



Convec Comfort Panels

InLine product programme

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Product Description

Convec InLine Panel

InLine is a compact comfort panel for installing in heating applications in buildings.

Applications

Aesthetics and comfort are the keywords for InLine panels. The discreet panels enable you to create a room with harmony and balance regardless of the building style and purpose.

InLine can be used in district heating, oil/gas boilers, heating pumps or similar systems - as a primary source of heating or in combination with other heat emitters, e.g. floor heating.

Technical information

Heated system water is conducted through Convec panels by two finned pipes (flow and return). An electric fan creates an airstream across the finned pipes and transfers heat to the air in the room.

Unlike traditional flow control, the Convec panel's output is controlled by adjusting the fan speed. As the panels operate at the same average temperature difference along the entire length of the panel, the heat output will be uniform over the panel's entire length.

Forced convection

The Convec comfort panels are based on forced convection, which transmits heat directly into the air in the room. The use of forced convection means that the panels can increase room temperature very quickly and will often be able to change the room temperature by several degrees in quite a short space of time.

Controls

The room temperature is controlled by manually adjusting the CHR room thermostat to the desired temperature. Alternatively, a 0-10 V signal from e.g. a BMS unit can be sent to the panel's motor control.

Dimensions

The cross section of a InLine panel is 81 x 81 mm. Panels can be supplied in lengths of up to 3500 mm (tolerance +/-2 mm).

Several panels can be built together creating panels to a length of 15 m.

Installation

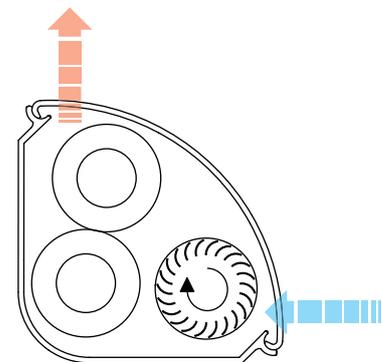
InLine panels are primarily developed for installing in a 90° corner between two surfaces, e.g. wall/wall, wall/ceiling, column/wall or similar.

Installation instructions are given on pages 5 and 6 of this product sheet. For more detailed information on installation, please see the InLine Installation Instructions supplied with the panels.

InLine panel



Air flow



Cold draught

Modern architecture often contains large sections of glass. Such large window sections can lead to cold draught and thereby create discomfort in rooms.

When installing InLine panels along window sections, MEINERTZ recommends placing of the panels with the finned pipes facing the window. The fan will then force the hot air in direction of the windows and cold draughts are avoided.

MEINERTZ offers to assist in calculating the exact heating output required to avoid cold draughts.

Visual optimisation (empty panel casing)

InLine can be supplied as an empty panel casing, i.e. without fan or finned pipes, for use in projects where a longer

panel is required for aesthetic reasons.

Operational conditions

InLine comfort panels can be used in a heating system with a maximum water temperature of 85°C and a 10 bar operational static pressure (test pressure = 1.3 x operational pressure).

Safety and handling during the building period

During the building period and before installation, it is important to store and handle InLine panels correctly. Each panel consists of a variety of precisely manufactured components, which are sensitive to impacts or dirt. It is recommended that final installation is performed in the building at a time when it will be possible to protect the panels from damage.

Maintenance

The panel components are developed for long-term use. Maintenance comprises cleaning front profile and possible hoovering of panel (as required).

Test

Convec comfort panels has been tested by the Danish Institute of Technology, according to DS/EN 442.

