TSP, TSFP, TSSP: Pneumatic room-temperature controllers

How energy efficiency is improved

Enables energy-efficient control of the room temperature in pneumatic installations. The room temperature can be set precisely with the setpoint adjuster.

Areas of application

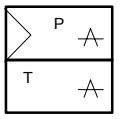
Continuous temperature measurement and control, e.g. in air-conditioning systems. Activation of volume flow controllers or unit valves.

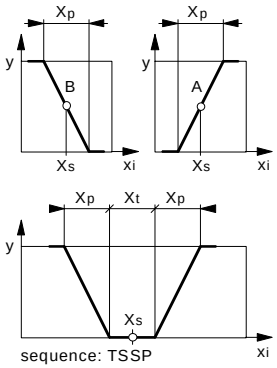
Features

- Robust bimetal sensor
- P control characteristic
- Housing 72 x 72 mm in pure-white thermoplastic
- Setpoint adjuster with +/- scale and adjustable stops for setpoint limiting
- Complies with directive 97/23/EC Art. 3.3 on pressure equipment

Technical description

- Supply pressure 1.3 bar ± 0.1
- Time constant at 0.2 m/s air velocity approx. 7 min.
- Output pressure 0.2 - 1.0 bar
- P range X_p approx. 2 K
- Linearity 2%





Type	Control function 1)	Control action	Air capacity l_n/h	Setpoint range °C	Weight kg
TSP 80A F117	fixed-value	A	33	17...27	0,1
TSP 80B F117	fixed-value	B	33	17...27	0,1
TSP 81A F117	fixed-value	A	200	17...27	0,1
TSP 81B F117	fixed-value	B	200	17...27	0,1
TSFP 80A F117	fixed/schedule	A	33	17...27	0,1
TSFP 80B F117	fixed/schedule	B	33	17...27	0,1
TSFP 81A F117	fixed/schedule	A	200	17...27	0,1
TSFP 81B F117	fixed/schedule	B	200	17...27	0,1
Heating-cooling sequence					
TSSP 80 F117	fixed-value	A and B	2 × 33	17...27	0,1

	TSP 80, TSFP 80	TSP 81, TSFP 81	TSSP
Air consumption l_n/h	33	20	66
Air exhaust capacity l_n/h 2)	50	34	50
External restrictor required	1 pc	–	2 pc
Dead zone X_t (sequence)	–	–	2 K
Connection diagram	A02044	A02045	A02047
Fitting instructions	MV 23176/23219	MV 23184/23185	MV 23200

Supply pressure 3)	1,3 bar ± 0,1	Time constants (0,2 m/s)	approx. 7 min
Output pressure	0,2...1,0 bar	Permissible ambient temperature	0...55 °C
P-band X_p	approx. 2 K		
Linearity	2%	Dimension drawing	M297350
		Connection diagram and MV	see table

1) 'Fixed/schedule' requires an external command signal of 0...1,2 bar (e.g RXP 81).
Setpoint shift ± 6 K. Setpoint increase: 0,6...1,2 bar = 0...+6 K. Setpoint decrease: 0,6...0 bar = 0...–6 K

2) Due to the blow-off noise produced, this value should not be exceeded.

3) See Section 60 on regulations concerning the quality of supply air, especially at low ambient temperatures.

Accessories

0228234 001*	Setpoint adjustment knob in pure white, with raised bridge
0296218 000*	Buckle-proof attachment for plug-in installation
0296990 000*	Buckle-proof attachment for screw-in installation, MV 7322
0297441 000*	Intermediate cover plate in pure white for various recessed junction boxes
0297354 000*	Short screw-in nipple R ⅛, for soft plastic tubing of 4 mm internal diameter
0303124 000*	Recessed junction box (in conjunction with 0297441, if necessary)
0297416 001	Housing cover in pure white, screw-type, without setpoint adjuster [1)]
0297418 032	Housing cover in pure white, screw-type, with setpoint adjuster, scale 17...27 °C [1)]
0297419 001	Housing cover in pure white, of light metal, w/o setpoint adjuster, w/o airing louvres [1)]
0297546 001	Housing cover in pure white, of light metal, w/o setpoint adjuster, w/o airing louvres [1)]
0297555 001*	Intermediate cover plate in pure white, for large recessed junction boxes (e.g USA)
0297560 001*	Intermediate cover plate in pure white for panels, for covering large holes
0297557 000*	Wall insulation; prevents imprecision due to draughts from the wall
0297760 001	Temperature other than 22 °C for middle of scale (span ± 5 K)
0297760 002	Setpoint shift other than ± 6 K or 1 K per 0,1 bar (for 'fixed/schedule' types only)
0369573 001*	Surface junction box, pure white
0369573 002*	Surface junction box, black

