

Brunata Optuna H

Ultrasonic energy meter

Type 775

Installation Guide

Edition 1.1

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*Brunata a/s is a Danish owned company.
We have more than 90 years of experience
within developing and producing meters,
heat cost allocators, consumption accounts,
meter services and latest substations.
Today meters are often remotely read with
access to the internet.
We have a quality control system fulfilling
DS/EN ISO 9001 and 14001.*

Brunata

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1.0 Introduction

1.1 General

This installation guide is intended for trained personnel and does not contain any basic working steps.

Important!

The seal on the energy meter must not be damaged! A damaged seal will result in immediate invalidation of the factory warranty and verification. The cables supplied with the meter must not be shortened or changed in any other way.

Notes!

The regulations on the use of energy meters must be observed!

The meter installation is only to be performed by an installation and/or electrical contractor using personnel trained in the installation and use of electrical equipment and familiar with the Low Voltage Directive.

Medium: Water without additives.

The specified medium temperature is 5...130 °C (150 °C).

The temperature range depends on variant and nominal size.

The encapsulated variant is to be used if condensation is expected.

The specified operating/ambient conditions are 5 ... 55 °C; IP54; 93 % rel. humidity.



Further details about the variants can be obtained from the comprehensive Installation and User Guide. Compliance with this guide is essential.

The IZAR@SET software is used for readout/parametrisation and is obtainable on the Internet at <http://www.brunataskovgaard.dk/produkter/software>

1.2 Installation of energy meter

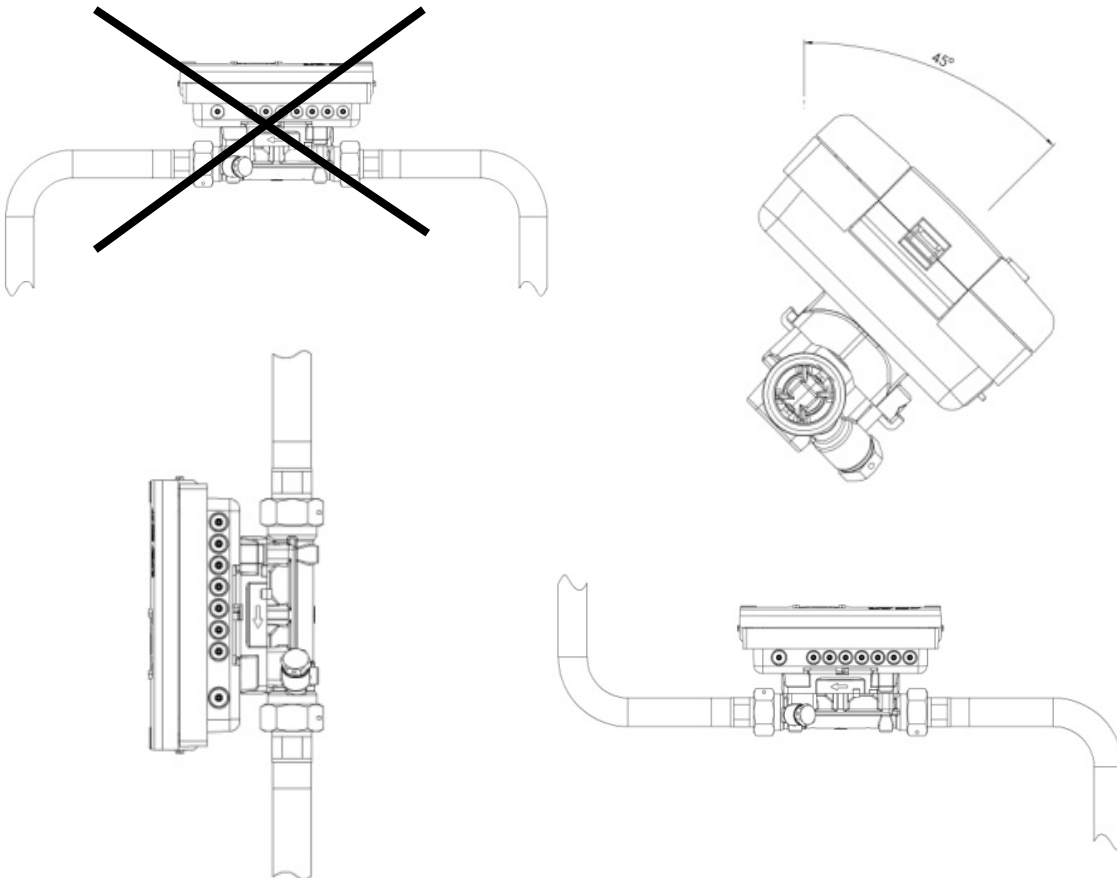
Depending on the design and application (heat, air conditioning or cooling meter), the energy meter is installed in either the hot or cold line of the system as indicated on the type plate.

