

TEMPERATURCONTROLLERE



FROSTBESKYTTELSE

Frost protection thermostats, mechanical, one-step, with switching output

The mechanical frost protection thermostat / frost monitor **THERMASREG® FST** with switching output, fully-active sensor rod, with automatic reset, or with mechanical locking and manual reset, is available with capillaries in lengths of 0.6 m, 1.8 m, 3 m, 6 m, or 12 m. This frost protection monitor is used for air- and water-side temperature monitoring at heat exchangers, water circulation systems, and heating registers to prevent freezing up and to avoid frost damages, e. g. in ventilation and air conditioning ducts. All devices are self-secure with sensor breakage detection. In case of damage to the capillary tube – membrane system, the relay automatically switches to heating function. **FST-3** can also be used for monitoring liquids. The sensor tube can be installed inside an immersion sleeve. Mounting clamps **MK-05-K** are included in the delivery.

FST-1D/5D/7D/8D



FST-3D



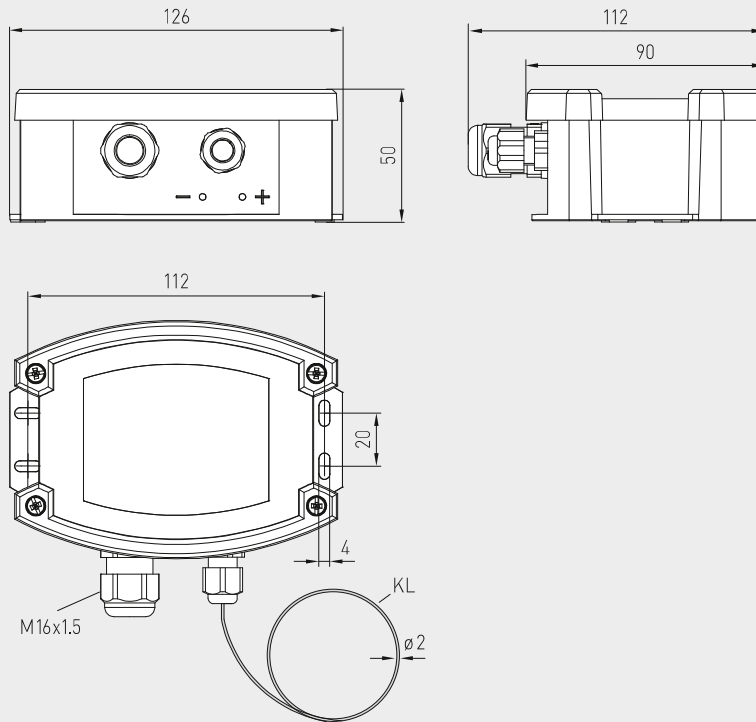
TECHNICAL DATA

Switching capacity:	10 (2) A, AC 250 V; because of gold-plated switching contacts also switching of signal voltages < 24 V
Setting range:	–10...+15 °C / +14 °F...+59 °F, factory setting to $w = +5$ °C (+41 °F)
Operating difference:	2 ± 1 K (3.6 ± 1.8 °F)
Reproducibility:	± 0.5 K (± 0.9 °F)
Contact:	dust-proof micro switch as single-pole potential-free changeover contact
Sensor responding length:	approx. 40 cm
Length of capillary tube:	see table of types (0.6...12 m)
Resetting:	FST-xD automatic FST-xD-HR manual
Permissible medium:	FST-1D/5D/7D/8D air FST-3D water
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) capillary: max. +150 °C (+302 °F)
Process connection:	by mounting clamps MK-05-K (included in the scope of delivery)
Housing:	plastic, UV-resistant, material polyamide, 30 % glass-globe reinforced, with quick-locking screws (slotted / Phillips head combination), colour traffic white (similar to RAL 9016)
Housing dimensions:	126 x 90 x 50 mm (Tyr2)
Cable gland:	M16 x 1.5; including strain relief
Other materials:	mechanical sheet metal parts: galvanised steel capillary tube: copper capillary tube filling: R 507 switching contacts: Ag / Ni (90% / 10%) gold-plated (3 µm)
Installation length:	arbitrary
Routing:	bending radius > 35mm admissible vibration load $\leq \frac{1}{2}g$ admissible tensile load < 100N
Electrical connection:	0.14 - 2.5 mm ²
Protection class:	I (according to EN 60 730-1)
Protection type:	IP 65 (according to EN 60 529)
Standards:	CE conformity, EMC directive 2014 / 30 / EU, low-voltage directive 2014 / 35 / EU
FUNCTION	Contact C-2: danger of frost / sensor breakage Contact C-3: normal operation

For further information and accessories see next page...