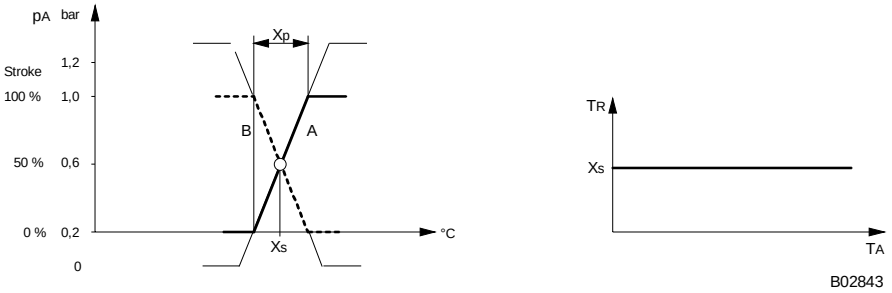
*) Dimension drawing or wiring diagram are available under the same number

1) For orders with controller, the housing will be replaced in the factory.

Operation

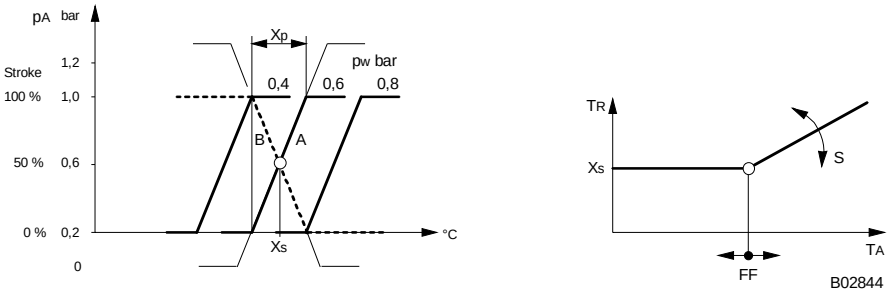
'Fixed-value' basic function: TSP 80 & TSP 81

The bimetal sensor, which works on the bleed-off force-balance principle, converts the temperature within its P-band into a pneumatic standard signal of 0,2 to 1,0 bar.
Direction of operation A: the output pressure increases as the temperature rises.
Direction of operation B: the output pressure decreases as the temperature rises.
When the temperature is rising, the bimetal strip bends and, via the force-balance lever, exerts a force on the nozzle–ball system. An output pressure – proportional to the force of the lever – builds up between the external pre-valve and the nozzle–ball system. On the model with direction of operation B, the nozzle–ball system is on the other side of the lever.
Instead of the external pre-valve, the models with type number 81 have an integrated pre-amplifier for systems with long lines or for drives with short running times; these require a connection for supply pressure.



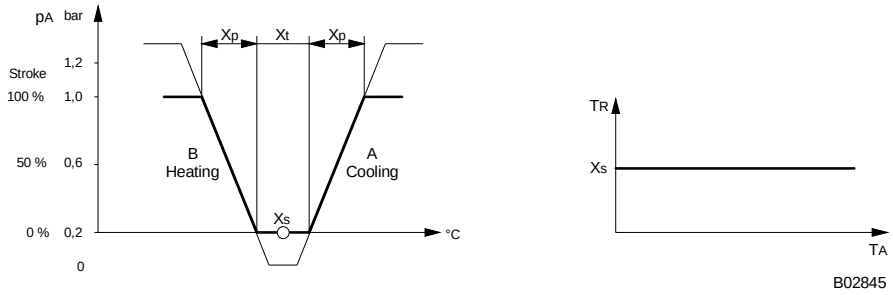
'Fixed-value + schedule' extra function: TSFP 80 & TSFP 81

On this model is a membrane cell below the force-balance lever. When this is pressurised by an external command signal, the setpoint X_S can be shifted. When the command signal is 0,6 bar, then control is performed exactly to the pre-set setpoint. The setpoint increase works on a command signal of 0,6 to 1,2 bar = 0 to +6 K; while the setpoint decrease is 0,6 to 0 bar = 0 to –6 K. Models with this setpoint shift have an `F' in the model code and require a connection for command pressure.