The flow sensor must be installed so that the direction of flow corresponds to the direction of the arrow on the sensor.

Ensure that the flow sensor is always filled with liquid during installation.

Calming sections before and after the flow sensor are not necessary.

The meter can be installed in both horizontal and vertical pipe sections, provided air bubbles cannot collect in the meter. We recommend installing the flow sensor in a tilted position.



Make sure the meter is installed sufficiently far away from possible sources of electromagnetic interference (switches, electric motors, fluorescent lamps, etc.).

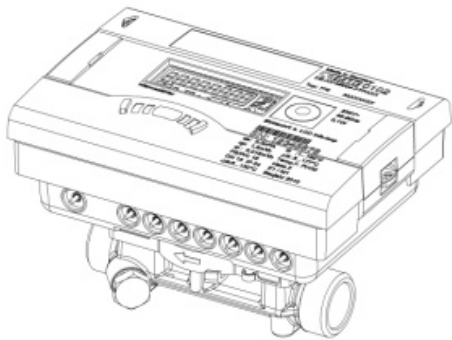
For medium temperatures of **90 °C or more** or if $T_{\text{water}} < T_{\text{ambient}}$ (application as cooling meter or heat/cooling meter), the integrator **must be removed** from the meter and installed a sufficient distance away from heat sources.

A wall holder (supplied with meter) or a spacer holder (optional) is available for this purpose.

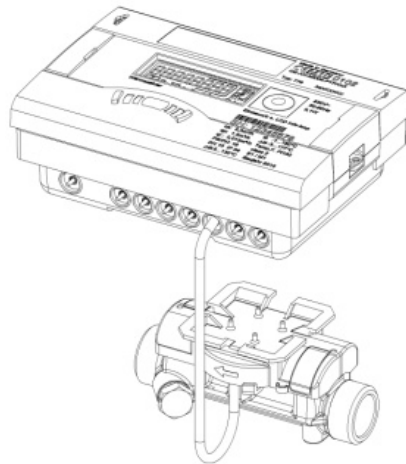
It is recommended that stop valves be fitted before and after the energy meter to simplify removing the meter.

The meter should be installed in a conveniently accessible position for service and operating personnel.

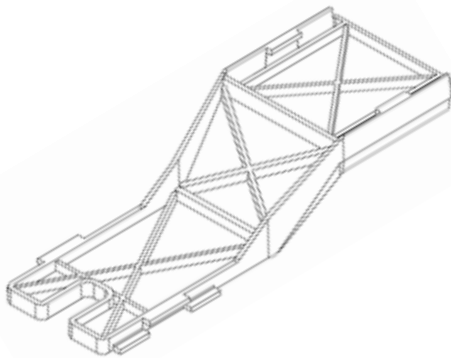
Initial operation is to be carried out and recorded after installation.



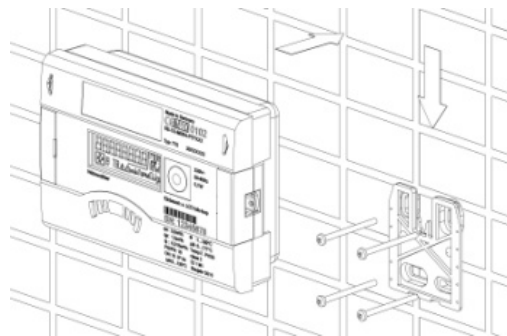
T: 5 ... 90°C / $T_{\text{water}} > T_{\text{ambient}}$



T: 90 ... 130°C/150°C / $T_{\text{water}} < T_{\text{ambient}}$



Spacer holder



Wall mounting

3.0 Installation of temperature sensors

Handle the temperature sensors carefully! The sensor cables are fitted with coloured type labels:

