METRIMA

SVM MF4

Calculator for mixed fluids (-20ºC to +150ºC)

Data sheet

Application field

MF4 is a flexible calculator for different water mixtures (e.g. water and glycol mixture). There are different types of MF4, for mixtures such as 25, 30, 35 or 40 wt% ethylene glycol, see also the conversion table for other mixtures.

The calculator is for 2/4-wire method temperature sensors and can easily be set for 4-wire method by removing jumpers. The flow pulse setting is freely selectable in the range 0.0001-9999 [l/p]. MF4 is dedicated for billing applications and therefore protected with several tampering seals.

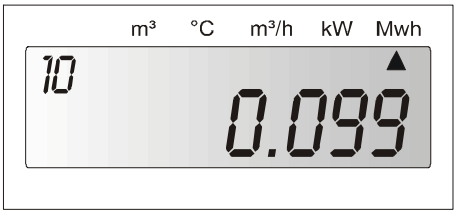
Measurement

MF4 measures the flow and the difference between the supply and return temperatures. Measurements are normally done for each flow sensor pulse.

Display and data access

MF4 is equipped with a 7+2 digit LCD (Liquid Crystal Display). From the display measured and historical values, calculator settings and messages, can be read.

The data is easily accessed through a push-button on the front of the calculator.



Example of a display image, showing accumulated energy.

Communication

The calculator is ready for system integration, with several different ways to communicate electronically.

Pulse inputs and outputs

MF4 is equipped with two pulse inputs and the pulses are accumulated into two pulse registers. The pulse input rate is selectable upon ordering. The data can be retrieved either on the display or using M-Bus communication.

MF4 is also equipped with two pulse outputs, energy and volume. The outputs are of the type “open-collector”. Every time the last significant digit on the display is incremented then one pulse is emitted (energy, pulse output 1 and volume, pulse output 2).

M-BUS output

MF4 is equipped with a M-Bus communication protocol as standard. This protocol is in accordance with international European standard EN1434-3, EN60870-5. Data can be accessed using two-wire connection or/and optical interface. The standard baud rate is 300 baud however the calculator can also be ordered in 2400 baud on request.

Displayed data

Accumulated values
- ❑ Accumulated energy
- ❑ Accumulated volume
- ❑ Accumulated calculated volume
- ❑ Accumulated pulses “pulse input 1”
- ❑ Accumulated pulses “pulse input 2”

Momentary values
- ❑ Momentary power
- ❑ Momentary flow
- ❑ Supply (H=High) temperature
- ❑ Return (L=Low) temperature
- ❑ Temperature difference

Calculator settings
- ❑ Total operating time
- ❑ Time
- ❑ Date
- ❑ Selected pulse value
- ❑ Flow sensor placing (H/L)
- ❑ Calculator S/N number
- ❑ Communication, primary address
- ❑ Communication, secondary address (S/N)

Calculator messages
- ❑ Error code
- ❑ Total error time
- ❑ Accumulated time for this error
- ❑ Preceding error code
- ❑ Recommended date for battery replacement

Historical values

Historical values are stored at the end of each month or period for account days. There are 37 monthly registers + 2 account days in the calculator.
- ❑ Accumulated energy
- ❑ Accumulated volume
- ❑ Accumulated calculated volume
- ❑ Accumulated pulses “pulse input 1”
- ❑ Accumulated pulses “pulse input 2”
- ❑ Error code at saving

Service / Installation

MF4 has a built-in service/Installation function that enables the user to change calculator settings using the push-button. Following settings can be modified:
- ➢ Time
- ➢ Date
- ➢ Account day 1
- ➢ Account day 2
- ➢ Communication, primary address
- ➢ Flow sensor placing, high or low temperature (H/L)
- ➢ Recommended date for battery replacement
- ➢ Reset error time
- ➢ Exit service menu

MF4 can also be parameterized using a special PC-program “FlexServ”.

