

USER MANUAL

MULTISIGNAL PANEL METER

PCE-DPD-U

ENGLISH



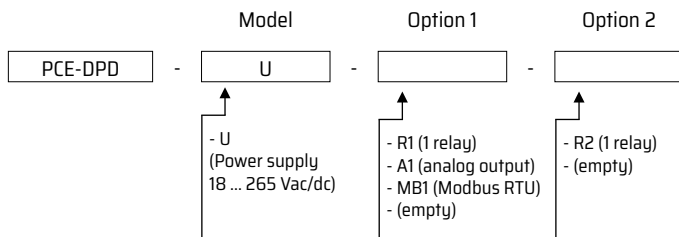
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MULTISIGNAL 96 X 48 MM PANEL METER

Multisignal digital panel meter in 96 x 48 mm size (1/8 DIN). Accepts AC and DC voltage signals from mV up to 600 V and currents up to 5 A (AC measures in True RMS), process signals (mA and Vdc) with excitation voltage included, thermocouples K, J, E, N, L, R, S, B, T and C, resistive temperature probes (Pt100, Pt500, Pt1000, Ni100, Ni200, Ni1000, PTC and NTC), resistances, potentiometers and frequency. Scalable reading with 4 digits up to 9999 / -1999 with configurable decimal point. Two independent alarms, configurable as maximum or minimum, with hysteresis and setpoint. Optional 1 or 2 relay outputs, 4/20 mA isolated analog output, and Modbus RTU isolated serial communications. Front protection IP50, with optional IP65. Connections with plug-in screw terminals. Instrument designed for industrial use, highly flexible, allows for integration in multiple applications, reduced cost, excellent quality and optional customization available.

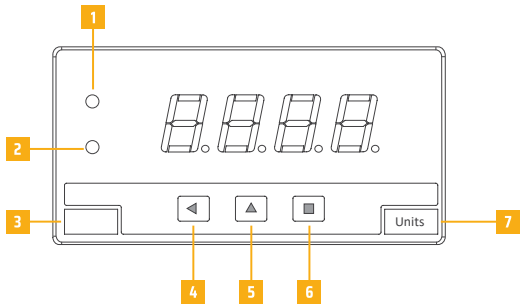
- » **"Fast access"** menu at front key UP configurable for fast access to alarm setpoints
- » **"Eco"** mode reduces power consumption
- » Simplified scaling configuration
- » Function **"external control"** to activate with a contact a predefined function (second scaling, decimal point, reading 'hold', 'tare', memory of maximum or minimum)
- » 5 configurable brightness levels

HOW TO ORDER



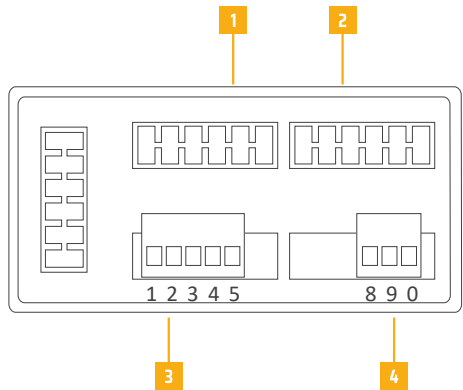
FRONT VIEW

- 1 - Alarm 1
- 2 - Alarm 2
- 3 - Logo
- 4 - Key LE
- 5 - Key UP / "Fast access"
- 6 - Key SQ / "Configuration menu"
- 7 - Units

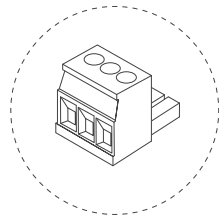


REAR VIEW

- 1 - Option 2
- 2 - Option 1
- 3 - Signal
- 4 - Power



Detail of the plug-in screw terminals provided with the instrument. The instrument is provided with all terminals needed, both male and female.

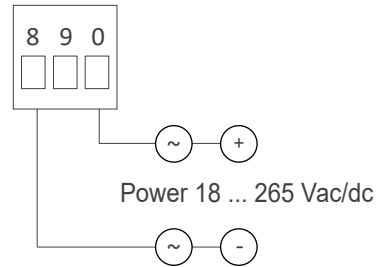


POWER CONNECTIONS

Earth connection - The instrument does not need earth connection for correct operation nor for compliance with security regulations. Terminal 9 is not connected to any internal circuit and is provided only as a safe place for earth wire.

Fuse - This instrument has no internal fuse. Conforming to security regulation 61010-1, add a protection fuse to the power line to act as disconnection element, easily accessible to the operator and identified as a protection device.

- » 250 mA time-lag for power voltage > 50 Vac/dc
- » 400 mA time-lag for power voltage < 50 Vac/dc

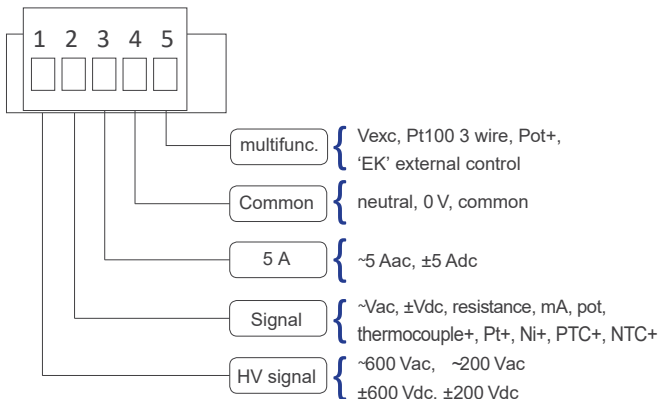


SIGNAL CONNECTIONS

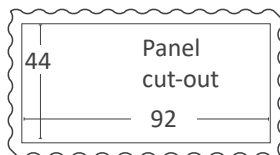
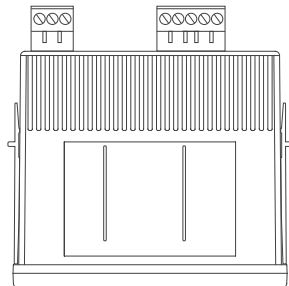
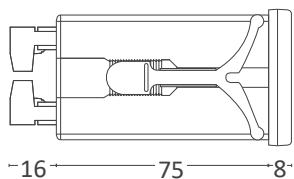
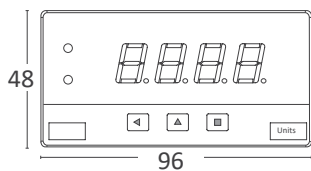
Signals up to 600 V and 200 V (AC and DC) must be connected at terminals 1 and 4. Signals for 5 A current (AC and DC) must be connected at terminals 3 and 4. All other signals must be connected between terminals 2 and 4. Terminal 5 is a 'multifunction' terminal, configurable with one of the following functions:

- » +15 Vdc excitation voltage (Vexc) for process signals
- » +5 Vdc excitation for potentiometer signals
- » connection for the Pt100 third wire compensation
- » external contact "EK" function

To select the terminal 5 function, select the position of internal jumper "T"



MECHANICAL DIMENSIONS (MM)



INSTALLATION AND START-UP

- » Open the instrument as indicated at "to open the instrument" and access the internal board.
- » Select jumpers "S" for the signal range required.
- » Select jumper "T" to assign to multifunction terminal 5 the required functionality.
- » Close the instrument.
- » Connect the input signal and the power supply as indicated above.
- » Enter the "configuration menu" to configure the instrument (scaling, alarms, ...).

TECHNICAL SPECIFICATIONS

Digits	
Number of digits	4
Led	7 segments
Color	red
Digit height	14 mm
Reading	
max. Reading	999999
min. Reading	-199999
Decimal point	configurable X.X.X.X.X
Readings	3 readings / second
Display refresh	3 refresh / second
Step response	300 mSec. (0 % to 99 % signal)
Overrange	reading flashes at '9999'
Underrange	reading flashes at '-1999'
Accepted input signals	
AC voltages and currents	600 Vac, 200 Vac, 20 Vac, 2 Vac 200 mVac, 60 mVac, 5 Aac, 20 mAac
DC voltages and currents	± 600 Vdc, ± 200 Vdc, ± 20 Vdc, ± 2 Vdc ± 200 mVdc, ± 60 mVdc, ± 5 Adc, ± 20 mAdc
Thermocouples	K, J, E, N, L, R, S, B, T y C
Temperature 'Pt'	Pt100 (2 and 3 wires with automatic compensation up to 30 R), Pt500, Pt1000

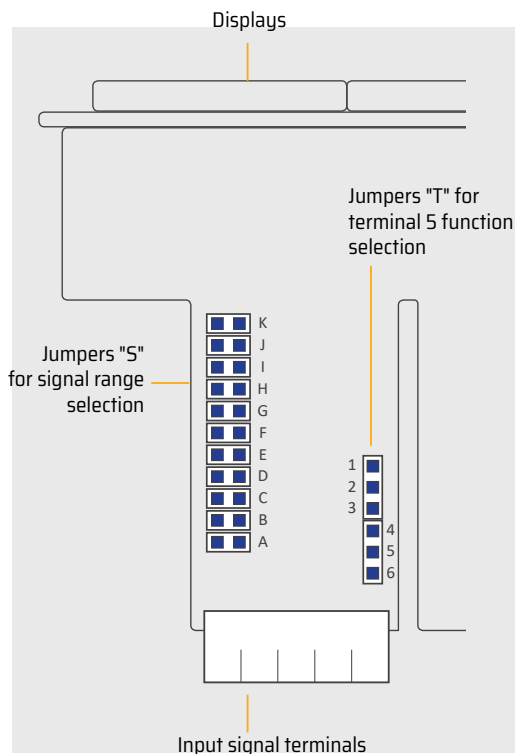
Temperature 'Ni'	Ni100, Ni200, Ni1000
Temperature 'NTC'	
Temperature 'PTC'	
Process	4/20 mA, 0/10 Vdc (active and passive)
Frequency	up to 100 Hz
Resistances	ranges of 5 K and 50 K
Potentiometers	nominal value 500 Ohm up to 20 KOhm
Accuracy at 25 °C	see following sections for each signal
Thermal drift	150 ppm/°
Excitation voltage	+15 Vdc (max. 30 mA) for process signals +5 Vdc for potentiometers (at terminal 5)
Power supply	
Power 'U'	18 ... 265 Vac/dc
Isolation	1500 Veff. isolation tested for 60 sec.
AC frequency	50/60 Hz
Consumption (without 'Eco')	<1.5 W meter only <2.5 W meter with options
Consumption (with 'Eco')	<0.3 W meter only <1.5 W meter with options
Power wires	1 mm² ... 2.5 mm² (AWG17 ... AWG14)
Configuration	3 front push buttons
Front protection	IP65 standard
Output options	relay, analog, serial

