Installation and Operating Instructions

Single-phase Digital Energy meters - Direct connection 125 A

IIST067-01 Stand 15-03-2012

active and reactive energy-meter with measurement of active and reactive instantaneous power - 2 tariff - 2 S0

Code	Description
AD1-125C	single-phase digital active and reactive energy-meter with active and reactice power indication direct connection 0.25-5 (125) A - **2 tariffs** - **2 S0**
AD1-125MC	single-phase digital active and reactive energy-meter with active and reactice power indication direct connection 0.25-5 (125) A - **2 tariffs** - **2 S0** with **MID** certified

active and reactive energy-meter with measurement of active and reactive instantaneous power, and inbuilt communication Modbus RTU - 2 tariff

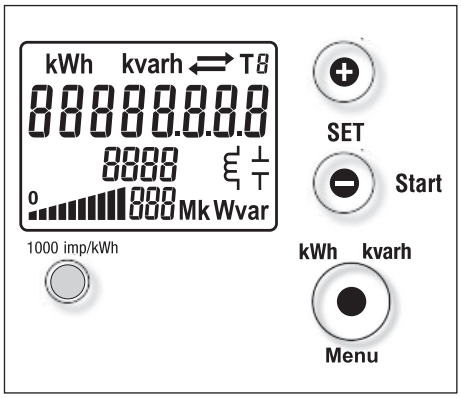
Code	Description
AD1-125MBIC	single-phase digital active and reactive energy-meter with active and reactice power indication direct connection 0.25-5 (125) A - **2 tariffs** - **2 S0** - and inbuilt communication **Modbus RTU -** with **MID** certified

⚠ WARNING

The Autometers range of DIN rail mounted meters should only been installed by a competent and qualified electrician who is fully aware of the latest electricity regulations concerning the installation of Electricity meters.
The AD1-125 must be installed in a suitable enclosure.

- This family of devices provides a set of single phase energy meters designed to be directly connected to system where high current is required. All the meters are equipped with an easy to read LCD with green back light on which displays all the active and reactive energy counters, with a red light LED which blink in proportion to the measured active energy and with a optocoupler that allows the storage of energy on two different tariffs. Depending on the model a insulated Modbus communication interface is built in two solid state relay which generate pulses proportional to the measured energy. Modbus communication interfaces offer a set of 15 measures.

Display

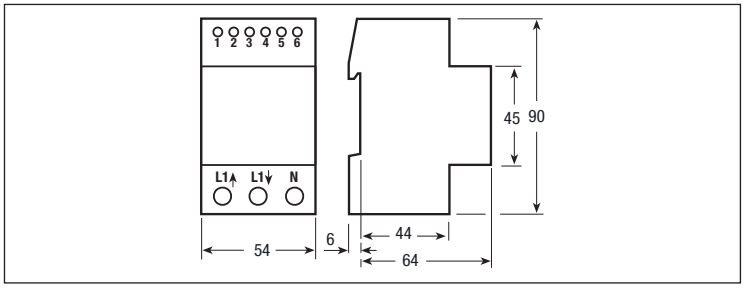


- Energy value
- kWh / kvarh display
- Running tarif, called tarif
- Energy export (absorbed ←)
- Energy import (supplied →)
- Displays inductive, reactive power
- Displays capacitative, reactive power
- Full scale current indication
- Consumption Bar display (percentage of ***Pmax***)
- Precision control LED

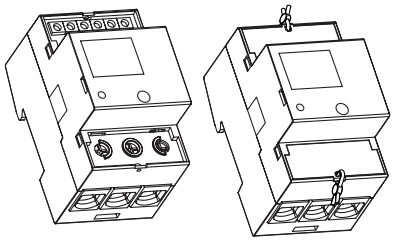
Commands

- Parameters set
- Menu key for reading selection

Dimension



Sealable terminal covers

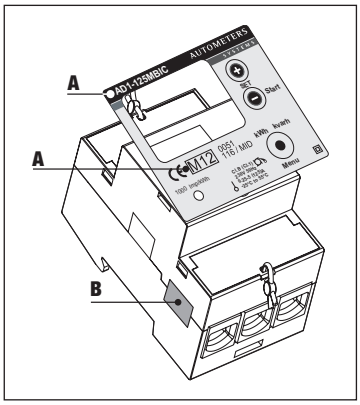


MID calibrated

AD1-125MC
AD1-125MBIC

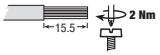
A) Device code and certification data indications