Ordering

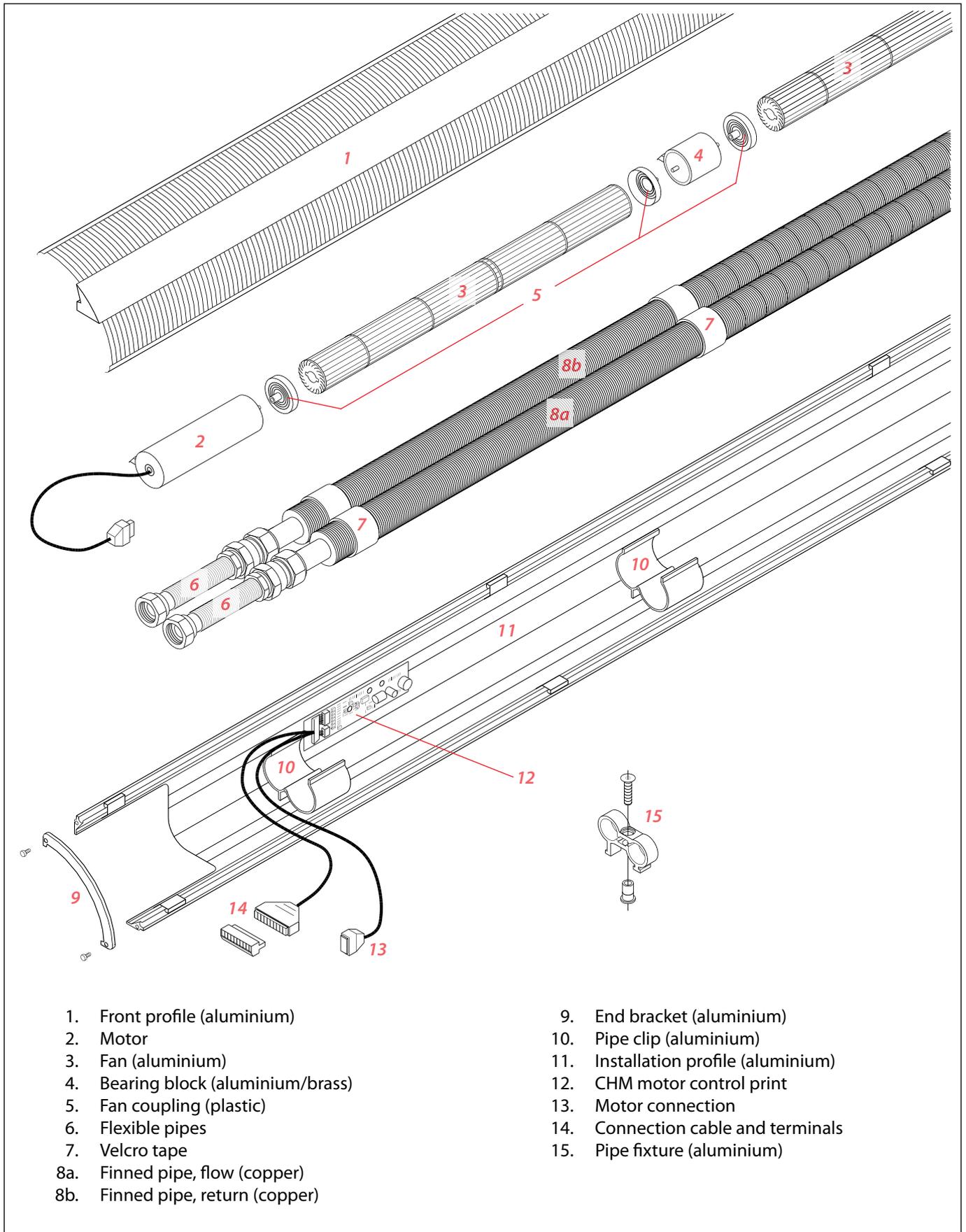
See "Ordering" on page 25 and the section "Placing orders" on the back page.

Technical information / specifications

Weight (without water)	3.8 kg/m
Length per panel unit	1000 - 3500 mm (±2 mm)
Storage temperature	-10 - 60 °C
Water temperature	8 - 85 °C
Water quality	VDI 2035
Max. operating static pressure	10 Bar
Max. test pressure	13 Bar
Air flow, 1500 rpm	85 m ³ /h per meter panel
Noise level at 1500 rpm	*22dB(A)

