ENGINEERING
TOMORROW

Danfoss

SonoSelect and SonoSafe
Energy Meters

SonoSelect 10
DN15, G¾, 110mm
Heat meter
CE M19 0200
DK-0200-MI004-034

Θ: 5 to 95°C   Pt1000
ΔΘ: 3 to 90K   PS: 16bar
qs: 3.0m³/h   PN: 16bar
qp: 1.5m³/h   Acc. Class 2
qi: 0.015m³/h   E1/M2/IP65
Serial No.: 0001217BE1908
Code No.: 014U0168

P.-Year: 2019
FW: 01.06.00
Add.: 90800012

ENGINEERING
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Danfoss

EU DECLARATION OF CONFORMITY

Danfoss A/S

Danfoss Energy Metering

6430 Nordborg, Denmark | CVR nr.: 20 16 57 15 | Telephone: +45 7488 2222 | Fax: +45 7449 0949

declares under our sole responsibility that the

Product category: Energy Meters   **Type designation(s):** SonoSelect 10 and SonoSafe 10

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.

[RED] – Radio Equipment Directive 2014/53/EU[2]

Article 3.1a (LVD)

EN 61010-1: 2010 - Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements.

EN 60950-1: 2006 + A11: 2009+ A1: 2010+A12:2011+AC:2011+A2:2013 - Information technology equipment. Safety. General requirements.

EN 62311: 2008 - Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz).

Article 3.1b (EMC)

EN 301 489-3 V2.1.1: 2019-03 - Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz.
EN 301-489-1 V2.1.1: 2017-02 - Common technical requirements.

Article 3.2 (Radio)

EN 300 220-2 V3.1.1:2017 - Short Range Devices (SRD) operating in the frequency range 25 MHz to 1000 MHz.

[EMC] – Electromagnetic Compatibility Directive 2014/30/EU[1]

EN 61000-6-1: 2007 – Immunity for residential, commercial and light-industrial environments.

EN 61000-6-3: 2007/A1:2011 – Emission standard for residential, commercial and light-industrial environments.

[LVD] – Low Voltage Directive 2014/35/EU[1,3]

EN 62311: 2008 - Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz).
EN 61010-1: 2010 - Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements.

[MID] – Measuring Instruments Directive 2014/32/EU

Module B+D
EN1434-4:2015+A1:2018 - Thermal energy meters – Part 4: Pattern approval tests[4].
Notified Body: Force Certification, 0200, performed type approval and issued certificate DK-0200-MI004-034.

[RoHS] – Restriction of Hazardous Substances Directive 2011/65/EU+A:2015/863

EN 50581: 2012 - Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

1 For variants with Radio Module the declaration for EMC & LVD shall be ignored
2 For variants without Radio Module the declaration for RED shall be ignored.
3 For variants without Radio Module and without Mains power supply (230Vac) the declaration for RED and LVD shall be ignored.
4 Not within MID – National Type Approval Certificate for cooling energy TS 27.02 010 is issued by "The Danish Safety Technology Authority"

Date: 2020.10.05 Place of issue:	Issued by	Date: 2020.10.05 Place of issue:	Approved by
6430 Nordborg, DK	**Signature:** **Name : Martin Steffensen** **Title: R&D Director**	1210 Ljubliana, SLO	**Signature:** **Name: Gasper Benedik** **Title: Energy Meter Director**

Danfoss only vouches for the correctness of the English version of this declaration. In the event of the declaration being translated into any other language, the translator concerned shall be liable for the correctness of the translation

ID No: 014R2903   **Revision No:** 14   This doc. is managed by 500B0577   Page 1 of 2

Note: To ensure latest version of declaration, please visit danfoss.com.

Contents

1. General

Ambient operating temperature	class A 5 - 55 °C (Indoor installation, non-condensing)		
Ambient storage temperature	-25 to 60 °C		
Temperature media	SonoSafe	SonoSelect	
	5-95°C	5-95°C	5-130°C
Power supply	3.6 V DC lithium battery (2 AA SonoSelect 1 AA SonoSafe), Mains supply 230V AC +10/-15 % 50/60 Hz, battery back up in case of power cuts: 1 hour		
Mechanical environment	class M2		
Electromagnetic environment	class E1		
Pressure	SonoSafe	SonoSelect	
	16	25	
MID	Accuracy Class 2		

1.1 Inside the box

Description of components included in the box

| 1 x Energy meter | 2 x Gaskets & 1 temperature sensor O-ring | 4 x Wired seals | 1 x Installation & User Guide |

Note:
- For cooling, combined and SonoSelect 5-130°C energy meters a wall mounting kit is delivered with the product.
- For mains supply meters a M12 gland is delivered with the product.