B) Safety-sealing between upper and lower housing part

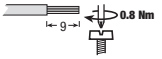


Cable stripping length and max. terminal screw torque

125 A direct connection main terminals - Screw driver PZ2



Tariff and communication terminals
Screw driver blade 0.8x3.5 mm



Symbols

- Measuring elements
- Reversal preventing device
- Protected by double insulation

Main Menu

Page 1:
In this page, the value of the currently growing Active Energy is represented (or the last one that has grown). The energy may be Consumed or Generated, with Tariff T1 or T2, depending on the current Energy flowing

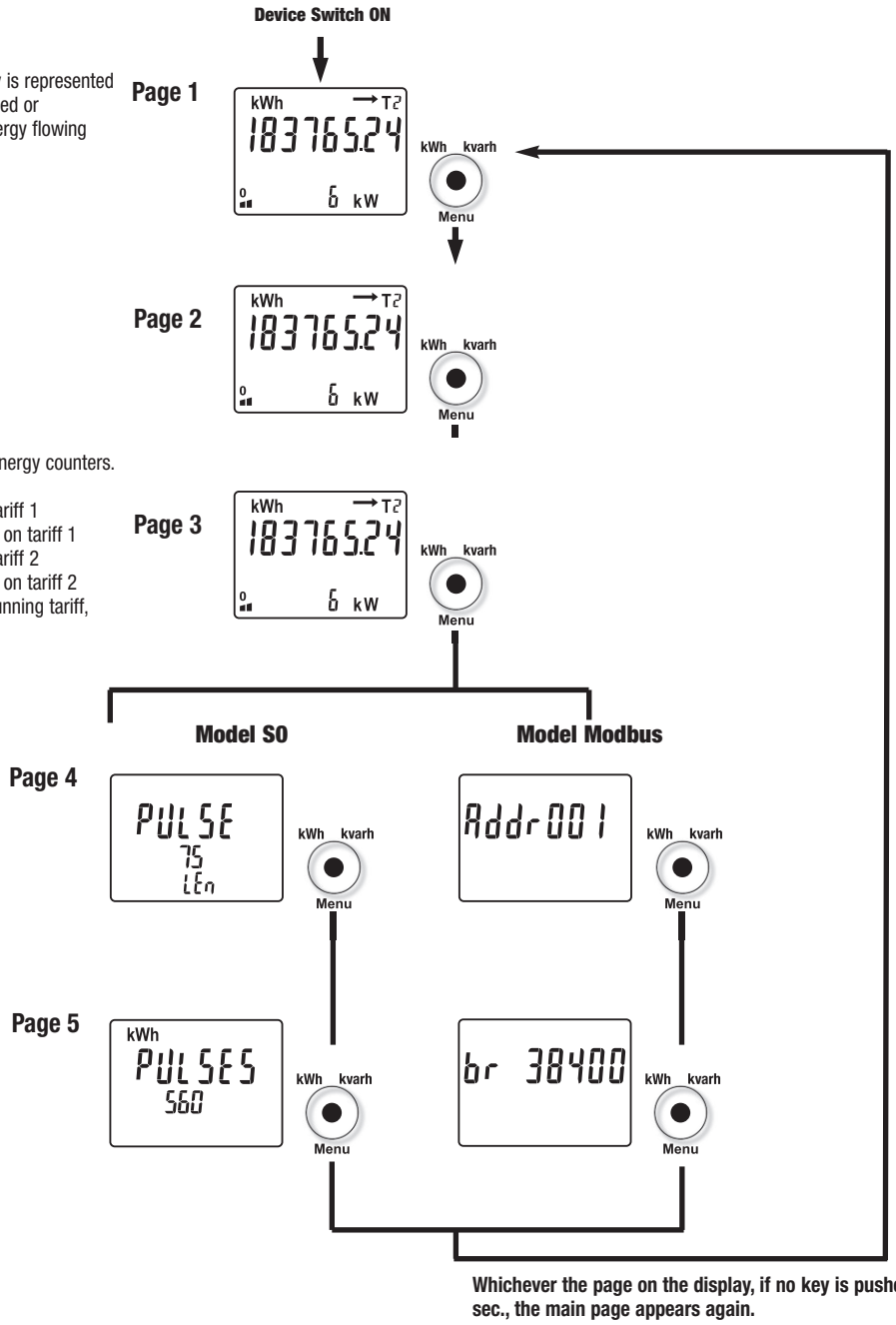
Page 2:
By pushing any key the back light turns on

