

Two-phase frost protection thermostats, with active and switching output

Electronic frost protection thermostat / frost monitor **THERMASREG® FS** with continuous and switching output, fully active sensor rod made of copper, additional control input 0-10 V and summation output 0-10 V, optional with or without display. The frost sensor is used for monitoring air conditioning systems, heat exchangers, heating registers and similar equipment preventing frost damage and freezing up. The sensor can detect when the temperature falls below the limit value at the coldest measuring point of the capillary tube. In case of capillary breakage, power failure, or electrical damage at the device, the frost protection monitor's relay automatically switches to frost. Mounting clamps **MK-05-K** are included in the delivery.

FS

TECHNICAL DATA

Power supply:	24 V AC / DC
Load resistance:	$R_L > 5 \text{ k}\Omega$
Measuring range:	0...+15 °C
Output:	1 x 0-10 V (equivalent to 0...+15 °C) 1 x 0-10 V summation output (frost signal and control voltage) 1 x potential-free changeover contact (24 V), setting range 0...+15 °C
Current consumption:	max. 10 mA at 24 V DC
Accuracy:	$\pm 1 \text{ K}$ (at +10 °C)
Hysteresis of switching step:	2 K
Switch-on / start-up time:	< 1 min
Response time:	$t_{90} < 5 \text{ s}$
Sensor and capillary:	copper, active over the entire sensor length, min. 25 cm
Temperature: (Sensor and capillary)	-20...+60 °C (capillary tube at a distance > 20 cm away from enclosure)
Ambient temperatures:	maximum operating temperature: +70 °C (+158 °F) minimum operating temperature: w + min. +2 °C (min. +3.6 °F) storage / transport: -30...+70 °C (-22...+158 °F)
Ambient temperature: (Enclosure)	-15...+50 °C
Enclosure:	plastic, material polyamide, 30 % glass-globe-reinforced, with quick-locking screws (slotted / Phillips head combination), colour traffic white (similar to RAL 9016)
Enclosure dimensions:	126 x 90 x 50 mm (Tyr 2)
Cable gland:	M 16 x 1.5; including strain relief, exchangeable, max. inner diameter 10.4 mm
Process connection:	by mounting clamps MK-05-K (included in the scope of delivery)
Electrical connection:	0.14 - 1.5 mm ² via terminal screws
Humidity:	< 95 % r. H., non-precipitating air
Protection class:	III (according to EN 60 730)
Protection type:	IP 65 (according to EN 60 529)
Standards:	CE conformity, electromagnetic compatibility according to EN 61 326, EMC directive 2014 / 30 / EU

For further information and accessories see next page...





