domat
control system

FS...-U Frost protection thermostat, active

Summary

Active frost protection thermostats are used for air-side temperature protection of water/air heaters. If the capillary or electronic part is damaged, or at power dropout the relay switches to Frost.

Application

- **Air handling units with hot water heating.**

Function

The gas in the capillary changes its volume and executes pressure which is proportional to the lowest temperature in any part of the capillary (minimum 20 cm) and registered by an analogue sensor. The signal is converterd to a standard electrical signal of 0..10 V. The in-built trimmer sets the threshold temperature of the frost relay in the range of 0 to 10 °C. In the no-frost state, contacts W and B are connected. As the temperature drops below the preset value, contacts W and A connect which is indicating danger of frost. If the internal jumper is set to manual mode the thermostat has no automatic reset: it must be reset by pushing the pushbutton or by short power off.
There are another terminals at the device: ST-E, and AV. The ST-E is an input for a 0..10 V heating valve control signal from a HVAC controller, while AV is a 0..10 V output which connects to the valve. If the capillary temperature is higher than the preset value FS+6K the AV terminal signal is equal to the ST-E input signal. As soon as the temperature drops below the FS+6K towards FS the AV output signal is the sum of ST-E and increasing 0..10 V value proportional to FS+6K...FS. However, the maximum value of AV output is not higher than 10 V.

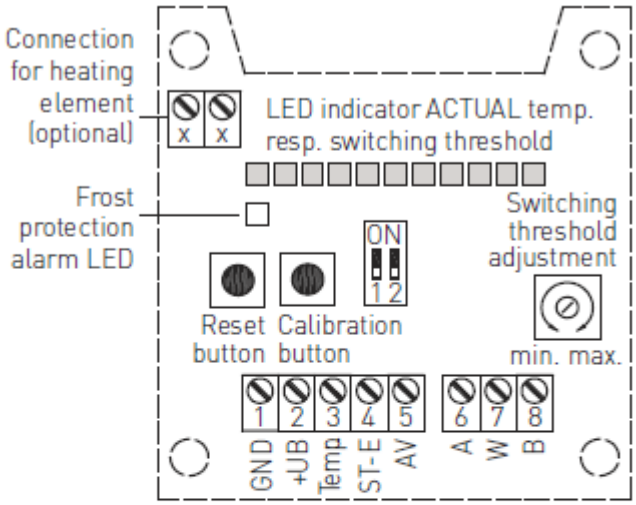
The capillary tube is laid at the warm side of the air heater to be protected, uniformly over the entire area at a distance of ca. 5 cm across of the heat exchanger tubes. For test purposes it is recommended to make a loop of ca. 20 cm directly underneath the enclosure and before entering the air duct. (This does not apply for outdoor installations!) To avoid damaging of the capillary tube, a minimum bending radius of 20 mm must be observed. Installation is facilitated by using the mounting clamps (MK-05-K) which are part of delivery.

The frost situation can be simulated and the functioning of the devices can be tested by dipping the capillary tube testing loop into a pot filled with ice water or using the test spray.

Technical data

Power	24 V AC / DC
Consumption	max. 10 mA at 24 V AC
Measuring range	0...+15 °C
Outputs	1x 0...10 V for 0...15 °C 1x 0...10 V combination of frost signal and valve input 1x potential free changeover contact (setting range 0…15 °C)
Contact setting range	0...15 °C
Ambient temperature	-10...50 °C (at the cover)
Admissible capillary temperature range	-20...60 °C, capillary min. 20 cm apart from the electronic part
Accuracy	+/-1 K (at 10 °C)
Hysteresis	2 K
Reaction length of the capillary	25 cm
Cover	polyamide, 30% glass fibre reinforced, colour white, similar to RAL 9010
Dimensions	108 x 70 x 73.5 mm
Connection	screw terminals for wires 0,14 – 1,5 mm^2
Cable gland	M20 x 1.5, with strain relief
Startup time	less than 60 s
Reaction time (90 %)	less than 5 s
Protection degree	III (according to EN 60730)
Protection	IP65 (according to EN 60529)
Standards	CE EMC according to EN 61326 + A1 + A2

Terminals



GND	Operating voltage GND
+UB	Operating voltage 24V AC/DC
Temp.	Output temperature 0-10V = 0...15°C
ST-E	Control input 0-10V
AV	Summation output 0-10V (optional)
B	Contact B, changeover
W	Contact W, changeover
A	Contact A, changeover