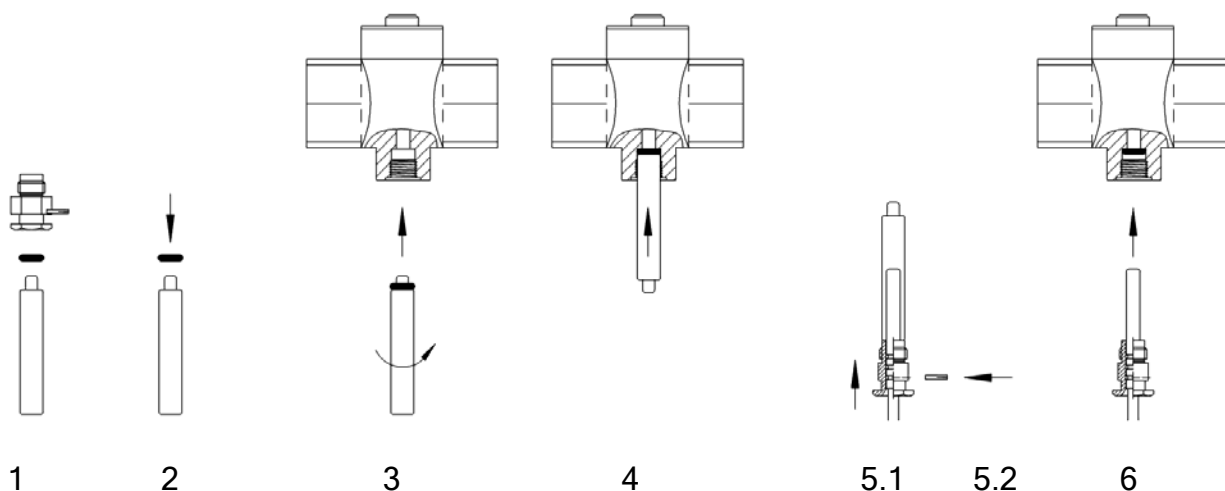
Meter type	Sensor marking	Terminal	Installation position
Energy meter in return line	Red	5 Hot 6	Forward
	Blue	7 Cold 8	On meter
Energy meter in forward line	Red	5 Hot 6	On meter
	Blue	7 Cold 8	Return
Cooling meter in return line	Blue	7 Cold 8	Forward
	Red	5 Hot 6	On meter
Cooling meter in forward line	Blue	7 Cold 8	On meter
	Red	5 Hot 6	Return
Air conditioning meter in return line	Red	5 Hot 6	Forward
	Blue	7 Cold 8	On meter
Air conditioning meter in forward line	Red	5 Hot 6	On meter
	Blue	7 Cold 8	Return

Red: sensor in hot line, blue: sensor in cold line.

The programmed installation location is shown in the information loop.

The free temperature sensor can be installed in a ball valve or in a pocket conforming to the requirements for this type of sensor. If the sensor is installed in a pocket, it must be inserted as far as the bottom of the pocket and secured.

For installation in a ball valve, a 5-piece coupling set is enclosed in a separate bag. Make sure the sensor is mounted symmetrically. The connecting cables must not be shortened or extended. The maximum cable length is 10 m. The sensors should preferably be installed directly immersed. Insert one O-ring in the sensor hole using the mounting pin supplied. Only tighten the brass or plastic screw by hand (2-3 Nm); tighten the plug screw with a torque of approx. 12 Nm.



4.0 Power supply

4.1 Battery

A 3.6 V DC lithium battery is fitted in the standard version. The battery is not to be charged or short-circuited. Ambient temperatures below 40 °C extend the life of the battery. Used batteries must be disposed of at suitable waste collection points! **Caution:** Risk of explosion if battery is replaced by an incorrect type.

4.2 Mains unit

24 V AC or 230 V AC mains units (Protection Class 1) can be changed or retrofitted at any time. The protective safety cover must be installed at all times. Never connect between two phases, as this would destroy the mains unit. The cable is to be fused at max. 6 A and protected against manipulation.

The mains unit notifies the meter if mains voltage is present. If the mains fails, the backup battery (CR2032) in the mains unit provides the power supply for up to 1 year. The LCD readings (on pressing button) and the date and time are still updated, but none of the measuring functions work, incl. the flow rate measurement. Communication still functions over the optional M-Bus, RS485 and RS232 modules or the optical interface, but reduces the life of the backup battery. The radio function is switched off in the event of mains failure.

5.0 Extension modules

The energy meter has two slots for extension modules.

