

Digital Panel Meters Modular Indicator and Controller Type UDM35



- Front protection degree: IP67, NEMA4x

- Multi-input modular instrument 3 1/2 dgt LED
- 0.1% RDG basic accuracy
- TRMS AC current and voltage measurements
- AC/DC current measurements: selectable full scales (200µA to 5A)
- AC/DC voltage measurements: selectable full scales (200mV to 500V)
- °C or °F temperature measurements (Pt100-250-500-1000, Ni100, TC J-K-S-T-E)
- Resistance measurements: selectable full scales (20Ω to 20kΩ)
- Up to 4 independent alarm set-points (optional)
- 20mA/10VDC analog output (optional)
- Serial port RS485 or RS232 (optional)
- MODBUS, JBUS communication protocol

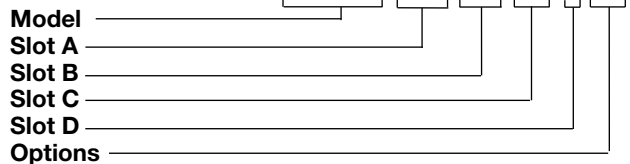
Product Description

µp-based digital panel meter, 3 1/2 dgt LED indicator, for current, voltage, temperature and resistance measurements. Measuring ranges and functions easily programmable from the keypad or from the PC by

means of optional UdmSoft software. UDM35 includes storage min-max functions and double level protection password. Housing for panel mounting with front protection degree: IP67, NEMA4x.

How to order

UDM35 XXX XX XX X XX



How to order

UdmSoft-kit

UdmSoft-kit: software plus "UCOM1" communication cable for programming UDM35 by means of PC.

Type Selection

Slot A (measuring inputs)	Slot B (communication)	Slot C (communication and alarm)	Slot D (power supply)
LSX: signal inputs: 0.2-2-20mA DC/AC; 0.2-2-20V DC/AC LSE/ LSF: signal inputs + AUX: 0.2-2-20mA DC/AC; 0.2-2-20V DC/AC HSX: signal inputs: 0.2-2-5A DC/AC; 20-200-500V DC/AC TRX: signal inputs: TC temperature probes (J-K-S-T-E, Pt100-250-500-1000) and resistance (0.02-0.2-2-20kΩ)	XX: None SX: Serial port RS485 SY: Serial port RS232 AV (*): Analogue output, 0 to 20mA DC and 0 to 10V DC (*): The two analogue outputs cannot be used at the same time. It is possible to plug in only one module by instrument.	XX: None R1: single relay output, (AC1-8AAC, 250VAC) R2: Dual relay output, (AC1-8AAC, 250VAC) R4: Dual relay output (AC1-8AAC, 250VAC) + dual open collector output (NPN, 100mA) R5: 4 relay outputs (AC1-5AAC, 250VAC) AV(*): Analogue output, 0 to 20mA DC and 0 to 10V DC	H: 90 to 260V AC/DC L: 18 to 60V AC/DC Options XX: None TX: Tropicalization

Input Specifications

Analogue inputs BQ LSX module BQ LSE/BQ LSF module BQ HSX module BQ TRX module BQ TRX module	Channels and variable 1, mA and V DC/AC 1, mA and V DC/AC + AUX 1, A and V DC/AC 1, temperature 1, resistance	Contact reading signal Close contact resistance Open contact resistance Insulation	BQ xxx: <0.1mA, <3,5V DC BQ LSE/BQ LSF: <2.5mA, <14V DC Max 1kΩ Min 500kΩ Non-insulated
Digital inputs Number of inputs Use	Incl. in the measuring module 1 (voltage-free) key-pad lock Display hold Reset of latch alarms	Accuracy (display, RS485)	See table "Measuring accuracy", temperature drifts and minimum-maximum indications"

Input specifications (cont.)