'Sequence' extra function: TSSP 80

This model has a nozzle–ball system on both sides of the force-balance lever. It requires two external pre-valves and has two outputs: one each for both directions of operation (A and B). This provides a sequence curve with the setpoint in the middle of the neutral zone X_t. Models with the sequence function have an additional 'S' in the model code.



Key

S	= slope, setpoint shift	T_R	= room temperature
FF	= shift starting point, setpoint of the scheduling relay	X_p	= P-band
X_S	= setpoint	X_t	= dead zone
T_A	= outside temperature	p_A	= output pressure
		p_W	= command pressure

Engineering notes

In order to prevent excess noise, the air recovery should be kept to 50 l_n/h for the TS. P 80 and 34 l_n/h for the TS. P 81. This means that the maximum number of RLP units that can be connected to each controller is as follows:-

TS. P 80: either three RLP 10 or 20, or three RLP 100 F00.
TS. P 81: either two RLP 10 or 20, or two RLP 100 F00.

On installations with a re-heater that have been equipped with a sequence relay or sequence-reversing relay (air supplied by the RLP), the air emitted at terminal 6 of the RLP is bled off by the sequence relay or sequence-reversing relay so that no such noise is caused by the TS. P 8 unit itself. The maximum air recovery of a sequence relay or sequence-reversing relay is 50 l_n/h.

For this reason, no more than three RLP units may be connected to such a relay. If more are connected (to either a sequence relay or sequence-reversing relay or a TS. P 8 unit), an interface relay XRP 101 must be used.

Additional details on accessories

0297419 001 Housing cover in pure white, of light metal, screw-type, without setpoint adjuster, without airing louvres, time constant 10 instead of 7 minutes.

0297546 001 Housing cover in pure white, of light metal, screw-type, without setpoint adjuster, with straight airing louvres, time constant approx. 7 minutes.

0297555 001 Intermediate cover plate in pure white, for large recessed junction boxes (e.g USA); includes fitting ring and two screws (M3 × 6, M4 × 16)

0297760 001 Setting limits: middle of scale 15 –40 °C; end of scale 10 –45 °C
For special settings, use full °C values only.

0297760 002 The command pressure can be set between 0 and 1,2 bar. The variable setpoint shift is either 0,5 °C or 0,75 °C per 0,1 bar.

Additional details on models

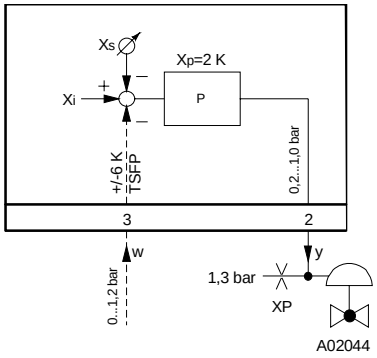
Housing cover of plastic with slanted air louvres, or metal (see Accessories). Internal setpoint adjustment with end stops and '+ –' scale.

Base plate for snap-on or screw-on housing cover with two Allen-type grub screws (1,5 mm). Types TSP 81 and TSFP 81 have quantity amplification.

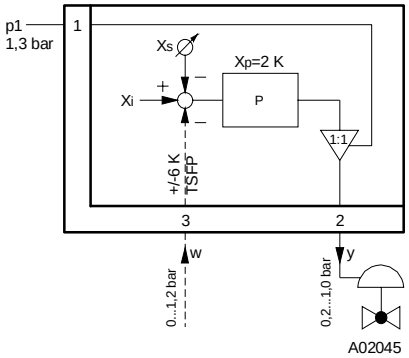
Types TSFP 80, TSFP 81 and TSFWP 80 have a connection piece with a membrane for the setpoint shift. Measurement connection for tube of Ø 1,8 × 3,5 mm.