2. Installation

2.1 Preparation

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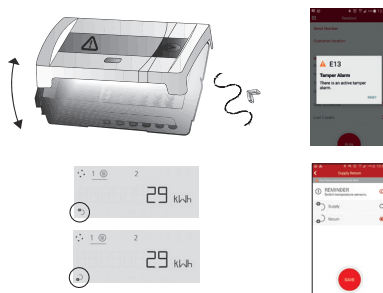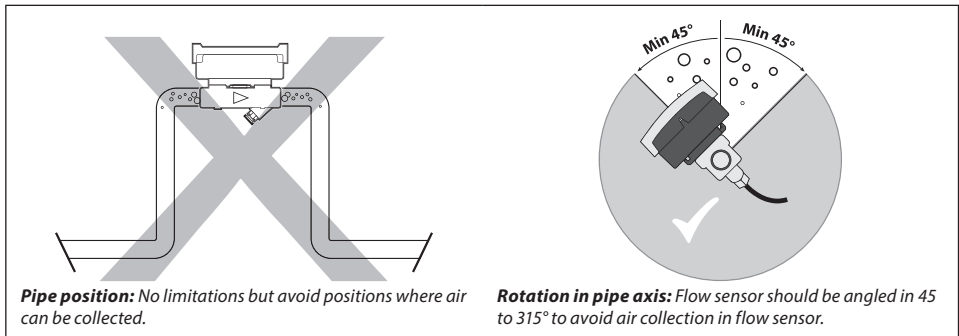

Note:
- Product is approved for ambient temperature between 5-55 °C, non-condensing (indoor installation). It is recommended to install Calculator at max. 45 °C to secure optimal conditions for battery lifetime. At media temperatures below ambient temperature (cooling, bifunctional) the calculator must be mounted separately from the flow sensor to prevent condensation.
- At media temperatures above 95°C (SonoSelect heating) the calculator must be mounted separately from the flow sensor to secure electronics lifetime
- Avoid installation stress from pipes and fittings.
- Flush the system.
- No outside installation and no flooding allowed.

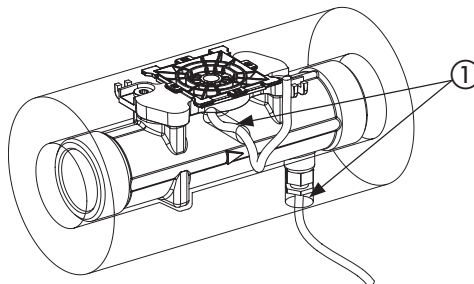## 2.2 Identification of installation: Supply/Return pipe installation

Supply installation   *Return installation*
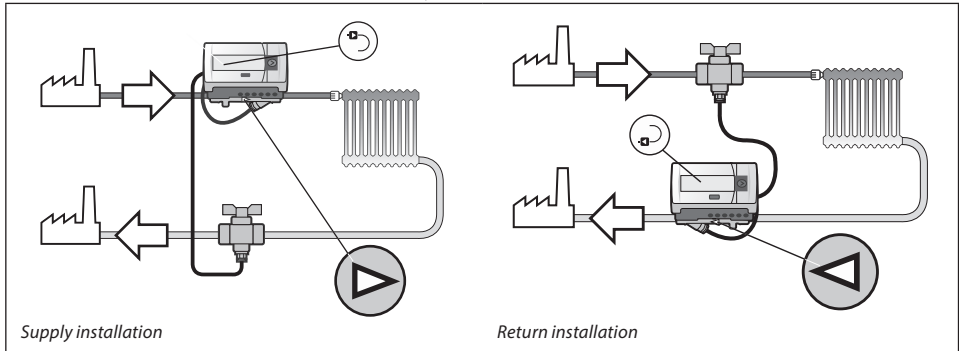
Note: *Heat meters and bifunctional meters have red temp sensor in supply pipe and all cooling meters have blue temp sensor in supply pipe.*
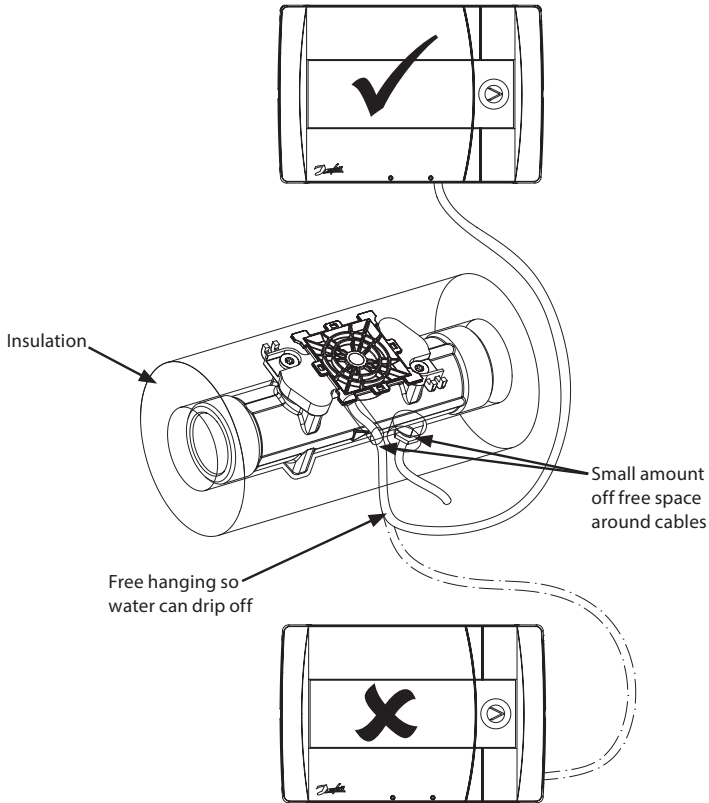
2.3 Flow sensor installation

