TKP, TKFP, TKSP: Pneumatic duct-temperature controllers

How energy efficiency is improved

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

Areas of application

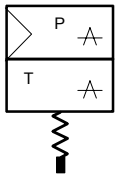
Continuous temperature measurement and control, e.g. in ducting in air-conditioning systems. Activation of volume flow controllers or unit valves.

Features

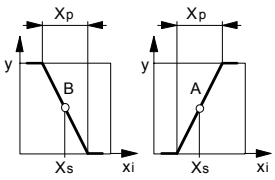
- Oil-filled external transducer for detecting the duct temperature
- Transducer can be distanced up to 1.5 m away
- P control characteristic
- Housing 72 x 72 mm in pure-white thermoplastic
- Setpoint adjuster with +/- scale and adjustable stops for setpoint limiting
- Complies with directive 97/23/EC Art. 3.3 on pressure equipment

Technical description

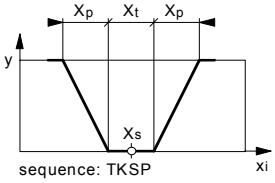
- Supply pressure 1.3 bar ± 0.1
- Time constant at 0.5 m/s air velocity approx. 2.5 min.
- Output pressure 0.2 - 1.0 bar
- P range X_P approx. 2 K
- Linearity 2%



Type	Control function [1]	Control action	Air capacity l_n/h	Setpoint range °C	Weight kg
TKP 80A F117	fixed-value	A	33	17...27	0,17
TKP 80B F117	fixed-value	B	33	17...27	0,17
TKP 81A F117	fixed-value	A	200	17...27	0,17
TKP 81B F117	fixed-value	B	200	17...27	0,17
TKFP 81A F117	fixed/schedule	A	200	17...27	0,17
TKFP 81B F117	fixed/schedule	B	200	17...27	0,17
TKSP 80 F117	sequence	A and B	2 × 33	17...27	0,17



	TKP 80	TKP 81, TKFP 81	TKSP
Air consumption l_n/h	33	20	66
Air exhaust capacity l_n/h [2]	50	34	50
External restrictor required	1 pc	–	2 pcs
Dead zone X_t (sequence)	–	–	2 K
Connection diagram	A02048	A02049	A02051
Fitting instructions	MV 23177	MV 23187/23188	MV 23201



Supply pressure [4]	1,3 bar ± 0,1	Permissible amb. temp	0...55 °C
Output pressure	0,2...1,0 bar		
P-band X_p	approx. 2 K	Dimension drawing	M297351
Linearity	2%	Connection diagram and MV	see table
Time constants (0.5 m/s)	approx. 2,5 min		

Accessories

0296724 000* Sensor holder for wall mounting
0303212 000* Sensor holder for duct mounting
0297302 000* Fixing bracket for the controller
0228234 001* Setpoint adjustment knob in pure white, with raised bridge
0297354 000* Short screw-in nipple R ⅛ for soft plastic tubing of 4 mm internal diameter
0297416 001 Housing cover in pure white, screw-type, without setpoint adjuster [3]
0297418 032 Housing cover in pure white, screw-type, with setpoint adjuster, scale 17...27 °C [3]
0297419 001 Housing cover in pure white, of light metal, screw-type, without setpoint adjuster, without airing louvres [3]
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 TKFP 81)

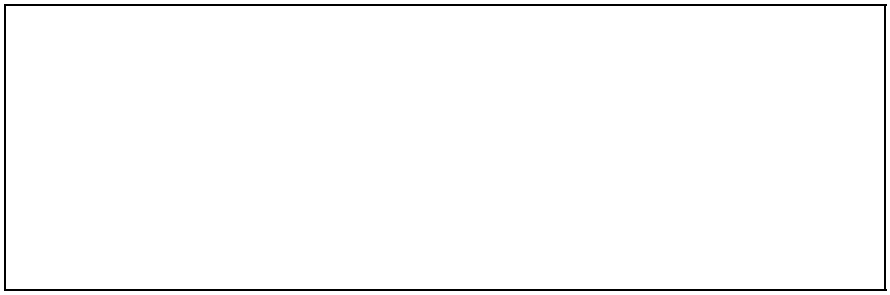
*) Dimension drawing or wiring diagram are available under the same number

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) For orders with controller, the housing will be replaced in the factory
4) See Section 60 on regulations concerning the quality of supply air, especially at low ambient temperatures