Page 3:
The next 8 **"Menu key"** presses allow the display of the 8 energy counters. The counters are:
- Active import energy on tariff 1 - Active export energy on tariff 1
- Reactive import energy on tariff 1 - Reactive export energy on tariff 1
- Active import energy on tariff 2 - Active export energy on tariff 2
- Reactive import energy on tariff 2 - Reactive export energy on tariff 2

When is displayed an energy counter corresponding to the running tariff, on the bottom row the power is displayed

Page 4:
This page changes depending on the model
- **ON time page (PULSE LEn)**: In this page the time on in ms of the S0 pulse appears. This value can be altered, see the section Pulse Output.
- **Model equipped with Modbus**:
  In this page the Modbus address or the primary address appears. This value can be altered, see the section Communication Address.

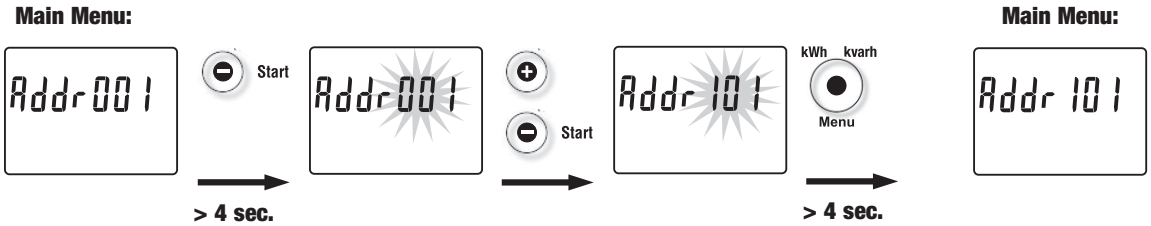
Page 5:
This page changes depending on the model
- **Pulse quantity page (PULSES)**:
  In this page the number of pulses per kWh, of the S0 output, appears. This value can be altered, see the section Pulse Output
- **Model equipped with Modbus**:
  In this page the communication baud rate appears. This value can be altered, see the section Communication Baudrate.



Whichever the page on the display, if no key is pushed for at least 20 sec., the main page appears again.

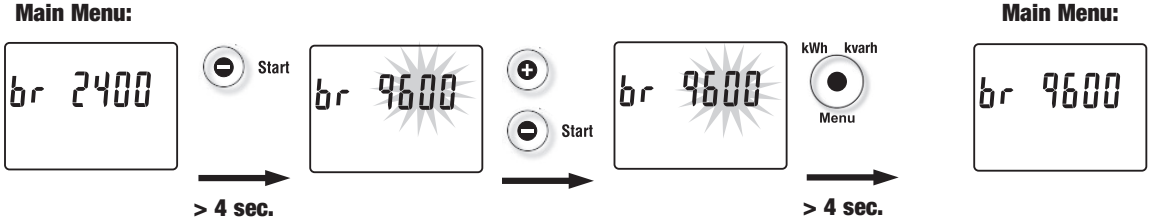
Communication Address

Modbus
In the Address page by kept pushed for 4 sec. the **"Start (-) key"** the value of the Address blink on the display:
Push **"Start (-) key"** or **"(+)"** charge the value. Push the **"Menu key"** to confirm, otherwise within 5 seconds the modification will be lost.



Communication Baudrate

In the Baudrate page by kept pushed for 4 sec. the **"Start (-) key"** the value of the Baud rate blink on the display.
Push **"Start (-) key"** or **"(+)"** charge the value. Push the **"Menu key"** for 4 sec. to confirm, otherwise within 5 seconds the modification will be lost.



Pulse Output

Pulse output quantity setting

The number of pulse per kWh (Pulse constant) that the meter can generate is a function of the ON time of the pulse. The relationship is: $\text{Pulse Constant} \leq \frac{50.000}{\text{ON time [ms]}}$

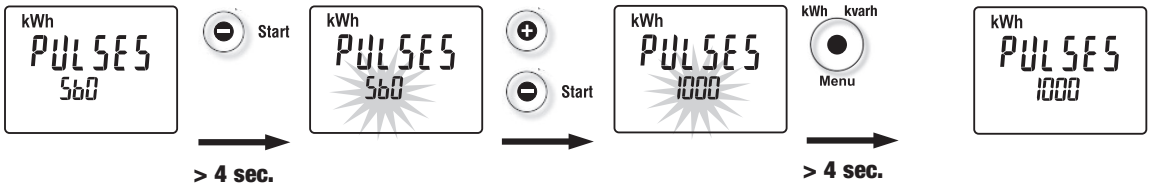
For example, a time ON pulse of 90 ms, the maximum Pulse constant that you can select is: $\text{Pulse Constant} = \frac{50.000}{90} = 555.5 = 550 \text{ pulse for kWh}$ (the number must be to tens truncated)

If the Pulse constant or the ON time of the pulse setted implies that the relationship is not respected, the setting is rejected.