Mechanical	
Mounting	panel
Connections	plug-in screw terminal
Housing	ABS, polycarbonate (VO)
Weight	<150 g
Front size	96 x 48 mm (1/8 DIN)
Panel cut-out	92 x 44 mm
Depth	91 mm (including terminals)
Temperature	
Operation	0 ... +50 °C
Storage	20 ... +70 °C
Warm-up time	15 minutes
Functions included	
Fast access	to alarm setpoints, maximum and minimum
External control	second scaling decimal point 0, 1, 2 or 3 'hold' reading tare function memory of maximum memory of minimum
Eco mode	reduced consumption
Alarms	setpoint hysteresis set as max or min type
Offset reading	subtract a fixed number of counts to reading
Display filter	recursive 'steps'
Simplified scaling	
Memory	max and min memory
Password	blocks configuration
Display brightness	5 levels

INTERNAL JUMPERS

Internal jumpers "S" are associated to the signal range. The position of internal jumper "T" assigns the function of the multifunction terminal 5. At Table 2 see a list of signal ranges and associated jumper "S" and "T". At Table 3 see the position for jumper "T" associated to each function of the multifunction terminal 5. To access the internal jumpers, open the housing. For additional information on each signal range see the following sections:

- » Ranges for AC voltages and currents
- » Ranges for DC voltages and currents
- » Ranges for thermocouples
- » Ranges for Pt and Ni probes
- » Ranges for NTC probes
- » Ranges for PTC probes
- » Ranges for process signals
- » Ranges for frequency signals
- » Ranges for resistance measures
- » Ranges for potentiometer measures



Jumpers not used can be stored for future use by placing them at the 'no contact' positions indicated below. Only the 3 positions indicated are safe to store jumpers.

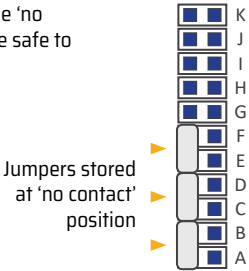


Table 2

Range	Jumpers "S"	Jumper "T"
AC voltages and currents		
~ 600 Vac	G I	4 - 5
~ 200 Vac	I	
~ 20 Vac	A I	
~ 2 Vac	B I	
~ 200 mVac	C I	
~ 60 mVac	E I	
~ 5 Aac	I	
~ 20 mAac	D I	
DC voltages and currents		
±600 Vdc	G	4 - 5
±200 Vdc	---	
±20 Vdc	A	
±2 Vdc	B	
±200 mVdc	C	
±60 mVdc	E	
±5 Adc	---	
±20 mAdc	D	
Process		
4/20 mA	D	1-2*
0/10 Vdc	A	
* jumper 1-2 to activate Vexc. Select 4-5 to activate function 'EK'		

Range	Jumpers "S"	Jumper "T"
Resistances		
0 ... 5 K	F H K	4 - 5
0 ... 50 K	F K	
Thermocouples		
Tc. K	E	4 - 5
Tc. J		
Tc. E		
Tc. N		
Tc. L		
Tc. R	E J	
Tc. S		
Tc. T		
Tc. C	E	
Tc. B	E J	
Pt and Ni probes		
Pt100 (3 wire)	F H J	4 - 5
Pt100 (2 wire)	F H	
Pt500	F	
Pt1000	F	
Ni100	F H	
Ni200	F H	
Ni1000	F	

Range	Jumpers "S"	Jumper "T"
NTC probes		
NTC	F K	4 - 5
PTC probes		
KTY 121	F	4 - 5
KTY 210, 220	F H K	
Potentiometers		
0/100 %	A	2 -3

Table 3

Jumpers "T"	Active function at terminal 5
1 2	Vexc (excitation voltage +15 Vdc) for process
2 3	Potentiometer excitation (+5 Vdc)
4 5	External control ('EK' function)
5 6	Pt100 third wire

MEASURING AC VOLTAGES AND AC CURRENTS

AC signal ranges

The instrument accepts the measure of AC voltages and currents, with ranges from 60 mVac up to 600 Vac, covering from shunt signals to typical power line voltages of 48 Vac, 115 Vac, 230 Vac and even 380 Vac. Both phase-to-neutral and phase-to-phase measures are accepted. AC currents signals up to 5 Aac are accepted, and it has a range of 20 mAac.

True RMS measure

AC measure are TrueRMS. The instrument assigns a dead band around 0, with a configurable value between 0 and 100. Value is empirical, and by default is set to 20. The dead band can be configured at the Configuration menu.

Scaling

The instrument allows to scale the reading to 4 digits (9999 / -1999) with configurable decimal point to any position. The second scaling function can also be used

Maximum oversignal

Maximum oversignal is the maximum signal accepted by the instrument. Higher signal values may cause instrument damage. Lower values are non destructive but may be out of accuracy specifications.

Response times

The response time to a signal step is 300 mSeconds, independent of the signal range selected.

Terminal 5 multifunction - External control

Terminal 5 remains configured as EK external control function. See "Internal jumpers" for a list of available functions.

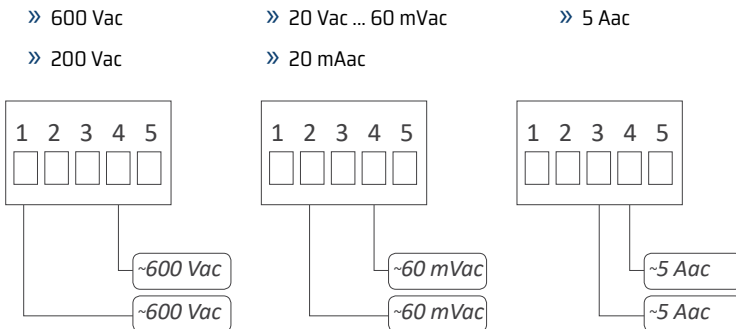
Start-up, connections and jumpers

For instrument start-up follow the steps listed at "Installation and start-up".

Signal connections are indicated at "Signal connections".

Location for internal jumpers is indicated at "Internal jumpers".

See below a list of typical connections :



Applications	
... with shunts ...	Measure of AC currents through a current shunt of 60 mV, 100 mV or 150 mV and scaled reading
... with X/5, X/1 current transformers ...	Measure of AC currents through a X/5 or X/1 current transformer and scaled reading
... direct measure ...	Direct measure of currents up to 5 Aac
... with power line voltages ...	Measure of voltages over power lines phase and neutral, of 230 Vac, 115 Vac...
... with power voltages ...	Measure of phase to phase lines on power lines 380 Vac, 230 Vac, ...
... with AC voltages ...	Measure of AC voltages in panels using 24 Vac, 48 Vac, ...

Vac ranges (Veff.)	Scale by default	Scalable	Jumper "S"	Jumper "T"	Accuracy (% FS)	Max. oversignal	Connection (terminals)	Z _{in}
~ 600 Vac	600	9999 ... -1999	G I	4 - 5	<0.30 % (up to 150 Hz)	800 Vac	1(~) 4(~)	12 M
~ 200 Vac	200.0		I			800 Vac		12 M
~ 20 Vac	20.00		A I			150 Vac	2(~) 4(~)	1 K
~ 2 Vac	2.000		B I			100 Vac		100 K
~ 200 mVac	200.0		C I			30 Vac		10 K
~ 60 mVac	60.0		E I			3 Vac		1 M

Aac ranges (Veff.)	Scale by default	Scalable	Jumper "S"	Jumper "T"	Accuracy (% FS)	Max. oversignal	Connection (terminals)	Z _{in}
~ 5 Aac	5.00	9999 ... -1999	I	4 - 5	<0.50 % (up to 150 Hz)	7 Aac (max. 7 sec.)	3(~) 4(~)	20 mOhm
~ 20 mAac	20.00		D I			25 mAac	2(~) 4(~)	4.7 R

MEASURING DC VOLTAGES AND DC CURRENTS

Measuring DC signal ranges

The instrument accepts the measure of DC voltages and currents, with ranges from 60 mVdc up to 600 Vdc, covering applications with current shunts, tachometric dynamos, batteries, process, etc. DC currents signals up to 5 Adc are accepted, and it has a range of 20 mAdc.

Bipolar ranges

All signal ranges are bipolar, and the instrument can measure both the positive and the negative signal.

Scaling

The instrument allows to scale the reading to 4 digits (9999 / -1999) with configurable decimal point to any position. The second scaling function can also be used

Maximum oversignal

Maximum oversignal is the maximum signal accepted by the instrument. Higher signal values may cause instrument damage. Lower values are non destructive but may be out of accuracy specifications.

Response times

The response time to a signal step is 300 mSeconds, independent of the signal range selected.

Terminal 5 multifunction - External control

Terminal 5 remains configured as EK external control function. See "Internal jumpers" for a list of available functions.

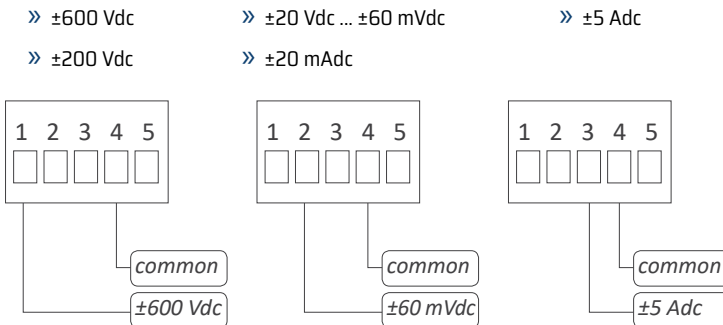
Start-up, connections and jumpers

For instrument start-up follow the steps listed at "Installation and start-up".

Signal connections are indicated at "Signal connections".

Location for internal jumpers is indicated at "Internal jumpers".