Slot 1	Slot 2
- Pulse In (2x)	- Pulse In (2x)
- Pulse In (2x)/Out (1x)	- Pulse Out (2x)
- RS232	- Pulse In (2x)/Out (1x)
- M-Bus	- RS232
- RS485	- M-Bus
- L-BUS (for ext. radio)	- RS485
- Analogue Out (2x)	- L-BUS (for ext. radio)

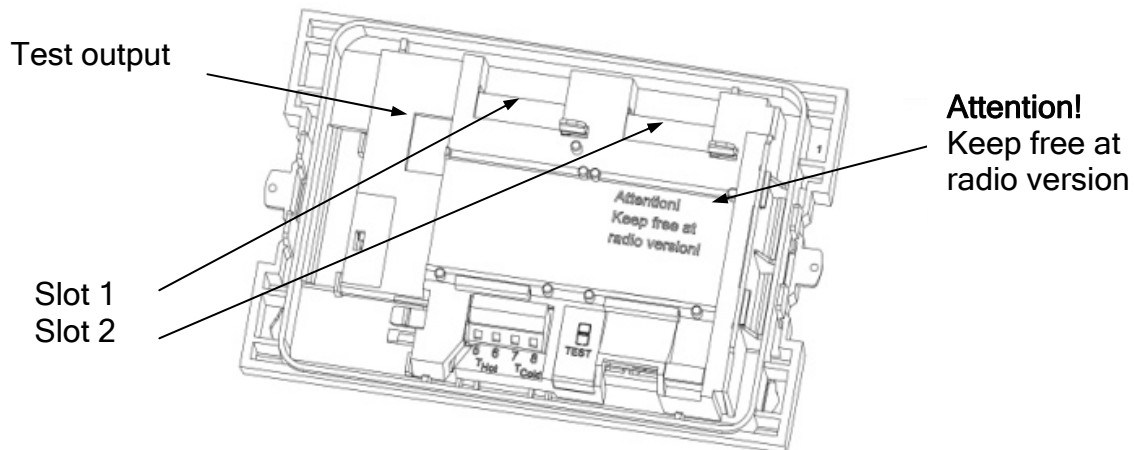
The modules can be used and combined as shown in the above table. Use of combinations not included in the above table is not allowed. With radio meters the slot two of the communication modules has to be left empty.



These modules have no effect on consumption recording and can be fitted retrospectively without damaging the verification mark. The relevant ESD regulations (electrostatic discharge) must be observed. No liability is accepted for damage (especially to electronic circuits) resulting from failure to comply with the ESD regulations.

5.1 Installation of modules

1. Open the integrator by releasing the side catches.
2. Engage the module in the relevant slot and carefully connect the pre-formed ribbon cable at both ends.
3. Close the lid and check the meter for correct operation by pressing the pushbutton. Renew the seal of the housing lid if the meter functions correctly.



5.2 Communication modules

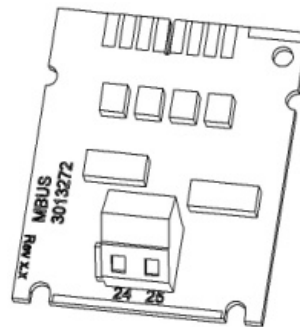
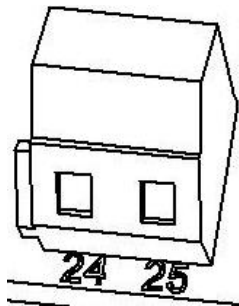
The meter supports two communication channels over the same or different interfaces. An additional communication module can be used in radio operation. The protocol is different for each of the two channels and is preset ex works, but can be set to customer-specific requirements using the IZAR@Set software. Each channel has its own primary address, but only one secondary address exists, which is set to the serial number ex works.

5.2.1 M-Bus

The M-Bus communication module is a serial interface for communication with external devices (M-Bus control centre), e.g. IZAR@CENTER. A number of meters can be connected to a control centre. The module contains a 2-pole terminal strip with terminals marked 24, 25.

