

EU-Type Examination Certificate

Measuring Instrument Directive

Certificate number: DK-0200-MI004-040

Issued by FORCE Certification A/S, Denmark
EU-notified body number 0200

In accordance with The Danish Safety Technology Authority's statutory order no. 544 of May 28, 2018 which implements the Directive 2014/32/EU of the European Parliament and Council of February 26, 2014 on measuring instruments (MID).

Issued to: **Kamstrup A/S**
Industrivej 28
DK-8660 Skanderborg
Denmark

Type of instrument: Thermal energy meter/heat meter, calculator

Type designation: MULTICAL® 603

Valid until: 2027-04-18

Number of pages: 14, including appendix

Date of issue: 2019-05-06

Version No.: 11
This new version of DK-0200-MI004-040 is issued due to changes to the meter and it replaces all previous versions.

Approved by



Michael Møller Nielsen
Certification Manager

Processed by



Lars Poder
Examiner

The conformity markings may only be affixed to the above type approved equipment. The manufacturer's Declaration of Conformity may only be issued and the notified body identification number may only be affixed on the instrument when the production/product assessment module (D or F) of the Directive is fully complied with and controlled by a written inspection agreement with a notified body. This EU-type examination certificate may not be reproduced except in full, without written permission by FORCE Certification A/S.

FORCE Certification references:
TASK No.: 119-24151.02 and ID. No.: 0200-MID-06429

Appendix to

EU-Type Examination Certificate Measuring Instrument Directive

Number: DK-0200-MI004-040

Issued by FORCE Certification A/S, Denmark
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Revision	Issued	Changes
DK-0200-MI004-040	2017-04-18	Original certificate
DK-0200-MI004-040 ver 1	2017-06-09	New software version added, new test points added to the verification section
DK-0200-MI004-040 ver 2	2017-08-10	New software versions added
DK-0200-MI004-040 ver 3	2017-08-31	New software version added
DK-0200-MI004-040 ver 4	2017-11-15	Three additional modules added, new software version added
DK-0200-MI004-040 ver 5	2018-01-04	Type 603-H variant added, various editorial changes added, new software version added
DK-0200-MI004-040 ver 6	2018-02-15	New software version added
DK-0200-MI004-040 ver 7	2018-03-15	New software version added, PQT controller added
DK-0200-MI004-040 ver 8	2018-04-20	New software version added
DK-0200-MI004-040 ver 9	2018-10-26	New modules added (module 51 + 85)
DK-0200-MI004-040 ver 10	2019-03-06	New modules added (module 80 + 82 + 83), editorial changes
DK-0200-MI004-040 ver 11	2019-05-06	New software version added, new modules added (module type 32 + 33), temperature difference cut-off added

Applied standards and documents:

- EN 1434:2015 + A1:2018
- WELMEC 7.2:2018

The instruments/measuring systems shall correspond with the following specifications:

Type designation:

MULTICAL® 603

Description:

The meter consists of a calculator, which constitute a thermal energy meter together with type approved temperature sensor pairs and type approved flow sensors.

The calculator unit has a display indicating registered thermal energy, and additionally, via pushbuttons, other values are available.

MULTICAL® 603 is optionally available with built-in M-Bus and can furthermore be extended by two internal communication modules (see the section on type number combination).

DK-0200-MI004-040

Technical documentation:

Reference No.:

- 119-24151.02
- 119-24151.01
- 118-20781.05
- 118-20781.04
- 118-20781.03
- 118-20781.02
- 118-20781.01
- 117-26187.05
- 117-26187.04
- 117-26187.03
- 117-26187.02
- 117-26187.01


