

Ultrasonic Flowmeters

SITRANS FUE950 Energy Calculator

Operating Instructions · Jan 2010



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Energy calculator type SITRANS FUE950

Operating Instructions

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Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER
indicates that death or severe personal injury will result if proper precautions are not taken.
⚠ WARNING
indicates that death or severe personal injury may result if proper precautions are not taken.
⚠ CAUTION
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.
CAUTION
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.
NOTICE
indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation for the specific task, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be adhered to. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of the Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Introduction

1.1 Preface

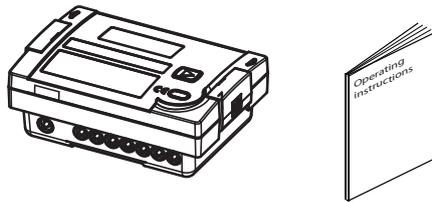
These instructions contain all the information you need for using the device.

The instructions are aimed at persons mechanically installing the device, connecting it electronically, configuring the parameters and commissioning it as well as service and maintenance engineers.

Note

It is the responsibility of the customer that the instructions and directions provided in the manual are read, understood and followed by the relevant personnel before installing the device.

1.2 Items supplied



- Energy calculator type SITRANS FUE950 (1 piece)
- Temperature sensors (1 pair), typical Pt 500 ¹⁾
- Temperature sensor pockets (2 pieces) ¹⁾
- Wall mounting bracket (1 piece)
- Operating Instructions (1 piece)
- EC Declaration of Conformity

¹⁾: Scope of delivery may vary depending on selections at ordering.

1.3 How to read the Operating Instructions

These Operating Instructions describe the SITRANS FUE950 Energy calculator. They are intended for trained personnel and therefore do not include basic working steps.

For further information, please see: Siemens Flow documentation (<http://www.siemens.com/flowdocumentation>)

1.4 History

The contents of these instructions are regularly reviewed and corrections are included in subsequent editions. We welcome all suggestions for improvement.

The following table shows the most important changes in the documentation compared to each previous edition.

Edition	Remarks
08/2003	<ul style="list-style-type: none">FUS105 (based on type Infocal 5)
09/2006	<ul style="list-style-type: none">New name: FUE950
12/2009	<ul style="list-style-type: none">New order structureProduct update

1.5 Further Information

The contents of these Operating Instructions shall not become part of or modify any prior or existing agreement, commitment or legal relationship. All obligations on the part of Siemens AG are contained in the respective sales contract which also contains the complete and solely applicable warranty conditions. Any statements contained herein do not create new warranties or modify the existing warranty.

Product information on the Internet

The Operating Instructions are available on the CD-ROM shipped with the device, and on the Internet on the Siemens homepage, where further information on the range of SITRANS F flowmeters may also be found:

Product information on the internet (<http://www.siemens.com/flowdocumentation>)

Worldwide contact person

If you need more information or have particular problems not covered sufficiently by the operating instructions, please get in touch with your contact person. You can find contact information for your local contact person on the Internet:

Local contact person (<http://www.automation.siemens.com/partner>)

Safety notes

 CAUTION
--

Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance. Only qualified personnel should install or operate this instrument.

Note

Alterations to the product, including opening or improper repairs of the product, are not permitted.

If this requirement is not observed, the CE mark and the manufacturer's warranty will expire.

2.1 Laws and directives

General requirements

Installation of the equipment must comply with national regulations. For example EN 60079-14 for the European Community.

Instrument safety standards

The device has been tested at the factory, based on the safety requirements. In order to maintain this condition over the expected life of the device the requirements described in these Operating Instructions must be observed.

CAUTION

Material compatibility

Siemens Flow Instruments can provide assistance with the selection of wetted sensor parts. However, the full responsibility for the selection rests with the customer and Siemens Flow Instruments can take no responsibility for any failure due to material incompatibility.
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CE marked equipment

The CE-mark symbolizes the compliance of the device with the following directives:

- EMC directive 2004/108/EC
- Low voltage directive 2006/95/EC
- R&TTE directive 1999/5/EC
- MID directive 2004/22/EC

2.2 Lithium batteries

Lithium batteries are primary power sources with high energy content designed to represent the highest possible degree of safety.

 **WARNING**

Potential hazard

Lithium batteries may present a potential hazard if they are abused electrically or mechanically. This is in most circumstances associated with the generation of excessive heat where internal pressure may cause the cell to rupture.

Thus the following basic precautions should be observed when handling and using lithium batteries:

- Do not short-circuit, recharge or connect with false polarity.
- Do not expose to temperature beyond the specified temperature range or incinerate the battery.
- Do not crush, puncture or open cells or disassemble battery packs.
- Do not weld or solder to the battery's body.
- Do not expose contents to water.

2.3 General requirements

The label seal on the calculator (see figures (Page 49)) must not be damaged!

A damaged seal will result in immediate invalidation of the factory warranty and calibration.

Siemens accepts no liability for amendment of legal metrological data if the seal has been broken.

The cables supplied with the calculator must not be shortened or altered in any other way.

Note

All regulations on the use of calculator must be observed!

All regulations on electrical installations must be observed!

All instructions listed in the data sheet of the calculator must be observed.

The medium is fixed to water (or - as special option - for glycol additive) with specified consistence.

Note

Calibration/verification

SITRANS FUE950 is a calorific energy meter ready for verification in accordance MID approval according to European norm EN 1434.

Calibration marks on the calculator must not be damaged or removed! Their removal invalidates the warranty and calibration of the meter. Label seals may only be removed by authorized persons for servicing purposes and must then be renewed.

Note

Device installation is only to be performed by personnel qualified to handle electrical devices of at least low voltage (up to 1000 V).

Disconnecting device

A switch or circuit-breaker shall be included in the building installation. It shall be in close proximity to the equipment and within easy reach of the Operator. It shall be marked as the disconnecting device for the equipment. Before removing the inner plastic cover the mains power shall be switched off. After installing main power cable, the inner plastic cover has to be installed with the two screws.

Description

SITRANS FUE950 is a universal thermal energy calculator, which meets the requirements of EN1434 and has the MID approval for heat metering.

The SITRANS FUE950 energy calculator has been developed for Siemens Flow Instruments.

Further, the energy calculator has been specially developed to receive volume pulses from flowmeter type SITRANS FUS380/FUE380 or alternatively SITRANS F M MAG 5000/6000 transmitter. Typically it is used with the SITRANS F US flowmeter programme for energy custody transfer in district and central heating systems, in which the medium is water with temperatures up to 190 °C, or in cooling systems using water as coolant.

The energy calculator is modular in construction and can be fitted with optional modules depending on the application. SITRANS FUE950 can be used for up to 9 999.9 m³/h.

3.1 Measuring principle

Energy calculation

Calculation of energy is based on the following formula:

$$\text{Energy} = \text{Volume} \times (T_{\text{Hot}} - T_{\text{Cold}}) \times K\text{-factor}_{(T_i)}$$

Volume: Volume [m³] of a given number of volume pulses from the flow meter (e.g. SITRANS FUE380)

T_{Hot}: Measured temperature in hot line (by the one of the Pt500 sensors)

T_{Cold}: Measured temperature in cold line (by the other Pt500 sensor)

K-factor (T_i): Thermal coefficient of media enthalpy and heat content (typical media is water)

The energy calculation is made by a counter and depends on temperature difference, pulse input frequency and legal requirements.

The calculator always carries out at least one energy calculation every 2 sec. If connected flowmeter has not sent enough pulses, energy calculation and flow indication is also based on the 2 sec. value.

3.2 Applications

Heating and cooling applications

SITRANS FUE950 is able to perform energy calculation in 3 kinds of applications:

- District heating applications

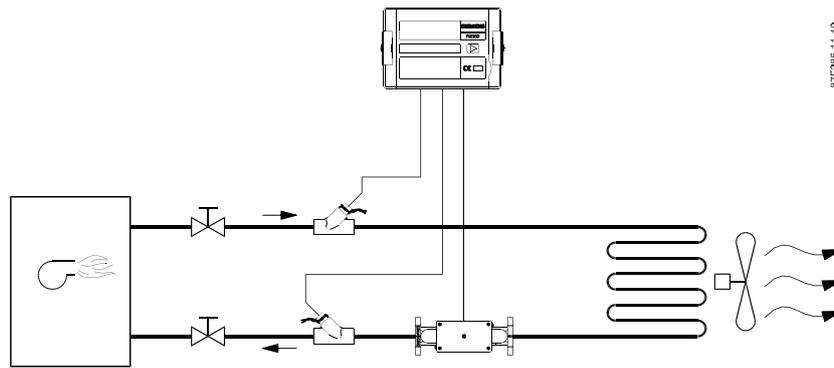


Figure 3-1 District heating applications with flowmeter in cold line

87F385.11.10

- Chilled water applications

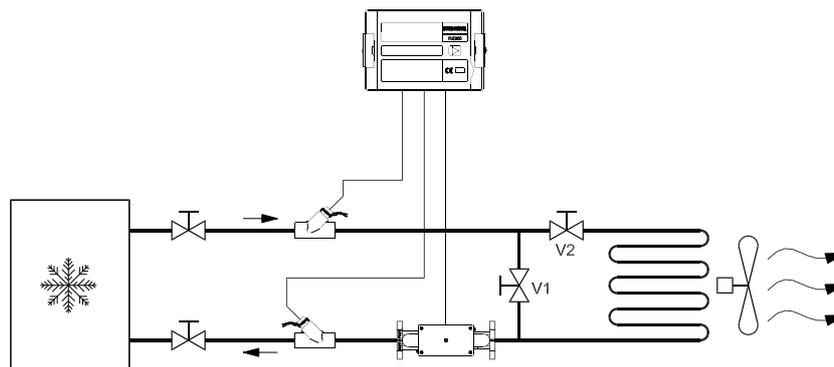


Figure 3-2 Chilled water applications with flowmeter in hot line

87F385.11.10

- Combined cooling/heating applications

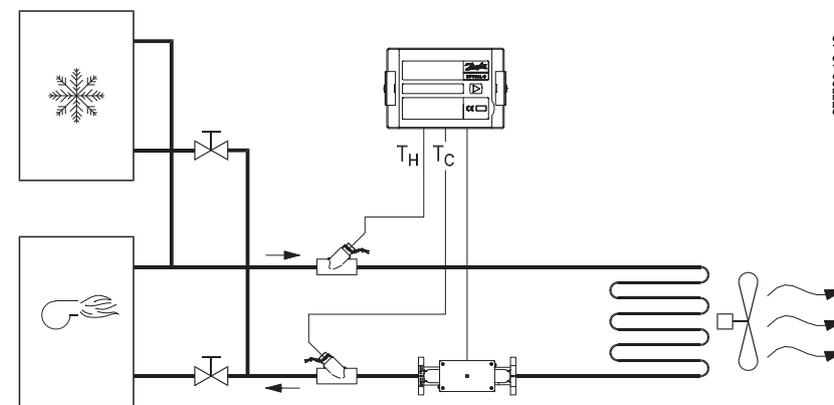


Figure 3-3 Combined cooling/heating applications with flowmeter in cold line (heating)

87F382.10.10

The separate flowmeter for the input of volume pulse can be installed in hot or cold line. Hot line is pipe with higher media temperature. In heating systems called forward line. Cold line is pipe with lower media temperature. In heating systems called return line. In cooling applications forward/return lines are the other way around.