Additional errors		Coupling type	Direct
Humidity	0.3% RDG, 60% to 90% R.H.	Crest factor	≤ 3 ; $A_{Pmax}=1.7I_n$; $V_{Pmax}=1.7U_n$
Input frequency	0.4% RDG, 62 to 440 Hz	Input impedance	See table "input impedances and overloads"
Magnetic field	0.5% RDG @ 400 A/m	Frequency	40 to 440 Hz
Temperature drift	See table "Measurement accuracy, temperature drifts, and max/min indications"	Overload	See table "input impedances and overloads"
Display refresh time	5 times/s @ 50Hz	Compensation	Only temperature measurement module.
Display	3 1/2 DGT, 7 segments height 14.2 mm Colour: red	RTD	- For Pt 100-250-500-1000, 3-wire connection: up to 10 Ω - For resistance measur. with 20 Ω range: up to max 0.1 Ω - For resistance measurements with $\geq 200\Omega$ range: up to max 10 Ω Internal cold junction, within the temperature range from 0 to +50°C. Automatic compensation or manual from 0 to 50°C.
Max and min indication	See table "Measurement accuracy, temperature drifts and max min indications"	TC	
Measurements	Current, voltage, temperature and resistance. For the current and voltage measurements: TRMS measurement of distorted sine waves.		

Measurement accuracy, temperature drifts, max and min indications

All accuracies and min/max indications are referred to an ambient temperature range of 25°C \pm 5°C, relevant humidity \leq 60% and scale ratio (electrical/displayed scale) equal to 1. The conversion into °F is obtained acting on the electrical/displayed scale ratio.

Module	Inputs	Type	Accuracy	Temp. drift	Min. indicat. (■)	Max. indicat. (■)
BQ LSX/ BQ LSE/ BQ LSF	-200 μ A to +200 μ A -2mA to +2mA -20mA to +20mA -200mV to +200mV -2V to +2V -20V to +20V	DC/AC	DC: $\pm(0.1\%RDG+3DGT)$ 0% to 25% FS; $\pm(0.1\%RDG+2DGT)$ 25% to 110% FS. TRMS (45 to 65Hz)*: $\pm(0.3\%RDG+3DGT)$ 0% to 25% FS; $\pm(0.3\%RDG+2DGT)$ 25% to 110% FS.	± 150 ppm/°C	- 199.9 - 1.999 - 19.99 - 199.9 - 1.999 - 19.99	+ 199.9 + 1.999 + 19.99 + 199.9 + 1.999 + 19.99
BQ HSX	-200mA to +200mA -2A to +2A -5A to +5A -20V to +20V -200V to +200V -500V to +500V	DC/AC	DC: $\pm(0.1\%RDG+3DGT)$ 0% to 25% FS; $\pm(0.1\%RDG+2DGT)$ 25% to 110% FS. TRMS (45 to 65Hz)*: $\pm(0.3\%RDG+3DGT)$ 0% to 25% FS; $\pm(0.3\%RDG+2DGT)$ 25% to 110% FS.	± 150 ppm/°C	- 199.9 - 1.999 - 5.00 - 19.99 - 199.9 - 500	+ 199.9 + 1.999 + 5.00 + 19.99 + 199.9 + 500
BQ TRX thermo- couple	-50°C to +760°C -58 °F to +1400 °F -200°C to +1260°C -328 °F to +2000°F -200°C to +1000°C -328°F to +1832°F -50°C to +1750°C -58°F to +2000°F -200°C to +400°C -328°F to +752°F	J J K K E E S S T T	$\pm(0.2\%RDG+1DGT)$ $\pm(0.2\%RDG+2DGT)$ $\pm(0.2\%RDG+2DGT)$ $\pm(0.2\%RDG+4DGT)$ $\pm(0.2\%RDG+2DGT)$ $\pm(0.2\%RDG+4DGT)$ $\pm(0.2\%RDG+2DGT)$ $\pm(0.2\%RDG+4DGT)$ $\pm(0.2\%RDG+2DGT)$ $\pm(0.2\%RDG+4DGT)$	± 150 ppm/°C	- 50°C - 58°F - 200°C - 328°F - 200°C - 328°F - 50°C - 58°F - 200°C - 328°F	+ 760°C + 1400°F + 1260°C + 1999°F + 1000°C + 1832°F + 1750°C + 1999°F + 400°C + 752°F

* <45Hz >65Hz= $\pm(0.5\%RDG+3DGT)$ 0% to 25% FS; $\pm(0.5\%RDG+2DGT)$ 25% to 110% FS.

(■) The min. indication for TRMS measurement (AC or DC) is 0; it is possible to modify the decimal point position.

Measurement accuracy, temp. drifts, min max indications (cont.)

All accuracies and min/max indications refer to an ambient temperature range of $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$, relevant humidity $\leq 60\%$ and scale ratio (electrical scale / displayed scale) equal to 1. The conversion into $^{\circ}\text{F}$ is obtained acting on the electrical scale / displayed scale.

