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JUMO frostTHERM-ATE

Electronic Frost Protection Thermostat, Type 604170



Special features

- Active probe line, setting range 1 to 10°C
- Operating mode with choice of manual or automatic reset
- Regulated membrane heating
- Self-monitoring of the probe line
- Signal input/output for valve control DC 0 to 10 V
- Probe line length 2000 mm or 6000 mm
- Protection type EN 60529, IP42
- Operating voltage (SELV) AC 24 V

Brief description

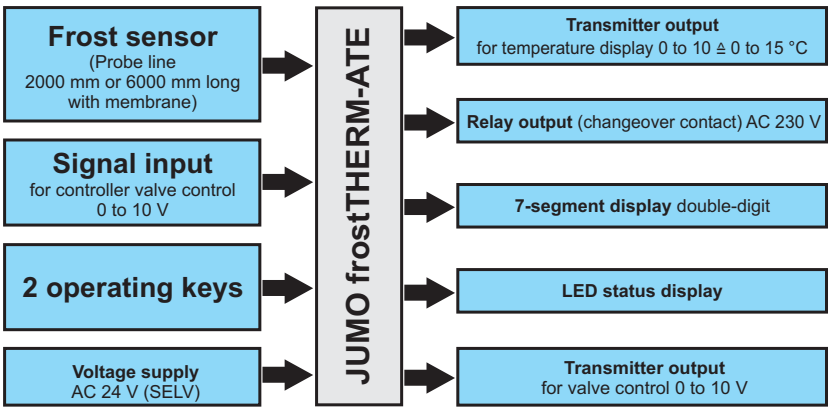
The frost protection thermostat is used for air-side temperature monitoring in ventilation and air conditioning systems to prevent damage caused by freezing.

Applications:

- Switching off ventilators
- Opening heating valves
- Closing air flaps
- Or other measures to prevent freezing

Thanks to the freely selectable switching point between 1 and 10 °C and the choice of a monitoring (automatic reset) or limiting function (manual reset), the JUMO frostTHERM-ATE can always be adjusted to suit the requirements of any particular application. The self-monitoring feature for the probe line ensures that the thermostat switches to frost function and the monitored plant remains protected at all times if a capillary tube breaks.

Block diagram



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Description

Device function

The frost monitor uses a steam-filled probe line and a membrane system to record the lowest temperature that occurs anywhere along at least 250 mm of the probe line. Assuming the probe line is correctly aligned at the air outlet for the air heater, it will also record the lowest temperature in the event of varying air temperature layers.

The steam pressure in the probe line displaces the membrane. With the help of an inductive measuring system, this movement is converted into an electrical signal and electronically amplified, and in turn generates a DC 0 to 10 V measuring signal.

In order to ensure it is always the lowest temperature measured at the probe line, the membrane temperature in the inner part of the case must always be higher than the probe line temperature. The heating facility installed in the case as standard achieves this by keeping the membrane temperature over 15 °C at ambient temperatures down to -15 °C.

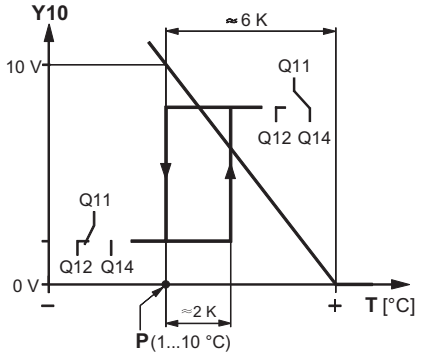
Function

The frost monitor uses three independent functions to help it perform its task:

1. It keeps the heating valve constantly open within a proportional control range.
2. It switches off the ventilators via its relay contact and closes the flaps.
3. It makes the measured temperature available for further processing.

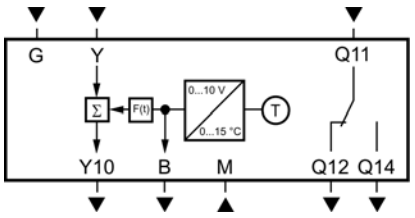
The measuring signal undergoes further processing and becomes the frost signal for the monitor function and valve control. At around 6 kelvin above the set switching point (P), the frost signal starts to increase.