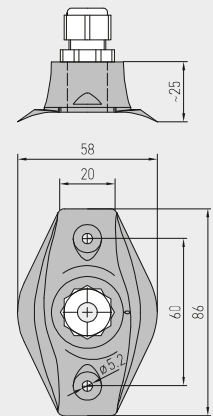
Dimensional drawing

FST -1D/5D / 7D/8D



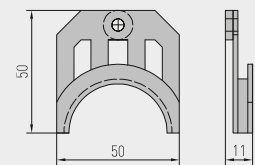
Dimensional drawing

KRD-04



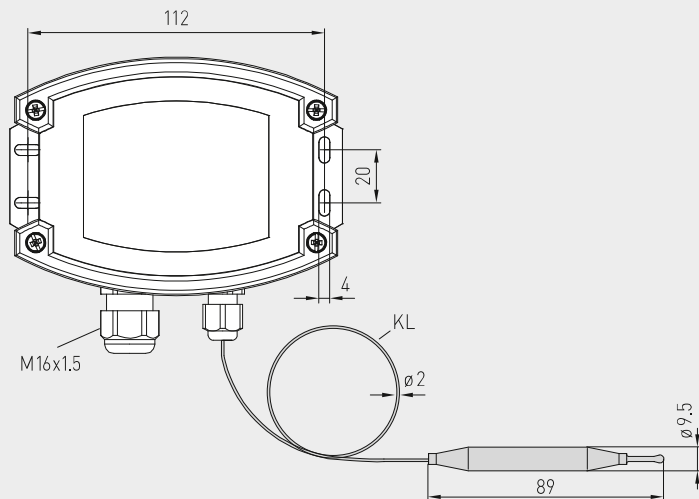
Dimensional drawing

MK-05-K



Dimensional drawing

FST-3D



MK-05-K

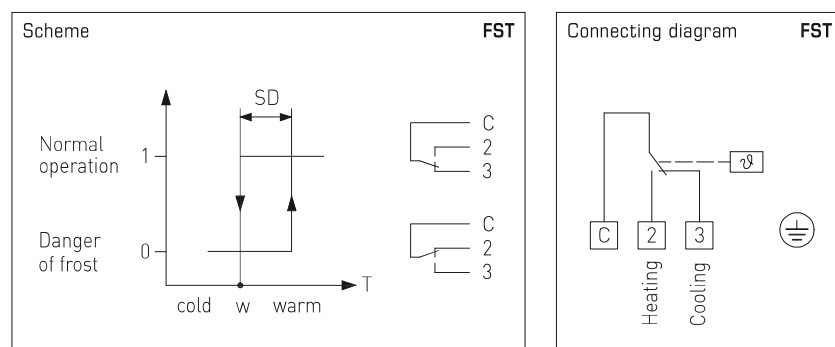


KRD-04



**Frost protection thermostats, mechanical, one-step,
with switching output**

FST - 1D / 5D / 7D / 8D - HR
(manual rest)



FUNCTION

The switch inside frost protection thermostat **FST** responds (closes contact C-2) when temperature falls below the preset temperature setpoint over a capillary tube length of at least 40 cm. Simultaneously contact C-3 breaks and can be used as a signal contact. Resetting (closing contact C-3) happens automatically when temperature rises above the preset setpoint value again (on type **FST-xR** resetting must be done manually by pressing the reset button).

The **FST** is "intrinsically safe", i.e., in the event of damage to the capillary tube-membrane system, it automatically switches to the heating function. Contact C-2 closes and therefore can be used as operating contact. The air temperature is detected over the entire sensor length (capillary tube). The gas-filled (R507) membrane system and the capillary tube constitute one measuring unit, which is mechanically coupled to the microswitch.

Capillary tube: The capillary tube is laid uniformly at the hot side of the air heater to be protected (in case of air coolers in front of the air cooler) at a distance of approx. 5 cm cross-wise to the heat exchanger tubes over the entire area. For test purposes, it is recommended to make a loop of approx. 20 cm directly underneath the housing and before entering the air duct. To avoid damaging the capillary tube, a minimum bending radius of 20 mm must be observed. Installation is facilitated by using the mounting clamps available under accessories.

Frost simulation: The frost situation can be simulated and functioning of the device can be tested by dipping the capillary tube testing loop into a pot filled with ice water.

FST-3D-HR
(manual rest)



WS-03

Weather and sun protection hood
(optional)





FST-xD
TW = temperature monitor
(automatically switching)



FST-xD-HR
TB = temperature limiter
(manual reset)



THERMASREG® FST Frost protection thermostats, mechanical

Type / WG03B	Temperature Range	Thermal Operating Difference (fixed) approx.	Length of Capillary	Permissible Medium	Item No.	Price
FST-xx D					TW	
FST-1D *	-10...+15 °C	2 K (± 1 K)	6.0 m	air	1102-1021-0102-000	83,00 €
FST-3D *	-10...+15 °C	2 K (± 1 K)	1.8 m	air / water	1102-1023-0102-000	84,69 €
FST-5D *	-10...+15 °C	2 K (± 1 K)	3.0 m	air	1102-1022-0102-000	80,74 €
FST-7D *	-10...+15 °C	2 K (± 1 K)	12.0 m	air	1102-1025-0102-000	143,07 €
FST-8D	-10...+15 °C	2 K (± 1 K)	0.6 m	air	1102-1024-0102-000	78,57 €
FST-xx D-HR					TB	
FST-1D-HR *	-10...+15 °C	2 K (± 1 K)	6.0 m	air	1102-1021-1102-000	99,71 €
FST-3D-HR *	-10...+15 °C	2 K (± 1 K)	1.8 m	air / water	1102-1023-1102-000	102,19 €
FST-5D-HR *	-10...+15 °C	2 K (± 1 K)	3.0 m	air	1102-1022-1102-000	99,36 €
FST-7D-HR *	-10...+15 °C	2 K (± 1 K)	12.0 m	air	1102-1025-1102-000	157,62 €
FST-8D-HR	-10...+15 °C	2 K (± 1 K)	0.6 m	air	1102-1024-1102-000	93,11 €
Features:	FST-x D FST-x D-HR	TW = temperature monitor (automatically switching) TB = temperature limiter (manual reset)				

