

# SonoSelect and SonoSafe energy meters





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## EU DECLARATION OF CONFORMITY

**Danfoss A/S**  
Danfoss Energy Metering

declares under our sole responsibility that the

Product(s):

SonoSafe 10 and SonoSelect 10 Energy Meters

covered by this declaration is in conformity with the following directive(s), standard(s) or other normative document(s), provided that the product is used in accordance with our instructions.

- MID Directive 2014/32/EU      Measuring Instrument Directive
  - Module B +D
  - EN1434: 2007      Heat meters
  - EN1434: 2015/TC176-WG2\_N480
- EMC Directive 2014/30/EU      Electromagnetic compatibility
  - EN 61000-6-1      Electromagnetic compatibility (EMC) Immunity for residential, commercial and light-industrial environments (IEC 61000-6-1)
  - EN 61000-6-4      Electromagnetic compatibility (EMC) Emission standard for industrial environments (IEC 61000-6-4)
- RoHS Directive 2011/65/EU      Restriction of Hazardous substances
- R&TTE Directive 1999/5/EC      Radio & Telecommunication Terminal Equipment

The products are provided with the following marking of conformity:

CE M16 0200

DK-0200-MI004-034

The first year of production is 2016

Date 2017.03.16	Issued by  Søren Kjeldsen R&D Director, Danfoss Energy Metering	Date 2017.03.16	Approved by  Bjarne Halkjær Strategy & portfolio Director
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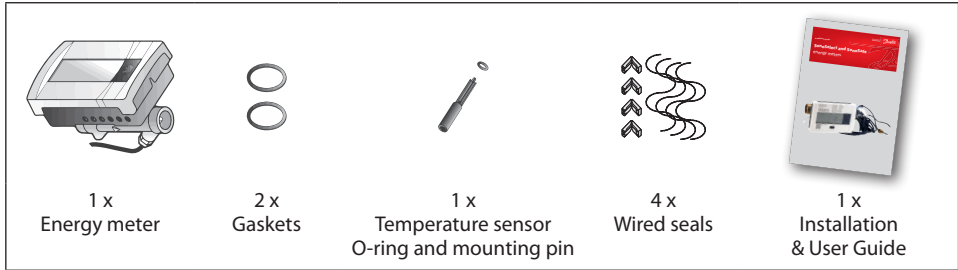
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## Installation & User Guide      SonoSelect and SonoSafe

### 1. Inside the box

Description of components included in the box



**Note!**

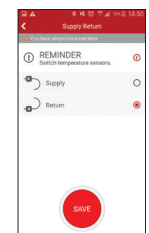
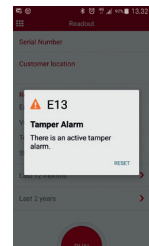
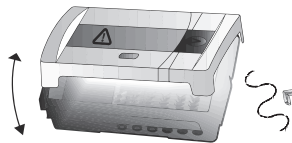
- For cooling meters a wall mounting kit is delivered with the product

### 2. Installation

#### 2.1 Preparation

SonoSelect incorporates a tamper monitoring function. If the calculator is opened the meter will set alarm E13 in display. Don't open unless for adding communication module, replacing battery or installing cables. Reset requires Bluetooth dongle 014U1963 and SonoApp service tool.

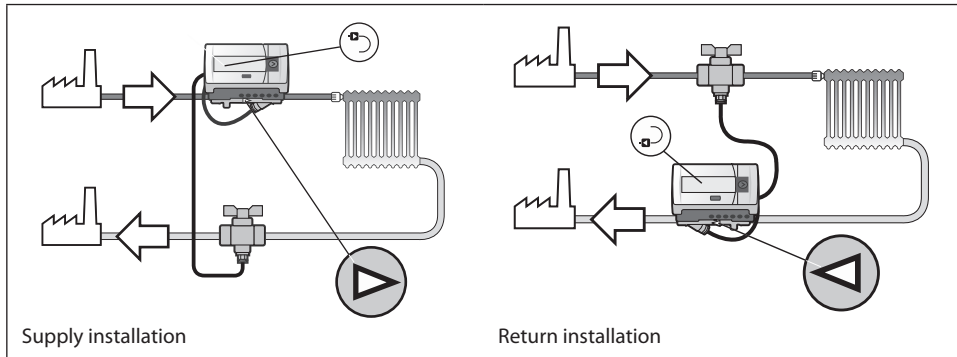
SonoSelect is delivered with the option of reconfiguring supply/return using the Bluetooth dongle 014U1963 and SonoApp service tool.