3.3 Design

Display and push button

SITRANS FUE950 has an easy-read 7 digit LCD display with associated pictograms for various functions. As display has been designed for several applications, figures/symbols not used for normal district heating applications will appear in display.



Figure 3-4 SITRANS FUE950

Energy calculator has a SIMPLE OPERATION push button and provides user-friendly control of various display menu loops.

Display will always be configured for a specific application, and for selected display settings. In normal operation menu loop, display will show cumulative current energy values.

Integrator has an IP54 plastic housing designed for wall or panel mounting. Housing comes with prepared rubber gaskets cable entries for fast and easy installation.

Temperature sensor set

Temperature sensor set is designed for use with Siemens energy calculator type SITRANS FUE950 for measurement of energy consumption in a district heating net.

To ensure accurate measurement of temperature difference according to MID (EN 1434) sensors are delivered as matched pairs.

Sensor sets can always be delivered with MID (EN1434) approval for multiple-purpose applications in heating applications.

Type label

A typical FUE950 type label shows the following main information:

- Product name and order number (SITRANS FUE950, 7ME3470-4AA47-2KC2)
- Temperature sensor type and ranges (Pt 500, 0 ...180 °C, ΔT 3 ...177 K)
- Flowmeter installation place (low temp.)
- Pulse input value (100 L/Pulse)
- Maximum flow rate (9999.9 m³/h)
- Verified in 2009 according to MID (CE, M09, 0102 based on type approval DE-09-MI 004-PTB019)



Figure 3-5 Type label

Installing/Mounting

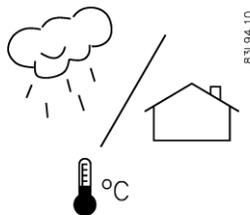
4.1 Application planning

Application planning of energy calculator consists of three steps:

1. Ambient conditions check.
2. Check of application settings.
3. Device installation, see Installation of device (Page 17).

4.2 Ambient conditions

Specifications



SITRANS FUE950 energy calculator suitable for indoor and outdoor installations.

- Temperature specifications:
 - Ambient temperature: 0 ... +55 °C (+32 ... +131 °F)
 - Storage: -25 °C ... +70 °C (-13 ... +158 °F)
- Enclosure rating:
 - IP54
- Environment classes:
 - EN1434 class E1 / M1 (electromagnetic / mechanical)

Note

Ensure calculator is installed sufficiently far away from possible sources of electromagnetic interference (switches, electric motors, fluorescent lamps, etc.).

Ensure that temperature and flow specifications indicated on device type plate / label will not be exceeded.

Installation safety precautions

 **WARNING**

In applications with working pressures/media that can be dangerous to people, surroundings, equipment or others in case of pipe fracture, it is recommended that special precautions such as special placement, shielding or installation of a security guard or a security valve are taken when the temperature sensors are mounted.

4.3 Application settings

Check of application settings

- Application and flow meter installation place

Application type and flow meter installation place can be checked via order code on device type label.

- Calculator district heating, flow meter in return line (cold pipe) 7ME3470-xxAx-xxxx
- Calculator district heating, flow meter in forward line (warm pipe) 7ME3470-xxBx-xxxx
- Calculator chilled water, flow meter in forward line (cold pipe) 7ME3470-xxCx-xxxx
- Calculator chilled water, flow meter in return line (warm pipe) 7ME3470-xxDx-xxxx
- Calculator combined cooling/ heating, flow meter in forward line (warm pipe by heating) 7ME3470-xxEx-xxxx
- Calculator combined cooling/ heating, flow meter in return line (cold pipe by heating) 7ME3470-xxFx-xxxx

- Pulse input setting

Calculator pulse input setting must fit flowmeter pulse output setting (e.g. ultrasonic flowmeter type SITRANS FUE380). Check both type plates for settings.

- Pt sensor type.

Observe information of temperature sensor installation.

- Max. flow rate.

Max. flow rate for energy calculator must not be exceeded.

4.4 Installation of device

Procedure

Installation of energy calculator consists of five steps:

1. Check of application settings (Page 16)
2. Installation of energy calculator
3. Installation of temperature sensors (Page 21)
4. Electrical connection (Page 21)
5. Start-up

Installation in application

Depending on the selection via the order code, see Ordering instructions (Page 63), the calculator is programmed for installation of the flowmeter in the hot line or cold line as indicated on calculator type plate.

Typically, integrator is mounted on a wall or in a panel. The integrator should be installed in a position that makes operation and service easy.

Wall mounting

The device is mounted using the wall bracket supplied (ambient temperature: max. 55°C (131°F)).

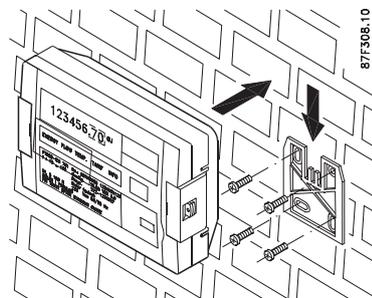


Figure 4-1 Wall mounting of device

Panel mounting

Mounting hole must be 94 x 128 mm (3.70 x 5.04 in). Device is fixed using M3 x 10 mm self-tapping screws.

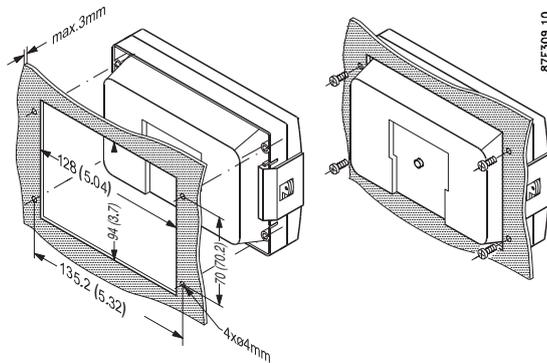


Figure 4-2 Panel mounting of device

Installing temperature sensors

Note

Important!

Handle temperature sensors with care.

Temperature sensors are matched paired sets and **must never be separated**.

Temperature sensor cable length must not be altered as it affects the meter accuracy.

Sensor pockets must be the same for cold pipe and hot pipe, and also mounted in the same way.

Observe the right temperature sensor installation in application. Sensor cables are provided with colored type labels: Red for warm line temperature sensor and blue for cold line temperature sensor.

Install temperature sensors in pipe lines using pockets (if ordered in separate bag) by inserting them in the two pockets installed in the forward and return pipes.

Fix sensors in pockets using the screws and make a user sealing for each sensor at the pockets

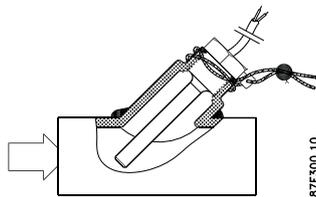


Figure 4-3 Sealing of temperature sensor at pocket

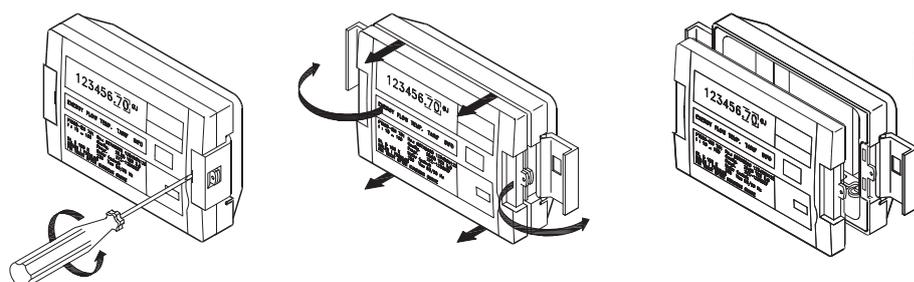
Ultrasonic flowmeter

Flowmeter must be mounted in accordance with the instructions given in the relevant flowmeter operating instructions.

Install flowmeter in application as stated on the type label of the energy calculator, i.e. in cold line (low temperature) or hot line (high temperature).

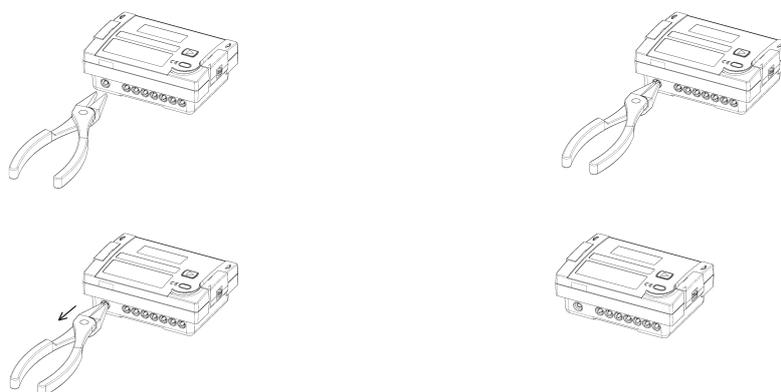
Connecting

Remove top of device.



Making cable entries

Make a circular hole by dismantling rubber grommet using a flat plier.



Note

Only use flat pliers as tool

Only make the number of cable entries corresponding to the number of cables

Connecting temperature sensors

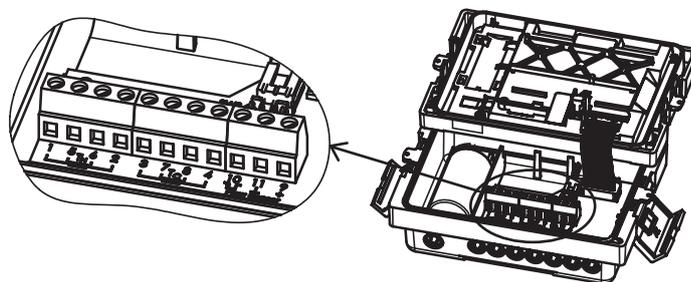
Note

Handle temperature sensors with care!

Length of temperature sensor cable must not be altered as it affects meter accuracy.

When connecting temperature sensors, please observe the coloured type labels:

- Red: forward temperature sensor.
 - Blue: return temperature sensor.
1. Feed sensor cables through entries as marked in fig.
 2. Connect to terminals 5-6/7-8 as described in the following table.



The four pre-mounted wire links (1-5, 6-2, 3-7 and 8-4) can be removed if local 4-wire temperature sensors are used. For standard 2-wire temperature sensors supplied wire links must be assembled.

