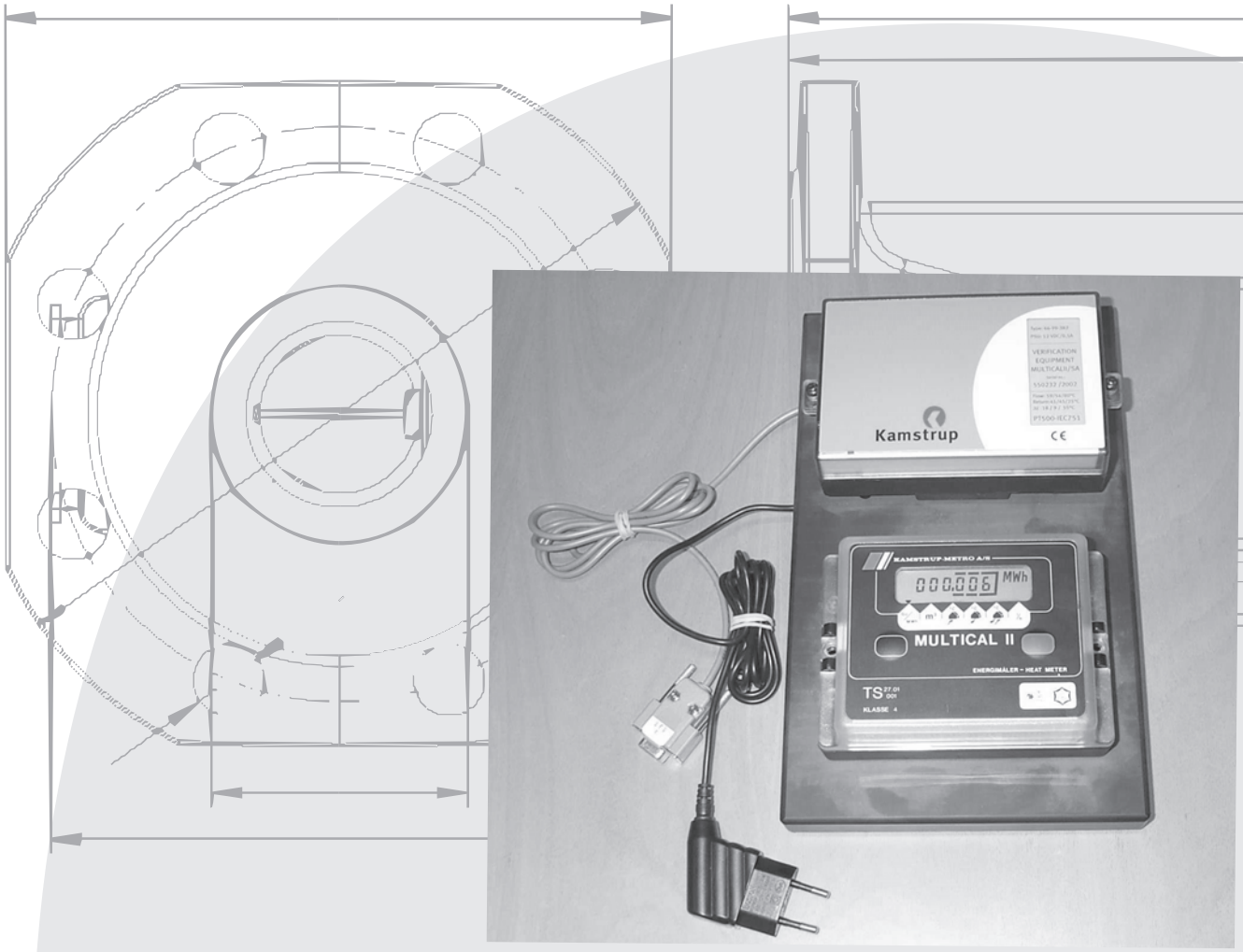
METERTOOL for MULTICAL® II/SA

User's Guide



Kamstrup

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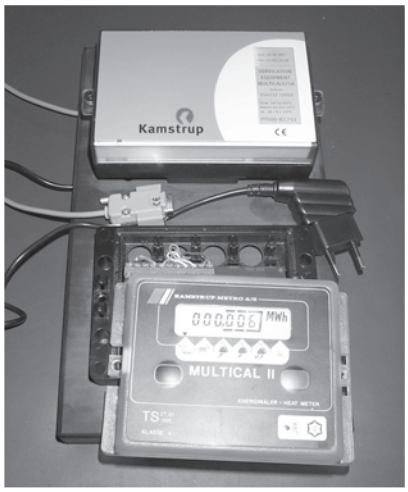
1. METERTOOL for MULTICAL® II/SA

