SIEMENS

SITRANS FUE950

Type 548 3052090

CE M14 0200

DE-11-MI004-PTB005
Siemens A/S Flow Instruments
DK-6430 Nordborg
Made in Germany

230V~
50-60Hz
0.15W

Calculator heating

Installation: low temp.
2,5L/Imp qmax:900m³/h

5000 2561

7ME3480-2BA00-2BD2

Θ: 0...180°C
ΔΘ: 3...177K
Pt 500
IP 54
E2 / M2
P.-Year 2014

F02-002-16

SITRANS F

Ultrasonic Flowmeters
SITRANS FUE950 Energy Calculator

Operating Instructions

Answers for industry.

SIEMENS

SITRANS F

Energy calculator type FUE950

Operating Instructions

Energy calculator designed for use with flowmeter types SITRANS FUS/FUE380, FST020, MAG 5000/6000 and MAG 8000
(Documentation for SITRANS FUE950 with order code 7ME3480)

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**
>
> indicates that minor personal injury can result if proper precautions are not taken.

> **NOTICE**
>
> indicates that property damage can result if proper precautions are not taken.

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, 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 complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of 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.

Table of contents

Introduction

<div style="text-align: right; font-size: 3em;">1</div>

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 operating instructions are read, understood and followed by the relevant personnel before installing the device.

1.2 Items supplied
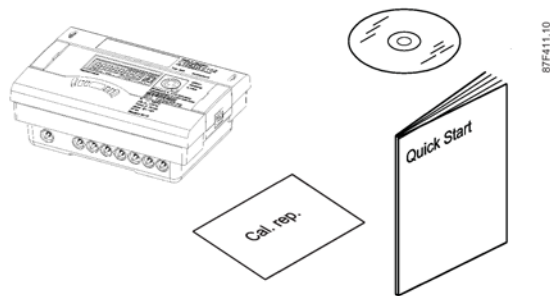
- Energy calculator type SITRANS FUE950 [1)]
- Temperature sensors (1 pair including the test report), typically Pt500 [1)]
- Temperature sensor pockets (2 pieces) [1)]
- Wall mounting bracket
- SITRANS F US documentation disk
- Quick start guide
- Calibration report

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

Note

Compatibility

The accessories for each FUE950 version are not compatible with other FUE950 versions, e.g. add-on modules for 7ME3480 versions can only be used with 7ME3480 devices.

Inspection

1. Check for visual mechanical damage due to possible improper handling during shipment. All claims for damage are to be made promptly to the carrier.

2. Make sure the scope of delivery, and the information on the type plate corresponds to your order and the delivery note.

1.3 Device identification
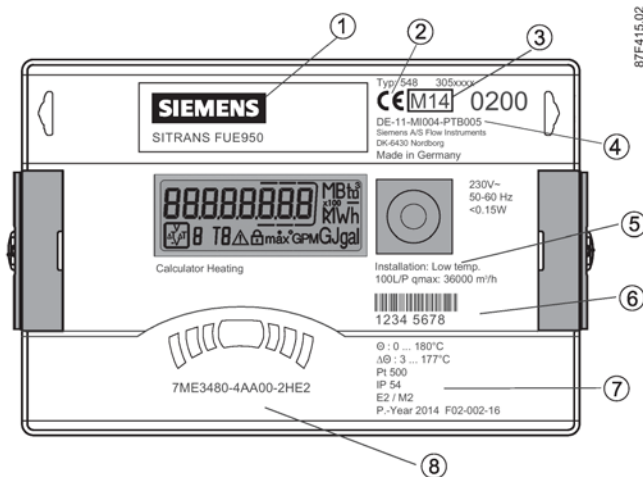
①	Product name
②	CE sign (Declaration of Conformity)
③	Year of first verification (if ordered)
④	MID approval number (if ordered with MID approval)
⑤	Installation place and pulse input setting
⑥	Serial number
⑦	Device data
	• Temperature input and range
	• Environment data
	• Production year and firmware version
⑧	Code number (7ME3480...)

Figure 1-1   FUE950 nameplate example

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	FW version M-Bus device ID Manufacturer ID (HEX)
08/2003	FUS105 (based on type Infocal 5)	F01-001 0X01 2324
09/2006	New name: FUE950	F01-001 0X01 2324
12/2009	New order structure (7ME3470...) Product update	F01-001 0X47 2324
07/2011	New order structure (7ME3480...) Product upgrade included	F01-001 0X52 2324
11/2012	Update of connection drawing Update of technical data	F01-001 0X52 4D25
02/2013	Firmware update Communication and function updates Increased resolution of displayed temperature	F02-002 0XA0 4D25
12/2013	Update of graphics (nameplate marking) and add-on module in slots 1 and 2	F02-002 0XA0 4D25
05/2014	Update of information on current output add-on module (an additional plug must be connected)	F02-002 0XA0 4D25
09/2014	Firmware update	F02-002-16 0XA0 4D25

1.5 Further Information

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 these Operating Instructions, 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 2

2.1 General safety instructions

> ⚠️ **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 modifications of the product, are not permitted.

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

2.2 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.

> **NOTICE**
>
> **Material compatibility**
>
> Siemens A/S, 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 A/S, Flow Instruments can take no responsibility for any failure due to material incompatibility.

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
- DE-11-MI004-PTB005
- PTB K7.2 (approval no. 22.75/11.02)

Standards and regulations

The requirements for heat meters and peripheral equipment (calculators, temperature sensors, flowmeters) are defined by EN 1434. Not only does it include all the requirements for measurement but also, in part 6, regulations and recommendations for installation and operation.

Heat meter systems used for custody transfer are subject to legal calibration. Peripheral equipment used in the measurement points subject to verification must be dismounted after typically five years (depending on local regulations) and verified again by an authorized verification center.

The metrological aspect of recalibration includes the use of predefined error limits. In practice, this means that attention must be paid to the installation and assembly of the heat measurement points so that the assembly and disassembly of all components of the measurement points can be carried out quickly and efficiently at all times.

2.3 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.

• Observe the following precautions 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.

2.4 General requirements

The label seal on the calculator, see "Sealing" (Page 51), 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 the 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 device is pre/programmed for water as the measuring medium (or - as special option - for glycol additive) with specified consistence.

Note

Calibration/verification

SITRANS FUE950 is an MID-approved calorific energy meter ready for verification in accordance with the European standard EN 1434.

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

Note

Personnel qualifications - particularly important for mains-powered versions

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 (min. 1 A) shall be included in the building installation for mains-powered versions. 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 the main power cable, the protection cover has to be installed with the two screws.

Description

3
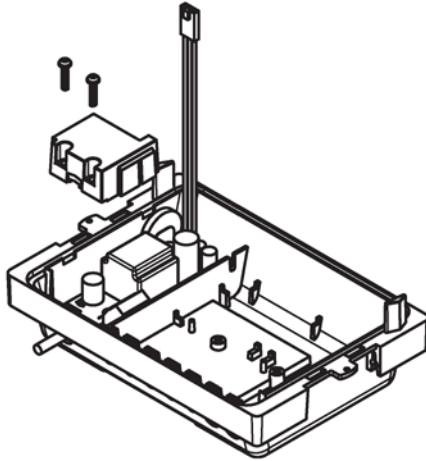
3.1 General description

SITRANS FUE950 is a universal thermal energy calculator that meets the requirements of EN 1434 and has an MID approval for heat metering. For cooling the SITRANS FUE950 has the national German approval according to the PTB K7.2 standard.

The SITRANS FUE950 energy calculator has been developed for Siemens Flow Instruments and is applicable with the following flowmeter types:

- SITRANS FUS380/FUE380
- SITRANS FST020
- SITRANS F M MAG 5000/6000
- SITRANS F M MAG 8000

Typically, the device 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 with the SITRANS F M flowmeter programme in cooling systems using water as coolant. The specific media temperature range is shown on the nameplate.

The energy calculator is modular in construction and can be fitted with optional modules depending on the application.

The reading and parameterization of the SITRANS FUE950 is done via the software tool IZAR@SET, available via www.siemens.com/flow (www.siemens.com/flow).

Temperature sensors

Temperature sensors are one of the integral components of every thermal energy meter in heating or cooling applications. They are used for determining temperature changes in fluids due to energy released from or supplied to the loop. The temperature is measured by mounting temperature sensors upstream and downstream from the point where the exchange in the thermal energy of the system occurs. The temperature sensors can be used in applications with pipe diameters from approximately DN 50 and upwards. They have good thermal properties with low heat radiation and must always be used with related sensor pockets (typically ordered together with the temperature sensor pair).

For further information on temperature measurement, see appendix (Page 75).

3.2 Measuring principle

Energy calculation

The calculation of energy is based on the following formula:

Energy = Volume x $(T_H - T_C)$ x K-factor$_{(Ti)}$

- Volume: Volume of a given number of volume pulses from the flow meter

- T_H: Measured temperature in the hot pipe

- T_C: Measured temperature in the cold pipe

- K-factor $_{(Ti)}$: Thermal coefficient of media enthalpy and heat content

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

The calculator always carries out at least one energy calculation every 2 sec. (mains-powered version; battery-powered version: 4 sec.). If the connected flowmeter has not sent enough pulses, the energy calculation and the flow indication is also based on the 2 sec. (4 sec.) value.

3.3   Applications

Heating and cooling applications

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

- District heating applications

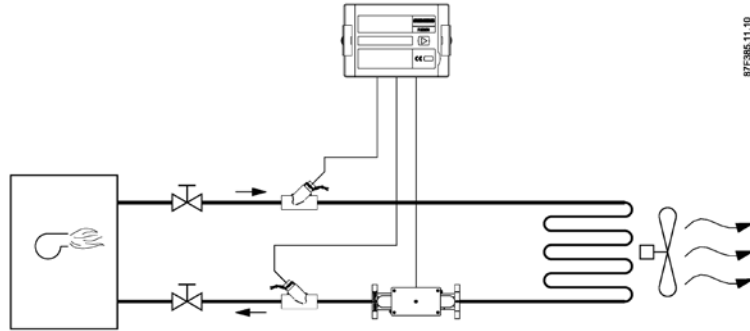Figure 3-1   District heating applications with the flowmeter in the cold pipe

- Chilled water applications
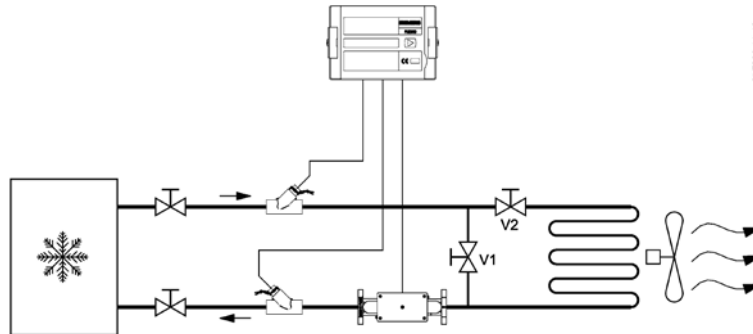

Figure 3-2   Chilled water applications with the flowmeter in hot pipe
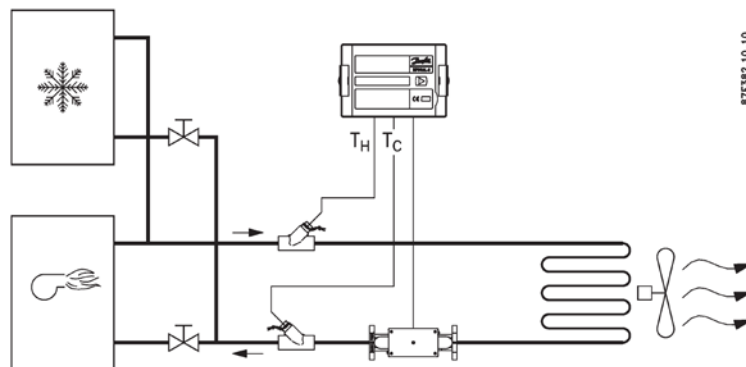
- Combined cooling/heating applications

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

The separate flowmeter for the input of volume pulse can be installed in the hot or the cold pipe.

The hot pipe is the pipe with the higher media temperature. In heating systems called forward line and in cooling systems the return line..

The cold pipe is the pipe with the lower media temperature. In heating systems called return line and in cooling systems the forward line.

3.4 Design

Display and push button

The SITRANS FUE950 has an easy-read 8-digit LCD display with associated pictograms for various functions.
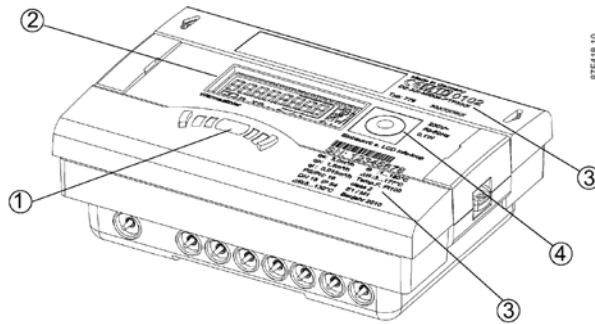
1	Optical IrDA interface
2	LCD display
3	Area with laser markings on nameplate
4	Push button

Figure 3-4   SITRANS FUE950

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

The display and the menu loops will always be configured for a specific application, and for the selected display settings. In the normal operation menu loop, the display will show accumulated energy and volume as well as the actual flow and temperature values.

