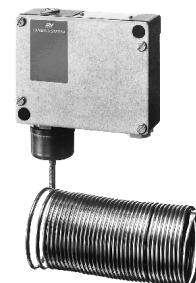# Frost thermostat

for air temperature monitoring

QAF81...

Frost protection thermostat to prevent frost damage in air conditioning systems
- **Robust aluminium die-cast housing**
- **Responds to temperature change sensed over any 30 cm length of capillary**
- **Small switching differential**
- **Good repeatability**
- **Setpoint adjustment – 5 ...15 °C**
- **Protection standard IP65**

Use

The frost protection thermostat QAF81... for air-side monitoring of the temperature of LTHW heating coils in ventilation and air conditioning systems is used to prevent frost damage. It has a small switching differential and good repeatability. The reset occurs automatically (manual reset required with QAF81.6M).

Typical applications

The frost thermostat can be used to initiate the following frost protection functions:

– Stop fan
– Close outside air dampers
– Open heating coil valve 100 %
– Start heating coil pump
– Switch off chiller (condenser) and humidifier
– Trip visual and/or audible frost alarm

Functions

The frost thermostat QAF81... trips when the temperature drops below the selected setpoint over a capillary length of 30 cm.
An automatic reset occurs when the temperature rises above the setpoint again (manual reset required with QAF81.6M).

Type summary

3 types of frost monitor are available. They differ in the length of the capillary and in the reset:

Type	Reset	Capillary length
QAF81.3	automatic reset	3 m
QAF81.6	automatic reset	6 m
QAF81.6M	with lock-out and manual reset	6 m

Ordering

The frost thermostat QAF81... and, if required, FK-TZ1 capillary supports, must be ordered separately (1 set of 6 is supplied).
When placing an order, please specify the quantity, product description and type code.

Example:
1 frost thermostat QAF81.6M and **1 set of capillary supports FK-TZ1**

Technical design

The (R134a) gas-filled capillary and the diaphragm assembly together form the measuring element, which is mechanically linked to the micro-switch. The temperature is measured over the full length of the capillary.

Operating diagram

X_D : Switching differential
W : Preselected setpoint
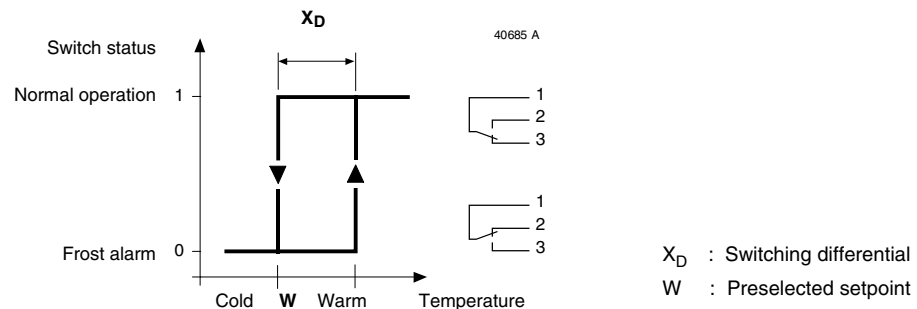
Mechanical design

The frost thermostat QAF81... has the following parts:

- Die-cast aluminium housing with removable cover
- Mechanical setpoint adjuster with scale in °Celsius and °Fahrenheit (setpoint adjustment screw can be locked mechanically)
- Micro-switch for change-over contact
- Sensor unit with diaphragm assembly and copper capillary
- Capillary filled with R134a gas
- The QAF81.6M has a manual reset button

Accessories

To prevent damage to the capillary, a minimum bending radius of 20 mm must be ensured. Mounting is easier if the FK-TZ1 capillary supports are used. (1 set of 6 pieces is supplied with the frost thermostat.)

FK-TZ1   capillary support (set of 6 pieces)

Engineering notes

Withdrawable tray:
It is recommended that the frost thermostat QAF81... should be installed on a purpose-built withdrawable tray directly downstream of the heating coil. The connecting cable must be long enough to enable the tray to be inserted and removed without difficulty.

For heating coils with very large cross-sections, a number of frost thermostats can be fitted and connected in series. In this case, the setpoint must be set individually on each thermostat.

Mounting notes

Frost thermostat

The ambient temperature affecting the thermostat housing (with the test loop) must be at least 2 °C above the pre-selected setpoint. If this cannot be guaranteed (e.g. outdoors or in exposed spaces), the housing and test loop must be installed inside the supply air unit.