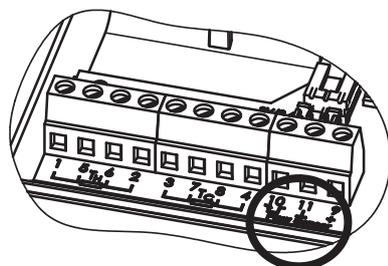
3. Press each sensor cable into strain relief.

Application type	Temp. sensor type label color	Connection terminals for 2-wire type	Temp. sensor installation position	Flowmeter (F) installation place
Calculator district heating, flowmeter in return line (pipe)	Red	5 T _H 6	Forward "hot line"	(F) return "cold line", low temperature
	Blue	7 T _C 8	Return "cold line"	
Calculator district heating, flowmeter in forward line (pipe)	Red	5 T _H 6	Forward "hot line"	(F) forward "hot line", high temperature
	Blue	7 T _C 8	Return "cold line"	
Calculator chilled water, flowmeter in return line (pipe)	Red	5 T _H 6	Return "hot line"	(F) forward "hot line", high temperature
	Blue	7 T _C 8	Forward "cold line"	
Calculator chilled water, flowmeter in forward line (pipe)	Red	5 T _H 6	Return "hot line"	(F) return "cold line", low temperature
	Blue	7 T _C 8	Forward "cold line"	
Calculator combined cooling/heating, flowmeter in return line (pipe) by heating	Red	5 T _H 6	Forward "hot line"	By heating: (F) return "cold line", low temperature
	Blue	7 T _C 8	Return "cold line"	
Calculator combined cooling/heating, flowmeter in forward line (pipe) by heating	Red	5 T _H 6	Forward "hot line"	By heating: (F) forward "hot line", high temperature
	Blue	7 T _C 8	Return "cold line"	

Table of type connection for installation

Flow pulse input

Pulse input (IN0) of FUE950 must be connected to pulse output external flow meter. The display menu name is IN0, see menu description (Page 39). The pulse input has three terminals, +9, 10 and -11. Only terminals 10 and 11 will be connected to the Siemens flowmeters.



Pulse input of FUE950:

- Voltage supply:
 - Internal used voltage of FUE950, typically 3.0 V or 3.6 V DC.
- Pulse duration:
 - Min. 3 ms
- Pulse frequency:
 - Max. 100 Hz
- Pulse value:
 - Depends on order, see device type label or display menu 3 at the "IN0" value.

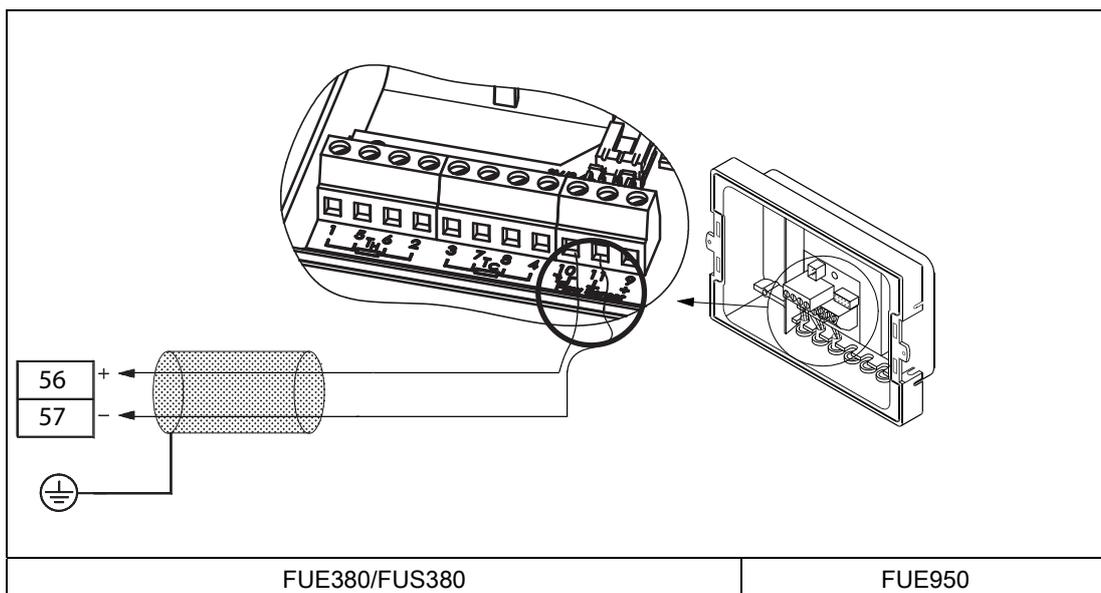
Note

Pulse value of the calculator must be the same as the value of the connected flow meter pulse output!

5.1 SITRANS FUE380 and FUS380

Power for pulse output from SITRANS FUE380 and FUE380 is automatically supplied via energy calculator terminals 10 and 11:

FUE380/FUS380 terminal	FUE950 terminal
56	10
57	11



Note

Use shielded cable. Connect shield to grounding at flowmeter (e. g. the clamp of FUE380).

For connection of flowmeter, see flowmeter operating instructions.

5.2 SITRANS F M MAG 5000/6000

When MAG 5000/6000 and SITRANS FUE950 are connected as a heat meter, 2 resistors are required to obtain a correct transmission of pulses.

The 2 resistors must be mounted between terminals 57 and 58 in the MAG terminal socket.

Resistors are part of neither delivery nor accessories list.

MAG 5000/6000 terminal	FUE950 terminal
57	10
58	11

5.3 Power supply options

Power supply module

A 3.0 V lithium battery (type C-cell) with up to 12 years lifetime (depending on configuration) is fitted in the standard version.



Figure 5-1 Battery 3.0 V DC, C-cell

Alternatively a 3.6 V lithium battery (D-cell), with typically >16 years lifetime, 24 V AC or 230 V AC mains units can also be used and can be modified afterwards.



Figure 5-2 Battery 3.6 V DC, D-cell

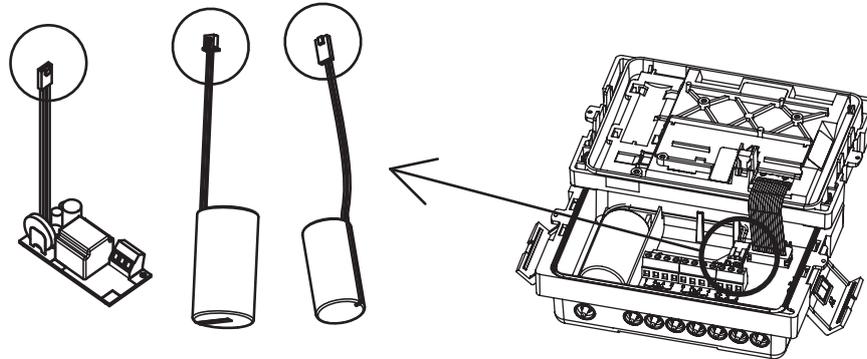
If no mains supply is connected, a back-up battery in the mains unit provides the power supply. The date and time remain actual but none of the measuring functions work, incl. flow rate measurement.



Figure 5-3 Mains power supply modules, 230 V AC or 24 V AC versions

Battery module

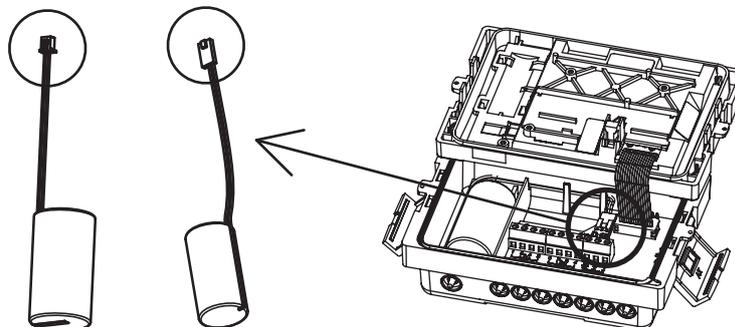
Check battery cable plug connection as shown in figure below.



The battery lifetime is highly dependent on thermal influences and consequently the functioning period of the energy calculator can only be guaranteed if the max. ambient temperature limits set out in section "Installation of device" (Page 17) are not exceeded.

Mounting battery

1. Push battery into place in bottom section and press power supply cable into cut-out in top of bottom section so that it is not crushed when refitting top of energy calculator (if not done already).
2. Mount plug on connection pin (if not done already).



3. Refit top of energy calculator.

Used batteries must be disposed of at suitable collecting points.

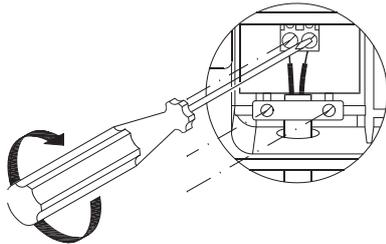
230 V AC / 24 V AC module

Instead of a battery the power can be supplied from a 230 V AC or a 24 V AC power supply module (depending on ordering).

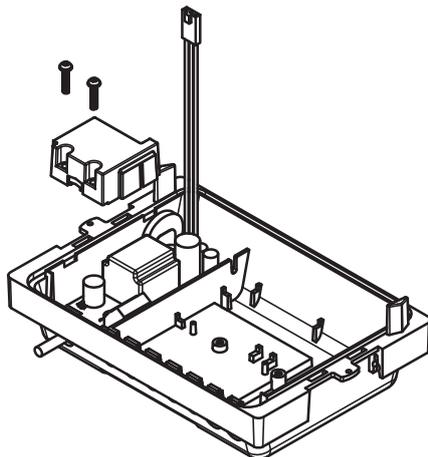
Check cable plug connection of power supply module.

Mounting power supply module

1. Push power supply unit into place in bottom section (if not done already).
2. Press power supply cable into cut-out in top of bottom section so that it is not crushed when refitting top of energy calculator (if not done already).
3. Mount plug on connection pin (if not done already).
4. Connect 24 V AC or 230 V AC cable to terminals (check voltage supply on top of transformer).



5. After installing main power cable, install plastic cover using the two screws in order to avoid contact between voltage-carrying parts and cable-pull-relief, see figure below



6. Refit the top of the energy calculator.
The 230 V module has a built-in fuse (T50mA L 250V).

Note

The mains unit tells the module whether mains voltage is present and switches automatically to power save mode. The display is also switched off, but can be switched on again by pressing any button. Communication is retained, e.g. over the M-Bus or the optical interface.