The energy calculator has an IP54 polyamide housing designed for wall or panel mounting. The housing comes with prepared rubber gaskets cable entries for fast and easy installation.

Temperature sensor set

The temperature sensor set is designed according to international standards of temperature sensor pairs and for use with the Siemens energy calculator type SITRANS FUE950 for measurement of energy consumption in heating or cooling applications.

To ensure accurate measurement of temperature difference according to MID (EN 1434) and PTB K7.2, the sensors are delivered as 4-wire matched pairs.

The 4-wire sensor set can always be delivered with MID (EN 1434) heating and PTB K7.2 cooling approvals for multiple-purpose applications in heating or cooling applications.

Installing/mounting

<div style="text-align: right; font-size: 3em; font-weight: bold;">4</div>

4.1 Application planning

The application planning of the energy calculator consists of three steps:

1. Ambient conditions check.

2. Check of application settings.

3. Device installation, see Installation of the device (Page 21).

4.2 Ambient conditions

Specifications
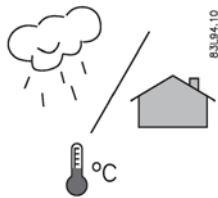
The SITRANS FUE950 energy calculator is suitable for indoor and outdoor installations.

- Temperature specifications:
  - Ambient temperature: 0 to +55 ºC (+32 to +131 ºF)
  - Storage: –25 °C to +70 °C (-13 to +158 °F)
- Enclosure rating:
  - IP54
- Environment classes:
  - EN 1434 class E2 / M2 (electromagnetic / mechanical)

    Note

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

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

Installation safety precautions

⚠ WARNING
High pressure hazard
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

  The application type and flow meter installation place can be checked via the order code on the device nameplate. The information can also be found in menu loop 3.

  – Calculator district heating, flow meter in return line (cold pipe) 7ME3480-xxAx-xxxx

  – Calculator district heating, flow meter in forward line (hot pipe) 7ME3480-xxBx-xxxx

  – Calculator chilled water, flow meter in forward line (cold pipe) 7ME3480-xxCx-xxxx

  – Calculator chilled water, flow meter in return line (hot pipe) 7ME3480-xxDx-xxxx

  – Calculator combined cooling/heating, flow meter in forward line (hot pipe by heating) 7ME3480-xxEx-xxxx

  – Calculator combined cooling/heating, flow meter in return line (cold pipe by heating) 7ME3480-xxFx-xxxx

- Pulse input setting

  The calculator pulse input setting must fit the flowmeter pulse output. Check both nameplates for the settings, see also menu loop 3 for the FUE950 settings.

- Pt sensor type

  Observe the information on the temperature sensor installation as well as the temperature limits on the nameplates.

- Max. flow rate

  The max. flow rate for the energy calculator must not be exceeded (see nameplate).

4.4 Installing the device

Procedure

The installation of the energy calculator consists of five steps:

1. Check of the application settings

2. Installation of the energy calculator

3. Installation of the temperature sensors

4. Electrical connection

5. Start-up

Installation in application

Depending on the selection via the order code, see "Ordering" (Page 71), the calculator is programmed for installation of the flowmeter in the hot pipe or the cold pipe as indicated on the calculator name plate.

Typically, the 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: 0 to 55°C (32 to 131°F)).
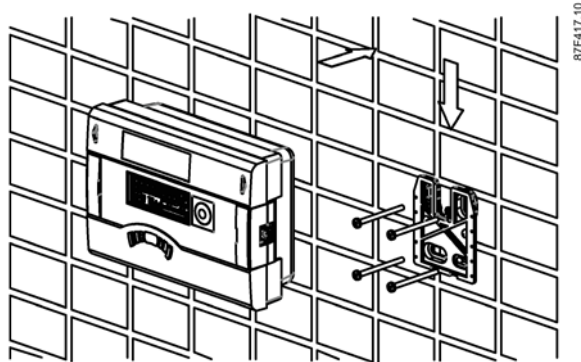

Figure 4-1   Wall mounting of the device

Panel mounting

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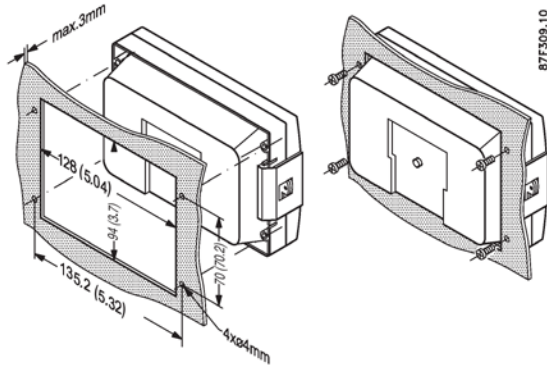

Figure 4-2   Panel mounting of the device

4.5   Temperature sensors

General requirements

- Handle the temperature sensors with care.

- The temperature sensors are matched paired sets and **must never be separated**.

- The max. supported sensor cable length is 10 m (33 ft) (2-wire and 4-wire).

- The sensor cables must be separated from high-voltage equipment and from electrically noisy environments.

- The sensor pocket type is approved for the specific sensor type only.

- Mount the sensor pair symmetrically, i.e. mount them in the same pocket types and installing depths for both the cold pipe and the hot pipe.

- Ensure that the flow rates and the thermal conditions are the same for both measurement points.

- Observe the right temperature sensor installation in the application. The sensor cables are provided with colored type labels: Red for the hot pipe temperature sensor and blue for the cold pipe temperature sensor.

- Install the sensor pockets and sensors so that there is sufficient room to easily remove them without the use of force in case of replacement.

- Use sensor types and pockets suitable for the temperature, pressure and flow velocity of the application.

- Optimize heat contact with the liquid (mount without a sensor pocket).

- Use proper insulation of the pipework and all metallic sensor parts to prevent temperature measurement inaccuracy due to heating or cooling of the sensors.

Note

The sensors, especially those with long immersion lengths, may be subject to considerable forces created by the flow.

Cable requirements

The FUE950 is offered with 4-wire Pt500 sensors with 5 m (16.4 ft) cable only.

2-wire sensors are available as accessories, but can only be mounted at the sole responsibility of the user.

According to the MID approval requirements, the FUE950 only supports cable length up to max. 10 m (33 ft) (2-wire and 4-wire).

If a prolonged sensor cable is required, it can be mounted at the sole responsibility of the user only.

For further information, see the international standard EN 1434.

4.5.1 Installing the temperature sensors

The standard sensors ensure maximum heat transfer with the sensor fitting tightly in the sensor pocket. Any dirt in the immersion tube will prevent the sensor from being properly seated in the pocket, and thus falsify the results.

- Mount the pockets either from the side or from below.
  This is especially important for cooling systems to prevent condensation or ice from building up in the pocket.

- Ensure that the front 40 mm (1.6") (the active measuring length) of the sensor tip is placed as close as possible to the center of the pipe cross-section.

- It is recommended to insulate the pipes. Typical insulation thickness for pipes DN 50 to DN 100 is equals the pipe diameter. For pipes larger than DN 100 the recommended insulation thickness is 100 mm (3.9").

It is recommended to mount the temperature sensors in pockets with welded sleeves.
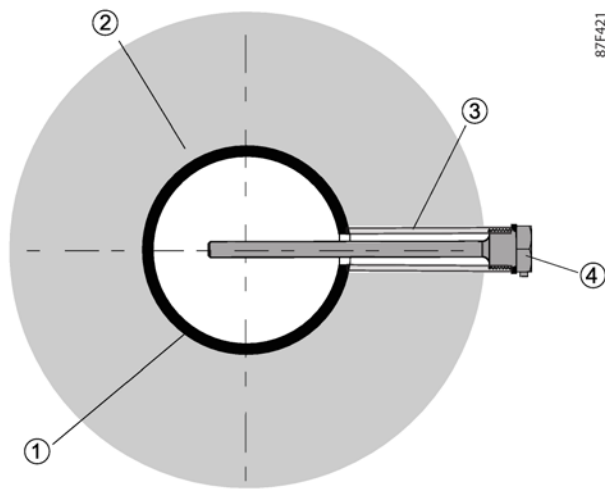
Pos.
①   Pipe wall
②   Insulation
③   Welded sleeve
④   Sensor pocket

Figure 4-3   Recommended installation in heating applications
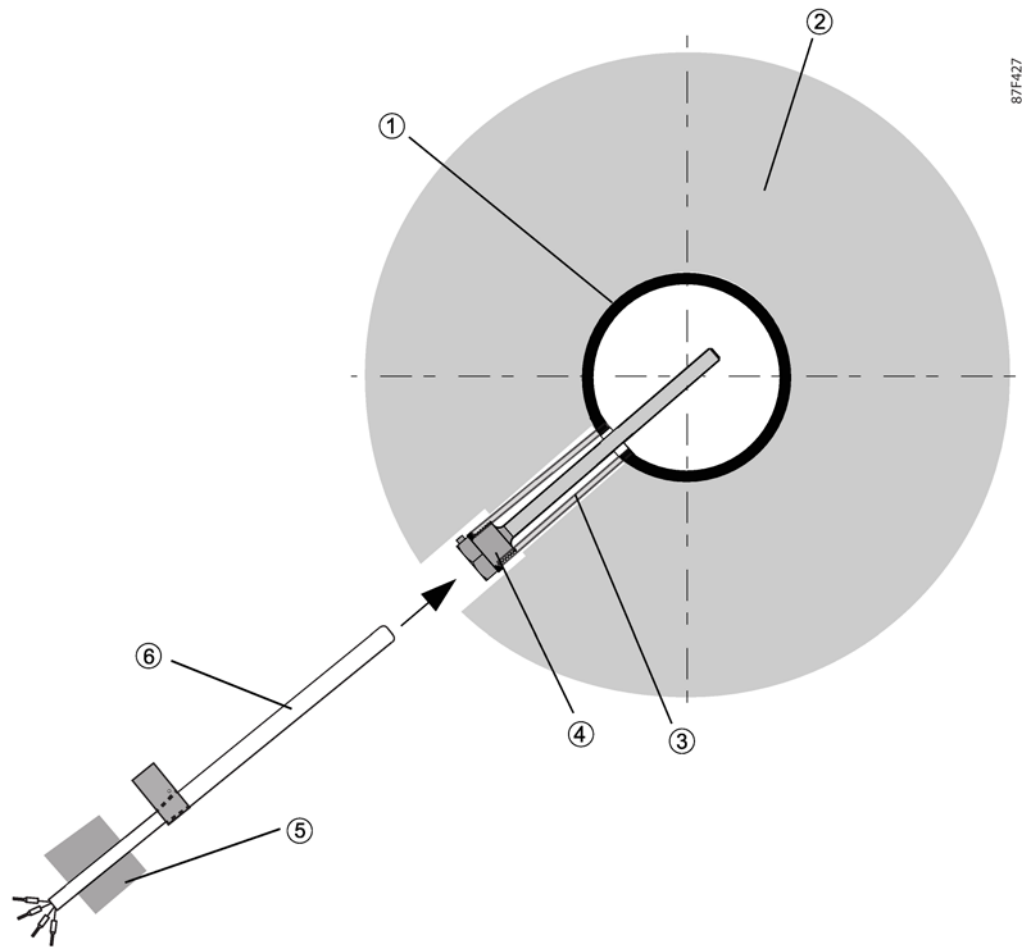
Pos.
① Pipe
② Insulation
③ Welded sleeve
④ Sensor pocket
⑤ Insulation seal for sensor
⑥ Pt500 (4-wire) temperature sensor

Figure 4-4   Recommended installation in cooling applications

In case of installation in a pipe bend, the sensor tip must always point against the flow direction and the entire active measuring length must be in the center of the flow.

Figure 4-5   Installation in pipe bend

In case of installation in a straight pipe, the sensor must be mounted in approx. 45° and the sensor tip must point against the flow direction. The entire active length must be as close as possible to the center of the flow.
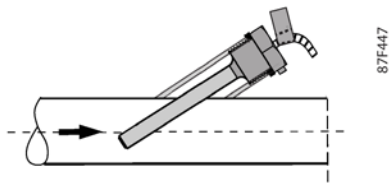
Figure 4-6   Installation in straight pipe

4.6   Installing the flowmeter

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

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

Connecting

<div style="text-align: right; font-size: 3em;">5</div>

5.1 Temperature sensors

The connecting cable from the measuring element to the energy calculator has a resistance, which depends both on the cable temperature of the cross section as well as on the cable materials used and the length of the cable. It is necessary either to eliminate these factors or to keep them as small as possible. Two- or four-wire connections can be used for connecting temperature sensors to the energy meter.

For four-wire connections, the sensors are supplied by a two-wire cable and the measurement resistance read via another two-wire cable.

