

zelsius® C5-ISF

Installation and operating manual

electronic compact heat meter

with single-jet flow sensor ISF

M-Bus, wM-Bus and 3 inputs/outputs optional

q_p 0,6/1,5/2,5 m³/h



Installation manual

General information

With zelsius® C5-ISF you have acquired one of the most up-to-date, modern heat meters currently available on the market.

Expressive symbols in the display and easy menu navigation make readout simple. Can be operated with one single button. It is equipped with a long-life battery made for operation during the initial verification validity period (5 years) including a reserve of at least another year. The meter can be equipped optionally with a battery lifetime of 11 years.

MID - Initial verification

zelsius® C5-ISF is produced and tested in compliance with the new European Measuring Instruments Directive (MID). According to this directive, devices are no longer carrying an initial verification stamp, but rather the year of the device's declaration of conformity (recognizable on the front of the device, for example: M12). The MID controls the use of heat meters up to the moment they are placed on the market resp. their first putting into use. After this, the national regulations for devices subject to compulsory verification apply within the EU.

The duration of initial verification validity in Germany remains 5 years for heat meters. After this period has expired the measuring device may no

longer be used for billing in commercial use. The regulations resp. validity period may vary in other countries of the EU.

ZENNER International GmbH & Co. KG declares that this product with the number of the EC type-examination certificate DE-12-MI004-PTB010 complies with the requirements of the EC directives 2004/22/EC (Measuring instruments directive) and 89/336/EEC (electro-magnetic compatibility).

Electro-magnetic interference

zelsius® C5-ISF fulfils the national and international requirements for interference resistance. To avoid malfunctions due to other interferences, do not install fluorescent lamps, switch cabinets or electric devices such as motors or pumps in the immediate vicinity of the meter (minimum distance 1 m). Cables leaving the meter should not be laid parallel to live cables (230V) (minimum distance 0.2 m).

Care instructions

Clean plastic surfaces with a damp cloth only. Do not use any scouring or aggressive cleaning agents! The device is maintenance-free during the service life. Repairs can only be made by the manufacturer.

The most up-to-date information about this product and of our installation notice can be found at www.zenner.com.

| Technical data flow sensor ISF | | | | |
|---|-------|---|---------|----------|
| Nominal flow qp | m³/h | 0,6 | 1,5 | 2,5 |
| Maximum flow qs | m³/h | 1,2 | 3,0 | 5,0 |
| Minimum flow qi horizontally* | l / h | 12 / 24 | 30 / 60 | 50 / 100 |
| Minimum flow qi vertically* | l / h | 12 / 24 | 30 / 60 | 50 / 100 |
| Starting flow horizontally ca. | l/h | 4 | 4 | 5 |
| Pressure loss at qp | bar | <= 0,25 bar | | |
| Temperature range | °C | 10°C <= θ_q <= 90°C | | |
| Minimum pressure (to avoid cavitation) | bar | 0,3 | | |
| Measurement accuracy class | | 3 | | |
| Nominal pressure | PS/PN | 16 | | |
| Nominal diameter | DN | 15 | 15 | 20 |
| Installation position | | horizontally or vertically, no upside down installation | | |
| Installation | | return flow optionally forward flow | | |
| Cable length up to calculator (in version combi) | m | 1,2 | | |
| Installation place temperature sensors | | M10 x 1 | | |
| Heat carrier (Medium) | | water | | |

* Standard: Ratio 25; optionally R50 but not for qp=0,6 and non-symmetrical temperature sensors installation

| Technical data temperature sensors | | |
|------------------------------------|----------------------|--|
| Platinum resistance | | Pt 1000 |
| Sensor diameter/type | mm | Standard: 5,0 (DS according to EN 1434); other sizes on demand |
| Temperature range | °C | 0 - 105 |
| Cable length | m | 1,5 (opt. 5) |
| Installation | forward temp.-sensor | by direct immersion or by immersion sleeves (in case of existing measuring points) |
| | return temp.-sensor | by direct immersion or by immersion sleeves (in case of existing measuring points); optionally integrated in flow sensor |