**Note!**

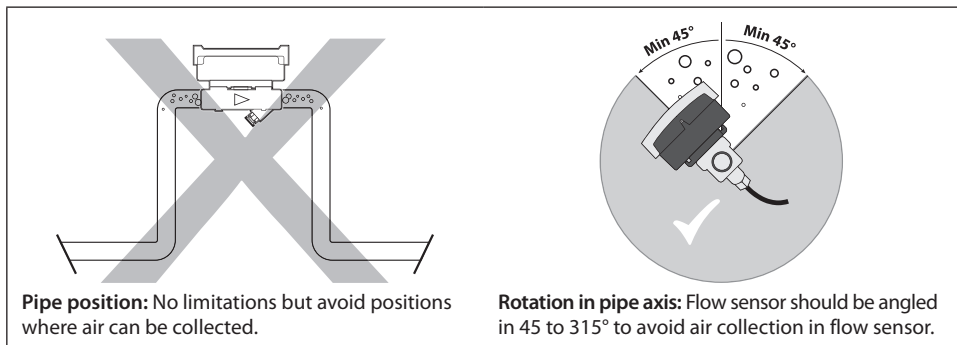
- Product is approved for ambient temperature between 5-55 °C, non-condensing (indoor installation). It is recommended to install Calculator at max. 45 °C to secure optimal conditions for battery lifetime. At media temperatures below ambient temperature (cooling) the calculator must be mounted separately from the flow sensor to prevent condensation.
- Avoid installation stress from pipes and fittings.
- Flush the system.

## 2.2 Identification of installation: Supply/Return pipe installation

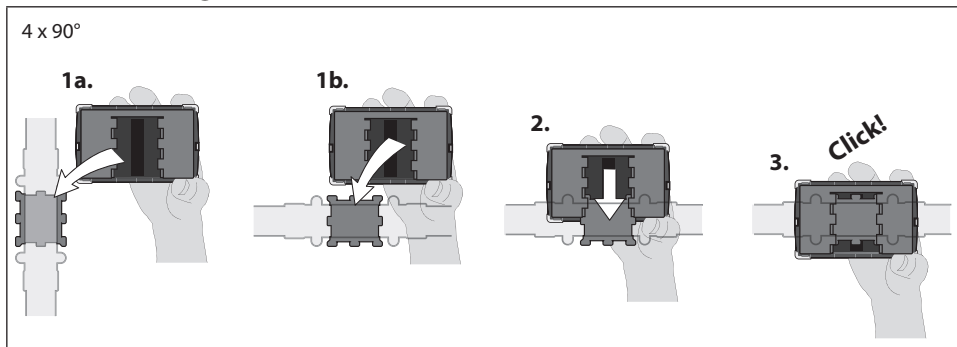


Heat meters have red temp sensor in supply pipe and all cooling meters have blue temp sensor in supply pipe