Pipe position: *No limitations but avoid positions where air can be collected.*

Rotation in pipe axis: *Flow sensor should be angled in 45 to 315° to avoid air collection in flow sensor.*

2.4 Flow sensor installation for cooling applications

Adhesive should not be used on the cables. A small amount of free space should be left around the cables to allow condensation to escape ①. Temperature sensor should preferably be installed from below to allow gravity to remove water and condensation from the temperature sensor. Both cables should form a drip nose for drainage of water.
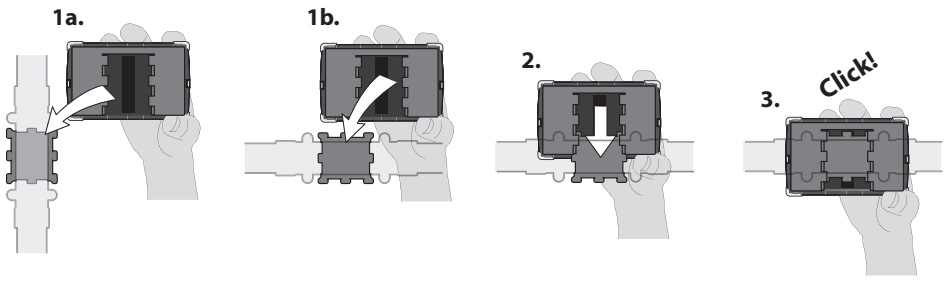
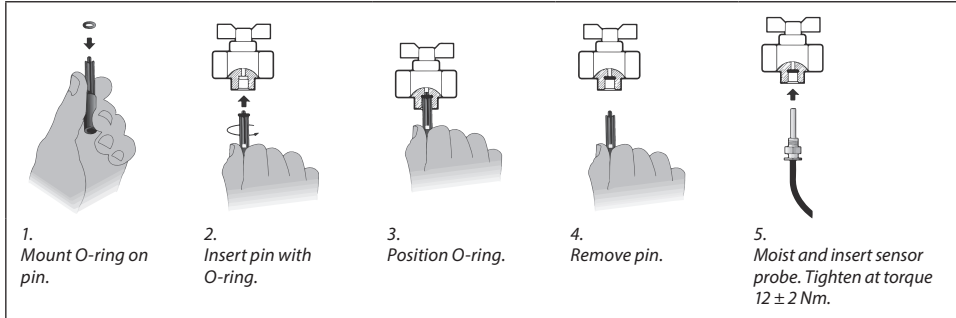Calculator position: Install calculator higher than flow sensor, separate from pipe.