If the input resistance of the calculator is much higher than the cable resistance, which is usually the case, the cable resistance can be neglected. The voltage drop detected is not dependent on the characteristics of the cable.

Note

Cable extension

Do not use two-wire cables for extension.

Use four-wire cables such as telephone cables, $\varnothing$0.8 mm (0.03") for extension.

Make the connection between the Pt500 cable and the extension cable in a standard terminal box.

Ensure sufficient sealing.

For further information on connection of temperature sensors, refer to the EN 1434 standard.

5.2 Procedure

Removing the top of the device
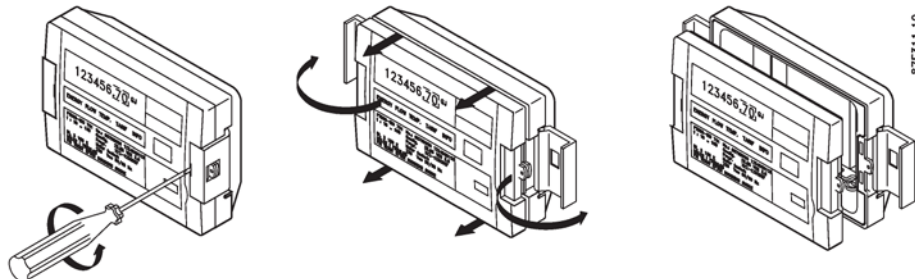
Preparing cable entries

Prepare a circular hole by dismounting rubber grommet using a flat plier.
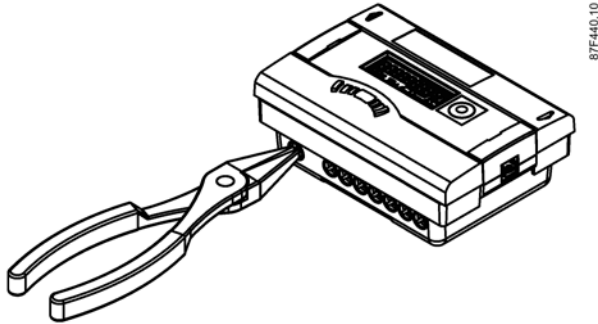
Note

Only use flat pliers as tool

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

Connecting temperature sensors

Note

Handle the temperature sensors with care!

The length of the temperature sensor cable must not be altered as it affects the meter accuracy and the measurement stability.

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

● Red: hot pipe temperature sensor.

● Blue: cold pipe temperature sensor.

1. Feed sensor cables through entries as marked in figure.

2. Connect to terminals 5-6/7-8 as described in the following table.
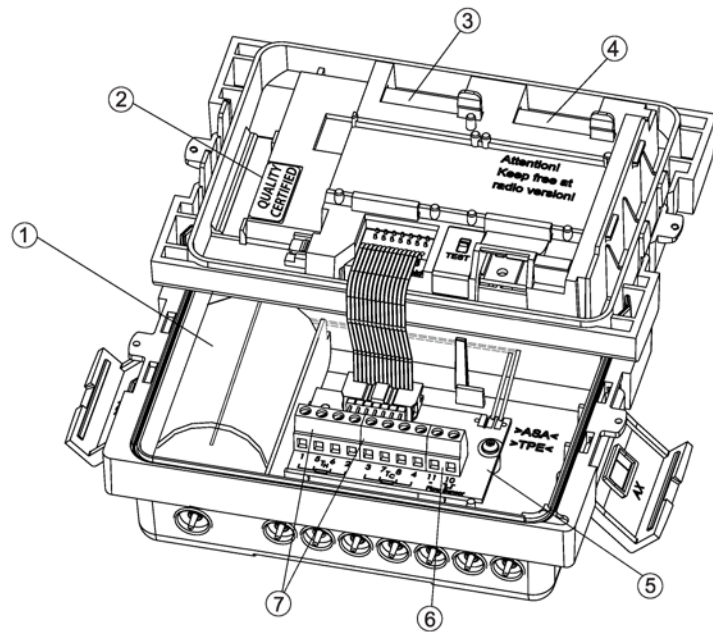
①   Battery power supply
②   Verification sealing (protective label/sealing)
③   Plug in card Port 1
④   Plug in card Port 2
⑤   Connection board
⑥   Pulse input IN0 (for connection of flowmeter)
⑦   Temperature sensor connection

Figure 5-1   SITRANS FUE950

3. Press each sensor cable into strain relief.

Wire/terminal connection

4-wire temperature sensor connection							
TH (cable with red marking)				TC (cable with blue marking)			
1	5	6	2	3	7	8	4
Red	Red/blue	White/blue	White	Red	Red/blue	White/blue	White

2-wire temperature sensor connection							
TH (cable with red marking)				TC (cable with blue marking)			
1	5	6	2	3	7	8	4
-	Red	White	-	-	Red	White	-
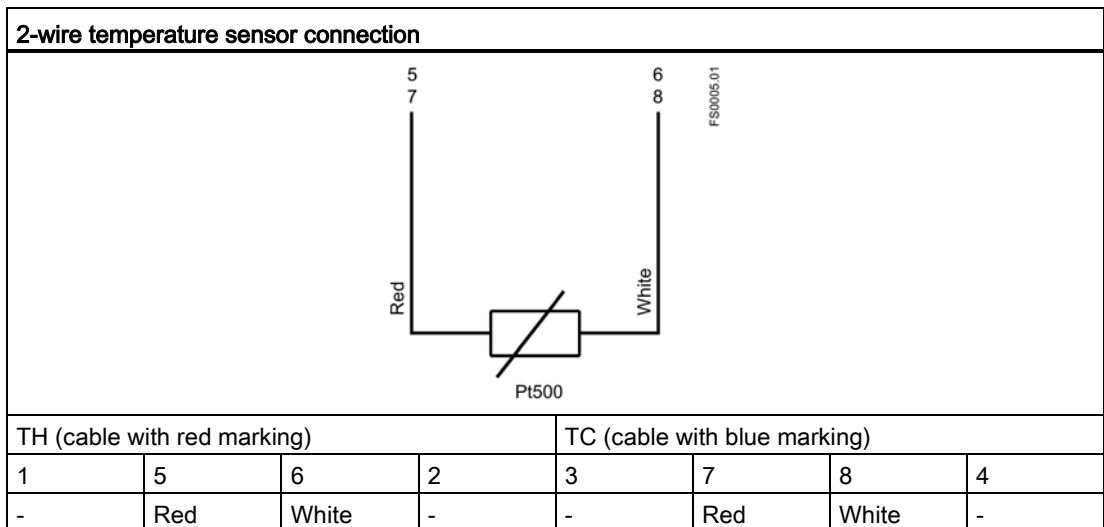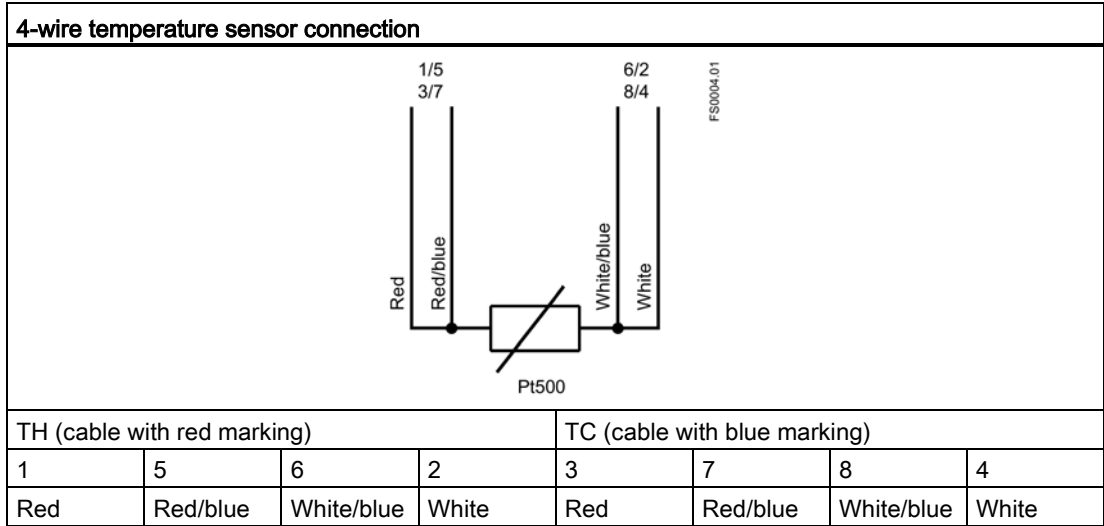
Table 5- 1   Connection terminals for various installations

| Application type	Temp. sensor type label color	Connection terminals for 2-wire type	Connection terminals for 4-wire type	Temp. sensor installation position	Flowmeter (F) installation place
Calculator district heating, flowmeter in return line (pipe)	Red	5 T_H 6	1/5 T_H 6/2	Forward "hot pipe"	(F) return "cold pipe", low temperature
	Blue	7 T_C 8	3/7 T_C 8/4	Return "cold pipe"	
Calculator district heating, flowmeter in forward line (pipe)	Red	5 T_H 6	1/5 T_H 6/2	Forward "hot pipe"	(F) forward "hot pipe", high temperature
	Blue	7 T_C 8	3/7 T_C 8/4	Return "cold pipe"	

Application type	Temp. sensor type label color	Connection terminals for 2-wire type	Connection terminals for 4-wire type	Temp. sensor installation position	Flowmeter (F) installation place
Calculator chilled water, flowmeter in return line (pipe)	Red	5 T_H 6	1/5 T_H 6/2	Return "hot pipe"	(F) forward "hot pipe", high temperature
	Blue	7 T_C 8	3/7 T_C 8/4	Forward "cold pipe"	
Calculator chilled water, flowmeter in forward line (pipe)	Red	5 T_H 6	1/5 T_H 6/2	Return "hot pipe"	(F) return "cold pipe", low temperature
	Blue	7 T_C 8	3/7 T_C 8/4	Forward "cold pipe"	
Calculator combined cooling/heating, flowmeter in return line (pipe) by heating	Red	5 T_H 6	1/5 T_H 6/2	Forward "hot pipe"	By heating: (F) return "cold pipe", low temperature
	Blue	7 T_C 8	3/7 T_C 8/4	Return "cold pipe"	
Calculator combined cooling/heating, flowmeter in forward line (pipe) by heating	Red	5 T_H 6	1/5 T_H 6/2	Forward "hot pipe"	By heating: (F) forward "hot pipe", high temperature
	Blue	7 T_C 8	3/7 T_C 8/4	Return "cold pipe"	

5.3 Pulse input from the flowmeter

Flow pulse input

The pulse input (IN0) of the FUE950 must be connected to the pulse output from the external flow meter. The display menu name in menu loop 3 is IN0, see menu description (Page 47). The pulse input has two terminals, 10 and 11. Only these terminals must be connected to the Siemens flowmeters.
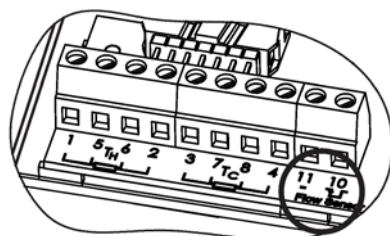
Pulse input of FUE950:

● Voltage supply:

– Passive flow meter output: Use of internal FUE950 voltage, typically 3.6 VDC (standard connection for FUS380/FUE380 and MAG5000/6000, please see "Connection of the flowmeter" (Page 32))

● Pulse duration:

– Min. 3 ms

- Pulse frequency:
  - Max. 100 Hz
- Pulse value and max. flow rate:
  - Depend on order; see the device nameplate or the display menu 3 at the "IN0" value.

Note

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

5.4 Connection of the flowmeter

The pulse output from the SITRANS FUS380/FUE380, MAG 5000/6000, MAG 8000 or FST020 is automatically powered via the energy calculator terminals 10 and 11:

FST020	FUS380/FUE380, MAG 5000/6000 or MAG 8000 terminal	FUE950 terminal
14	56	10
15	57	11

FUE380/FUS380, MAG 5000/6000, MAG 8000, FST020	FUE950
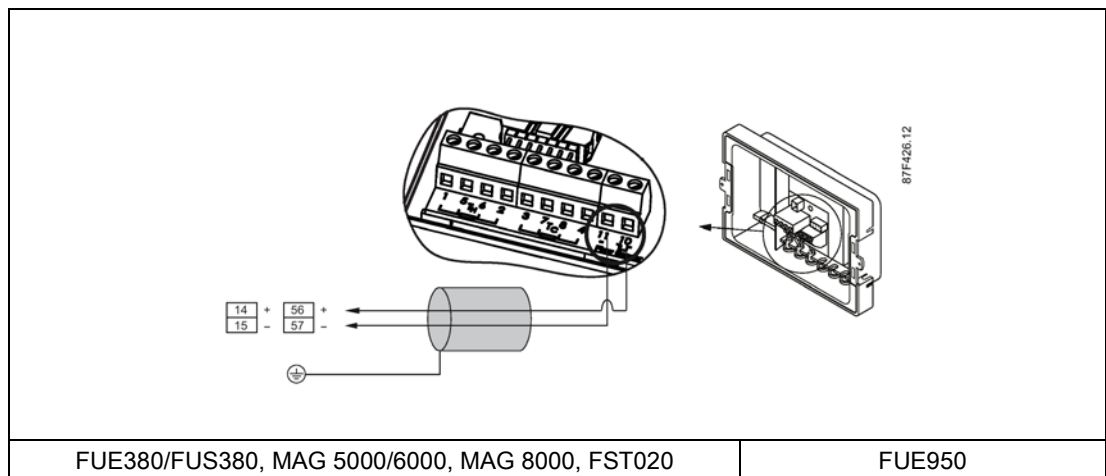
Note

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

For the connection of the flowmeter/transmitter, see the relevant flowmeter/transmitter operating instructions.