Delivery

MF4 is delivered in transport mode, only the built-in real time clock is active. In this mode, power consumption is at its minimum.

Technical data

Flow sensor	
Frequency	Max. 12 Hz
Pulse length	Min. 40 ms
Voltage	Max. 3V
Cable length	Max. 15m
Pulse value acceptable	0.0001 – 9999 l/p
Temperature sensors	
Approved and matching pairs type Pt100 are to be used.	
Max cable length (two wire method)	Min cable area
2.5 m	0.22 mm^2
5.0 m	0.50 mm^2
7.5 m	0.75 mm^2
Sensor current	4 µA (RMS) for Pt100

Temperature	
Range	-20 – 150ºC
Difference	2 – 120 K
Ambient temperature	
Operation	5ºC – 55ºC
Storage/transport	-20ºC – 70ºC

Protection	
Class	IP54
Environmental class C according to EN1434	
Power supply	
Battery	3V – 2.75 Ah*
Mains	230 V ± 10%, 45-65 Hz
Battery as backup	

* Operation time max. 10 years.

Display	
7 + 2 digits LCD (backlight as option)	
Pulse Outputs	
Type	Open collector
Pulse length	250 ms
Voltage	Max. 30 V
Current	Max. 20 mA
Pulse inputs	
Frequency	Max. 12Hz
Pulse length	Min. 40 ms
Voltage	Max. 3V
Alarm output	
One pulse every hour as long as a mains power is cut (only mains supplied calculators).	
Type	Open collector
Pulse length	250 ms

M-Bus	
Complies with EN1434-3 and EN60870-5	
Two-wire connection	Standard
Optical interface	Enabled

Option boards

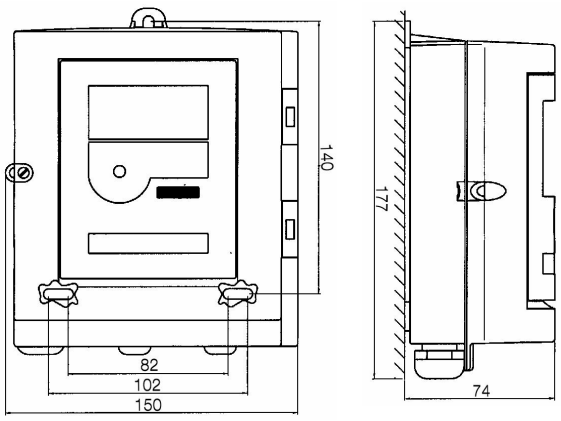
The option boards available for MF4 are:

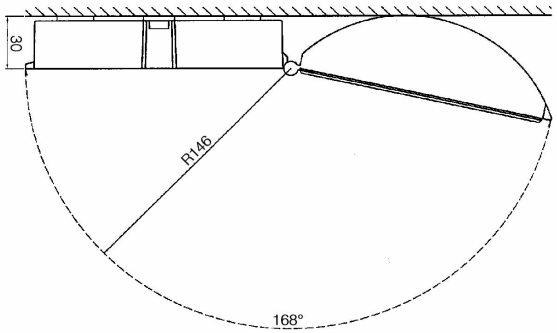
- Relay option board (FCRC)
- Galvanic isolated M-Bus (FCR2)
- U2500 board (FCU2)
- RS232/M-Bus (FC2N)*
- FTT-10

* Only mains supplied MF4

Dimensions and mounting

All dimensions are in [mm]. MF4 has to be wall mounted.





MF4 Article number key

By combining the letters in the table below the correct article number is acquired for MF4.

