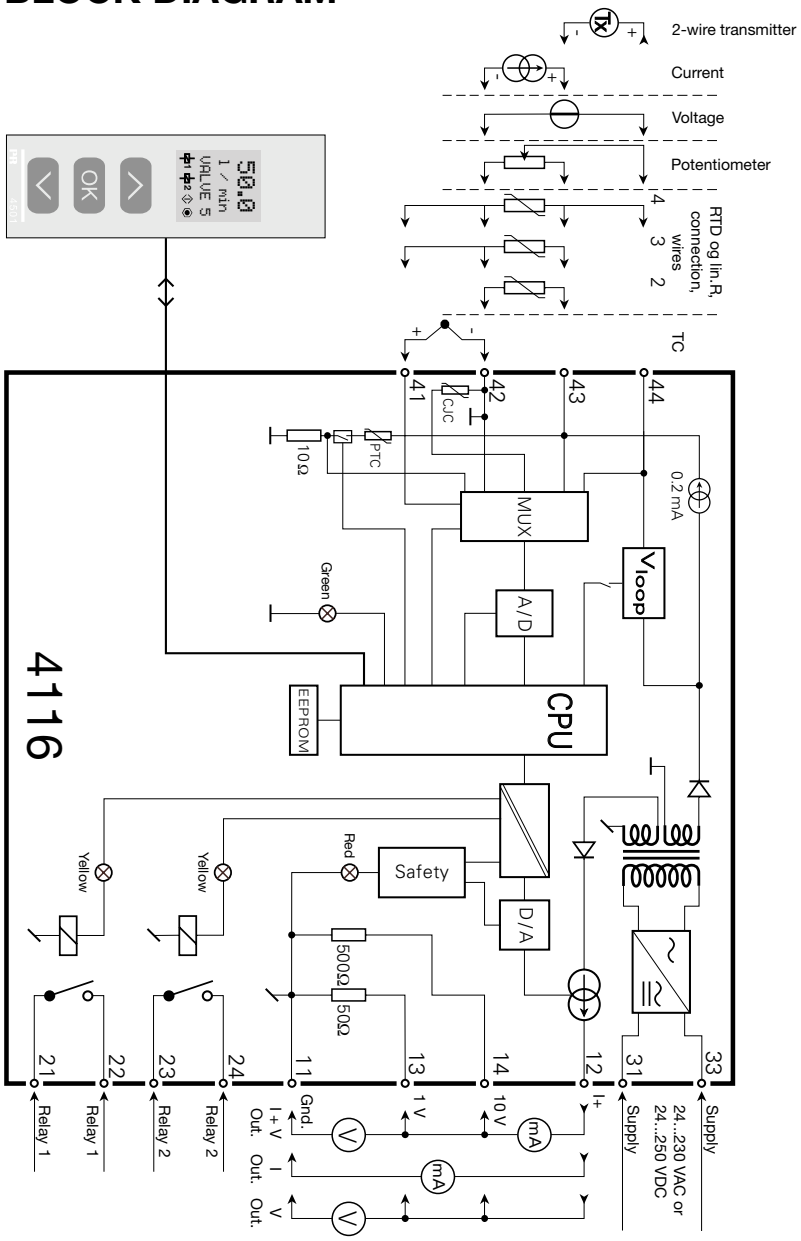
Inputs:



Outputs:



BLOCK DIAGRAM



CONFIGURATION / OPERATING THE FUNCTION KEYS

Documentation for routing diagram.

In general:

When configuring the 4116, you will be guided through all parameters and you can choose the settings which fit the application. For each menu there is a scrolling help text which is automatically shown in line 3 on the display.

Configuration is carried out by using the 3 function keys:

- ⌃ will increase the numerical value or choose the next parameter
- ⌄ will decrease the numerical value or choose the previous parameter
- OK will save the chosen value and proceed to the next menu

When configuration is completed, the dispaly will return to the default state 1.0.

Pressing and holding OK will return to the previous menu or return to the default state (1.0) without saving the changed values or parameters.

If no key is activated for 1 minute, the display will return to the default state (1.0) without saving the changed values or parameters.

Further explanations:

Fast setpoint adjustment and relay test: These menus allow you to make a quick setpoint change and relay test when the FastSet menu is activated. This function can only be activated when the relays are set for setpoint function and are controlled by a setpoint.