 WARNING
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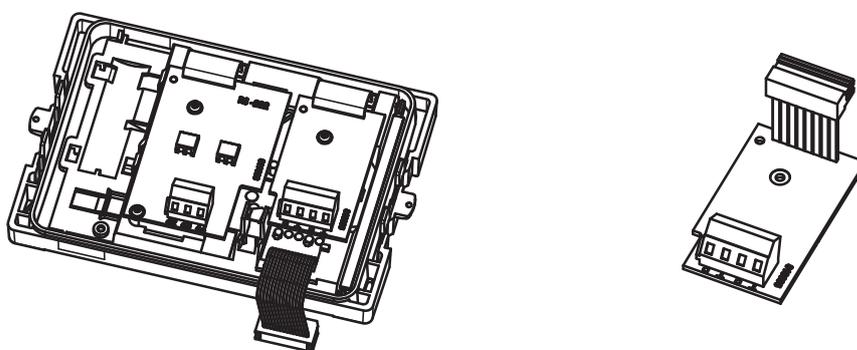
Never connect between two phases, as this will destroy the mains unit

5.4 Add-on output and input modules

Introduction

The FUE950 can be supplied with too of several types of add/on output and input modules (depending on order). The modules are placed in two slots at the backside of the calculator top and must be screwed tight if this has not already been done on supply. Modules are "active" when installed. The settings and functions for the modules can be changed via a free using software tool and the IrDA interface of the FUE950. For more details, please contact Siemens Flow Instruments.

The two slots for extension modules are shown in figures below. Slot 1 (to the left) is intended for the M-Bus or RS-232 communication modules or the pulse input module. Slot 2 (to the right) is for the pulse input function module (e.g. for two additional volume measuring components) or pulse output function module (e.g. for volume and energy pulse).



Attention: The modules must not be reversed in the slots! Always make sure that the modules are inserted in the correct slots.

These modules have no effect on consumption recording and can be retrospectively fitted without damaging the calibration mark.

Pulse input module

(Extra input of signal inputs C and D)

The device is available with an add-on module for two optional pulse inputs (see figure below), which can be freely programmed using the software tool. Standard for input C (terminal naming) is accumulating of input C pulses and settings are shown as 'Int1' in display menu 4. Standard for input D is accumulating of input D pulses and shown as 'Int2' in display menu 4.

- Data collector for two pulses of separate flow meters for transmission over integrator interfaces.

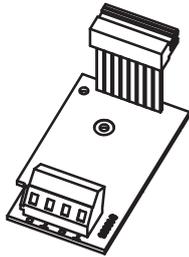


Figure 5-4 Pulse input module

- The pulse-rate is programmable in a wide range with steps of 1 litre per pulse (via free using the software tool).
- The input unit is selectable with m³ volume unit, all internal energy units or no unit.
 1. Signal input C: terminal C and ⊥ (ground)
 2. Signal input D: terminal D and ⊥ (ground)
- Max. pulse input frequency: 8 Hz with a pulse duration ≥ 10 ms.
- Input resistance: 2.2 MOhm.
- Terminal voltage: 3 V DC
- Data is separately cumulated in different registers. Also accounting days are available.
- Connected cable length should be less than 10 m (shielded cable is recommended).

Pulse output module

The device is available with an add-on module for two optional pulse outputs, if specified on ordering (default 1 least significant digit).

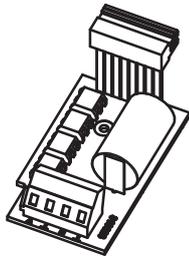


Figure 5-5 Pulse output module

Standard function for pulse output A (terminal A) is accumulated energy and settings are shown as Out1 in display menu 3. Standard function for pulse output B (terminal B) is accumulated volume and shown as Out2 in display menu 3. The pulse output is active (low, "contact closed") for changing with least significant figure in display (accumulated energy or volume). Default is 1 decimal place, e.g. 0.1 MWh/Pulse.

The functions and settings of the outputs can be freely programmed using a software tool and the IrDA interface, e.g. default settings for pulse values can be changed with the factors 0.1, 1, 10 and 100.

Possible combinations / functions of output pulses

- Energy pulse output (default function for output A)

Pulse value: depending on last digit of energy display unit

- Volume pulse output (default function for output B)

Pulse value: depending on last digit of volume display unit

Example:

Display unit	Pulse value
MWh with 1 decimal place (default)	100 kWh/Pulse (0.1 MWh/Pulse)
m ³ with 1 decimal place (default)	100 L/Pulse

- Tariff energy 1 and Tariff energy 2

Pulse value: depending on display unit last digit in display

- Tariff condition 1 or/and Tariff condition 2, (level switch)

Output as static state for each new determination of tariff condition e.g. flow rate ≥ 100 m³/h or/and temperature difference $< 50^{\circ}\text{C}$

1. Signal input A: terminal A and \perp (ground)
2. Signal input B: terminal B and \perp (ground)

- External power supply: VCC = 3 ... 30 V DC
- Output current: max. 20 mA with a residual voltage of 0.5 V
- Output type: Open collector (drain)
- Max. output frequency: 4 Hz
- Pulse length: typically 125 ms \pm 10 ms
- Pulse break: ≥ 125 ms \pm 10 ms
- Connections for 2 x 2.5 mm² wires (shielded cable is recommended)

M-Bus communication module

The optional M-Bus communication module is a serial interface for communication via M-Bus protocol (according to EN1434 standard) with external devices (e.g. M-Bus controlling centre like a M-Bus-repeater or M-Bus-master). A number of heat meters can be connected to a control centre.

The board contains 2 terminals marked as 24 and 25, which are typically connected to the M-Bus master (M-Bus controlling centre).



Figure 5-6 M-Bus module

- M-Bus module refers to EN 1434-3 standard
 - Connections for 2 x 2.5 mm² wires (shielded cable is recommended)
 - Output is electrically insulated
 - Max. voltage: 50 V DC
 - Current consumption: As one M-Bus-load
 - Primary or secondary addressing, default address is serial number (freely changeable via SW-tool), see M-Bus communication setup
 - Baud rate 300 or 2400 bauds
- (M-Bus communication description available on request).

M-Bus communication setup

Default settings for M-Bus communication can be changed by using a software tool, pc and IrDA adapter.

M-Bus communication description is available on request, please contact Siemens.

For setup of M-Bus communication, please use HYDRO-SET® software tool (<http://www.hydrrometer.com/systems/download.html>).

HYDRO-SET® is a registered trademark of Hydrometer GmbH.

RS-232 communication module

The optional RS-232 communication module is a serial interface for communication via M-Bus protocol (according to EN1434 standard) with external devices, e.g. a PC.

The board contains a 3-pole terminal strip with terminals marked 62 (Dat), 63 (Request) and 64 (Ground).



Figure 5-7 RS232 module

For communication with a PC due to signal modification to RS 232 level the device requires a special adapter cable, see accessories (Page 63). The wire colors of the RS-232 adapter cable must be connected as follows: 62 = brown; 63 = white; 64 = green.

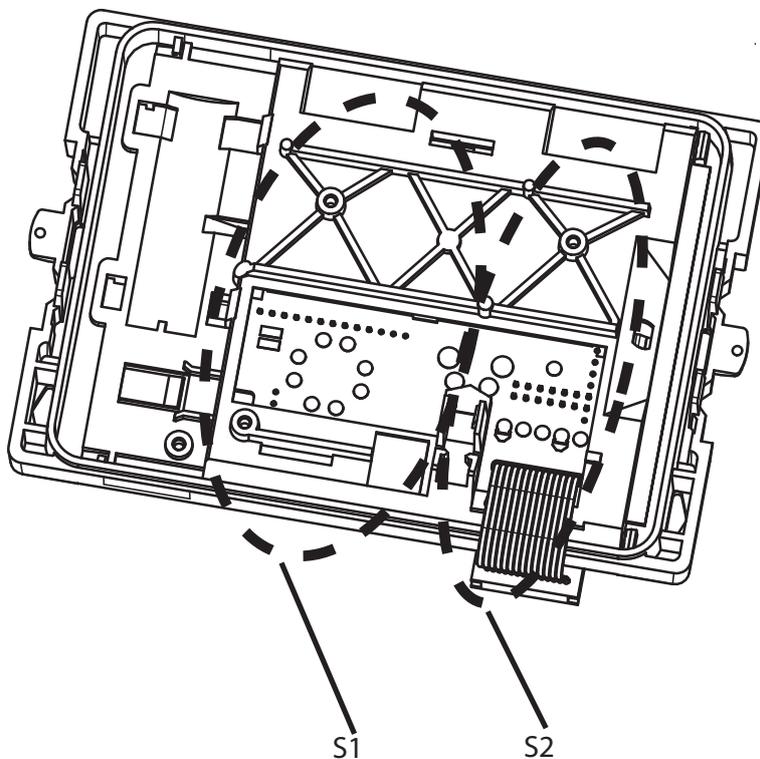
(M-Bus communication description available on request.)

Installation of add-on modules

Typically, optional modules are ordered with the device and pre-mounted from factory in slot 1 and/or 2. In case add-on modules are to be installed afterwards (ordered separately as accessories) install add-on modules according to the following:

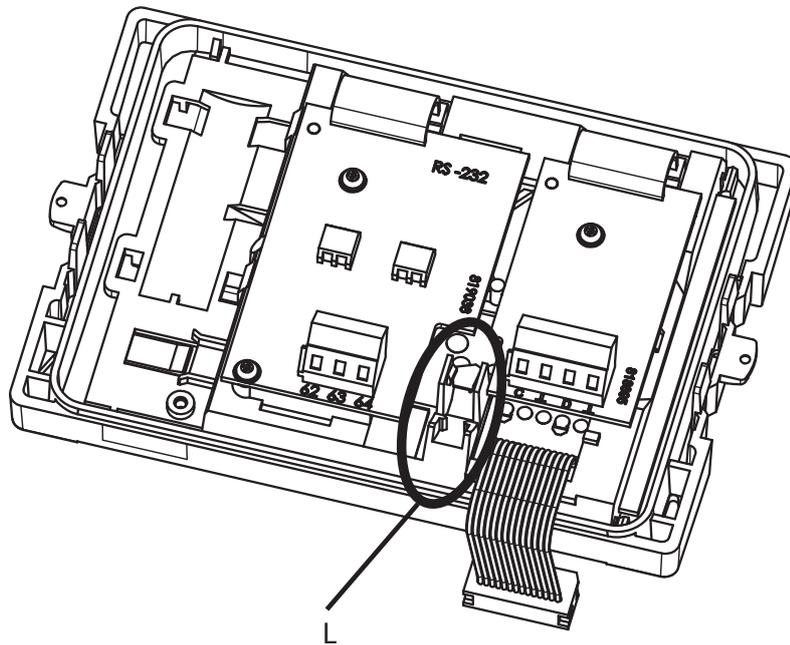
Communication modules

1. Remove user sealing (if present) from integrator housing and open lid.
2. Install communication modules (M-Bus, RS-232) in slot 1 (S1).