DK-0200-MI004-040

Technical data

Instrument type according to Instrument type Parts	: EN 1434:2015 + A1:2018 : Combined instrument : Calculator or Calculator and temperature sensors or Calculator and flow sensor
Energy indication	: GJ, kWh or MWh (kWh in calibration mode)
Display registers	: 7 or 8 digit (programmable)
Integration/update intervals for energy, volume and temperature	: Fixed 2 s, 8 s, 32 s or adaptive 2...64 s (programmable)
Temperature range $\theta_{\min} \dots \theta_{\max}$: 2°C...180°C (or narrower range)
Temperature diff. range $\Delta\theta_{\min} \dots \Delta\theta_{\max}$: 3 K...178 K (or narrower range)
Temperature diff. cut-off	: 0.00...2.50 K configurable (default 0.00 K)
Flow sensor, range	: From qp 0.6 m ³ /h to qp 15,000 m ³ /h
Flow sensor, position	: Inlet or outlet pipe (programmable)
Environment class	: E1 and E2, M1 and M2
Climatic class	: 5...55°C, condensing, closed location
Durability specification	: 12 years
Protection class	: IP 65
Mains supply	: 230 VAC, 48...62 Hz (Linear or SMPS) 24 VAC, 48...62 Hz (Linear) 24 VAC/VDC, 48...62 Hz (SMPS)
Battery	: 3.65 VDC, D-cell or 2xA-cell Lithium battery
Back-up battery	: 3.0 VDC, BR-cell Lithium battery
Temperature sensor cables (un-shielded)	: Max. 100 m sensors cables for 4-wire connections Or max. 10 m cables for Pt100 2-wire connections Or max. 20 m cables for Pt500 2-wire connections (Minimum cross sectional area according to EN 1434-2, table 2)
Flow meter cables (un-shielded)	: Max. 10 m for ULTRAFLOW® flow sensors Max. 10 m for flow sensors w/electronic pulse output Max. 10 m for mechanical flow sensors with Reed- switch Max. 30 m via the Cable extender box, 66-99-036 Max. 100 m for flow sensors with 24 V active pulses

DK-0200-MI004-040

Software identification

Software revision	E1(0501)	0 5 0 1
Kamstrup Internal Item No.	50981335	1 3 3 5
		
Software Identification		1 3 3 5 0 5 0 1

The Software identification and checksum can be shown on the display of the meter (display No. 10 and No. 11)

Software Identification	Date	CRC-16 sum	Description
13350501 (E1)	2017-04-03	11625	Initial release for production
13350601 (F1)	2017-05-19	19261	Second release for production
13350701 (G1)	2017-06-12	60228	Third release for production
13350801 (H1)	2017-07-14	24919	Fourth release for production
13351001 (J1)	2017-08-29	46594	Fifth release for production
13351101 (K1)	2017-10-31	17556	Sixth release for production
13351201 (L1)	2017-12-15	49832	Seventh release for production
13351301 (M1)	2018-02-09	50538	Eighth release for production
13351302 (M2)	2018-03-15	7954	Ninth release for production
13351401 (N1)	2018-04-09	7972	Tenth release for production
13351601 (P1)	2019-04-12	2299	Eleventh release for production

Only for member states where software download is allowed:

Software download according to WELMEC 7.2

The meter is approved for software download, both direct (via cable) and remote (via wireless). The software download function is separated between legally relevant (the software in the meter) and legally non-relevant software (the software in the communication module). The software separation is implemented via hardware separation, whereby the level of separation exceeds Extension S. The meter is a Type P instrument and Risk Class C applies.

The legally relevant software download function can be disabled for use in member states where software download for instruments in use is not allowed. In this case download of legally relevant software cannot be done without breaking the verification seal.

DK-0200-MI004-040
Type number combination
MULTICAL® 603 type number

Static part

Dynamic part

Type 603 - □ - □ - □□ - □ - □□ - □ - □□ - □□

Calculator type

Pt100 2-wire	t1-t2	V1	w/ int. wired M-Bus	A
Pt100 4-wire	t1-t2	V1	w/ int. wired M-Bus	B
Pt500 2-wire	t1-t2	V1	w/ int. wired M-Bus	C
Pt500 4-wire	t1-t2	V1	w/ int. wired M-Bus	D
Pt500 2-wire	t1-t2-t3	V1-V2		E
Pt500 2-wire	t1-t2-t3	V1-V2	w/ backlighted display	F
Pt500 4-wire	t1-t2	V1 (24 V active pulses)	w/ int. wired M-Bus	G
Pt500 4-wire	t1-t2	V1-V2		H

Meter type

Heat meter	MID module B+D		2
Heat/Cooling meter	MID module B+D & TS 27.02	θ _{HC} = OFF	3
Heat/Cooling meter	MID module B+D & TS 27.02	θ _{HC} = ON	6

Country code

See country code specification. XX

Flow sensor connection

Delivered with one ULTRAFLOW®	1
Delivered with two identical ULTRAFLOW®	2
Prepared for one ULTRAFLOW®	7
Prepared for two identical ULTRAFLOW®	8
Prepared for flow sensors with fast and bounce-free electronic pulses	C
Prepared for flow sensors with slow and bounce-free electronic pulses	J
Prepared for flow sensors with slow pulses with bounce	L
Prepared for flow sensors with 24 V active pulses	P