1.1 Introduction

METERTOOL for MULTICAL® II/SA is a Windows based software, which can be installed on a PC and used to verify the calculator. METERTOOL is developed with a view to offering distributors, utilities and laboratories a simple and effective access to reading logging data and verification of the calculator.

This program cannot be used for programming or reconfiguration of MULTICAL® II/SA. If programming or reconfiguration is necessary, please contact Kamstrup A/S.

This software cannot operate MULTICAL® II/SA where the addressable function is activated. Please contact Kamstrup A/S for further instructions.



1.2 PC and Printer Requirements

METERTOOL is suitable for installation under Windows 95/98/NT/2000 on Pentium based PC's with min. 16 MB RAM, 15 MB free hard disk and VGA monitor of min. 640 x 480. Recommended 800 x 600 or higher.

In order to install the program, the PC must be supplied with a 680 MB CD-drive.

To facilitate verification of MULTICAL® II/SA the verification equipment type 66-99-382 between the calculator and PC is used.

The program can be set up to use the PC's COM1...8.

Meanwhile, the program can be used for printing certificates for MULTICAL® II/SA. The printer must be compatible with Windows.

The printer is connected to the computer's parallel port, LPT1.

1.3 Installing of Software

Please check that the computer has min. 15 MB free space on the hard disk, e.g. by means of Windows File Manager. Close all active Windows programs before installing the program.

Insert the CD into the drive and follow the program's instructions as they appear on your screen.

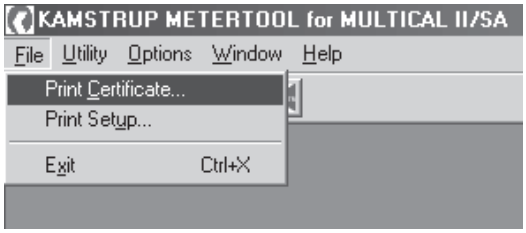
When the installation is completed, the icon "METERTOOL" will appear in the start menu.
Path: Start/Program/Kamstrup METERTOOL/ MULTICAL® II/SA.
Double click on the new icon "MULTICAL® II/SA" to start the program.

Please note: The program will only print certificates, if the correct printer has been installed..

1.4 Connecting MULTICAL® II/SA to PC

The connection can only be obtained by means of verification equipment, e.g. type 66-99-382.

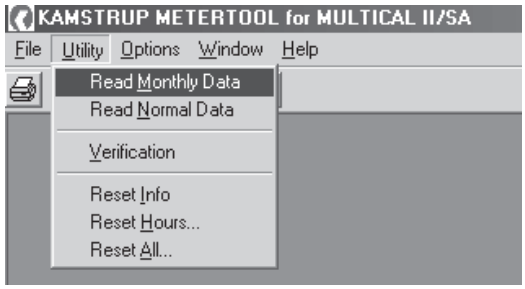
If the computer is equipped with a 25-pole COM-plug, a 9M/25F adapter type 66-99-120 must be used.



Under the menu "File" one of the following functions can be selected:

Print Certificate	Starts printing a test certificate. Advanced menu should be used to change the text on the certificate.
Print Setup	Printer setup for printing certificates.
Exit	Terminates METERTOOL.

1.6 Utility



This menu gives access to the following dialog boxes:

Read Monthly Data	Retrieves monthly data from the meter. Data can be saved as a .csv-file.
Read Normal Data	Retrieves normal data from the meter. Data can be saved as a .csv-file.
Verification	Test/Verification of calculators (see paragraph 2).
Reset Info	Resets Info code.