Insulation

Small amount off free space around cables

Free hanging so water can drip off

2.5 Mounting orientation, calculator

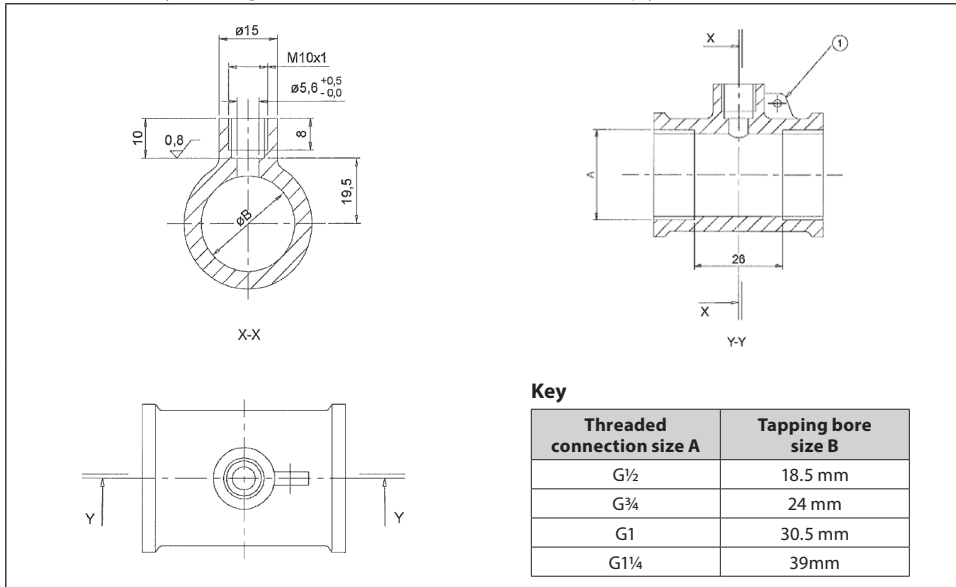4 x 90°

1a.

1b.

2.

3.

Click!

2.6 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. Mounting pin available as accessory.

1.	2.	3.	4.	5.
Mount O-ring on pin.	Insert pin with O-ring.	Position O-ring.	Remove pin.	Moist and insert sensor probe. Tighten at torque 12 ± 2 Nm.

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

X-X

Y-Y

Key

Threaded connection size A	Tapping bore size B
G½	18.5 mm
G¾	24 mm
G1	30.5 mm
G1¼	39mm

Note:
• *Tolerance on machined dimensions = ± 0.5 mm.*
• *Pipe fittings for use with probe type DS (Direct Short).*
①: *Provision for security sealing.*

2.7 Bifunctional meters

Bifunctional meters are for combined heating and cooling applications. Θ_{hc} default value is 30°C and it can be configured with SonoApp. Bifunctional energy meters are available only in approved meteorological range 5-95°C.

Key

- No energy accumulation
- Heating
- Cooling

$\Delta\Theta hc = \Delta\Theta cutoff = 0.25K$
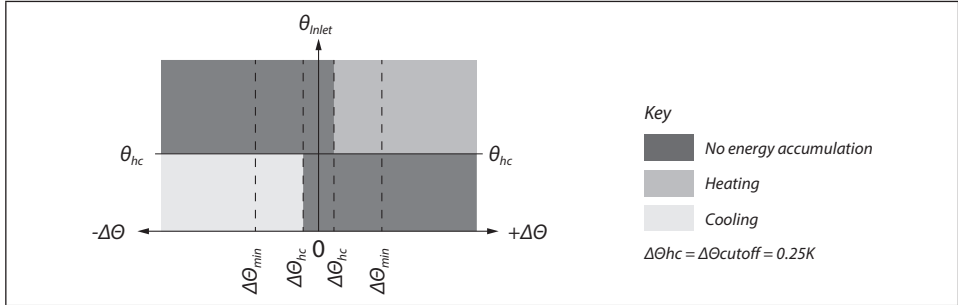
2.8 Communication modules

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 μ-controller.
Modules have their own parameter set which is saved in the module μ-controller flash memory. A local copy of the energy meter parameters used for communication is stored in the module.
Modules with pulse input have the inputs stored in legal backup every 10 minutes.
Power: Lithium Thionyl Chloride battery (half of AA size) or mains power supply (230V). In case of power cuts on mains power the module has no power back up.
2 pulse in/outputs have common ground.
Modules are galvanically isolated from main 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 μ-controller 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) or mains powered
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
Addressing	Serial number: **sssss**vvNNy**yWW** **ss**: Primary address, **yWWsssss**: Secondary address

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 (Max. 25mW; 13,9 dBm)
Mode	T1 mode
Encryption	AES 128 bit encryption (mode 5), Parameterized Static key
Sending interval	Battery power: Fixed network 15 min Walk by: 2 min Mains power: 16 seconds
Telegram	Standard telegram*
Battery life time	16+1 year (with pulse inputs off), depending on period (e.g. 10+1 year for 2 min period)
Addressing	Serial number: **sssss**vvNNy**yWW** **yWWsssss**: Secondary address

See section with data telegram.

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

Pulse value	$0.001\ m^3$ to $1\ m^3$ 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.