5.5 Power supply options

Power supply module

A 3.6 V lithium battery (D-cell) with typically >16 years lifetime (depending on configuration) is fitted in the standard version.

Figure 5-2   Battery 3.6 VDC, D-cell

Alternatively, a 24 VAC or a 230 VAC mains unit can also be used and afterwards modified.

Figure 5-3   Mains power supply module, 230 VAC or 24 VAC version

If mains supply is interrupted, a back-up battery in the mains unit provides the power supply. The date and time remain actual, but neither the calculation nor any of the measuring functions or output modules work, incl. flow rate and temperature measurements.

Note

Battery lifetime

To prevent reduced battery lifetime it is recommended to operate the device on mains supply when a communication module or a current output module is used.

Check that the battery or power supply cable plug connection is mounted as shown in the figure below.
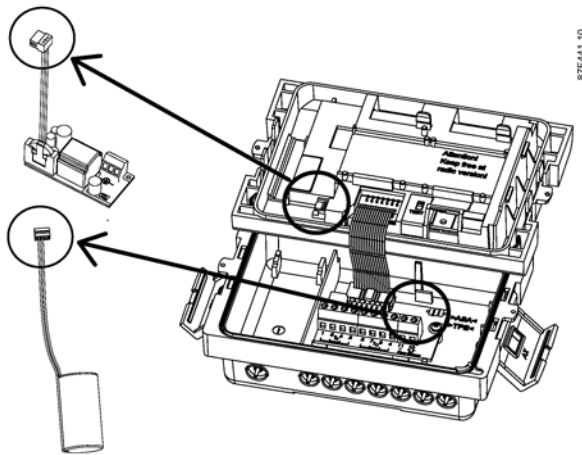
If the power supply module is not installed from factory, mount it as described below.

Battery module

The battery lifetime is highly dependent on the thermal influences and consequently the functioning period of the energy calculator can only be guaranteed if the maximum ambient temperature limits set out in the section "Installation of the device" (Page 21) are not exceeded.

Check the cable plug connection of the battery module.

Mounting the battery module

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.

2. Mount plug on connection pin.

3. Refit top of energy calculator.

Used batteries must be disposed of at suitable collecting points.

230 VAC / 24 VAC module

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

Check the cable plug connection of the power supply module.

Mounting the 230 VAC / 24 VAC module

1. Push power supply unit into place in bottom section.

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.

3. Mount plug on connection pin.

4. Connect 230 VAC or 24 VAC cable to terminals (check voltage supply on top of transformer).
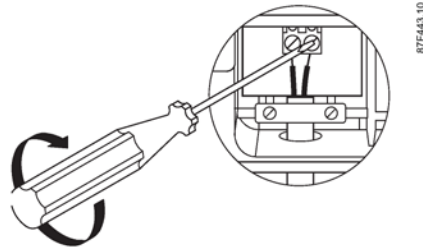
5. After installing main power cable, install protection cover using the two screws in order to avoid contact between voltage-carrying parts and cable-pull-relief, see figure below.
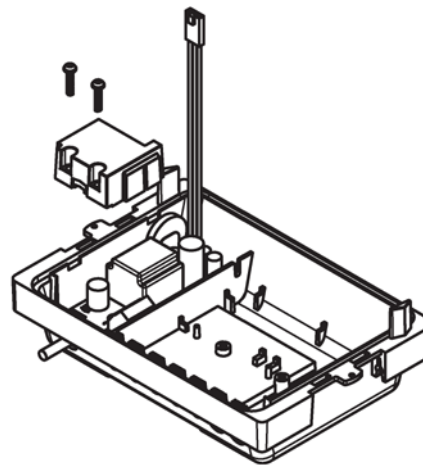
6. Refit top of energy calculator.

The 230 V module has a built-in fuse (T50 mA 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, calculation and measurements are retained, e.g. over the M-Bus or the optical interface.

⚠ WARNING
Power supply connection
Never connect between two phases, as this will destroy the mains unit.

5.6   Add-on output and input modules

The FUE950 can be supplied with two of several types of add-on output and input modules (depending on ordering). The modules are placed in two ports at the backside of the calculator top and must be screwed tight if this was not factory-done. The modules are "active" when installed. These modules have no influence on the energy calculation and can be retrofitted without violating the verification sealing, see "Sealing" (Page 51). The settings and functions for the modules can be changed via a separate software tool and an clipped-on IrDA interface on the FUE950. For more details, please contact Siemens Flow Instruments.

The two ports for extension modules are shown in the figure below. The following overview of module and port combinations shows how the modules can be combined and in which interface/port the modules must be installed. The current output module is connected to Port 1. It does, however, take up the space of both ports.

FUE950 overview of module and port combination		Interface / Port 2				
		No module	M-Bus	RS 232	RS 485	Pulse input
Interface / Port 1	No module	•	-	-	-	-
	M-Bus	•	•	•	•	-
	RS 232	•	-	-	-	-
	RS 485	•	-	-	-	-
	Pulse input	•	•	•	•	-
	Pulse output	•	•	•	•	•
	Pulse input/output	•	•	•	•	-
	Current output (4 to 20 mA)	•	-	-	-	-

• Combination allowed

- Combination not allowed
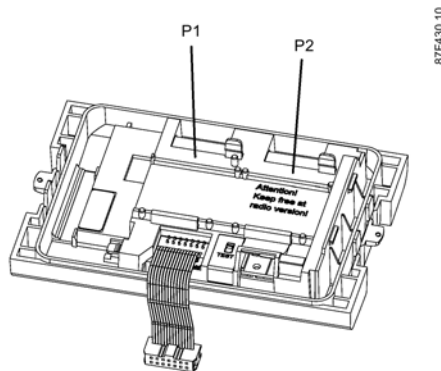
Note

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

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

5.6.1 Description of add-on modules

Typically, optional modules are ordered with the device and are to be mounted in port 1 and/or 2.

The type of add-on module installed can be checked in menu loop 3 ("Port 1" or "Port 2"). The information shows the actual port, e. g. "Port 1", and a number between 1 and 7. Each number is dedicated to one specific module type (see table below). The module number is automatically indicated when a module is installed.

Table 5- 2   Add-on modules

Identification number	Module type
0	No module installed
1	M-Bus
2	RS 232
3	RS 485
4	Pulse input
5	Pulse output
6	Current output
7	Combined pulse input/output

Installing the add-on modules

In case add-on modules are to be installed afterwards (delivered as accessories) install the add-on modules according to the following:

Communication modules

1. Remove user sealings if present (refer to local requirements).

2. Open lid.

3. Fix top part (lid) on bottom part.

4. Install communication modules (M-Bus, RS 232, RS 485) on the top part in the port.

   – Place module over upper locating stud.

   – Click module into place.

   – Carefully slide module connection cable plugs onto board and module.
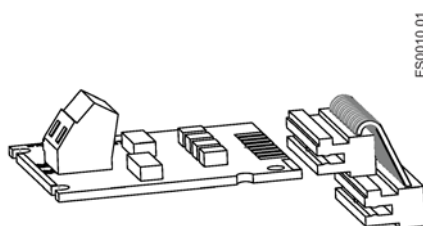
5. Connect wires to specific module terminals, see below.

6. Close lid and check meter for correct operation by pressing push button. Renew user sealings if meter functions correctly.

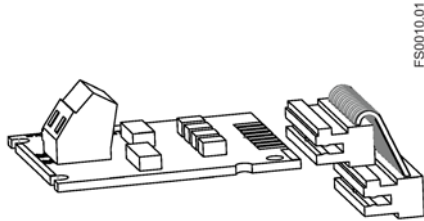7. Functions and settings can be checked via display menu loop 3 and freely programmed using a software tool and the IrDA interface.

Function modules

1. Remove user sealings if present (refer to local requirements).

2. Open lid.

3. Fix top part (lid) on bottom part.

4. Install function modules on the top part in the port.

   – Place module over upper locating stud.

   – Click module into place.

   – Carefully slide module connection cable plugs onto board and module.

5. Connect wires to specific module terminals, see module descriptions below.

6. Close lid and check meter for correct operation by pressing push button. Renew user sealings if meter functions correctly.

7. Functions and settings can be checked via display menu loops 3 and 4 and freely programmed using a software tool and the IrDA interface.

5.6.2 Module description

In the following the various add-on modules are described.

M-Bus communication module (loop 3 module identification number 1)

The optional M-Bus communication module is a serial interface for communication via M-Bus protocol (according to the EN 1434-3 and EN 13757 standards) with external devices (e.g. M-Bus controlling center like an M-Bus-repeater or M-Bus-master). A number of energy meters can be connected to a control center.

The board contains 2 terminals marked as 24 and 25, which are typically connected to the M-Bus master (M-Bus controlling center).
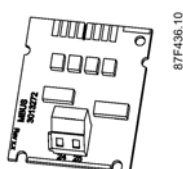
Figure 5-4   M-Bus module

Characteristics

- Refers to the EN 1434-3 and EN 13757 standards

- Connections for 2 x 2.5 mm² wires (shielded cable is recommended)

- Output is electrically insulated

- Max. voltage: 50 VDC

- Current consumption: as one M-Bus-load

- Primary or secondary addressing: the default primary address is the last two digits of the serial number, and the default secondary address is the serial number. These addresses are freely changeable via a separate software tool, see M-Bus communication setup

- Baud rate: 300 or 2400 bauds (default: 2400 baud)

- Internal data update rate: minimum every 3 minutes

M-Bus communication setup

The default settings for the M-Bus communication can be changed using a software tool, a pc and an IrDA adapter.

M-Bus communication description can be downloaded from: Product information on the internet (http://www.siemens.com/flowdocumentation).

For setup of M-Bus communication, use a separate software tool.

RS 232 communication module (loop 3 module identification number 2)

The optional RS 232 communication module is a serial interface for communication via M-Bus protocol (according to the EN 1434-3 and EN 13757 standards) with external devices, e.g. a PC.

The board contains a 3-pole terminal strip with terminals marked 62 (Data), 63 (Request) and 64 (Ground) (max. 2.5 mm²).
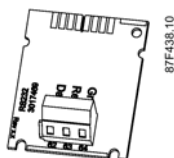

Figure 5-5   RS 232 module

For communication with a PC due to signal modification to RS 232 level, the device requires a special adapter cable. The colored wires of the RS 232 adapter cable must be connected as follows: 62 = brown; 63 = white; 64 = green.

See also

Spare parts/accessories (Page 71)

RS 485 communication module (loop 3 module identification number 3)

The optional RS 485 communication module is a serial interface for communication via M-Bus protocol (according to the EN 1434-3 and EN 13757 standards) with external devices, e.g. a PC; only 2400 baud. The module contains a 4-pole terminal strip with terminals marked D+, D-, + and - (12 V) (max. 2.5 mm^2).
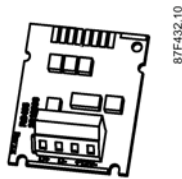
Figure 5-6   RS 485 module

An external supply of 12 VDC ±5 V (<5 W) is needed for module.

Pulse input module (loop 3 module identification number 4)

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. The module contains a 4-pole terminal strip with terminals marked I1 and ⊥, and I2 and ⊥. Standard for input I1 is accumulation of input I1 pulses and settings are shown as 'Int1' in display menu loop 4. Standard for input I2 is accumulation of input I2 pulses and shown as 'Int2" in display menu loop 4.

● Data collector for two pulses of separate flow meters, gas meters, or electricity meters for transmission over integrator interfaces.

Figure 5-7   Pulse input module

Characteristics

- The pulse rate is programmable in a wide range with steps of 1, 2.5, 10, 25, 100, 250, 1000, or 2500 l/pulse (via a separate software tool). Default pulse input: 0.1 m^3 (or 1 gal if unit "gal" is ordered via the Z-option "L05")

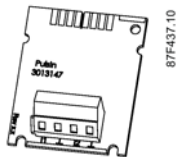- The input unit is selectable as either one of the internal energy and volume units or no unit

  - Signal input I1: terminal I1 and ⊥ (ground)

  - Signal input I2: terminal I2 and ⊥ (ground)

- The pulse input must be galvanically isolated, e.g. connection via a reed contact.