Pressing ⌃ and ⌄ simultaneously will activate a relay test and change the state of the relay.

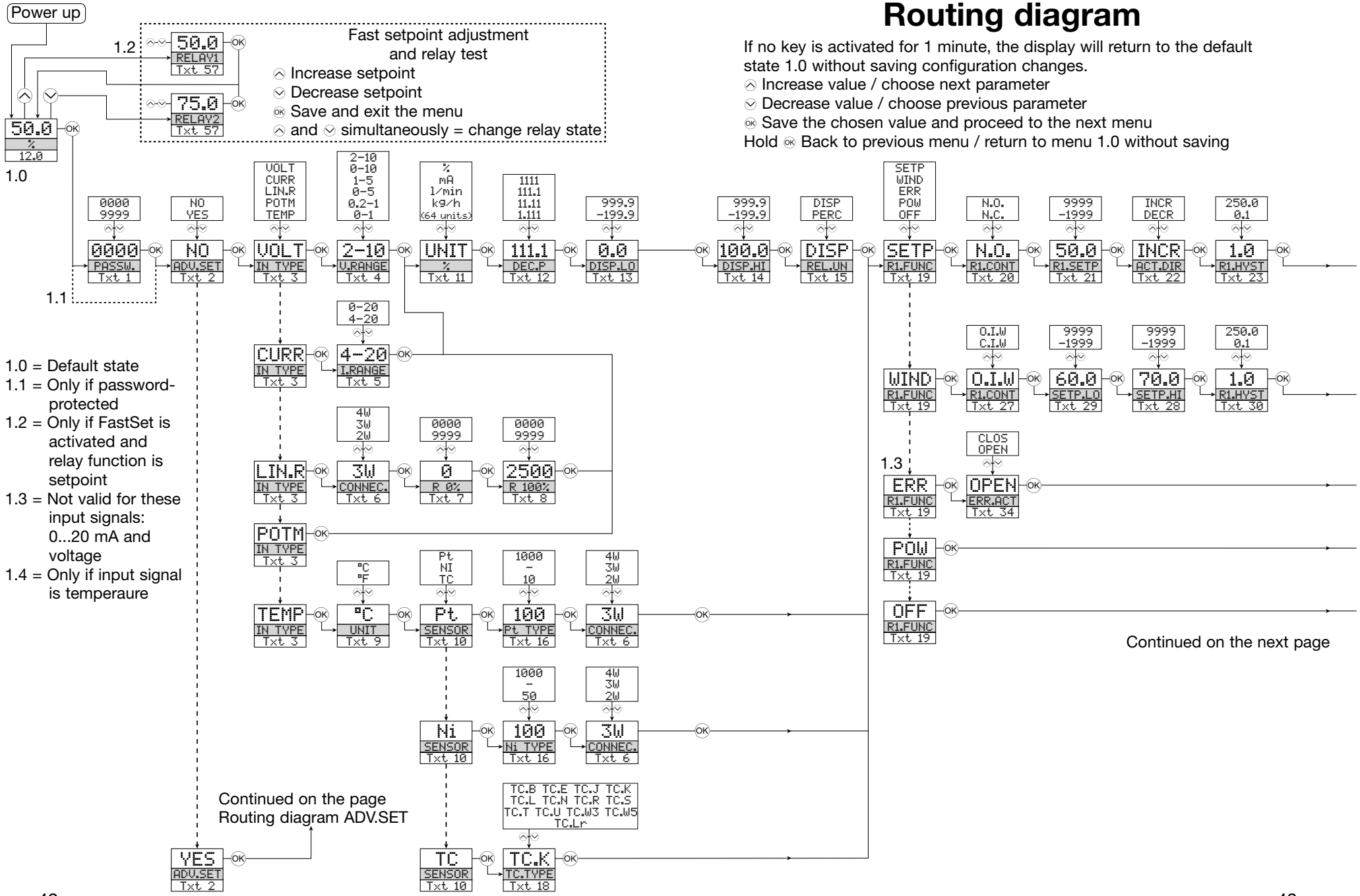
Pressing OK will save the setpoint change.