M4 ABCDEFGHIJ KLM

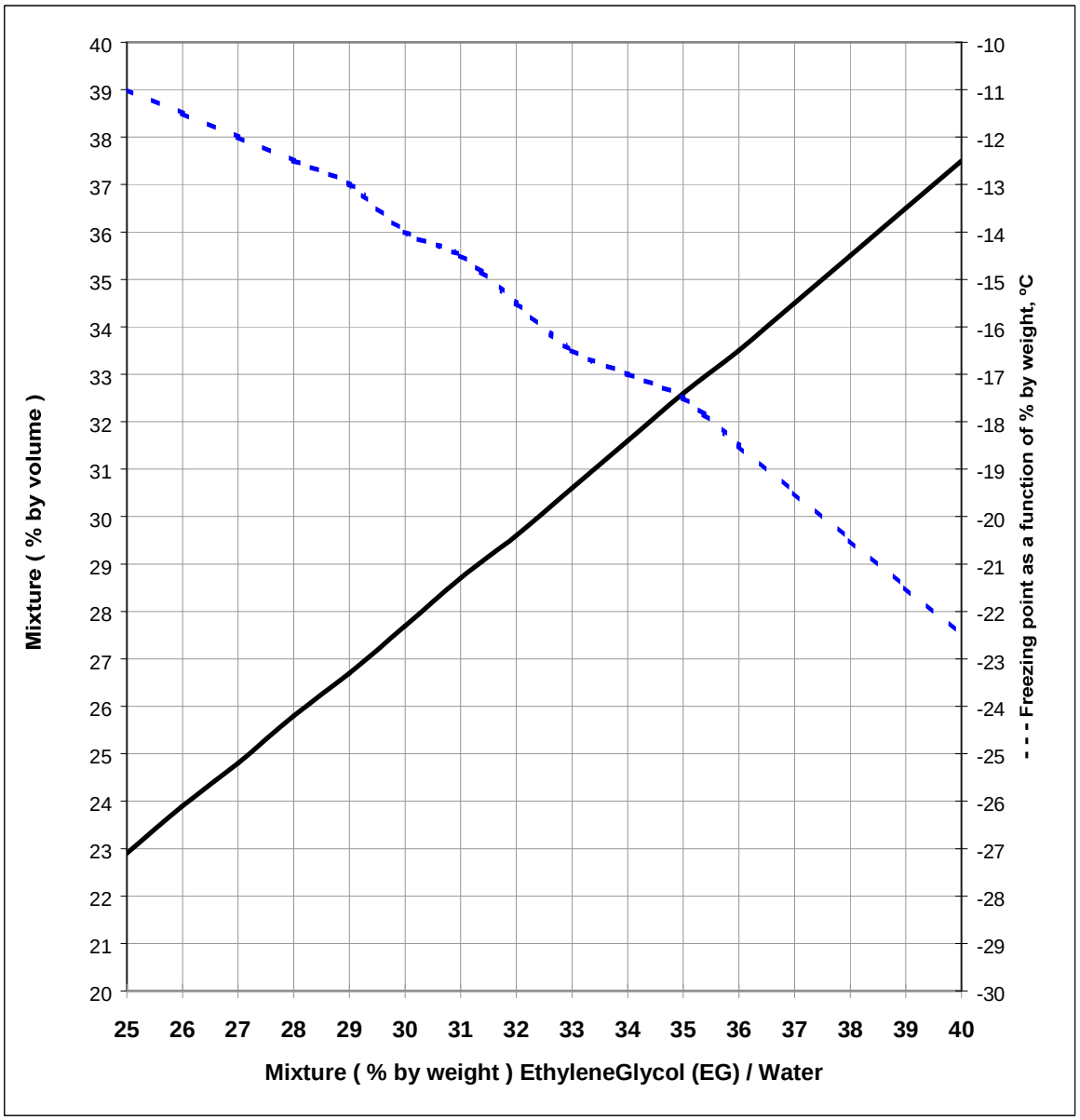
A	3	Pt100 2/4-wire method, measuring in the low temp
A	4	Pt100 2/4-wire method, measuring in the high temp
B	1	Battery supplied
B	3	Mains supplied 230V (with battery backup)
C	0	The pulse value is specified in text following the order
C	1	Pulse value 2.5 l/p
C	2	Pulse value 25 l/p
C	3	Pulse value 250 l/p
C	4	Pulse value 2500 l/p
C	5	Pulse value 1 l/p
C	6	Pulse value 10 l/p
C	7	Pulse value 100 l/p
C	8	Pulse value 1000 l/p
D	0	KWh [m^3 kW m^3/h]
D	1	MWh [m^3 kW m^3/h]
D	2	GJ [m^3 kW m^3/h]
D	3	MBTU [m^3 kW m^3/h]
D	4	MBTU [kUSG kW USG/m]
E	2	25 w.p., ethylene glycol, extra information at the order, e.g. costumer info..
E	3	30 w.p., ethylene glycol, extra information at the order, e.g. costumer info..
E	4	40 w.p., ethylene glycol, extra information at the order, e.g. costumer info..
E	5	35 w.p., ethylene glycol, extra information at the order, e.g. costumer info..
F	A	Extra pulse inputs, 2.5 l/p (+ pulse outputs), dec. 2
F	B	Extra pulse inputs, 25 l/p (+ pulse outputs), dec. 1
F	C	Extra pulse inputs, 250 l/p (+ pulse outputs), dec. 0
F	D	Extra pulse inputs, 2500 l/p (+ pulse outputs)
F	E	Extra pulse inputs, 1 l/p (+ pulse outputs), dec. 3
F	F	Extra pulse inputs, 10 l/p (+ pulse outputs), dec. 2
F	G	Extra pulse inputs, 100 l/p (+ pulse outputs), dec. 1
F	H	Extra pulse inputs. 1000 l/p (+ pulse outputs), dec. 0
G	0	Backlight, with active Opto and M-Bus
G	1	No backlight, active opto and M-Bus
H	0	Wall mounting
I	1	Standard
J	1	Standard
KLM	X	Country Code (300 = standard English, 100 = Swedish)