- Max. pulse input frequency: 8 Hz with a pulse duration ≥ 10 ms

- Input resistance: 2.2 MΩ

- Terminal voltage: 3 VDC

- The data is separately accumulated in different registers. Also accounting days are available

- The connected cable length must be less than 10 m (33 ft) (shielded cable is recommended)

Pulse output module (loop 3 module identification number 5)

The device is available with an add-on module for two optional pulse outputs, if specified on ordering (default 1 last significant digit).
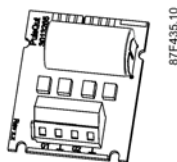
Figure 5-8   Pulse output module

The standard function for pulse output O1 (terminals O1 and ⊥) is accumulated energy and settings are shown as Out1 in display menu loop 4. The standard function for pulse output O2 (terminals O2 and ⊥) is accumulated volume and shown as Out2 in display menu loop 3. Whenever energy or volume is accumulated (i.e. each time the last significant figure in the display changes), the output sends a pulse by changing the output from high ("contact open") to low ("contact closed") .

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 O1)
    - Pulse value: depending on last digit of energy display unit
- Volume pulse output (default function for output O2)
    - Pulse value: depending on last digit of volume display unit

Example:

Display unit	Pulse value
MWh with 1 digit after comma (default)	100 kWh/Pulse (0.1 MWh/Pulse)
m^3 with 1 digit after comma (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 m^3/h or/and temperature difference < 50°C
    - Signal output O1: terminal O1 and ⊥ (ground)
    - Signal output O2: terminal O2 and ⊥ (ground)

Characteristics

- External power supply: 3 to 30 VDC
- Output current: max. 20 mA with a residual voltage of 0.5 V
- Output type: open collector (drain)
- Galvanically isolated
- Output 1 (O1):
    - Output frequency ≤ 4 Hz
    - Pulse length: 125 ms ±10 %
    - Pulse duration: 125 ms ±10 %
    - Pulse break: ≥ 125 ms -10%
- Output 2 (O2):
    - Output frequency ≤ 100 Hz (depending on the selected pulse length)
    - Ratio: Pulse length / Pulse break ~1:1
    - O2 pulse length: 5, 10, 50 or 100 ms; default: 5 ms (allowed maximum 100 Hz)
- Connections for 2 x 2.5 mm² wires (shielded cable is recommended)

Connection on pulse outputs 1 and 2
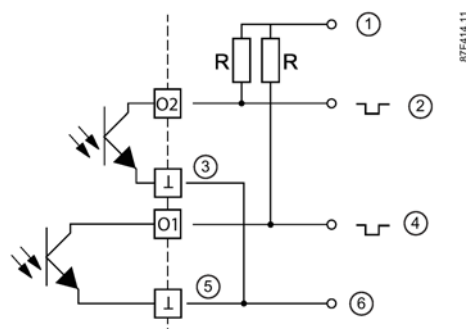
① +V external

② Output 2 (default : Volume pulse)

③ I (max. 20 mA)

④ Output 1 (default: energy pulse)

⑤ I (max. 20 mA)

⑥ 0 V

Figure 5-9   Typical example of connection on pulse outputs 1 and 2.

Practical example:

V ext.	I	R required
24 VDC (< 30 VDC)	< 20 mA	Min. 1.2 kΩ

Current output function module (loop 3 module identification number 6)

The module contains connections for 2 passive current outputs, which can be programmed individually using a separate software tool.

Default setup:

#1: Power: 20 mA equals the maximum selectable value which is 100 000 times the last digit of the display.

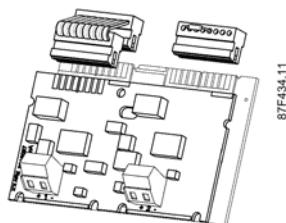#2: Flow rate: 20 mA equals the maximum selectable value which is 10 000 times the last digit of the display.

Figure 5-10   Current output module

The outputs are marked "1" and "2" with corresponding polarity "+" and "-" on the terminal strip.

Note

20 mA scaling

Ensure the correct 20 mA scaling

Note

Connection of the module

The current output module is electrically connected to the calculator via the connection plug on the left slot. Ensure to connect the separate plug on the right slot to the current output module in order to make the module function properly.

Characteristics

- Passive, external supply: 10 to 30 VDC

- Current loop 4 to 20 mA; with 4 mA = 0 value; 20 mA = programmed maximum value

- Overload up to 20.5 mA, excess causes error current

- Errors are shown as 3.5 mA or 22.6 mA (programmable; default: 3.5 mA)

- Output values: power, flow, temperatures (programmable)

Combined function pulse input/output module (loop 3 module identification number 7)

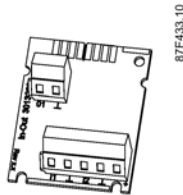The combined module is equipped with 2 inputs and 1 output.

Figure 5-11   Pulse input/output module

The pulse input is specified as stated in "Pulse input module" (Page 40).

The pulse output is specified as stated in "Pulse output module" (Page 41) (output 01), but not electrically isolated.

Commissioning

6

The FUE950 is supplied with only one control button.

In the normal mode of operation the display shows the cumulative energy, see section "Menu structure" (Page 47).

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 EN 1434 the diameter and the length of the temperature sensor cables must be the same. The cables must be connected correctly and not altered (shortened or prolonged).

It is not allowed to wind the cable around pipes or to locate the equipment within a distance of 0.3 m (1 ft) from source of high-frequency or clocked electromagnetic radiation.

The devices must be sealed after the installation.

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

Operation conditions concerning the symmetrical installation of the temperature sensors stated in the 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 the temperature sensors must be used.

The measurement repeatability stated by the manufacturer will be obtained if further described environmental conditions are present.

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

6.2 Display

Overview

The display will always be configured in accordance with the customer's application and selected settings and consequently there will be more or fewer display options under the individual display menus.
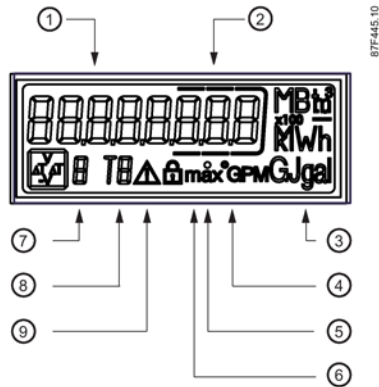
Pos.	Display indication
①	Values for energy, power, volume, flow rate, error, and date
②	Frame of least significant digits/decimal places
③	Energy and flow units
④	Temperature unit
⑤	Flow pulse input indicator point
⑥	Maximum power/flow
⑦	Menu loop number
⑧	Tariff 1 and 2
⑨	Alarm symbol

Figure 6-1   SITRANS FUE950 display

Button for operation

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

- Pressing the $\triangleright$ button *briefly*: The display switches to the next display menu within a loop. When the maximum menu number is reached, the display shows the first display menu in the loop again.

- Pressing the $\triangleright$ button for *long*: The display switches to the next menu loop for reading the secondary parameters.

- *Permanent* pressing of the $\triangleright$ button: The display switches to the next menu loop until the maximum loop number (6) is reached. Then the display shows the first menu loop again.

Automatic sequences

- In menu loops 2 to 6 some menus are shown in window sequences. If a menu is selected and the button not pressed, the display automatically toggles between two or more 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").

- The basic menu loop is number 1 showing the main information (energy, volume, flow, power, temperatures, status information).

6.3   Menu structure

The "Energy" window (menu 1.1) in the main menu loop is the basic display. The loop settings can be programmed to suit customer-specific requirements via a separate software tool.

Loops overview

The energy meter is equipped with a data memory enabling comparison of previous months' readings with current readings.

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

The energy meter display has six menu loops: main loop, accounting day loop, information loop, pulse input loop, tariff loop, and month loop.

Some loop menus consist of two or more windows alternating every 2 to 4 seconds.

Note

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

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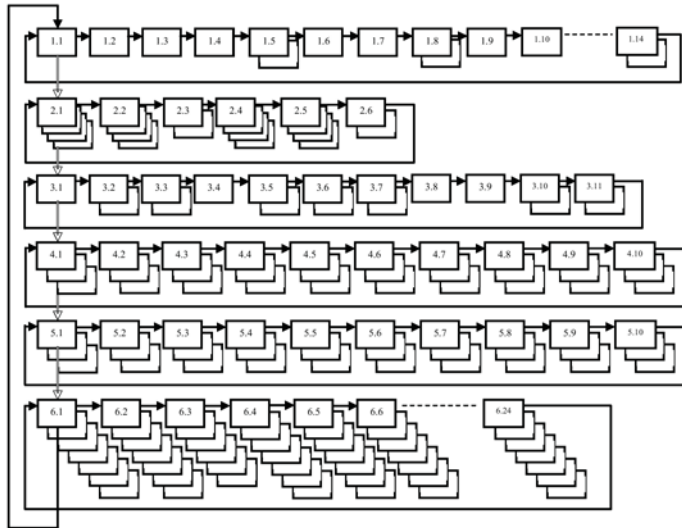

Figure 6-2   Menu loop overview

1. Main loop (Page 79)
2. Accounting date loop (Page 79)
3. Information loop (Page 80)
4. Pulse input loop (Page 80)
5. Tariff loop (Page 81) (only visible if activated)
6. Month loop (Page 81)

6.4 Function test

Before operating the unit, check the following:

Flowmeter

1. The flowmeter is fitted correctly in the direction of the water flow (see the relevant flowmeter operating instructions).

2. The flowmeter is placed in the forward or the return line section in accordance with the position information printed on the energy calculator label (forward or return).

3. The value of the flowmeter pulse output is the same as the value of the energy meter pulse input.

4. The expected flow rate is within the measuring range of the SITRANS FUE950 calculator.

5. The temperature sensors are of the same pair.

6. The temperature sensors are wired correctly (including any cable extensions), installed correctly, and mounted in the correct sensor pockets.

SITRANS FUE950

1. The pulse indicator is shown, and the flow rate shown in the display is normal and concordant with the connected flowmeter.

2. The temperatures shown are within the normal range and typical for the application.

3. T_H is higher than T_C.

4. No error indication is shown in the display.

Test procedure

1. Check that pulse indicator is flashing regularly.

2. Check that no error function is indicated by a ⚠ symbol or the text "E - 1 - - - - -".

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 the user seals to the FUE950 cover and the temperature sensor pockets, if applicable.

The SITRANS FUE950 is now ready for use.

Service and maintenance

<div style="text-align: right; font-size: 3em;">7</div>

7.1 Replacing the battery

The SITRANS FUE950 battery can easily be replaced, refer to "Power supply options" (Page 33) 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

The energy calculator must be provided with an adhesive label seal on the top back of the device.
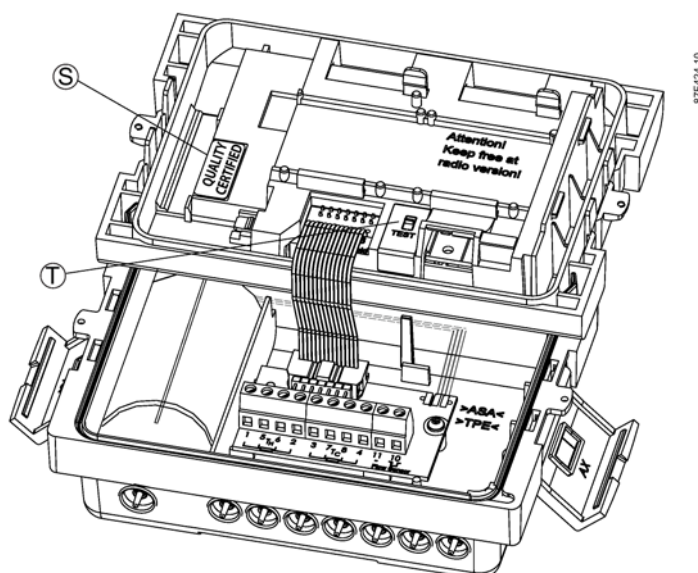
Figure 7-1   S - Verification sealing (protective seal); T - Verification sealing / HW key (TEST)

T: access sealing of HW key. This sealing may be broken by local authorities if metrological relevant settings need to be changed. Afterwards the input must be protected by a new label sealing (e.g. a suitable laboratory protective sealing).

The energy calculator is provided with a thread seal or adhesive label seal.
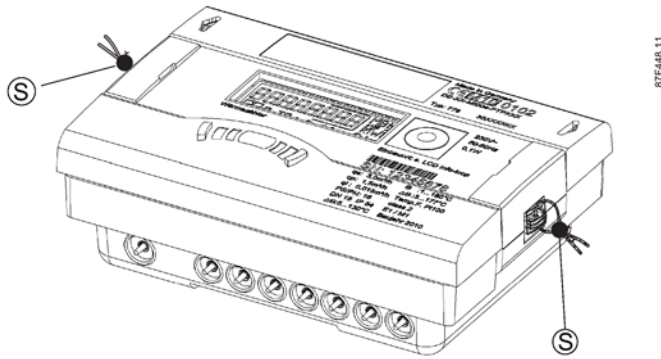
Figure 7-2   S - User sealing

The sensors are thread-sealed.

Note

Important

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

7.3   Verification

Test output

The test output, which is located on the side, is used for verification at test laboratories.

