

Digital Panel Meters Modular Indicator and Controller Type USC-DIN

CARLO GAVAZZI



- Front protection degree: IP 20
- Linearization of V and A inputs up to 16 points

- Multi-input modular signal's conditioner
- 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)
- Dual rate, speed, frequency and period measurement (0.001Hz to 50kHz)
- 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 signal conditioner, for current, voltage, temperature, resistance, rate, frequency, speed and period measurements. Measuring ranges and functions easily programmable from the PC by means of optional UscSoft software available on

request. UscSoft includes programming, display and min-max functions. Conditioner housing for DIN-rail mounting with front protection degree: IP 20. All displaying and programming data are referred to UscSoft.

How to order

USC XXX XX XX X XX

Model _____
Slot A _____
Slot B _____
Slot C _____
Slot D _____
Slot E _____
Options _____

How to order

UscSoft-kit

UscSoft-kit: software plus communication cable for programming USC by means of PC.

UscSoft: software for programming USC by means of PC, downloadable from www.carlogavazzi.com.

Type Selection

Slot A (measuring inputs)	Slot B (communication)	Slot C (communication and alarm)	Slot D (communication)
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) TF1: 0.001Hz to 50kHz for DC signals: PNP, NPN, NAMUR, TTL, free of voltage, contacts, voltages up to 14VDC TF2: 0.001Hz to 50kHz for AC signals: pick-up, voltages up to 500VAC	XX: None SX: Serial port RS485 SY: Serial port RS232 (*): The two analogue outputs cannot be used at the same time. It is possible to plug in only one module by signal conditioner.	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(*): Single analogue output: 0 to 20mA DC and 0 to 10V DC	XX: None AV(*): Single analogue output, 0 to 20mA DC and 0 to 10V DC Slot E (power supply) H: 90 to 260V AC/DC L: 18 to 60V AC/DC 3: 10 to 28V DC Options XX: None TX: Tropicalization

Input specifications

Analogue inputs BQ LSX module BQ LSE/LSF module BQ HSX module BQ TRX module BQ TRX module BQTF1 module BQTF2 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 2, frequency 2, frequency	Max and min indication	See table "Measurement accuracy, temperature drifts and max min indications"
		Measurements	Current, voltage, temperature, resistance and frequency. For the current and voltage measurements: TRMS measurement of distorted sine waves.
Digital inputs Number of inputs Use Contact reading signal Close contact resistance Open contact resistance Insulation	Incl. in the measuring module 1 (voltage-free) key-pad lock Display hold Reset of latch alarms BQ xxx: <0.1mA, <3.5V DC BQ LSE/BQ LSF: <2.5mA, <14V DC BQTF1: <6mA, <7VDC BQTF2: <0.25mA, <3VDC Max 1k Ω Min 500k Ω (BQTFx: 100k Ω) Non-insulated	Coupling type Crest factor	Direct ≤ 3 ; $A_{Pmax}=1.7I_n$; $V_{Pmax}=1.7U_n$
		Input impedance	See table "input impedances and overloads"
Accuracy (display, RS485)	See table "Measuring accuracy", temperature drifts and minimum-maximum indications"	Frequency	40 to 440 Hz
		Overload	See table "input impedances and overloads"
Additional errors Humidity Input frequency Magnetic field	0.3% RDG (BQTFx: 0.05%), 60% to 90% R.H. 0.4% RDG, 62 to 440 Hz 0.5% RDG (BQTFx: 0.05%) @ 400 A/m	Compensation	Only temperature measurement module.
		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
Temperature drift	See table "Measurement accuracy, temperature drifts, and max/min indications"	TC	Internal cold junction, within temperature range from 0 to +50°C. Automatic or manual compensation from 0 to 50°C.
Sampling rate	500 samples/s @ 50 Hz (escl. BQTFx)		
Display refresh time	200 msec @ 50Hz (escl. BQTFx)		

Measurement accuracy, temp. drifts, max and min indications

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

Module	Inputs	Type	Accuracy	Temp. drift	Min. indication (■)	Max. indicat. (■)
BQ LSX/ BQ LSE/ BQ LSF	-200 μA to +200 μA -2mA to +2mA -20mA to +20mA -200mV to +200mV -2V to +2V -20V to +20V	DC/AC	DC: $\pm(0.1\%\text{RDG}+3\text{DGT})$ 0% to 25% FS; $\pm(0.1\%\text{RDG}+2\text{DGT})$ 25% to 110% FS. TRMS (da 45 a 65Hz)*: $\pm(0.3\%\text{RDG}+3\text{DGT})$ 0% to 25% FS; $\pm(0.3\%\text{RDG}+2\text{DGT})$ 25% to 110% FS.	$\pm 150 \text{ ppm}/^{\circ}\text{C}$	- 200.0 - 2.000 - 20.00 - 200.0 - 2.000 - 20.00	+ 200.0 + 2.000 + 20.00 + 200.0 + 2.000 + 20.00

* <45Hz >65Hz= $\pm(0.5\%\text{RDG}+3\text{DGT})$ 0% to 25% FS; $\pm(0.5\%\text{RDG}+2\text{DGT})$ 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, max and min indications (cont.)

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

Module	Inputs	Type	Accuracy	Temp. drift	Min. indication (■)	Max. indicat. (■)
BQ HSX	-200mA to +200mA -2A to +2A -5A to +5A -20V to +20V -200V to +200V -500V to +500V	DC/AC	DC: $\pm(0.1\%\text{RDG}+3\text{DGT})$ 0% to 25% FS; $\pm(0.1\%\text{RDG}+2\text{DGT})$ 25% to 110% FS. TRMS (45 to 65Hz)*: $\pm(0.3\%\text{RDG}+3\text{DGT})$ 0% to 25% FS; $\pm(0.3\%\text{RDG}+2\text{DGT})$ 25% to 110% FS.	$\pm 150 \text{ ppm}/^{\circ}\text{C}$	- 200.0 - 2.000 - 5.000 - 20.00 - 200.0 - 500.0	+ 200.0 + 2.000 + 5.000 + 20.00 + 200.0 + 500.0
BQ TRX Thermo- couple	-50°C to +760°C -58 °F to +1400 °F -200°C to +1260°C -328 °F to +2300°F -200°C to +1000°C -328°F to +1832°F -50°C to +1750°C -58°F to +3182°F -200°C to +400°C -328°F to +752°F	J J K K E E S S T T	$\pm(0.2\%\text{RDG}+1\text{DGT})$ $\pm(0.2\%\text{RDG}+2\text{DGT})$ $\pm(0.2\%\text{RDG}+2\text{DGT})$ $\pm(0.2\%\text{RDG}+4\text{DGT})$ $\pm(0.2\%\text{RDG}+2\text{DGT})$ $\pm(0.2\%\text{RDG}+4\text{DGT})$ $\pm(0.2\%\text{RDG}+2\text{DGT})$ $\pm(0.2\%\text{RDG}+4\text{DGT})$ $\pm(0.2\%\text{RDG}+2\text{DGT})$ $\pm(0.2\%\text{RDG}+4\text{DGT})$	$\pm 150 \text{ ppm}/^{\circ}\text{C}$	- 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 + 2300°F + 1000°C + 1832°F + 1750°C + 3182°F + 400°C + 752°F