Technical data calculator

| | | |
|---|-----------------------------|---|
| Temperature range | °C | 0...105 |
| Temperature difference range | K | 3...80 |
| Display | | LCD 8-digit + additional character |
| Ambient temperature | °C | 5...55 |
| Minimum temperature difference | K | 3 (cooling or change-over: 2) |
| Resolution temperature | °C | 0,01 |
| Measurement frequency | s | adjustable ex works, beginning with 2s, standard 30s |
| Unit to read the heat consumption | | Standard MWh; optionally kWh, GJ |
| Data storage | | 1 x daily |
| Due date values | | Storage of all monthly values during the entire operating time |
| Maximum value storage | | extensive storage of flow rate, performance and other parameters |
| Interface | Standard | optical interface (ZVEI, IrDA) |
| | optional | M-Bus, wM-Bus, RS485, radio |
| Supply | | 3,6 V lithium battery (different capacities) |
| Battery lifetime | Years | > 6, opt. > 11 (changeable during the operation time) |
| Protection class | | IP54 |
| EMC | | C |
| Ambient conditions / climatic influencing (valid for complete compact meter) | - climatic | Highest permissible ambient temperature 55°C Lowest permissible ambient temperature 5°C Humidity class IP54 |
| | - mechanical class | M1 |
| | - electro-magnetic class | E1 |

Pulse inputs and outputs (optional)

By meters with pulse outputs, the pulse value can be called up in the display (see the display overview, Level 4).

The pulse value of the outputs is permanently set and corresponds with the last position of the associated display value.

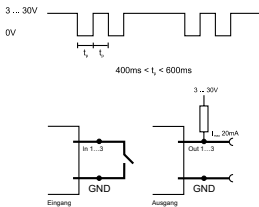
Example:

Output 1 = energy output

Energy display = XXXXX.XXX

Last position = 0.001 MWh = 1 kWh

Output pulse = 1 kWh



| colour | connection | signification |
|--------|------------|---------------------------|
| white | I/O 1 | In-/Output 1 |
| yellow | I/O 2 | In-/Output 2 |
| green | I/O 3 | In-/Output 3 |
| brown | GND | common ground for I/O 1-3 |

| Technical data M-Bus | |
|----------------------|------------------|
| Cable length | 1,5 m |
| Cable | D=3.8 mm, 2-core |

Technical data I/O

| | |
|-------------------|---------------------------|
| Load max. | max. 30V DC/20 mA |
| I/O 1, 2, 3 | Open Drain, n-channel FET |
| Cable | D = 3.8 mm, 4-core |
| Pulse-duty factor | 1:1 (out); 1:5 (in) |
| Cable length | 1,5 m |
| Input frequency | max. 1 Hz |

A firmly attached cable is included: external wiring must be done by oneself.

M-Bus (optional)

The optional M-Bus interface complies with the norm 1434-3 and operates with 2400 baud fixed. The two conductors can be connected in any order to the M-Bus network.

| colour | connection | signification |
|--------|------------|---------------|
| brown | M-Bus 1 | M-Bus-Line 1 |
| white | M-Bus 2 | M-Bus-Line 2 |