If it is requested to change some metrological parameters, the verification sealing must be broken and the HW key (T) connected. It is recommended to make a suitable sealing after the changes have been completed.
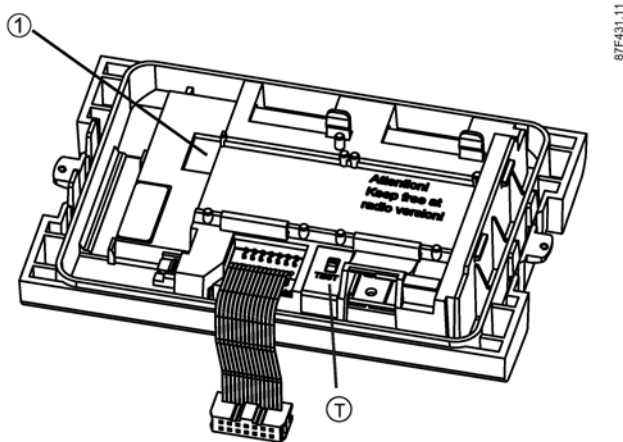
Figure 7-3   1 - Test output; T - Verification sealing / HW key (TEST)

Two special cables with a verification tool are available from factory:

- Volume test pulse

- Energy test pulse

Note

Precondition for verification

Ensure that the connection of the temperature sensors is not interrupted during the energy verification.

Additional specifications (pulse value, pulse duration/pulse break, pulse frequency) are documented in the test description.

7.4 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 Customer Support:

- Via the Internet using the **Support Request:**
  Support request (http://www.siemens.com/automation/support-request)

- Via Phone:

  – Europe: +49 (0)911 895 7222

  – America: +1 423 262 5710

  – Asia-Pacific: +86 10 6475 7575

Further information about our technical support is available on 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.

- 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 local contact partner at: http://www.automation.siemens.com/partner (http://www.automation.siemens.com/partner)

7.5   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.

7.6 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 (http://www.automation.siemens.com/partner) or follow the return procedures (Page 54) of Siemens Flow Instruments.

Troubleshooting/FAQs

<div style="text-align: right; font-size: 3em;">8</div>

8.1 Error information and codes

If the energy meter is operating normally, menu loop 1 will show the measured value.

If a ⚠ or an 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).

Note

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

Error codes

The error code is displayed in the main loop if an error occurs. All other windows are still selectable through button press, but the error code display re-appears if the button is not pressed for 4 minutes.

The error display disappears automatically as soon as the cause of the error has been remedied. All errors present longer than 6 min are saved in the error log.

Maximum four errors can be shown at the same time. The error display view shows 8 digits. In case of no errors present, the display will show "E - - - - - - -".

Table 8- 1   Error display

	Digit 1	Digit 2	Digit 3	Digit 4	Digit 5	Digit 6	Digit 7	Digit 8
Priority 1	E	-	1 @ ERR1	-	-	5@ ERR5	8 @ ERR8	-
Priority 2	E	-	3 @ ERR3	-	-	-	9 @ ERR9	-
Priority 3	E	-	-	-	-	-	-	-
Priority 4	E	-	-	-	-	-	-	-

Priorities are valid for each digit

Error pending table

Error code	Display	Error description/cause	Device behavior	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 (-20°C to +190°C[-4°F to +374°F]) 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 after approximately four minutes	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 - - - - -		$T_H < T_C$; 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).
E - - - - 5 - -	⚠ displayed	Communication not possible (too frequent reading via the optical IrDA eye) if battery-supplied	Disables: optical communication and test functions at field mode	Reduce the communication speed
E - - - - - 8 -	⚠ displayed permanently	Mains power supply 230 VAC or 24 VAC 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 to 3.6 VDC
E - - - - - 9 -	⚠ displayed permanently	Battery empty (checked at the end of each day).	Monitors: remaining usage time Shows: error if remaining time < 400 days (the internal counter starts on the production date of a battery-powered version) Disables: no functions	Replace battery. Check power supply, a battery replacement might be necessary

8.2 Temperature sensors

Often the malfunction of the device relates to the temperature sensors.

Examples of error causes

- Unsuitable sensor design
- Incorrectly matched sensor pairs
- Incorrect sensor lengths
- Incorrect sensor connections
- Sensors installed in the wrong pipe
- Asymmetric mounting of sensor pocket or temperature sensor
- Sensors not immerged far enough into the sensor pockets
- Sensor pocket too short or too long for the pipe
- Unsuitable temperature sensor cables
- Too long temperature sensor cables
- Sensor cables shortened to different lengths
- Sensor response time not taken into account
- External heat radiation of sensor not taken into account

8.3 Condensation

How do I prevent condensation?

Pipework at temperatures below room temperature are susceptible to formation of condensation water. If the piping is not properly insulated it will probably become permanently wet. This will especially affect sensors with connection heads, which would then have to be connected with water-tight seals.

Water entering the sensor pocket can result in the formation of ice in the pocket chamber which (despite the locking device) can force the sensor out of the pocket due to the expansion of the freezing water.

8.4 Maximum cable length

What is the maximum cable length for 4-wire sensor connections?

This question cannot be completely answered as the theoretical ohmic resistance as well as the complex impedance values (capacitive and inductive resistance) of the extension cabling must be taken into account along with unknown effects of local interference emissions.

The metrological approval tests according to EN 1434 are carried out with a maximum cable length of 10 m (33 ft). The appropriate information is stated on the approval certificate. Longer cables are not covered by the approval and the use of such is at the operator's risk. Cable screening is not required for cable lengths up to 10 m (33 ft), but can be used for longer cable. The screen should then be connected to the piping system on the sensor side or to the ground connection of the building. Thus, there is no connection on the calculator and the temperature sensor sides and the screening is to be left open and insulated.

The quality of the connection is seen on the differential temperature display of the meter. Persistently changing values indicate interference on the sensor cabling.

8.5 Temperature difference

How do I check the temperature difference?

The deviation of the matched sensor pair can be determined by placing both sensors in a water-filled vessel and read off the measured temperature on both sensors.

1. Place sensors in close to each other to ensure the same temperature conditions.

2. Submerge sensors completely in the water.

With a resolution 0.1 K, the difference between the matched sensor pair ($\Delta T_{theoretical} = 0$ K) can be read off after about 3 to 5 minutes.

In case of a temperature difference, see "Temperature sensors" (Page 59).

Technical data

<div style="text-align: right; font-size: 3em;">9</div>

9.1 Energy calculator

Parameter	Data
Approval	MID-approved (international heating approval)
	PTB-approved (K7.2; national German cooling approval)
	The approvals only apply to heating or cooling water according to the German AGFW standard FW510
Temperature range	Heating approval: 0 to 180 °C (32 to 356 °F)
	Cooling approval: 0 to 105 °C (32 to 221 °F)
Absolute temperature range	-20 to +190 °C (-4 to +374 °F)
Temperature difference	Heating: 3 to 177 K, cooling: 3 to 102 K (starting at 0.125 K)
Measuring accuracy	Meets requirements of EN 1434 Typically max. $\pm(0.5 + 3\ K/\Delta\theta[\%]$ of measured value
Flow range	Q_n (Q_p) $\leq$ 360 000 m^3/h (600 000 GPM) (depending on selection of pulse input and display resolution)
Power range value	0 to 15 000 000 kW

Accuracy

Parameter	Data
Typical accuracy	
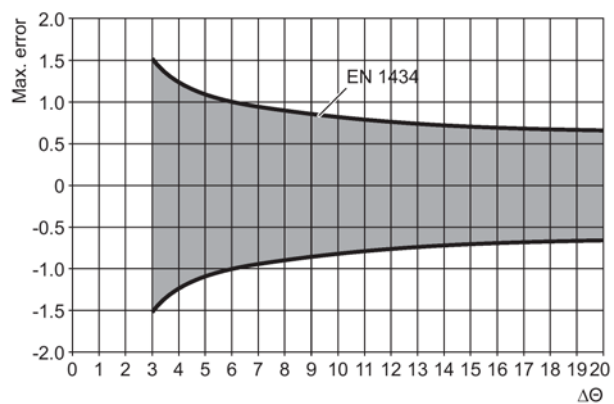
User interface

Parameter	Data
Display	8-digit LCD display with associated pictograms/symbols
Units	MWh, GJ, Gcal, MBtu, m^3, gal, m^3/h, GPM, ºC, °F, kW, MBtu/h
Totalizer value range	99 999 999 or 9 999 999.9
Values	Power, energy, volume, flow rate, temperatures
Push button	Single push button for the menu controlling
Optical IrDA interface	ZVEI optical interface with M-Bus protocol as per EN 1434 and EN 13757, connection via separate IrDA-adapter

Rated operation conditions

Parameter	Data
Temperature	
• Ambient	5 to 55 °C (41 to 131 °F)
• Storage	-25 to +70 °C (-13 to +158 °F)
Environment class	EN 1434 class E2 / M2

Design

Data	
IP54 in accordance with IEC 529 (93 % rel. humidity)	
Material	
• Top	Polyamide
• Pipe/wall fitting	PA 6.6 GF25
• Gaskets	Neoprene/EPDM

Temperature input

Parameter	Data
Sensor types	Pt100 or Pt500 with 2 or 4-wire leads, cable length < 10 m (33 ft), standard setting: Pt500, selection by order code and shown at the nameplate (only Pt500 types are available)
Sensor connection	4-wire or 2-wire; auto-detection of connected type
Temperature range (Absolute measuring range)	-20 to 190°C (-4 to +374°F)
Temperature difference	3 to 177 K (starting at 0.125 K)

Parameter	Data
Measurement cut-off	0.125 K
	Temperature measurement resolution:
	Displayed temperature (hot "ht", cold "ct" and delta "dt"): 0.1 K
	16-bit digital resolution AD converter
Sensor current	Pt500 peak < 2 mA, rms < 0.012 mA
	or
	Pt100 peak < 8 mA, rms < 0.015 mA
	(rms = root mean square)

Flow input (In0)

Parameter	Data
Volume input from an external flowmeter	
Pulse value	1 to 1000 l/pulse (1 to 100 gal/pulse), selection by order code and shown on the nameplate
Pulse frequency	≤ 100/200 Hz
Flow range	Q_{max} ≤ 360 000 m³/h (600 000 GPM) (depending on selection of pulse input and display resolution)
Pulse ON-time	≥ 3 ms
Pulse OFF-time	≥ 2 ms
Type	Active pulse input
Flowmeter installation place	Hot pipe or cold pipe ("forward or return line"), selection by order code. The installation place is shown on the nameplate
Connected cable	Max. 10 m (33 ft) (shielded cables recommended)

9.2 Option modules

Ports

Parameter	Data
Number of ports	2 ports for optional plug-in modules, one port for a function module and the other for a communication module.
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)
	Current output module, 2 outputs (Out1, Out2)
Communication modules	M-Bus, RS 232 or RS 485 (M-Bus protocol according to EN 1434-3 and EN 13757)

Pulse output module

Parameter	Data
Type	Passive "open collector" pulse output, potential isolated from each other
Pulse value	Last significant digit unit/pulse, selection by order code and setting can be read via display menu, programmable by a software tool
Pulse frequency	≤ 4 Hz / 100 Hz
Pulse length	O1: typically 125 ms ±10% O2: default 5 ms (programmable to 5, 10, 50 or 100 ms via a software tool)
External voltage supply	3 to 30 VDC
Current	≤ 20 mA
Possible pulse output selections (max. output frequency: 4 Hz / 100 Hz)	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 m^3 with specific display resolution (or with factor 0.1, 1, 10 or 100 thereof)
	Energy with specific display resolution (or factor 0.1 thereof)

Pulse input module

Parameter	Data
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
Terminal voltage	3 VDC
Current	Based on Ri = 2.2 MΩ
Cable length	< 10 m (33 ft) connection limit

M-Bus output module

Parameter	Data
Type	A serial interface for communication with external devices (M-Bus Repeater), data update rate min. every 3 minutes
Protocol	M-Bus according to EN 1434-3 and EN 13757
Connection	2-pole terminal strip (max. 2.5 mm^2). One M-Bus load, 2400/300 baud

RS 232 output module

Parameter	Data
Type	A serial interface; permits data exchange with the calculator.
Protocol	M-Bus according EN 1434-3 and EN 13757
Connection	3-pole terminal strip (max. 2.5 mm^2), 2400/300 baud

RS 485 output module

Parameter	Data
Type	A serial interface; permits data exchange with the calculator
Protocol	M-Bus according EN 1434-3 and EN 13757
Connection	4-pole terminal strip (max. 2.5 mm^2), 2400 baud, 12 VDC ± 5 V

Combined current output module

Parameter	Data
Type	2 passive 4 to 20 mA
Connection	2 x 2-pole terminal strip (max. 2.5 mm^2)
Possible current output selections	Power (standard setting for #1)
	Flow (standard setting for #2)
	Temperature difference
	T_H (hot pipe temperature)
	T_C (cold pipe temperature)

Power supply

Parameter	Data
Supply data	Internal voltage 3.6 V by the battery or plug-in power supply module
Battery, 3.6 V type (standard)	3.6 V lithium D-cell, battery lifetime typically 16 years with independently powered flowmeter

Parameter	Data
230 VAC module	Plug-in module for 230 VAC (195 to 253 VAC) 50/60 Hz (incl. battery backup)
24 VAC module	Plug-in module for 24 VAC (incl. battery backup)
Battery backup	Only with mains supply modules by internal 3.0 V lithium battery (type CR 2032)

Note
Battery lifetime

To prevent reduced battery lifetime it is recommended to operate the device on mains supply when a communication module or a current output module is used.