## 2.3 Flow sensor installation



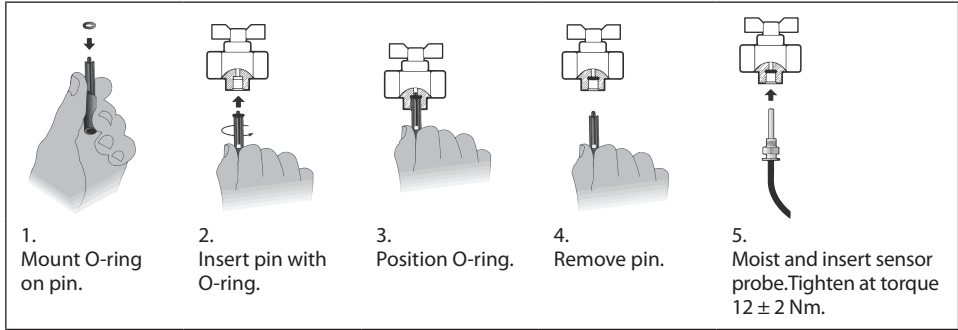
## 2.4 Mounting orientation, calculator



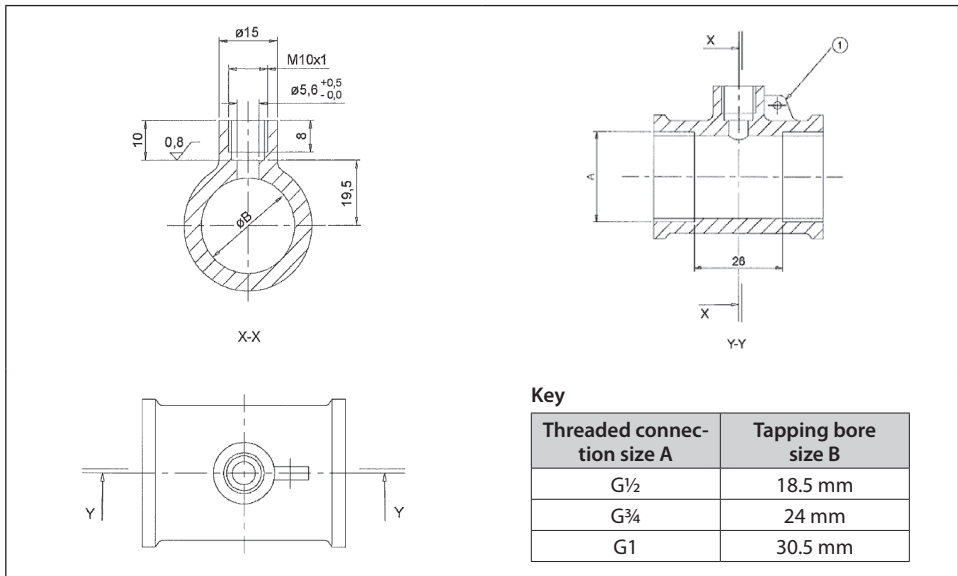
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### 2.5      Mounting of O-ring and temperature sensor

One temperature sensor is factory mounted in the flow sensor. The other must be mounted in the opposite pipe relative to the flow sensor installation.



To ensure accuracy and a tight seal the sensor installation should comply to EN1434-2 annex A:



**Note:**

Tolerance on machined dimensions =  $\pm 0.5$  mm.

Pipe fittings for use with probe type DS (Direct Short).

①: provision for security sealing.

## 2.6      Communication modules

### Modules in general

To adapt the meter for various applications SonoSelect 10 and SonoSafe 10 features a slot for mounting communication modules.

Each module features its own  $\mu$ -controller and is powered by its own battery.

Modules have their own parameter set which is saved in the module  $\mu$ -controller flash memory. A local copy of the energy meter parameters used for communication is stored in the module.

Data from module is updated in meter every 10 minutes.

Power: Lithium Thionyl Chloride battery (half of AA size).

2 pulse inputs have common ground.

Modules are galvanically isolated from energy meter circuitry

### Wired M-Bus module with 2 pulse inputs

Once installed the meter will display the icon for wired communication and pulse inputs in loop 2 of the display.

Wired M-Bus is galvanically isolated from  $\mu$ C and pulse inputs.

The two pulse inputs can be programmed independently of each other (see specification for pulse input module).

M-Bus (primary)	Lithium Thionyl Chloride battery (half of AA size)
M-Bus (secondary)	M-Bus supply
Baud rate supported	300, 2400, 4800, 9600
Communication protocol	According to EN1434-3 & EN13757-3
Battery life time	16+1 year (from productiondate)

### Wireless OMS communication module, 868.95MHz with 2 pulse inputs

Once installed the meter will display the icon for wireless communication and pulse inputs in loop 2 of the display. The two pulse inputs can be programmed independently of each other (see specification for pulse input module).

Standard	Open Metering System (OMS) issue 4.0.2
Frequency	868.95 MHz
Antenna	Internal
Transmission power	10mW (7.8 dBm); (Max 25mW; 13,9dBm)
Mode	T1 mode
Encryption	AES 128 bit encryption (mode 5), Parameterized Static key
Sending interval	Fixed network: 15 min.
Telegram	Standard telegram*
Battery life time	16+1 year (with pulse inputs off)

\* See section with data telegram.

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### 2 pulse input module

Once installed the meter will display the icon for pulse inputs in menu 2 of the display. Accumulated volume is only readable by communication. The two pulse inputs can be programmed independently of each other (see specification for pulse input module).

