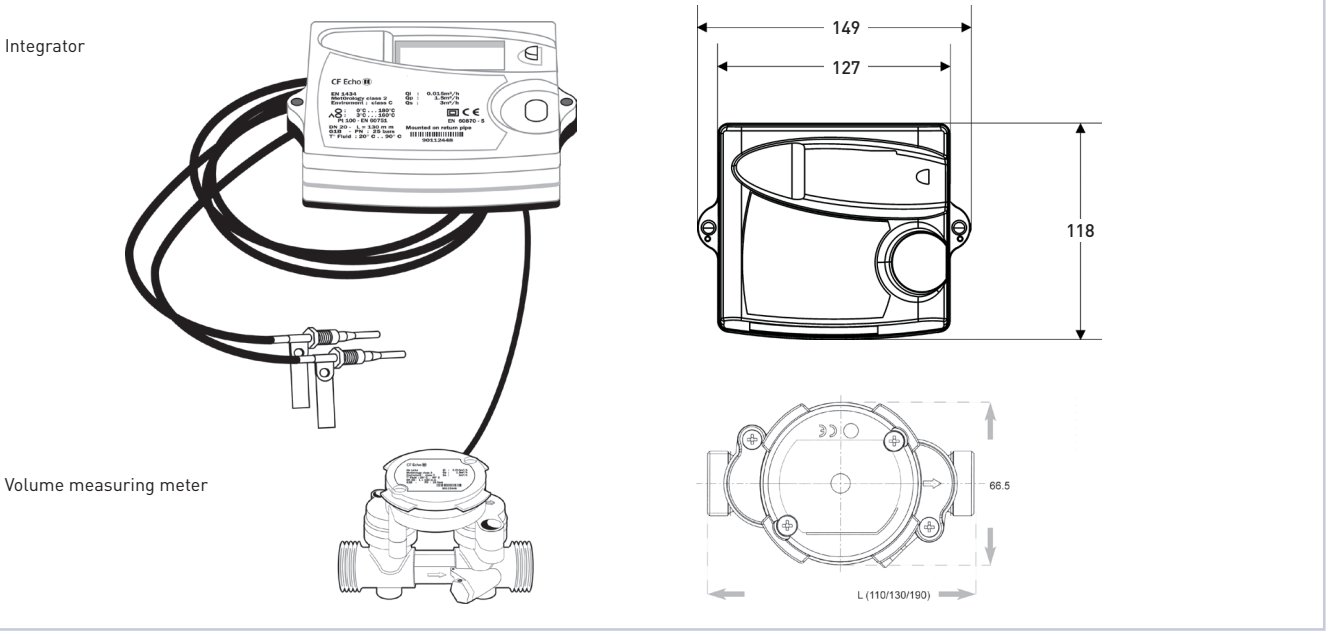
Building technology

GWF

Installation and operating instructions
CF-Echo II



1. Scope of delivery CF-Echo II

- 1 x integrator, removable, with battery or power supply unit connection cable app. 1,5 m, cannot be disconnected)
- 1 x permanently connected volume measuring meter
- 2 x temperature sensor with cable (optional)
- 1 x wall mounting bracket
- 1 x package, incl. meter sealing material, screws, wall plugs (6 mm)
- 1 x set of gaskets
- Installation and operating instructions

Required tools:
- 3 mm screwdriver
- Wrench
- Crosstip screwdriver

2. General information

The heat meter CF-Echo II is a high-quality electronic measuring instrument. The following instructions must be carefully observed to ensure correct installation and to fulfil all safety and guarantee conditions.

2.1 Safety information

Heating water circuits and mains power supplies are operated under high temperatures, high pressures or high voltages. If operated incorrectly, this may cause serious injuries. Therefore, the measuring instruments should only be installed by qualified and trained personnel. The casings of the heat meters are designed for cold, warm and hot water with the corresponding characteristic values, excluding any other liquid. If the meter casing is subjected to strong vibrations and impacts, or dropped from a height of more than 60 cm, etc., the heat meter must be replaced. Pipes must be earthed. Disconnect the mains voltage (optional) before opening the integrator.

2.2 CE marks and protective classes

The measuring instrument CF-Echo II fulfils all requirements of CE guidelines and is approved for environmental class C (industrial applications) according to DIN EN 1434:

- Ambient temperature +5 to +55 °C (indoor installation)
- Storage temperature (without battery) -10 to +60 °C
- Relative atmospheric humidity ‹95%
- Absolute altitude ‹2000 m
- Protective class IP64 according to DIN 40050 (protection against dust and splashing) volume measuring meter IP66/67
- EMC protection according to EN 1434-4 (2007)
- Double protective insulation ⧈ (protective class II according to EN 60010-1 (2011))
- CF-Echo II fulfils the requirements for pressurized instrument guideline (97/23/EC) concerning specific pressures and temperatures
- Do not dispose of electronic devices or batteries contained in CF-Echo II in normal household waste. Please return our products to us free of charge after use for correct disposal in accordance with local regulations.

2.3 Further important information

- The flow meter must not be lifted or transported by the connecting cable.
- Select a mounting position that ensures the connection cable of the volume measuring meter and the temperature sensor cables are not in the vicinity of mains cables or other sources of electromagnetic disturbances (minimum distance 50 cm).
- Do not install cables along hot pipes reaching temperatures above 55 °C.
- Opening of calibration seals will result in the loss of calibration validity and warranty.
- Only clean the casing on the outside with a soft, slightly damp cloth. Do not use detergents.
- Installation must be carried out according to DIN EN 1434.