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

Pulse 1 (energy*)	+ terminal 16, - terminal 17
Pulse 2 (volume*)	+ terminal 18, - terminal 19
Pulse value*	Unit follow the display. Scaling follow least significant digit of the display (default setting can be changed via SonoApp)
Pulse timing	Updates every 15 seconds
Polarity reversal:	Not possible, but can withstand -30V, max 27 mA without damage
Pulse length	≥100 ms
Pulse Pause:	≥100 ms
Voltage supply	3-30 V
Source current	≤ 27 mA
"ON" condition	U<2,0 @ 27mA
"OFF" condition	R>=6 MΩ
Maximum frequency	≤ 5 Hz
Pulse outputs	According to EN1434-2, section 8.2.3 (Classification of pulse output devices Class OB)
Battery life time	16+1 year
Cable length	Max 25 m
Alarms	E32 activates in meter if: 1) Module battery is empty 2) When no. of delayed pulses exceeds 5000 (incorrect scaling)

Default setting. Can be changed via SonoApp.

Data telegram
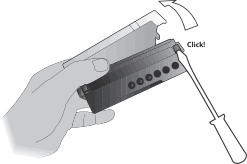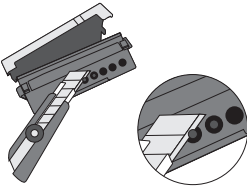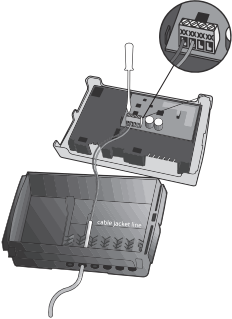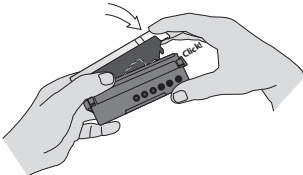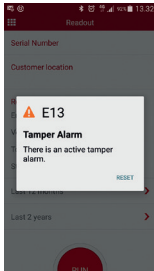
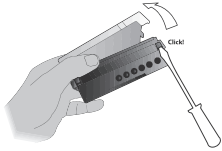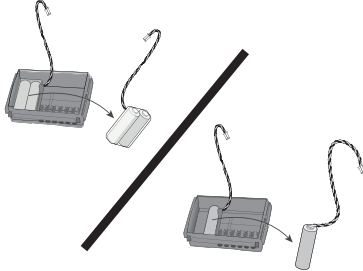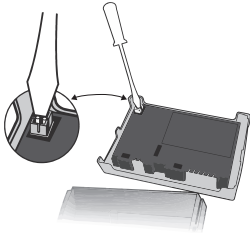| Wired M-bus	Wireless M-bus (OMS)	Wireless M-Bus (Walk -by)
Standard telegram (16 seconds if mains powered): • Accumulated Energy (heat and cooling for bifunctional) • Accumulated Volume (heat and cooling for bifunctional) • Current flow • Current power • Supply temperature • Return temperature • Difference temperature • Enclosure temperature • Current time • Hour counter factory • Hour counter OK	Standard telegram fixed network (15 minutes sending interval, 16 seconds if mains powered): • Accumulated Energy (heat and cooling for bifunctional) • Accumulated Volume (heat and cooling for bifunctional) • Current flow • Current power • SupplyTemperature • ReturnTemperature • CurrentTime	Standard telegram Walk by (2 minutes sending interval, 16 seconds if mains powered): • Accumulated Energy (heat and cooling for bifunctional) • Accumulated Volume (heat and cooling for bifunctional) • CurrentTime • Hour counter factory • Month log 1 (last month log)

Can be changed via SonoApp
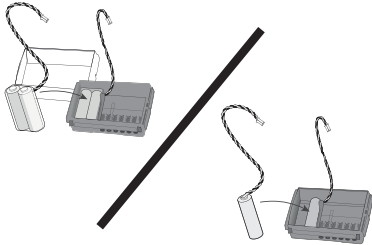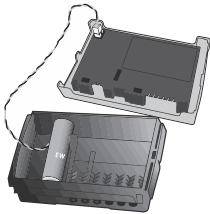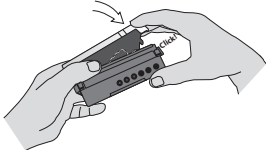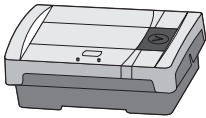
Terminals and cables

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
Pulse output	Pulse output 1+ (brown)	16
	Pulse output 1- (white)	17
	Pulse output 2+ (brown)	18
	Pulse output 2 – (white)	19