9.3 Temperature sensors

Sensors

Table 9- 1   4-wire version

Parameter	Data
Type	Pt500 according to EN 60751; for pocket mounting
Measuring insert	Pt500 4-wire, tolerance: Class B to ISO 751
Cable	No. of wires: 4 Length: 5 m (16.4 ft) Isolation material: Silicon Terminal sleeves: according to DIN 46228
Protective tube	Diameter: 6 mm (0.24") Length: 140 mm (5.5")/230 mm (9.1") Material: 1.4571 (or similar)
Measuring medium	Typically heating/cooling water
Temperature range	Measuring medium: 0 to 150 °C (32 to 302 °F)
Temperature difference	3 to 150 K (180 K)
Protection degree	IP65
Pressure rating	PN 25; for installation in sensor pockets, see sensor pockets
Approvals (matched pair)	MID (MI-004 for heating; DE-06-MI004-PTB011) PTB (K7.2 for cooling; PTB 22.77/09.01)

Table 9- 2   2-wire version

Parameter	Data
Type	Pt500 according to EN 60751; for pocket mounting
Measuring insert	Pt500 2-wire, tolerance Class B to ISO 751
Cable	No. of wires: 2 Length: 2, 3, 5 or 10 m (6. 56, 9.84, 16.4 or 32.8 ft) Isolation material: Silicon Terminal sleeves: according to DIN 46228
Protective tube	Diameter: 6 mm (0.24") Sensor length: 50 mm (1.97") Material: 1.4303 / AISI 304 (or similar)
Measuring medium	Heating water
Temperature range	Measuring medium: 0 to 150 °C (32 to 302 °F)
Temperature difference	3 to 150 K (180 K)
Protection degree	IP65
Pressure rating	PN 16 or PN 25 (related to the used sensor pockets)
Approvals (matched pair)	Paired according to the EN1434 standard

Table 9- 3   Pt 500 resistance according to EN 60751

Temperature		Resistance (Ω)		Temperature		Resistance (Ω)
°C	°F			°C	°F	
-20	-4	460.80		110	230	711.45
-10	14	480.45		120	248	730.30
0	32	500		130	266	749.10
10	50	519.20		140	284	767.90
20	68	538.95		150	302	786.55
30	86	558.35		160	320	805.20
40	104	577.70		170	338	823.80
50	122	597.00		180	356	842.30
60	140	616.20		190	374	860.80
70	158	635.35		200	392	879.20
80	176	654.45		210	410	897.55
90	194	673.50		220	428	915.85
100	212	692.50		230	446	934.10

Sensor pockets

Table 9- 4   For use with 4-wire Pt500 only

Parameter	Data
Recommended installation	With steel or stainless steel welded sleeves
Length	120 mm/135 mm (4.7"/5.3") 210 mm/225 mm (8.3"/8.9")
Protective tube	External diameter: 8 mm/11 mm (0.31"/0.43") Internal diameter: 6 mm (0.24") Material: AISI 304Ti / 1.4571 (or similar)
Pipe connection	G½" thread (with sealing screw for sensor)
Measuring medium	Typically heating/cooling water Flow velocity: max. 5 m/s (16.4 ft/s)
Temperature range	Measuring medium: 0 to 180/200 °C (32 to 356/392 °F)
Pressure rating	PN 40
Approvals	Approved with 4-wire sensors only

Table 9- 5   For use with 2-wire Pt500 only

Parameter	Data	
	Stainless steel	Brass
Recommended installation	With steel or stainless steel welded sleeves	
Length	92/223 mm (3.6"/8.8")	47/127 mm (1.9"/5.0")
Protective tube	External diameter: 8 mm (0.31") Internal diameter: 6 mm (0.24") Material: AISI 304Ti / 1.4571 (or similar)	External diameter: 8 mm (0.31") Internal diameter: 6 mm (0.24") Material: brass
Pipe connection	G½" thread (with sealing screw for sensor)	
Measuring medium	Typically heating water Flow velocity: up to 1 m/s (3.3 ft/s)	
Temperature range	Measuring medium: 0 to 150 °C (32 to 302 °F)	
Pressure rating	PN 25	PN 16
Approvals	Approved with 2-wire sensors only	

Note

Only use temperature sensors pockets approved for the specific temperature sensor types.

Dimension drawings
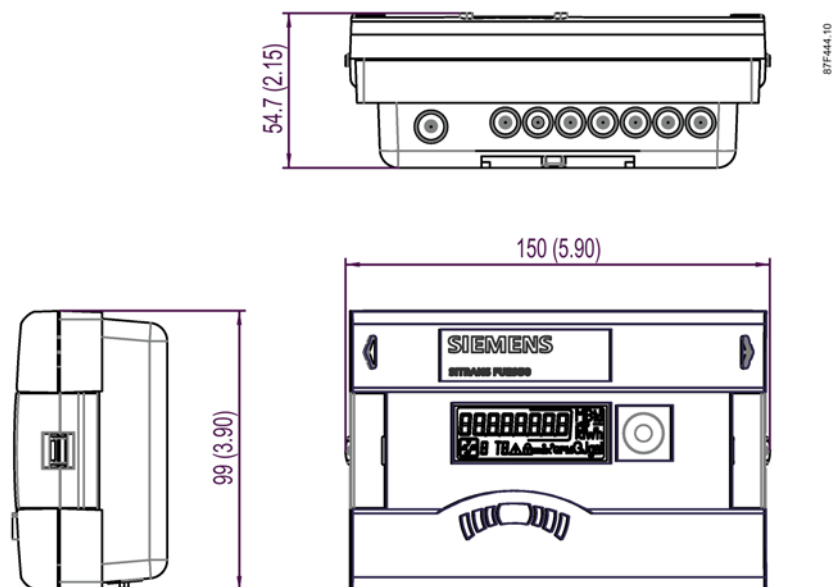
10

FUE950 energy meter

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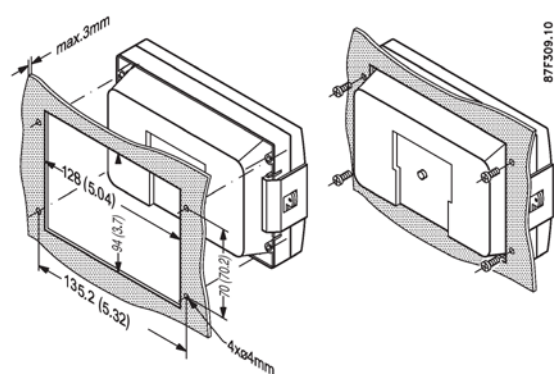

Figure 10-2   Panel mounting, dimensions in mm (in)
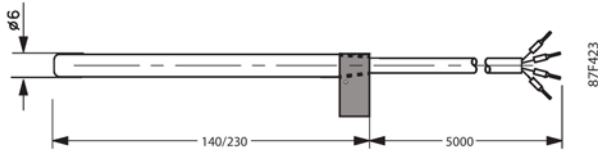
Temperature sensor

Figure 10-3   Pt500 temperature sensor, 4-wire type, dimensions in mm (in)
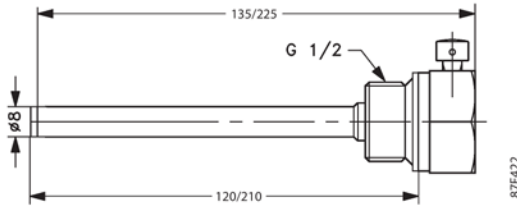

Figure 10-4   Sensor pocket (stainless steel), for use with 4-wire sensors only, dimensions in mm (in)
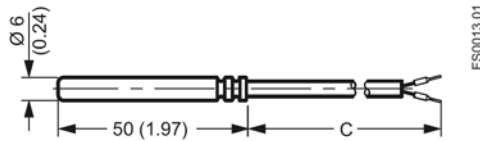

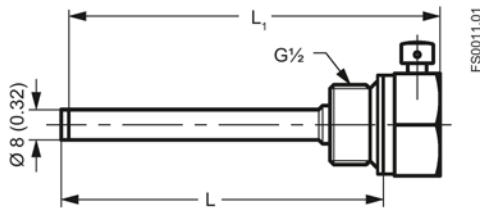Figure 10-5   Pt500 temperature sensor, 2-wire type, dimensions in mm (in)

Figure 10-6   Sensor pocket (stainless steel), for use with 2-wire sensors only, dimensions in mm (in)

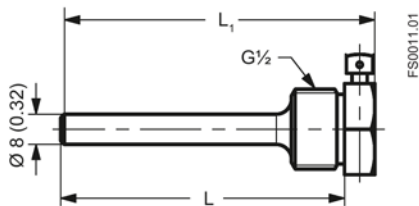| L1 [mm (inch)]	92 (3.62)	127 (5.00)	168 (6.61)	223 (8.78)
L [mm (inch)]	82 (3.23)	117 (4.61)	155 (6.10)	210 (8.27)

Figure 10-7   Sensor pocket (brass), for use with 2-wire sensors only, dimensions in mm (in)

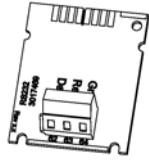| L1 [mm (inch)]	47 (1.85)	92 (3.62)	127 (5.00)
L [mm (inch)]	40 (1.57)	82 (3.23)	117 (4.61)
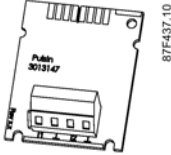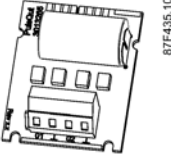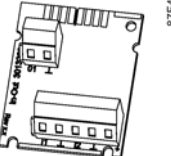
Spare parts/accessories
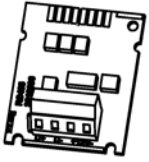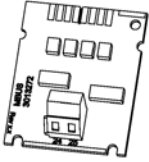
11

11.1 Ordering
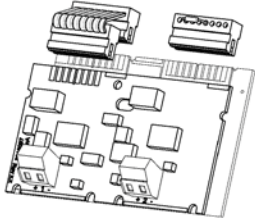
In order to ensure that the ordering data you are using is not outdated, the latest ordering data is always available on the Internet: Catalog process instrumentation (http://www.siemens.com/processinstrumentation/catalogs).
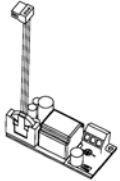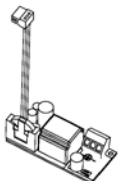
11.2 Accessories

Option modules

Description	Order code	
Pulse input module	A5E03461432	
Pulse output module	A5E03461436	
Combination pulse input/output module (2 inputs and 1 output)	A5E03461437	
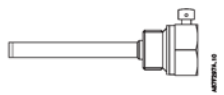
Description	Order code	
RS 232 module	A5E03461459	
RS 485 module	A5E03461512	
M-Bus slave module	A5E03461516	
Current output module	A5E03461583	

11.3 Power supply

Description	Order code	
3.6 V D-cell battery	A5E03461708	
230 VAC supply module	A5E03461717	
24 VAC supply module	A5E03461719	
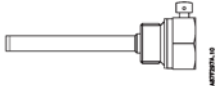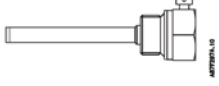
11.4 Temperature sensor pocket

Table 11- 1   For use with 4-wire Pt500 only

Description	Order code	
Stainless steel pocket 6 mm (0.24"), G½" x 135 mm (5.3") (PN 40)	A5E03462868	
Stainless steel pocket 6 mm (0.24"), G½" x 225 mm (8.9") (PN 40)	A5E03462870	

Table 11- 2   For use with 2-wire Pt500 only

Description	Order code	
Brass pocket 6 mm (0.24"), G½" x 40 mm (1.6") (PN 16)	A5E02611778	
Brass pocket 6 mm (0.24"), G½" x 85 mm (3.3") (PN 16)	A5E02611779	
Brass pocket 6 mm (0.24"), G½" x 120 mm (4.7") (PN 16)	A5E02611780	
Stainless steel pocket 6 mm (0.24"), G½" x 85 mm (3.3") (PN 25)	A5E02611781	
Stainless steel pocket 6 mm (0.24"), G½" x 120 mm (4.7") (PN 25)	A5E02611783	
Stainless steel pocket 6 mm (0.24"), G½" x 155 mm (6.1") (PN 25)	A5E02611792	
Stainless steel pocket 6 mm (0.24"), G½" x 210 mm (8.3") (PN 25)	A5E02611793	

11.5   Pt500 temperature sensor pair

Table 11- 3   4-wire sensors (for corresponding 4-wire sensor pocket types only)

Description	Order code	
Pt500 temperature 4-wire sensor pair with MID (MI-004) and PTB (K7.2) approvals Sensor diameter: 6 mm (0.24") Sensor length: 140 mm (5.5") 230 mm (9.1") Cable length: 5 m (16.4 ft)	 A5E03462872 A5E03462878	

Table 11- 4   2-wire sensors (for corresponding 2-wire sensor pocket types only)

Description	Order code	
Pt500 temperature 2-wire sensor pair, paired to EN 1434 Sensor diameter: 6 mm (0.24") Sensor length: 50 mm (1.97") Cable length: 2 m (6.56 ft) 3 m (9.84 ft) 5 m (16.4 ft) 10 m (32.8 ft)	 A5E02611794 A5E02611795 A5E02611796 A5E02611798	

For information on further spare parts/accessories, see: Catalog process instrumentation (http://www.siemens.com/processinstrumentation/catalogs)

Appendix

<div align="right">

A

</div>

A.1 Temperature sensors

Temperature measurement

In heat transport systems, the release of energy (heat loss) is determined by measuring the supply (hot side) and return (cold side) temperatures as well as the volume of the measuring medium.