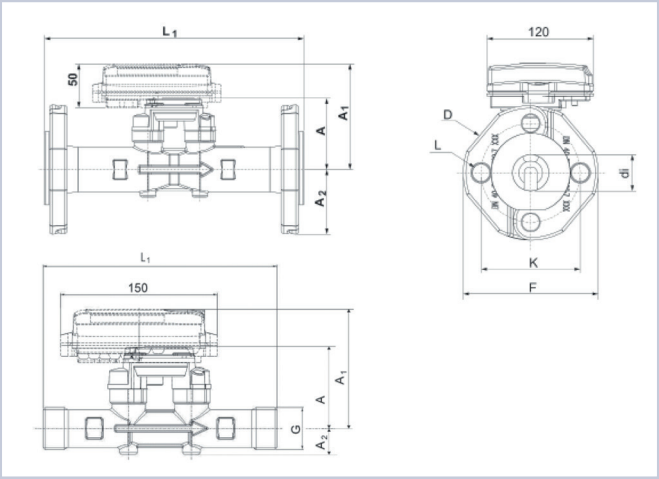
3. Mounting the volume measuring meter

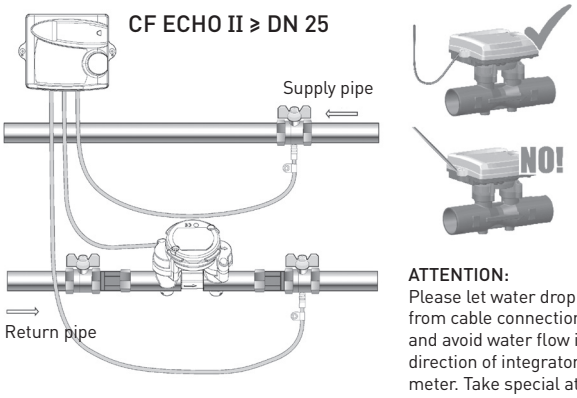
3.1 Operating conditions and limit values

The operating parameters of the heating circuit must not exceed the following values:
Nominal pressure 16/25 bar, operating temperature 130 °C, short-term maximum temperature 150 °C. For further technical data, please refer to the table below:

Thread connection													
Connection			Thread acc. to ISO 228										
Materials	Transducer		Stainless steel										
	O-Ring		EPDM										
	Pipe		Brass CuZn36Pb2AS				Bronze CuPb5Sn5Zn5						
Nominal flow rate	q_p	m^3/h	1,5	1,5	2,5	2,5	3,5	3,5	6	6	6	10	10
Maximum flow rate	q_s	m^3/h	3	3	5	5	7	7	12	12	12	20	20
Minimum flow rate	q_i	l/h	15	15	25	25	35	35	60	60	60	100	100
Starting flow		l/h	3	3	5	5	7	7	12	12	12	20	20
Nominal diameter	DN	mm	15	20	20	20	25	25	25	25	32	40	40
Length	L1	mm	110	130	130	190	150	260	150	260	260	200	300
Connection thread on meter	G...B	Inch	¾	1	1	1	1¼	1¼	1¼	1¼	1½	2	2
Height	A A1 A2	mm mm mm	72 110 18	72 110 18	72 110 18	72 110 18	77 114 23	77 114 23	77 114 23	77 114 23	77 114 23	85 123 35	85 123 35
Weight		kg	1,1	1,2	1,1	1,4	1,5	1,9	2,4	2,0	1,8	2,5	5,5
Internal diameter	d_i	mm	19	19	29	29	28,5	28,5	28,5	28,5	28,5	44	44
Pressure loss @ q_p		bar	0,22	0,22	0,17	0,17	0,11	0,11	0,13	0,13	0,13	0,09	0,09

Flange connection							
Connection			Flanged acc. to ISO 7005-3, PN 25				
Materials	Transducer		Stainless steel				
	O-Ring		EPDM				
	Pipe		Brass CuZn36Pb2AS	Bronze CuPb5Sn5Zn5			
Nominal flow rate	q_p	m^3/h	2,5	3,5	6	10	15
Maximum flow rate	q_s	m^3/h	5	7	12	20	30
Minimum flow rate	q_i	l/h	25	35	60	100	150
Starting flow		l/h	5	7	12	20	30
Nominal diameter	DN	mm	20	25	25	40	50
Length	L1	mm	190	260	260	300	270
Height	A1	mm	110	114	114	123	123
Weight movable flanges (former version)		kg	3,2	4,5	4,5	8,2	9,0
Weight mobile flanges (new version)		kg	-	3,6	3,7	6,5	7,0
Flange external dimension	D	mm	105	115	115	150	165
Hole circle diameter	K	mm	75	85	85	110	125
Bolt holes diameter	L	mm	14	14	14	18	18
Flange dimension	F	mm	100	110	110	140	160
Internal diameter	d_i	mm	20	28,5	28,5	44	44



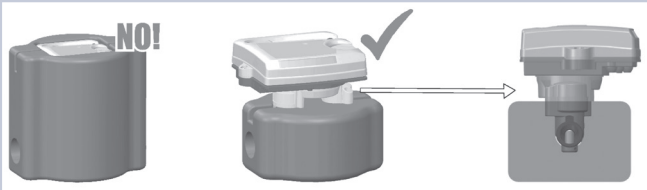


ATTENTION:
Please let water drop down from cable connections and avoid water flow in direction of integrator/flow meter. Take special attention in cooling systems due to condensating water.

3.2 Installation information

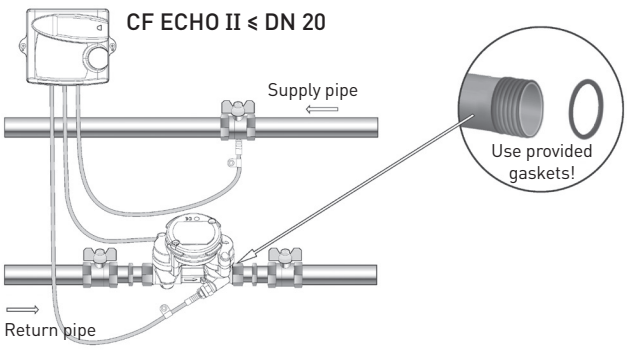
- Never carry out welding or drilling work near the meter.
- Leave the meter in its original packaging until all connections, insulating, painting and cleaning tasks have been performed.
- Always install the meter according to the mounting position indicated on the nameplate (supply or return).
- The volume measuring meter may be installed either horizontally or vertically, but not upside down.
- The heat meter must be protected against shocks and vibrations which might occur at the place of installation. Shut-off valves must be opened slowly during commissioning.
- Thread and flange connections at the meter must comply with the nominal diameter DN and nominal pressure PN (according to EN 1092) of the corresponding counterparts of the pipes. The measuring instrument must not be subject to excessive tension caused by pipes or moulded parts. The pipes of the heating system must be securely fastened in front of and behind the heat meter. With flange connections, all screws must be used and tightened. All screws, nuts and gaskets used must comply with the nominal diameter DN, nominal pressure PN, the maximum admissible temperature and pressure.