**Measured a 2200 mm panel, water flow 300 l/h, distance 1.5 m.*

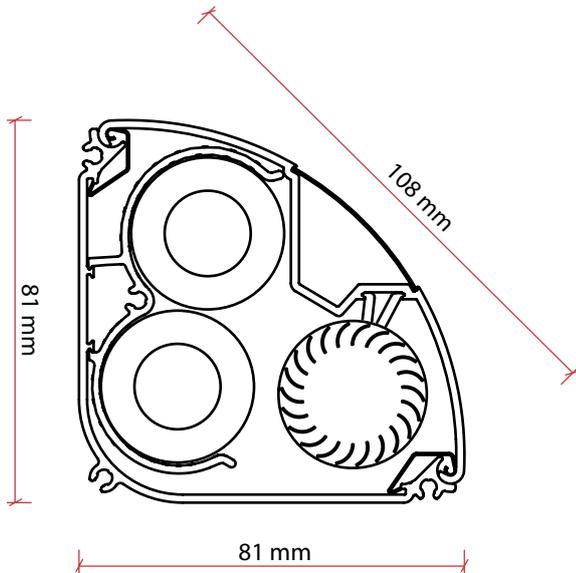
Design



Dimensions

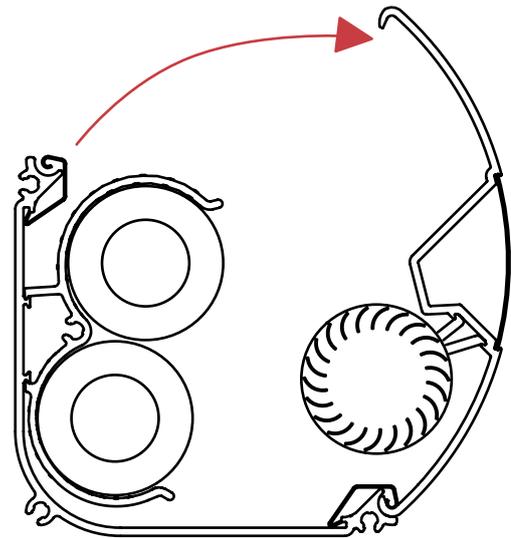
Produkt dimensions

Convec InLine panels measure 81 mm in width, 81 mm in height and 108 mm across.



Hinge

The front profile of the InLine panel is fixed firmly to the installation profile with hinge clips which allows the panel to be opened without disassembling the front profile. The panel can be opened to both sides.

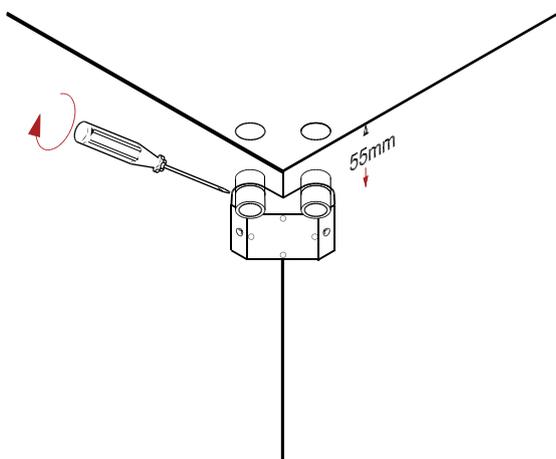


Installation

Connection bracket

A connection bracket is used to connect to the system supply to prevent transmission of any expansions from the system onto the panel.

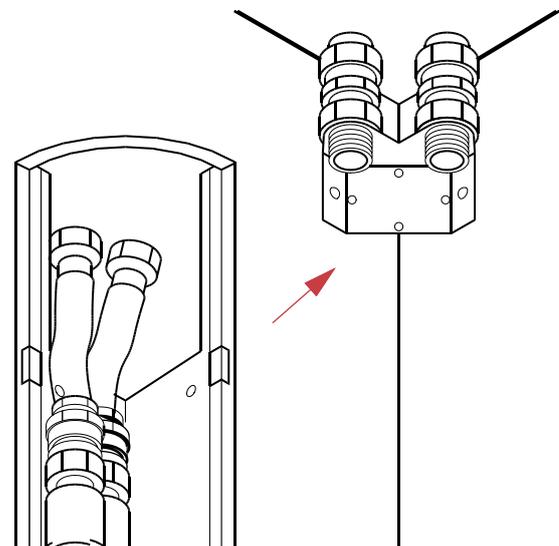
The connection bracket can be installed early in the construction period, which allows the system pipe work to be completed at an early stage.



Installing the panel

The InLine installation profile can easily be slid over the connection bracket.

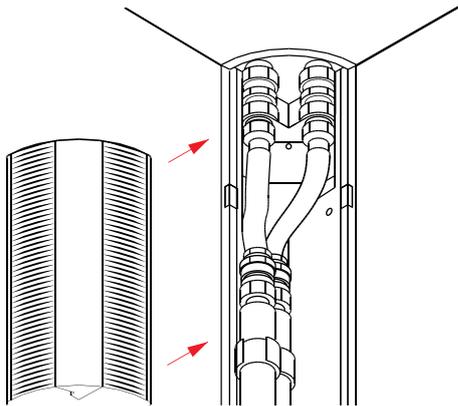
The installation profile can hereafter be fixed firmly to the support trough pre-drilled holes.



