EnergyMetering

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 m^3/h

ZENNER
All that counts.

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.

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

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.

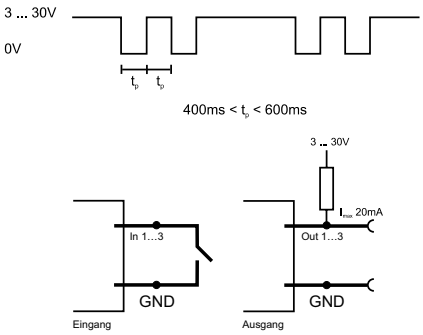
Pulse inputs and outputs (optional)

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



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 diffence	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

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.

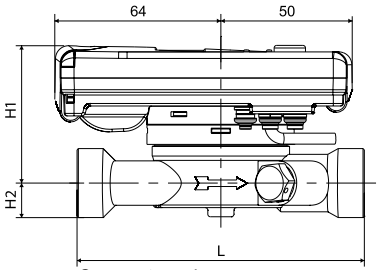
M-Bus (optional)

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.

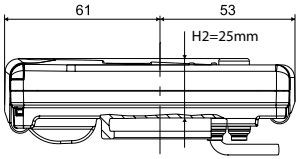
colour	connection	signification
brown	M-Bus 1	M-Bus-Line 1
white	M-Bus 2	M-Bus-Line 2

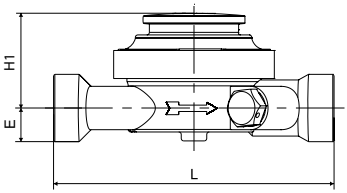
Dimensions		
Height compact version:		H_{max} = 55 mm E_{max} = 21 mm
Height combiversion:	(H1+H2):	H_{max} = 65 mm E_{max} = 21 mm

Connecting sizes					
Nominal flow	qp	m³/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					

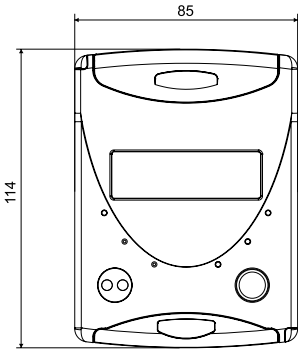


Compact version





Combiversion



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 90ºC.
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.

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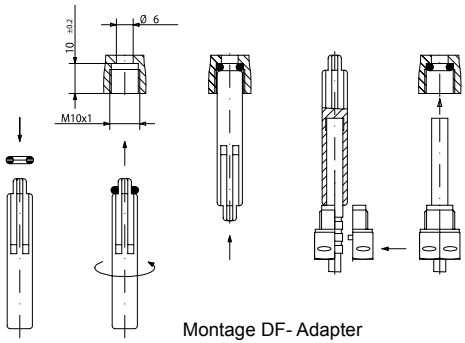
Notes ball valves

- 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.



Montage DF- Adapter

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

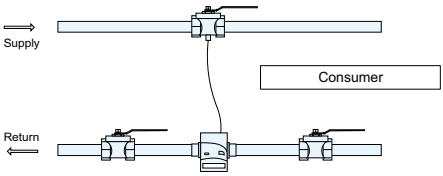
- Open valves carefully and check installation for leakage.
- If the sleep mode of the counter is enabled (Display: **SLEEP 1**), then it must be deactivated by longer pressing the button (>5s).
- While the system is operating, check whether the volume display advances and the temperatures displayed 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.

Note relating to the mounting in existing immersion sleeves:

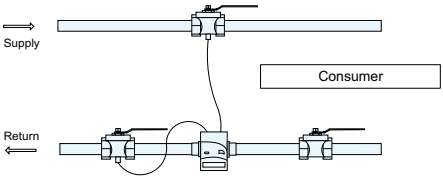
The device C5 can be put into use in connection with existing immersion sleeves in accordance with the article “Putting into use of MID homologated temperature sensors” released in the PTB notifications 119 (2009), vol.6.

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.



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



Symmetrical sensor installation for zelsius® C5-ISF

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.

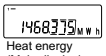
Symbol	Status	Event
	External voltage	-
	Flow existent	-
	Attention!	Check system / device for errors
	Symbol flashing: Data transmission	-
	Symbol constantly displayed: optical interface active	-
	Emergency operation	Exchange device

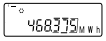
Error codes show faults detected by zelsius® C5-ISF. If more than one error appears, the sum of the error codes is displayed: Error 1005 = error 1000 and error 5.