ACCESSORIES

KRD-04	Capillary tube gland bracket	7100-0030-7000-000	8,49 €
MK-05-K	Mounting clamps (6 pieces) plastic (*= included in the scope of delivery)	7100-0034-1000-000	9,41 €
TH-MS-01	Immersion sleeves, brass, for FST-3	7100-0011-5402-000	14,81 €
TH-VA-02	Immersion sleeves, stainless steel V2A (1.4301), for FST-3	7100-0012-5402-000	38,80 €
WS-03	Weather and sun protection hood, 200 x 180 x 150 mm, stainless steel V2A (1.4301)	7100-0040-6000-000	42,61 €

For further information see last chapter!

**Duct frost protection thermostat,
incl. mounting flange, mechanical, one-step,
with switching output**

Mechanical frost protection thermostat/frost monitor **THERMASREG® FST-K** with switching output, duct tube monitored across the entire length, with automatic reset or with mechanical locking, with/without optional manual reset.

The frost protector is suitable for air side temperature monitoring at heat exchangers and heating registers to prevent freezing up and to avoid frost damage, e.g. in ventilation and air conditioning ducts. The FST-K is intrinsically safe and is equipped with sensor breakage detection. In the event of damage to the capillary membrane system, the frost sensor automatically switches to the heating function. The scope of delivery includes the mounting flange **MF-14-K**.

TECHNICAL DATA

Switching capacity:	10 (2) A, AC 250 V; because of gold-plated switching contacts also switching of signal voltages < 24 V
Setting range:	−10...+15 °C / +14 °F...+59 °F, factory setting to $w = +5 °C$ (+41 °F)
Operating difference:	$2 \pm 1 K$ ($3.6 \pm 1.8 °F$)
Reproducibility:	$\pm 0.5 K$ ($\pm 0.9 °F$)
Contact:	dust-proof micro switch as single-pole potential-free changeover contact
Resetting:	FST-K automatic FST-K-HR manual (by hand)
Permissible medium:	Air
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)
Housing:	plastic, UV-resistant, material polyamide, 30 % glass-globe reinforced, colour traffic white (similar to RAL 9016)
Housing dimensions:	108 x 70 x 73.5 mm (Thor 2)
Cable gland:	M 20 x 1.5; with strain relief
Process connection:	by mounting flange, plastic (included in the scope of delivery)
Electrical connection:	0.14 - 2.5 mm ² , via screw terminals
Protective tube:	metal , material CuZn37 (2.0321), Ø 14 mm, NL = 205 mm
Other materials:	mechanical sheet metal parts: galvanised steel capillary tube: copper capillary tube filling: R 507 switching contacts: Ag / Ni (90% / 10%) gold-plated (3 µm)
Protection class:	I (according to EN 60 730-1)
Protection type:	IP 65 (according to EN 60 529)
Standards:	CE conformity, EMC Directive 2014 / 30 / EU, Low Voltage Directive 2014 / 35 / EU
FUNCTION	Contact C-2: danger of frost / sensor breakage Contact C-3: normal operation
For further information and accessories see next page...	