Connection diagrams

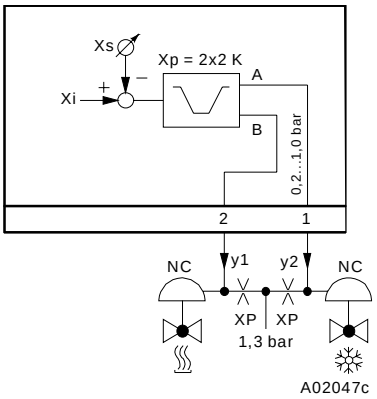
TSP 80, TSFP 80



TSP 81, TSFP 81



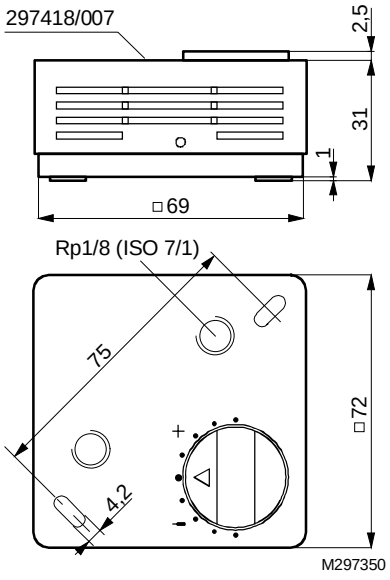
TSSP 80



Use NC valves (normally closed)
(e.g. VK18P or BK18P)

Dimension drawing

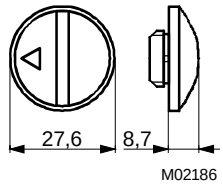
TS . P 80



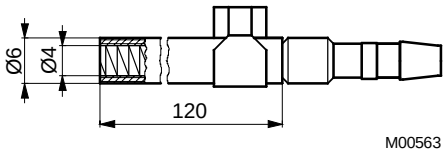
TS . P 81

Accessories

228234



296218



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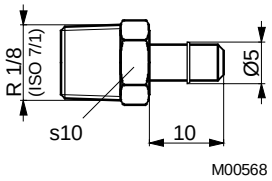

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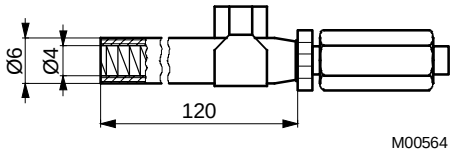

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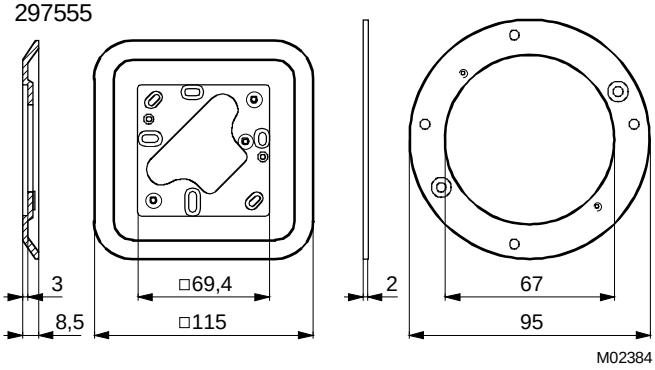

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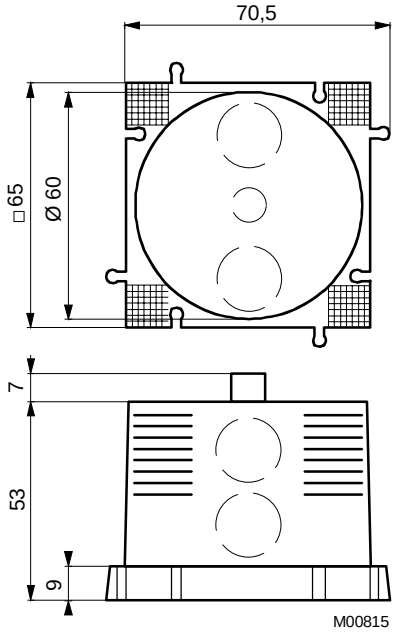

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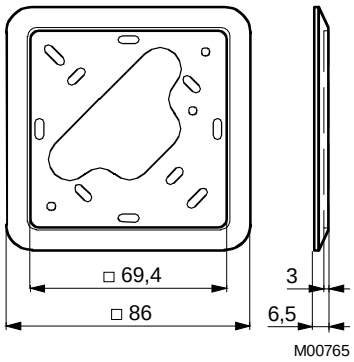

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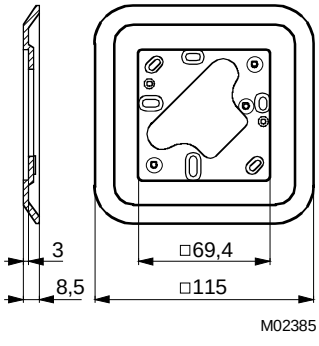