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

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

Module	Inputs	Type	Accuracy	Temp. drift	Min. indication	Max. indicat.
BQ TRX Thermoresistance	-200°C to +850°C -328°F to +1562°F -200.0°C to +200.0°C -328°F to +392°F -200.0°C to +200.0°C -328°F to +392°F -200.0°C to +200.0°C -328°F to +392°F -200.0°C to +200.0°C -328°F to +392°F -60°C to +180°C -76°F to +356°F	Pt100 Pt100 Pt100 Pt100 Pt250 Pt250 Pt500 Pt500 Pt1000 Pt1000 Ni100 Ni100	$\pm(0.2\%\text{RDG}+2\text{DGT})$ $\pm(0.2\%\text{RDG}+4\text{DGT})$ $\pm(0.5\%\text{RDG}+5\text{DGT})$ $\pm(0.5\%\text{RDG}+5\text{DGT})$ $\pm(0.5\%\text{RDG}+5\text{DGT})$ $\pm(0.5\%\text{RDG}+5\text{DGT})$ $\pm(0.5\%\text{RDG}+5\text{DGT})$ $\pm(0.5\%\text{RDG}+5\text{DGT})$ $\pm(0.5\%\text{RDG}+5\text{DGT})$ $\pm(0.5\%\text{RDG}+5\text{DGT})$ $\pm(0.5\%\text{RDG}+1\text{DGT})$ $\pm(0.5\%\text{RDG}+2\text{DGT})$	$\pm 150 \text{ ppm}/^{\circ}\text{C}$	- 200 - 328 - 200.0 - 328.0 - 200.0 - 328.0 - 200.0 - 328.0 - 200.0 - 328.0 - 60 - 76	+ 850 + 1562 + 200.0 + 392.0 + 200.0 + 392.0 + 200.0 + 392.0 + 200.0 + 392.0 + 180 + 356
BQ TRX Resistance	0 to 20Ω 0 to 200Ω 0 to 2000Ω 0 to 20.00kΩ		$\pm(0.2\%\text{RDG}+2\text{DGT})$ 25% to 110% FS $\pm(0.2\%\text{RDG}+3\text{DGT})$ 0% to 25% FS	$\pm 150 \text{ ppm}/^{\circ}\text{C}$	0 0 0 0	20.00 (■) 200.0 (■) 2000 (■) 20.00 (■)
BQ TF1	NPN (DC) PNP (DC) NAMUR (DC) TTL (DC) Free of voltage contact (DC)		0.001% RDG ± 3 digit	$\pm 50 \text{ ppm}/^{\circ}\text{C}$	0.000 (*) 00.00 (*) 000.0 (*) 0000 (*)	9.999 99.99 999.9 9999
BQ TF2	Pick-up (AC) Voltage (AC) up to 100VAC Voltage (AC) up to 500VAC		0.001% RDG ± 3 digit	$\pm 50 \text{ ppm}/^{\circ}\text{C}$	0.000 (*) 00.00 (*) 000.0 (*) 0000 (*)	9.999 99.99 999.9 9999

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

(*) The min indication is -9.99999, ..., -999999 in case of "rotation speed detection" function

Input impedances and overloads

Module	Inputs	Type	Impedance	Overload (continuous)	Overloads (1s)
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/AC DC/AC DC/AC DC/AC DC/AC	$\leq 2,2k\Omega$ $\leq 22\Omega$ $\leq 22\Omega$ $\geq 2,2k\Omega$ $\geq 200k\Omega$ $\geq 200k\Omega$	5mA 50mA 50mA 10V 50V 50V	10mA 150mA 150mA 20V 100V 100V
BQ HSX	-200mA to +200mA -2A to +2A -5A to +5A -20V to +20V -200V to +200V -500V to +500V	DC/AC DC/AC DC/AC DC/AC DC/AC DC/AC	$\leq 1\Omega$ $\leq 0.012\Omega$ $\leq 0.012\Omega$ $\geq 2M\Omega$ $\geq 2M\Omega$ $\geq 2M\Omega$	0.8A 7.5A 7.5A 750V 750V 750V	1A 100A 100A 1000V 1000V 1000V
BQ TRX Thermo- couple	-50°C to +760°C -58 °F to +1400 °F -200°C to +1260°C -328 °F to +2300°F -200°C to +1000°C -328°F to +1832°F -50°C to +1750°C -58°F to +3182°F -200°C to +400°C -328°F to +752°F	J J K K E E S S T T	$I_{LK} < 0.5\mu A$	Max 5V	Max 10V
BQ TRX Thermo- resistance	-200°C to +850°C -328°F to +1562°F -200.0°C to +200.0°C -328°F to +392°F -200.0°C to +200.0°C -328°F to +392°F -60°C to +180°C -76°F to +356°F	Pt100 Pt100 Pt250/Pt100 Pt250/Pt100 Pt1000/Pt500 Pt1000/Pt500 Ni100 Ni100	800 μ A (*) 800 μ A (*) 90 μ A (*) 90 μ A (*) 800 μ A (*) 800 μ A (*) 800 μ A (*) 800 μ A (*)	Max 5V	Max 10V
BQ TRX Resistance	0 to 20 Ω 0 to 200 Ω 0 to 2000 Ω 0 to 20.00k Ω		800 μ A (*) 90 μ A (*) 800 μ A (*) 90 μ A (*)	Max 5V	Max 10V
BQ TF1	NPN (DC) PNP (DC) NAMUR (DC) TTL (DC) Free of voltage contact (DC)		600 Ω 600 Ω 600 Ω 600 Ω	15 VAC/DC 15 VAC/DC 15 VAC/DC 15 VAC/DC 15 VAC/DC	20 VAC/DC 20 VAC/DC 20 VAC/DC 20 VAC/DC 20 VAC/DC
BQ TF2	Pick-up (AC) Voltage (AC) up to 100VAC Voltage (AC) up to 500VAC		220 k Ω 950 k Ω	120 VAC/DC 600 VAC/DC	200 VAC/DC 600 VAC/DC