Pulse value	0.001 m <sup>3</sup> to 1 m <sup>3</sup> per pulse
Voltage supply	≤ 6.0 V
Source current	≤ 0.1 mA
High level input threshold	≥ 2 V
Low level input threshold	≤ 0.5 V
Pull-up resistor	100 kΩ
Pulse length	≥ 100 ms
Maximum frequency	≤ 5 Hz
Pulse inputs	According to EN1434-2, section 7.1.5 (Classification of pulse input devices Class IB)
Battery life time	16+1 year

\* Suitable for both electronic switch and Reed contact.

### Data telegram

<b>Wired M-bus</b> Standard telegram: <ul style="list-style-type: none"> <li>• Accumulated energy</li> <li>• Accumulated volume</li> <li>• Current flow</li> <li>• Current power</li> <li>• Supply temperature</li> <li>• Return temperature</li> <li>• Difference temperature</li> <li>• Enclosure temperature</li> <li>• Current time</li> <li>• Hour counter factory</li> <li>• Hour counter OK</li> </ul>	<b>Wireless M-bus (OMS)</b> Standard telegram fixed network: <ul style="list-style-type: none"> <li>• Accumulated energy</li> <li>• Accumulated volume</li> <li>• Current flow</li> <li>• Current power</li> <li>• SupplyTemperature</li> <li>• ReturnTemperature</li> <li>• CurrentTime</li> </ul>
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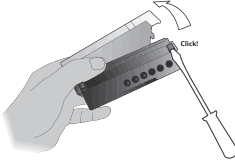
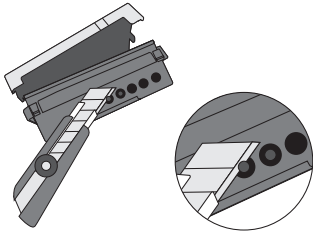
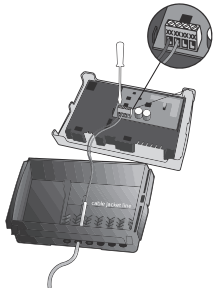
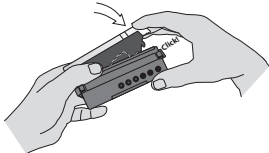
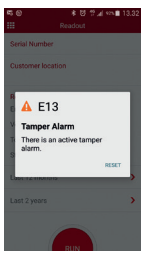
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### Terminals and cables


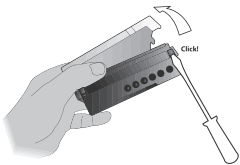
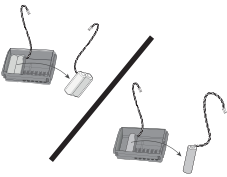
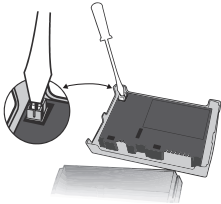
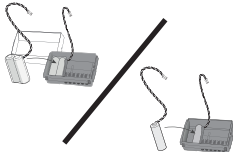
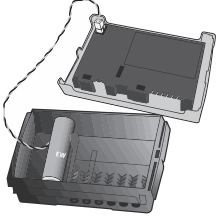
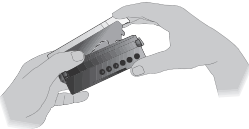
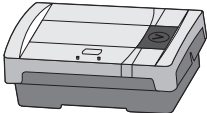
Communication	Name	Terminal No.
M-Bus	Meter bus (blue or orange)	24
	Meter bus (blue or orange)	25
Pulse input	Pulse input 1 + (Brown)	50
	Pulse input 1 - (White)	51
	Pulse input 2 + (Brown)	52
	Pulse input 2 - (White)	53
Cable specification	Pulse input cables	<10 m
	To ensure IP protection class connecting cable outer jackets must be	Ø4.2 ± 0.1 mm
	Communication cables delivered with heat meter. Cable ends are stripped with crimped ferule.	1.0 m

## 2.7      Installation of module/cable

<p>1. Before handling module PCB ensure relevant ESD regulations are observed (IEC 61340-5-1).</p> 	<p>2. Break wired seal for enclosure.</p> 
<p>3. Cut rubber parallel to enclosure.</p> 	<p>4. Insert module following guide on PCBA cover. Insert cable through hole, connect cable and fix to screw terminals matching color and terminal numbers. Fix cable(s) to cable relief. Outer jacket no longer than 9 mm from cable relief (line). Press down.</p> 
<p>5. Close enclosure making sure that no cables interfere with rubber sealing and other internal parts.</p> 	<p>6. Reset tamper alarm via SonoApp for SonoSelect 10. For module configuration, see SonoApp user guide.</p> 