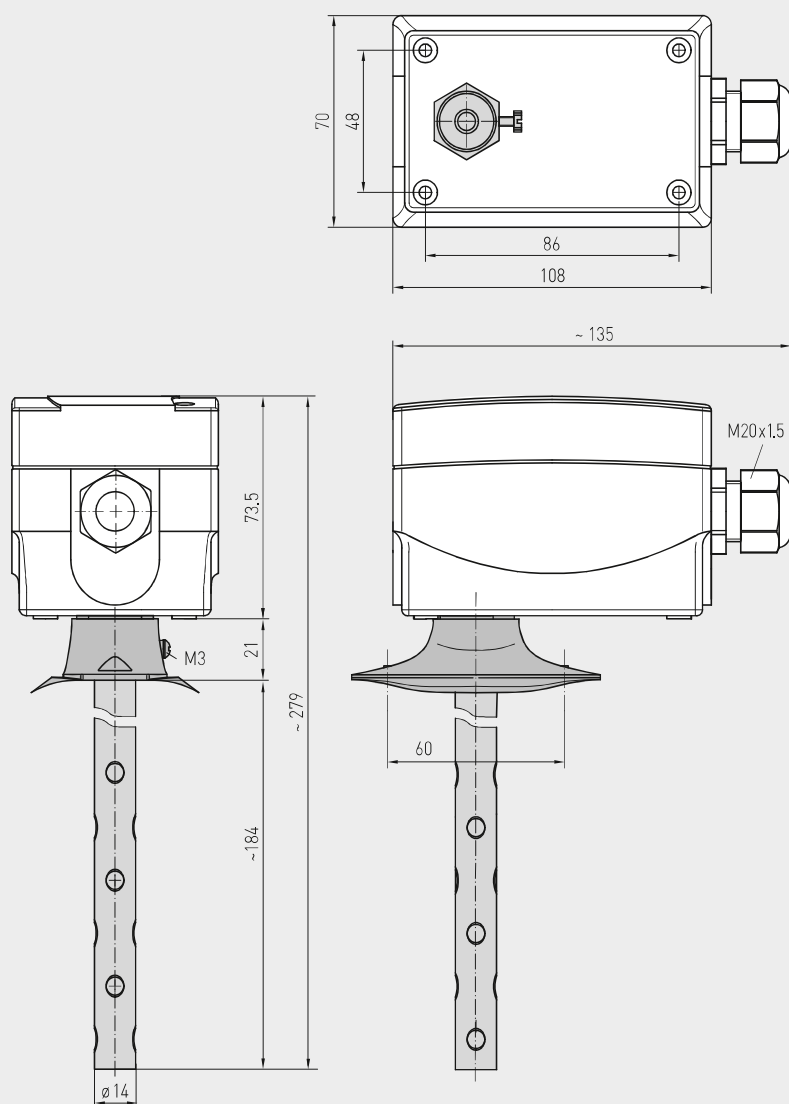
S+S REGELTECHNIK

THERMASREG® FST-K

Duct frost protection thermostat,
incl. mounting flange, mechanical, one-step,
with switching output

Dimensional drawing

FST-K



FST-K



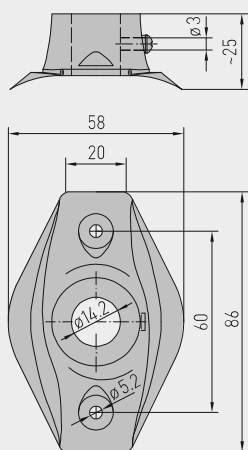
FST-K-HR
with manual reset



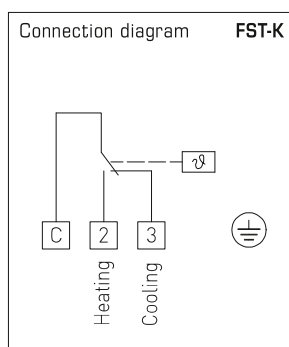
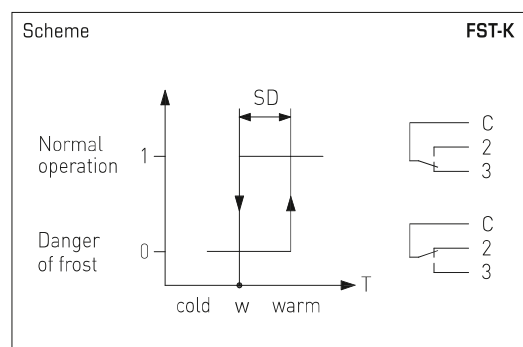
Dimensional drawing

MF-14-K

MF-14-K
Mounting flange,
plastic



Duct frost protection thermostat,
incl. mounting flange, mechanical, one-step,
with switching output



FUNCTION

The switch in the **FST-K** duct frost protection thermostat responds if the temperature across the entire length of the duct tube falls below the preset temperature setpoint (closes contact C-2). Contact C-3 opens at the same time and can be used as a signal contact. Resetting occurs automatically (contact closes C-3) if the temperature rises above the preset setpoint again (on type **FST-K-HR**, resetting must be performed manually using the reset button).

The **FST-K** is "intrinsically safe", i.e., in the event of damage to the capillary tube-membrane system, it automatically switches to the heating function. Contact C-2 closes and can therefore be used as an operating contact. The air temperature is detected over the entire length of the sensor (capillary tube). The gas-filled (R507) membrane system and the capillary tube constitute one measuring unit, which is mechanically coupled to the microswitch.



Duct frost protection thermostat,
incl. mounting flange, mechanical, one-step,
with switching output

FST-K

TW = temperature monitor
(automatically switching)



FST-K-HR

TB = temperature limiter
(manual reset)



THERMASREG® FST-K Duct frost protection thermostat, mechanical						
Type / WG02	Temperature Range	Thermal Operating Difference (fixed) approx.	Function	Permissible Medium	Item No.	Price
FST-K					TW	
FST-K	-10...+15 °C	2 K (± 1 K)	TW	air	1102-1064-0100-001	114,39 €
FST-K-HR					TB	
FST-K HR	-10...+15 °C	2 K (± 1 K)	TB	air	1102-1064-1100-000	128,95 €
Equipment:	FST-K FST-K-HR	TW = temperature monitor (automatically switching) TB = temperature limiter (manual reset)				
ACCESSORIES						
MF-14-K	Mounting flange, plastic				7100-0030-2000-000	9,10 €
For further information see last chapter!						