Module	Inputs	Type	Accuracy	Temp. Drift	Min. Indication	Max. Indication
BQ TRX Thermoresistance	-200°C to +850°C	Pt100	$\pm(0.2\% \text{RDG} + 2\text{DGT})$	$\pm 150 \text{ ppm}/^{\circ}\text{C}$	- 200	+ 850
	-328°F to +1562°F	Pt100	$\pm(0.2\% \text{RDG} + 4\text{DGT})$		- 328	+ 1562
	-200.0°C to +200.0°C	Pt100	$\pm(0.5\% \text{RDG} + 5\text{DGT})$		-199.9	+199.9
	-328°F to +392°F	Pt100	$\pm(0.5\% \text{RDG} + 5\text{DGT})$		-199.9	+199.9
	-200.0°C to +200.0°C	Pt250	$\pm(0.5\% \text{RDG} + 5\text{DGT})$		-199.9	+199.9
	-328°F to +392°F	Pt250	$\pm(0.5\% \text{RDG} + 5\text{DGT})$		-199.9	+199.9
	-200.0°C to +200.0°C	Pt500	$\pm(0.5\% \text{RDG} + 5\text{DGT})$		-199.9	+199.9
	-328°F to +392°F	Pt500	$\pm(0.5\% \text{RDG} + 5\text{DGT})$		-199.9	+199.9
	-200.0°C to +200.0°C	Pt1000	$\pm(0.5\% \text{RDG} + 5\text{DGT})$		-199.9	+199.9
-328°F to +392°F	Pt1000	$\pm(0.5\% \text{RDG} + 5\text{DGT})$	-199.9	+199.9		
-60°C to +180°C	Ni100	$\pm(0.5\% \text{RDG} + 1\text{DGT})$	- 60	+ 180		
-76°F to +356°F	Ni100	$\pm(0.5\% \text{RDG} + 2\text{DGT})$	- 76	+ 356		
BQ TRX Resistance	0 to 20Ω	Ω	$\pm(0.2\% \text{RDG} + 2\text{DGT})$	$\pm 150 \text{ ppm}/^{\circ}\text{C}$	0	19.99 (■)
	0 to 200Ω		25% to 110% FS		0	199.9 (■)
	0 to 2000Ω		$\pm(0.2\% \text{RDG} + 3\text{DGT})$		0	1999 (■)
	0 to 20.00kΩ		0% to 25% FS		0	19.99 (■)

(■) It is possible to modify the decimal point position.

Input impedances and overloads

Module	Inputs	Type	Impedance	Overload (continuous)	Overloads (1s)
BQ LSX/ BQ LSE/ BQ LSF	-200μA to +200μA	DC/AC	$\geq 2.2\text{k}\Omega$	5mA	10mA
	-2mA to +2mA	DC/AC	$\geq 22\Omega$	50mA	150mA
	-20mA to +20mA	DC/AC	$\geq 22\Omega$	50mA	150mA
	-200mV to +200mV	DC/AC	$\geq 2.2\text{k}\Omega$	10V	20V
	-2V to +2V	DC/AC	$\geq 200\text{k}\Omega$	50V	100V
BQ HSX	-20V to +20V	DC/AC	$\geq 200\text{k}\Omega$	50V	100V
	-200mA to +200mA	DC/AC	$\geq 1\Omega$	0.8A	1A
	-2A to +2A	DC/AC	$\geq 0.012\Omega$	7.5A	100A
	-5A to +5A	DC/AC	$\geq 0.012\Omega$	7.5A	100A
	-20V to +20V	DC/AC	$\geq 2\text{M}\Omega$	750V	1000V
BQ TRX Thermocouple	-200V to +200V	DC/AC	$\geq 2\text{M}\Omega$	750V	1000V
	-500V to +500V	DC/AC	$\geq 2\text{M}\Omega$	750V	1000V
	-50°C to +760°C	J	$I_{\text{LK}} < 0.5\mu\text{A}$	Max 5V	Max 10V
	-58 °F to +1400 °F	J			
	-200°C to +1260°C	K			
-328 °F to +2000°F	K				
-200°C to +1000°C	E				
BQ TRX Thermoresistance	-328°F to +1832°F	E	800μA (*)	Max 5V	Max 10V
	-50°C to +1750°C	S			
	-58°F to +2000°F	S			
	-200°C to +400°C	T			
	-328°F to +752°F	T			
BQ TRX Resistance	-200°C to +850°C	Pt100	800μA (*)	Max 5V	Max 10V
	-328°F to +1562°F	Pt100	800μA (*)		
	-200.0°C to +200.0°C	Pt250/Pt100	90μA (*)		
	-328°F to +392°F	Pt250/Pt100	90μA (*)		
	-200.0°C to +200.0°C	Pt1000/Pt500	800μA (*)		
	-328°F to +392°F	Pt1000/Pt500	800μA (*)		
	-60°C to +180°C	Ni100	800μA (*)		
-76°F to +356°F	Ni100	800μA (*)			
BQ TRX Resistance	0 to 20Ω	Ω	800μA (*)	Max 5V	Max 10V
	0 to 200Ω		90μA (*)		
	0 to 2000Ω		800μA (*)		
	0 to 20.00kΩ		90μA (*)		