Pulse constant setting

In the Pulse constant page by kept push for 4 sec. the **"Start (-) key"** the value of the constant blink on the display.
Push **"Start (-) key"** or **"(+)"** to change the value. Push the **"Menu key"** for 4 sec. to confirm, otherwise within 5 seconds the modification will be lost.

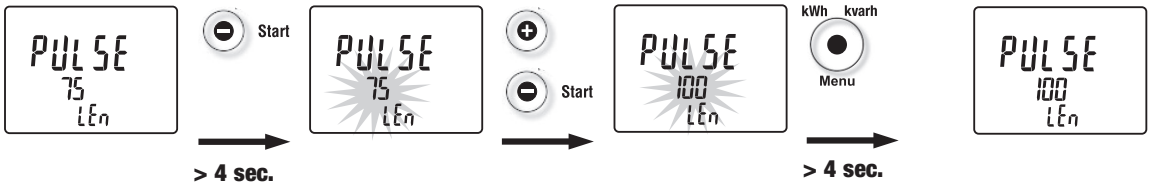
Main Menu:



Pulse length (ms) setting

In the ON time page by kept push for 4 sec. the **"Start (-) key"** the value of the constant blink on the display.
Push **"Start (-) key"** or **"(+)"** to change the value. Push the **"Menu key"** for 4 sec. to confirm, otherwise within 5 seconds the modification will be lost.

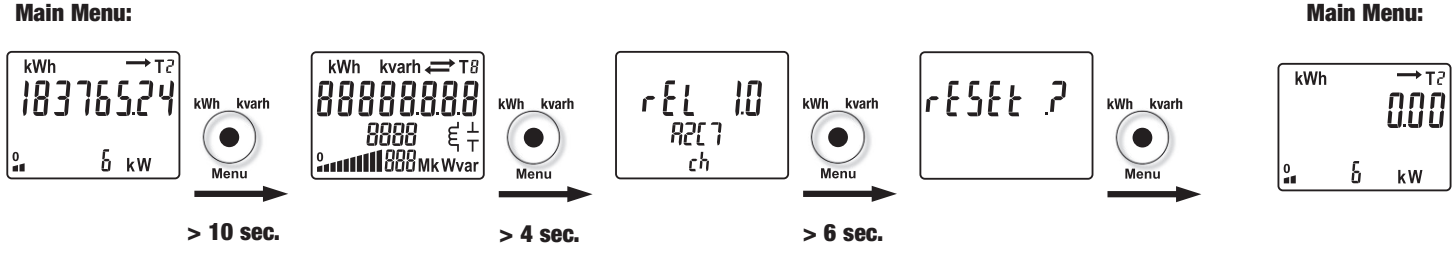
Main Menu:



Firmware Information - Diagnostic Page of the Display - Energy Reset

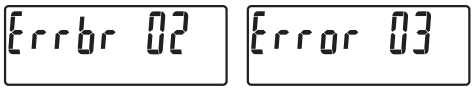
In any page of the Main Menu by kept push for 10 sec. the **"Menu key"** the diagnostic page of the display appears. If the **"Menu key"** is held down for other 4 sec. the display shows information about the firmware release and the firmware checksum. If the **"Menu key"** is held down for other 6 sec. is possible to enter in the zeroing menu of the energy counters. **(The zeroing menu is available only in the meter not MID certified.)** When the display shows **"rESET"** the key must be released. To do the reset press it again, afterwards it will go back to the default visualization with all registers reset. After 4 sec. from the button release if the **"Command reset"** is not done, it will go back to the default visualization without the reset.

Main Menu:



Diagnostic Message

Error Condition
When the display show these messages, the meters has got a malfunction and must be replaced.