Capillary	The capillary must be mounted on the downstream side of the heating coil (and on the upstream side in the case of coiling coils). It should be looped diagonally across the heat exchanger pipes at a distance of approximately 5 cm, and should cover the entire area evenly. For test purposes, it is advisable to leave a loop of approximately 20 cm directly beneath the housing outside the entry to the duct.

To prevent damage to the capillary it should be protected by grommets or similar where it passes through metal walls. The capillary has a minimum bending radius of > 20 mm. Tighter bends must be avoided. Use capillary supports FK-TZ1!

50346
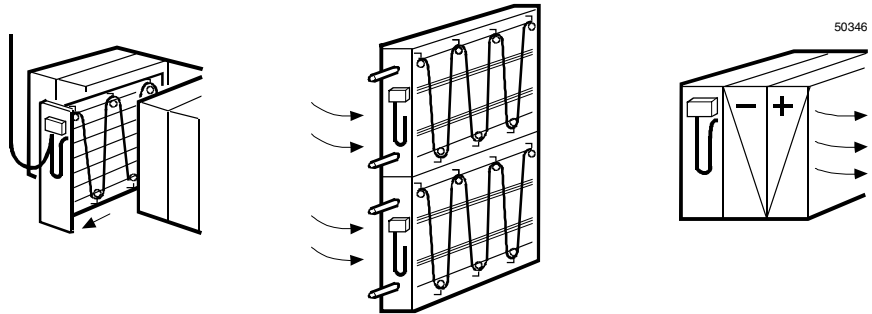
Commissioning notes

After removal of the locking screw (under the housing cover) the setpoint can be adjusted from above with a screwdriver.

Frost simulation

To simulate frost conditions, the test loop can be immersed in a vessel of iced water. A frost alarm can also be initiated by short-circuiting terminals 1 and 2. To simulate frost with the QAF81.6M, pull out the reset button (on the housing base).
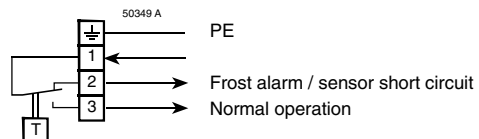
Maintenance notes

The frost thermostat is maintenance-free.
Correct operation of the device can be checked by immersing the test loop in a vessel of iced water.

Technical data

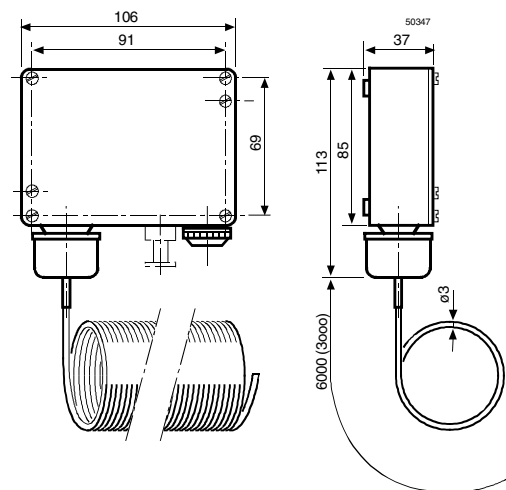|	
Setpoint adjustment range X_K	– 5 ... 15 °C (23 ... 59 °F)
Factory setting	5 °C (41 °F)
Switching differential	2 °C ±1 °C (3.6 °F ±1.8 °F)
Repeatability	± 0.5 °C (± 0.9 °F)
Responsive length of sensor	Approx. 0.3 m
Type of switch	Single pole change-over
Contact rating	AC 250 V, 10(2)A
Reset mechanism:	QAF81.3 , QAF81.6 Automatic
	QAF81.6M Manual
Admissible medium	Air
Orientation	Any
Materials:	
Housing	Die-cast aluminium
Bellows housing	Copper
Capillary	Copper
Capillary contents	Freon R134a
Electrical connection	3 screw terminals, 1.5 mm^2
Cable entry	Threaded PG 13.5
Protection class	I (to IEC730-1)
Protection standard	IP65 to IEC529
Ambient temperature:	
Max. operating temperature	70 °C (158 °F)
Min. operating temperature	X_K + min. 2 °C (+ min. 3.6 °F)
Storage	– 30 ... 70 °C (–22 ...158 °F)
Destruction limit	140 °C (284 °F)
Weight (including packaging)	0.9 kg
Maintenance	None required
Conformity	Meets the requirements for CE marking

Connection terminals

50349 A

PE	
1	
2	Frost alarm / sensor short circuit
3	Normal operation

T

Dimensions

All dimensions in mm

QAF81...

106

91

69

50347

37

113

85

6000 (3ooo)

ø3

FK-TZ1

50348A

5,4

37

R30

51,5

3,5

© 1998 Siemens Building Technologies Ltd.