(*) Maximum measuring current generated for resistance equal to 0.

Output specifications

RS422/RS485 Serial output LED Connections Distance Terminalization Addresses Protocol Data (bidirectional) Dynamic (reading only) Static (reading/writing) Data format Baud rate Insulation	(on request) Module: BR SX Bidirectional (static and dynamic variables). Display of data reception/transmission Multidrop, 2 or 4 wires 1000m Directly on the module by means of jumper 1 to 255, selectable by means of key-pad MODBUS RTU/JBUS Measurement, min value max value alarm status All programming parameters, min max reset reset of latch alarm 8 data bit, no parity, 1 stop bit selectable 4800, 9600, 19200 and 38400 bit/s By means of opto-couplers 4000 V _{rms} output to measuring inputs 4000 V _{rms} output to power supply input	Relay output BOR4 Relay output BOR5 Insulation Open collector output Insulation	Type SPDT AC 1: 8A, 250VAC DC 12: 5A, 24VDC AC 15: 2,5A, 250VAC DC 13: 2,5A, 24VDC Type SPDT (normally open) AC 1: 5A, 250VAC DC 12: 3A, 24VDC AC 15: 1,5A, 250VAC DC 13: 1,5A, 24VDC 4000 V _{RMS} output to measuring input, 4000 V _{RMS} output to power supply input. NPN transistor type V _{ON} 1.2 VDC/ max. 100 mA V _{OFF} 30 VDC max. By means of opto-couplers, 4000 V _{RMS} output to measuring input, 4000 V _{RMS} output to power supply input
RS232 Serial output Connections Distance Data format Baud rate Other features	(on request) Module: BR SY Bidirectional (static and dynamic variables) 3 wires, max. 15m 1 start bit, 8 data bit, no parity, 1 stop bit Selectable 4800, 9600, 19200 and 38400 bit/s Same as RS422/485	Analogue output Range Scaling factor Accuracy Response time Temperature drift Load: 20 mA output 10 V output Insulation	(on request) Module: BO AV 0 to 20 mADC, 0 to 10 VDC Programmable within the whole retransmission range; it allows to manage the retransmission of all values from 0 to 20 mA / 0 to 10V ± 0.2% FS (@ 25°C ± 5°C) ≤ 10 ms ± 200 ppm/°C ≤ 700 Ω ≥ 10 kΩ By means of optocouplers 4000V _{rms} output to measuring input 4000V _{rms} output to power supply input
Alarm outputs Alarm type Alarm set-point Hysteresis On-time delay Off-time delay Output status Min response time Output channels	(on request) Active alarm for out-of-range, up alarm, down alarm, down alarm with start-up deactivation, up alarm with latch, down alarm with latch Adjustable from 0 to 100% of displayed electric range 0 to 100% of displayed range 0 to 255 s 0 to 255 s Selectable: normally energized/de-energized 500 ms, with filter excluded, without alarm activation delay 1 with BO R1 module (relay output). 2, independent with module BO R2 (2 relay outputs). 4, independent with BO R4 module (2 relay outputs + 2 open collector outputs). BOR5 (4 relay outputs)	Notes: Excitation output BQ LSE module Voltage Insulation BQ LSF module Voltage Insulation	(on request) 13 VDC ±10% max. 50 mA 25V _{rms} output to measuring input 4000 V _{rms} output to power supply input 25 VDC ±10% max. 25 mA 25V _{rms} output to measuring input 4000 V _{rms} output to power supply input