- The connection is not polarity-conscious and is electrically isolated

- M-Bus protocol to EN 1434-3 standard
- 300 or 2400 bauds (auto baud detect)
- Connection for 2 x 2.5 mm² wires
- Current drawn: one M-Bus load



5.2.2 Communication over radio

The integrated radio module is an interface for communication with Hydrometer radio receivers. Unidirectional communication has the following specification:

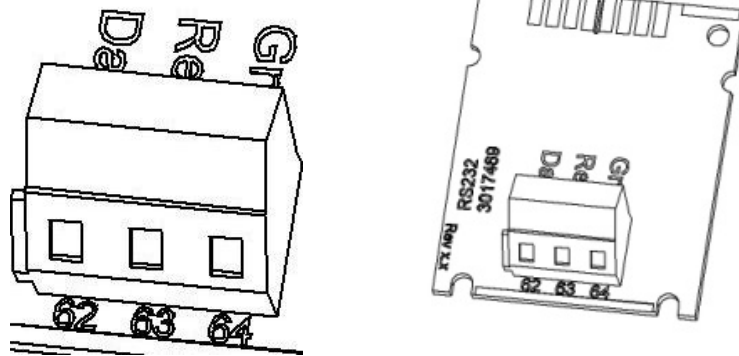
- The module sends every 6 ... 25 s (variable, depending on protocol length)
- The radio module always accesses the current meter registers
- Transmission frequency: 868 MHz
- Various Hydrometer receivers are available for receiving the protocol (e.g. Bluetooth, GPRS, LAN, ...)
- The protocol corresponds to the Open Metering or HYD standard and is encrypted
- Reading modes: Brunata DriveBy, Brunata LiveNetwork

5.2.3 RS-232 Communication module

The RS232 communication module is a serial interface for communication with external devices, e.g. PC; 300 or 2400 bauds.

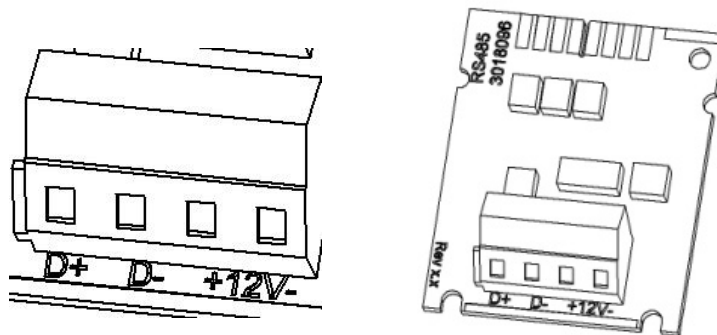
The module contains a 3-pole terminal strip with terminals marked 62(Dat), 63(Req) and 64(GND). A special adapter cable is required for connection (order no. 087H0121). The coloured wires are to be connected as shown.

62 = brown
63 = white
64 = green



5.2.4 RS-485 Communication module

The RS485 communication module is a serial interface for communication with external devices, e.g. PC; 2400 bauds only. The module contains a 4-pole terminal strip with terminals marked D+, D- and +12-. The module needs an external power supply of 12 V DC \pm 5 V.

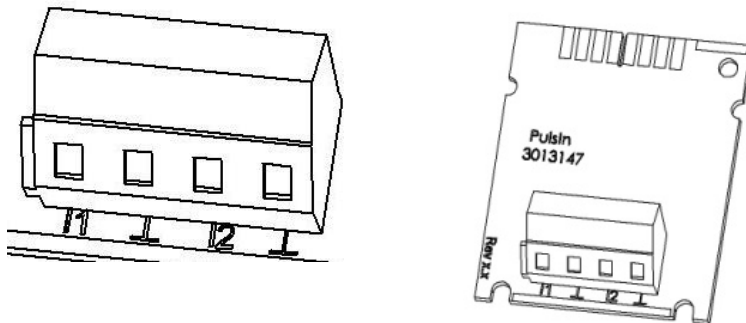


5.3 Pulse input function module

Module for two additional pulse counters. Pulse input 1 is marked as "I1" and "I" and input 2 as "I2" and "I".

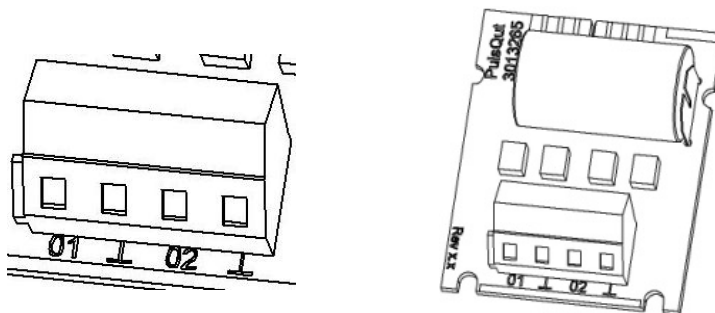
- Pulse inputs are programmable (IZAR@SET) for a value of: 1, 2.5, 10, 25, 100, 250, 1000, 2500 litres per pulse
- Possible units are all the energy units available in the meter, the volume unit m³ or no unit
- Input frequency is in the range < 8 Hz; min. pulse duration 10 ms
- Input resistance 2.2 M Ω ; terminal voltage 3 V DC
- Data is accumulated separately in registers