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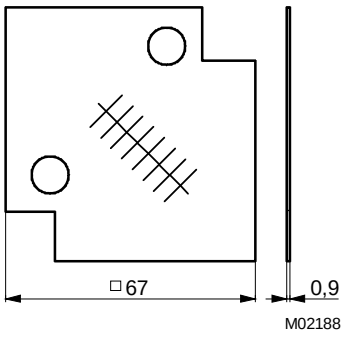

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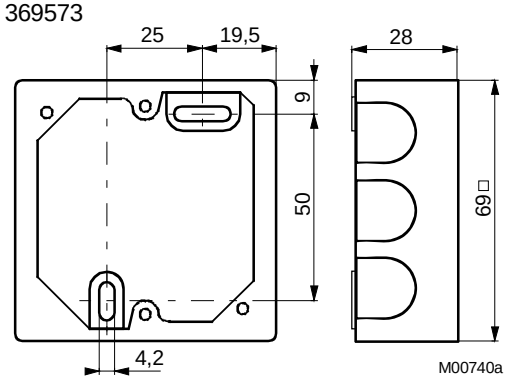
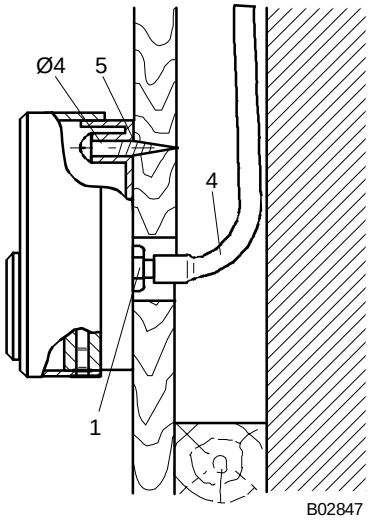


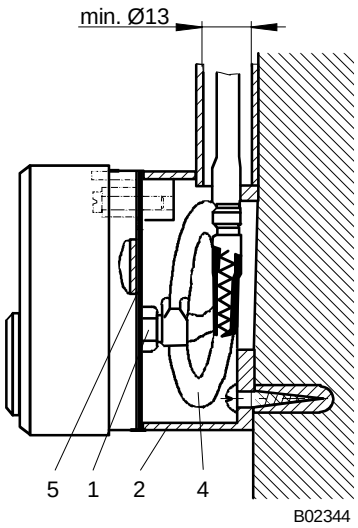
Engineering and fitting notes

To connect the air lines, the short screw-in piece (0297354) must be used. Where space is limited, the use of the buckle-proof adaptor is recommended.