Software functions

Min / Max storage	Automatic storage (in the EEPROM) of the minimum and maximum measured value from the previous memory reset	Diagnostics	The display flashes when the limits of the display range are exceeded and the data are updated up to 20% of the rated display range. Only temperature inputs. Opening of probe's connection: EEE indication Opening of probe's connection: EEE indication probe's short circuit: -EEE indication.
Password 1st level 2nd level	Numeric code max 4 dgt 2 levels of data protection. 0 to 4999 completely protected. 5000 to 9999 access to programming is protected . Alarm set-points are directly programmable from the measuring mode.	Burn-out: TC RTD	
Measurement selection	Depending on the module: measuring range and type of probe (resistance, RTD thermoresistance, TC thermocouple) or measuring type (TRMS or DC).	Digital filter Filter operating range Filtering coefficient	0 to 1999 1 to 32
Integration time selection	Automatic or from 100.0 to 999.9 ms only in the current and voltage measurement.	Display selection	3 1/2 DGT or 3 DGT plus dummy zero
Scaling factor Operating mode Electrical range Decimal point position Displayed range of the variable	Electrical scale compression, displayed scale compression/expansion (max. 2 without filter, up to 10 with filter) Programmable within the whole measuring range Programmable within the display range Programmable within the display range	Scaling	Selection of min value of the input range. Selection of max value of the input range. Selection of decimal point position. Selection of min displayable value. Selection of max displayable value.
		UdmSoft	Software for programming UDM35 by means of PC (Windows 95, 98se, ME, XP) by means of serial port RS485 and relevant connection cable. The software is available in English, Spanish, Italian, German and French. See also "Programming of UDM35 by means of PC".

General Specifications

Operating temperature	0° to 50°C (32° to 122°F) (R. H. < 90% non-condensing)	Safety Standards Safety	EN 61010-1, IEC 61010-1
Storage temperature	-10° to 60°C (14° to 140°F) (R.H. < 90% non-condensing)	Connections Wire section	Screw type Max 2.5mm ²
Insulation reference voltage	300 V _{RMS} to ground (500V input)	Housing Dimensions Material	1/8 DIN, 48 x 96 x 105 mm PC-ABS, self-extinguishing: UL 94 V-0
Insulation	See table "Insulation between inputs and outputs"	Protection degree	Front: IP67, NEMA4x Connections: IP20
Dielectric strength	4000 V _{RMS} for 1 minute	Weight	520 g approx (included all modules and packing)
Rejection NMRR CMRR	40 dB, 40 to 60 Hz 100 dB, 40 to 60 Hz	Approvals	CE, UR, CSA
EMC	EN61000-6-2, IEC61000-6-2 EN61000-6-3, IEC61000-6-3		

Supply Specifications

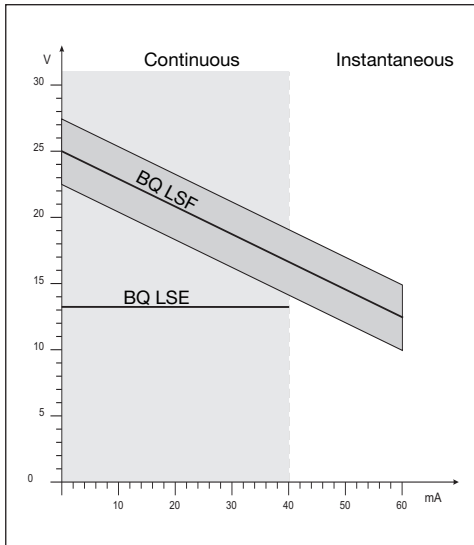
AC/DC voltage

90 to 260V (standard)
18 to 60V (on request)

Energy consumption

≤ 30VA/12W (90 to 260V)
≤ 20VA/12W (18 to 60V)

Excitation output



Excitation output is constant and independent of power supply's voltage.