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

Output specifications

RS422/RS485	(on request) Module: BR SX Bidirectional (static and dynamic variables). Display of data reception/transmission Multidrop, 2 or 4 wires, 1000 m Directly on the module by means of jumper by means of key-pad MODBUS RTU/JBUS	Relay output BO R1, R2, R4	2 open collector outputs). BO R5 (4 relay outputs)
Serial output			Type SPDT
LED			AC 1: 8A, 250VAC DC 12: 5A, 24VDC AC 15: 2.5A, 250VAC DC 13: 2.5A, 24VDC
Connections Distance Terminalization		Relay output BO R5	Type SPST (NO) AC 1: 5A, 250VAC DC 12: 3A, 24VDC AC 15: 1.5A, 250VAC DC 13: 1.5A, 24VDC
Addresses	1 to 255, selectable by means of key-pad	Insulation	4000 V _{RMS} output to measuring input,
Protocol Data (bidirectional) Dynamic (reading only)	Measurement, min value max value alarm status	Open collector output	4000 V _{RMS} output to power supply input. NPN transistor type V _{ON} 1.2 VDC / max. 100 mA V _{OFF} 30 VDC max.
Static (reading/writing)	All programming parameters, min max reset reset of latch alarm	Insulation	By means of opto-couplers 4000 V _{RMS} output to measuring input 4000 V _{RMS} output to power supply input
Data format	8 data bit, no parity, 1 stop bit		
Baud rate	selectable 4800, 9600, 19200 and 38400 bit/s		
Insulation	By means of opto-couplers 4000 V _{rms} output to measuring inputs 4000 V _{rms} output to power supply input		
RS232	(on request) Module: BR SY Bidirectional (static and dynamic variables)	Analogue output	(on request) Module: BO AV
Serial output		Range	0 to 20 mADC, 0 to 10 VDC
Connections Distance	3 wires, max. 15m	Scaling factor	Programmable within the entire retransmission range; allows to manage the retransmission of all the values from
Data format	1 start bit, 8 data bit, no parity, 1 stop bit		0 to 20 mA / 0 to 10V ± 0.2% FS (@ 25°C ± 5°C)
Baud rate	Selectable 4800, 9600, 19200 and 38400 bit/s	Accuracy	≤ 10 ms
Other features	Same as RS422/485	Response time	± 200 ppm/°C
		Temperature drift	≥ 700 Ω
		Load: 20 mA output 10 V output	≥ 10 kΩ
		Insulation	By means of opto-couplers 4000V _{rms} output to measuring input 4000V _{rms} output to power supply input
Alarm outputs	(on request)		The two outputs cannot be used at the same time.
Alarm type	Over-range alarm, up alarm, down alarm, down alarm with start-up deactivation up alarm with latch, down alarm with latch	Notes:	
Alarm set-point	Adjustable from 0 to 100% of displayed electric range	Excitation output	(on request)
Hysteresis	0 to 100% of displayed range	BQ LSE Module Voltage	13 VDC ±10%, max. 50 mA
On-time delay	0 to 255 s	BQ LSF Module Voltage	25 VDC ±10%, max. 25 mA
Off-time delay	0 to 255 s	BQTF1 Module Voltage 1	8.2VDC ±10%, max 10mA.
Output status	Selectable: normally energized /de-energized	Voltage 2	13VDC ±10%, max 40mA.
Min response time	500 ms, with filter excluded, without alarm activation delay	Insulation	25V _{RMS} output to measuring input 4000 V _{RMS} output to power supply input
Output channels	1 with module BO R1 (relay output). 2, independent with module		
BO R2 (2 relay outputs).	4, independent with module		
BO R4 (2 relay outputs +			

Software functions

Min / Max storage	Automatic storage (in the EEPROM) of the minimum and maximum measured value from the previous memory reset	Displayed range of the variable	Programmable within the display range
Password	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.	Pulse per revolution	BQTFx only: programmable from 1 to 9999
1st level		Input engineering unit	BQTFx only: programmable among Hz, kHz, rpm, krpm, rph, krph
2nd level		Digital filter	
		Filter operating range	0 to 9999
		Filtering coefficient	1 to 32
Measurement selection	Depending on the module: measuring range and type of probe (resistance, RTD thermoresistance, TC thermocouple) or measuring type (TRMS or DC).	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 display value. Selection of max display value.
Function (only BQTFx)	Calculated functions of channel A and B: F1: scaled value of channel A; F2: 1/A; F3: A-B; F4: (A-B)/B*100; F5: A/B; F6: B/(A+B)+100; F7: rotation sensing.	Linearization	
		Points	Up to 16
		Input range	Selectable by every single point
		Output range	Selectable by every single point
Integration time selection	Automatic or from 100.0 to 999.9 ms only in the current and voltage measurement. (BQTFx excluded)	UscSoft	Software for programming USC 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, French. See also "Programming of USC by means of PC" .
Scaling factors			
Operating mode	Electrical scale compression, displayed scale compression/expansion (max. 2 without filter, up to 10 with filter)		
Electrical range	Programmable within the whole measuring range		
Decimal point position	Programmable within the display range		

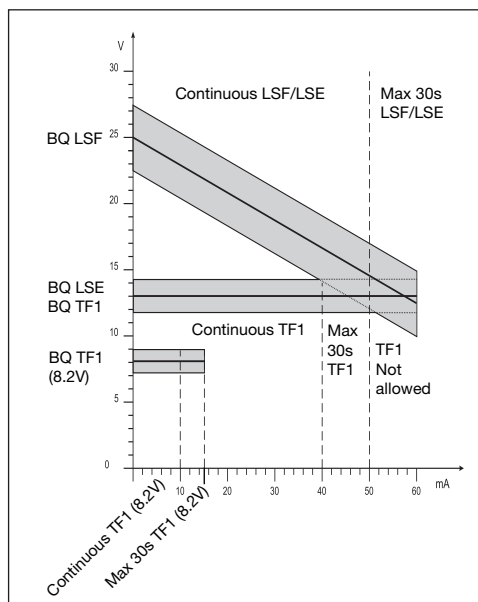
Supply Specifications

AC/DC voltage	90 to 260V (standard) 18 to 60V (on request)	Energy consumption	≤ 30VA/12W (90 to 260V) ≤ 20VA/12W (18 to 60V) ≤ 7.5W (10 to 28V)
DC voltage only	10 to 28V (on request)		