**2-phase frost protection thermostat,
with control and cascading input,
with active and switching output**

Electronic frost protection thermostat/frost monitor **THERMASREG® FS-20** with switching relay output, continuous temperature and valve output (summation output 0–10V) and control and cascading output (0–10V), optionally with connection for heating element, in an impact-resistant plastic housing with quick-locking screws, with display by default, with fully active sensorrod made from copper.

The frost monitor is used to monitor air conditioning systems, heat exchangers, heating registers and similar systems, and protects against frost damage and freezing. Falling below the limit value is detected at the coldest measuring point of the capillary tube, the sensor rod is active along its entire length. Uses internal diagnostics to detect capillary breakage, power failure or electric damage to the sensor as an error and the relay automatically switches to frost.

The innovative 2-phase frost protection thermostat enables simple combination of several devices (cascading) for demand-oriented, comprehensive frost monitoring. The delivery scope includes the mounting clamps **MK-05-K** for expert attachment of the sensor rod.

FS-20



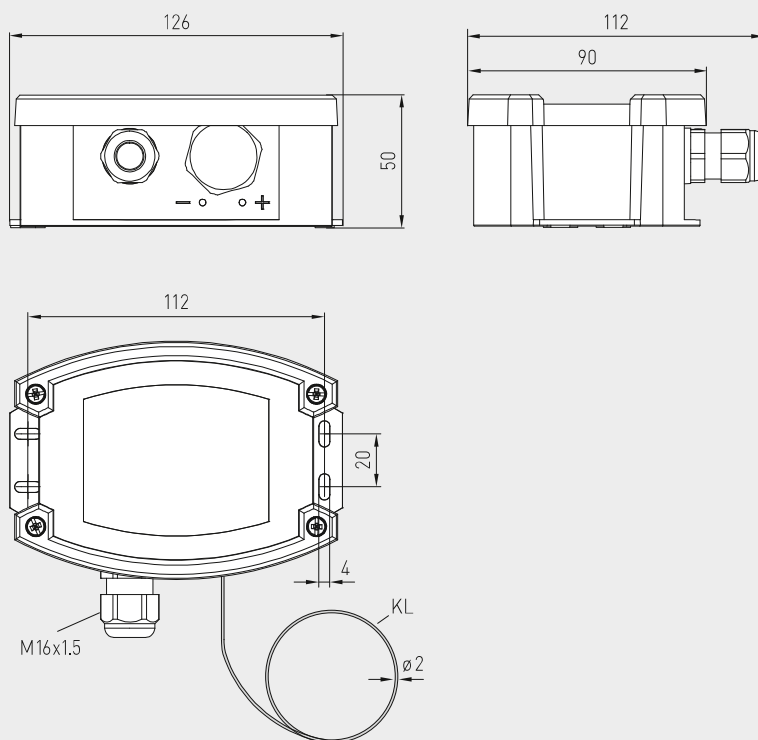
TECHNICAL DATA

Power supply:	24 V AC / DC (± 10 %)
Load resistance:	$R_L > 50 \text{ k}\Omega$
Measuring range:	0...+15 °C
Input:	1 x 0-10 V control input DDC 1 x 0-10 V cascading input
Output:	1 x 0-10 V output temperature (corresponding to 0...+15 °C) 1 x 0-10 V output valve (frost signal with control voltage and cascading) 1 x potential-free changeover contact (24 V), range of adjustment 0...+15 °C
Current consumption:	max. 100 mA at 24 V DC (FS-20 without heating element) max. 200 mA at 24 V DC (FS-20 xx HE with heating element)
Accuracy:	typically ± 1 K (at +10 °C)
Hysteresis of the switch step:	2 K
Turn-on/run-in time:	< 1 min
Response time:	$t_{90} < 5 \text{ s}$
Sensor and capillary tube:	Copper sensor rod, length of 3 m or 6 m, active along the entire sensor length, min. response length of 25 cm
Ambient temperatures:	Sensor and capillary tube: –20...+60 °C (capillary tube at a distance of > 20 cm from the housing) Housing: –15...+50 °C Storage/transport: –30...+70 °C
Housing:	plastic, UV-resistant, material polyamide, 30 % glass-globe reinforced, with quick-locking screws (slotted / Phillips head combination), colour traffic white (similar to RAL 9016), housing cover for display is transparent!
Housing 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 MMK-05-K (included in the scope of delivery)
Electrical connection:	0.14 - 1.5 mm², via screw terminals
Routing:	bending radius > 35 mm admissible vibration load ≤ ½g admissible tensile load < 100 N
Permitted 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
Equipment:	display with illumination , three-line, cutout approx. 70 x 40 mm (W x H), for displaying the actual temperature, measuring range overrange/underrange of the set switch point (frost protection temperature), and alarm indicator for "frost" or "error" (capillary breakage, overvoltage/undervoltage)
Internal diagnostics:	Error 1 in case of cable / capillary breakage Error 2 in case of undervoltage / overvoltage (relay automatically switches to frost)