Front profile

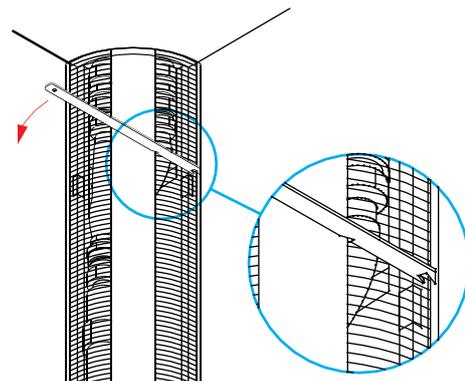
Installation of front profile

The front profile is easily fastened to the installation profile.
For more information, see the installation instruction that comes with the panel.



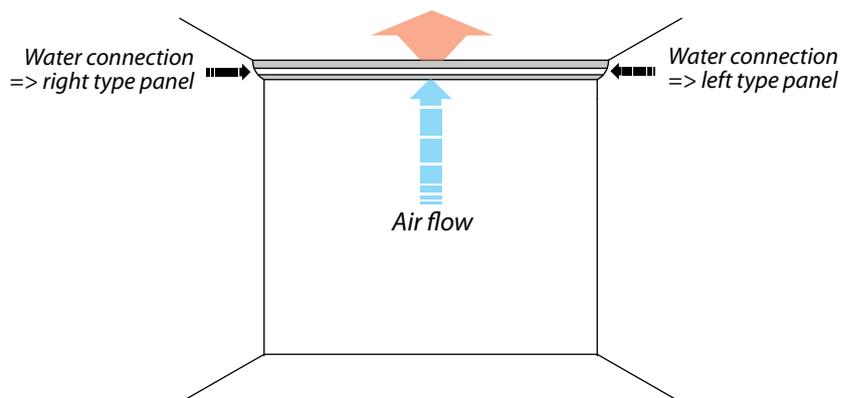
Opening the front profile

The front profile can easily be opened, using a Convec opening tool (088H4820) which by applying a light pressure releases the front profile from the installation profile.

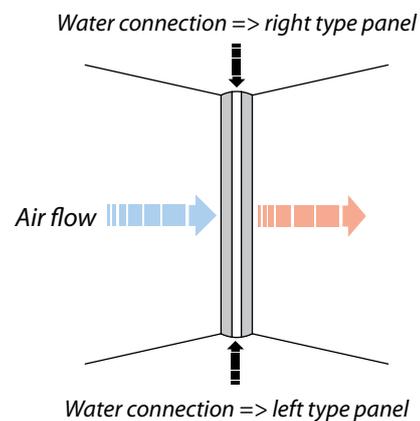
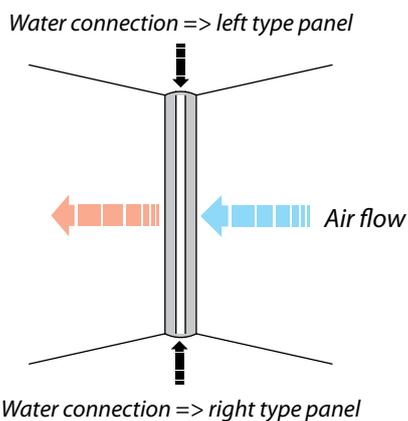


Defining the connection side of a panel

Before ordering InLine panels it is necessary to define if the panel must be a right or a left type panel. This definition is based on the air flow direction in relation to the system connection.

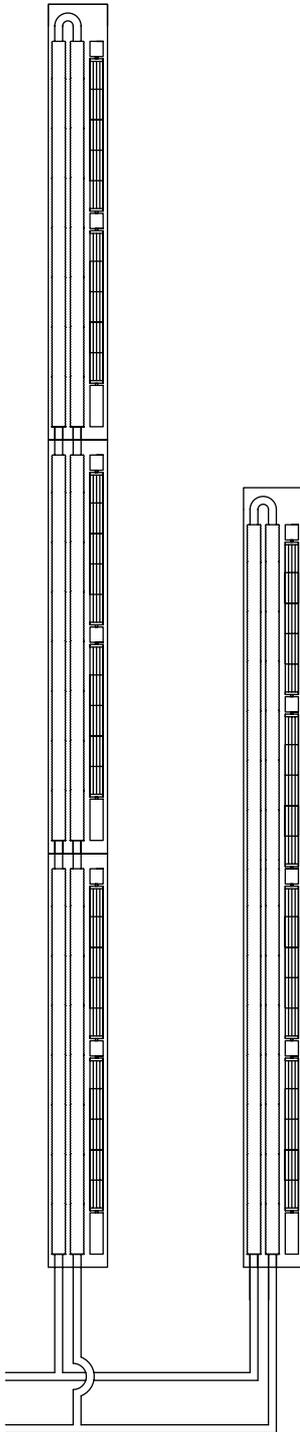


Note! Installations with the air flow in opposite direction are not recommendable because of possible feed-back of the air flow around the panel.