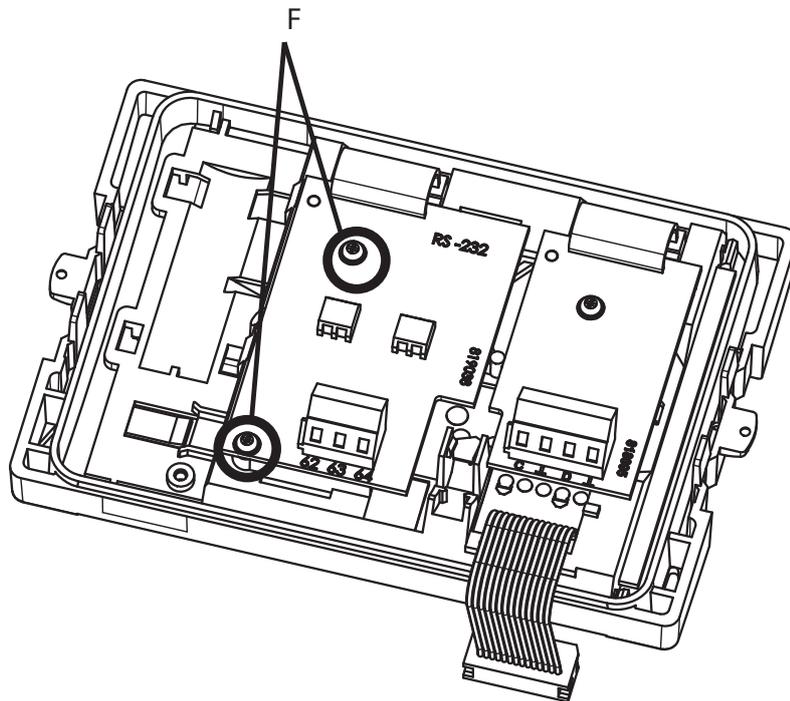


3. Carefully slide plug onto board.
4. Place module over upper locating stud.

5. Position module to locating stud (L) between slot 1 and 2.



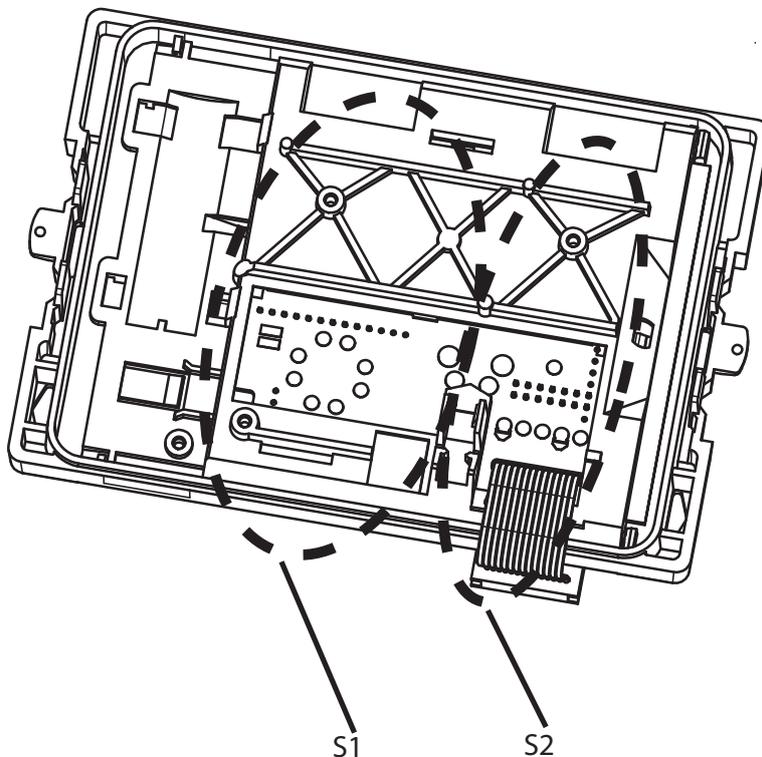
6. Push as far as the stop and mount module with two screws (F).



7. Close lid and check meter for correct operation by pressing push button. Renew label seal of housing lid if meter functions correctly.
8. Functions and settings can be checked via display menu 3 and freely programmed using a software tool and the IrDA interface.

Function modules

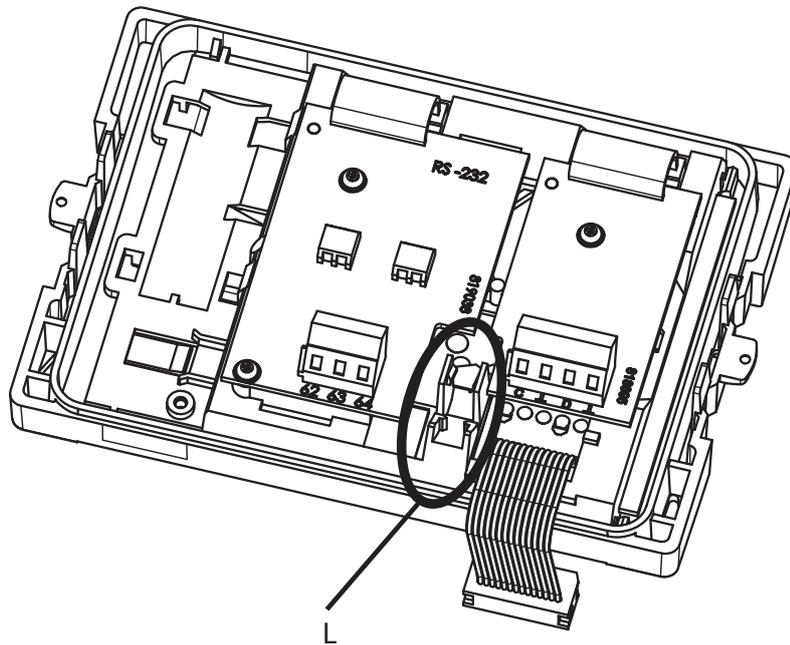
1. The function modules (pulse input or pulse output) are to be installed in slot 2 (S2).



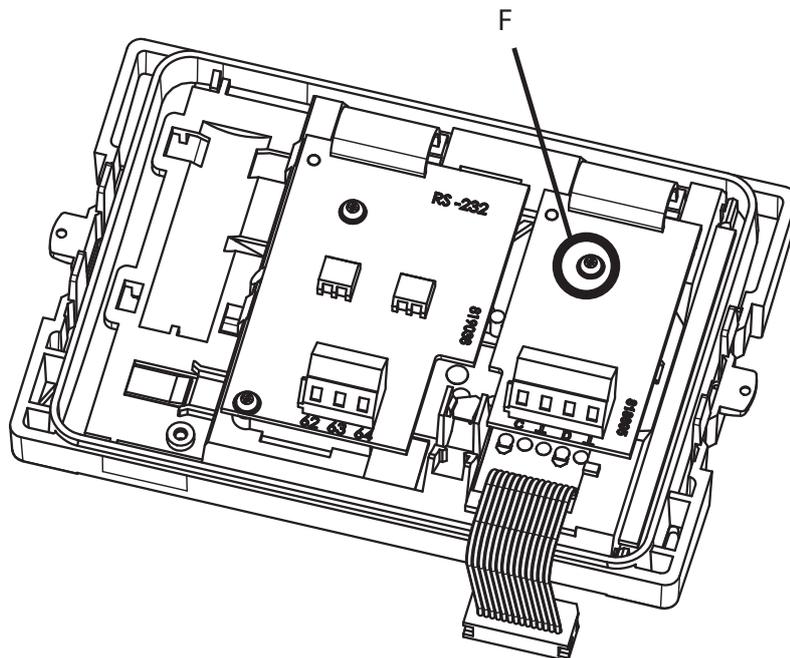
Only if an M-Bus or RS-232 module is not used, *only* pulse input module can also be installed in slot 1.

2. Carefully slide plug onto board.
3. Place module over the upper locating stud.

4. Position module to locating stud (L) between slot 1 and 2.



5. Push as far as the stop and screw tight with the recessed head screw (F).



6. Close lid and check meter for correct operation by pressing push button. Renew label seal of housing lid if meter functions correctly.
7. Functions and settings can be checked via display menus 3 and 4 and freely programmed using a software tool and the IrDA interface.

Operation (hardware)

FUE950 is supplied with only one control button.

In normal mode of operation display shows the cumulative energy, see section Menu structure (Page 39).

6.1 General requirements

Start-up

Before starting up the energy meter, its compatibility with the flow sensor must be checked through function control.

With respect to EN1434 diameter and length of temperature sensor cables must be the same.

In applications with fix connected sensor pair, connection length must not be altered. It is not allowed to wind the cable around pipes or to locate the equipment within a distance of 0.3 m from source of high-frequency or clocked electromagnetic radiation.

Cable must be sealed after connection of flow sensor.

Functional test of calculator at installation location as well as connection of CE-marked flow sensor with protection measures must be performed according to the installation and user guide.

Operation conditions concerning the symmetrical installation of temperature sensors stated in installation and user guide must be fulfilled in order to obtain high measuring accuracy.

In compliance with any existing national regulations only sensor pockets tested for conformity with temperature sensors must be used.

Sensors in forward and return lines must fit right to bottom of sensor pockets.

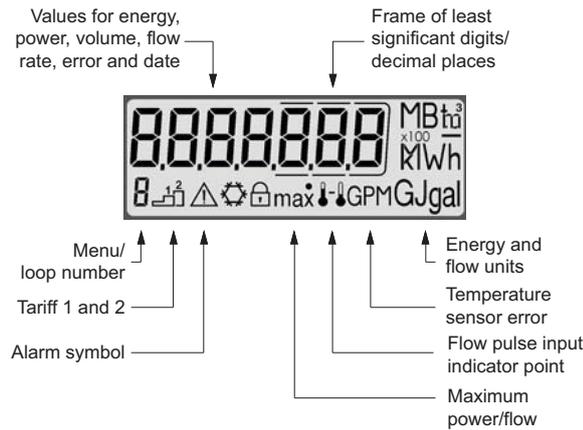
Measurement repeatability stated by manufacturer will be obtained if further described environmental conditions are present.

In case of deviating environmental conditions, energy meter has to be remounted regularly for service.

6.2 Display

Overview

Display will always be configured in accordance with customer's application and selected settings and consequently there will be fewer or more display options under the individual display menus.



Button for operation

A push button () mounted on front of meter is used to switch to various displays. Button can be pressed briefly (< 3 sec.) or long (> 3 sec.). Actual menu loop number is indicated in left side of display.

- Pressing  button *briefly*: Display switches to next display menu within a loop. When maximum menu number is reached, display shows first display menu in loop again.
- Pressing  button for *long*: Display switches to next menu loop for reading secondary parameters.
- *Permanent* pressing of  button: Display switches to next menu loop until maximum loop number (6) is reached. Then display shows first menu loop again.

Automatic sequences

- In menu loops 2 to 6 some display windows are shown in sequences. If a menu is selected and button not pressed, display automatically toggles between two or more display windows every two or four seconds, for instance in menu 3.3 in which output 1 and the actual pulse output value are shown alternately (i.e. "Out_1" and e.g. "0.1 MWh").
- If  button is not pressed for approx. four minutes, meter automatically switches LCD off to save power and returns to basic display menu when  button is pressed again.
- Basic menu loop is number 1 showing the main information (energy, volume, flow, power, temperatures, status information).