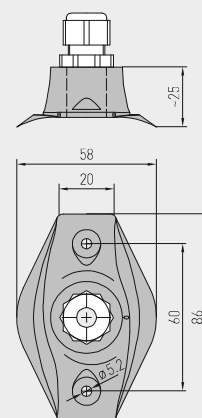
Dimensional drawing

FS-20



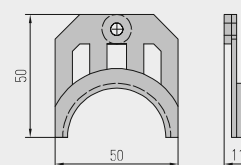
Dimensional drawing

KRD-04



Dimensional drawing

MK-05-K



WS-03

Weather and sun protection hood
(optional)



MK-05-K



KRD-04



2-phase frost protection thermostat, with control and cascading input, with active and switching output

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. 200 mm). This is converted into an electrical signal by a sensor and electronically amplified. The standard signal 0-10 V generated as a result corresponding to 0...+15°C is issued. This voltage is available at the "Temp." terminal.

The internal potentiometer can be used to specify a **frost switchpoint** "FS" 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 "W" connected to contact "Ö"). If the temperature rises by more than 2 K above the set switchpoint "FS", the device switches back to normal operating mode if **"Reset Auto"** is selected. The relay drops out to the initial position (contact "W" connected to contact "S"). If the **"Reset Hand"** operating mode is selected, the relay output does not automatically switch even if the set switchpoint "FS" +2 K is exceeded, but must be manually reset from the **reset button**.

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

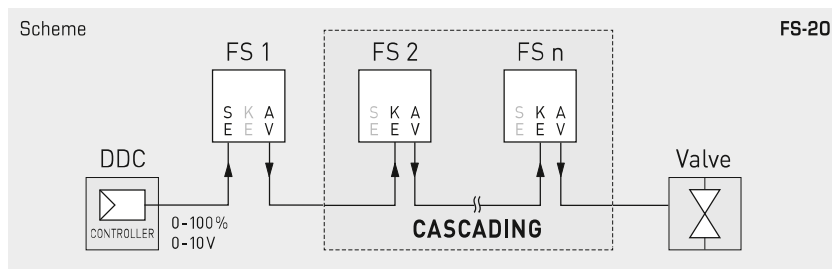
Several frost protection devices can be connected to each other via the **cascading input** "KE" to cover a larger channel cross-section for frost monitoring. The AV output of the first device is connected to the KE input of the second device. The internal device logic decides on the priority frost signal of both devices for controlling the heating register valve.

In the event of capillary breakage, electrical sensor damage (cable breakage), voltage failure, falling short of the permissible voltage level or exceeding it, the relay output is automatically switched to "Frost protection" (contact "W" connected to contact "Ö").

NOTE

The capillary tube must be securely seated in the socket and must not twist.

A redundant setup to protect critical systems is **absolutely necessary**.