Article number key for MF4

To acquire the article number just fill in the blanks

M4	A	B	C	D	E	F	G	H	I	J	KLM
								0	1	1	

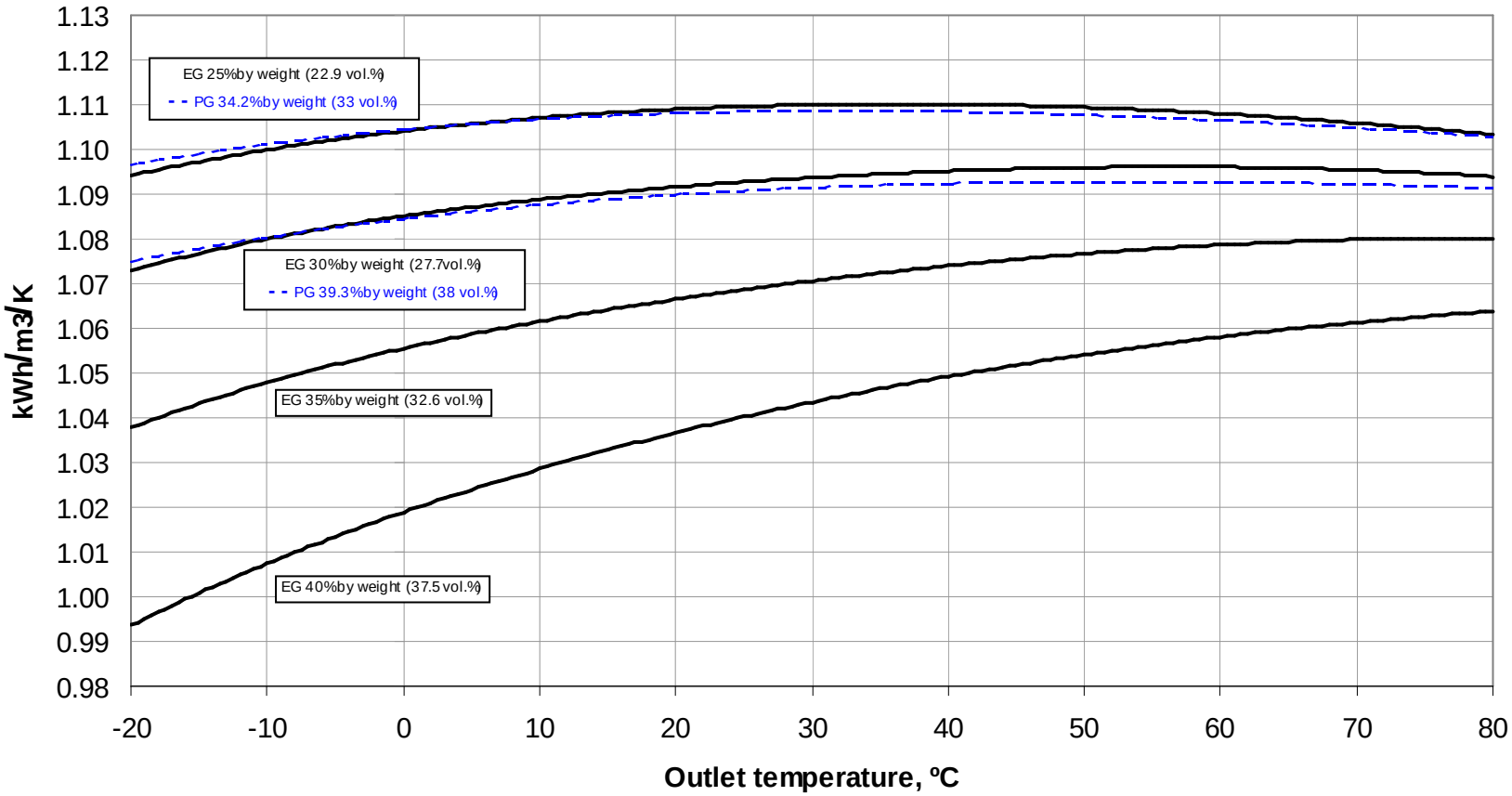
Conversion tables, MF4 Calculator for mixed fluids (-20ºC to +150ºC)



Heat coefficient, K, at ΔT = 20ºC for various Glycol mixtures

EG = Ethylene Glycol, e.g Antifrogen N

PG = 1.2 Propylene Glycol, e.g Antifrogen L



Systematical error (%) to add for various mixtures.

(Relative EG 30% by weight)

Temperature Inlet / Outlet (°C)	**3 / 0**	**23 / 20**	**43 / 40**	**10 / 0**	**20 / 10**	**60 / 40**	**90 / 40**
Temperature difference (K)	**3**	**3**	**3**	**10**	**10**	**20**	**50**
EG 20% by weight (18.1 vol%)	-3	-2.5	-2	-2.5	-2.5	-2	-2
EG 25% by weight (22.9 vol%)	-1.5	-1.5	-1	-1	-1	-1	-1
EG 40% by weight (37.5 vol%)	+1.5	+5.5	+4.5	+6	+6	+4	+4.5
Antifrogen N, 30% by volume (32.4 weight%)	+3	+2	+2	+2	+3	+3	+4
Antifrogen N, 40% by volume (42.6 weight%)	+5	+5	+5	+5	+5	+5	+4
Antifrogen L, 40% by volume (41.3 weight%)	+1	+1	+1	+0.5	0	+0.5	0
1.2 PropyleneGlycol 50% by weight (48.7 vol%)	+4	+4.5	+4.5	+7	+6	+4	+3.5
PKL 30	-2	-5	-6	-3	-3	-6	-7
PKL 40	+2.5	+2	+1	+1.5	+2	+1	0
Ethyl alcohol 15% by weight	-10	-14			-10		
Ethyl alcohol 25% by weight (≈ 30 vol%)	-2.5	-5.5			-4		
CalciumCloride 15% by weight	+3			+3	+3		
CalciumCloride 25% by weight	+8			+8	+8		
Water 100%	-7	-6	-5.5	-7	-7	-5	-4.5

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