See below a list of typical connections :



Applications	
... with shunts ...	Measure of DC currents through a current shunt of 60 mV, 100 mV or 150 mV and scaled reading
... direct measure ...	Direct measure of currents up to 5 Adc and voltages up to 600 Vdc
... with batteries ...	Measure of the battery voltage at 12 Vdc and 24 Vdc
... with tachometric dynamos ...	Read the speed in RPM from a tachometric dynamo voltage signal
... with speed variators ...	Measure the voltage signal from the variator, proportional to the RPM speed of the motor

Vdc ranges	Scale by default	Scalable	Jumper "S"	Jumper "T"	Accuracy (% FS)	Max. oversignal	Connection (terminals)	Z _{in}
±600 Vdc	600	9999 ... -1999	G	4 - 5	<0.20 %	800 Vdc	1(+) 4(-)	12 M
±200 Vdc	200.0		---			800 Vdc		12 M
±20 Vdc	20.00		A			150 Vdc	2(+) 4(-)	1 K
±2 Vdc	2.000		B			100 Vdc		100 K
±200 mVdc	200.0		C			30 Vdc		10 K
±60 mVdc	60.0		E		<0.25 %	3 Vdc		1 M

Adc ranges	Scale by default	Scalable	Jumper "S"	Jumper "T"	Accuracy (% FS)	Max. oversignal	Connection (terminals)	Z _{in}
±5 Adc	±5.00	9999 ... -1999	---	4 - 5	<0.25 %	7 Aac (max. 7 sec.)	3(+) 4(-)	20 mOhm
±20 mAdc	±20.00		D		<0.15 %	25 mAdc	2(+) 4(-)	4.7 R

MEASURING WITH THERMOCOUPLES

Thermocouples accepted

The instrument accepts direct connection of thermocouples type K, J, E, N, L, R, S, B, T and C.

Temperature ranges and total error

Temperature ranges and total error for each type of thermocouple are indicated on the table below.

Cold junction compensation

The thermocouple cold junction is automatically compensated by the instrument. The automatic compensation can be disabled from the configuration menu.

Resolution and units

The thermocouple resolution when measuring thermocouples is 1°. Reading can be configured in °C (degrees Celsius) or °F (degrees Fahrenheit).

Sensor break detection

In case of sensor break, the instrument will show 'h.ovr' or 'h.udr' depending on the broken cable.

Compensated cable

To correctly measure a thermocouple signal, always use compensated cable, of the thermocouple used, to connect the instrument and the thermocouple.

Response times

The response time to a signal step is 300 mSeconds, independent of the signal range selected.

Terminal 5 multifunction - External control

Terminal 5 remains configured as EK external control function. See "Internal jumpers" for a list of available functions.

Start-up, connections and jumpers

For instrument start-up follow the steps listed at "Installation and start-up".

Signal connections are indicated at "Signal connections".

Location for internal jumpers is indicated at "Internal jumpers".

See below connections for thermocouple :

Thermocouple	Jumper "S"	Jumper "T"	Range in °C (in °F)	Connection (terminals)	Total error (cold junction included)
Thermocouple K	E	4 -5	-100 / 1350 °C (-148 / 2462 °F)	2 (tc +) 4 (tc -)	<3 °
Thermocouple J			-100 / 1200 °C (-148 / 2192 °F)		
Thermocouple E			-100 / 1000 °C (-148 / 1832 °F)		
Thermocouple N			-100 / 1300 °C (-148 / 2372 °F)		
Thermocouple L			-100 / 900 °C (-148 / 1652 °F)		
Thermocouple R	E J	4 -5	0 / 1768 °C (32 / 3214 °F)		<5 °
Thermocouple S			0 / 1768 °C (32 / 3214 °F)		
Thermocouple T			-100 / 400 °C (-148 / 752 °F)		
Thermocouple C	E		0 / 2300 °C (32 / 4172 °F)		
Thermocouple B	E J		700 / 1820 °C (1292 / 3308 °F)		

MEASURING WITH PT AND NI PROBES

Accepted Pt and Ni probes

The instrument accepts connection of Pt100, Pt500 and Pt1000 temperature probes, and also Ni100, Ni200 and Ni1000 temperature probes. Temperature ranges for each type of probe are indicated on the Table below.

Pt100 with 2 and 3 wires

The instrument accepts connection for 2 and 3 wire Pt100 probes. For 3 wire Pt100 probes, configure internal jumper 'T' at position 5-6. For 2 wire Pt100 probes, configure internal jumper 'T' at position 4-5. Compensation of the wire resistance for 2 wire probes can be manually configured with the parameter 'Offset reading' (oFFS) which allows to configure a fixed number of counts to be added to the reading.

Resolution and units

The temperature resolution using Pt and Ni temperature probes is configurable to 1° or 0.1°. Reading can be configured in °C (degrees Celsius) or °F (degrees Fahrenheit).

Sensor break detection

In case of sensor break, the instrument will show 'h.ovr' or 'h.udr' depending on the broken cable.

Alpha temperature coefficient

The instrument accepts Pt probes (Pt100, Pt500, Pt1000) with 'Alpha' parameter of '0.0385' and '0.0390'. This parameter is associated to the specific model of probe installed.

Terminal 5 multifunction - External control

To configure for 3 wire Pt100 probes, set internal jumper 'T' at position 5-6. Terminal 5 will be assigned to the connection of the third wire of the Pt100 probe, for automatic wire resistance compensation purposes, up to 30 R. To configure for 2 wire Pt100 probes, set internal jumper 'T' at position 4-5. Terminal 5 will be configured as 'EK' external control function.

Start-up, connections and jumpers

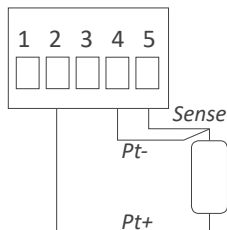
For instrument start-up follow the steps listed at "Installation and start-up".

Signal connections are indicated at "Signal connections".

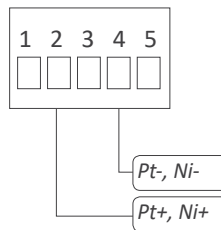
Location for internal jumpers is indicated at "Internal jumpers".

See below a list of typical connections :

» Pt100 3 wires



» other probes 2 wires



Sensor	Jumper "S"	Jumper "T"	Range in °C (in °F)	Total error	Connection (terminals)	Current at sensor
Pt100 3 wires	F H J	5 - 6	-200 / 700 °C (-328 / 1292 °F)	<1°	2 (Pt+) 4 (Pt -) 5 (sense)	< 900 uA
Pt100 2 wires	F H	4 - 5	-200 / 700 °C (-328 / 1292 °F)		2 (Pt+, Ni+) 4 (Pt -, Ni-)	
Pt500	F		-150 / 630 °C (-238 / 1166 °F)			< 90 uA
Pt1000	F		-190 / 630 °C (-310 / 1166 °F)			< 90 uA
Ni100	F H		-60 / 180 °C (-76 / 356 °F)			< 900 uA
Ni200	F H		-60 / 120 °C (-76 / 248 °F)			< 900 uA
Ni1000	F		-60 / 180 °C (-76 / 356 °F)			< 90 uA

MEASURING WITH NTC PROBES

Accepted NTC probes

The NTC probe is a temperature variable resistor with a temperature - resistance curve defined by two parameters called 'R25' and 'beta'. By default, the instrument is configured for a standard NTC with 'R25' of 10K and 'beta' of 3500. The measured temperature ranges from -60 °C to 150 °C. Different NTC probes can be used, by configuring the instrument for different values of 'R25' and 'beta'. The instrument measures resistance from 100 R up to 1 MOhm.

Parameters 'R25' and 'Beta'

The instrument accepts values of 'beta' between 2500 and 5500, and values of R25 between 1.0 K and 200.0 K

Resolution and units

The temperature resolution using NTC temperature probes is configurable to 1° or 0.1°. Reading can be configured in °C (degrees Celsius) or °F (degrees Fahrenheit).

Sensor break detection

In case of sensor break, the instrument will show 'h.ovr' or 'h.udr' depending on the broken cable.

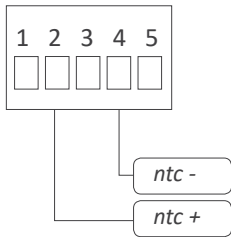
Terminal 5 multifunction - External control

Terminal 5 remains configured as 'EK' external control function.

Start-up, connections and jumpers

For instrument start-up follow the steps listed at "Installation and start-up". Signal connections are indicated at "Signal connections". Location for internal jumpers is indicated at "Internal jumpers".

See below connections for NTC probe :



NTC 'R25'*(configurable)	Jumper "S"	Jumper "T"	Range of measure	Accuracy (% of reading)	Connection (terminals)	Beta* (configurable)
10K	F K	4-5	-60 °C ... 150 °C	<1.5% of reading	2 (NTC +) 4 (NTC -)	3500

*R25' is configurable from 1.0 K up to 200.0 K.

*Beta' is configurable from 2000 to 5500.

MEASURING WITH PTC PROBES

Accepted PTC probes

The instrument accepts direct connection of PTC probes. Accepted PTC probes are listed at the Table below.

Resolution and units

The temperature resolution using PTC temperature probes is configurable to 1° or 0.1°. Reading can be configured in °C (degrees Celsius) or °F (degrees Fahrenheit).

Sensor break detection

In case of sensor break, the instrument will show 'h.ovr' or 'h.ldr' depending on the broken cable.

Terminal 5 multifunction - External control

Terminal 5 remains configured as 'EK' external control function.

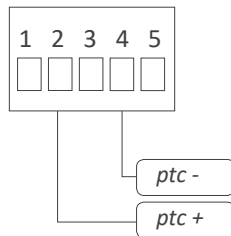
Start-up, connections and jumpers

For instrument start-up follow the steps listed at "Installation and start-up".

Signal connections are indicated at "Signal connections".

Location for internal jumpers is indicated at "Internal jumpers".

See below connections for PTC probe :



Family	Sensor	Jumper "S"	Jumper "T"	Range in °C (in °F)	Total error
KTY 121	KTY81-121 KTY82-121	F	4-5	-55 / 150 °C (-67 / 302 °F)	<1°
KTY 210	KTY81-210 KTY82-210	FHK			
KTY 220	KTY81-220 KTY82-220	FHK			

PROCESS MEASURES

Measuring process signals

The instrument accepts the measure of process signals in 4/20 mA and 0/10 Vdc. The instrument provides excitation voltage to power up transducers.