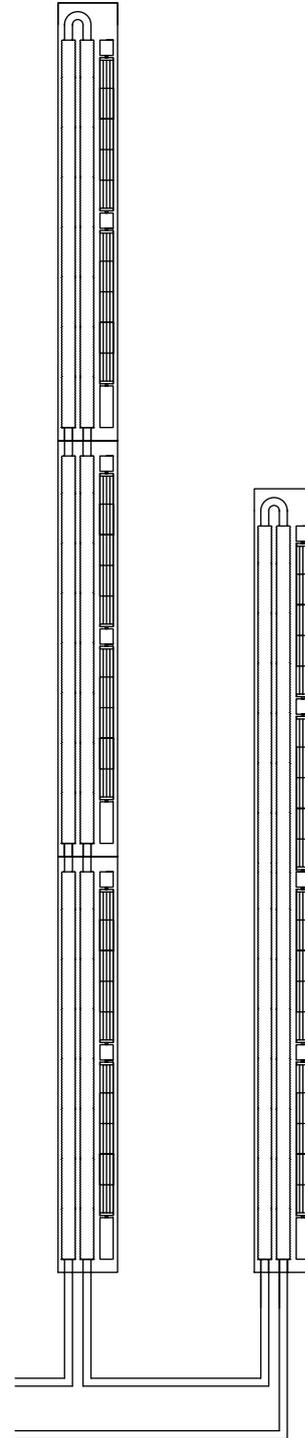
Applications

Two-pipe system



Convec comfort panels can be used in a traditional two-pipe system or connected in series of lengths of up to 15000 mm with the potential for intermediary pipe work. The same panel string can be used for several rooms as the panel output is controlled by fan speed rather than flow.

One-pipe system

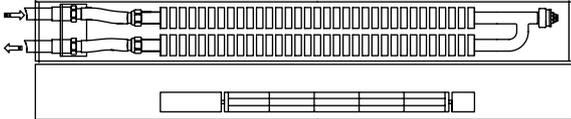
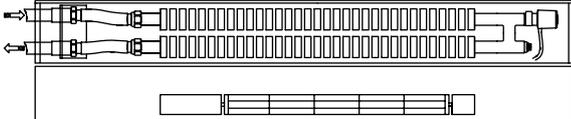
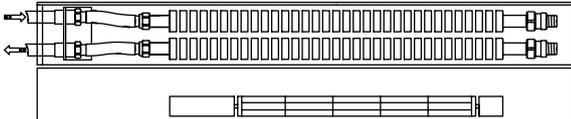
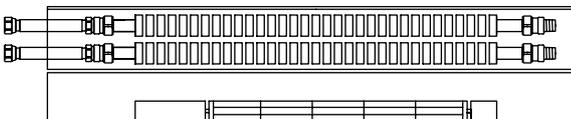
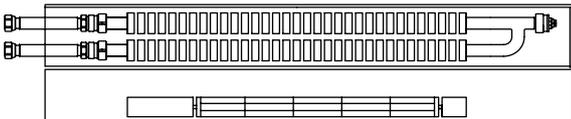
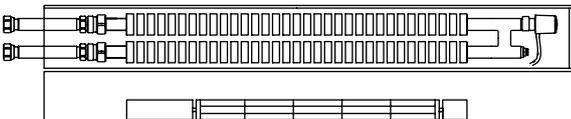
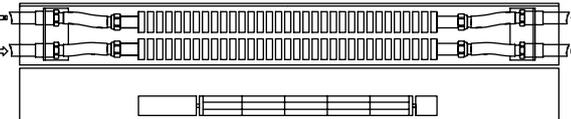
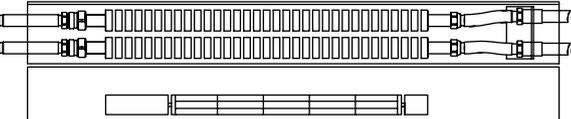


Convec panels can also be used in a one-pipe system. However, this will create a different output than stated in this product sheet.
Contact MEINERTZ for further information regarding one pipe systems.