Insulation between inputs and outputs

	Meas. inputs	Relay output	Static output	Analogue output	Serial Port	AUX p.supply	90-260VAC/DC p.supply	18-60VAC/DC p.supply
Meas. inputs	-	4kV	4kV	4kV	4kV	25V	4kV	4kV
Relay Output	4kV	-	2kV	4kV	4kV	4kV	4kV	4kV
Static Output	4kV	2kV	-	4kV	4kV	4kV	4kV	4kV
Analogue Output	4kV	4kV	4kV	-	4kV	4kV	4kV	4kV
Serial Port	4kV	4kV	4kV	4kV	-	4kV	4kV	4kV
AUX p.supply	25V	4kV	4kV	4kV	4kV	-	4kV	4kV
90-260VAC/DC p.supply	4kV	4kV	4kV	4kV	4kV	4kV	-	-
18-60VAC/DC p.supply	4kV	4kV	4kV	4kV	4kV	4kV	-	-

Available modules

Type	N. of channels	Ordering code
UDM35 main unit		BD 35
DC/AC input: 200μA, 2mA, 20mA, 200mA, 2V, 20V	1	BQ LSX
DC/AC input: 200μA, 2mA, 20mA, 200mA, 2V, 20V + excitation output	1	BQ LSE/ BQ LSF
DC/AC input: 200mA, 2A, 5A, 20V, 200V, 500V	1	BQ HSX
Input: 20Ω, 200Ω, 2kΩ, 20kΩ	1	BQ TRX
TC: J-K-S-T-E, Pt100-250-500-1000	1	BQ TRX
Analogue output 0 to 20mA, 0 to 10VDC	1	BO AV
Relay output	1	BO R1
Relay output	2	BO R2
Outputs: 2 relays + 2 open collectors	4	BO R4
Relay output	4	BO R5
RS485 Serial Port	1	BR SX
RS232 Serial Port	1	BR SY
Power supply 18 to 60V AC/DC		BP L
Power supply 90 to 260V AC/DC		BP H

Possible module combinations

Basic Unit	Slot A	Slot B	Slot C	Slot D
Measuring inputs: LSX, LSE, LSF, HSX, TRX	●			
RS485 Serial port: SX		●		
RS232 Serial port: SY		●		
Analogue output: AV (*)		●	●	
Relay outputs and/or open collector: R1, R2, R4, R5			●	
Power supply: H, L				●

(*) Up to 1 module max.

Used calculation formulas

Only for TRMS Measurements

Instantaneous effective voltage (TRMS)

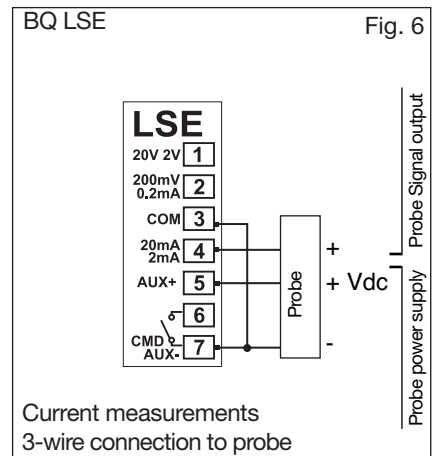
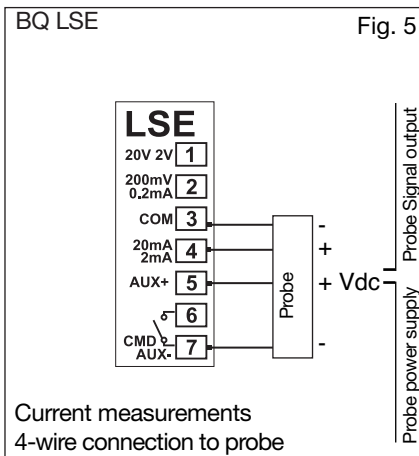
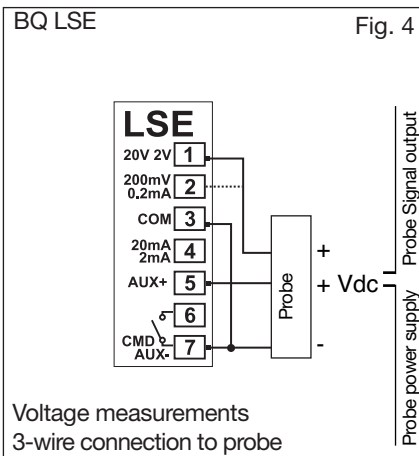
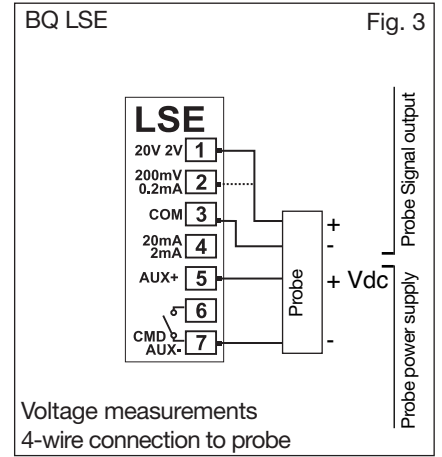
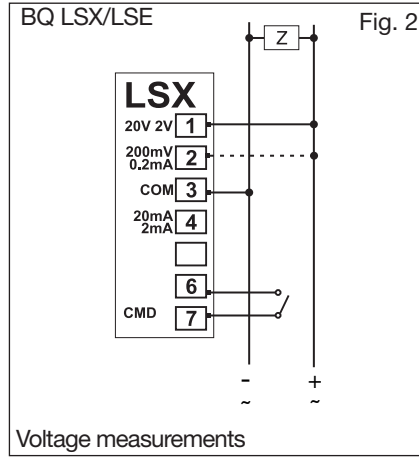
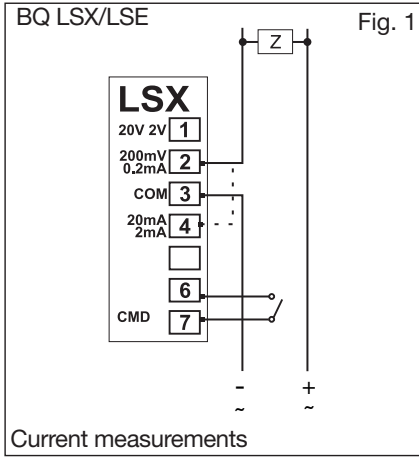
$$V_1 = \sqrt{\frac{1}{n} \cdot \sum_1^n (V_1)_i^2}$$