NEW

S+S REGELTECHNIK

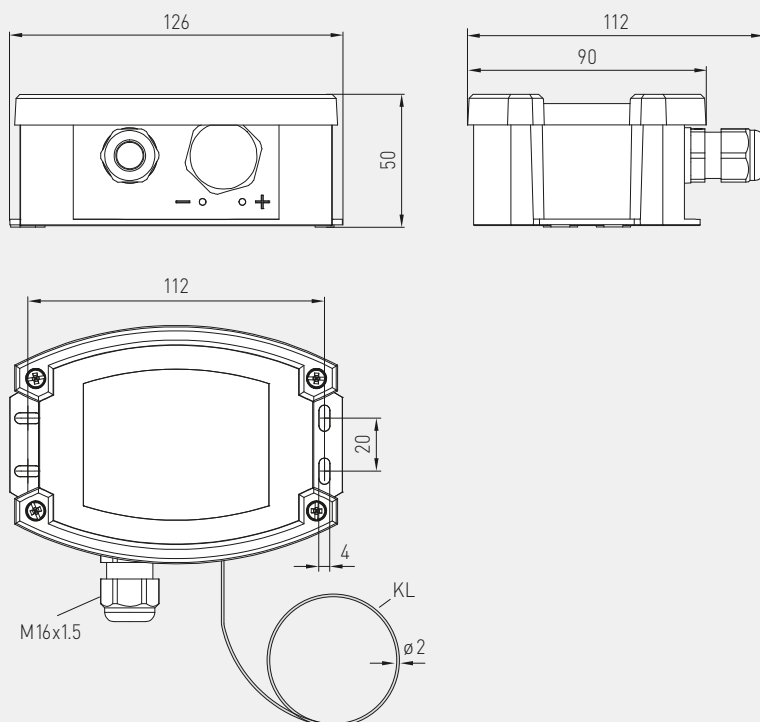
THERMASREG® FS

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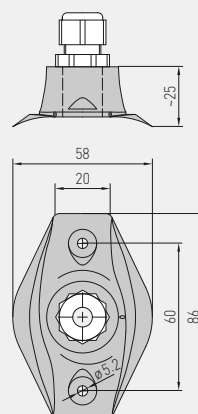
Dimensional drawing

FS



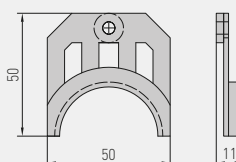
Dimensional drawing

KRD-04



Dimensional drawing

MK-05-K



WS-03

Sunshade and weather protection
(optional)



MK-05-K



KRD-04



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FUNCTION

The filling used in the copper capillary tube in the frost protection monitor generates a pressure signal that is proportional to the lowest temperature on the entire capillary tube (but min. 200mm). This is converted into an electrical signal by a sensor and electronically amplified. The standard signal 0-10V generated as a result corresponding to 0...+15°C is issued. This voltage is available at the "Temp." terminal. In addition, a 270° control knob can be used to specify a switchpoint for the potential-free changeover contact in the range from 0°C (left limit stop) to +15°C (right limit stop). If this switchpoint "FS" is undershot, the relay output switches to the "Frost protection" position (contact "6" connected to contact "5"). If the temperature rises by more than 2K above the set switchpoint "FS", the device switches back to normal operating mode if "automatic mode" is selected. The relay drops out to the initial position (contact "6" connected to contact "7").

If the "manual operation" operating mode was selected, the relay output does not automatically switch even if the set switchpoint "FS" +2K is exceeded, but must be manually reset using the "Reset" button or by disconnecting the device from the operating voltage.

In addition, a second voltage output "AV", mapped by 0-10V, is available. At a voltage of 0V at the control input "ST-E", the output voltage "AV" is always 0V if the measured temperature is at least 6K above the set switchpoint "FS". If the measured temperature falls below the set switchpoint "FS" +6K, the voltage output "AV" increases in a linear fashion from 0V to 10V. The increase here amounts to 1.67 V for every degree Kelvin by which the temperature approaches the preset switchpoint "FS". The output voltage 10V is therefore issued at "FS" = measured temperature. If you increase "ST-E", the output voltage "AV" is increased by this amount. The "AV" output therefore represents a summation output for the input variables "ST-E" and "Frost signal". In this case, the "Frost signal" variable describes the output behaviour of "AV" at "ST-E" = 0V. The maximum output voltage is restricted to 10V.

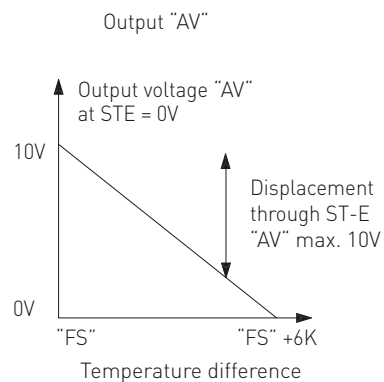
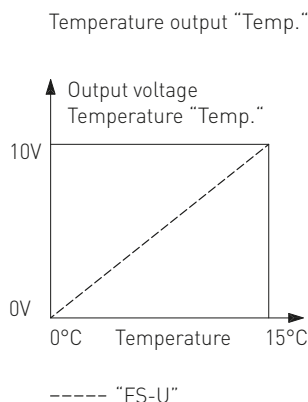
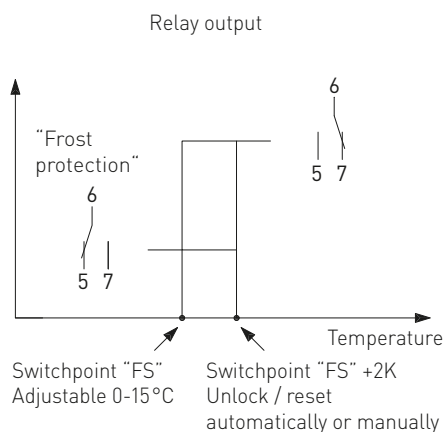
In case of capillary breakage or electrical damage to the device, the relay output automatically switches to "Frost protection" (contact "6" connected to contact "5").