General Specifications

Operating temperature	0° to 50°C (32° to 122°F) (H.R. < 90% non-condensing)	Safety Standards	EN 61010-1, IEC 61010-1
Storage temperature	-10° to 60°C (14° to 140°F) (H.R. < 90% non-condensing)	Connections	Screw type Cable cross-section area Max. 2.5 mm ² ; Min./Max. screws tightening torque: 0.4 Nm / 0.6 Nm
Insulation reference voltage	300 V _{RMS} to ground (500V input)	Housing	Dimensions Material
Insulation	See table "Insulation between inputs and outputs"		44 x 113 x 107 mm PC-ABS, self-extinguishing: UL 94 V-0
Dielectric strength	4000 V _{RMS} for 1 minute	Protection degree	IP20
Rejection		Weight	560 g approx (included all modules and packing)
NMRR	40 dB, 40 to 60 Hz	Approvals	CE, UR, CSA
CMRR	100 dB, 40 to 60 Hz		
EMC	EN61000-6-2, IEC61000-6-2 EN61000-6-3, IEC61000-6-3		

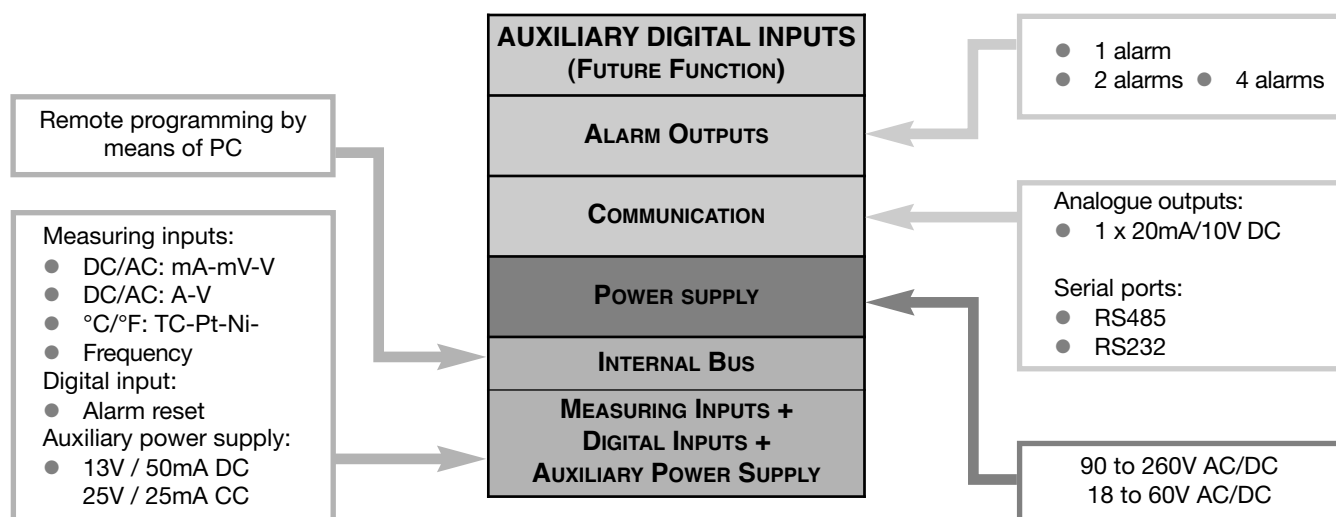
Excitation output



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	-	-

USC architecture



Available modules

Possible module combinations

Type	N. of ch.	Ordering code
UDS-DIN main unit		BD XX
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
Pulse signals input: 0.001Hz to 50kHz for DC signals	2	BQ TF1
Pulse signals input: 0.001Hz to 50kHz for AC signals	2	BQ TF2
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
Power supply 10 to 28V DC		BP 3

Basic Unit	Slot				
	A	B	C	D	E
Measuring inputs: LSX, LSE, LSF, HSX, TRX, TF1, TF2	●				
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, 3					●

(*) Up to 1 module max.

Used calculation formulas

Only for TRMS Measurements

Instantaneous effective voltage (TRMS)