6.3 Menu structure

Loops overview

Heatmeter calculator is equipped with a data memory enabling comparison of previous months' readings with current readings.

To show data read out by integrator in display, various windows have been created as loop functions that can be called up in succession to display plant information associated with each window (e.g. energy amounts, operating hours, water amounts, current temperatures, maximum values).

Heat meter display has six loops: main loop, reading day loop, information loop, pulse input loop, tariff loop, and month loop.

Some display windows consist of two or more (maximum seven) display sequences alternating every 2 to 4 seconds.

Note

For quick visual guidance, loops in display are numbered from 1 to 6.

Main loop with current data, e.g. for energy, volume and flow rate, is programmed as default setting. It is possible to change order of contents of main loop. "Energy" window (sequence 1.1 in main loop) is the basic display.

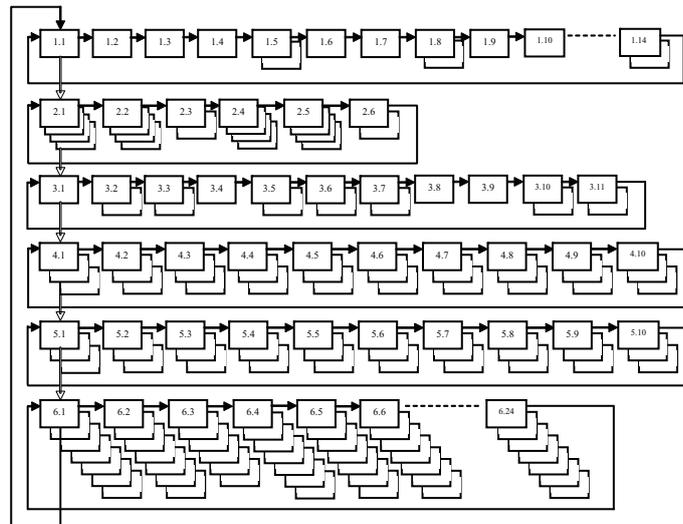


Figure 6-1 Menu loop overview

1. Main loop
2. Accounting date loop
3. Information loop
4. Pulse input loop
5. Tariff loop (only visible if activated)
6. Month loop

Display menu loops

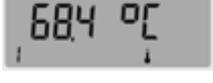
The various loops will show the following information:

("OFF" means display menu is only visible if activated with SW tool, freely changeable)

Main loop

Table 6- 1 Loop no. 1

Menu	Window 1	Window 2
1.1	Accumulated energy	
1.2	Volume	
1.3	Flow	
1.4	Power	
1.5	Forward temperature	Return temperature
1.6	Temperature difference	
1.7	Operation hours	
1.8 (OFF)	Month peak power rate	Date
1.9	Error code	
1.10	Display test	
1.11 (OFF)	Tariff energy 1	
1.12 (OFF)	Tariff energy 2	
1.13 (OFF)	"In 1"	Pulse input counter 1
1.14 (OFF)	"In 2"	Pulse input counter 2

Sequence	Window 1		Window 2
1.1			
	Short press		
1.2			
	Short press		
1.3			
	Short press		
1.4			
	Short press		
1.5		2 sec.	
	Short press		
1.6			

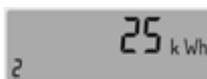
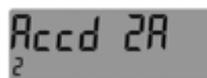
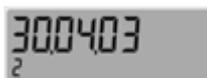
Sequence	Window 1		Window 2
	Short press		
1.7			
	Short press		
1.9			
	Short press		
1.10			
	Short press Returns to menu 1.1		

6.3 Menu structure

Accounting date loop

Table 6- 2 Loop no. 2

Menu	Window 1	Window 2	Window 3	Window 4
2.1	Accounting date 1	Accounting date 1 energy	Accounting date 1 volume	"Accd. 1A"
2.2	Accounting date 1 previous year	Accounting date 1 previous year energy	Accounting date 1 previous year volume	"Accd. 1L"
2.3	"Accd 1"	Accounting date 1 in the future		
2.4	Accounting date 2	Accounting date 2 energy	Accounting date 2 volume	"Accd. 2A"
2.5	Accounting date 2 previous year	Accounting date 2 previous year energy	Accounting date 2 previous year volume	"Accd. 2L"
2.6	"Accd 2"	Accounting date 2 in the future		

Sequence	Window 1	Window 2	Window 4
2.1		2 sec. 	4 sec. 
	Short press		
2.2		2 sec. 	4 sec. 
	Short press		
2.3		2 sec. 	
	Short press		
2.4		2 sec. 	4 sec. 
	Short press		
2.5		2 sec. 	4 sec. 
	Short press		
2.6		2 sec. 	
	Short press Returns to menu 2.1		

Information loop

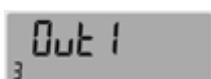
Table 6-3 Loop no. 3

Sequence	Window 1	Window 2
3.1	Current date	
3.2	"SEC_Adr"	Secondary address
3.3	"Pri_Adr"	Primary address
3.4	"Pt100" or "Pt500"	
3.5	Month peak flow rate	Date max. flow
3.6	Month peak power rate	Date max. power
3.7	Integration interval (maximum value)	
3.8	Number of error days	
3.9	"Out1"	Value and unit pulse output 1
3.10	"Out2"	Value and unit pulse output 2
3.11	UHF On of UHF Off (only at mounted module)	
3.12	"F01-001"	
3.13	Glycol concentration (adjustable text / code number)	
3.14	Battery remaining day lifetime	
3.15	Pulse input flow sensor (text with unit)	

Sequence	Window 1		Window 2
3.1			
	Short press		
3.2		2 sec.	
	Short press		
3.3		2 sec.	
	Short press		
3.4			
	Short press		
3.5		4 sec.	
	Short press		

Operation (hardware)

6.3 Menu structure

3.6		4 sec.	
	Short press		
3.7			
	Short press		
3.8			
	Short press		
3.9		2 sec.	
	Short press		
3.10		2 sec.	
	Short press Returns to menu 3.1		

Pulse input loop

Table 6- 4 Loop no. 4

Sequence	Window 1	Window 2	Window 3
4.1	"In1"	Accumulated volume 1	Pulse value 1
4.2	"In2"	Accumulated volume 2	Pulse value 2
4.3 (OFF)	Accounting date 1	"In1"	Acc. date 1 Pulse value 1
4.4 (OFF)	Accounting date 1	"In2"	Acc. date 1 Pulse value 2
4.5 (OFF)	Accounting date 1 previous year	"In1"	Acc. date 1 previous year Pulse value 1
4.6 (OFF)	Accounting date 1 previous year	"In2"	Acc. date 1 previous year Pulse value 2
4.7 (OFF)	Accounting date 2	"In1"	Acc. date 2 Pulse value 1
4.8 (OFF)	Accounting date 2	"In2"	Acc. date 2 Pulse value 2
4.9 (OFF)	Accounting date 2 previous year	"In1"	Acc. date 2 previous year Pulse value 1
4.10 (OFF)	Accounting date 2 previous year	"In2"	Acc. date 2 previous year Pulse value 2

Menu	Window 1		Window 2		Window 3
4.1		2 sec.		4 sec.	
	Short press				
4.2		2 sec.		4 sec.	
	Short press Returns to menu 4.1				

6.3 Menu structure

Tariff loop

Menu loop 5 is only visible if ordered with tariff function option or if activated via free SW-tool.

Table 6- 5 Loop no. 5

Sequence	Window 1	Window 2	Window 3
5.1 (OFF)	Current tariff energy 1	Tariff function 1 (e.g. "t 01")	Treshold tariff 1
5.2 (OFF)	Current tariff energy 2	Tariff function 2 (e.g. "t 02")	Treshold tariff 2
5.3 (OFF)	Accounting date 1	Accounting date 1 tariff energy 1	"Accd. 1A"
5.4 (OFF)	Accounting date 1	Accounting date 1 tariff energy 2	"Accd. 1A"
5.5 (OFF)	Accounting date 1 previous year	Accounting date 1 tariff energy 1	"Accd. 1L"
5.6 (OFF)	Accounting date 1 previous year	Accounting date 1 tariff energy 2	"Accd. 1L"
5.7 (OFF)	Accounting date 2	Accounting date 2 tariff energy 1	"Accd. 2A"
5.8 (OFF)	Accounting date 2	Accounting date 2 tariff energy 2	"Accd. 2A"
5.9 (OFF)	Accounting date 2 previous year	Accounting date 2 tariff energy 1	"Accd. 2L"
5.10 (OFF)	Accounting date 2 previous year	Accounting date 2 tariff energy 2	"Accd. 2L"

Month loop

Table 6- 6 Loop no. 6

Sequence	Window											
	1	2	3	4	5	6	7	8	9	10	11	12
6.1	Last month	Energy	Tariff energy 1	Tariff energy 2	Volume	Max. flow rate	Max. power	In 1	Pulse 1 counter	In 2	Pulse 2 counter	LOG
6.2	Month - 1	Energy	Tariff energy 1	Tariff energy 2	Volume	Max. flow rate	Max. power	In 1	Pulse 1 counter	In 2	Pulse 2 counter	LOG
6.3	Month - 2	Energy	Tariff energy 1	Tariff energy 2	Volume	Max. flow rate	Max. power	In 1	Pulse 1 counter	In 2	Pulse 2 counter	LOG
.								In 1	Pulse 1 counter	In 2	Pulse 2 counter	LOG
6.24	Month - 23	Energy	Tariff energy 1	Tariff energy 2	Volume	Max. flow rate	Max. power	In 1	Pulse 1 counter	In 2	Pulse 2 counter	LOG

6.4 Function test

Before leaving the unit, check the following:

Flowmeter

1. Flowmeter is fitted correctly in direction of water flow (see relevant flowmeter operating instructions).
2. Flowmeter is placed in forward or return line section in accordance with position information printed on energy calculator label (forward or return).
3. Value of flowmeter pulse output is the same as value of energy meter pulse input.
4. Expected flow rate is within measuring range of SITRANS FUE950 calculator.
5. Temperature sensors are of the same pair.
6. Temperature sensors are wired correctly (including any cable extensions), installed correctly, and mounted in correct sensor pockets.

SITRANS FUE950

1. Pulse indicator is shown, and flow rate shown in display is normal and concordant with connected flowmeter.
2. Temperatures shown are within normal range and typical for the application.
3. T_H is higher than T_C .
4. No error indication is shown in display.

Test procedure

1. Check that pulse indicator is flashing regularly.
2. Check that no error function is indicated by a  symbol or a broken Pt sensor .
3. Press  button briefly to check that all major functions display feasible values, e.g. cumulative energy, cumulative water quantity, forward and return temperature.
4. Press  button repeatedly to return arrow indicator to top "Err" and check that all display segments are visible.