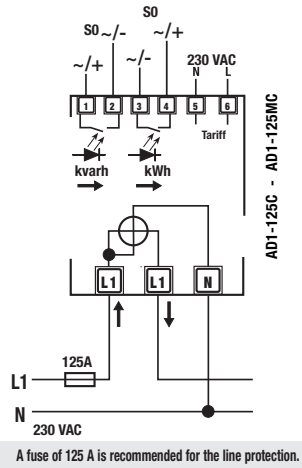


Service and Maintenance

It should not be necessary to recalibrate device during its lifetime as it is an electronic meter with no moving parts with electronics and voltage and current sensors that do not naturally degrade or change with time under specified environmental conditions. If a degradation in the performance is observed the device has probably been partly damaged and should be sent for repair or exchanged. If the meter is dirty and needs to be cleaned, use lightly moistened tissue with a water based mild detergent. Make sure no liquid goes into the meter as this could damage the meter.

Wiring diagram

S0



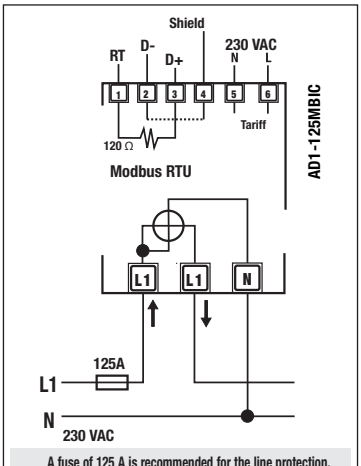
A fuse of 125 A is recommended for the line protection.

Terminal Description

S0

- **1-2:** Pulse output of reactive energy imported, isolated by a OptoMOS Relay.
- **3-4:** Pulse output of active energy imported, isolated by a OptoMOS Relay
- **6-7:** Tariff signal, isolated by a Opto Coupler. When there is a voltage of 230 VAC connected the device store energies on the Tariff 2 registers, otherwise on the Tariff 1 registers.
- **L1 ↑:** Input for the phase conductor.
- **L1 ↓:** Output for the phase conductor.
- **N:** Measuring input of neutral.

Modbus



A fuse of 125 A is recommended for the line protection.

Modbus

- **1:** Modbus network. For the termination of the for the termination of the network short this terminal with terminal 3.
- **2:** Modbus network. Data -
- **3:** Modbus network. Data +
- **4:** Modbus network. Shield
- **6-7:** Tariff signal, isolated by a Opto Coupler. When there is a voltage of 230 VAC connected the device store energies on the Tariff 2 registers, otherwise on the Tariff 1 registers.
- **L1 ↑:** Input for the phase conductor.
- **L1 ↓:** Output for the phase conductor.
- **N:** Measuring input of neutral.