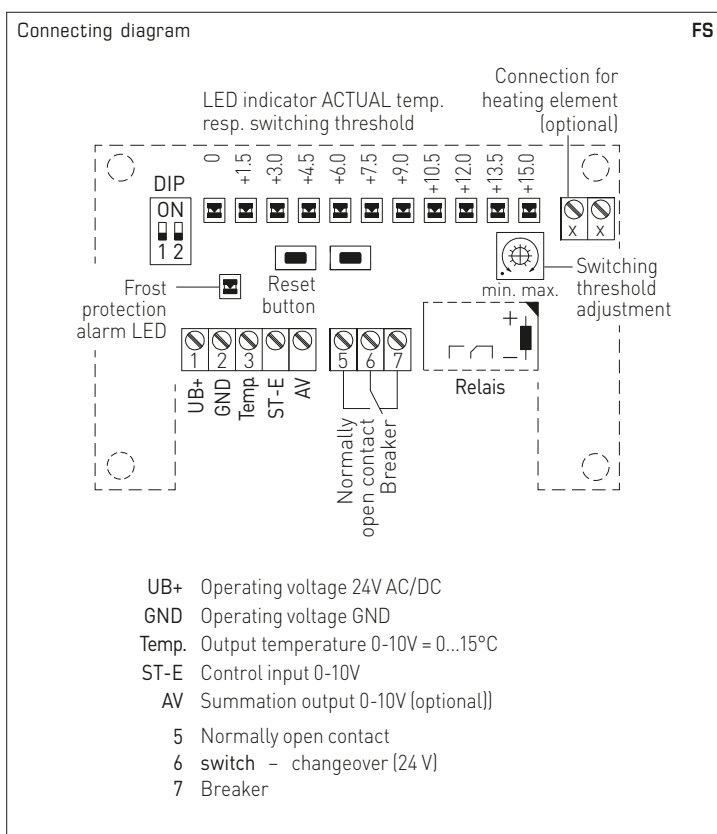
FS



Function

FS





Reset after frost protection (selectable)	DIP 1
manual	ON
automatic	OFF

Temperature Range (selectable)	DIP 2
(not assigned)	ON
0...+15 °C	OFF

LED indication of ACTUAL temperature or switching threshold in °C											
Measuring Range	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7	LED 8	LED 9	LED 10	LED 11
0...+15 °C	0	+1.5	+3.0	+4.5	+6.0	+7.5	+9.0	+10.5	+12.0	+13.5	+15.0

THERMASREG® FS – Two-phase frost protection thermostats					
Type / WG02	Measuring Range	Output	Sensor Length	Item No.	Price
FS		(standard)			
FS1-U	0...+15 °C	2 x 0-10 V, 1 x changeover contact	3.0 m	1102-1012-0102-000	200,94 €
FS2-U	0...+15 °C	2 x 0-10 V, 1 x changeover contact	6.0 m	1102-1011-0102-000	238,68 €
Accessories					
KRD-04	Capillary tube gland bracket			7100-0030-7000-000	7,52 €
MK-05-K	Mounting clamps (6 pieces) plastic (included in the scope of delivery)			7100-0034-1000-000	8,33 €
WS-03	Sunshade and weather protection, 200 x 180 x 150 mm, stainless steel			7100-0040-6000-000	37,74 €
For further information see last chapter!					