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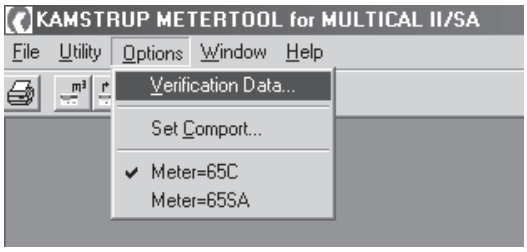
Reset Hours Resets operating hour counter.

Reset All Resets all registers and readings.

1.7 Options



The menu has a few settings which are not used very often:

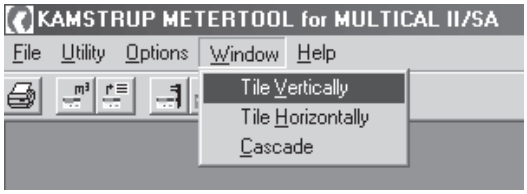
Verification data See paragraph 2. Verification via METERTOOL.

Set COMPort Indicates the selection of COM1...8.

Meter=65C Select meter type.

Meter=65SA Select meter type.

1.8 Window



Tile Vertically Positions open program menus vertically.

Tile Horizontally Positions open program menus horizontally.

Cascade Makes it possible to shift between displays, if several program parts are activated.

1.9 Help

Help Index By activating the F1 key it is possible to get help to the active menu.

About Shows type number together with numbers and revisions of both program and database.

2. Verification via METERTOOL

Equipment description

Verification equipment type 66-99-382 is used for testing and verification of MULTICAL® II/SA calculator. The test includes volume and temperature simulation.

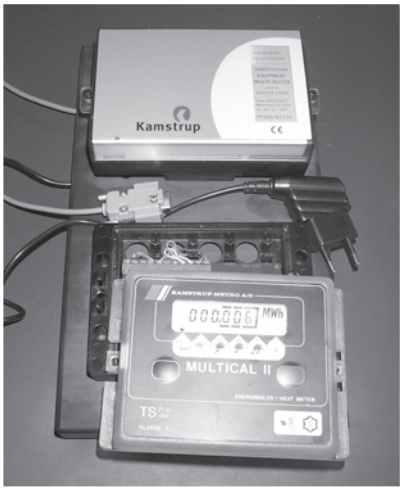
Different temperatures for both sensor inputs are simulated and, together with the volume simulation, form the basis of verification of the energy calculation.

The equipment is primarily designed for use in laboratories which test and verify energy meters, but it can also be used to test the operation of the calculator.

The computer program METERTOOL type 66-99-211 is used for test and verification.

All data communication between the computer and the calculator is transmitted via the computer's serial ports; COM 1...8, which are connected to the verification equipment. Please note that the equipment must be supplied via the associate mains adapter.

Verification does not comprise temperature sensors and flow parts.



66-99-382	t_F [°C]	t_R [°C]
Standard	59	41
	54	45
	80	25

2.1 Function

Verification equipment type 66-99-382 is mounted in a standard MULTICAL® base and contains battery, connection PCB, verification PCB, microprocessor, control relays and precision resistors.

During testing the calculator is supplied by the battery. The verification PCB is supplied via the associate external mains adaptor with 12 VDC. The microprocessor simulates the volume based on pulse frequency and the number of pulses per test point, which have been selected in METERTOOL. Temperature is simulated by means of permanent precision resistors which are changed automatically via relays controlled by the microprocessor.

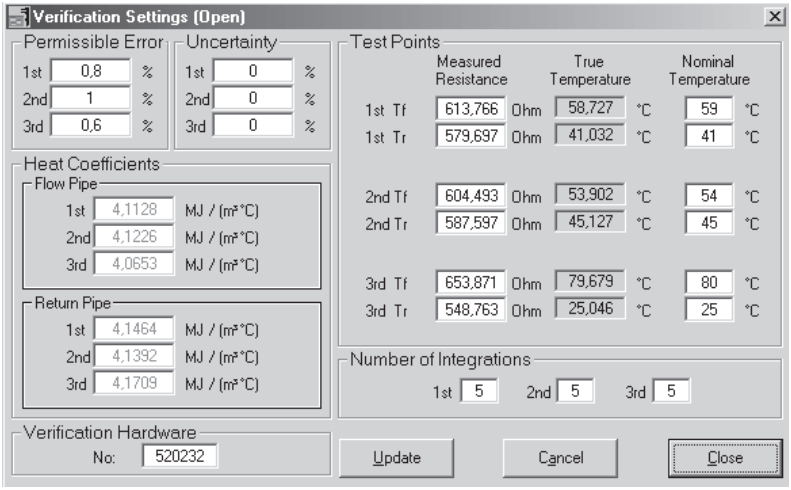
After testing the computer reads all registers in the calculator and compares the values with the calculated values.