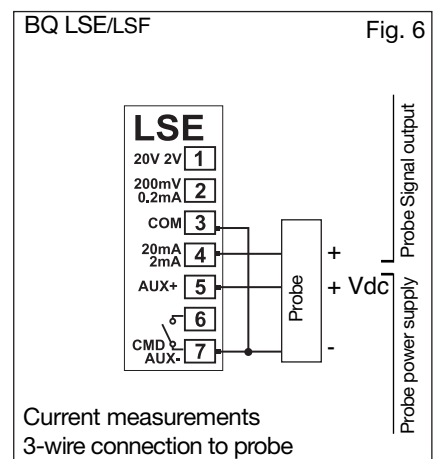
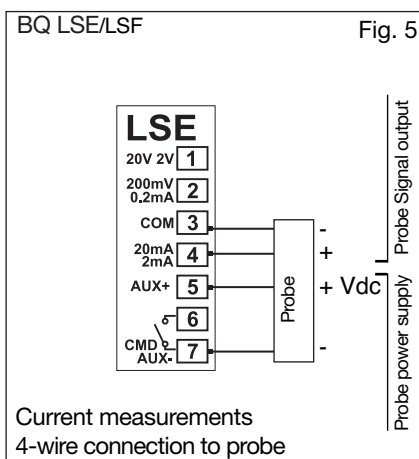
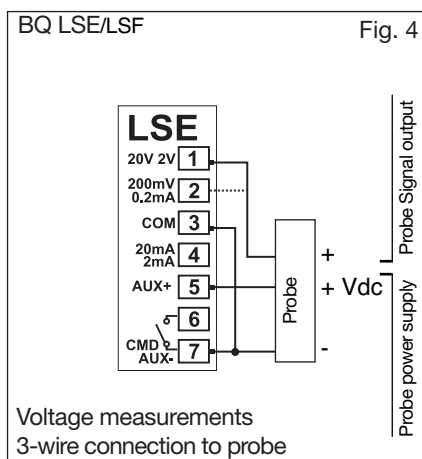
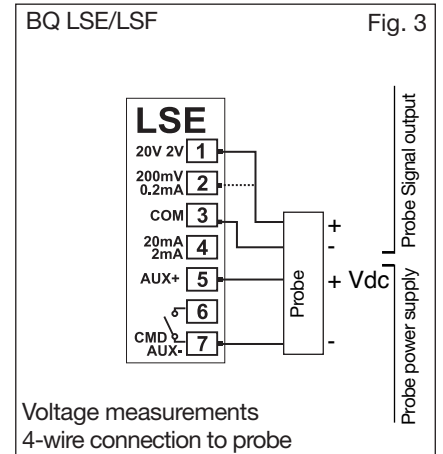
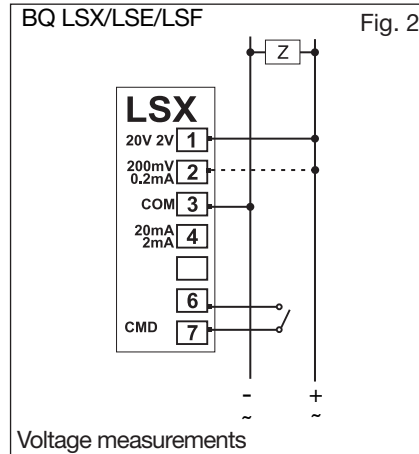
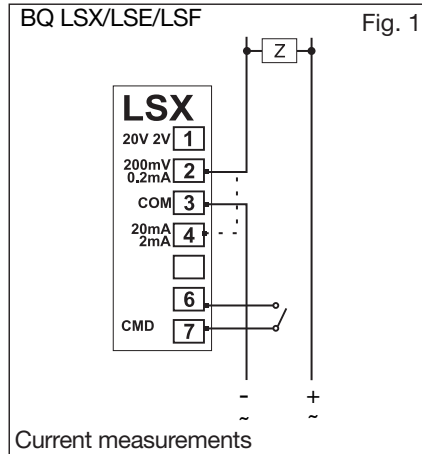
$$V_1 = \sqrt{\frac{1}{n} \cdot \sum_1^n (V_1)_i^2}$$

Instantaneous effective current (TRMS)

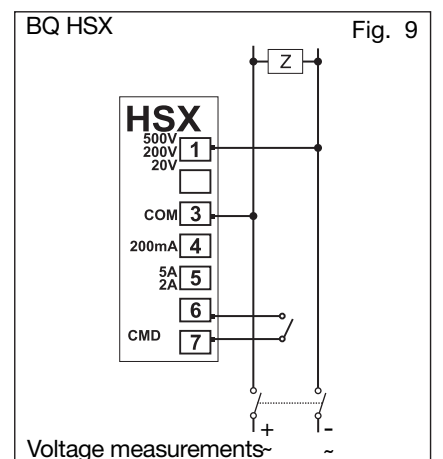
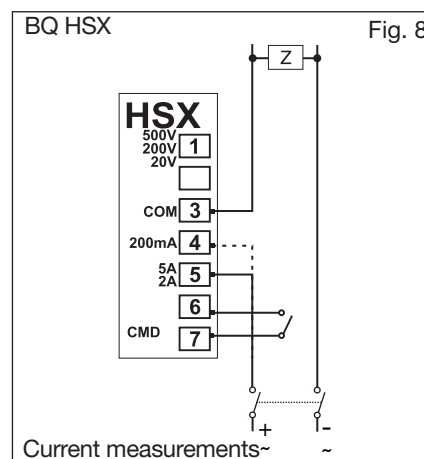
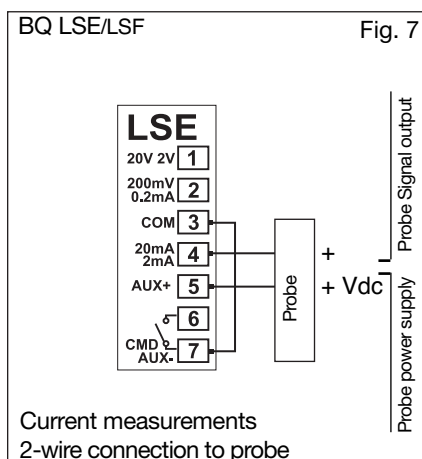
$$A_1 = \sqrt{\frac{1}{n} \cdot \sum_1^n (A_1)_i^2}$$

Wiring diagrams

Process signal wiring diagrams



Wirings for high-level signals

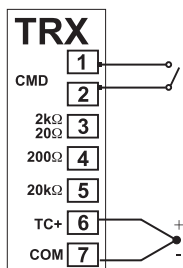


Wiring diagrams (cont.)