Scaling

The instrument allows to scale the reading to 4 digits (9999 / -1999) with configurable decimal point to any position. The 'second scaling' function can also be used.

Maximum oversignal

'Maximum oversignal' is the maximum signal accepted by the instrument. Higher signal values may cause instrument damage. Lower values are non destructive but may be out of accuracy specifications.

Response times

The response time to a signal step is 300 mSeconds, independent of the signal range selected.

Terminal 5 multifunction - External control

To configure the +15 Vdc excitation voltage at terminal 5, set internal jumper 'T' at position 1-2. Transducers with a consumption of up to 30 mA can be powered from this terminal. To configure the 'EK' external contact function at terminal 5, set internal jumper 'T' at position 4-5.

Start-up, connections and jumpers

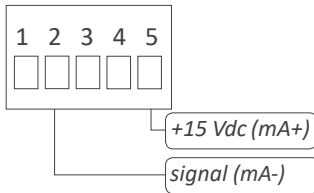
For instrument start-up follow the steps listed at "Installation and start-up".

Signal connections are indicated at "Signal connections".

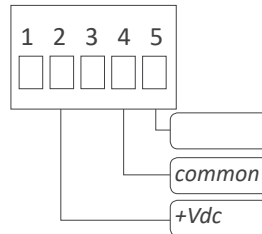
Location for internal jumpers is indicated at "Internal jumpers".

See below a list of typical connections :

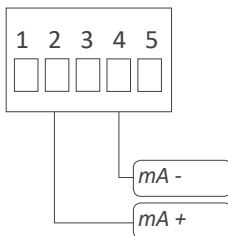
» signal 4/20 mA passive



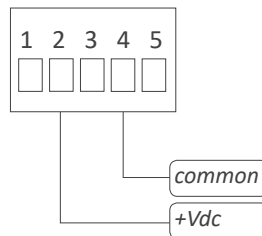
» signal 0/10 Vdc passive



» signal 4/20 mA active



» signal 0/10 Vdc active



Ranges of measure		Scale by default	Scalable	Jumper "S"	Jumper "T"	Accuracy (% FS)	Max. oversignal	Connection (terminals)	Z _{in}
4/20 mA	passive (needs Vexc.)	0/100.0	9999 ...	D	1-2	<0.15 %	25 mA	2 (signal) 5 (Vexc)	4.7 Ohm
	active				4-5			2 (mA+) 4 (mA-)	
0/10 Vdc	passive (needs Vexc.)		-1999	A	1-2	<0.20 %	25 Vdc	2 (+Vdc) 4 (comm.) 5 (Vexc)	1 M
	active				4-5			2 (+Vdc) 4 (comm.)	

MEASURING FREQUENCY

How the instrument measures frequency

The instrument measures frequency from an AC voltage (Vac) or AC current (Aac) signal. The instrument detects each '0' crossing of the signal, either '0 Vac' or '0 Aac'. All available Vac and Aac signal ranges are accepted as frequency input signal.

How to configure the instrument to measure frequency

To measure frequency from a Vac signal, select the internal jumpers for the desired AC voltage range, connect the signal for the selected voltage range, and configure the instrument to measure frequency. The same applies to measure frequency from Aac signals. See example at section below.

Scaling

The default resolution is 0.1 Hz. The instrument allows to scale the reading to 4 digits (9999 / -1999) with configurable decimal point to any position

Maximum and minimum signal

Frequency signals below 15 Hz are measured as '0'. Frequency signals higher than 100 Hz are out of accuracy. Signals higher than 1000 Hz will read 'display overflow' 'd.oVr' error.

Example

To measure the 50 Hz frequency from a 230 Vac power line, select jumpers 'GI' for 600 Vac signal range, connect signal to terminals '1' and '4', and configure 'frequency' at the input signal configuration menu.

Ranges of measure	Scale by default	Scalable	AC signal	Jumper "T"	Response time	Accuracy (% reading)
15 Hz ... 100 Hz	0/100.0	9999 ... -1999	select Vac or Aac range	4-5	70 mSec.	<0.15% of reading

MEASURING RESISTANCES

Measuring resistive signals

The instrument accepts the measure of resistances and provides two ranges of measure from 0 to 5 K and from 0 to 50 K.

Compensating the resistance of the signal wire

Resistances are measured with 2 wires system. To compensate for the possible error introduced by the resistance of the signal wires, the instrument allows to configure a fixed number of counts to be added to the reading, both in positive or negative. This is done with the parameter 'Offset reading' ('oFFS')

Scaling

The instrument allows to scale the reading to 4 digits (9999 / -1999) with configurable decimal point to any position. The 'second scaling' function can also be used

Response times

The response time to a signal step is 300 mSeconds, independent of the signal range selected.

Terminal 5 multifunction - External control

Terminal 5 remains configured as 'EK' external control function.

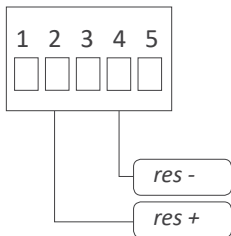
Start-up, connections and jumpers

For instrument start-up follow the steps listed at "Installation and start-up".

Signal connections are indicated at "Signal connections".

Location for internal jumpers is indicated at "Internal jumpers".

See below connections for resistance measures :



Ranges of measure	Scale by default	Scalable	Jumper "S"	Jumper "T"	Accuracy (% of reading)
0 ... 5 K	5.000	9999 ... -1999	F H K	4-5	<1.5% of reading
0 ... 50 K	50.00		F K		

MEASURING POTENTIOMETERS

Measuring potentiometers

The instrument accepts the measure of 3 wire potentiometers, with a single default range of 0/100 % of the potentiometer span.

Scaling

The instrument allows to scale the reading to 4 digits (9999 / -1999) with configurable.

Response times

The response time to a signal step is 300 mSeconds, independent of the signal range selected.

Terminal 5 'multifunction' - 'Vexc'

To measure potentiometer signals, set internal jumper 'T' at position 2-3. Terminal 5 will be assigned to a +5 Vdc excitation voltage for the potentiometer.

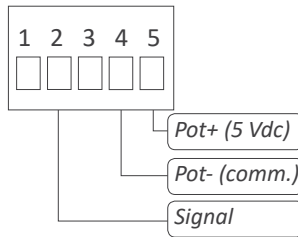
Start-up, connections and jumpers

For instrument start-up follow the steps listed at "Installation and start-up".

Signal connections are indicated at "Signal connections".

Location for internal jumpers is indicated at "Internal jumpers".

See below connections for measure of potentiometers :



Nominal pot. value	Ranges of measure	Scale by default	Scalable	Jumper "S"	Jumper "T"	Accuracy (% FS)
500 R ... 20 K	0 ... 100 %	0/100.0	9999 ... -1999	A	2-3	<0.5%

'FAST ACCESS' MENU

The 'fast access' menu allows to configure the front key 'UP' as a direct access to the alarm 1 and / or alarm 2 setpoint values, and / or the memory of maximum and minimum reading. The objective is to provide the operator with a fast and direct access to alarm setpoints, without accessing the standard configuration menu. Access to 'fast access' menu is still allowed even with active 'password' function, allowing the operator to modify the alarm setpoints, while still blocking any other change on the configuration. The 'fast access' menu is configurable, and it allows to assign to the front key none, one, several or all of the available functions. In case of configuring access only to alarm 1, when pushing front key 'UP', the display directly access the setpoint value of alarm 1 (same for alarm 2)

SCALING

The instrument can scale the reading to any value between 9999 and -1999 and configure the decimal point position, for all signal ranges except temperature ranges (thermocouples, Ni and Pt sensors, NTC and PTC sensors) are not scalable. The scaling configuration is a simplified two steps process :

- » configure at the 'Display Low' ('d.Lo') parameter the reading value associated to the low signal range
- » configure at the 'Display High' ('d.Hi') parameter the reading value for the high signal range

Some examples are explained below:

- » for AC voltage and current ranges, for example 0/600 Vac, configure at 'd.Lo' the reading for a signal of 0 Vac. Configure at 'd.Hi' the reading for a signal of 600 Vac.
- » for DC voltage and current ranges, for example ± 600 Vdc, configure at 'd.Lo' the reading for a signal of 0 Vdc. Configure at 'd.Hi' the reading for a signal of 600 Vdc.
- » for process ranges, for example 4/20 mA, configure at 'd.Lo' the reading for a signal of 4 mA. Configure at 'd.Hi' the reading for a signal of 20 mA.
- » for potentiometer ranges, configure at 'd.Lo' the reading for a signal of 0% (0 R). Configure at 'd.Hi' the reading for a signal of 100% (nominal of the potentiometer).

OFFSET READING

The 'Offset reading' ('oFFS') parameter allows a number of counts to be subtracted from the reading. This is specially useful to manually compensate for resistance errors due to wire resistance, when measuring with 2 wires Ni and Pt probes, and resistances. Applies to all signal ranges. See configuration menu at 'Tools' \ 'oFFS'

'ECO' MODE

The 'Eco' mode reduces the consumption of the instrument to a level of 0.3 W. The 'Eco' mode turns off the display, while the right decimal point remains flashing gently on and off, showing that the instrument is running on the background.

Display will turn on when an alarm activates, or when the operator touches any of the front keys. If no alarms are active, and there is no interaction from the operator, the instrument will turn off the display. The waiting time before display turn off is configurable from 5 to 255 seconds.

EXTERNAL CONTROL

The 'external control' function allows to activate, by closing a free potential contact, one of the following configurable functions :

- » activation of the second scaling
- » change the active decimal point
- » 'hold' the reading
- » 'tare' function
- » visualize de memory of maximum (or minimum)

To configure the 'EK' external contact function, set internal jumper 'T' at position 4-5. The 'EK' external control function is not compatible with function 'Vexc' (excitation voltage), the measure of 3 wire Pt100, and the measure of potentiometers.

To assign a function to the 'external control' see the configuration menu at 'External control'.

The function associated to the 'EK' external control activates when short-circuiting terminal 5 and terminal 4.