3.3 Installation isolation

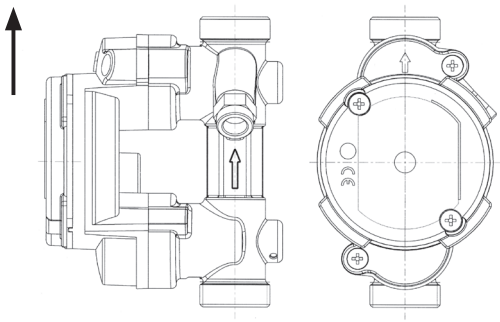


ATTENTION: Do not cover plastic parts of the meter with isolating material.

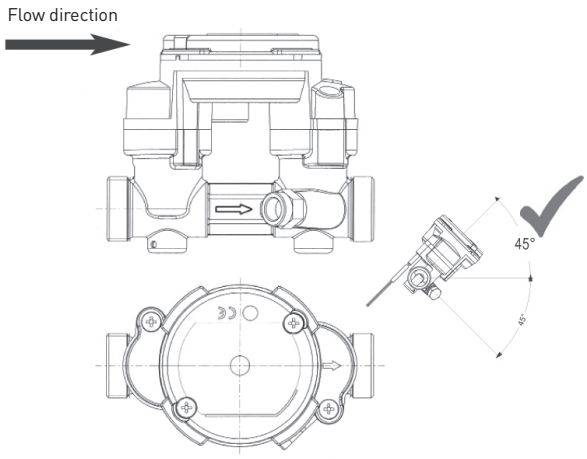
3.4 General installation schematic



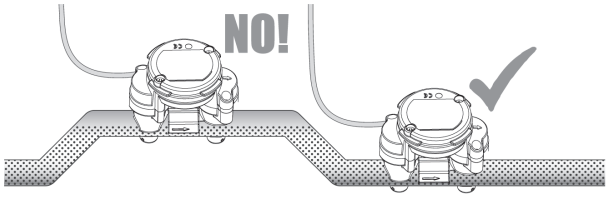
3.5 Position of the volume measuring meter



Flow direction, e.g. rising pipe, vertical mounting

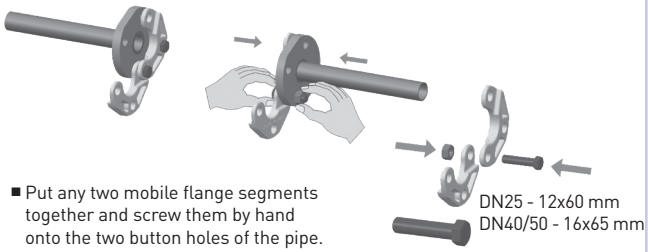


Horizontal mounting



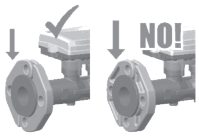
ATTENTION: The flow meter must always be completely filled with liquid! Flow meter must not be installed at the highest point of an installation to avoid air inside the meter.

3.6 Mounting of meter with mobile flanges (new version)

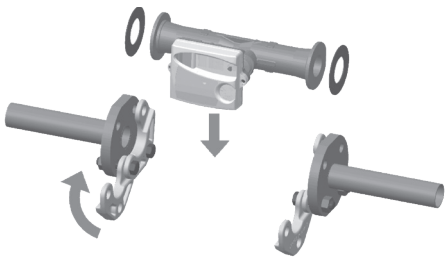


- Put any two mobile flange segments together and screw them by hand onto the two button holes of the pipe.
- Leave the mobile flanges open.

DN25 - 12x60 mm
DN40/50 - 16x65 mm

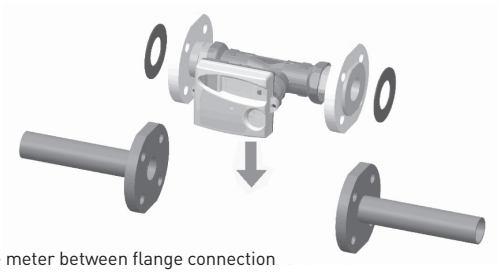


ATTENTION:
Smooth side of flange outwards.

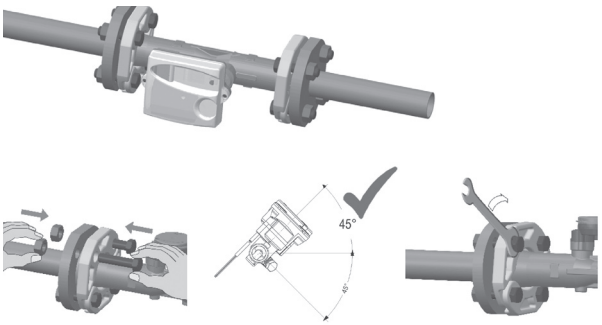


- Place meter into open mobile flanges
  ATTENTION: Use provided gaskets!
- Close mobile flanges

3.7 Mounting of meter with movable flanges (former version)



- Place meter between flange connection of pipe
  ATTENTION: Use provided gaskets!