Wiring diagrams for temperature measurements

BQ TRX

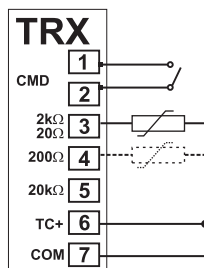
Fig. 10



Temp. measur. from thermocouple

BQ TRX

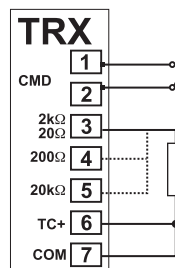
Fig. 11



Temp. measur. from thermoresistance

BQ TRX

Fig. 12

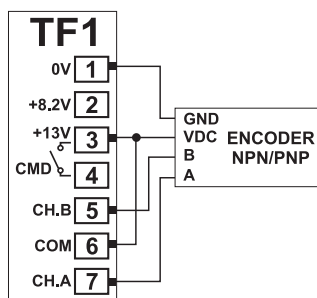


Resistance measurements

Wiring diagrams for frequency measurements

BQ TF1

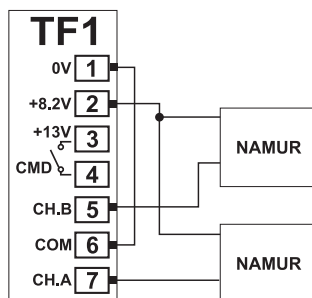
Fig. 13



ENCODER NPN/PNP

BQ TF1

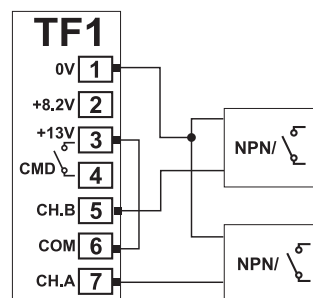
Fig. 14



NAMUR

BQ TF1

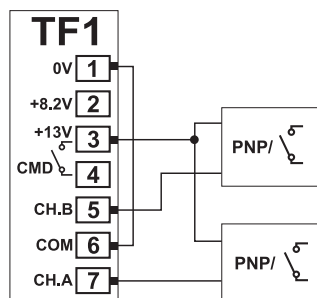
Fig. 15



NPN and contact

BQ TF1

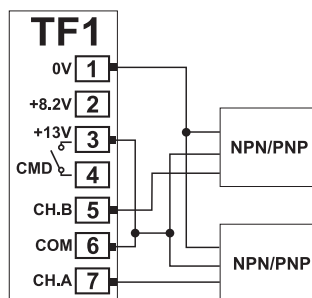
Fig. 16



PNP and contact

BQ TF1

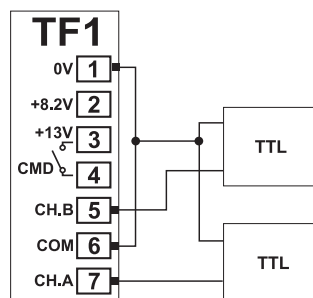
Fig. 17



NPN/PNP

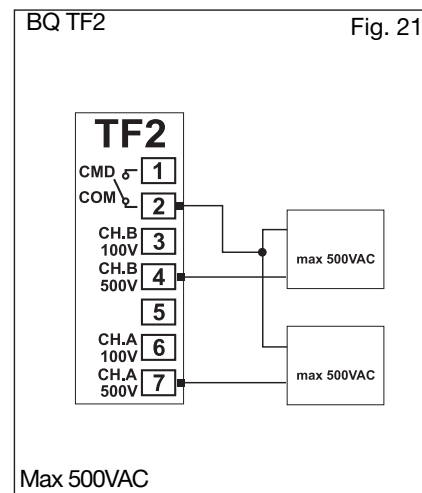
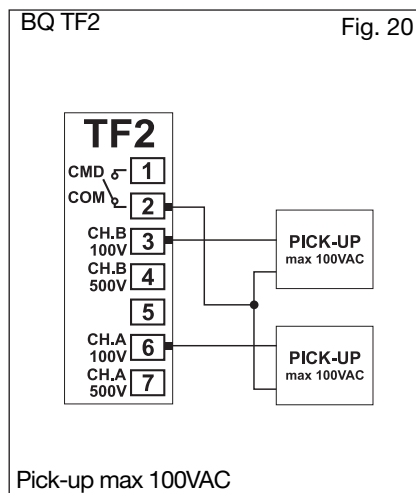
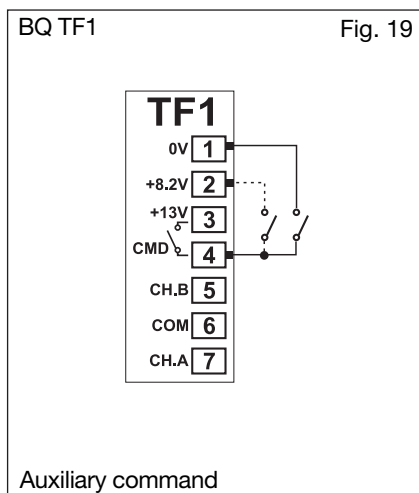
BQ TF1

Fig. 18

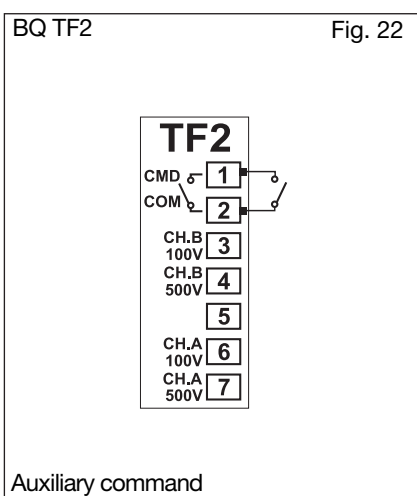


TTL

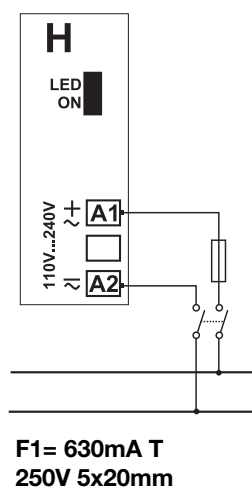
Wiring diagrams (cont.)



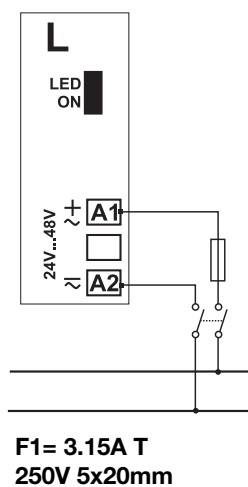
Wiring diagrams for power supply



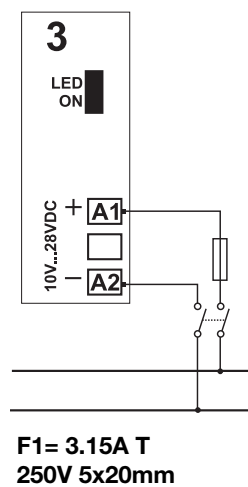
BP H: power supply



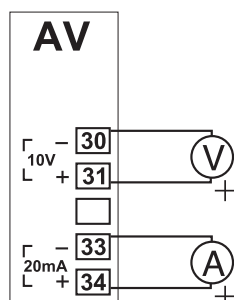
BP L: power supply



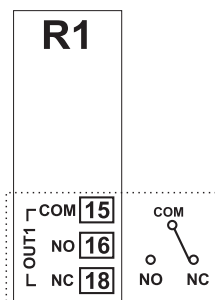
BP 3: power supply



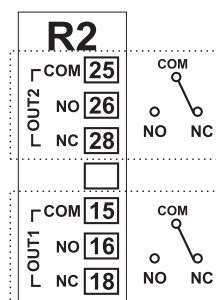
Wiring diagrams of optional modules



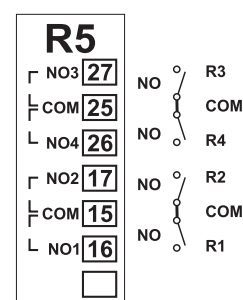
BO AV: analogue output
(10V, 20mA DC)