Deviation, determined for each test point – shown as a percentage – can be stored in the computer under the serial number of the tested MULTICAL® II/SA.

Up to 99 results can be stored at each serial number.

Stored test data can be printed on a certificate.

2.2 Verification Data



The first time METERTOOL and the verification equipment are used, a number of calibration data must be entered under the menu "Verification data". As these data are of crucial importance for the verification result, they are protected by a password which can only be disclosed by Kamstrup A/S.

Permissible error and uncertainty

Max. permissible error, indicated as a percentage, and the equipment's measuring uncertainty must be indicated under each of the three verification points; 1st, 2nd and 3rd. The "permitted error" minus "uncertainty" will be indicated as MPE on the verification certificate.

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Heat coefficient in flow and return

When the calibration values for the temperature simulators are entered into the program, it automatically calculates the true k-factor, according to the formula in EN 1434.

Test points

The test points 1st, 2nd and 3rd are determined by the size of the temperature simulation resistances fitted in the test equipment. The rated temperature points are indicated in the table in paragraph 2.

Measured resistance

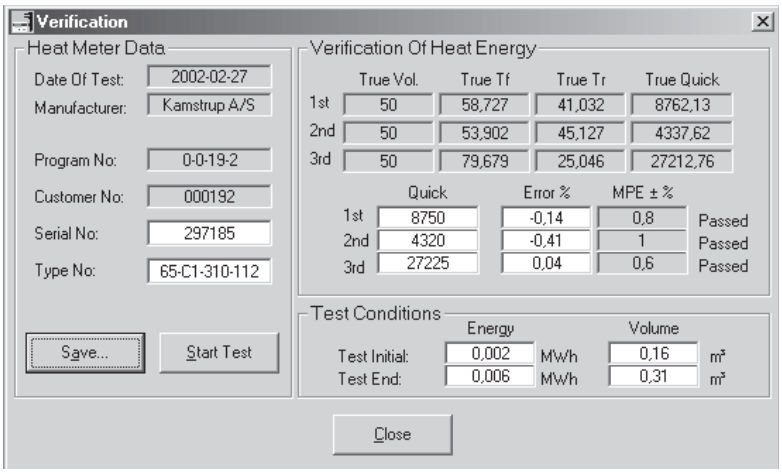
In order to update the temperature simulators' calibration, the temperature resistances' latest measured resistance values are entered. A calibration sheet with declaration of measured resistance values for all simulators is supplied by Kamstrup A/S together with the verification equipment. The temperature simulators must be calibrated at Kamstrup A/S at least once a year.

Enter number of integrations

Enter the number of integrations required at each test point in this field. If the programming number is e.g. YY=19, 1000 volume pulses must be received for each integration corresponding to 0.01 m³. In case of doubt please see the YY-table in paragraph 3.3.

2.3 Verification

This software cannot operate MULTICAL® II/SA where the addressable function is activated. Please contact Kamstrup A/S for further instructions.



All necessary information can be transmitted directly from the calculator via serial data transmission, which simplifies verification. Before test or verification can be started, a control must be made to confirm that all verification data are correct and that the correct meter type is selected in the "Option" menu box. The procedure is started by clicking on "Start test".

In some MULTICAL® II's the Quick Figure cannot be read automatically due to MULTICAL® II being too old (revision). A message box will then appear and request manual input of the Quick Figures after each test.

The duration of the test is between one and five minutes depending on the configuration of the flow input (YY) of the meter.

When the test is completed, the results are shown on the monitor. If the results can be approved, click on "Save" and all verification data will be stored in the data base under the calculator serial number. It is possible to save up to 99 verification results under each serial number.

If a printed certificate with the test results is desired, select "Print" from the "File" menu.