Function chart



P = Switching point can be adjusted
T = Capillary temperature
Y10 = Valve control signal (Y = DC 0 V)
Q11/12/14 = Relay output (changeover contact) AC 230 V

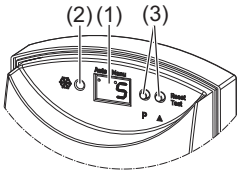
Circuit diagram for device



G = Voltage supply (SELV) AC 24 V
M = System zero point, measurement zero point
B = Transducer output
DC 0 to 10 V ≙ 0 to 15 °C
Y = Signal input for valve controller
DC 0 to 10 V
Y10 = Transducer output for valve control
DC 0 to 10 V
Q11/12/14 = Relay output AC/DC 12 to 230 V
Q12 = Closed if risk of frost

Display and control elements

(1) Display	7-segment 2-digit display, red
(2) Relay status indication	1 LED for relay output
(3) Keys	To operate and program the device in order to perform a reset in manual operating mode



Parameters and configuration

Description	Display	Default setting	Value range
Switching point	Sp	5 °C	1 to 10 °C
Operating mode	St	Automatic	Automatic (At) Manual (Hd)

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Technical data

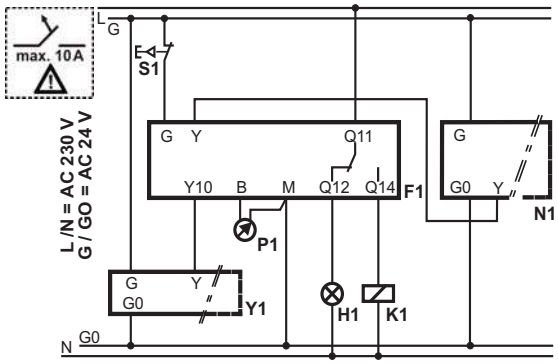
Specifications	Measuring range	Measuring range	0 to 15 °C
		Setting range	1 to 10 °C
	Adjustment point		5 °C
		Accuracy at adjustment point	+/- 1 K
	Switching differential		Approx. 2 K
	Time constant	In still air	Approx. 90 s
		In moving air	< 40 s
	Probe line	Minimum response length	250 mm
		Admissible temperature	Max. 110 °C
	Weight	Frost monitor, 2 m probe line	Approx. 0.34 kg
		Frost monitor, 6 m probe line	Approx. 0.41 kg
Electrical data according to EN 60730	Electrical connection	Terminals featuring tension springs	Max. 2 x 1.5 mm² or 1 x 2.5 mm² Min. 0.25 mm²
		Cable inlet	Cable gland M16, for cable Ø 5 to 10 mm
	Voltage supply		AC 24 V +10 % / -20 %, SELV
		Frequency	48 to 63 Hz
		Power consumption	Max. 6.6 VA
		Electrical protection	Power switch max. 13 A
	Analog input	Valve control (terminal Y)	DC 0 to 10 V
		Current	Max. 0.1 mA
		Admissible line length for 1.5 mm²	300 m
	Analog outputs	Probe temperature (terminal B)	DC 0 to 10 V ≙ 0 to 15 °C
		Valve control (terminal Y10)	DC 0 to 10 V
		Current	Max. 1 mA
		Admissible line length for 1.5 mm²	300 m
	Relay output (terminal Q11, -12, -14)	Output	Floating
		Min. switching capacity	AC/DC 12 V, 100 mA
		Max. switching capacity	AC 230 V, 6(2) A; DC 24 V, 6 A
Environmental influences	Operating temperature range	Operation according to	IEC 721-3-3
		Climatic conditions	Class 3K5
		Temperature	-15 to +55 °C
		Humidity	< 85 % r. H.
	Storage/Transport	Operation according to	IEC 721-3-2
		Climatic conditions	Class 2K3
		Temperature	-25 to +65 °C
		Humidity	< 95 % r. H.
	Electromagnetic compatibility	Interference emission	Class B according to EN 61 326-1
		Interference immunity	Industrial requirements according to EN 61 326-1
		CE conformity according to the EMC Directive	2004/108/EC
		Low Voltage Directive	2006/95/EC
	Vibration strength	DIN EN 60 721-3-3	Class 3M2
Case	Materials/Colors	Case lid	PC, transparent
		Case bottom section	PA, silver gray (RAL 7001)
		Cover cap	ABS, light gray (RAL 7035)
		Probe line	Copper
		Packaging	Corrugated cardboard