In heating loops the supply side is defined as the hot side and the return side as the cold side. Cooling systems are opposite to heating systems in the sense that the supply side is defined as the cold side and the return side as the hot side.

The effective difference between the supply and return temperatures is always of critical importance for determining the thermal energy exchanged.

The absolute value of the temperature is required but is only of secondary importance for purposes of accuracy. The measuring error in the differential temperature is directly included in the total error when calculating the energy involved.

Thermal consideration

Heat flows from a warm to a cold region. If a sensor head at a measurement point becomes warmer, then the heat has most probably come from the liquid, i.e. heat flows from the measurement point to the sensor head located on the outside of the pipe. This dissipation inevitably produces varying temperatures along the flow path where the measuring resistor may be situated. For exact measurements, it is important that this heat dissipation is kept as low as possible.

Example: Temperature difference of plant: 3 K

A measurement deviation of ± 0.1 K results in a measurement range of 2.9 to 3.1 K => maximum percentage error in temperature measurement: 3.3 % (0.1:3).
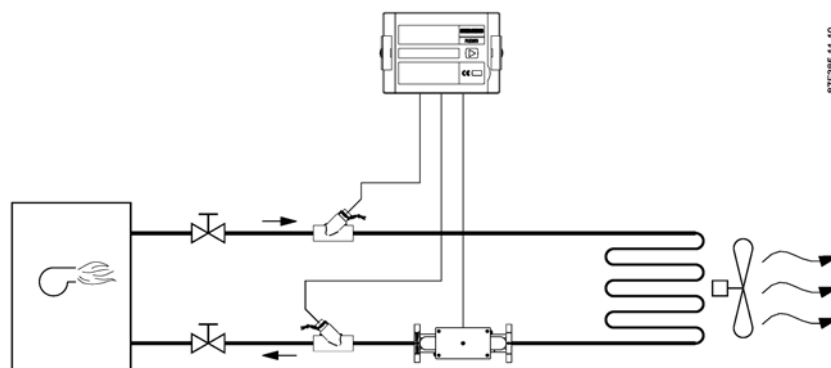

Figure A-1   District heating application with the flowmeter installed in the cold pipe

In contrast to other consumption measurements (water, gas) the consumption of energy in heating/cooling closed circuits does not involve depletion of the measuring medium.

A large proportion of the energy supplied to a circuit is usually returned unused. This often requires small amounts having to be measured from the large quantity supplied. This particular measurement task requires exceptional accuracy for determining temperature differences.

Because the temperature sensors cannot be manufactured with the required accuracy for working in matched pairs, the sensor pairs themselves are individual sensors with approximately similar properties determined by careful measurement. Only in this way the necessary maximum matched pair deviation of 0.05 K can be fulfilled.

Stated accuracy limits apply to all heating/cooling measurement applications. Even though significantly higher costs are involved, there is scarcely any difference between domestic and district heating measurement systems as the measurement accuracy in percentage terms remains the same.

Special care is required for measurements in loops with permanently small temperature differences (cooling applications) as are commonly found in e.g. heat pumps and cooling circuits.

Recommendations

The location of the installation point of the temperature sensors and the flow sensor in the heating/cooling circuit is determined by the measurement itself. The two temperature measurement points form the limits for which the energy flow is calculated. (The supplier, for example, bears all pipe losses, which occur upstream, and the consumer all those downstream from the temperature measurement points.)

Platinum resistance temperature sensors

The EN 1434 standard stipulates platinum resistance temperature sensors according to EN 60751 for heat meters with separate temperature sensors.

Whereas the choice of basic resistance values is open, in practice 100 Ω, 500 Ω and 1000 Ω sensors have generally gained acceptance.

The SITRANS FUE950 offer the Pt100 and Pt500 input, with the Pt500 input as standard including 4-wire Pt500 sensor pairs and related sensor pockets.

Temperature measurement is based on a change in the resistance of the platinum (Pt) resistor caused by a change in temperature. According to EN 60751, a Pt500 sensor has a value of 500 Ω at 0 °C and 962.5 Ω at 100 °C.

The average change in resistance between 0 °C and 100 °C is thus: 462.5 Ω, means Pt500 changes 1.925/K.

The accuracy depends on the minimum temperature difference that occurs (ΔT_{min}).

According to the EN 1434 standard, the formula for the maximum relative error of a temperature sensor is:

$E = \pm (0.3K + 0.005/T)$ in %
E = relative error in %
T = temperature in K

Common energy meter types with 3 K as the minimum temperature difference (Class 3) have a maximum matched pair error of 3.5 % at the minimum temperature difference. This corresponds to an absolute value of 0.105 K.

The energy meter is always the master when matching energy meter and temperature sensors. The correct temperature sensors for the SITRANS FUE950 are Pt500 sensors.

Note

Always choose temperature sensors to match the energy meter, not vice versa.

A.2 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-11-MI004-PTB005)

A.3 Certificates

Certificates are posted at
Flow documentation (http://www.siemens.com/flowdocumentation)
and can also be found on the documentation disk shipped with the device.

Loops

B

B.1 Main loop

Loop no. 1

Menu	Window 1	Window 2
1.1	Accumulated energy	
1.2	Accumulated volume	
1.3 (OFF) *	Accumulated energy (cooling) *	
1.4	Actual flow	
1.5	Actual power	
1.6	Hot temperature (for example "ht 100.1 °C")	Cold temperature (for example "ct 50.2 C")
1.7	Temperature difference (for example "dt 50.1 C")	
1.8	Operation days (Ond 10)	Accumulated error time on hours (e.g. Eh 0 h)
1.9	Error code (e.g. E- - - - - - -)	
1.10	Display test	

*: Is only visible if the device is ordered for combined heating/cooling applications (order code 7ME3480 - xxYxx-xxxxx; Y = E or F)

B.2 Accounting date loop

Loop no. 2

Menu	Window 1	Window 2	Window 3
2.1	Accounting date 1	Accounting date 1 energy	"Accd. 1A"
2.2	"Accd 1"	Accounting date 1 in the future	
2.3	Accounting date 1 previous year	Accounting date 1 previous year energy	"Accd. 1L"
2.4	Accounting date 2	Accounting date 2 energy	"Accd. 2A"
2.5	"Accd 2"	Accounting date 2 in the future	
2.6	Accounting date 2 previous year	Accounting date 2 previous year energy	"Accd. 2L"
2.7	Accounting date 1	Pulse input 1	Volume pulse input 1
2.8	Accounting date 1 previous year	Pulse input 1	Volume pulse input 1
2.9	Accounting date 2	Pulse input 1	Volume pulse input 1
2.10	Accounting date 2 previous year	Pulse input 1	Volume pulse input 1
2.11	Accounting date 1	Pulse input 2	Volume pulse input 2
2.12	Accounting date 1 previous year	Pulse input 2	Volume pulse input 2
2.13	Accounting date 2	Pulse input 2	Volume pulse input 2
2.14	Accounting date 2 previous year	Pulse input 2	Volume pulse input 2

B.3 Information loop

Loop no. 3

Menu	Window 1	Window 2
3.1	Actual date ("dd.mm.yy.")	Actual time ("hours - minutes")
3.2	"SEC_Adr"	Secondary address (default serial number)
3.3	"Pri_Adr 1"	Primary address (default: the last two digits of the serial number)
3.4	"Pri_Adr 2"	Primary address 2 (default: 0)
3.5	Flowmeter installation place (e.g. "cold.PIPE")	
3.6	Month peak flow rate (e.g. 123.4 m^3/h)	Date of max. flow ("dd.mm.yy")
3.7	Month peak power rate (e.g. 332.4 kW)	Date of max. power ("dd.mm.yy")
3.8	Integration interval (maximum value above) (default value: 1.00 h)	
3.9	"In0" (pulse input 0)	Pulse input value and unit for flowmeter pulses on terminal 10 and 11 (e.g. 0.100 m^3)
3.10	"Port 1"	Installed add-on module type identification number (Page 37)
3.11	"Port 2"	Installed add-on module type identification number (Page 37)
3.12	"F02-002" (software version)	Checksum
3.13 (OFF)	Glycol concentration (adjustable text / only visible in devices ordered with the Z-option "C02")	

B.4 Pulse input loop

Loop no. 4

Menu	Window 1	Window 2
4.1	"In1" (pulse input 1)	Accumulated volume of pulse input 1
4.2	"In2" (pulse input 2)	Accumulated volume of pulse input 2
4.3	"Out1" (pulse output 1)	Value of pulse output 1 (default: energy (heating); last significant display digit with display unit)
4.4	"Out2" (pulse output 2)	Value of pulse output 2 (default: volume; last significant display digit with display unit)

B.5   Tariff loop

Loop no. 5

Menu loop 5 is only visible if the device is ordered for combined cooling/heating applications (order code 7ME3480-xxYxx-xxxx; Y = E or F) or with accounting date/tariff option (7ME3480-xxxxx-xxxx-Z, D02 (tariff limit and date specified in plain text).

Menu	Window 1	Window 2	Window 3
5.1 (OFF)	Tariff 1 (e.g. energy with 123 MWh)	Tariff function 1 (e.g. "t 000E")	Tariff limit 1 (e.g. 100 °C)
5.2 (OFF)	Accounting date 1 tariff totalizer 1 (dd.mm.yyy)	Accumulated energy of accounting date 1 tariff totalizer 1 (e.g. T1 with 123 MWh)	"Accd. 1A"
5.3 (OFF)	Accounting date 2 tariff 1 (dd.mm.yyy)	Accumulated energy of accounting date 2 tariff totalizer 1 (e.g. T1 with 123 MWh)	"Accd. 2A"
5.4 (OFF)	Tariff totalizer 2 (e.g. T2 with 456 m³)	Tariff function 2 (e.g. "t 000u")	Tariff limit 2 (e.g. 100 °C)
5.5 (OFF)	Accounting date 1 tariff 2 (dd.mm.yyy)	Accumulated energy of accounting date 1 tariff totalizer 2 (e.g. T2 with 123 MWh)	"Accd. 1A"
5.6 (OFF)	Accounting date 2 tariff 2 (dd.mm.yyy)	Accumulated energy of accounting date 2 tariff totalizer 2 (e.g. T2 with 123 MWh)	"Accd. 2A"
5.7 (OFF)	Tariff totalizer 3 (e.g. energy with 123 MWh)	Tariff function 3 (e.g. "t 000E")	Tariff limit 3 (e.g. 100 m³/h)
5.8 (OFF)	Tariff totalizer 4 (e.g. energy with 123 MWh)	Tariff function 4 (e.g. "t 000E")	Tariff limit 4 (e.g. 100 m³/h)

B.6   Month loop

Loop no. 6

Standard version

Menu	Window					
	1	2	3	4	5	6
6.1	"LOG"	Latest month	Energy	Volume	Max. flow rate	Max. power
6.2	"LOG"	Month -1	Energy	Volume	Max. flow rate	Max. power
6.3	"LOG"	Month -2	Energy	Volume	Max. flow rate	Max. power
. . .	"LOG"					
6.24	"LOG"	Month -23	Energy	Volume	Max. flow rate	Max. power

Energy calculator with cooling tariff

This variation of the menu loop is only visible if the device is ordered for combined cooling/heating applications (order code 7ME3480-xxYxx-xxxx; Y = E or F) or with accounting date/tariff option (7ME3480-xxxxx-xxxx-Z, D02 (tariff limit and date specified in plain text)).

Menu	Window							
	1	2	3	4	5	6	7	8
6.1	"LOG"	Latest month	Energy	Tariff totalizer 1	Tariff totalizer 2	Volume	Max. flow rate	Max. power
6.2	"LOG"	Month -1	Energy	Tariff totalizer 1	Tariff totalizer 2	Volume	Max. flow rate	Max. power
6.3	"LOG"	Month -2	Energy	Tariff totalizer 1	Tariff totalizer 2	Volume	Max. flow rate	Max. power
. . .	"LOG"							
6.24	"LOG"	Month -23	Energy	Tariff totalixzer 1	Tariff totalizer 2	Volume	Max. flow rate	Max. power

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For more information

www.siemens.com/flow

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www.siemens.com/processautomation