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

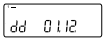
* Due to certification reasons, change of the battery only possible abroad.

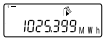
Ebene 1

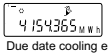

Heat energy
(Main display)

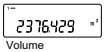

Cooling energy

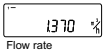

Segment test


Date last due date

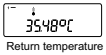

Energy
Last due date

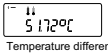

Due date cooling energy

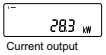

Volume

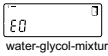

Flow rate


Supply temperature

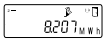

Return temperature

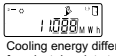

Temperature difference

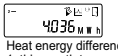

Current output

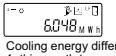

water-glycol-mixtures*

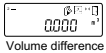
Ebene 2

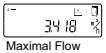

Heat energy difference from
last due date to now

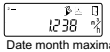

Cooling energy difference
from last due date to now

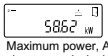

Heat energy difference from
1. this month to now


Cooling energy difference fror
1. this month to now

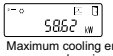

Volume difference from
1. this month to now

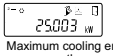

Maximal Flow

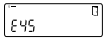

Date month maximal
flow


Maximum power, Average val
since commissioning


Maximum heat energy
power month


Maximum cooling energy pow
average value since commiss


Maximum cooling energy
power month



* Function only available in variant zelsius C5 „Glycol Meter“

Important Note:

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

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.

Legend

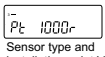
S Press the button briefly (S) to switch through the display from top to bottom. When you have reached the last menu item the device automatically jumps back to the menu item at the top (loop).

L 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.

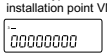
H Hold down the button (H) until the device switches to another level or switches back from the sub-menu.

A detailed display overview including sub-menus is available upon request.

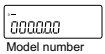
Ebene 3



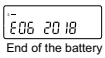
Sensor type and installation point VMT



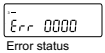
Serial number



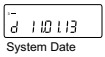
Model number



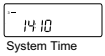
End of the battery



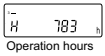
Error status



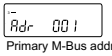
System Date



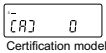
System Time



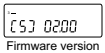
Operation hours



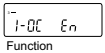
Primary M-Bus address



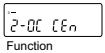
Certification model



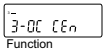
Firmware version



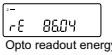
Function Output 1



Function Output 2

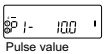


Function Output 3

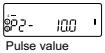


Opto readout energy

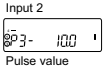
Ebene 4



Pulse value Input 1



Pulse value Input 2

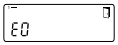


Pulse value Input 3

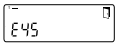
Setting of water-glycol-mixtures for zelsius C5 „Glycol Meter“

Level 1

Selection of the display „E 0“ on Level 1



Press the button for about 2 seconds until letter „E“ flashes



With each short press on the button the following loop for different mixing ratios runs:

E 20 - E 25 - E 30 - E 35 - E 40 - E 45 - E 50
P 20 - P 25 - P 30 - P 35 - P 40 - P 45 - P 50 - E 0

E = ethylene glycol
P = propylene glycol
E 0 = water without glycol additive

Upon reaching the required value, press the button for about 2 seconds to program the value. Buchstabe Letter "E" or "P" will stop flashing. The programming process can be retried if necessary.

Disposal

Attention: This device contains a non-removable and non-rechargeable lithium battery.
Batteries contain substances, which could harm the environment and might endanger human health if not disposed of properly.

To reduce the disposal quantity so as unavoidable pollutants from electrical and electronic equipment in waste, old equipment should be reused prior or materials recycled or reused as another form.
This is only possible if old equipment, which contains batteries or other accessories are disposed. Therefore please contact the department of your local authority which is responsible for waste disposal. Alternatively a waste disposal via ZENNER is possible.

Your local or municipal authority or the local waste disposal company can give you information relating the collection points for your used equipments.

Attention:
Do not dispose of the devices with domestic waste.
In this way, you will help to protect natural resources and to promote the sustainable reuse of material resources.

For any question, please contact
info@zenner.com

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