- Data is readable as IN1 and IN2 in the display and can be transmitted over the communication modules
- Cable length up to 10 m

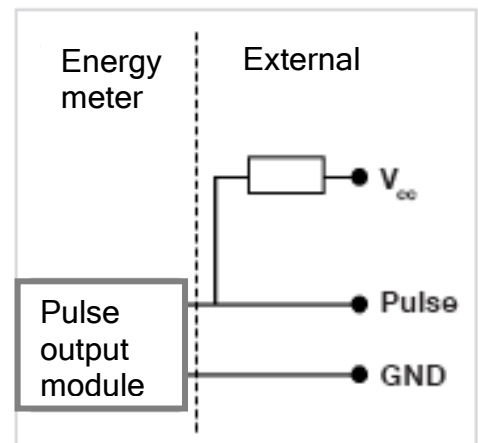


5.4 Pulse output function module

The module contains connections for 2 pulse outputs, which can be programmed as desired using the IZAR@SET software. The outputs are marked on the terminal strip as "O1" and "⊥" or "O2" and "⊥" and in the display as Out1 and Out2.



- External supply: $V_{cc} = 3-30 \text{ V DC}$
- Output current $\leq 20 \text{ mA}$ with a residual voltage of $\leq 0.5 \text{ V}$
- Open collector (drain)
- Electrically isolated
- Output 1: $f \leq 4 \text{ Hz}$
 - Pulse duration: $125 \text{ ms} \pm 10 \%$
 - Pulse break: $\geq 125 \text{ ms} - 10 \%$
- Output 2: $f \leq 100 \text{ Hz}$
 - Pulse duration/Pulse break $\sim 1:1$
- Volume pulse value is programmable as desired.
 - Default: last digit in display

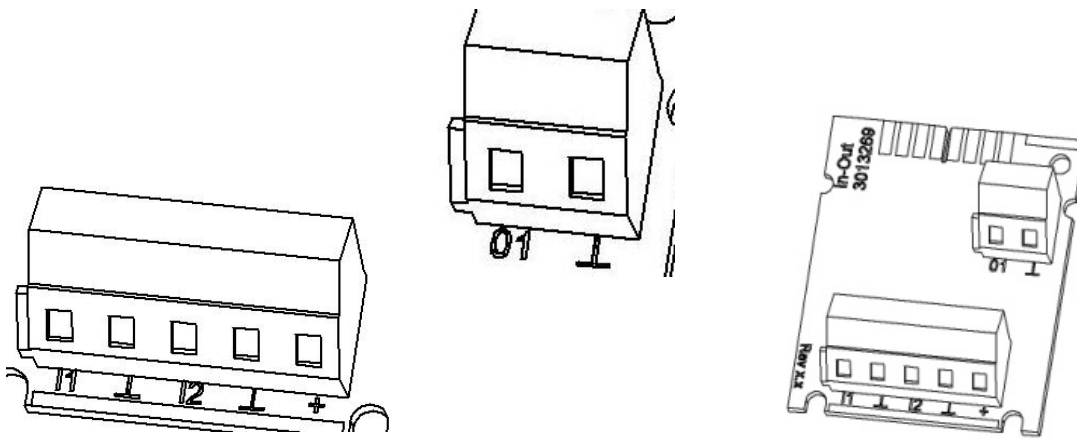


5.5 Combined function module

The combined module is equipped with 2 inputs and 1 output.

The pulse input specification is the same as 5.3 above.