2.4 Maintenance

Verification equipment type 66-99-382 is designed to work a number of years with a minimum of maintenance. The following must, however, be executed frequently in order to secure optimal operation:

Recalibration

On delivery, a calibration certificate is enclosed issued by Kamstrup A/S. The applied calibrated resistance values must be entered under "Verification data". The equipment must be recalibrated at least once a year.

Change of connection PCB

The connection print (in the base of the MULTICAL® II) must be changed with regular intervals as the connection pins for the calculator top will wear down in time - depending on how often it is applied. Under normal circumstances the PCB should be replaced for every 500 verified calculators (type 5550-596).

Kamstrup

CERTIFICATE OF CALIBRATION

Verification Equipment for MULTICAL® / MULTICAL® Compact / PICOCAL

Customer: **Kamstrup**

Type No.: **66-99-382** Type of meter: **MULTICAL II/SA**

Serial No.: **550232**

Procedure: Kamstrup A/S No.: 5509-405 QI

Test equipment:

DMM, Datron 1271 Kamstrup A/S No.: 14-021-010

Standard resistor, Vishay RTB 10 Kamstrup A/S No.: 14-061-020

This certificate provides traceabilty of measurement to recognised national/international standards.

Expanded Uncertainty: ± 15 ppm
(Coverage factor k=2)

Measurements:

		Nominal temperature [°C]	Nominal resistance [ohm]*	Measured resistance [ohm]	Calculated temperature [°C]*
T1	tF	59	614,290	**613,766**	58,727
	tR	41	579,635	**579,697**	41,032
T2	tF	54	604,682	**604,493**	53,902
	tR	45	587,352	**587,597**	45,127
T3	tF	80	654,484	**653,871**	79,679
	tR	25	548,673	**548,763**	25,046

*According to IEC 751/EN 60751 Amendment 2, 1995-07 "Industrial platinum resistance thermometer sensors"

Date: **2002-02-21** Calibrated by: **JDO** Tamb.: **22,7** °C

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3. Data & Coding

3.1. Data format MULTICAL®II readings:

Monthly data:

Energy	Water	Info/hour
6 ascii	6 ascii	6 ascii
1 string Actual data		

Normal data:

Meter No.	Energy	Water	T_{flow}	T_{return}	T_{diff}	Flow	Info	Hours
6 ascii	6 ascii	6 ascii	6 ascii	6 ascii	6 ascii	6 ascii	6 ascii	6 ascii
1 string Actual data and 11 strings Monthly data								

3.2 Data format MULTICAL®SA readings:

Monthly data:

Energy	Water	Water1	Water2	Info/hour
6 ascii	6 ascii	6 ascii	6 ascii	6 ascii
1 string Actual data and 11 strings Monthly data				

Normal data:

Meter No.	Energy	Water	T_{flow}	T_{return}	T_{diff}	Flow	Water1	Water2	Info	Hours
6 ascii	6 ascii	6 ascii	6 ascii	6 ascii	6 ascii	6 ascii	6 ascii	6 ascii	6 ascii	6 ascii
1 string Actual data										

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3.3 Table of flow (YY)-coding