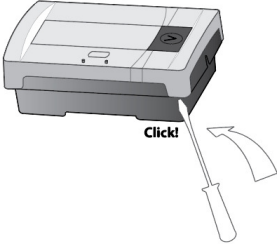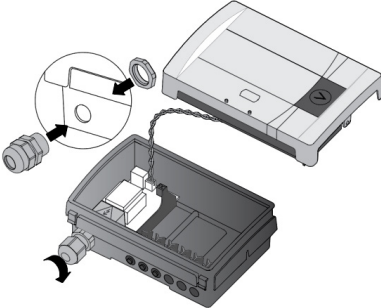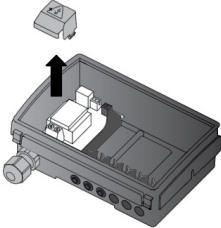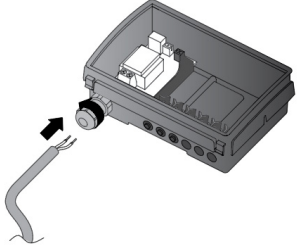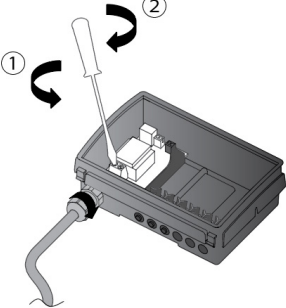|	Name	Dimensions
Cable specification	Pulse input cables 22AWG	<10m
	Pulse output cables 22AWG	<25m
	To ensure IP protection class connecting cable outerjackets must be	Ø4.2 ± 0.1 mm
	Communication cables delivered with energy meter. Cable ends are stripped with crimped ferule.	1.0m
Mains power cable	Mains power meters are delivered with M12x1.5 cable gland suitable for outside cable diameter Ø3-Ø6.5mm 2x0.75 mm². In case stranded wire is used Ferrules are required. Pre fuse of max 6A must be used	

2.9 Installation of module/cable

<table>
<tr>
<td>

1. Before handling module PCB ensure relevant ESD regulations are observed (IEC 61340-5-1).
</td>
<td>

2. Break wired seal for enclosure.
</td>
<td>

3. Cut rubber parallel to enclosure.
</td>
</tr>
<tr>
<td>

4. Insert module following guide on PCBA cover.
Insert cable through hole, connect cable and fix to screw terminals matching colour and terminal numbers.
Fix cable(s) to cable relief. Outer jacket no longer than 9 mm from cable relief (line). Press down.
</td>
<td>

5. Close enclosure making sure that no cables interfere with rubber sealing and other internal parts.
</td>
<td>

6. Reset tamper alarm via Sono-App.
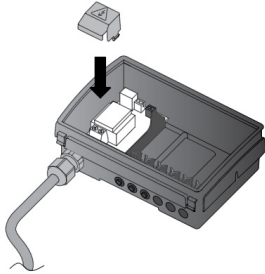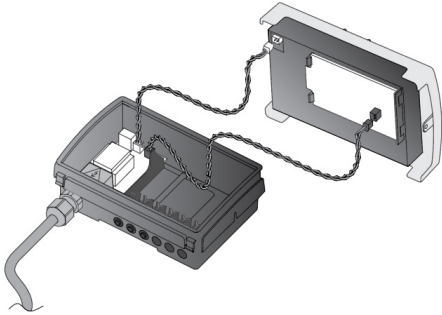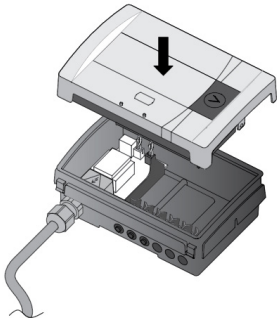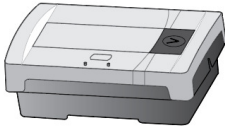For module configuration, see SonoApp user guide.
</td>
</tr>
</table>

2.10 Battery

 1. Before handling module PCB ensure relevant ESD regulations are observed (IEC 61340-5-1).	 2. Break installation seal and open enclosure.
 3. Disconnect battery connector and remove battery.	 4. Short circuit battery connectors on PCB using a small flat head screwdriver.
 5. Connect new battery to PCB.	 6. Fit battery in enclosure.
 7. Close enclosure making sure that no cables interfere with rubber sealing or other internal parts.	 8. Meter displays "use app" on power up. Use SonoApp to set date/time and confirm battery change (and reset tamper alarm E13). If no Sonoapp is available a long press of 5 seconds when display shown "use app" will also confirm the battery change. Note that date and time will not be updated.