Please fill in the following:

Commissioned

Date: _____

Name: _____

Close and affix user seals to FUE950 cover (Page 49) and temperature sensor pockets (Page 17), if applicable.

SITRANS FUE950 is now ready for use.

Service and maintenance

7.1 Replacing the battery

The SITRANS FUE950 battery can easily be replaced, please refer to chapter Power supply options (Page 26) for detailed instructions.

7.2 Sealing

The individual parts of the SITRANS FUE950 system are to be sealed in accordance with local provisions in the country in which it is installed.

Seals

1. Energy calculator must be provided with an adhesive label seal on back of top of device.

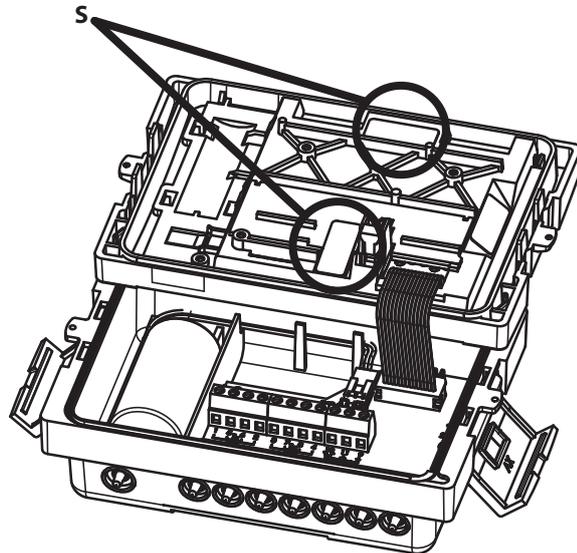


Figure 7-1 S - Verification sealing

2. Energy calculator is provided with a thread seal or adhesive label seal.

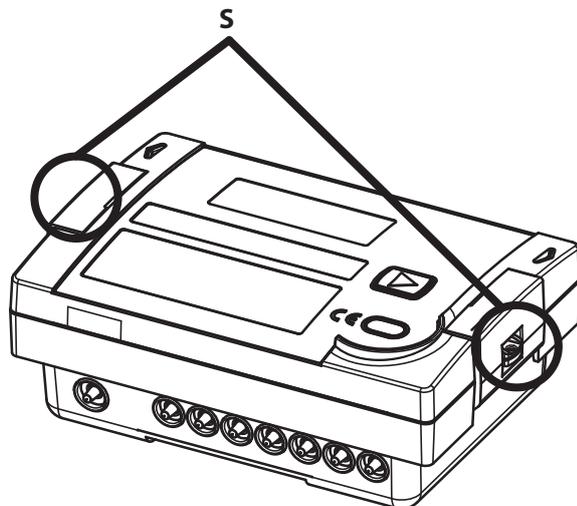


Figure 7-2 S - User sealing

3. Sensors are thread-sealed.

Note

Important

It is important that sealing threads are kept as short as possible and are tensioned well to seal.

7.3 Technical support

CAUTION
Repair and service must be carried out by approved Siemens Flow Instruments personnel only.

Note

Siemens Flow Instrument defines sensors as non-repairable products.

Technical Support

If you have any technical questions about the device described in these Operating Instructions and do not find the right answers, you can contact Technical Support:

- Via the Internet using the **Support Request:**
Support request (<http://www.siemens.com/automation/support-request>)
- Phone: +49 (0) 180 5050 222

Further information about our technical support is available in the Internet at Technical support (<http://support.automation.siemens.com/WW/view/en/16604318>)

Service & Support on the Internet

In addition to our documentation, we offer a comprehensive knowledge base online on the Internet at:

Service and support (<http://www.siemens.com/automation/service&support>)

There you will find:

- The latest product information, FAQs, downloads, tips and tricks.
- Our newsletter, providing you with the latest information about your products.
- A Knowledge Manager to find the right documents for you.
- Our bulletin board, where users and specialists share their knowledge worldwide.
- You can find your local contact partner for Industry Automation and Drives Technologies in our partner database.
- Information about field service, repairs, spare parts and lots more under "Services."

Additional Support

Please contact your local Siemens representative and offices if you have additional questions about the device

Find your contact partner at:

Local contact person (<http://www.automation.siemens.com/partner>)

7.4 Return procedures

Enclose the delivery note, the cover note for return delivery together with the declaration of decontamination form on the outside of the package in a well-fastened clear document pouch.

Required forms

- **Delivery Note**
- **Cover Note for Return Delivery** with the following information
Return delivery form (<http://support.automation.siemens.com/WW/view/en/16604370>)
 - product (ordering number)
 - number of devices or spare parts returned
 - reason for the return
- **Declaration of Decontamination**
Decontamination declaration
(http://pia.khe.siemens.com/efiles/feldg/files/Service/declaration_of_decontamination_en.pdf)

With this declaration you certify *that the returned products/spare parts have been carefully cleaned and are free from any residues.*

If the device has been operated together with toxic, caustic, flammable or water-damaging products, clean the device before return by rinsing or neutralizing. Ensure that all cavities are free from dangerous substances. Then, double-check the device to ensure the cleaning is completed.

We will not service a device or spare part unless the declaration of decontamination confirms proper decontamination of the device or spare part. Shipments without a declaration of decontamination will be cleaned professionally at your expense before further proceeding.

You can find the forms on the Internet and on the CD delivered with the device.

Note

Return of products with Lithium batteries

Lithium batteries are certified as dangerous goods according to the Regulation of Dangerous Goods, UN 3090 and UN 3091. Special transport documentation is required to observe these regulations.

Therefore it is recommended to remove lithium batteries prior to shipment

If the battery is important for the examination of the product and it cannot be removed, the product has to be returned according to the Regulation of Dangerous goods.

7.5 Battery Disposal



In accordance with EU directive 2006/66/EC, batteries are not to be disposed of using municipal waste disposal services.

Waste industrial batteries are accepted back by Siemens or by the local Siemens representative. Please talk to your local Siemens contact or follow the return procedures of Siemens Flow Instruments described in chapter: Return procedures (Page 52)

Troubleshooting/FAQs

8.1 Error information and codes

If the energy meter is operating normally, menu loop 1 will show a measuring value (e.g. ).

If a  or  error code is displayed in menu loop 1, an error has occurred. This symbol is displayed permanently, however only in the corresponding "normal" display (e.g. temperature error is not shown in temperature display, but not in flow rate display). In the basic display mode, display changes between basic display and error pending view showing codes for errors occurred. The only exception is error "C-1", which is displayed permanently.

Note

The display "E -1 - - - -" will be shown at delivery. Because no PT-sensors are connected, temperature error is displayed.

Note

If no error has occurred and button is not used for 4 minutes, display will automatically be switched off for power-saving. It is automatically switched on when button is pressed.

Maximum four errors can be shown at the same time. The error display view shows 7 digits.



1. Always shows an "E"
2. Always shows a "-"
3. Shows:
 - "-" (if no temperature error has occurred)
 - "1" or "3" (if an temperature error has occurred)
4. Shows:
 - "-" (if no leak was detected)
 - "A", "B", "C" or "D" (if a leak was detected)
5. Always shows a "-"
6. Shows:
 - "-" (if communication is working properly)
 - "5" (if communication is impossible)
7. Shows:
 - "-" (if there is no power failure)
 - "8" or "9" (if mains power or battery power, respectively, is insufficient)

Error pending table

Error code	Display	Error description/cause	Device behaviour	Remedy
C - 1	 displayed permanently	Basic parameter in Flash or RAM destroyed. (A self test is done each minute)	Disables: Energy, power, flow and volume calculation Optional LCD displaying Clock and date actions Stores: C-1 in event memory	Replace device
E - 1	 displayed	Error in measuring the temperature (typically checked every 4-8 seconds) Temperature outside range (-9.9°C...+190°C) PT-sensor short-circuited PT-sensor not or wrong connected PT-sensor broken	Shows: "Err" for temperatures and power in menu loop 1 Disables: energy and power calculation	Check temperature sensors, cables and connection. If sensor are broken change I to a new sensor pair. Check media temperature (must be within specified temperature range)
E - 3		Wiring of sensors for hot and cold temperature measurements are switched ($\Delta T < -5$ K).	Disables: energy calculation Resets: E-3 automatically if $\Delta T \geq -5$ K.	Ensure that sensor for hot (T_H) and cold temperature (T_C) are placed correctly. Ensure temperature sensors are connected to the right terminals (T_H : 5-6, T_C : 7-8). Ensure bridges are present/mounted (necessary for 2-wire PT-sensors).
E - 5	 displayed	"Logical data capacitor exhausted", communication temporarily impossible (checked every 4 seconds)	Disables: opto. communication	Improve data communication (e.g. using IrDA-eye). Change data request settings, i.e. reduce data request speed.
E - 8	Display switched off  displayed permanently	Mains power supply 230 V AC or 24 V AC failed (only for mains-powered modules with internal backup-battery).	Powered via the back-up battery (checked every minute) Disables: energy, power, flow and volume calculation temperature measurement	Check the mains power supply. Output voltage of module to FUE900 plug must be 3.0 ... 3.6 V DC
E - 9	Display switched off  displayed permanently	Battery empty (checked every day).	Monitors: remaining usage time Shows: error if remaining time < 400 days Disables: no functions	Replace battery.

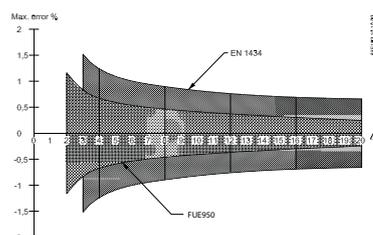
Error code	Display	Error description/cause	Device behaviour	Remedy
A		Leak detection heating circuit (small leak detected by measurement over time)	Disables: no functions	Error is used as a warning. Remedy depends on settings by local user programming via SW-tool
B		Leak detection heating pipe burst (checked every minute)	Disables: no functions	Error is used as a warning. Remedy depends on settings by local user programming via SW-tool
C		Leak detection water meter at In1, check by end of day	Disables: no functions	Error is used as a warning. Remedy depends on settings by local user programming via SW-tool
D		Leak detection water meter at In2, check by end of day	Disables: no functions	Error is used as a warning. Remedy depends on settings by local user programming via SW-tool

Technical data

Technical data

Parameter	Data	
General	Approval	MID-Approved in accordance with approved temperature range
	Temperature range	0 ... 180°C (32 ... 356°F)
	Absolute temperature range	-9.9 ... +189.9°C (14 ... 338°F)
	Temperature difference	3 ... 177 K (starting at 0.1 K)
	Accuracy	Max. $\pm(0.5 + 3 \text{ K}/\Delta\theta[\%])$
	Flow range	$Q_n (Q_p) \leq 9\,999.9 \text{ m}^3/\text{h}$
	Power range value	0 ... 999 999.9 kW
	Environment class	EN 1434 Class C/A