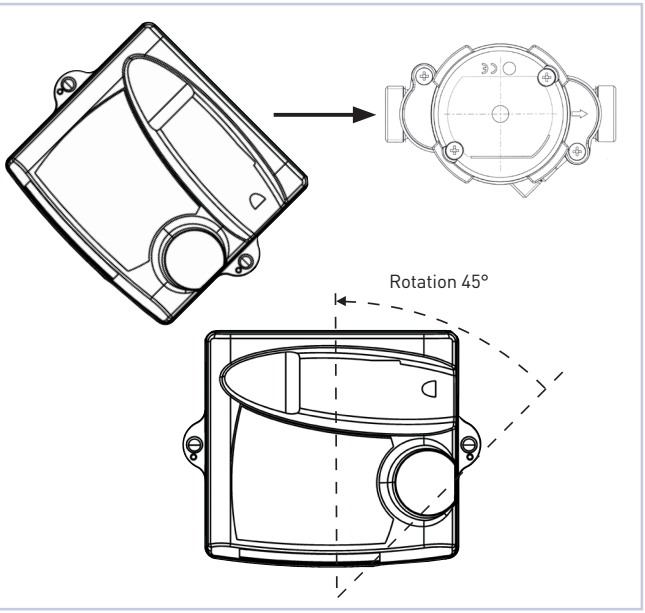


- Insert remaining screws and screw them first by hand
- Align flow meter into correct position
- Tighten all screws with a tool/spanner

4. Mounting of the integrator

4.1 Mounting at the volume measuring meter

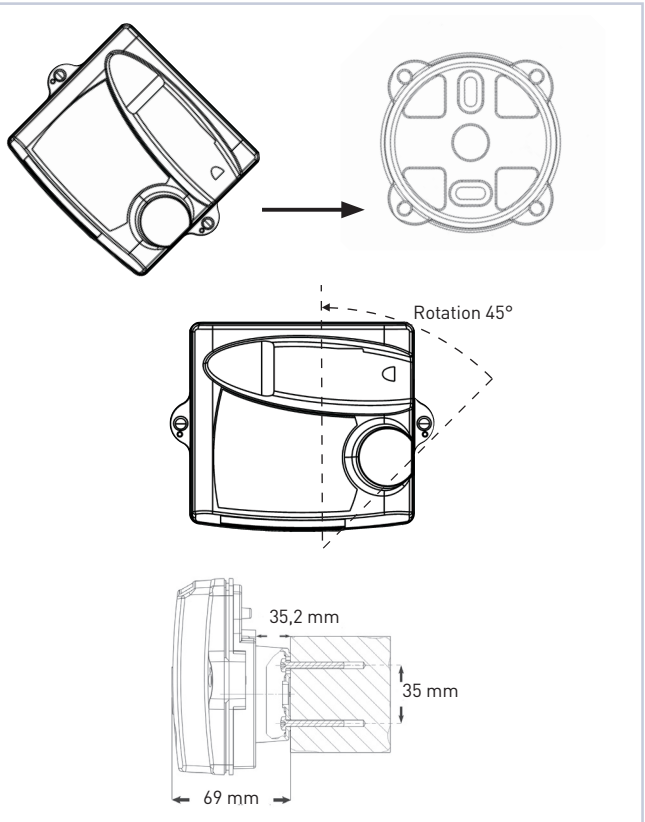
The integrator must not be installed at the volume measuring meter if the ambient temperature is permanently above 55 °C or in case of cooling operations.



Place the integrator on the bracket at a 45° angle. Rotate the integrator 45° until it engages.

4.2 Wall mounting

If the temperatures in the heating circuit are permanently above 90 °C or the ambient temperature is above 55 °C, it is recommended to mount the integrator on a wall.



Screw the supplied wall bracket to the wall or fasten it to a cool pipe. Place the integrator on the bracket at a 45° angle. Rotate the integrator 45° until it engages.

5. Mounting the temperature sensors (if not already factory mounted)

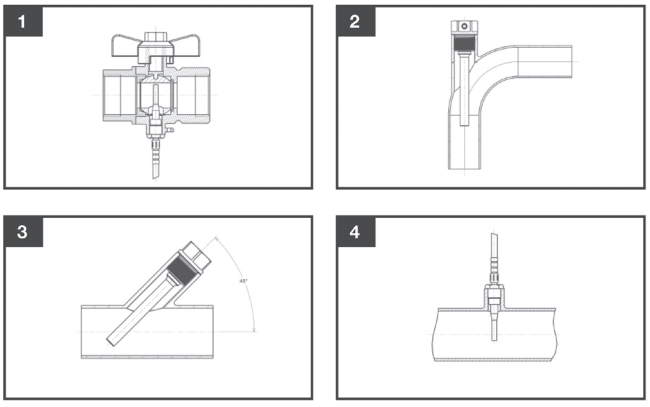
5.1 Technical data

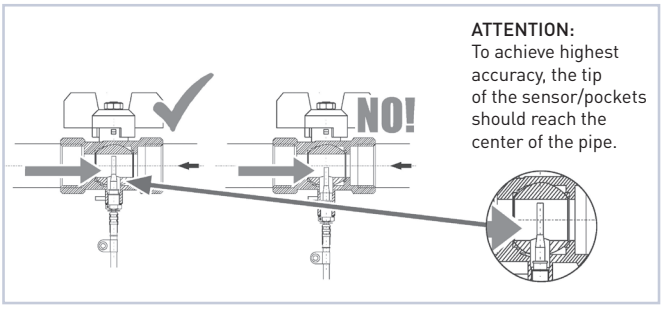
Connection:	2-wire technology
Cable diameter:	3,5 ... 6,5 mm
Max. wire section:	0,2 ...1,5 mm^2
Type:	Pt 100 according to DIN EN 60751 (Observe nominal value of the integrator please refer to nameplate!)