2.11 Mains supply

1. Before handling module PCB ensure relevant ESD regulations are observed (IEC 61340-5-1). 1.1 Do not connect the cable to 230V before installing it in energy meter	2. Break installation seal on both sides and open enclosure.
3. Screw on the cable gland.	4. Remove protective cap from screw terminals.
5. Insert cable through cable gland hole to secure IP class and strain relief. In case stranded wire is used Ferrules are required.	6. Connect cable and fix it to screw terminals. Tighten the cable gland.

2.11 Mains supply (continuous)

7. Secure cable-terminal connection with protective cap.	8. Connect mains supply module with PCB and communication module. Left [white] plug for meter (to have back up for power cut). Right [black] for module.
9. Close enclosure making sure that no cables interfere with rubber sealing or other internal parts. Power up the meter.	10. USE APP appears in display: 1) Use SonoApp to set up. Confirm mains supply and set date & time. OR 2) Hold button for 5 seconds to continue without setting date & time.

3. Commissioning

3.1 Bleeding

Bleed the system until the flow rate display is steady.

Make sure no error codes are displayed.

Check the display for a plausible indication of flow rate and temperatures.

Run installation check using Bluetooth dongle 014U1963 and SonoApp service tool.

3.2 Supply/return configuration

Use Bluetooth dongle 014U1963 and SonoApp service tool/Configuration.

3.3 Meter sealing

①	Tamper monitor/ access level 1
②	Test seal (verification mode)
③	Factory seal
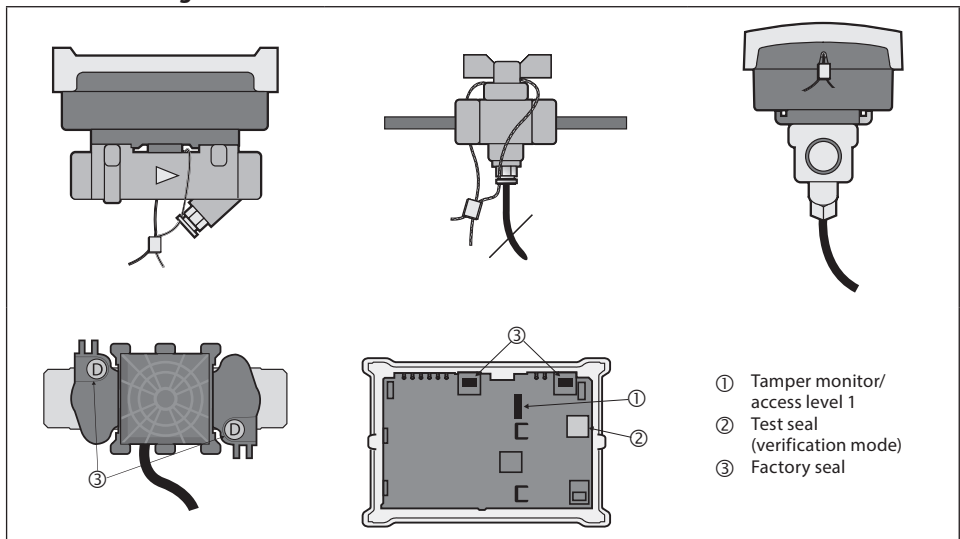
3.4 IP class

| Calculator	IP65
Flow sensor	IP68 (SonoSelect) / IP65 (SonoSafe)
Temperature sensor	IP65

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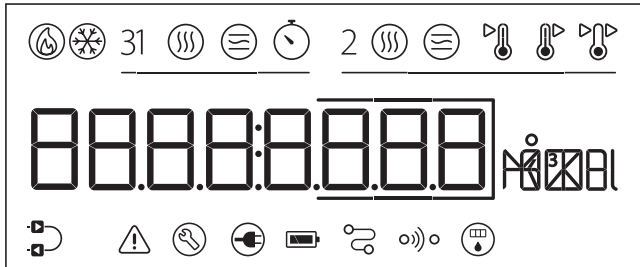
4. Function overview

The accumulated measured values as well as the current and historical values are stored in the calculator and can be displayed via the control button.