Temperature sensor set

Delivered without temperature sensor set 00

Pt500 temperature sensors

Short direct sensor pair or 3 set	DS 27.5 mm	1.5 m - 3.0 m	1x
Short direct sensor pair	DS 38.0 mm	1.5 m - 3.0 m	2x
Pocket sensor pair or 3 set	PL ø5.8 mm	1.5 m - 10 m	3x

Pt100 temperature sensors

Short direct sensor pair	DS 27.5 mm or DS 38.0 mm	2.0 m	Jx
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DK-0200-MI004-040
MULTICAL® 603 type number
Dynamic part
Type 603 - - - - - - - -
Supply module

Delivered without supply module											0	
Battery, 1 x D-cell											2	
230 VAC High power SMPS											3	
24 VAC/VDC High power SMPS											4	
230 VAC power supply											7	
24 VAC power supply											8	
Battery, 2 x A-cell											9	

Communication modules (2 slots)

No module												00	00
Data + 2 pulse inputs (A, B)												10	10
Data + 2 pulse outputs (C, D)												11	11
M-Bus, configurable + 2 pulse inputs (A, B)												20	20
M-Bus, configurable + 2 pulse outputs (C, D)												21	21
M-Bus, configurable w/ thermal disconnect												22	22
Wireless M-Bus, EU, configurable, 868 MHz + 2 pulse inputs (A, B)												30	30
Wireless M-Bus, EU, configurable, 868 MHz + 2 pulse outputs (C, D)												31	31
LinkIQ/wM-Bus, Inputs, (In-A, In-B), EU												32	32
LinkIQ/wM-Bus, Outputs, (Out-C, Out-D), EU												33	33
Analog module 0/4...20 mA												40	40
Analog 0...20 mA/0...10 V inputs												41	41
KNX communication												42	42
PQT controller												43	43
Kamstrup Radio (low power) + 2 pulse inputs (A, B)												50	50
Kamstrup Radio GDPR (low power) + 2 pulse inputs (A, B)												51	51
LON TP/FT-10 + 2 pulse inputs (A, B)												60	60
BACnet MS/TP (RS-485) + 2 pulse inputs (A, B)												66	66
Modbus RTU (RS-485) + 2 pulse inputs (A, B)												67	67
2G/4G network module + 2 pulse inputs (In-A, In-B)												80	80
Modbus/KMP TCP/IP + 2 pulse inputs (In-A, In-B)												82	82
READY TCP/IP Ethernet + 2 pulse inputs (In-A, In-B)												83	83
High Power Radio Router + 2 pulse inputs (A, B)												84	84
High Power Radio Router GDPR + 2 pulse inputs (A, B)												85	85

DK-0200-MI004-040

Verification

Errors: Maximum permissible errors according to Directive 2014/32/EU of the European Parliament and Council of February 26, 2014 on measurement instruments (MID), Annex VI, Thermal energy meters (MI-004)

Procedure: Test points and verification requirements according to EN 1434-5:2015

Calculator according to 6.4

Calculator with temperature sensors according to 6.5

Test points

	Inlet	Outlet		Inlet	Outlet		Inlet	Outlet
	a) 44.3 °C	41 °C	or	a) 43 °C	40 °C	or	a) 43 °C	40 °C
	b) 80 °C	65 °C		b) 50 °C	40 °C		b) 50 °C	40 °C
	c) 160 °C	20 °C		c) 130 °C	40 °C		c) 160 °C	40 °C
or	Inlet	Outlet	or	Inlet	Outlet	or	Inlet	Outlet
	a) 53 °C	50 °C		a) 43 °C	40 °C		a) 43 °C	40 °C
	b) 70 °C	50 °C		b) 50 °C	40 °C		b) 110 °C	40 °C
	c) 130 °C	20 °C		c) 130 °C	40 °C		c) 160 °C	40 °C

After verification, the meter can be reprogrammed with a view to:

- Installation of flow sensor in inlet or outlet pipe, according to the sign in the display
- Measuring unit of energy indication (kWh, MWh or GJ)
- Decimal point in energy* and volume* indication

**) Register resolution requirements according to EN 1434-1:2015, point 6.3.7 must be observed*

Auto Detect function

The calculator is available with an Auto Detect function, which automatically sets the pulse value, when connected to ULTRAFLOW® x4 flow sensors (e.g. DK-0200-MI004-008 and -033). The detected pulse value (e.g. in the range of 300 pulses/litre to 0.15 pulse/litre) as well as the flow sensors nominal size (e.g. in the range of qp 0.6 to 1000 m³/h) is available in the meters display.