Accuracy



User interface	Display	7-digit LCD display with associated pictograms/symbols
	Units	MWh, kWh, GJ, Gcal, MWh, kWh, GJ, Gcal, MBtu, m ³ , m ³ /h, °C, kW
	Totalizer value range	999 999.9; 99 999.99; 9 999.999
	Values	Power, energy, volume, flow rate, temperatures
	Push button	Single push button for the menu controlling
	Optical interface IrDA interface	ZVEI optical interface with M-Bus protocol as per EN1434, connection via separate IrDA-adaptor
Rated operation conditions	Enclosure	IP54 in accordance with IEC 529
	Material	
	• Top	PC Lexan 141R Transparent 111
	• Pipe/wall fitting	PA 6,6 GF25
	• Other plastic parts	ABS Cycolac GPM500

Parameter	Data	
	<ul style="list-style-type: none"> Gaskets 	
	Neoprene	
	<ul style="list-style-type: none"> Rubber cable bushings 	
	EPDM 50	
	Temperature	
	<ul style="list-style-type: none"> Ambient 	
	0 ... 55 °C (32 ... 131 °F)	
	<ul style="list-style-type: none"> Storage 	
	-25 ... +70 °C (-13 ... +158 °F)	
	Environment class	
	EN 1434 class E1 / M1	
Temperature input	Temperature range (Absolute measuring range)	-9.9 ... 189.9 °C (14.18 ... 373.82 °F)
	Temperature difference	Start 0.1 K, min. 3 K, max. 177 K
	Sensor types	Pt 100 or Pt 500 with 2-wire leads, cable length < 10 m, standard setting: Pt 500, selection by order code and shown at the device label (only Pt 500 types are available)
	Sensor connection	4-wire (prepared as 2-wire)
	Measurement resolution	0.1 °C (0.18 °F)
	Flow input (In 0)	Pulse value
Pulse frequency		≤ 100 Hz
Flow range		$Q_{max} \leq 9\,999.9$ m ³ /h
Pulse ON-time		≥ 4 ms
Pulse OFF-time		≥ 6 ms
Type		Active or passive pulse input
External voltage supply (active pulse input)		Max. 3.6 V DC (min. 3.0 V DC) and max up to the power supply module version, e.g. 3.0 V DC
Flowmeter installation place		Hot line or cold line ("forward or reward pipe"), selection by order code. The "inst. place" will be shown at the device label.
Slots for option modules		Type
	Function modules	Pulse input module, 2 inputs(In1, In2) Pulse output module, 2 outputs (Out1, Out2) Combination module of 2 inputs (In1, In2) and 1 output (Out1)
	Communication modules	M-Bus or RS 232
	Pulse output	Type

Parameter	Data	
	Pulse value	Last display digit unit/pulse, selection by order code and setting can be read via display menu, freely programmable by a software tool
	Pulse frequency	≤ 4 Hz
	Pulse length	Typically 125 ms (100 ... 150 ms)
	External voltage supply	3 ... 30 V DC
	Current	≤ 20 mA
	Possible pulse output selection (max. output frequency: 4 Hz)	<ul style="list-style-type: none"> • Energy (standard setting for 'Out1') • Volume (standard setting for 'Out2') • Tariff energy 1 • Tariff energy 2 • Tariff condition 1 (limit switch) • Tariff condition 2 (limit switch) • Energy error • Volume error • Volume in m³ with specific display resolution (or with factor 0,1, 10 or 100 thereof) • Energy with specific display resolution (or factor 0.1 thereof) • Leakage detection (2 channel)
Pulse input	Type	Passive "open collector" pulse inputs, outputs not potential isolated from each other, data are separately cumulated in different registers and are also stored on the two accounting days.
	Pulse value	Pulse value and the unit are configurable for energy, water, gas or electrical meter by a software tool
	Pulse frequency	≤ 8 Hz
	Pulse length	≥ 10 ms
	External voltage supply	3 ... 30 V DC
	Current	Based on Ri = 2.2 M Ω
	Cable length	< 10 m connection limit
M-Bus output	Type	The optional M-Bus plug-in module is a serial interface for communication with external devices (M-Bus Repeater)
	Protocol	M-Bus according to EN1434
	Connection	Open collector, 2400/300 baud, 3.6 V
RS 232 output	Type	The optional plug-in RS232 communication module is a serial interface and permits data exchange with the calculator. For this purpose a special data cable is necessary
	Protocol	M-Bus according EN1434

Parameter		Data
	Connection	Open collector, 2400/300 baud, 3.6 V
Power supply	Supply data	Internal voltage 3.0 V or 3.6 V by the battery or plug-in power supply module
	Battery, 3.6 V type	3.6 V lithium D-cell, battery lifetime typically years, 16 years with independently powered flowmeter
	Battery, 3.0 V type (standard)	3.0 V lithium C-cell, battery lifetime typically years, 12 years with independently powered flowmeter
	230 V AC module	Plug-in module for 230 V AC +15/-30% 50/60 Hz (incl. battery backup)
	24 V AC module	Plug-in module for 24 V AC (incl. battery backup)
	Battery backup	Only with mains supply modules by internal 3.0 V lithium battery (type BR 2732)

Dimension drawings

10.1 Dimensional drawings

FUE950 energy meter

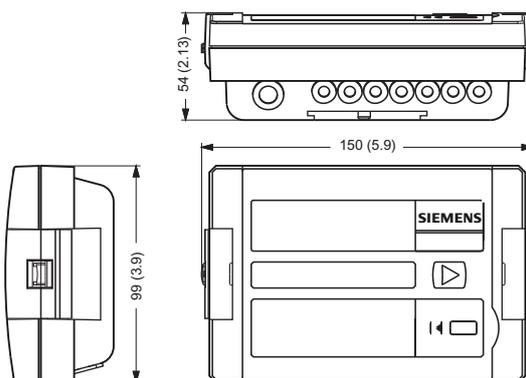


Figure 10-1 FUE950, dimensions in mm (in)

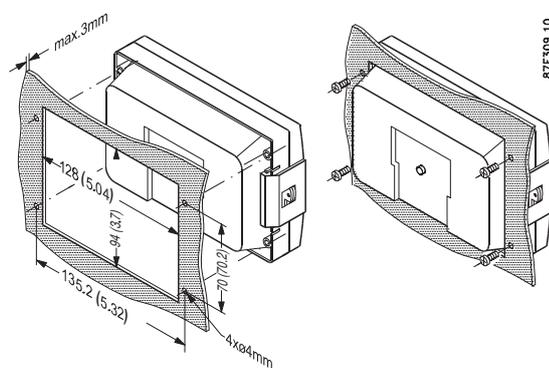


Figure 10-2 Panel mounting, dimensions in mm (in)

Temperature sensor

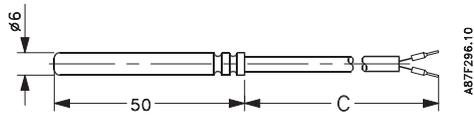


Figure 10-3 Pt500 temperature sensor, dimensions in mm (in)

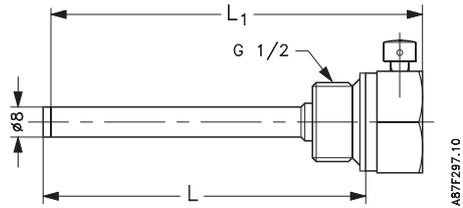


Figure 10-4 Sensor pocket (stainless steel), dimensions in mm (in)

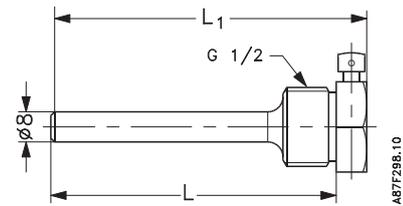


Figure 10-5 Sensor pocket (brass), dimensions in mm (in)

Spare parts/Accessories

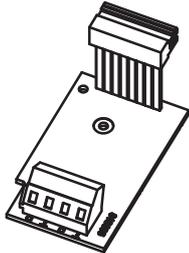
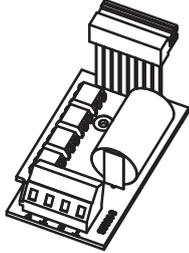
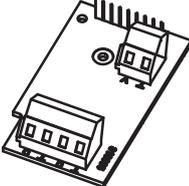
11.1 Ordering

In order to ensure that the ordering data you are using is not outdated, the latest ordering data is always available on the Internet:

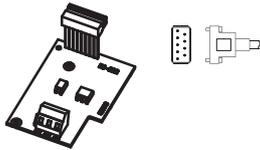
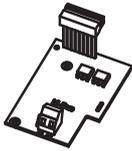
Catalog process instrumentation (<http://www.siemens.com/processinstrumentation/catalogs>)

11.2 Accessories

Option modules

Description	
Pulse input module	
Pulse output module	
Combination pulse input/output module (2 inputs and 1 output)	

11.3 Power supply

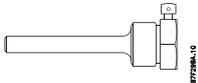
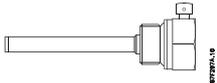
Description	
Data RS 232 module	
Data RS 232 module incl. serial data cable (1.5 m incl. serial PC plug)	
M-Bus slave module	

11.3 Power supply

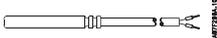
Description	
3.0 V C-cell battery	
3.6 V D-cell battery	

Description	
230 V AC supply module (internal fuse: T50mA L 250 V)	
24 V AC supply module	

11.4 Temperature sensor pocket

Description	
Brass pocket 6 mm, G $\frac{1}{2}$ B x 40 mm (PN 16)	
Brass pocket 6 mm, G $\frac{1}{2}$ B x 85 mm (PN 16)	
Brass pocket 6 mm, G $\frac{1}{2}$ B x 120 mm (PN 16)	
Stainless steel pocket 6 mm, G $\frac{1}{2}$ B x 85 mm (PN 25)	
Stainless steel pocket 6 mm, G $\frac{1}{2}$ B x 120 mm (PN 25)	
Stainless steel pocket 6 mm, G $\frac{1}{2}$ B x 155 mm (PN 25)	
Stainless steel pocket 6 mm, G $\frac{1}{2}$ B x 210 mm (PN 25)	

11.5 Pt500 temperature sensor pair

Description	
Pt500 temperature sensor, 2-wire, with MID/EN approval and verification Cable length: 2 m, 3 m, 5 m, 10 m	

Appendix

A.1 Conformity to guidelines

Declaration of conformity

Siemens hereby declares that this product meets the essential requirements of the following guidelines:

- EMC – Directive (2004/108/EC)
- R&TTE – Directive (1999/5/EC)
- MID – Directive (2004/22/EC)
- Council Directive (2006/95/EC)
- EC-type examination certificate number (DE-09-MI004-PTB019)

A.2 Certificates

All certificates are posted on the Internet. Additionally, the CE Declaration of Conformity as well as EX approvals are available on the Sitrans F literature CD-ROM Certificates (<http://www.siemens.com/processinstrumentation/certificates>)

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Further information

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