* Risk of electric shock. The 'EK' external control function shares terminal 4 with the common of the input signal connection. When measuring dangerous voltages AND using 'EK' external control contact, apply the appropriate protections to isolate the operator from dangerous voltages.

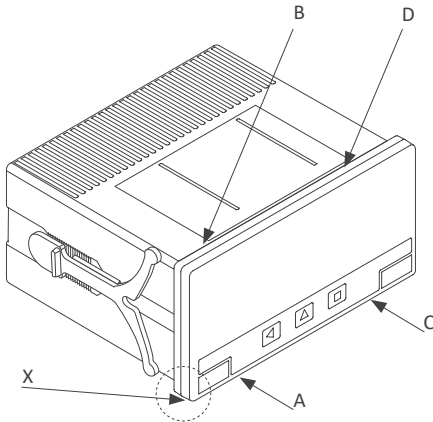
SECOND SCALING

The instrument provides a 'second scaling', independent and additional to the standard scaling. Control of the scaling to be applied, with a free potential contact called 'External control'. To configure the 'second scaling' :

- » configure the internal jumper 'T' to activate the 'EK' external control function.
- » associate the external control to the 'second scaling' function, at the configuration menu 'ScL.2' set the value 'EXt.c' ('External control')
- » configure the scaling at the configuration menu 'Tools' \ 'ScL.2'.
- » apply connections to the external control

TO OPEN THE INSTRUMENT

To open the housing and access the internal circuits, use a flat screwdriver to unlock clips 'D', 'C', 'B' and 'A', in this order. Remove the front filter. Let the inside of the instrument slide out of the housing. To reinsert the instrument make sure that all modules are correctly connected to the pins on the display module. Place all the set into the housing, assuring that the modules correctly fit into the internal guiding slides of the housing. Once introduced, place again the front filter at cover 'X', and then insert clips 'A', 'B', 'C' and 'D', in this order.

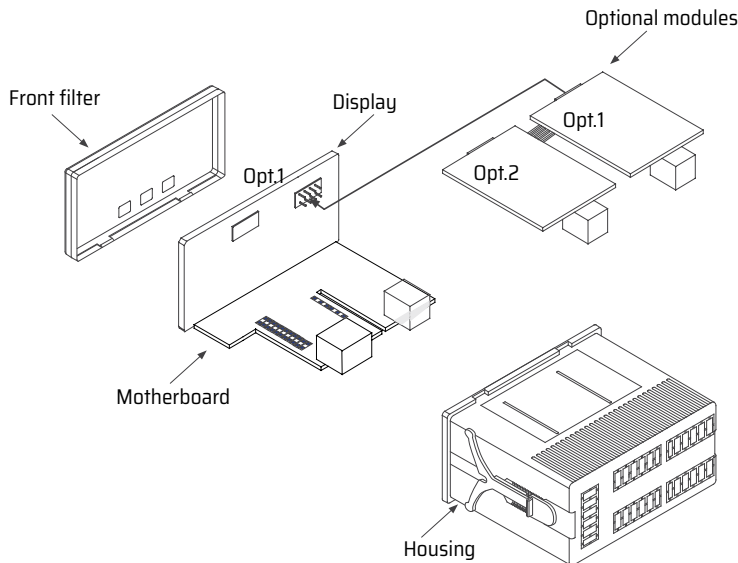


Risk of electric shock. Removing the front cover will grant access to the internal circuits. Disconnect the input signal to prevent electric shock to the operator. Operation must be performed by qualified personnel only.



Observe precautions for handling ESD (electrostatic discharge) sensitive devices

The internal structure of the instrument is shown in the graphic below. Module 'Opt.2' connects to module 'Opt.1'. Module 'Opt.1' connects to the display. Optional modules can be replaced, changed, added or removed simply by placing the proper module at the proper location.



HOW TO OPERATE THE MENUS

The instrument has two menus accessible to the user :

» 'Configuration menu' (key SQ)

» 'Fast access' menu (key UP)

Configuration menu

The 'configuration menu' modifies the configuration parameters to adapt the instrument to the application needs. To access the 'configuration menu' press for 1 second the SQ key. This access can be blocked by activating the 'Password' ('PASS') function. While operating the 'configuration menu', the alarm status is 'hold' to the status they had before accessing the menu, and the output and control modules remain in 'error' state. When leaving the 'configuration menu', the instrument applies a system reset, followed by a brief disconnection of the alarms and the output and control modules. Functionality is then recovered. For a detailed explanation on the 'configuration menu', and for a full view of the 'configuration menu' structure.

'Fast access' menu

The 'fast access' menu is an operator configurable menu, providing fast and direct access to the most usual functions of the instrument with a single key pad stroke. Press key UP to access this menu. The 'Password' ('PASS') function does not block access to this menu. Accessing and modifying parameters in the 'fast access' menu does not interfere with the normal functionality of the instrument, and it does not generate any system reset when validating the changes.

Front key pad description

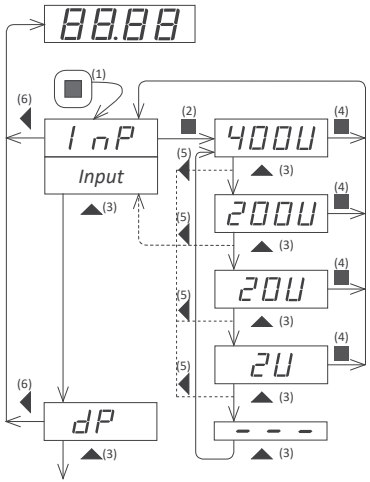
Key SQ - Press the SQ key for 1 second to access the 'configuration menu'. Inside the menu, the SQ key functions as a 'ENTER' key. It selects and accesses the menu option currently displayed. At menus with numerical value entries, it validates the number displayed.

Key UP - The UP key gives access to the 'fast access' menu. Inside the menus, it moves vertically through the different menu options. At menus with numerical value entries, it modifies the digit selected by increasing its value to 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

Key LE - Inside the menus, the LE key functions as the 'ESCAPE' key. It leaves the selected menu, and eventually, will leave the whole menu. When leaving the 'configuration menu' with the LE key, the changed parameters are activated. At menus with numerical value entries, the LE key allows to select the active digit. To modify the value of the selected digit use the UP key.

Menu ‘rollback’

After 30 seconds without interaction from the operator, the instrument will rollback and leave the ‘configuration menu’ or the ‘fast access’ menu. All changes will be discarded.



Example of operation inside the ‘configuration menu’.

- » The SQ key enters into the ‘configuration menu’.
- » The SQ key enters into the ‘InP’ option menu.
- » The UP key moves through the menu options.
- » The SQ key selects the desired range and returns to the ‘InP’ menu.
- » The LE key leaves the actual menu level and moves to the previous menu level.
- » The LE key leaves the ‘configuration menu’. Changes are applied and saved at this moment.

Note: Example menu indicated above is for information purposes only, and may not match with the actual menu entries of the instrument.

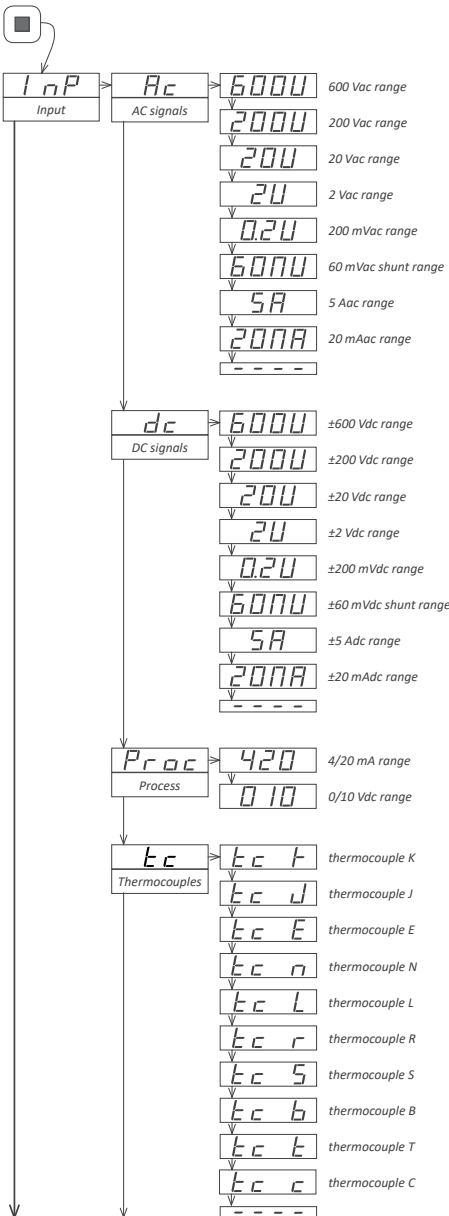
MESSAGES AND ERRORS

The error messages are shown on display in flash mode.

Messages and errors	
‘h.ldr’ ‘h.ovr’	Hardware underrange (‘h.ldr’) / overrange (‘h.ovr’). Input signal is lower / higher than the minimum / maximum signal the instrument can detect.
‘d.ldr’ ‘d.ovr’	Display underrange (‘d.ldr’) / overrange (‘d.ovr’). The instrument already displays the minimum / maximum value possible (9999 / -1999).
‘Err.1’	Incorrect password.