Operation

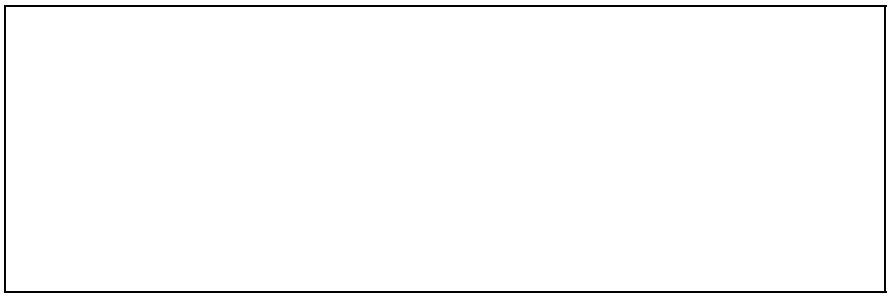
Fixed-value' basic function: TKP 80 & TKP 81

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 oil-filled sensor 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.



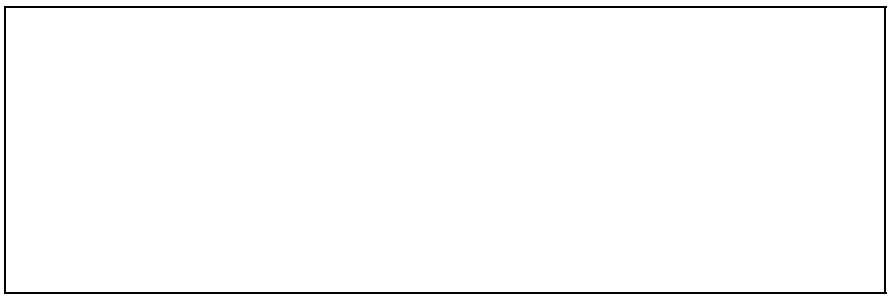
Fixed-value + schedule' extra function: TKFP 81

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 elevation works on a command signal of 0,6 to 1,2 bar = 0 to +6 K; while the setpoint setback works between 0,6 and 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: TKSP 80 & TKSP 81

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 TK . P 80 and 34 l_n/h for the TK . P 81. This means that the maximum number of RLP units that can be connected to each controller is as follows:-

TK . P 80: either three RLP 10 or 20, or three RLP 100 or 200;
TK . P 81: either two RLP 10 or 20, or two RLP 100 or 200.

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 TK . P 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 TK . P unit), an interface relay XRP 101 must be used.

Additional details on accessories

0297760 001 Setting limits: middle of scale 15 - 40 °C; end of scale 10 - 45 °C.
Only whole °C values can be used for the special settings.

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 or metal (see Accessories). Internal setpoint adjustment with end stops and `+ –' scale.

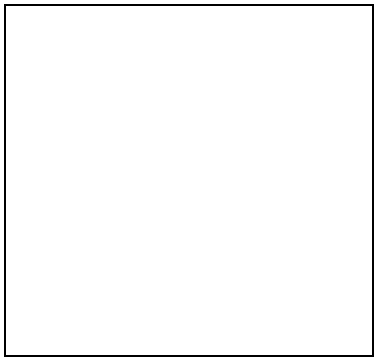
Base plate for snap-on or screw-on housing cover with two Allen-type grub screws (1,5 mm).

Types TKP 81 and TKFP 81 have quantity amplification.

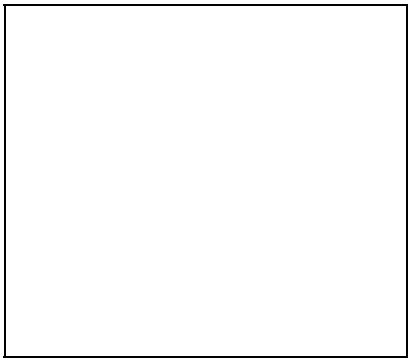
Types TKFP 81 have a connection piece with a membrane for the setpoint shift. Measurement connection for tube of Ø 1,8 × 3,5 mm.