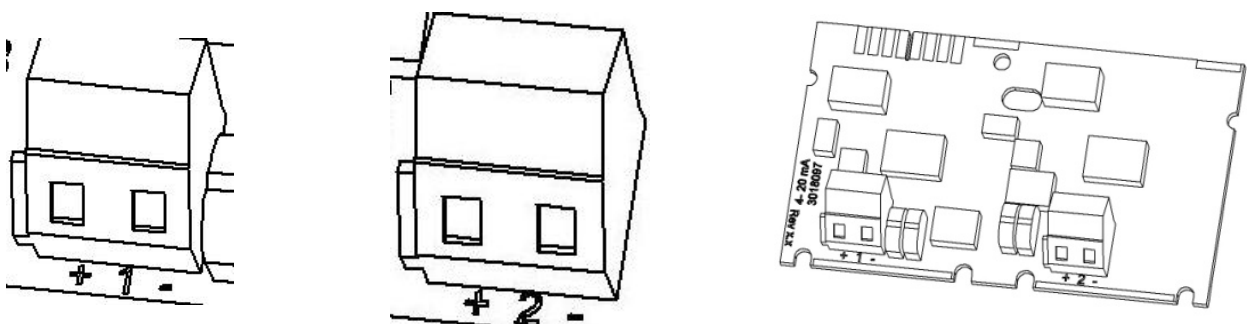
The pulse output specification is the same as pulse output 1 in 5.4 above, but not electrically isolated.



5.6 Analogue output function module

The module contains connections for 2 passive analogue outputs, which can be programmed as desired using the IZAR@SET software. The outputs are marked on the terminal strip as “1” and “2” with the respective polarity “+” and “-”.

- Passive; external power supply: 10...30 V DC
- Current loop 4 ... 20 mA, where 4 mA = 0 value; 20 mA = programmed max. value
- Overload up to 20.5 mA, then fault current
- Errors are generated at 3.5 mA or 22.6 mA (programmable)
- Output values: power, flow rate, temperatures



5.7 Test output

This test output located on the side is intended for use by test centres. The manufacturer provides two special cables for this:

- Volume test pulses
- Energy test pulses

Other specifications (pulse value, pulse duration/break, pulse frequency) can be obtained from the Inspection and Test Instruction.

6.0 Display

To show the data generated by the integrator in the display, various windows are provided as loop functions that can be called up in succession to display the system information associated with each window (e.g. energy amounts, running days, water amounts, current temperatures, maximum values). The energy meter has 6 different display loops:

main loop, day loop, information loop, pulse input/output loop, tariff loop and month loop.

The window content of each loop can be programmed almost as desired. The various display windows comprise up to seven displays that change at intervals of 2 - 4 s. The loops in the display are numbered from 1 to 6 to help the user find his way around quickly. The main loop is programmed with the current data as default setting, e.g. for energy, volume and flow rate.

7.0 Simple operation

The pushbutton is used to switch through the various displays. The button can be pressed for a short or long time. A short press of the button (<3 seconds) switches to the next display within a loop and a long press (>3 seconds) switches to the next display loop. The "Energy" window (sequence 1.1) in the main loop is the basic display. The meter automatically switches off the display to save power if the button is not pressed for approx. 4 minutes (except in the event of a fault) and returns to the basic display when the button is pressed again. The loop settings can be programmed to suit customer-specific requirements using the IZAR@SET software.

8.0 Error codes

The error code is displayed in the main loop if an error occurs. All the other windows can still be selected by pressing the button. The error code display appears again automatically if the button is not pressed for approx. 4 minutes. The error display disappears automatically as soon as the cause of the error has been cleared. All errors present longer than 6 minutes are saved in the error log.

Fejlvisning	Fejlbeskrivelse
C - 1	Basic parameter error in flash or RAM
E 1	Temperature range exceeds [-19,9 °C...199,9 °C] → Sensor short-circuit, sensor break
E 3**	Forward and return sensor reversed
E 4	Hardware error in ultrasonic measurement → transducer or drive defective or short-circuit
E 5	Communication not possible (too frequent reading)
E 6**	Wrong direction of flow in volume measuring component
E 7	No meaningful ultrasonic receive signal → air in the measuring path
E 8	No primary power supply (only if mains unit used), supply is via backup battery
E 9	Battery almost flat; calculated lifetime expired
E A*	Leakage: pipe break detected
E b*	Leakage: leakage detected in energy meter
E C*	Leakage: leakage pulse input 1
E d*	Leakage: leakage pulse input 2

* optional

** application-dependent

9.0 Declaration of conformity for devices after MID

These products conform to the essential requirements of the following directives:

- EMC Directive (2004/108/EC)
- R&TTE Directive (1999/5/EC)
- MID Directive (2004/22/EF)
- DE-10-MI004-PTB013 DE-10-MI004-PTB003