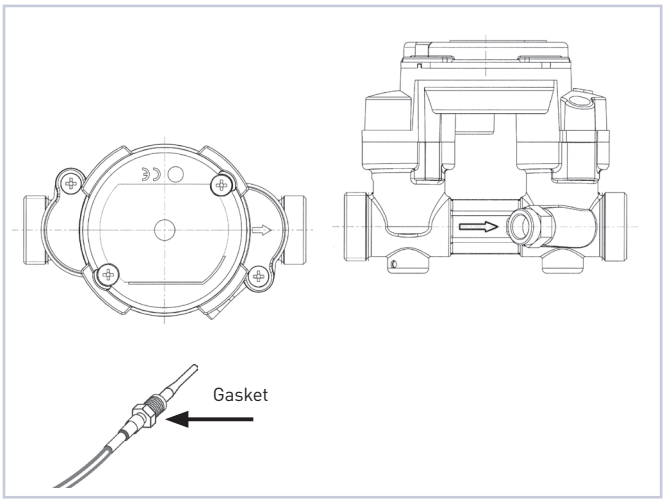
5.2 Mounting

Only use pairs of temperature sensors with the same serial number. Do not shorten or lengthen sensor cables on site. Install the sensors in accordance with DIN EN 1434. With nominal flows q_p 0,6 - 2,5, the return measuring point for direct measuring sensors of type DS or pocket sensors of type PS must be integrated in the volume measuring meter.

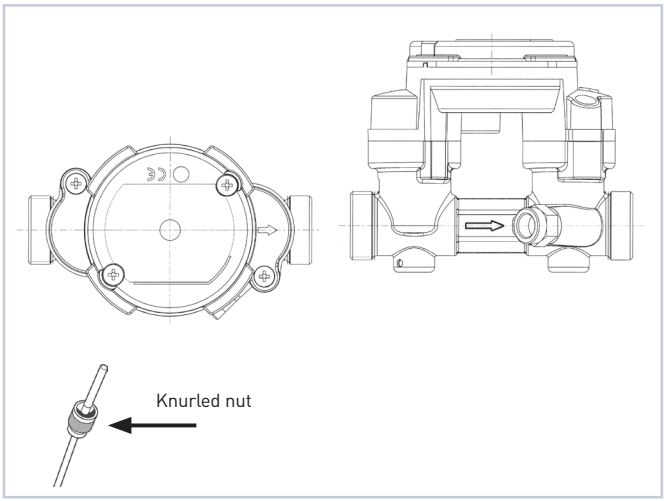
- Both supply and return temperature sensors should be installed in a similar way to ensure symmetric measurement and therefore best accuracy. Don't mix direct installation and installation in pockets.
- When laying the cables, a minimum distance of 50 mm to main power cables and/or sources of electromagnetic interferences should be respected.
- In case of strong sources for electromagnetic disturbanes (e.g. high power machines and pumps, frequency and power converters, power switches, neo tubes) it's recommended to increase the minimum distance to meter signal cables to 50 cm.







Direct measurement in the volume measuring meter (DN 15/20 only)



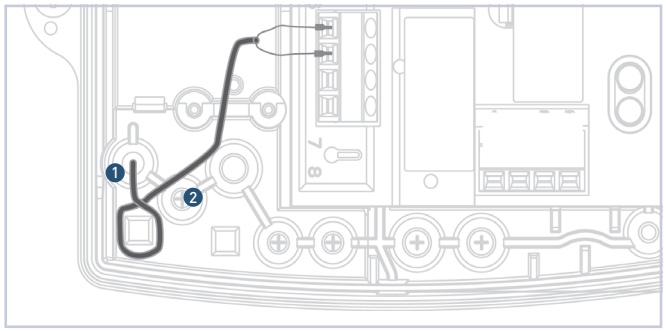
Immersion sleeve in the volume measuring meter (DN 15/20) only)

5.3 Connecting the temperature sensor cables

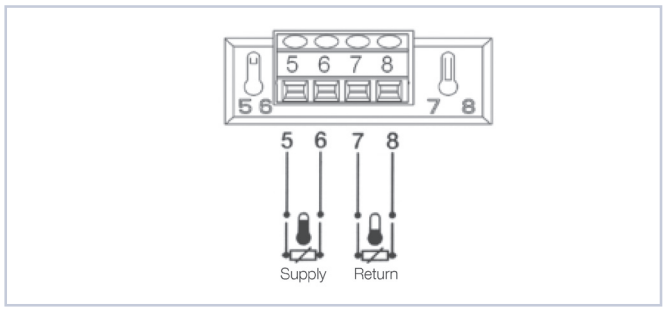
Please note the following instructions to connect temperature sensors in heating-, cooling or combined heating-cooling systems:

	Warm connector	Cold connector
Heating system	supply pipe	return pipe
Cooling system	return pipe	supply pipe
Combined heating-cooling system	supply pipe	return pipe

- Pierce the first and second cable entries of the integrator (from the left).
- Pull the cable of the supply temperature sensor (= warmer pipe) through the first cable entry and the cable of the return temperature sensor through the second cable entry, from the left.
- Make a loop to resist tension and loop over the corresponding support. (see figure)
- Connect the wires to the terminal strip according to the terminal assignment diagram (protected against reverse polarity).

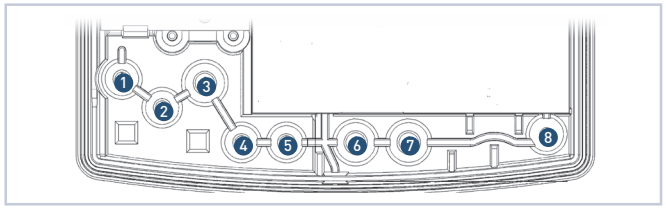


5.4 Plan of terminal connections



Cable entries:

1. Ø4,25 ± 0,75 mm² - T. sensor (supply)
2. Ø4,25 ± 0,75 mm² - T. sensor (return)
3. Ø6 ± 1 mm² - Mains power supply – optional
4. Ø4,25 ± 0,75 mm² - Optional:
5. Ø4,25 ± 0,75 mm² - Optional:
6. Ø6 ± 1 mm² - T. sensor (supply) /optional
7. Ø6 ± 1 mm² - T. sensor (return) /optional
8. Ø3,75 ± 0,75 mm² - Volume measuring meter