BO R1: 1 relay output

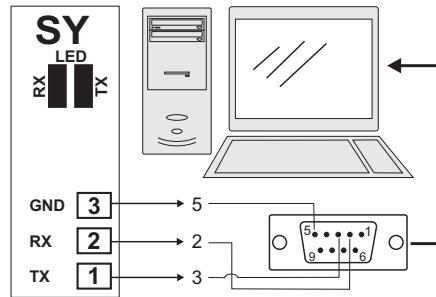
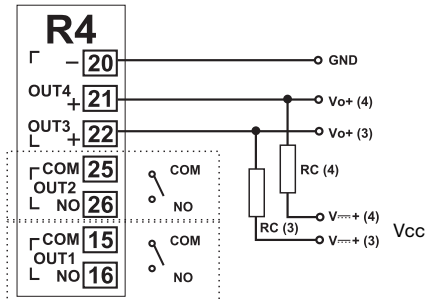


BO R2: 2 relay outputs



BO R5: 4 relay outputs

Wiring diagrams of optional modules (cont.)



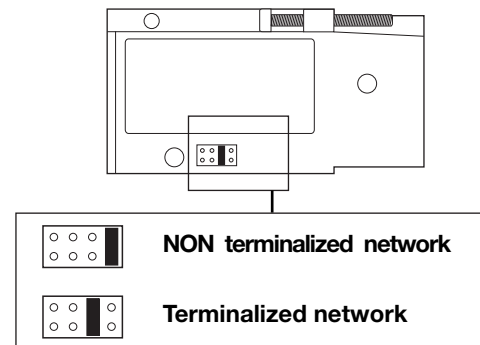
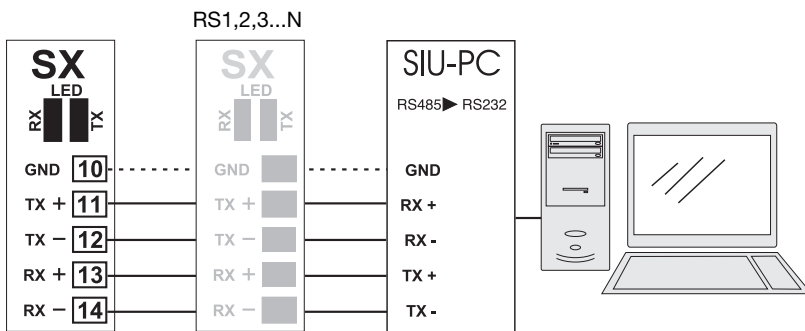
BO SY: RS232 direct connection to PC by means of COM port. RS232 has no terminalization.

BO R4: dual relay output + dual open collector output: the load resistances (R_c) must be designed so that the close contact current is lower than 100mA; the VDC voltage must be lower than or equal to 30VDC.

VDC: power supply output

Vo+: positive output (open collector transistor).

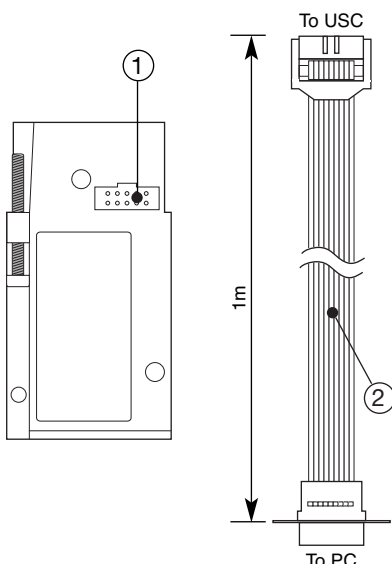
GND: ground (open collector transistor).



BR SX: RS485 4-wire connection: additional devices provided with RS485 port (indicated as RS1,2,3...N) are connected in parallel. The termination of the serial port is carried out only on the last instrument of the network. The serial module is provided with a jumper for the termination of the RS485 network as shown in the figure above.

Note: particular types of cables or plants may require an external termination. For the network connections use twisted cable type AWG26.