Display readout

FS-20



Normal operation

Actual temperature and
set switchpoint temperature



Frost protection alarm

Actual temperature is
below switchpoint temperature



Measuring range exceeded

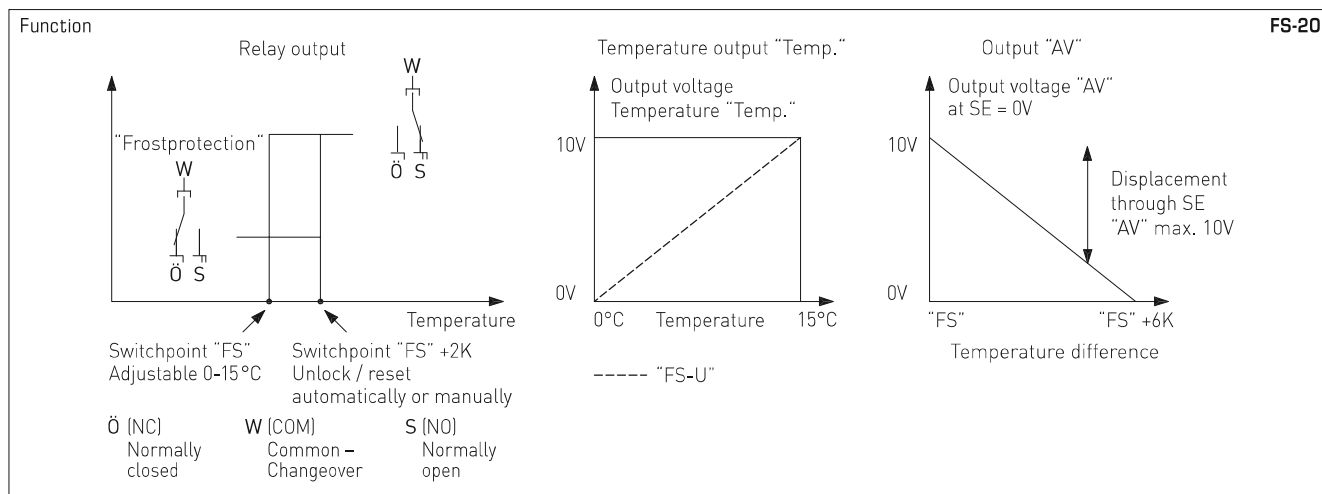
Actual temperature rises
above +15°C



Measuring range underranged

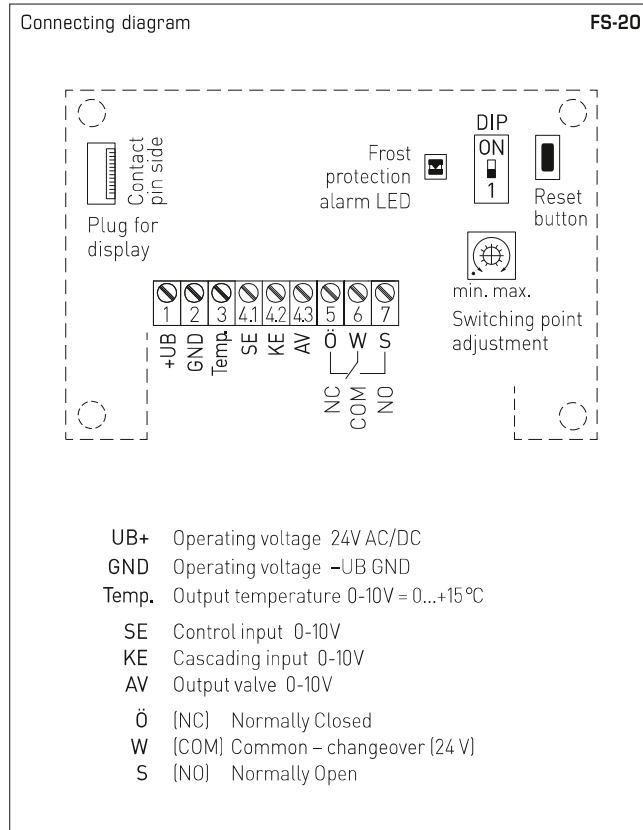
Actual temperature falls
below 0°C

- 1**
ERROR Error message 1
in case of cable/
capillary breakage
- 2**
ERROR Error message 2
in case of undervoltage/
overvoltage





2-phase frost protection thermostat,
with control and cascading input,
with active and switching output



DIP switch	FS-20
Resetting after frost protection (Mode adjustable)	DIP 1
Reset Hand (manually) Alarm remains saved	ON
Reset Auto (automatically) Alarm is reset automatically (default)	OFF

THERMASREG® FS-20 Two-phase frost protection thermostats						
Type/WG02	Measuring Range	Output	Sensor length	Display	Item No.	Price
FS-20						
FS20-UW 3m LCD	0...+15°C	2 x 0-10 V, 1 x changeover contact	3,0m	■	1102-1012-2102-030	243,83 €
FS20-UW 6m LCD	0...+15°C	2 x 0-10 V, 1 x changeover contact	6,0m	■	1102-1011-2102-030	286,44 €
FS-20 xx HE with heating element						
FS20-UW-HE 3m LCD	0...+15°C	2 x 0-10 V, 1 x changeover contact	3,0m	■	1102-1012-2112-030	265,36 €
FS20-UW-HE 6m LCD	0...+15°C	2 x 0-10 V, 1 x changeover contact	6,0m	■	1102-1011-2112-030	309,02 €
ACCESSORIES						
KRD-04	Capillary tube gland bracket				7100-0030-7000-000	8,49 €
MK-05-K	Mounting clamps (6 pieces) plastic (included in the scope of delivery)				7100-0034-1000-000	9,41 €
WS-03	Weather and sun protection hood, 200 x 180 x 150 mm, stainless steel V2A (1.4301)				7100-0040-6000-000	42,61 €
For further information see last chapter!						

Temperature controller for top hat rail installation for remote sensor, with multi-range switching and switching output

S+S REGELTECHNIK

Electronic top hat rail thermostat / top hat rail temperature controller **THERMASREG® TET** for installation in distributor boxes or control cabinets, with switching output, multi-range switching, and adjustable hysteresis. It is used for electronic control and monitoring of temperatures by remote sensors in the residential sector (e.g. in connection with floor heating systems), in halls and greenhouses and in the industrial sector.

This controller is provided with sensor breakage detection and a switch-off function.