Technical Data

Data in compliance with EN 50470-1, EN 50470-3, EN 62053-23 and EN 62053-31

			AD1-125C **AD1-125MC** **direct connection 125 A** **Pulse output** **S0**	**AD1-125MBIC** **direct connection 125 A** **inbuilt commun.** **Modbus**
General characteristics				
• Housing	DIN 43880	DIN	3 modules	3 modules
• Mounting	EN 60715	35 mm	DIN rail	DIN rail
• Depth		mm	70	70
Operating features				
• Connectivity	to single-phase network	n° wires	2	2
• Storage of energy values and configuration	digital display (EEPROM)	-	yes	yes
• Display tariffs identifier	for active and reactive energy	n° 2	T1 and T2	T1 and T2
Supply				
• Certified voltage range ***Un***		VAC	230 ±20%	230 ±20%
• Operating voltage range		VAC	110 ... 276	110 ... 276
• Certified frequency ***fn***		Hz	50 ±2%	50 ±2%
• Operating frequency range		Hz	48 ... 62	48 ... 62
• Rated power dissipation (max.) ***Pv***		VA (W)	⩽8 (0.6)	⩽8 (0.6)
Overload capability				
• Voltage ***Un***	continuous	VAC	276	276
	momentary (1 s)	VAC	300	300
• Current ***Imax***	continuous	A	125	125
	momentary (10 ms)	A	3750	3750
Display				
• Display type	LCD	n° digits	8 (2 decimal)	8 (2 decimal)
	digit dimensions	mm x mm	6.00 x 3	6.00 x 3
• Active energy: 1 display, 7-digit	tariffs 2	kWh	0.01	0.01
+ display import or export (arrow)	overflow	kWh	999999.99	999999.99
• Reactive energy: 1 display, 7-digit	tariffs 2	kvarh	0.01	0.01
+ display import or export (arrow)	overflow	kvarh	999999.99	999999.99
• Instantaneous active power: 1 display, 3-digit		W, kW or MW	000 ... 999	000 ... 999
• Instantaneous reactive power: 1 display, 3-digit		var, kvar or Mvar	000 ... 999	000 ... 999
• Instantaneous tariff measurement		-	1	1
	1 display, 1-digit	-	T1 or T2	T1 or T2
• Display period refresh		s	1	1
Measuring accuracy	at 23 ±1°C, referred to nominal values			
• Active energy and power	acc.to EN 50470-3	class	B	B
• Reactive energy and power	acc.to EN 62053-23	class	2	2
Measuring input				
• Type of connection	phase/N	-	direct	direct
• Operating range voltage	phase/N	VAC	110 ... 276	110 ... 276
• Current ***Iref***		A	5	5
• Current ***Imin***		A	0.25	0.25
• Operating range current ***(Ist ... Imax)***	direct connection	A	0.020 ... 125	0.020 ... 125
• Operating frequency		Hz	48 ... 62	48 ... 62
• Certified frequency		Hz	50 ±2%	50 ±2%
• Starting current for energy measurement ***(Ist)***		mA	20	20
Pulse output S0	acc.to EN 62053-31			
• Pulse output	for active and reactive energy T1 and T2	-	yes	-
• Pulse quantity		imp/kWh	1000	-
• Pulse duration		ms	100 ms (lower on request)	-
• Required voltage	min. (max.)	VAC (DC)	5 ... 230 ±5% (5 ... 300)	-
• Permissible current	pulse ON (max. 230 V AC/DC)	mA	90	-
• Permissible current	Impuls OFF (leakage cur. max. 230 V AC/DC)	µA	1	-
Optical interfaces				
• Front side ***(accuracy control)***	LED	imp/kWh	1000	1000
Safety acc. to EN 50470-1				
• Indoor meter		-	yes	yes
• Degree of pollution		-	2	2
• Operational voltage		VAC	300	300
• AC voltage test (EN 50470-3, 7.2)		kV	4	4
• Impulse voltage test		1.2/50 µs-kV	6	6
• Protection class (EN 50470)		class	II	II
• Housing material flame resistance	UL 94	class	V0	V0
• Safety-sealing between upper and lower housing part **(mod. AD1-125MC / AD1-125MBIC)**		-	yes	yes
Embedded communication				
• Modbus RTU	RS-485 - 3 wires	-	-	up to 38.400 bps
Adaptor for Communication				
• Plug-and-play technology		-	•	•
• LAN Interface with Modbus/TCP protocol	Ethernet 802.3	-	10/100 Mbps	10/100 Mbps
• Modbus RTU, Ascii interface	RS-485 - 3 wires	-	up to 38.400 bps	-
• M-Bus interface	2 wires	-	up to 9.600 bps	-
• KNX interface	EIB-standard	-	up to 9.600 bps	up to 9.600 bps
• SD-Card Datalogger		-	1 to 8 Gigabytes	1 to 8 Gigabytes
Connection terminals				
• Type cage main current paths	screw head Z +/-	POZIDRIV	PZ2	PZ2
• Type cage pulse output	blade for slotted screw	mm	0.8 x 3.5	0.8 x 3.5
• Terminal capacity main current paths	solid wire min. (max.)	mm^2	1.5 (50)	1.5 (50)
	stranded wire with sleeve min. (max.)	mm^2	1.5 (50)	1.5 (50)
• Terminal capacity pulse output	solid wire min. (max.)	mm^2	1 (4)	1 (4)
	stranded wire with sleeve min. (max.)	mm^2	1 (2.5)	1 (2.5)
Environmental conditions				
• Mechanical environment		-	M1	M1
• Electromagnetic environment		-	E2	E2
• Operating temperature		°C	-25 ... +55	-25 ... +55
• Limit temperature of transportation and storage		°C	-25 ... +70	-25 ... +70
• Relative humidity (not condensation)		%	⩽80	⩽80
• Vibrations	50 Hz sinusoidal vibration amplitude	mm	±0.075	±0.075
• Degree protection	housing when mounted in front (terminal)	-	IP51(⁎)/IP20	IP51(⁎)/IP20

(⁎) **For the installation in a cabinet at least with IP51 protection.**