Dimensions

Height compact version: $H_{\max} = 55 \text{ mm}$

$E_{\max} = 21 \text{ mm}$

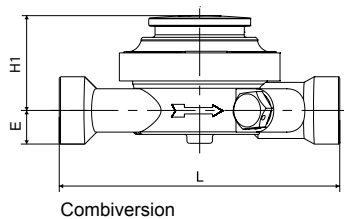
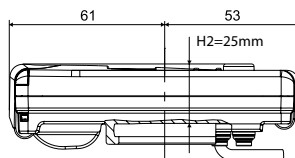
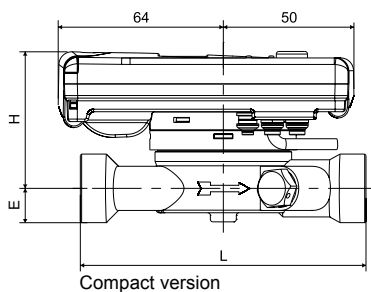
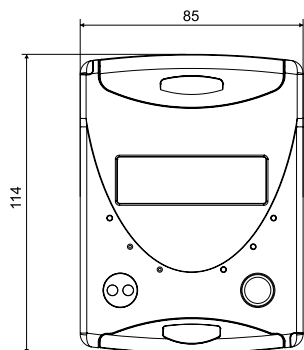
Height combiversion:

$(H1+H2): H_{\max} = 65 \text{ mm}$

$E_{\max} = 21 \text{ mm}$

Connecting sizes

| | | | | | |
|--------------------------------------|------|-------------------|-------|-----|-----|
| Nominal flow | qp | m ³ /h | 0,6 | 1,5 | 2,5 |
| Nominal diameter | DN | mm | 15 | 15 | 20 |
| Connecting length AS | L | mm | 110 | 110 | 130 |
| High | H1 | mm | 40 | 40 | 40 |
| Required minimum installation height | min. | = | 30 mm | | |



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Installation instructions

General information

Read these instructions carefully right up to the end before starting to mount the device!

The installation has to be done by qualified professional personnel. The current laws and regulations have to be observed, especially EN1434 part 1+6, (in Germany also AGFW directive FW202, FW510, FW218 and DIN4713 part 4 and the initial verification directive). At devices with M-Bus the general rules of technology and the respective regulations for electrical installations have to be followed.

Make sure no heating water escapes during installation – **this can cause burns!**

The maximum heating water temperature at the flow sensor may not exceed 90°C.

For heating systems with a lack of temperature mixing resp. with temperature stratification a straight pipeline of min. 10xDN has to be provided upstream of the meter. It is important to ensure adequate system pressure to avoid cavitation.

To mount the heat computer of the C5-ISF in combi version on the wall, the supplied mounting adapter has to be used. The review of the approval can be identified definitely in the display menu (Level 3). ZENNER recommends to use direct temperature measurement and not to use immersion sleeves.

Notes to installation of the flow sensor (VMT)

- Mount ball valves up- and downstream of the VMT.
- Consider the correct installation point (supply or return). Normally this is the return pipe (cooler pipe at heating systems). Please note the type plate information.
- Consider the correct flow direction. This is indicated by an arrow on the side of the VMT.
- Install horizontally or vertically only, not tilted, inclined or overhead. Installation into horizontal or upstreaming or downstreaming pipelines.
- Do not install at highest point of piping to avoid air inside the flow sensor.
- Consider the dimensions of the heat meter.
- Keep about 1 meter distance between zelsius® C5-ISF and electromagnetic sources of interference like switch cabinets, motors or pumps. Keep about 0.2 m distance to power cables. Keep min. 3 cm free mounting space around the device.

Notes ball valves

- Mount ball valves up- and downstream of the meter.
- Mount a ball valve with bore M10x1 for direct sensors in the supply. This is required for the installation of the supply sensor
- For symmetrical temperature sensor installation, mount an identical ball valve in the return. This one is used for mounting the return sensor.

Mounting heating- / cooling energy meter

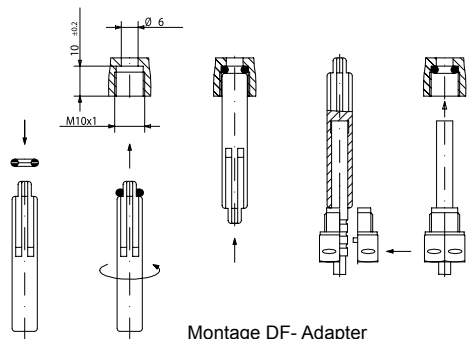
- Flush the system thoroughly before installing the heating-/cooling energy meter.
- Close valves and release pressure.
- Dismount the existing flow sensor or meter blank.
- Use only new and flawless sealing material and check the seal face for damage.
- Install the new flow sensor according to the correct flow direction and installation position.
- Turn heat computer to desired reading position.