TECHNICAL DATA

Power supply:	24 V DC, +10 % / -15 %; 24 V AC or 230 V AC, +10 % / -15 %, 50 - 60 Hz
Power consumption:	2.5 VA
Control range:	-10...+30 °C; +20...+80 °C; +60...+120 °C, selectable
Input:	Pt1000
Output:	relay as single-pole, potential-free changeover contact (1x)
Switching capacity: (Contact load)	max. 6 A 250 V AC U _e / I _e AC-15, 120 V / 3.5 A, 240 V / 3 A U _e / I _e DC-13, 24 V / 2.5 A EN 60947-5-1, VDE 0435
Operating Difference:	adjustable
Lifetime:	changeover contact mechanical: 5 x 10 ⁶ changeover contact electrical: 1 x 10 ⁵
Ambient conditions:	-20...+60 °C, non-precipitating air
Operating mode indicator:	LED
Housing:	plastic, colour black-grey (similar to RAL 7021) and light grey (similar to RAL 7035), width: 45 mm, 3TE
Electrical connection:	0.14 - 2.5 mm ² via terminal screws
Mounting:	on DIN top hat rail
Humidity:	< 90 % r. H., non-precipitating air
Protection class:	II (according to EN 60 730)
Protection type:	IP 20 at front side (according to EN 60 529)
Standards:	CE conformity, electromagnetic compatibility according to EN 61 326, EMC directive 2014 / 30 / EU, low-voltage directive 2014 / 35 / EU

FUNCTION

The range of interpretation is selected at the lower potentiometer.

Three measuring ranges can be chosen: -10...+30 °C; +20...+80 °C; +60...+120 °C.

The temperature to be monitored is determined by the potentiometer »Setpoint« and the switchpoints (hysteresis) are defined at the potentiometer »Hyst.«

When temperature at the Pt1000 exceeds the value of »Setpoint + Hyst.«, the output relay switches to rest position (switched off).

When temperature falls below »Setpoint - Hyst.«, the output relay is reactivated.

The following conditions result in a drop of the relay to rest position:

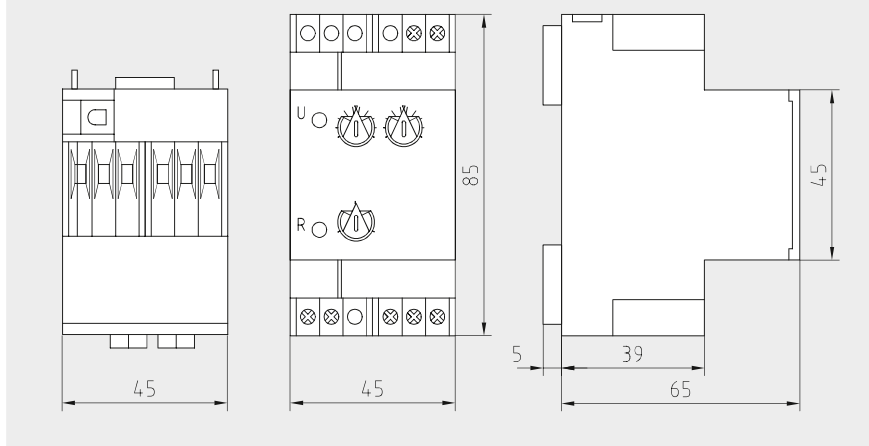
Excess temperature, short circuit, or wire breakage at the Pt 1000 sensor, failure of power supply.

Measuring input and power supply have no electric connection i.e. are galvanically isolated.

Dimensional drawing

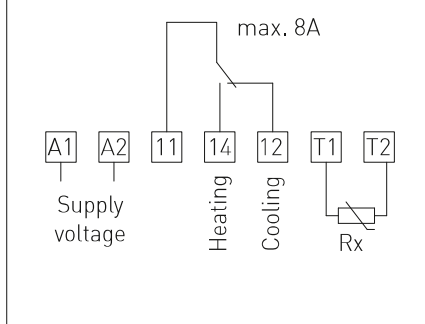
TET

TET



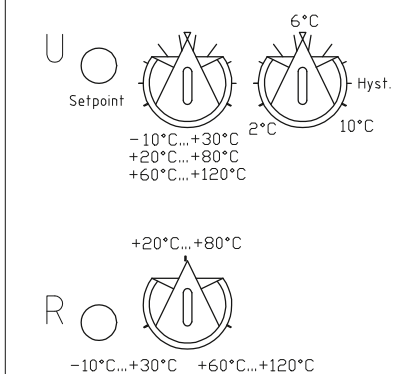
Connecting diagram

TET



Scheme

TET



THERMASREG® TET Temperature controller for top hat rail installation

Type / WG01	Supply Voltage	Input Sensor	Output	Item No.	Price
TET					
TET-230VAC	230 V AC, 2,5 VA	Pt1000	1 x changeover contact (potential-free)	1 102-6021-0000-000	192,22 €
TET-24VAC	24 V AC, 2,5 VA	Pt1000	1 x changeover contact (potential-free)	1 102-6022-0000-000	192,22 €
TET-24VDC	24 V DC, 2,5 VA	Pt1000	1 x changeover contact (potential-free)	1 102-6023-0000-000	192,22 €



**HVAC & BYGNINGS-
AUTOMATIK**

VORES PRODUKTSORTIMENT INKLUDERER:



FLWSWITCHE



HYGROSTATER



KONTAKTORER



TILBEHØR



TEMPERATURCONTROLLERE



MODBUS/BACNET

VI FØRER PRODUKTER INDENFOR KATEGORIERNE:



AUTOMATIK



ELVARME



KØLEPROFILER

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