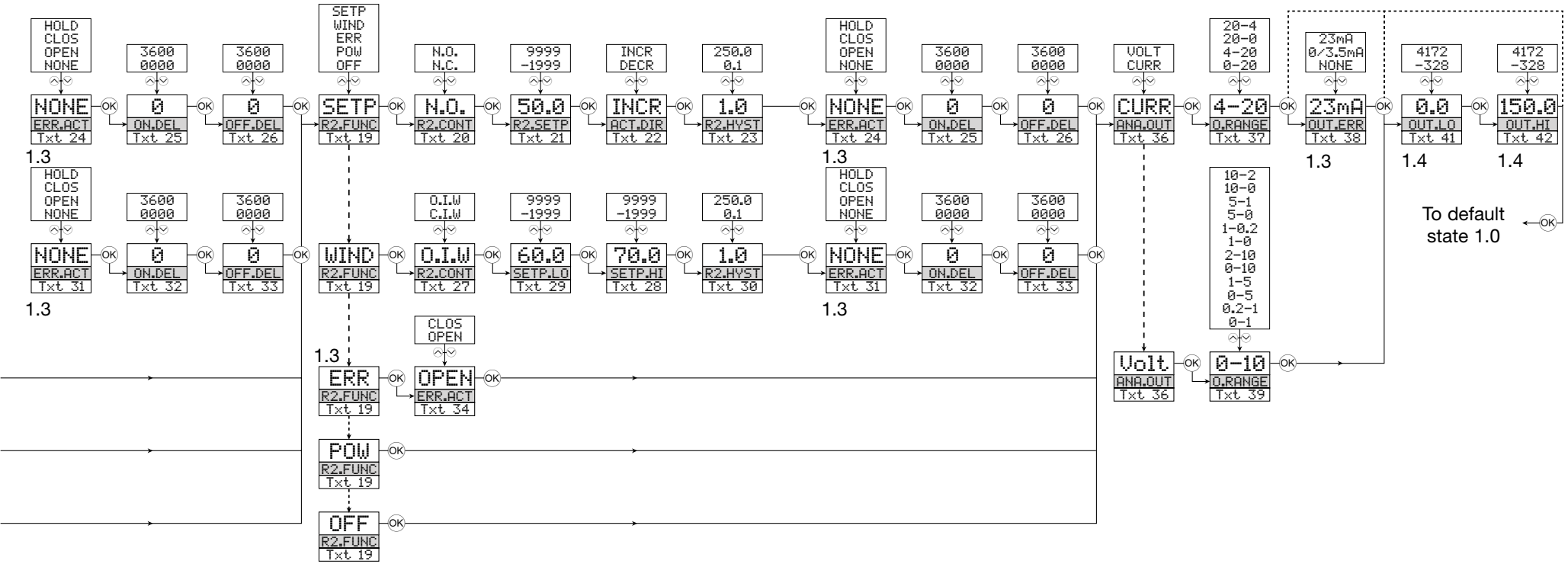
Holding down OK for more than 1 second will return the unit to the default state without saving the setpoint change.

Password protection: Programming access can be blocked by assigning a password. The password is saved in the transmitter in order to ensure a high degree of protection against unauthorised modifications to the configuration. Default password 2008 allows acces to all configuration menus.

Routing diagram

If no key is activated for 1 minute, the display will return to the default state 1.0 without saving configuration changes.
▲ Increase value / choose next parameter
▼ Decrease value / choose previous parameter
OK Save the chosen value and proceed to the next menu
Hold OK Back to previous menu / return to menu 1.0 without saving