CONFIGURATION MENU

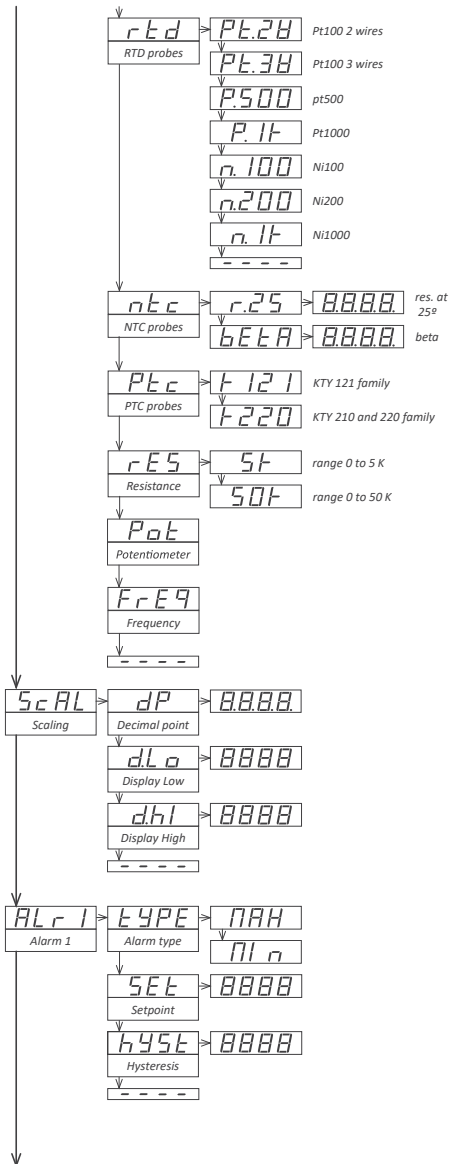
Press SQ key for 1 second to access the "Configuration menu"
 For a description on how to operate inside the menus see "How to operate the menus"



Input signal ranges

Access the 'Input' ('InP') menu to select the input signal range. For a correct reading, the internal jumper "T" must also be selected accordingly. The instrument offers the following signal ranges:

- » 'AC signals' ('Ac') - Select a range between 600 Vac, 200 Vac, 20 Vac, 2 Vac, 200 mVac, 60 mVac, 5 Aac and 20 mAac. The AC measure ranges provide 'True RMS' reading.
- » 'DC signals' ('dc') - Select a range between ±600 Vdc, ±200 Vdc, ±20 Vdc, ±2 Vdc, ±200 mVdc, ±60 mVdc, ±5 Adc and ±20 mAdc. Dc measures are bipolar.
- » 'Process' ('Proc') - Select 4/20 mA or 0/10 Vdc. The instrument provides excitation voltage to power up transducers at terminal 5.
- » 'Thermocouples' ('tc') - Select the thermocouple type between K, J, E, N, L, R, S, B, T and C. The instrument automatically compensates for the thermocouple cold junction.



» **'RTD probes' ('rtd')** - The 'rtd' menu offers temperature resistive probes type Pt (platinum) and Ni (Nickel). Select the type of probe from the available options Pt100 3 wire, Pt100 2 wire, Pt500, Pt1000, Ni100, Ni200 and Ni1000. For measures with 2 wires, a manual compensation for the wire resistance error is available using parameter 'Offset reading' ('oFFS')

» **'NTC probes' ('ntc')** - Select the 'ntc' menu to configure the input for NTC probes. To correctly configure the measure for NTC, two parameters need to be defined: first the resistance of the NTC probe at 25° ('r.25') and parameter 'beta' ('bEtA'). The instrument accepts beta values between 2000 and 5500, and values of R25 between 1.0 K and 200.0 K.

» **'PTC probes' ('ptc')** - Select the 'ptc' menu to configure the input for PTC probes. Select K121 for PTC probes from the KTY-121 family (KTY81-121 and KTY82-121). Select K220 for PTC probes from the KTY-210 family (KTY81-210 and KTY82-210) and KTY-220 (KTY81-220 and KTY82-220).

» **'Resistance' ('res')** - Select 5 K for a measuring range from 0 to 5 KOhms or select 50 K for a measuring range of 0 to 50 KOhms. For a manual compensation for the error introduced by the signal wires, see parameter 'Offset reading' ('oFFS')

» **'Potentiometer' ('Pot')** - Potentiometer measure has a single range, valid for any potentiometer with nominal value between 500 R and 20 K.

» **'Frequency' ('FrEq')** - Frequency measure has no selectable ranges. The instrument reads frequency up to 100 Hz, within accuracy specifications.

SCALING

Scale the reading at the **'Scaling' ('ScAL')** menu. Temperature ranges (thermocouples, Pt and Ni probes, NTC and PTC probes) have direct temperature indication and are not scalable.

To configure the scaling, enter the **'Decimal point' ('dP')** parameter and select the desired position for the decimal point, using key 'LE'.

Then configure at the **'Display Low' ('d.Lo')** parameter the reading value associated to the low signal range and configure at the **'Display High' ('d.Hi')** parameter the reading value for the high signal range.

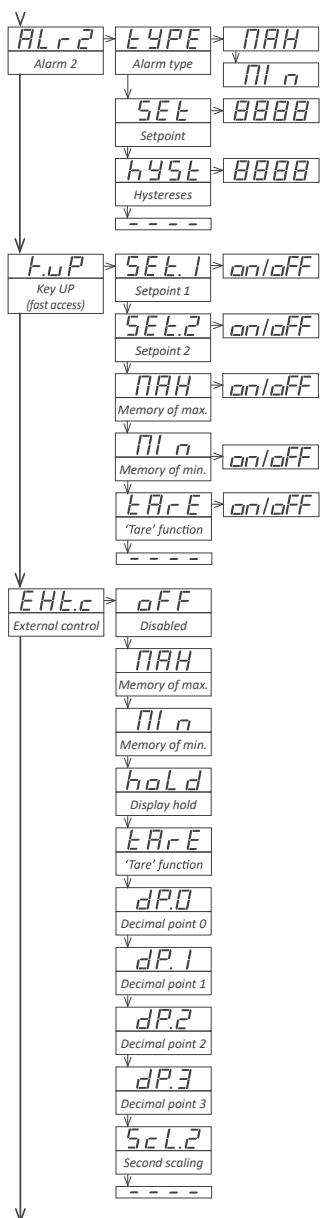
ALARMS

The instrument has 2 independent and configurable alarms.

Control the independent activation of relays A1 installed (optionally) at slots 1 and 2 from menu entries **'Alarm 1' ('ALr1')** and **'Alarm 2' ('ALr2')**. Alarms control also the activation of front leds '1' and '2' located as indicated at "Front view".

To configure the alarms, enter at the alarm menu ('ALr1', or 'ALr2') and configure the following parameters:

- » At the **'Alarm type' ('Type')** parameter select alarm as a maximum type alarm ('MAX') or a minimum type alarm ('Min'). The maximum type alarm (or minimum type) activates when the display value is higher (or lower) than the setpoint value.
- » At the **'Setpoint' ('SEt')** parameter enter the value for the alarm activation point. This parameter is eligible for configuration through the 'Fast access' menu.
- » Configure the hysteresis value at **'Hysteresis' ('hySt')**. The hysteresis applies to the deactivation process of the alarm. The alarm deactivates when the reading has passed the setpoint value plus the hysteresis value. Hysteresis helps to avoid repetitive switching of the alarm relays, due to fluctuating input signals around the setpoint.



Fast access

The key 'UP' at the front of the instrument gives access to a list of functions configurable by the operator.

The "Key UP (Fast access) ('K.uP)'" menu allows to select which functions will be accessible when pressing the front key 'UP'. Select 'on' to activate each function.

- » The **'Setpoint 1' ('ALr1')** function allows to visualize and modify the setpoint value of alarm 1.
- » The **'Setpoint 2' ('ALr2')** function allows to visualize and modify the setpoint value of alarm 2.
- » The **'Memory of maximum' ('MAX')** or **'Memory of minimum' ('Min')** allows to visualize the memory of maximum and minimum reading. The memory resets when the instrument restarts (power off-on cycle, or when leaving the configuration menu with a change to be applied).
- » The **'Tare function' ('tArE')** allows to visualize the actual tare value.

Super fast access

If only a single function is selected for the 'fast access' menu, pressing the the 'UP' key will shortly display the function name and then automatically jump to the function value.

EXTERNAL CONTROL

An external on / off control can be connected to the rear of the instrument. The operator can then control the activation of a configured function based on the state of this control. Function remains activated while the external contact is closed, and will deactivate when contact is open. To configure the function associated to the external control, enter the menu **'External control' ('Ext.c')**.

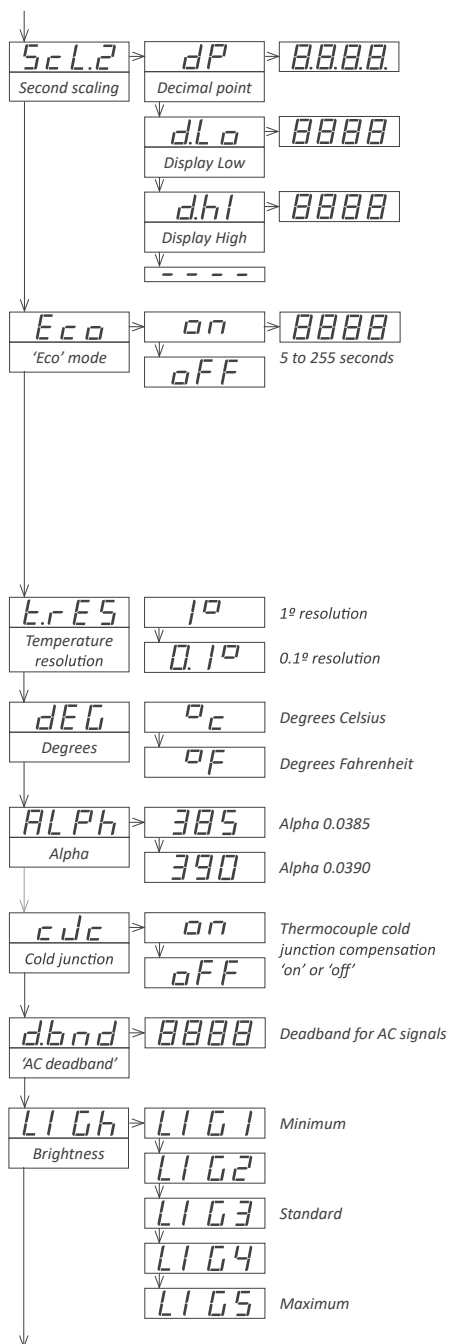
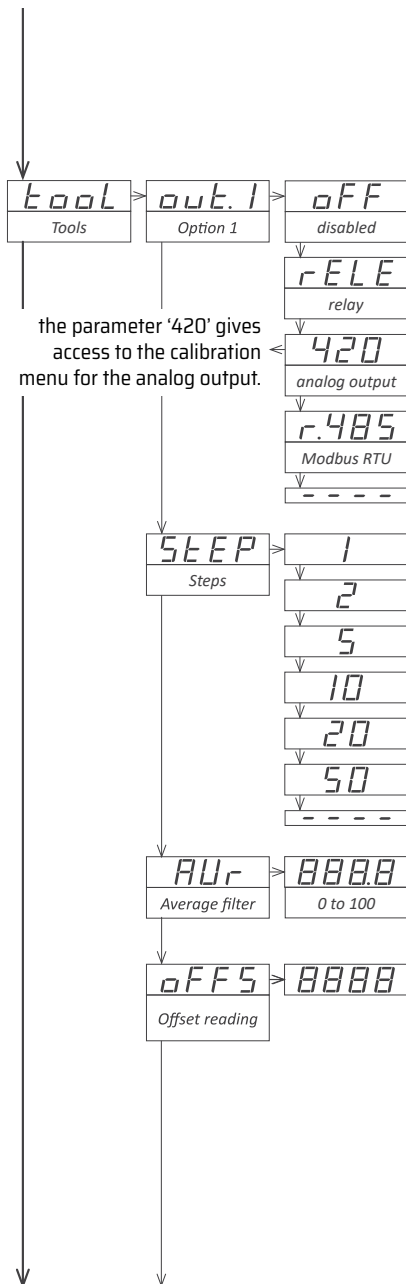
- » Select **'Disabled' ('oFF')** to have no function associated.
- » Select parameter **'Memory of maximum' ('MAX')** to visualize on display the memory of maximum reading.
- » Select parameter **'Memory of minimum' ('Min')** to visualize on display the memory of minimum reading.
- » Select parameter **'Display hold' ('hoLd')** to maintain the actual reading 'on hold'. Open the external contact to free the reading.