* Tarif function can be added via SonoApp

4.1 Menu structure
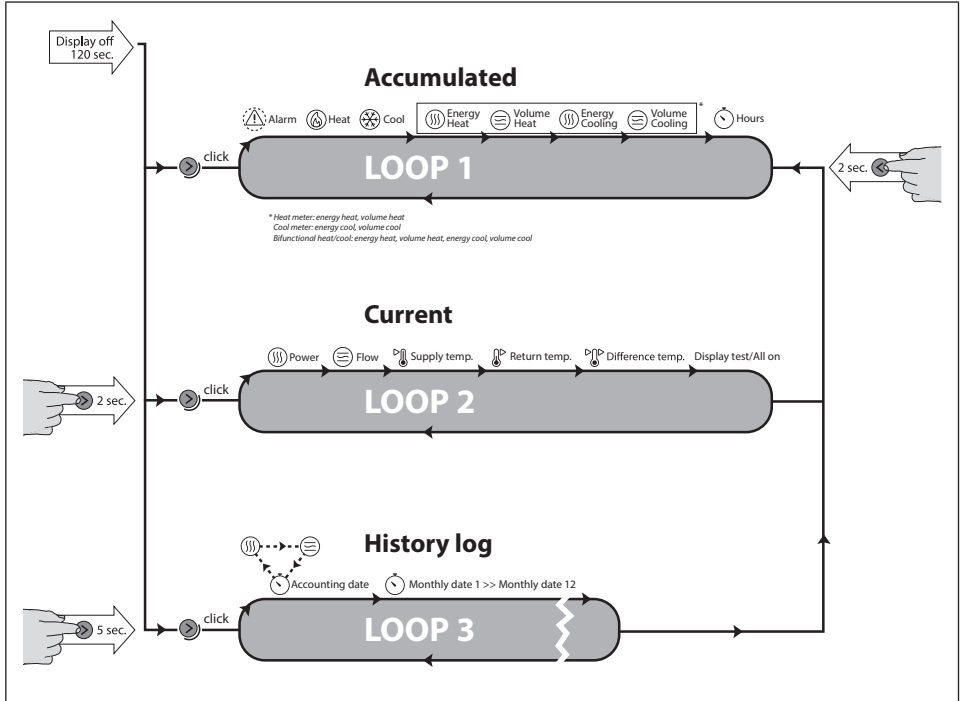
4.2 Display explanation

	Heating symbol				Accounting date (yearly log)	Loop 3
	Cooling symbol				Monthly log 1...12	
	Accumulated energy	Loop 1			Supply/return mounted installation	
	Accumulated flow				Alarm	
	Total hours	Loop 2			Service/maintenance	
	Instant power				Mains power icon	
	Instant flow				Battery full or low	
	Supply temperature				Wired communication	
	Return temperature				Wireless communication	
	Temperature difference				Pulse	
					Decimal emphasizer	
					Units field	

4.3 Alarms

E01	System error		E10	Transducer error
E02	PCB error		E11	Outside measured range
E03	Battery empty (less than 1 month)		E12	Negative flow
E04	Battery low voltage		E13	Tamper alarm
E05	Battery low (less than 12 months)		E14	High flow > qss
E06	Supply Temperature Error		E15	Battery consumption too high
E07	Return Temperature Error		E16	Display overflow (energy/volume)
E08	Absolute/Difference temperature outside accumulated range		E18	Bifunctional meter dead band error
E09	Low transducer signal		E32	Communication module error

5. Device overview
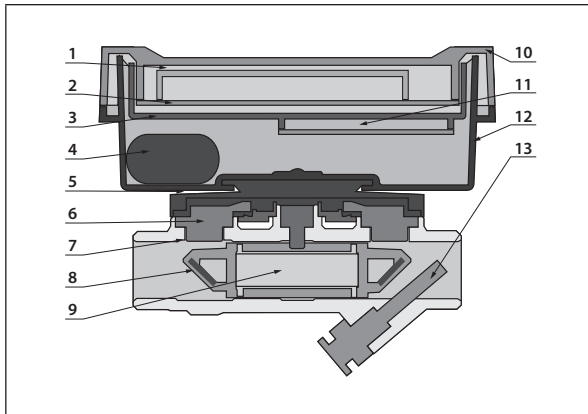
1. Display
2. PCBA
3. Cover part (PC)
4. Battery (Lithium)
5. Enclosure connection (PC)
6. Transducer (PZT/stainless steel/ PEI)
7. Spool piece (Brass)
8. Liner fixture (PPS/PEI/stainless steel)
9. Liner (PPS)
10. Top part (PC, TPE)
11. Module (PCB)
12. Bottom part (PC)
13. Temperature sensor

6. Disposal

Disposal note
This symbol on the product indicates that it may not be disposed of as household waste.
It must be handed over to the applicable take-back scheme for the recycling of electrical and electronic equipment.
• Dispose of the product through channels provided for this purpose.
• Comply with all local and currently applicable laws and regulations.

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, silicone 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

7. Local Importer name and address

For goods delivered to UK, importer name

and address is:
Danfoss Ltd.
22 Wycombe End
HP9 1NB
GB

BC189986476699en-011101