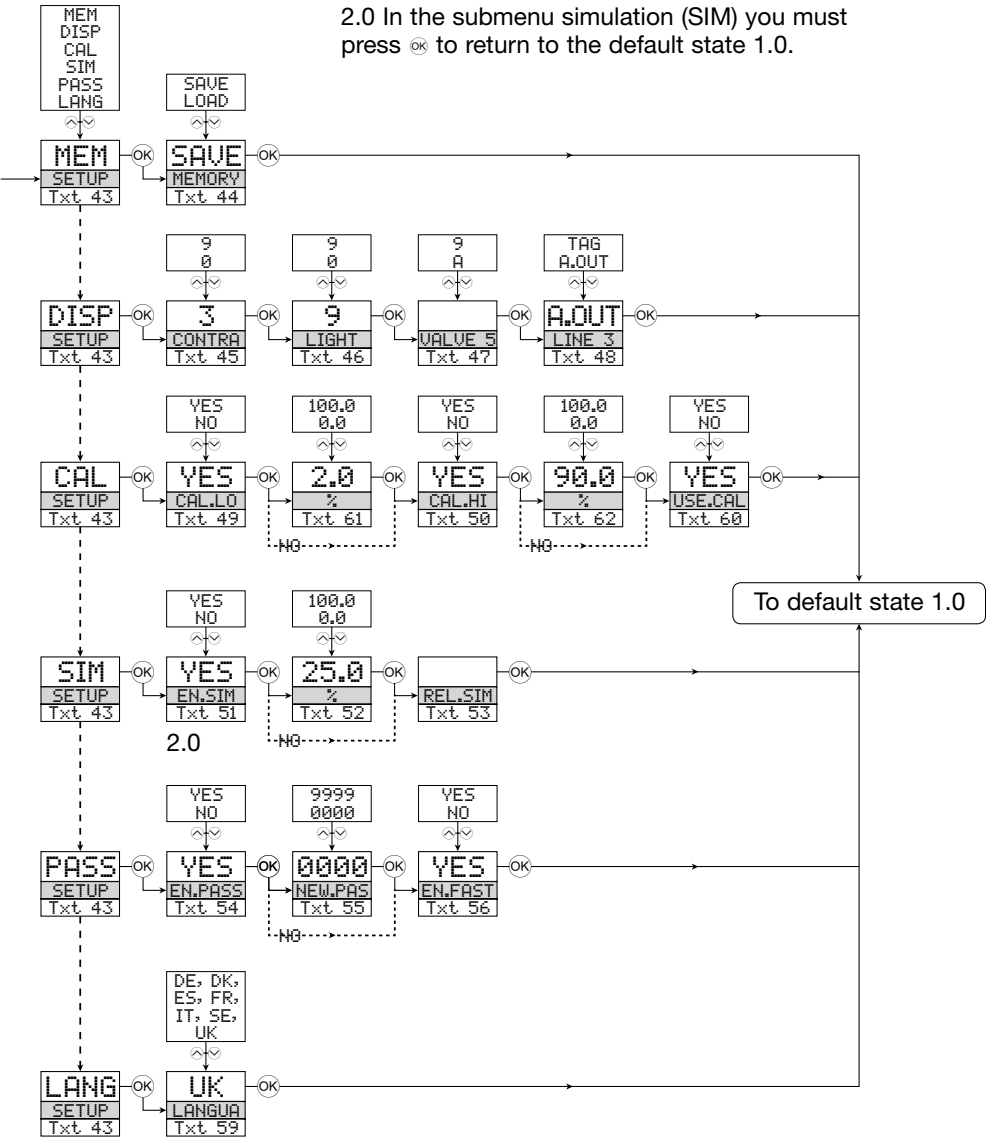



HOLD CLOS OPEN NONE
NONE
ERR.ACT
Txt 24
1.3
3600 0000
0
ON.DEL
Txt 25
3600 0000
0
OFF.DEL
Txt 26
SETP WIND ERR POW OFF
SETP
R2.FUNC
Txt 19
N.O. N.C.
N.O.
R2.CONT
Txt 20
9999 -1999
50.0
R2.SETP
Txt 21
INCR DECR
INCR
ACT.DIR
Txt 22
250.0 0.1
1.0
R2.HYST
Txt 23
HOLD CLOS OPEN NONE
NONE
ERR.ACT
Txt 24
1.3
3600 0000
0
ON.DEL
Txt 25
3600 0000
0
OFF.DEL
Txt 26
VOLT CURR
CURR
ANA.OUT
Txt 36
20-4 20-0 4-20 0-20
4-20
O.RANGE
Txt 37
23mA 0/3.5mA NONE
23mA
OUT.ERR
Txt 38
1.3
4172 -328
0.0
OUT.LO
Txt 41
1.4
4172 -328
150.0
OUT.HI
Txt 42
1.4
To default state 1.0
HOLD CLOS OPEN NONE
NONE
ERR.ACT
Txt 31
1.3
3600 0000
0
ON.DEL
Txt 32
3600 0000
0
OFF.DEL
Txt 33
WIND
R2.FUNC
Txt 19
O.I.W C.I.W
O.I.W
R2.CONT
Txt 27
9999 -1999
60.0
SETP.LO
Txt 29
9999 -1999
70.0
SETP.HI
Txt 28
250.0 0.1
1.0
R2.HYST
Txt 30
HOLD CLOS OPEN NONE
NONE
ERR.ACT
Txt 31
1.3
3600 0000
0
ON.DEL
Txt 32
3600 0000
0
OFF.DEL
Txt 33
10-2 10-0 5-1 5-0 1-0.2 1-0 2-10 0-10 1-5 0-5 0.2-1 0-1
0-10
O.RANGE
Txt 39
Volt.
ANA.OUT
Txt 36
1.3
CLOS OPEN
ERR
R2.FUNC
Txt 19
OPEN
ERR.ACT
Txt 34
POW
R2.FUNC
Txt 19
OFF
R2.FUNC
Txt 19
OK