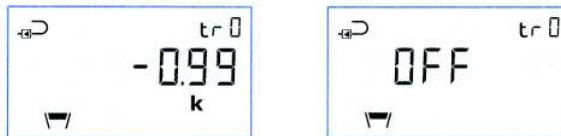
DK-0200-MI004-040

Temperature offset

The temperature reading can be offset adjusted from -0.99...0.99 K, commonly for the inlet and outlet, in order to compensate for the sensor cable influence on the absolute temperature.

During change of temperature sensor pairs, it is recommended to adjust the meters offset temperature according to the newly mounted sensor pair. Alternatively adjust the offset to 0.00 K whereby the function is disabled (OFF).

Example: If the temperature sensor pair has an error at +0.20 K at zero, then the meters offset should be -0.20 K in order to compensate.



Test mode

During test of the calculator, the internal high-resolution registers are useful to reduce the test duration.

Flow sensor size	High resolution	
$q_p \leq 1.5$	0.001 kWh	0.01 litre
$1.5 < q_p \leq 15$	0.01 kWh	0.1 litre
$15 < q_p \leq 150$	0.1 kWh	1 litre
$150 < q_p \leq 1500$	1 kWh	0.01 m ³
$1500 < q_p \leq 15000$	0.01 MWh	0.1 m ³

Configuration data logger

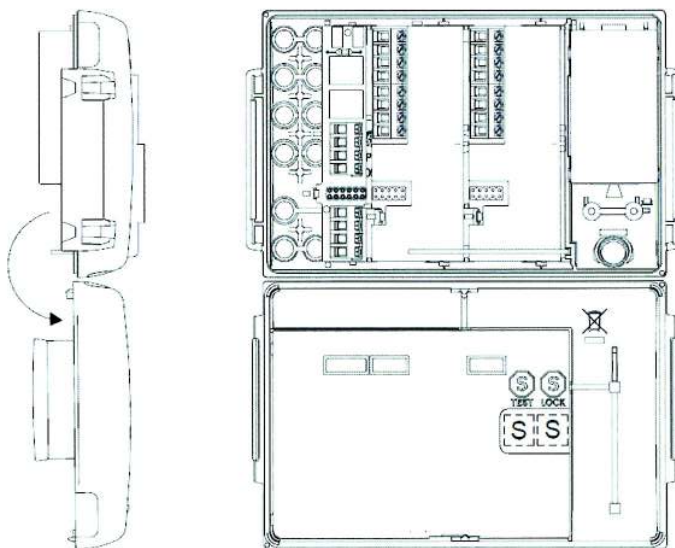
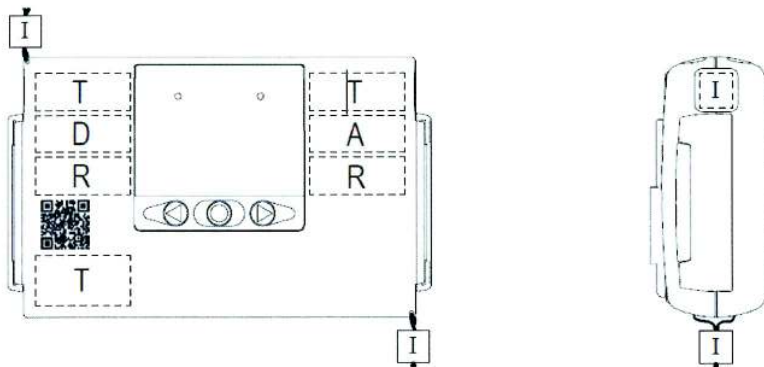
The meter includes several non-volatile data loggers, e.g. for configuration changes. The data logger read-out is done by means of an IEC 1107 optical head, placed above the display on the meter and connected to a standard PC or Tablet, using the PC-programme LogView, which is available from Kamstrup.