Connection diagrams

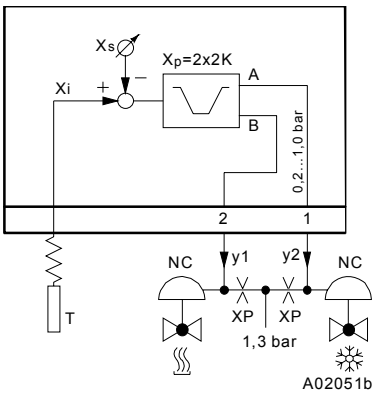
TKP 80



TKP 81, TKFP 81

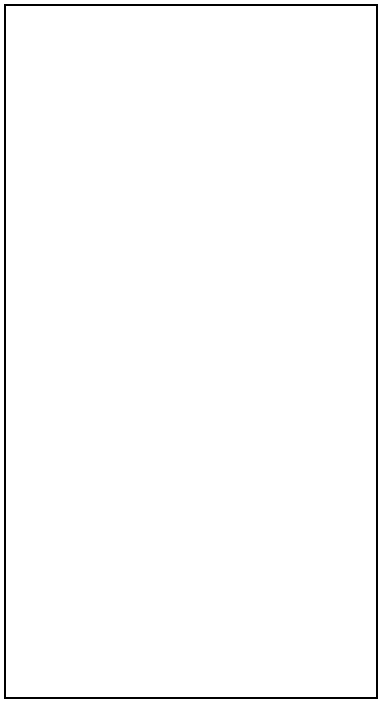


TKSP 80

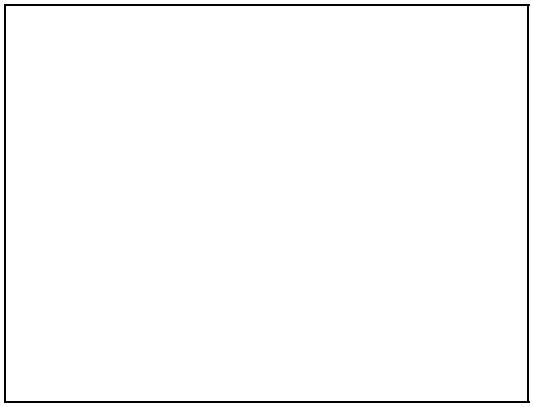


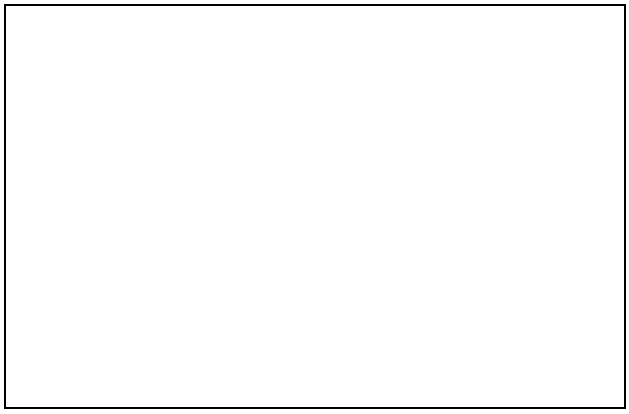
For heating and cooling: use NC valves (normally closed) (e.g. VK18P or BK18P)

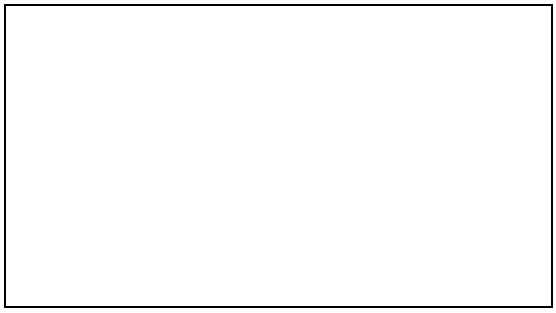
Dimension drawing

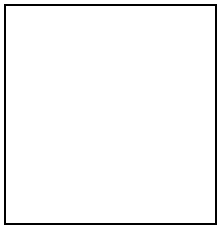


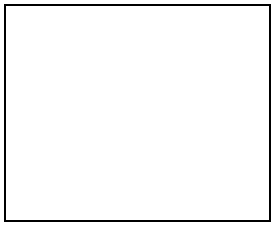
Accessories





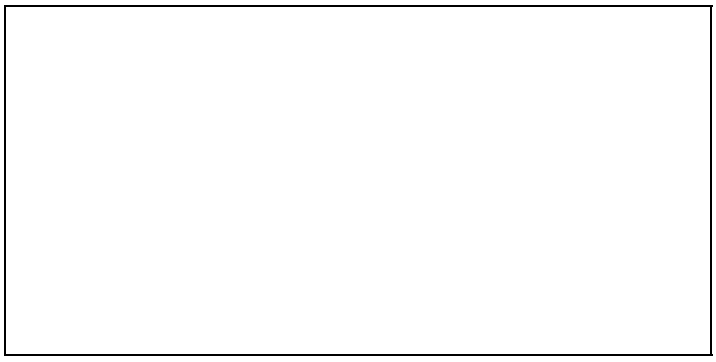






Examples of use

– Addition of a command variable (outside temperature) to several TKFP 81 duct-temperature controllers



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