6. Power supply

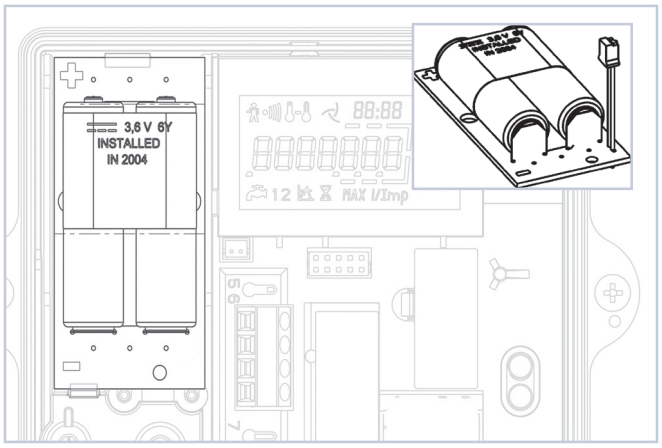
Two types of power supply are available.

6.1 Battery for 12 years

Type 2 x lithium 3,6 V-AA, soldered to an insert board

- Only use original battery.
- Do not recharge, open, heat to more than 100 °C, expose to an open flame or immerse in water.
- Do not dispose of in household waste but return it to GWF AG after use for correct disposal in accordance with local regulations.
- Connect the battery using plug-in connectors.
- Place the battery in the corresponding recess in the integrator casing and engage.

CAUTION: If the battery has been disconnected for longer than 5 minutes, it might be necessary to reset the internal clock.



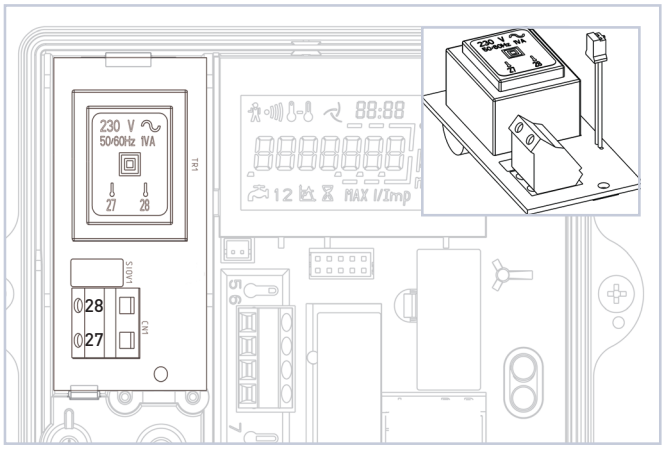
Lithium 3,6 V-AA

CAUTION: Risk of exlosion if battery is replaced by an incorrect type. Dispose of used batteries in accordance to local government regulations.

6.2 Mains module

Mains voltage	230 V ±15%
Mains frequency	50 Hz ±2%
Maximum power consumption	1 VA
Type of cable	2 wires (no earth)
Cable diameter	4,5 mm ...7,0 mm
Wire cross section	0,5 mm²... 2,5 mm²

Heat meters with mains power supply must be connected according to the installation instructions. The mains power supply must be protected against unintentional voltage failures. Protective systems (circuit breakers) must be used in order to ensure secure disconnection of the instrument from the mains in the event of electric problems (breaking current < 1 A).



Mains module

An emergency circuit breaker must:

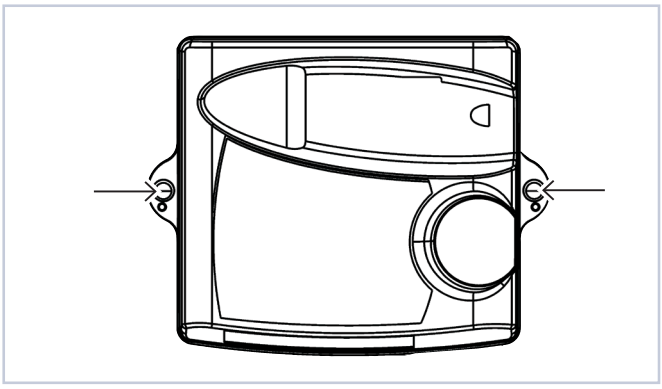
- be installed within reach
- be clearly recognizable as an emergency circuit breaker
- cut off both wires
- clearly show the on/off position

The connection cable of the mains module must be directly connected to the circuit breaker.

- Disconnect the mains voltage (circuit breaker).
- Open the integrator casing and connect the mains power supply to the integrator using the plug.
- Insert the mains module into the corresponding recess in the casing.
- Pierce the third cable entry from the right and pull through the mains cable.
- Mount the cable strain relief.
- Connect wires to terminals no. 27 and 28 (protected against reverse polarity, strip 8 mm of insulation).
- Close the casing lid and switch on the mains voltage.

7. Commissioning

- Check all the functions, especially plausibility of the displayed temperatures and volume flow.
- Replace the upper casing and screw tight.
- Secure the screws with user seals (supplied plastic seals or wire seals).



8. Operating instructions CF-Echo II

A heat meter is a measuring instrument for recording the energy released in a heating or cooling system. A split heat meter consists of the following components: temperature sensor pair, volume measuring meter and integrator. The integrator records the measured values for the sensor pair and the volume measuring meter and enables the display of various data on three separate display levels.