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### 2.8      Battery

<p>1. Before handling module PCB ensure relevant ESD regulations are observed (IEC 61340-5-1).</p> 	<p>2. Break installation seal and open enclosure.</p> 
<p>3. Disconnect battery connector and remove battery.</p> 	<p>4. Short circuit battery connectors on PCB using a small flat head screwdriver.</p> 
<p>5. Connect new battery to PCB.</p> 	<p>6. Fit battery in enclosure.</p> 
<p>7. Close enclosure making sure that no cables interfere with rubber sealing or other internal parts.</p> 	<p>8. Confirm battery change by pressing the button 2 times within 120 seconds. Reset tamper alarm (E13) via SonoApp for SonoSelect 10.</p> 

## 3. Commissioning

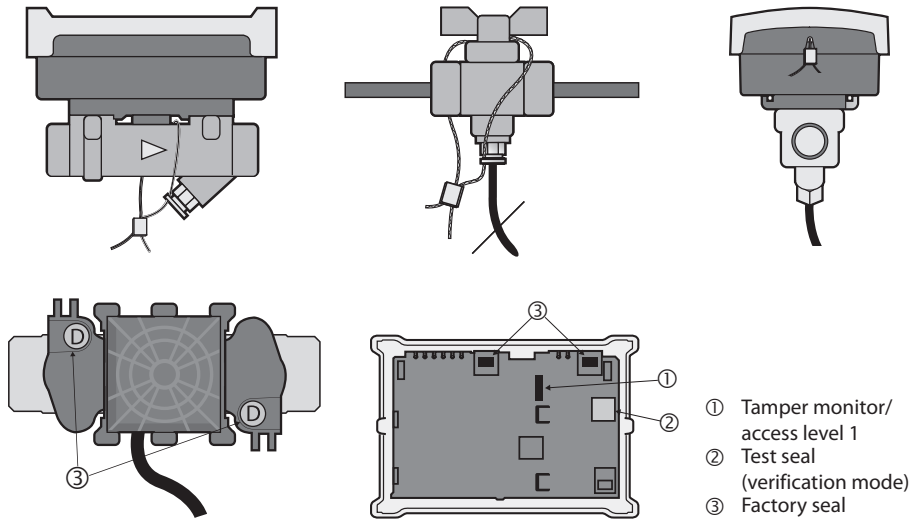
### 3.1 Bleeding

1. Bleed the system until the flow rate display is steady.
2. Make sure no error codes are displayed.
3. Check the display for a plausible indication of flow rate and temperatures.
4. For SonoSelect: Run installation check using Bluetooth dongle 014U1963 and SonoApp service tool.

### 3.2 Supply/return configuration

Only available for SonoSelect: Use Bluetooth dongle 014U1963 and SonoApp service tool/Configuration