Routing diagram

Advanced settings (ADV.SET)

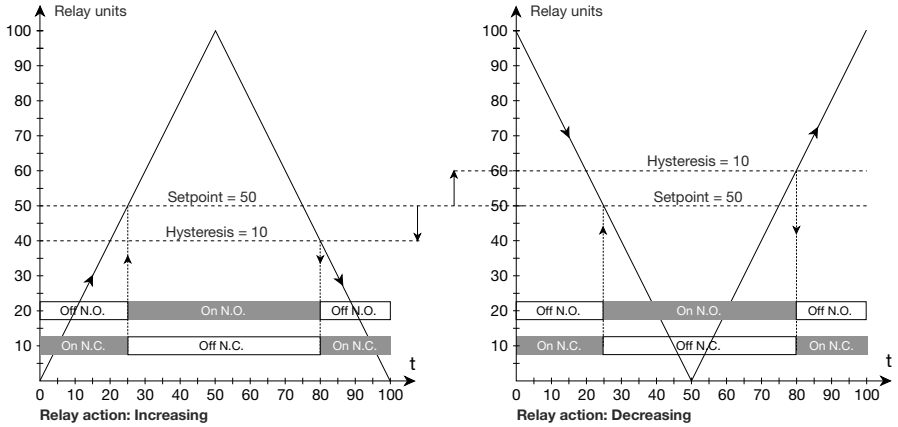
2.0 In the submenu simulation (SIM) you must press OK to return to the default state 1.0.