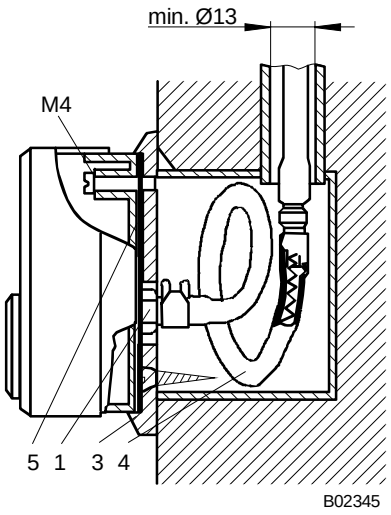
Panel fittingl



Surface fitting

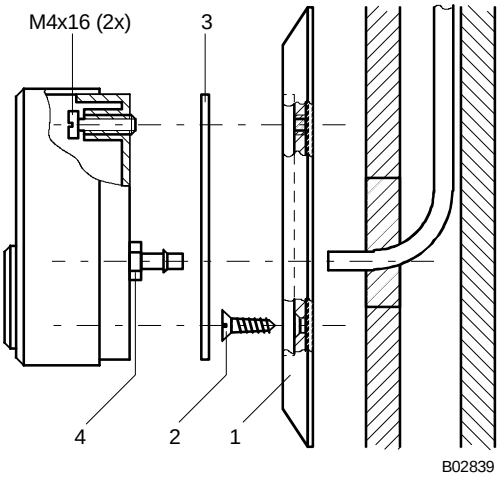


Recessed fitting



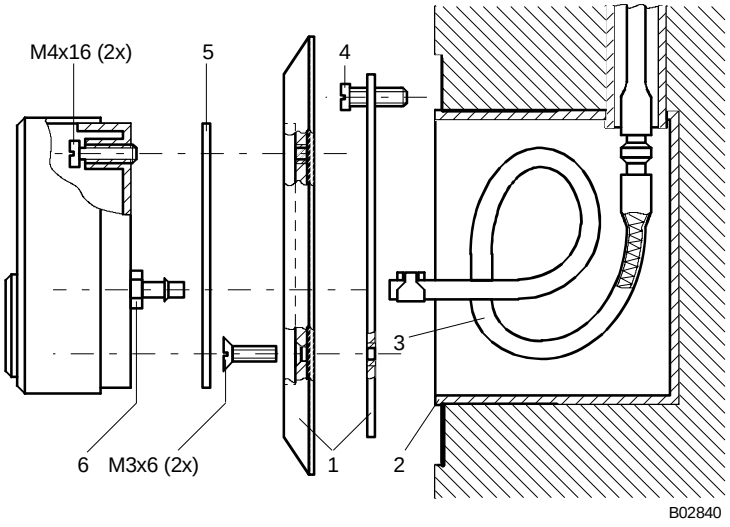
1 Short screw-in piece (0297354)
2 Surface junction box, pure white
3 Intermediate cover plate (0297441)
4 Buckle-proof adaptor, plug-in type (0296218)
Buckle-proof adaptor, screw-in type (0296990)
5 Wall seal (0297557)

Panel fitting on partition walls (plaster board) with large opening for the compressed-air tube.



1 Intermediate cover plate incl. M 4 × 16 (21) (0297560/001)
2 Screws Ø 3,5 (2 ×); not supplied
3 Wall seal (0297557)
4 Short screw-in piece (0297354)

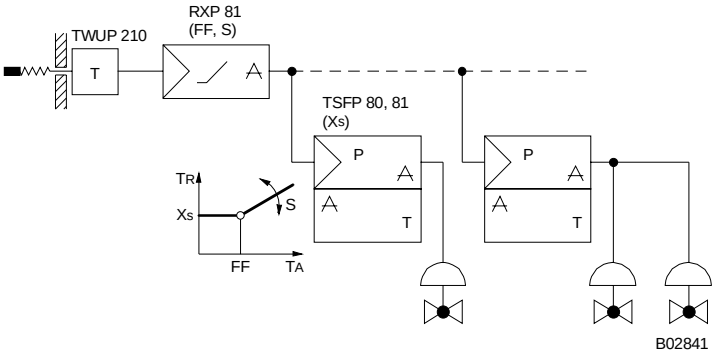
Recessed fitting with large recessed junction box (e.g. for USA)



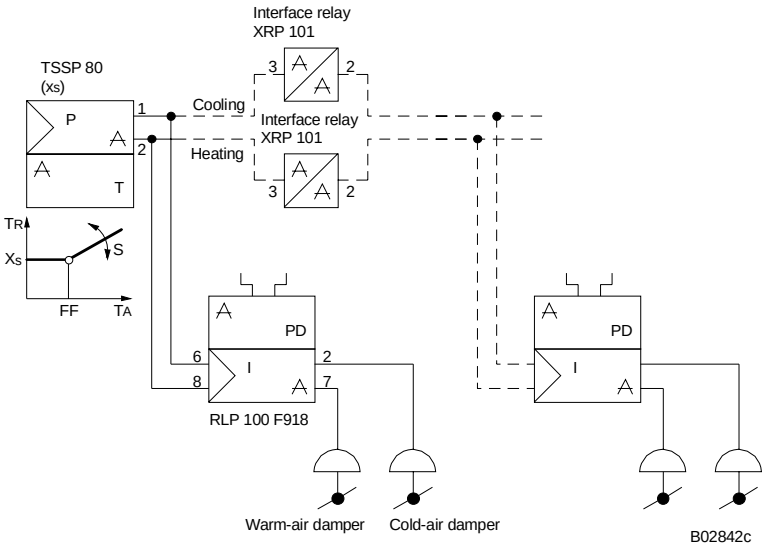
1 Intermediate cover plate incl. M 3 × 6 (2×) and fitting ring 0297555/001
2 Recessed junction box; not supplied
3 Buckle-proof adaptor, plug-in type (0296218)
4 Screws; not supplied
5 Wall seal (0297557)
6 Short screw-in piece (0297354)

Examples of use

– Feeding a command variable (outside temperature) to several room-temperature controllers of type TSFP. 80, 81



– Feeding a command variable (outside temperature) to a room-temperature controller of type TSSP 80 with two outputs (heating/cooling) for twin-circuit VAV control with several VAV controllers.



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