Programming USC by means of PC

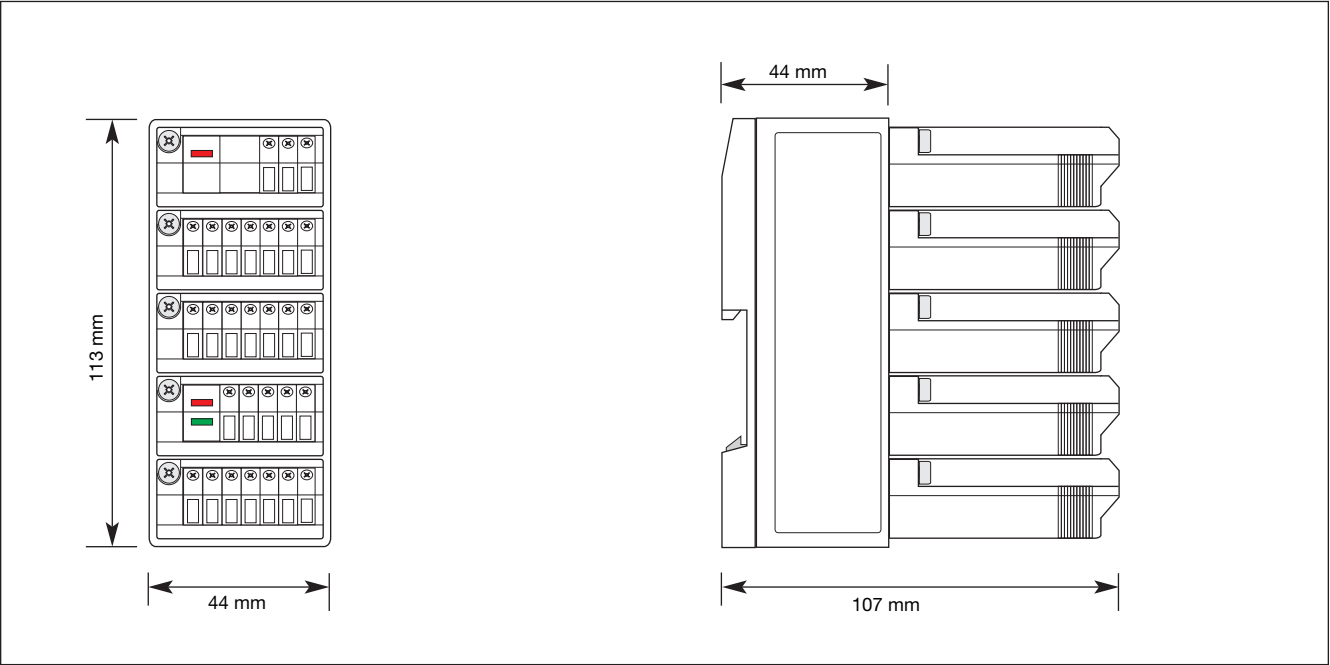


USC is programmable by PC by means of the UscSoft software (available on request). The user can program all parameters of USC that will be subsequently uploaded and set in the instrument by the RS485 network (BR SX).

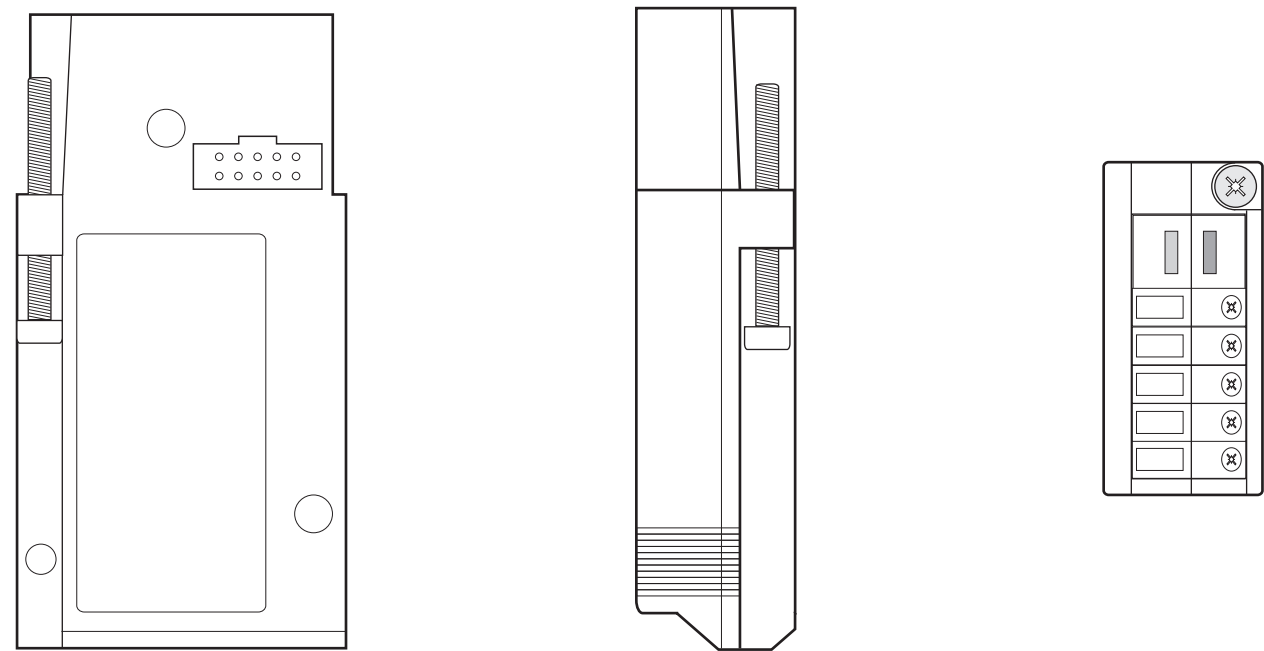
Should USC be without the RS485 serial module, all programming parameters will be uploaded and set in the instrument by the RS232 auxiliary serial connection (1) located on the side of the measuring input module using the special connection cable (2) available on request, as shown in the figures on the left. It is also possible to program the instrument using the connector (1) by means of the HyperTerminal Windows functions of a PC.

Note: the RS232 auxiliary port IS NOT insulated from the measuring inputs.

Dimensions



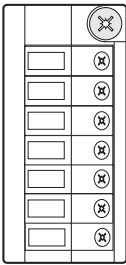
Dimensions of optional module in scale 1:1





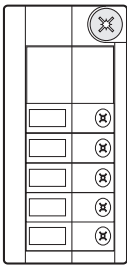
Modules

Input modules



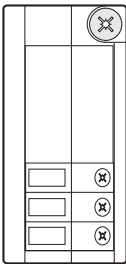
BQ LSX, BQ LSE, BQ LSF, BQ HSX, BQ TRX, BQ TF1, BQ TF2
Measuring inputs

Output modules

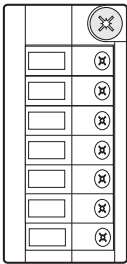


BO AV
Single analogue output 10V, 20mA

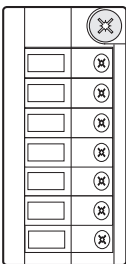
Output modules



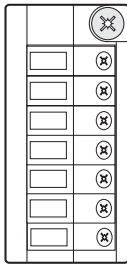
BO R1
Single relay output



BO R2
Dual relay output

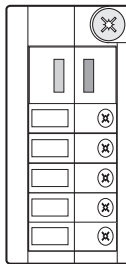


BO R4
Dual relay output + Dual open collector

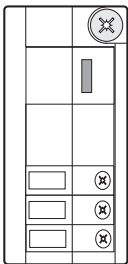


BO R5
4-relay output

Serial port modules

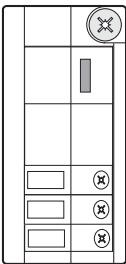


BR SX
RS485 Serial port

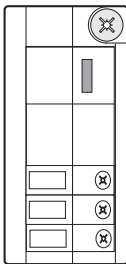


BR SY
RS232 Serial port

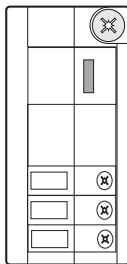
Power supply modules



BP H
Power supply:
60 to 260V AC/DC



BP L
Power supply:
18 to 60V AC/DC



BP 3
Power supply:
10 to 28V DC

Mouser Electronics

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