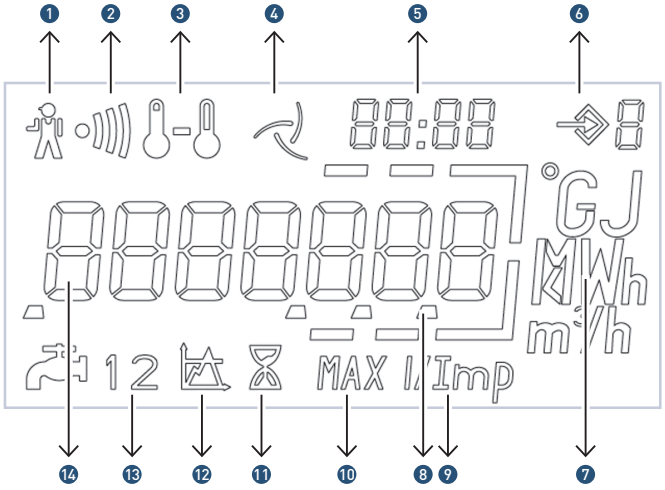
Display level 1:
Billing level (cumulated energy and volume flow display)

Display level 2:
Service level (current operating data of the heat meter)

Display level 3:
Due date level (13/24* monthly values for cumulated energy and volume flow)

*Software version 20-47 and higher

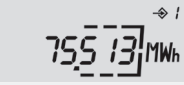
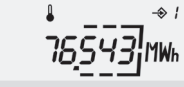
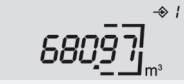
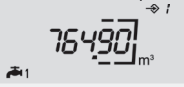
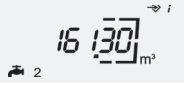
8.1 LC display and meaning of the segments

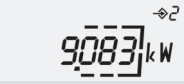
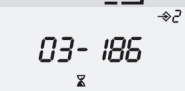
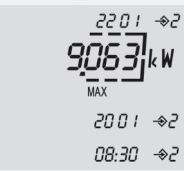


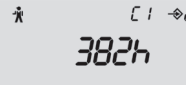
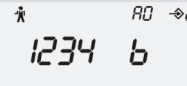
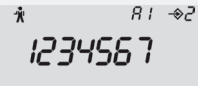
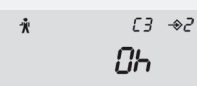
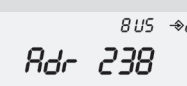
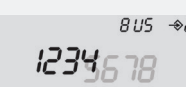
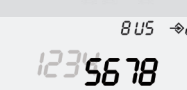
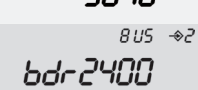
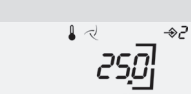
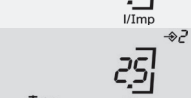
1. **Alarm symbol:** Energy measurement stopped. For cause of error, see 8.3.5.
2. **Soiling warning:** Energy measurement continues; the volume measuring meter must, however, be cleaned.
3. **Temperatures:** Shown for temperature-related displays or for cooling energy in case of combined heating/cooling meters.
4. **Flow display:** Permanent symbol: Flow is present / Flashing symbol: No flow
5. **Time and date:** Shows the time and date in relation to time-related displays, e.g. due day values and maximum values.
6. **Display level:** Currently selected display level
7. **Unit:** Physical unit
8. **Decimal point**
9. **Pulse value of externally connected water meters** (only when using a corresponding option board)
10. **Maximum value:** Is shown when maximum values are displayed
11. **Operating time:** Is shown when the operating time is displayed
12. **Not used**
13. **Water meter 1 or 2:** Display concerns external water meter (1 or 2)
14. **Main display section:** Seven digits for displaying all cumulated and current values

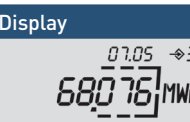
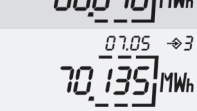
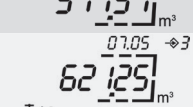
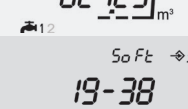
8.2 All display levels and levels in detail

Depending on the device version, the actual display range can deviate from the one shown here. Press the push button to activate the LC display. Press the push button for a longer period (2 s) to change the level and briefly press the push button to change the display.

Function	Display	Level
Energy (MWh, kWh or GJ)		1
Cooling energy (MWh, GJ or kWh) (optional)		1
Volume		1
LCD test		1
Water meter 1 (optional)		1
Water meter 2 (optional)		1

Function	Display	Level
Flow		2
Power		2
Supply temperature		2
Return temperature		2
Temperature difference		2
Operating time		2
Maximum power display day + month/year/time permanent change of display		2
Maximum flow value day + month/year/time permanent change of display		2
Maximum supply temperature value day + month/year/time permanent change of display		2

Function	Display	Level
Failure hours		2
Error code temperature measurement		2
Error code flow measurement (optional)		2
Overload times (optional)		2
Mains voltage failure times		2
M Bus primary address (optional)		2
M Bus secondary address (optional)		2
M Bus secondary address (optional) digits 5 - 8		2
M-Bus baudrate		2
Pulse weight water meter		2
Pulse weight water meter 1/2 (optional)		2

Function	Display	Level
Due day values energy, month 1 ...13/24*		3
Due day values cooling energy, month 1 ...13/24* (optional)		3
Due day values volume, month 1 ...13/24*		3
Due day values water meter 1/2 month 1 ...13/24*(optional)		3
Software version		3

*Software version 20-47 and higher

8.3 Information on special display functions

(partly optional, depending on the device version)

8.3.1 Energy and volume index (display levels 1 and 3)

The energy unit is programmed in the factory. As standard, energy is displayed in MWh, kWh or GJ are optionally also possible.

8.3.2 Cooling energy (display level 1)

Display of the cumulated cooling energy with instrument versions for application in combined heating/cooling circuits (for detailed information, please refer to point 10).

8.3.3 Water meters 1 and 2 (display level 1)

Display of the meter readings of additionally connected water meters with pulse output when using a corresponding option board (for detailed information, please refer to point 9).

8.3.4 Maximum value display (Display level 2)

These displays show the current monthly maximum values for power output, flow and supply temperature with time stamp. Internally, 13/24* monthly maximum values are stored which can be read via the M Bus or the optical interface. The period for determining the maximum values is 15 minutes.

*Software version 20-47 and higher

8.3.5 Malfunction messages (display level 2)

In the event of malfunctioning, CF-Echo II displays a symbol «». If this fault message is displayed, contact the responsible technician. CF-Echo II shows detailed information on malfunctions in special display levels (see display description).