Standard YY-coding for MULTICAL® II/SA										
YY	Pre-	Number of decimals displayed					l/pulse	Pulse/l	Qn	Type no.
no.	counter	MWh	m³	GJ	l/h	pulse/min.				
0	10	3	2	2	-	0	1	1	1-30	
1	4	3	2	2	-	0	2.5	0.4	1.5-30	
2	1	3	2	2	-	0	10	0.1	2.5-30	
3	1	2	1	2	-	0	25	0.04	6-300	
4	10	2	1	1	-	0	10	0.1	2.5-300	
5	10	1	0	1	-	0	25	0.04	60-3000	
6	1	2	1	1	-	0	100	0.01	25-300	
7	1	1	0	1	-	0	250	0.004	60-3000	
8	1403	3	2	2	0	-	0.007128	140.3	0.6	GWF
9	957	3	2	2	0	-	0.010449	95.7	1.0	GWF
10	646	3	2	2	0	-	0.015479	64.6	1.5	GWF
11	404	3	2	2	0	-	0.024752	40.4	1.5/2.5	HM/GWF
12	502	3	2	2	0	-	0.01992	50.2	1.5/2.5*	GWF
13	2350	2	1	1	0	-	0.042553	23.5	3.5/6*	GWF
14	712	2	1	1	0	-	0.14044	7.12	10/15*	GWF
15	757	3	2	2	0	-	0.01321	75.7	1.0*	GWF
16	3000	3	2	2	0	-	0.00333	300.0	0.6*	GWF
17	269	3	2	2	0	-	0.037174	26.9	1.5	Brunata
18	665	3	2	2	0	-	0.015037	66.5	1.5	Aquastar
19	1000	3	2	2	0	-	0.01	100.0	0.6/1.5	HM/UF/UF II
20	1000	2	1	1	0	-	0.1	10.0	15	UF II
21	294	3	2	2	0	-	0.034013	29.4	2.5	HM
22	1668	3	2	2	0	-	0.005995	166.8	0.6	HM
23	864	3	2	2	0	-	0.011574	86.4	0.75/1*	HM
24	522	3	2	2	0	-	0.019157	52.2	2.5/1.5*	CG/HM
25	607	3	2	2	0	-	0.016475	60.7	1.5/1*/1.5*	HM
26	420	3	2	2	0	-	0.023809	42.0	1.0/2.5*	CG/HM
27	2982	2	1	1	0	-	0.033534	29.82	2.5/3.5*	HM
28	2424	2	1	1	0	-	0.041254	24.24	3.5*	HM
29	1854	2	1	1	0	-	0.053937	18.54	2.5*/6*	HM
30	770	2	1	1	0	-	0.12987	7.7	10*	HM
31	700	2	1	1	0	-	0.14285	7.0	15*	HM
32	366	3	2	2	0	-	0.027322	36.0	2.5	Wehrle
33	604	3	2	2	0	-	0.016537	60.47	1.5	Wehrle
34	1230	3	2	2	0	-	0.008126	123.05	0.6	Wehrle
35	1600	2	1	1	0	-	0.0625	16.0	10*	HM
36	500	3	2	2	0	-	0.02	50	3	UF
37	2500	2	1	1	0	-	0.04	25	6/10	UF/UF II
38	1000	1	0	0	0	-	1	1		
39	256	3	2	2	0	-	0.03906	25.6	1.5/2.5	GWF
40	1280	2	1	1	0	-	0.078125	12.8	3.5/5.0	GWF
41	1140	2	1	1	0	-	0.087719	11.4	6	GWF
42	400	2	1	1	0	-	0.25	4	10	GWF
43	320	2	1	1	0	-	0.3125	3.2	10/15	GWF
44	1280	1	0	0	0	-	0.78125	1.28	25/40	GWF
45	640	1	0	0	x1000	-	1.5625	0.64	60	GWF
46	128	1	0	0	x1000	-	7.8125	0.128	125	GWF
51	5000	2	1	1	0	-	0.02	50	3/3.5	UF II

*** Multi jet flow meter**

Special YY-coding for MULTICAL® II/SA										
YY no.	Pre-counter	Number of decimals displayed MWh	m³	GJ	l/h	pulse/min.	l/pulse	Pulse/l	Qn	Type no.
47	1000/1536	1	0	0	x10	-	1	1	18/30/45/75	Sonocal
48	400/384	1	0	0	x100	-	2.5	0.4	120/220/300	Sonocal
49	1000/154	0	x10	x10	x1000	-	10	0.1	450/750/1200	Sonocal
50	2000/768	x10	x100	x100	x1000	-	50	0.02	1800/2400/3000	Sonocal
52	1194	2	1	1	0	-	0.083752	11.94	10*	GWF
53	1014	2	1	1	0	-	0.098619	10.14	15*	GWF
89	1	1	0	0	0	-	1000	0.001	60-3000	
90	10	3	2	2	0	-	1.0	1	1-30	
91	4	3	2	2	0	-	2.5	0.4	1.5-30	
92	1	3	2	2	0	-	10	0.1	2.5-30	
93	4	2	1	2	0	-	25	0.04	6-300	
94	10	2	1	1	0	-	10	0.1	2.5-300	
95	40	1	0	1	0	-	25	0.04	60-3000	
96	1	2	1	1	0	-	100	0.01	25-300	
97	4	1	0	1	0	-	250	0.004	60-3000	