DK-0200-MI004-040

Security measures

Sealing

S	Security seals. Covering release for PCB box (label or integrated part of PCB box)
D	Module D marking (engraving or separate label)
T	Type marking
I	Installation seals (sealing wire or void labels)
A	Alternative approval marking
R	Re-verification marking



DK-0200-MI004-040

Marking and inscriptions

Marking for MULTICAL® 603

System designation

Type, production year and serial number

Temperature limits (θ_{\min} ... θ_{\max})

Differential temperature limits ($\Delta\theta_{\min}$... $\Delta\theta_{\max}$)

Temperature sensor type (Pt500 or Pt100)

Below information is available in the installation manual:

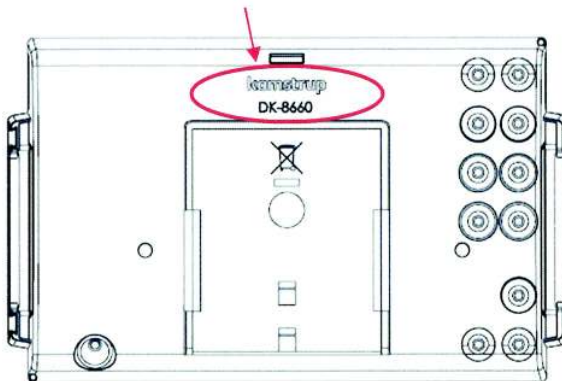
Mechanical and electromagnetic environment classes