Display level → 2 Operation shutdown code
A0 = Temperature recording faults

1 = Supply temperature sensor is not connected, pipe is interrupted or broken



2 = Return temperature sensor is not connected, pipe is interrupted or broken
3 = Negative temperature difference; temperature sensors have been exchanged (except for combined heating/cooling metering)
4 = Analogue / Digital converter is broken (replace the instrument)
b = Low battery voltage (replace the battery)*

*Software version 20-47 and higher

Display level → 2 Operation shutdown code (optional)
A1 = Flow rate measuring faults

1 = Return in the meter or pipe system



2 = Air in the pipe system, broken ultrasound sensors or very heavy deposits (cleaning or inspection required)
3 = The maximum admissible flow rate has been exceeded
* This message is a warning and does not mean that the measurement is terminated.
4 = Connection cable to the volume measuring meter or connection to the ultrasound sensors has been disconnected.
5 = No flow for > 24 h, but ΔT >15 K
6 = No data communication between integrator and volume measuring meter (=usual for 2-wire pulse pick-ups)
7 = Option board fault

8.3.6 M-Bus parameters (display level 2)

Presentation of characteristic data for remote data readout via M-Bus or optical interface.

8.3.7 Due day values (display level 3)

Representation of 13/24* monthly end values of the cumulated values for energy, volume, cooling energy (optional) and volume of the connected water meters with time stamp, starting with the end value of the previous month.

*Software version 20-47 and higher

9. Plug-in option boards

The function range of the integrator may be extended for data communication and remote data display using different plug-in option boards. The following option boards are available:

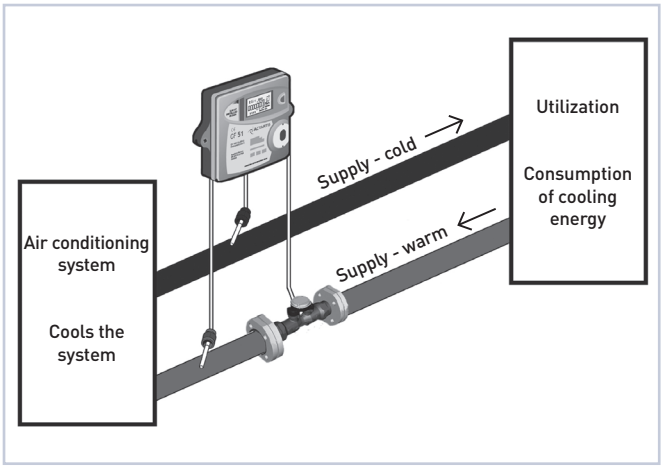
- M-Bus / 2 water meter inputs
- M-Bus / 2 pulse outputs for energy + volume
- M-Bus Power / 2 water meter inputs
- LonWorks / 2 water meter inputs

Details on installation and commissioning are described in the installation and operating instructions of the respective option board.

10. Special version for application in cooling and combined heating/ cooling circuits

10.1 Integrator for application in cooling circuits

With this product version, the heat meter integrator has been specifically labelled and programmed in the factory for application in cooling systems.



Operation, LC display and application of the option boards are similar to the heat meter integrator; however, all energy and output-related displays, M-Bus data as well as remote display pulses refer to the cooling energy in this case.

The integrator has been programmed for the installation of the volume measuring meter in the «warm» pipe of the cooling system (= return of the cooling system). A version programmed for installation of the volume measuring meter in the cold pipe is also available as an option.

10.2 Integrator for application in combined heating / cooling circuits

With these product versions, the integrator has been specifically labelled and programmed in the factory for application in air conditioning systems with combined heating and cooling operation.

Operation, LC display and application of the option board are generally similar to the heat meter integrator; the following special characteristics must, however, be observed:

Basic conditions for metering heating and cooling energy

- Heating energy is measured as soon as the temperature difference ΔT exceeds a value of 0,5 K and the supply temperature exceeds 25 °C. (ΔT = supply temperature T_v - return temperature T_r).
- Cooling energy is measured as soon as the temperature difference ΔT remains below -0,5 K and the supply temperature T_v is below 25 °C.
- A version with switched off supply temperature threshold is available as an option.

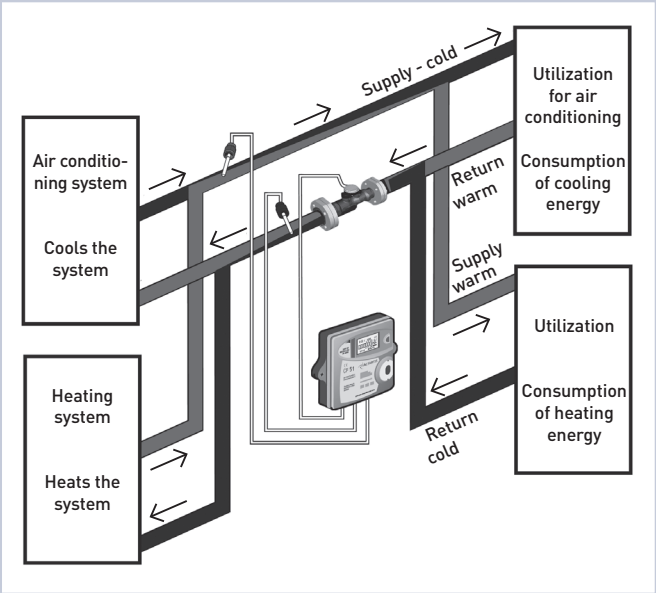
LC display

- Cooling energy is displayed on an additional tab in the 1st display level. A thermometer symbol is displayed simultaneously to differentiate heating energy.
- 13/24* due day values (monthly end values) of cooling energy can be called in the 3rd display level.

  *Software version 20-47 and higher

Option boards for remote display

- The option board outputs are marked with «E» (for energy) and «V» (for volume). With this product version, pulses proportional to the cooling energy are output at the output marked «V».



This product version has been programmed for installation of the volume measuring meter in the return pipe of the air conditioning system (= cold pipe in heating operation, warm pipe in cooling operation). A version programmed for installation of the volume measuring meter in the supply pipe is also available as an option.

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