Panel variants - left

InLine is available in six different panel variants, which differ according to use and panel connections.

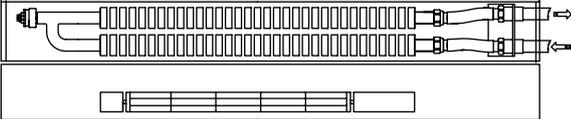
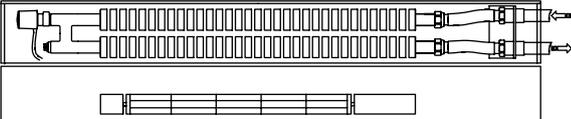
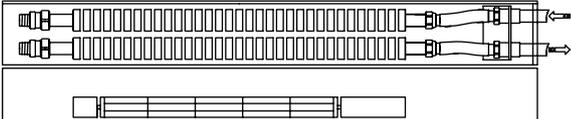
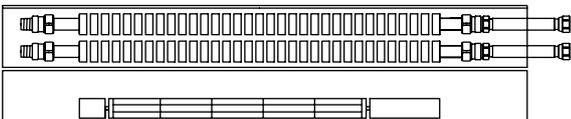
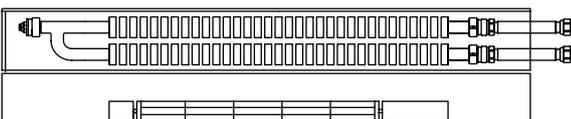
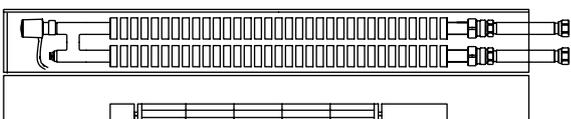
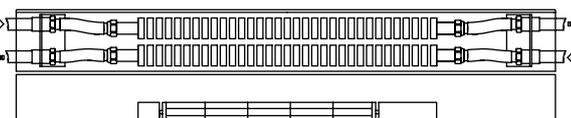
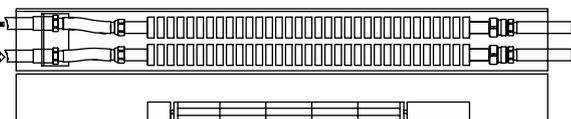
Each panel variant can be supplied with left or right connection.

Stand-alone panels (S & ST)		K_V
	S-panel: Stand-alone panel unit with connection to system supply, incl. return bend with air vent.	1.3
	ST-panel: Stand-alone panel unit with connection to system supply, incl. return valve with TWA-A thermal actuator and air vent.	0.9
Connection panel (C)		K_V
	C-panel with connection to system supply and nipples for direct panel extension with other panels.	1.4
Extension panel (E)		K_V
	E-panel for direct connection to two panels, incl. flexible pipes and nipples.	1.4
Return panels (R & RT)		K_V
	R-panel: Panel for finishing a panel string, incl. flexible pipes and air vent.	1.4
	RT-panel: Panel for finishing a panel string, incl. flexible pipes, air vent and TWA-A thermal actuator.	0.9
Link panel (L)		K_V
	L-panel for series connection of panels of the same string that are not connected directly into a panel. Closed at both ends with connection to system supply.	1.1
Finishing panel (F)		K_V
	F-panel for ending a series connection panel string before system supply is connected to the next panel, incl. flexible pipes and system connection.	1.1

Panel variants - right

The different panel variants can be combined together. Left type or right type versions must be requested in orders. See panel codes for orders on page 25.

Note! The stated K_v values are used when calculating the total pressure loss over one or more panels. See guidance on page 16.

Stand-alone panels (S & ST)	K_v
	1.3
	0.9
Connection panel (C)	K_v
	1.4
Extension panel (E)	K_v
	1.4
Return panels (R & RT)	K_v
	1.4
	0.9
Link panel (L)	K_v
	1.1
Finishing panel (F)	K_v
	1.1

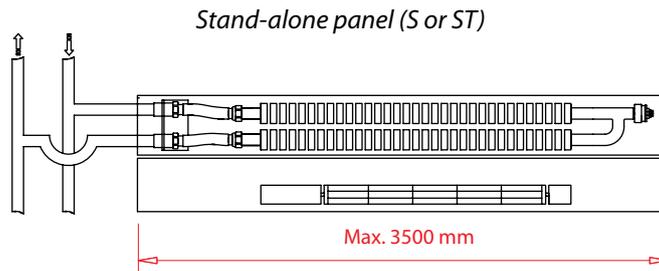
Panel configuration I

Panel length up to 3500 mm (stand-alone solution)

If possible, panels of up to 3500 mm should be constructed as a stand-alone solution. In principle, this is carried out like a traditional radiator installation, connected to a two-pipe system.