Instantaneous effective current (TRMS)

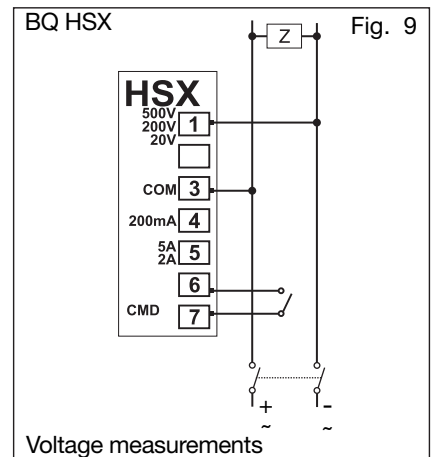
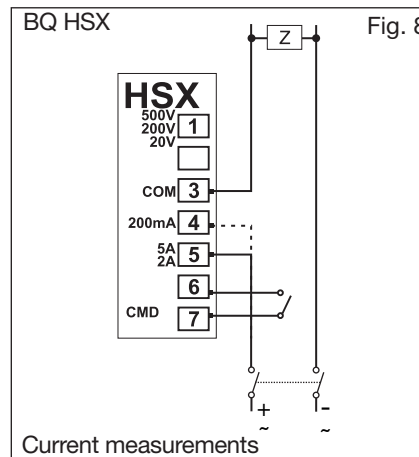
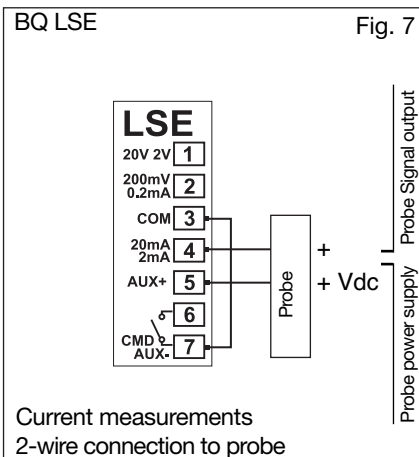
$$A_1 = \sqrt{\frac{1}{n} \cdot \sum_1^n (A_1)_i^2}$$