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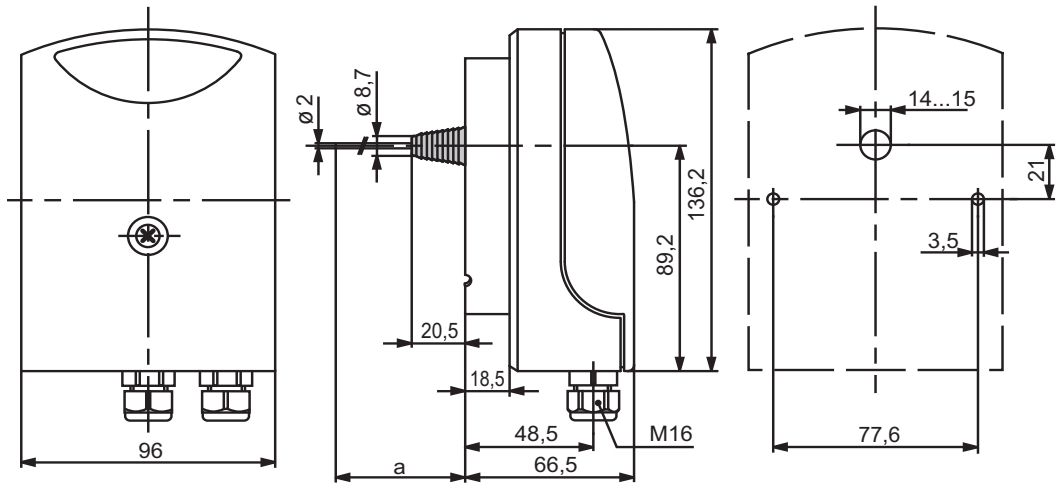
Connection example



F1 JUMO frostTHERM-ATE frost monitor
N1 Controller with DC 0 to 10 V control signal
H1 e.g. external frost detector
K1 e.g. fan contactor
P1 e.g. temperature display
S1 If required, reset push-button to reset the frost status externally
Y1 Actuator

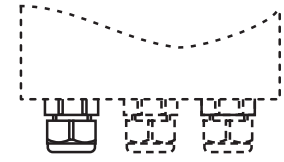
Dimensions

Measurements in mm

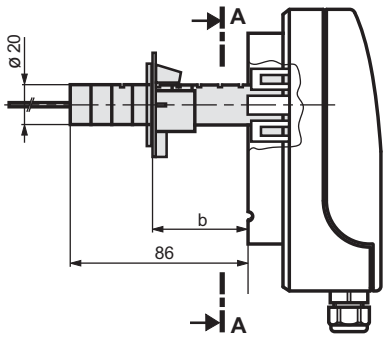


Drilling diagram for direct mounting

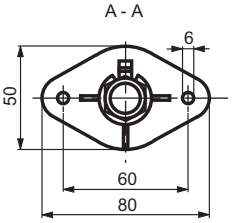
Optional connectable accessories



Max. 1 cable gland for additional mounting



Mounting flange



b	
Max.	Min.
70	10

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Order details

Order code	(1)	Basic type
604170		JUMO frostTHERM-ATE
	(2)	Basic type extension
02		Frost monitor with relay contact
	(3)	Design type
5		Surface-mounted thermostat (standard)
	(4)	Control range
008		1 to 10°C
	(5)	Probe line length
2000		2000 mm
6000		6000 mm
	(6)	Probe material
40		Cu (copper)
	(7)	**Extra code**
000		Without extra code
102		Neutral version

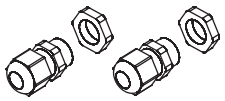
	(1)		(2)		(3)		(4)		(5)		(6)		(7)
Order code	604170	/		-		-		-		-		/	
Order example	604170	/	02	-	5	-	008	-	6000	-	40	/	000

Stock version

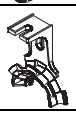
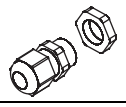
JUMO frostTHERM-ATE	Probe line length 2000 mm	TN 60003410
	Probe line length 6000 mm	TN 60003411

Accessories

Accessories integrated as standard

2 x cable glands M 16 x 1.5	
2 x screws for direct mounting	
1 x rubber plug for routing the probe line	

Optional connectable accessories

Mounting flange	Reinforced polyamide		1 piece	TN 00604453
Holder	Reinforced polyamide		3 pieces	TN 00558731
			6 pieces	TN 00558730
Cable gland M 16 x 1.5			1 piece	TN 00495887