60 cm of a panel unit is used for motor, connections and fittings. To ensure maximum output per meter of panel, MEINERTZ recommend using panel units as long as possible.

Example

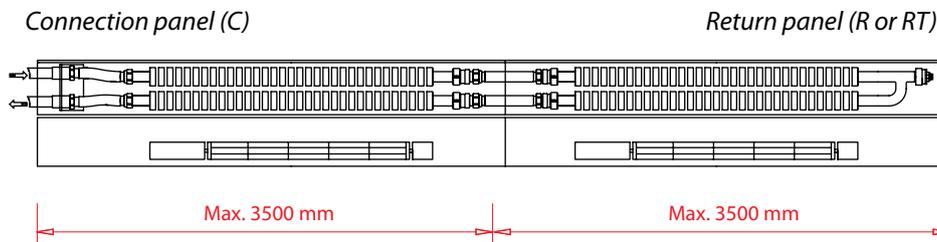


Panel length 3500 mm to 7000 mm (connection of 2 panels)

Panels longer than 3500 mm are created by connecting a connection panel (C) with a return panel (R or RT).

This configuration has a max. length of 7000 mm.

Example

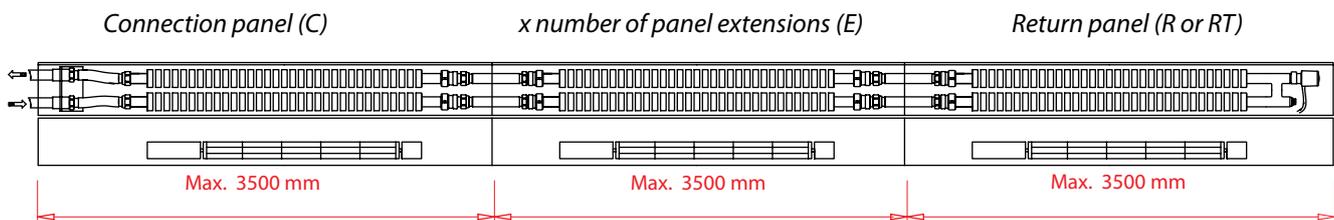


Panel length 7000 mm to 15000 mm (connection of 3 or more panels)

Extension panels (E) are used to extend Convec comfort panels from 7000 mm up to 15000 mm by connecting the panels directly together.

The recommended maximum length of the combined panel is 15000 mm. However, the pressure loss must be observed prior to ordering.