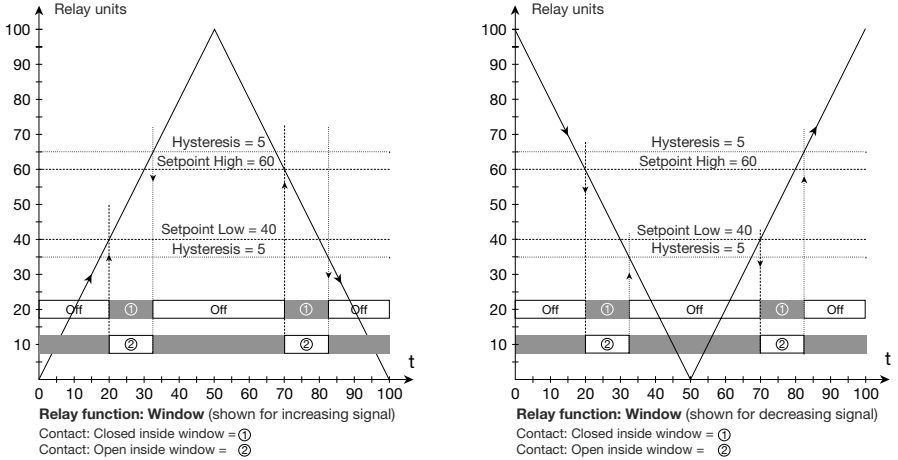
Scrolling help text in display line 3

[01] Set correct password
[02] Enter advanced setup menu?
[03] Select temperature input
Select potentiometer input
Select linear resistance input
Select current input
Select voltage input
[04] Select 0.0-1 V input range
Select 0.2-1 V input range
Select 0-5 V input range
Select 1-5 V input range
Select 0-10 V input range
Select 2-10 V input range
[05] Select 0-20 mA input range
Select 4-20 mA input range
[06] Select 2-wire sensor connection
Select 3-wire sensor connection
Select 4-wire sensor connection
[07] Set resistance value low
[08] Set resistance value high
[09] Select Celsius as temperature unit
Select Fahrenheit as temperature unit
[10] Select TC sensor type
Select Ni sensor type
Select Pt sensor type
[11] Select display unit
[12] Select decimal point position
[13] Set display range low
[14] Set display range high
[15] Set relays in % of input range
Set relays in display units
[16] Select Pt10 as sensor type
Select Pt20 as sensor type
Select Pt50 as sensor type
Select Pt100 as sensor type
Select Pt200 as sensor type
Select Pt400 as sensor type
Select Pt500 as sensor type
Select Pt1000 as sensor type
[17] Select Ni50 as sensor type
Select Ni100 as sensor type
Select Ni120 as sensor type
Select Ni1000 as sensor type
[18] Select TC-B as sensor type
Select TC-E as sensor type
Select TC-J as sensor type
Select TC-K as sensor type
Select TC-L as sensor type
Select TC-N as sensor type
Select TC-R as sensor type
Select TC-S as sensor type
Select TC-T as sensor type
Select TC-U as sensor type
Select TC-W3 as sensor type
Select TC-W5 as sensor type
Select TC-Lr as sensor type
[19] Select OFF function - relay is permanently off
Select POWER function - relay indicates power status OK
Select ERROR function - relay indicates sensor error only
Select WINDOW function - relay controlled by 2 setpoints
Select SETPOINT function - relay controlled by 1 setpoint
[20] Select Normally Closed contact
Select Normally Open contact
[21] Set relay setpoint
[22] Activate relay on decreasing signal
Activate relay on increasing signal
[23] Set relay hysteresis
[24] No error action - undefined status at error
Open relay contact at error
Close relay contact at error
Hold relay status at error
[25] Set relay ON delay in seconds
[26] Set relay OFF delay in seconds
[27] Relay contact is Closed Inside Window
Relay contact is Open Inside Window
[28] Set relay window setpoint high
[29] Set relay window setpoint low
[30] Set relay window hysteresis
[31] No error action - undefined status at error
Open relay contact at error
Close relay contact at error
Hold relay status at error
[32] Set relay ON delay in seconds
[33] Set relay OFF delay in seconds
[34] Open relay contact at error
Close relay contact at error
[36] Select current as analogue output type
Select voltage as analogue output type
[37] Select 0-20 mA output range
Select 4-20 mA output range
Select 20-0 mA output range
Select 20-4 mA output range
[38] Select no error action - output undefined at error
Select downscale at error
Select NAMUR NE43 downscale at error
Select NAMUR NE43 upscale at error
[39] Select 0.0-1 V output range
Select 0.2-1 V output range
Select 0-5 V output range
Select 1-5 V output range
Select 0-10 V output range
Select 2-10 V output range
Select 1-0.0 V output range
Select 1-0.2 V output range
Select 5-0 V output range
Select 5-1 V output range
Select 10-0 V output range
Select 10-2 V output range
[41] Set temperature for analogue output low
[42] Set temperature for analogue output high
[43] Enter password setup
Enter simulation mode
Perform process calibration
Enter display setup
Perform memory operations
[44] Load saved configuration into 4116
Save 4116 configuration in 4501
[45] Adjust LCD contrast
[46] Adjust LCD backlight
[47] Write a 6-character device TAG
[48] Analogue output value is shown in display line 3
Device TAG is shown in display line 3
[49] Calibrate input low to process value?
[50] Calibrate input high to process value?
[51] Enable simulation mode?
[52] Set the input simulation value
[53] Relay simulation - use ⌃ and ⌄ to toggle relay 1 and 2
[54] Enable password protection?
[55] Set new password
[56] Enable Fastset functionality?
[57] Relay setpoint - press OK to save
[58] Relay setpoint - Read only
[59] Select language
[60] Use process calibration values?
[61] Set value for low calibration point
[62] Set value for high calibration point

Graphic depiction of relay action Setpoint:



Graphic depiction of relay action Window:



TRANSMETTEUR UNIVERSEL

PReasy 4116

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