Climatic class

Non-condensing and condensing/closed location

Enclosure (base part/rear side) MULTICAL® 603

Manufacturer postal address



Other information about the product

Software identification in the display

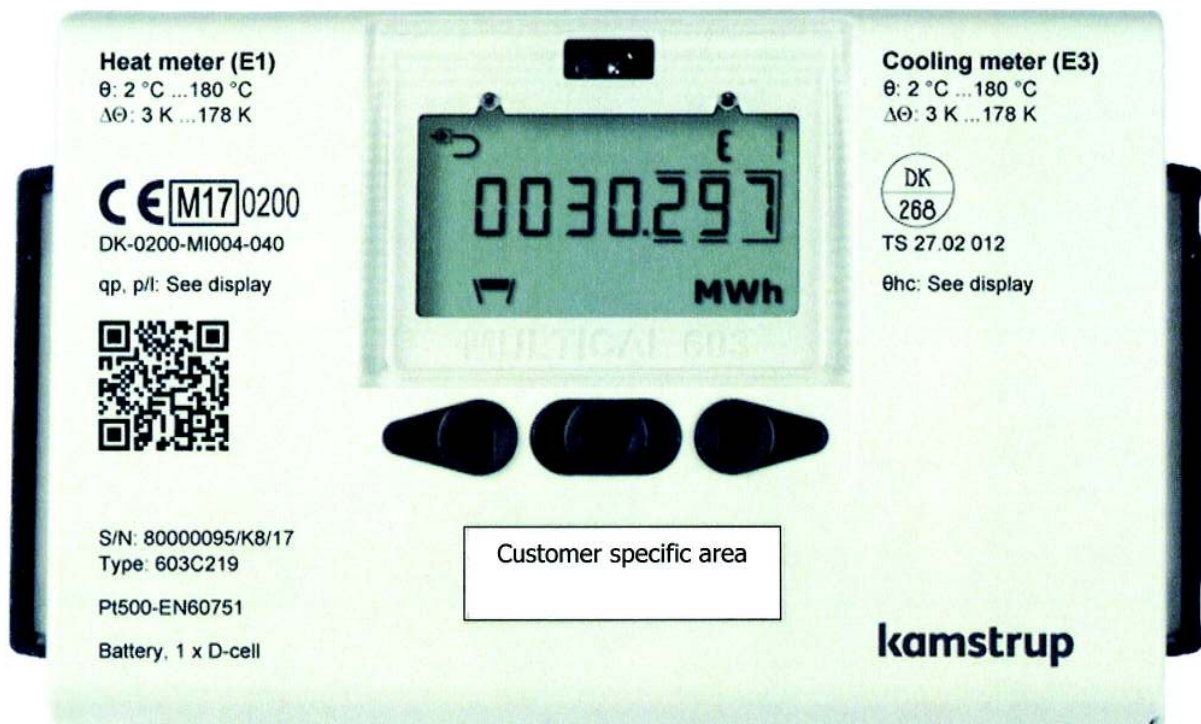
Unit of measurement in the display

Mounting the flow sensor in inlet or outlet pipe in the display

DK-0200-MI004-040

Example of type marking for MULTICAL® 603

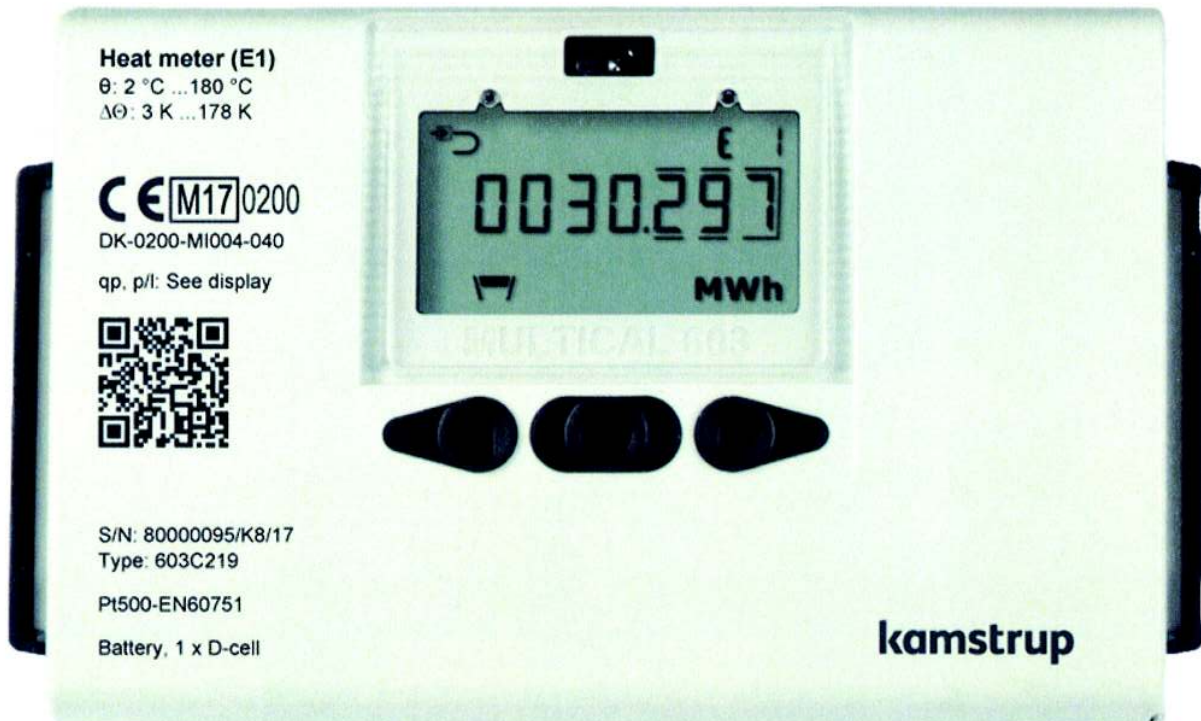
Marking:



Symbols, as an alternative to textual inscriptions, are acceptable, if explained in the installation manual.

DK-0200-MI004-040

Photos of MULTICAL® 603



Informative Annex

Integrated functions not subject to the Measuring Instruments Directive:

Integrated bi-functional Heat/Cooling function

The MULTICAL® 603 is type tested as Heating, Cooling and as bi-functional Heating/Cooling energy meters according to EN 1434-4:2015.

On this basis, the energy meter is national type approved for Cooling according to the Danish law¹, System designation TS 27.02 012.

The integrated bi-functional Heating/Cooling function can therefore be utilized under the operating conditions as described in this certificate.

The meter is type tested in the temperature differential range $\Delta\Theta_{\min} - \Delta\Theta_{\max}$: 2 K...178 K and can be used as so.

Alternative energy units for use outside the EU

The calculator is also available with configuration as to register thermal energy in Gcal.

Re-verification

Re-verification of the calculator as a heat meter or as a cooling meter is allowed, due to the extended type test.

Calibration of intelligent flow sensors through the calculator

The calculator facilitates password-protected adjustment of intelligent flow sensors via serial data, whereby the subassemblies calculator and flow sensor commonly is calibrated and adjusted as a compact meter in the laboratory, if the calculator and flow sensor have the same serial number.

¹ BEK No. 1178 of 06/11/2014, Ordinance on metrological control of meters used for measuring consumption of cooling energy in district cooling systems and central cooling systems as amended by BEK. No. 549 of 01/06/2016.