*** Multi jet flow meter**

3.4 Table of display unit coding (X)

Program WXYYZ	Energy unit heat meter	Resolution of Water1/Water2 inputs (MULTICAL® SA only) l/imp.
W0YYZ	MWh	10
W1YYZ	MWh	1
W2YYZ	Gcal	10
W3YYZ	Gcal	1
W4YYZ	GJ	10
W5YYZ	GJ	1
W6YYZ	MWh	100
W7YYZ	Gcal	100
W8YYZ	GJ	100

3.5 Alphabetical Register

The following alphabetical register explains the terms which appear on the monitor or compiles to the meter.

The register can be used as a reference when a question arises.

A	
AAA	Data output address
C	
Com 1...8	The computer's serial data port no. 1....8
E	
EN1434	European standard for heat meters
Energy	The total energy (e.g. in kWh)
F	
Flow	The actual flow of water meter
H	
Hours	Number of operating hours
I	
Info	Actual info code
Instr. number	The serial number of the meter
K	
Kat. no.	The meter's type number contains information on power supply, data module, sensor type, pick-up unit and language on the front label
M	
Meter no.	Customer no./serial no.
MPE	Maximum Permissible Error
P	
Print Certificate	Starts printing the calibration certificate
Program Number	The meter's program number =WXYYZ-UU states selected data output, energy selection, pulse counter, flow meter installation and display reading
Q	
Quick	(Qsum) High resolution measuring unit for heat energy
S	
Start test	This command is used to start the automatic verification sequence
T	
Test initial	Registers the value before verification
U	
UU	Displays code which indicates the display reading selected
W	
W	Configuration of data output
Water	m³ consumed
Water1	m³ consumed on input 1 (SA only)
Water2	m³ consumed on input 2 (SA only)
WXYYZ-UU	The meters program number = WXYYZ-UU
X	
X	Displays read-out unit (MWh/Gcal/GJ)
Y	
YY	Flow meter code. E.g. YY=19 is used with 100 imp/l for flow meter Q_n = 0.6 m³/h
Z	
Z	Coding for installation in flow/return flow

4. Environmentally Correct Disposal

The Kamstrup heat meter has been constructed with a view to long-term, reliable operation at the heat consumer. As we know, however, all good things come to an end, and heat meters are no exception. It must , of course, be disposed of with consideration for the environment.

Disposal by the supplier
Kamstrup accepts MULTICAL® II for environmentally correct disposal according to previous agreement.
The disposal is free of charge to the customer, who must, however, pay for the transportation costs to Kamstrup A/S.

Disposal by the customer
The lithium battery must be removed from the meter*) and sent to separate, approved destruction. It must not be possible to short-circuit the lead-in wires to the battery during transportation.

– If small quantities of meters are dismounted, the energy meter without battery can be handed in for industrial scrapping or for combustion with subsequent metal recycling.

– In case of dismounting a large number of heat meters, the parts must be separated, sorted and handed in for separate destruction and recycling as described in below-mentioned list.

Please direct any questions you may have concerning environmental matters to:

Kamstrup A/S
Att.: Quality Control Dept.
Fax: +45 89 93 10 01
E-mail: energi@kamstrup.dk

Part	Information on materials	Recommended disposal
Lithium battery in MULTICAL® II/SA - D-cell	Lithium and Thionyl-cloride >UN 3091< - D-cell: 4.9 g lithium	Approved destruction of lithium cells
PC boards in MULTICAL® II/SA (LC-display and electrolytic capacitor are removed)	Copper epoxide laminate with soldered components	PC board scrap for concentration of noble metals
LC-display	Glass and liquid crystals	Approved scrap centre for LC-displays
Electrolytic capacitor	Can contain PCB	Approved destruction of electrolytic capacitors
Cables for flow meters and sensors	Copper with PVC- or silicone mantle	Cable recycling
Plastic parts, cast	Noryle and ABS	Plastic recycling
Packing	Recycled cardboard/styrofoam	Cardboard/styrofoam recycling

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