Information: The best measuring results can be achieved by mounting with horizontal diallevel. Combi-devices are, for example, used in tight installation points without room for the calculator on the flow sensor or when the calculator is difficult to read. Therefore the device still remains easy to read enabling optimum use of the space available for installation of the flow meter.

Installing the temperature sensor

- The installation of the temperature sensors should be preferably symmetrical and direct installation.
- Do not remove the return sensor if already mounted in the VMU. This is also valid for all the safety seals which are mounted on the device as standard.
- Sensors are colour-coded (red = supply, blue = return).

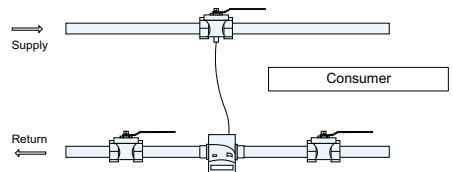
- The connecting cables may not be buckled, extended or shortened.
- The seal at the sensor installation point on the measuring capsule may not be damaged.
- Remove locking screw and seal at the ball valve completely, if existing.
- Attach the O-ring to the installation aid (the 2nd O-ring is only a spare O-ring).
- Using the installation aid, insert the O-ring into the installation point according to DIN EN 1434 with a slight circular motion.
- Using the other end of the installation aid bring the O-ring into the correct position.
- Insert the 2 halves of the plastic connector into the sensor's three notches (crimps) and press them together.
- Use the installation aid as positioning aid.



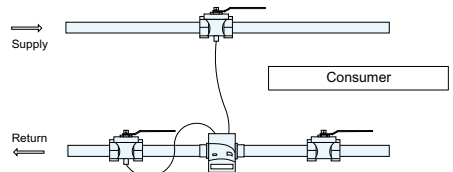
- Insert the temperature sensor into the installation point and screw it in tightly until the dead stop of the seal on the 12-point is reached (mounting torque 3-5 Nm).
- The sensor optional integrated in the VMT has to be secured
- Secure the sensor after installation against unauthorised removal with appropriate sealing (available as a sealing set).

Putting into use

- Open valves carefully and check installation for leakage.
- If the sleep mode of the counter is enabled (Display: **SLEEP 1**), then it must be deactivated by longer pressing the button (>5s).
- While the system is operating, check whether the volume display advances and the temperatures displayed correspond with the actual temperatures (see the display overview).
- Wait for the temperature display to be updated (1-2 sec).
- Secure meter with the enclosed sealing material against unauthorised removal.
- Fill in the putting into use report in accordance with PTB-Directive TR K9.



Asymmetrical sensor installation for zelsius® C5-ISF with the return sensor integrated in the flow sensor



Symmetrical sensor installation for zelsius® C5-ISF

Note relating to the mounting in existing immersion sleeves:






The device C5 can be put into use in connection with existing immersion sleeves in accordance with the article "Putting into use of MID homologated temperature sensors" released in the PTB notifications 119 (2009), vol.6.

Based on current information, the regulation has a period of validity until 30.10.2016. For the identification

and marking of the usable existing immersion sleeves in connection with the C5 device, an identification and marking set can be delivered from our company.