### 3.3 Meter sealing



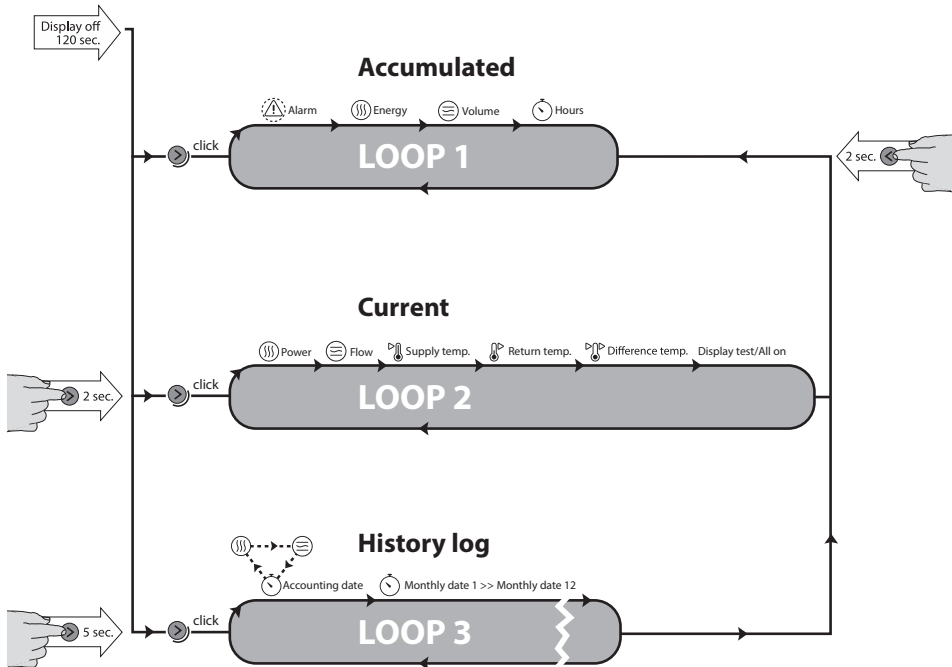
### 3.4 IP class

Calculator	IP65 (SonoSelect) / IP54 (SonoSafe)
Flow sensor	IP65
Temperature sensor	IP65

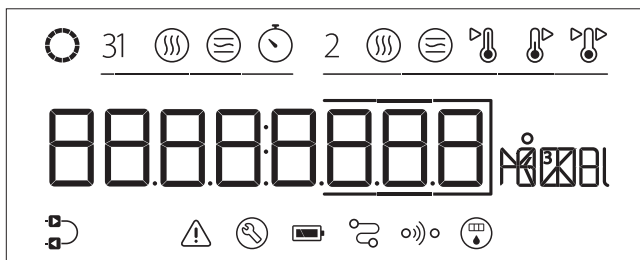
**Note:** The IP class can be compromised if cables are subjected to angled tension.

## 4. Function overview

### 4.1 Menu structure



## 4.2 Display explanation



	Working symbol
	Accumulated energy
	Accumulated flow
	Total hours
	Instant power
	Instant flow
	Supply temperature
	Return temperature
	Temperature difference

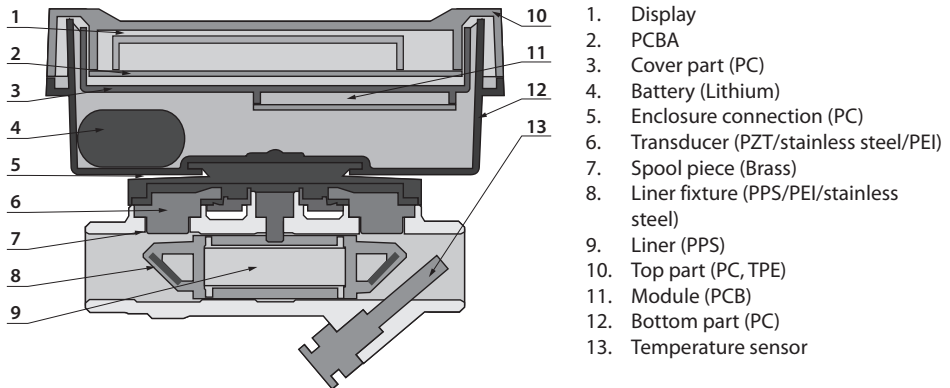
	Supply/return mounted installation
	Alarm
	Service/maintenance
	Battery full or low
	Wired communication
	Wireless communication
	Pulse
	Decimal emphasizer
	Units field

## 4.3 Alarms

E01	System error
E02	PCB error
E03	Battery empty (less than 1 month)
E04	Battery low voltage
E05	Battery low (less than 12 months)
E06	Supply Temperature Error
E07	Return Temperature Error
E08	Absolute/Difference temperature outside accumulated range
E09	Low transducer signal

E10	Transducer error
E11	Outside measured range
E12	Negative flow
E13	Tamper alarm
E14	High flow > qss
E15	Battery consumption too high
E16	Display overflow (energy/volume)
E32	Communication module error

## 5. Device overview



## 6. Disposal



Item	Material	Disposal
Battery	AA-cell Lithium/thionyl chloride 620 mg Lithium	Approved deposit for lithium batteries
PCBA with display and communication module	Coppered epoxy laminate components soldered on, PC, TPE	Electronic waste
Cables	Copper with PUR or PVC jackets	Cable recovery
Flow sensor (including transducer and liner)	Brass, stainless steel, PPS	Metal recovery
Transducer	PZT, stainless steel, PEI	Approved deposit for PZT
Other plastic parts	PC, PPS, PEI, TPE	Plastic recovery

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