Parameters **'Memory of maximum' ('MAX')**, **'Memory of minimum' ('Min')** and **'Display hold' ('hoLd')** show on display a value which is not the actual measured input signal, therefore the values for this parameters will be shown in flash mode, indicating that the actual value is not the actual input value.

- » Select **'Tare function' ('tArE')** to activate a tare to the signal. The actual signal will read '0'. The calibration is not changed.
- » Select parameter **'Decimal point 0' ('dP.0')** to remove the decimal point on display.
- » Select parameter **'Decimal point 1' ('dP.1')** to activate the decimal point at position XXX.X
- » Select parameter **'Decimal point 2' ('dP.2')** to activate the decimal point at position XX.XX
- » Select parameter **'Decimal point 3' ('dP.3')** to activate the decimal point at position X.XXX

Parameters **'Decimal point 0' ('dP.0')** and similar **'dP.1'**, **'dP.2'** and **'dP.3'** control which decimal point is on. When the external contact closes, the decimal point selected lights on and the decimal point that was activated before will power off. When the external contact opens, the previous decimal point powers on again while removing the new decimal point. Display does not show in flash mode when decimal point functions are activated.

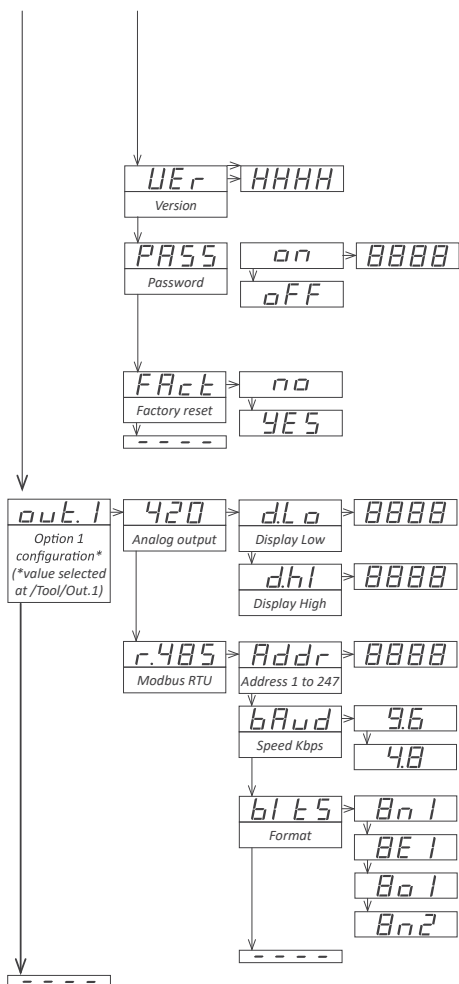
- » Select parameter **'Second scaling' ('ScL.2')** to activate the second scaling configured at menu **'Tools' ('Tool') \ 'Second scaling'**. The activation of the 'Second scaling' function is accepted for all signal input ranges based on AC input signals, DC input signals, process and resistances. Display does not show in flash mode when second scaling function is activated.



MENU 'TOOLS'

The **'Tools' ('tool')** menu contains multiple configuration options of the instrument.

- » Select at the **'Option 1' ('out.1')** parameter the module type installed at the 'Opt.1' slot.
Select **'Relay' ('rELE')** for the relay output module 'A1'.
Select **'Analog output' ('420')** for the analog output module 'M1'.
Select **'Modbus RTU' ('r.485')** for the Modbus RTU serial output module 'S1'.
- » The **'Steps' ('StEP')** parameter allows to configure a defined minimum step change on the reading. Reading will change in steps of 1, 2, 5, 10, 20 or 50 counts.
- » The **'Average filter' ('AVr')** function allows to reduce reading oscillations due to noisy signals, by applying a recursive filter on the reading values. The strength of the recursive filter is a value configurable between '0' and '100'. Value '0' means 'filter disabled'. Filter strength increases with the value. Increasing the filter strength, increases the response time of the instrument.
- » The **'Offset reading' ('oFFS')** parameter allows to configure a fixed number of counts to be subtracted from the reading. Accepts values from -500 to 500. This function allows to compensate for the possible error introduced by the resistance of the signal wires when measuring Pt probes, Ni probes or resistances.
- » The **'Second scaling' (ScL.2')** function allows to configure the reading associated to the 'second scaling', which can be activated by controlling a contact at the 'external control'.
- » The **'Eco mode' ('Eco')** is a function to reduce consumption of the instrument, by powering off the display when display is not needed. The operation of the 'Eco' mode is explained below:
 - the waiting time until display is powered off display is configurable from 5 to 255 seconds.
 - after the configured time is over, without interaction from the operator, the display powers off the reading. It will not power off if the instrument is into 'configuration menu' or in 'fast access' menu or there is an active alarm.
 - the instrument will power on the display when an alarm activates (either alarm 1 or 2) and will remain on if alarm remains active.
 - the instrument will power on the display if the operator press any front key.
- » At the **'Temperature resolution' ('t.RES')** menu select the resolution to 1° or 0.1°. This resolution applies to temperature probes Pt100, Pt500, Pt100, Ni100, Ni200, Ni1000, PTC and NTC. For thermocouple probes resolution is fixed to 1°.
- » At the **'Degrees' ('dEG')** menu select the temperature values to be read in °C (degrees Celsius) or in °F (degrees Fahrenheit).
- » At the **'Alpha' ('ALPh')** menu select the value for the alpha parameter to '0.0385' or '0.0390'. This parameter affects to Pt probes (Pt100, Pt500, Pt1000) and it depends on the probe.
- » At the **'Cold junction' ('cJc')** menu select 'on' to activate the thermocouple cold junction compensation. Select 'off' to deactivate.
- » The **'AC deadband' ('d.bnd')** parameter applies only to AC measuring ranges. The True RMS measures deal with a considerable noise when signal is near to 0. This parameter allows to set a value between 0 and 100 (by default is 20) to empirically set the signal level at which reading will be forced to 0, when signal is below that level.
- » At the **'Brightness' ('LIGH')** menu select between 5 levels of brightness intensity for the display. It adapts the instrument to environments with higher or lower brightness is needed or to adapt the intensity to other meters in the area.



- » The **'Version' ('Ver')** menu informs about the firmware version installed on the instrument.
- » At the **'Password' ('PASS')** menu select a 4 digit code to block access to the 'configuration menu'. Use the 'Password' function to prevent modifications on the instrument configuration. To activate the 'Password' select 'on' and enter the numerical code. The code will be requested when trying to access the 'configuration menu'. The 'fast access' menu is not blocked by the 'Password'.
- » At the **'Factory reset' ('FACT')** menu, select 'yes' to load the default factory configuration for the instrument.

Configuring the options

At the 'Option 1 configuration' ('out.1') configure the module installed at slot Opt.1. This menu varies depending on the module installed (relay, analog output or serial output). The type of module installed is indicated at the menu 'Tools' / 'out.1'.

- » **'Analog output' ('420')**: Select 'analog output' ('420') at 'Tools' / 'out.1' / '420', to have the analog output configuration at this menu entry. Introduce the reading value associated to 4 mA (Display Low ('d.Lo')) and the reading value associated to 20 mA (Display High ('d. Hi'))
- » **'Modbus RTU' ('r.485')**: Select 'Modbus RTU' ('r.485') at 'Tools' / 'out.1' / 'r.485', to have the serial output configuration at this menu entry. Configure the address for the instrument (parameter 'Address 1 to 247' ('Addr')), the bus speed (parameter 'Speed kbps' ('bAud')) configurable to 9.600 bps or 4.800 bps, and the bus format (parameter 'Format' ('bItS')) configurable at 8n1, 8E1, 8o1 or 8n2.

The slot at Opt.2 allows only for a relay module, and configuration is done through the menu entry 'Alarm 2' ('ALr2').

PRECAUTIONS ON INSTALLATION



Risk of electrical shock. Instrument terminals can be connected to dangerous voltage.



Instrument protected with double isolation. No earth connection required.



Instrument conforms to CE rules and regulations.

This instrument has been designed and verified conforming to the 61010-1 CE Security Regulation, for industrial applications. Installation of this instrument must be performed by qualified personnel only. This manual contains the appropriate information for the installation.

Using the instrument in ways not specified by the manufacturer may lead to a reduction of the specified protection level. Disconnect the instrument from power before starting any maintenance and / or installation action.

The instrument does not have a general switch and will start operation as soon as power is connected. The instrument does not have protection fuse, the fuse must be added during installation.