Wiring diagrams

Process signal wiring diagrams

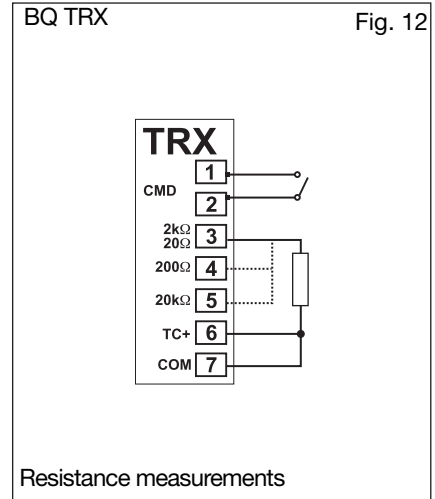
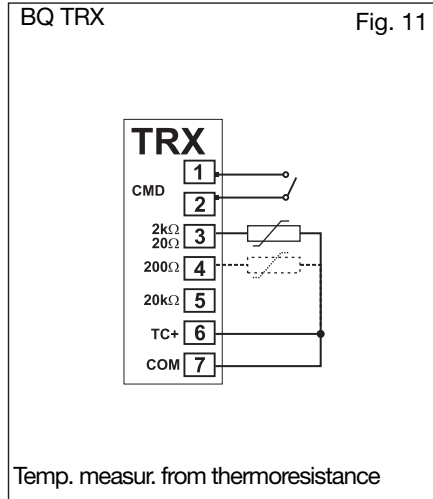
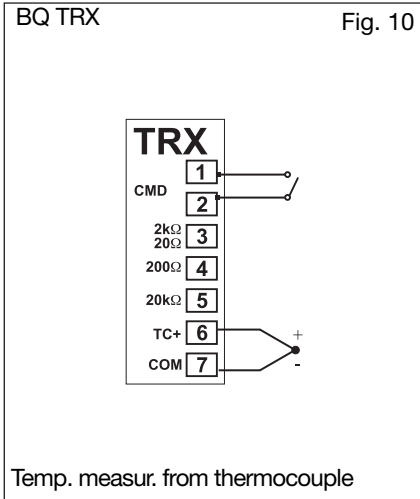


Wirings for high-level signals

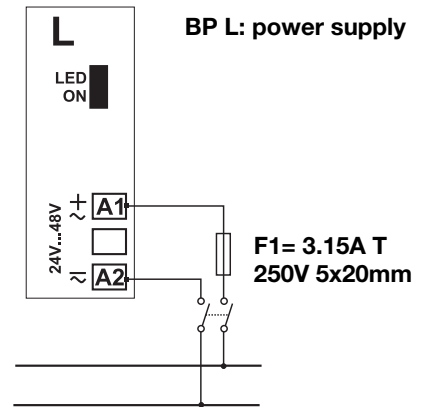
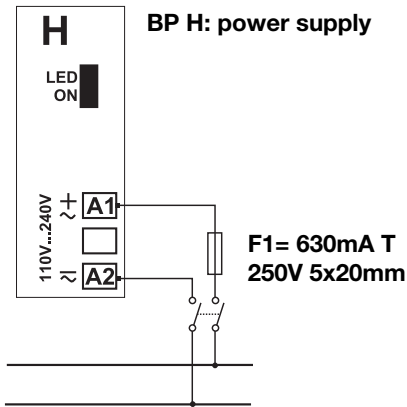


Wiring diagrams (cont.)

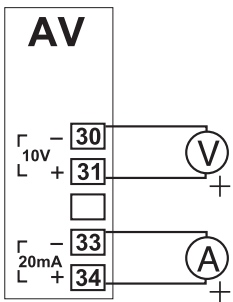
Wiring diagrams for temperature measurements



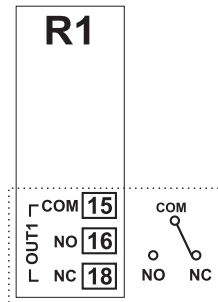
Wiring diagrams for power supply



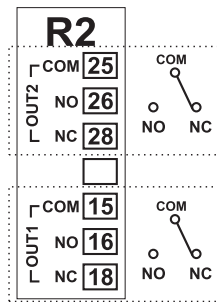
Wiring diagrams of optional modules



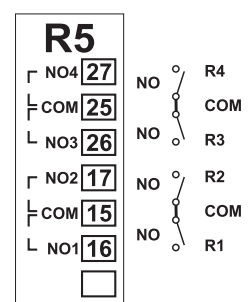
BO AV: analogue output
(10V, 20mA DC)



BO R1: 1 relay output



BO R2: 2 relay outputs



BO R5: 4 relay outputs