Status display / Error codes

The symbols in the table below show the meter's operational status. The status messages only appear in the main display (energy)! The temporary display of the warning triangle can be caused by special operating states and does not always mean that the device is malfunctioning. However, should the symbol be displayed over a longer period of time, you should contact the service company.

| Symbol | Status | Event |
|---|---|----------------------------------|
| | External voltage | - |
|  | Flow existent | - |
|  | Attention! | Check system / device for errors |
|  | Symbol flashing: Data transmission | - |
|  | Symbol constantly displayed: optical interface active | - |
|  | Emergency operation | Exchange device |

Error codes show faults detected by zelsius® C5-ISF. If more than one error appears, the sum of the error codes is displayed: Error 1005 = error 1000 and error 5.

| Code | Error | Event |
|------|-------------------------------------|---------------------------------------|
| 1 | Temperature out of measuring range | Check sensors |
| 2 | Temperature out of measuring range | Check sensors |
| 3 | Short-circuit return sensor | Check sensors |
| 4 | Interruption return sensor | Check sensors |
| 5 | Short-circuit supply sensor | Check sensors |
| 6 | Interruption supply sensor | Check sensors |
| 7 | Battery voltage | Exchange device |
| 8 | Hardware error | Exchange device |
| 9 | Hardware error | Exchange device |
| 100 | Hardware error | Exchange device |
| 800 | Wireless interface | Exchange device |
| 1000 | Status end of the battery | Exchange device respectively battery* |
| 2000 | Status Initial verification expired | Exchange device |

* Due to certification reasons, change of the battery only possible abroad.

Level 1

1468379 MWh

Heat energy
(Main display)

468379 MWh

Cooling energy

Segment test

dd 01.12

Date last due date

1025399 MWh

Energy
Last due date

4154365 MWh

Due date cooling energy

2376429 m³

Volume

1370 %

Flow rate

8720°C

Supply temperature

3548°C

Return temperature

5172°C

Temperature difference

283 kW

Current output

Level 2

8207 MWh

Heat energy difference from
last due date to now

14088 MWh

Cooling energy difference
from last due date to now

4036 MWh

Heat energy difference from
1. this month to now

6048 MWh

Cooling energy difference from
1. this month to now

0000 m³

Volume difference from
1. this month to now

3418 %

Maximal Flow

1238 %

Date month maximal
flow

5862 kW

Maximum power, Average value
since commissioning

25003 kW

Maximum heat energy
power month

5862 kW

Maximum cooling energy power,
average value since commissioning

25003 kW

Maximum cooling energy
power month

Important Note:

The optical interface has to be activated by means of the OptoHead through keypress before reading out of the device.

Devices, which are in sleep mode (Display: **SLEEP 1**) have to be activated through keypress until the energy display shows up.

Depending on you meter's model its displays can differ in number and order from those shown here.


Level 3


| | |
|--|----|
| PE 1000r | ▶▶ |
| Sensor type and installation point VMT | |
| 00000000 | |
| Serial number | |
| 000000 | |
| Model number | |
| E06 20 18 | |
| End of the battery | |
| Err 0000 | |
| Error status | |
| d 10 13 | |
| System Date | |
| 14 10 | |
| System Time | |
| H 783 h | |
| Operation hours | |
| Rdr 001 | |
| Primary M-Bus address | |
| CR3 0 | |
| Certification model | |
| CS3 0200 | |
| Firmware version | |
| 1-0C En | |
| Function Output 1 | |
| 2-0C CEn | |
| Function Output 2 | |
| 3-0C CEn | |
| Function Output 3 | |
| rE 8604 | |
| Opto readout energy | |


Level 4

| | |
|---------------------|----|
| SP1- 100 | ▶▶ |
| Pulse value Input 1 | |
| SP2- 100 | |
| Pulse value Input 2 | |
| SP3- 100 | |
| Pulse value Input 3 | |

Legend

 Press the button briefly (S) to switch through the display from top to bottom. When you have reached the last menu item the device automatically jumps back to the menu item at the top (loop).

 Press the button for about 2 seconds (L), wait for the door symbol to appear (upper right corner of the display) and then release the button. The menu is then updated resp. switches to the sub-menu.

 Hold down the button (H) until the device switches to another level or switches back from the sub-menu.

A detailed display overview including submenus is available upon request.