The instrument is designed to be panel mounted. An appropriate ventilation of the instrument must be assured. Do not expose the instrument to excess of humidity. Maintain clean by using a humid rag and do NOT use abrasive products such as alcohols, solvents, etc. General recommendations for electrical installations apply, and for proper functionality we recommend : if possible, install the instrument far from electrical noise or magnetic field generators such as power relays, electrical motors, speed variators, ... If possible, do not install along the same conduits power cables (power, motor controllers, electrovalves, ...) together with signal and/or control cables. Before proceeding to the power connection, verify that the voltage level available matches the power levels indicated in the label on the instrument. In case of fire, disconnect the instrument from the power line, fire alarm according to local rules, disconnect the air conditioning, attack fire with carbonic snow, never with water.

FACTORY CONFIGURATION

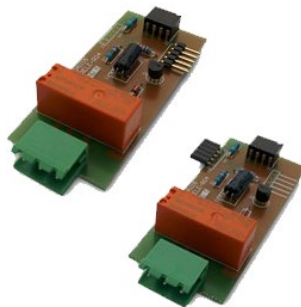
Range	600 Vac
Scaling and decimal point	0/600 Vac = 0/600
Alarms 1	
Type	alarm as maximum
Setpoint	1000
Hysteresis	0 counts
Alarm 2	
Type	alarm as maximum
Setpoint	1000
Hysteresis	0 counts
External control	off
Fast access	all off
Tools	
Option.1	off (retains last configuration value)
Step	1
Average	0
Offset reading	0
Second scaling	0/600
'Eco' mode	off
Temperature resolution	1°
Degrees	°C
Alpha	385
cJc	on
AC deadband	20
Brightness	3
Password	off
Option 1	configuration
Option analog output	0/100.0=4/20 mA
Option serial Modbus RTU	9600 bps, address 1, format 8n1
Jumpers "S"	selected for 600 Vac
Jumper "T"	selected for 'EK' external control function

OUTPUT AND CONTROL MODULES

Modules PCE-DPD-U/R1 and PCE-DPD-U/R2 (relay output)

The PCE-DPD-U/R1 (and PCE-DPD-U/R2) modules offer 1 relay output to be installed at slot Opt.1 (module PCE-DPD-U/R2 at Opt.2). The relay installed at Opt.1 is controlled by alarm 1, and is configured from the 'Alarm 1' ('Alr1') menu explained at section 1.29.3. The relay installed at Opt.2 is controlled by alarm 2, and is configured from the 'Alarm 2' ('Alr2') explained at section 1.29.3. Relay with 3 contacts (Common, Normally closed, Normally open) accepting voltages up to 250V @8A.

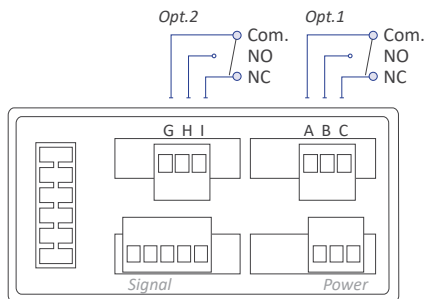
The PCE-DPD-U/R1 and PCE-DPD-U/R2 modules can be ordered installed in to the instrument or standalone for later installation, as they do not require soldering or special configuration..



Type of relay	3 contact relay (NC, NO, common)
Current maximum	8 A per relay (resistive load)
Voltage maximum	250 Vac continuous

when switching power lines, with overvoltage category 3, maximum switching voltage is 150Veff to comply with CE safety requirements.

Isolation	3500 Veff
Type of terminal	plug-in screw terminal, pitch 5.08 mm
Slots allowed	Opt.1 for PCE-DPD-U/R1 module Opt.2 for PCE-DPD-U/R2 module



Terminal A, G	Common
Terminal B, H	NO - Normally open
Terminal C, I	NC - Normally closed

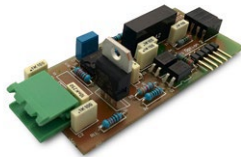
Module PCE-DPD-U/A1 (analog output)

The PCE-DPD-U/A1 module offers 1 analog output at 4/20 mA, isolated, to be installed at slot Opt1. The 4/20 mA output signal is fully scalable, both with positive and negative slopes, and is proportional to the reading of the instrument. The mA output can be connected to work in active loop (the module provides the power of the loop) or passive mode (the power of the loop is not provided by the instrument)

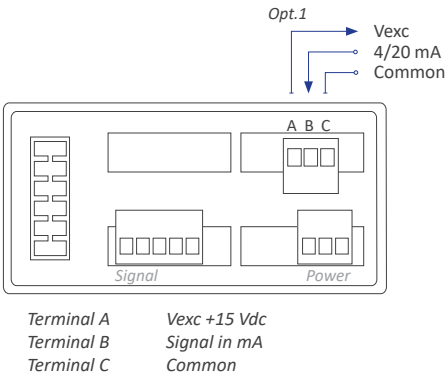
Connections

For an active 4/20 mA loop, connect terminal A ('Vexc +15 Vdc') as current output and terminal B ('Signal in mA') as return of current.

For a passive 4/20 mA loop, connect terminal B ('signal in mA') as current output and terminal C ('GND') as return of current.



Output signal	4/20 mA (active and passive)
Active output	connect terminal A (+15 Vdc) and B (mA) RL <350 R
Passive output	connect terminal C (GND) and B (mA) RL < 700 R
Accuracy	<0.5% FS
Response time	<100 mSeg. + meter response time
Isolation	1000 Vdc
Slots allowed	Opt.1



Installing, calibrating and configuring a PCE-DPD-U/ A1 module

If the PCE-DPD-U/A1 module has been acquired installed in the instrument, then the module has been factory calibrated. In this case you can jump directly to point 7 below.

If the PCE-DPD-U/A1 module has been acquired separately and installation is needed, follow the next steps:

- » Access the instrument and install the PCE-DPD-U/A1 module at slot Opt.1.
- » From the 'Configuration menu' go to 'tool' \ 'out.1' and select value '420' to inform the instrument that there is a A1 analog output module installed.

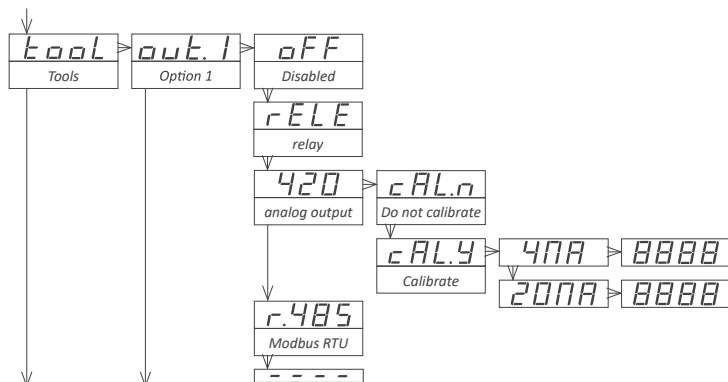
From this point you will need the calibration sheet provided together with the module PCE-DPD-U/A1. This sheet shows the values for parameters 'cAL.y / 4mA' and 'cAL.y / 20mA'.

- » When selecting '420' the instrument shows 'cAL.n'. ('Do not calibrate'). Press 'UP' to read 'cAL.y' ('Calibrate').
- » When selecting 'cAL.y' ('Calibrate') select '4 mA'. Display shows a number. Introduce the value of the 'cAL.y / 4mA' indicated at the calibration sheet provided together with the A1 module. Increase the numerical value with key 'UP' and reduce the value with key 'LE'. Validate the value with key 'SQ'. See below an image of the configuration menu.
- » Repeat with the '20 mA' parameter, and update with the value 'cAL.y / 20mA' indicated at the calibration sheet. Validate with key 'SQ', and press key 'LE' several times to exit the 'Configuration menu'.
- » The instrument will reboot when exiting the menu. The analog output is calibrated.

Note: If you do not have the calibration sheet which was attached to the A1 module at manufacturing time, you can use a milliammeter to measure the mA at the output loop. Then access parameters 'cAL.y / 4mA' and 'cAL.y / 20mA' and adjust the calibration value by checking the milliammeter value.

At this point the module is installed and calibrated. Now configure the reading associated to the output signal 4 mA and 20 mA.

- » Configure the reading associated to the 4 mA output signal and the reading associated to the 20 mA output signal, at the configuration menu 'out.1' \ '420'

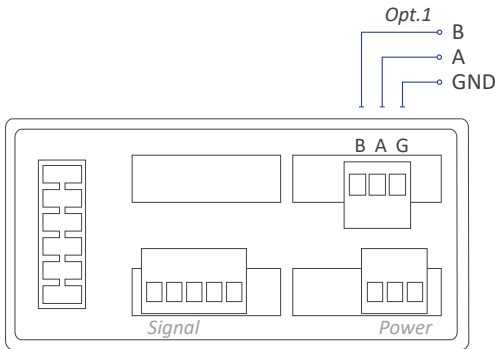


Module PCE-DPD-U/MB1 (Modbus RTU)

The PCE-DPD-U/MB1 module offers 1 Modbus RTU serial output, isolated, to be installed at slot Opt1. Configuration is done from the front keypad, through the configuration menu. The instrument must be informed that there is a Modbus RTU module at slot.1 and this is done at the configuration menu 'Tool' \ 'out.1'. Then configure the bus parameters at the configuration menu 'out.1' \ 'r485'. The PCE-DPD-U/MB1 module can be ordered installed in to the instrument or standalone for later installation, as it does not require soldering or special configuration.



Protocol	Modbus RTU	
Bus type	RS-485, configurable for 9.600 or 4800 bps	
Addresses	1 to 247	
Formats	configurable 8n1, 8e1, 8o1, 8n2	
Function code	4	read register
Registers	0	reading value (16 bits)
	1	number of decimals (16 bits)
Errors	0	function not supported
	1	register not accessible
Isolation	1000 Vdc	
Slots allowed	Opt.1	



Terminal B	B
Terminal A	A
Terminal G	GND

DISPOSAL

For the disposal of batteries in the EU, the (EU) 2023/1542 directive of the European Parliament applies. Due to the contained pollutants, batteries must not be disposed of as household waste. They must be given to collection points designed for that purpose. In order to comply with the EU directive 2012/19/EU we take our devices back. We either re-use them or give them to a recycling company which disposes of the devices in line with law. For countries outside the EU, batteries and devices should be disposed of in accordance with your local waste regulations. If you have any questions, please contact PCE Instruments.

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