Type summary

Type	Output	Capillary length
FS1-U	2x 0..10 V, 1x contact	3 m
FS2-U	2x 0..10 V, 1x contact	6 m

Accessories:

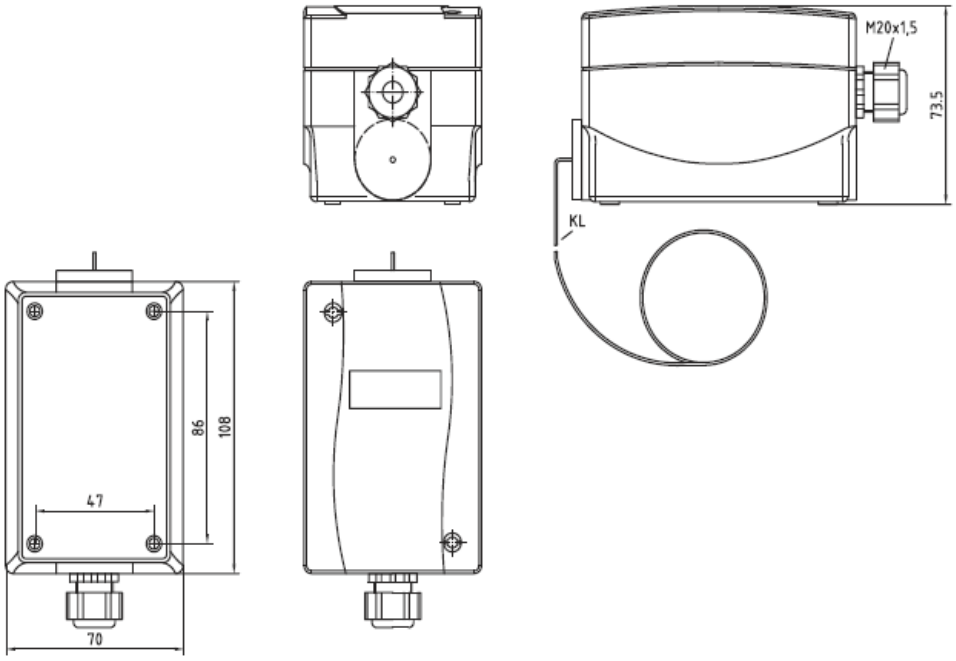
MK-05-K	6 pieces mounting clamps; plastic
KRD-04	capillary tube gland bracket

The most commonly used type for HVAC units active frost protection is **FS2-U**. In case that more thermostats are used to protect one unit (for large unit dimensions) connect the contacts in serial so that alarm is actuated when any of the thermostats responds.

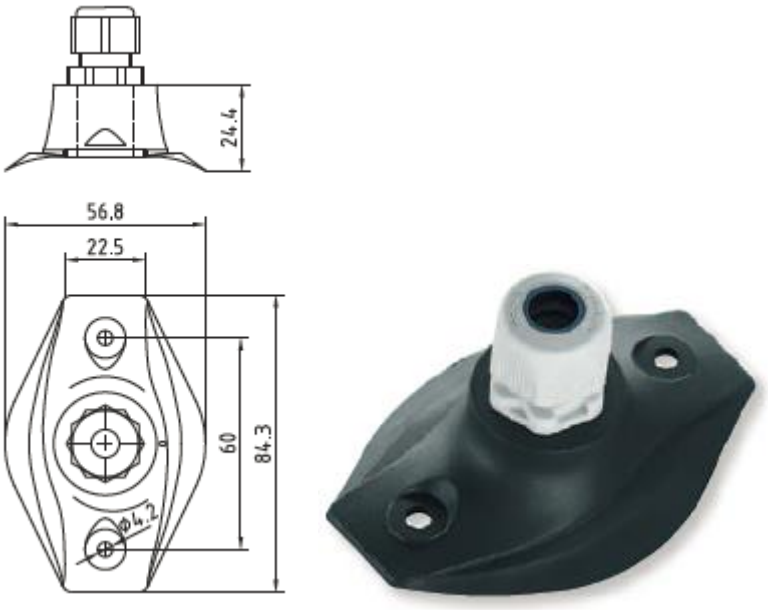
FSx-U Display is thermostat extended by optional LCD display 37 x 15 mm which indicates measured temperature in °C.

Dimensions

FSxx-U Display



KRD-04



MK-05-K