Example

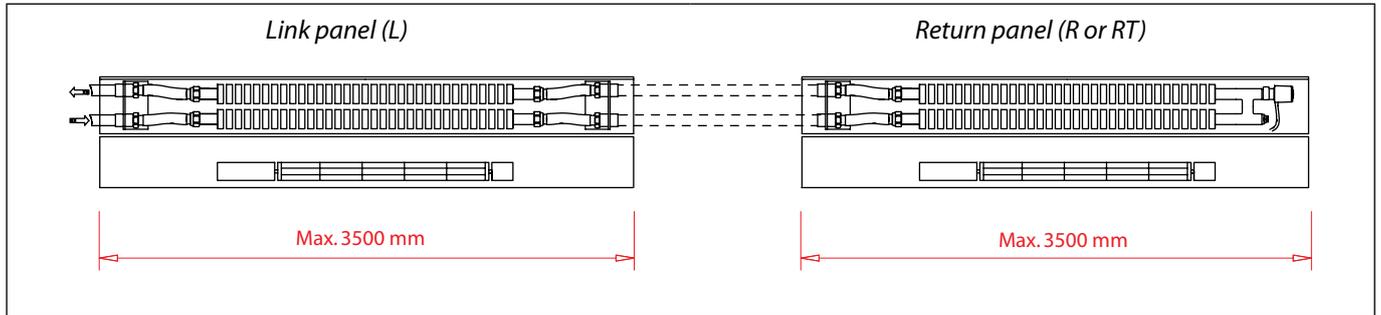


Panel configuration II

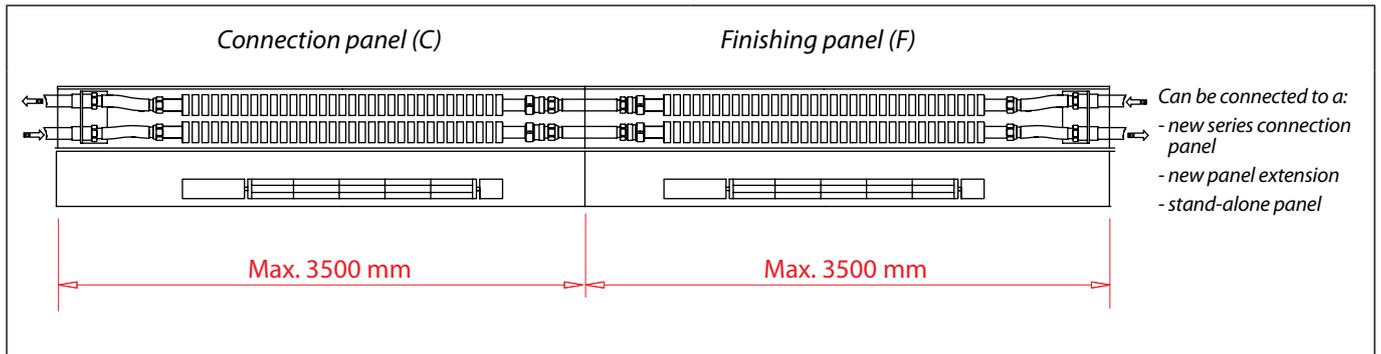
Series connection of panels

In addition to extending panels by direct connection of InLine panels, it is also possible to connect panels of the same string by using intermediary tubing in series.

Series connection allows you to successfully run one string through several rooms.



Series connection using finishing panels



Heat output I

Temperature set: 50/45/20 °C		(Fan speed: 1500 RPM)
Panel length	Heat output	Flow
1000 - 1199 mm	80 W	14 l/h
1200 - 1399 mm	137 W	24 l/h
1400 - 1599 mm	196 W	34 l/h
1600 - 1799 mm	254 W	44 l/h
1800 - 1999 mm	313 W	54 l/h
2000 - 2199 mm	370 W	65 l/h
2200 - 2399 mm	427 W	75 l/h
2400 - 2599 mm	487 W	85 l/h
2600 - 2799 mm	552 W	96 l/h
2800 - 2999 mm	617 W	108 l/h
3000 - 3199 mm	683 W	119 l/h
3200 - 3399 mm	749 W	131 l/h
3400 - 3500 mm	815 W	142 l/h

Temperature set: 60/50/20 °C		(Fan speed: 1500 RPM)
Panel length	Heat output	Flow
1000 - 1199 mm	83 W	7 l/h
1200 - 1399 mm	153 W	13 l/h
1400 - 1599 mm	226 W	20 l/h
1600 - 1799 mm	301 W	26 l/h
1800 - 1999 mm	377 W	33 l/h
2000 - 2199 mm	453 W	40 l/h
2200 - 2399 mm	530 W	46 l/h
2400 - 2599 mm	605 W	53 l/h
2600 - 2799 mm	681 W	60 l/h
2800 - 2999 mm	755 W	66 l/h
3000 - 3199 mm	829 W	73 l/h
3200 - 3399 mm	902 W	79 l/h
3400 - 3500 mm	983 W	86 l/h

Heat Output II

Temperature set: 70/40/20 °C		(Fan speed: 1500 RPM)
Panel length	Heat output	Flow
1000 - 1199 mm	29 W	1 l/h
1200 - 1399 mm	74 W	2 l/h
1400 - 1599 mm	131 W	4 l/h
1600 - 1799 mm	195 W	6 l/h
1800 - 1999 mm	263 W	8 l/h
2000 - 2199 mm	333 W	10 l/h
2200 - 2399 mm	407 W	12 l/h
2400 - 2599 mm	481 W	14 l/h
2600 - 2799 mm	556 W	16 l/h
2800 - 2999 mm	633 W	19 l/h
3000 - 3199 mm	709 W	21 l/h
3200 - 3399 mm	787 W	23 l/h
3400 - 3500 mm	864 W	25 l/h

Temperature set: 75/65/20 °C		(Fan speed: 1500 RPM)
Panel length	Heat output	Flow
1000 - 1199 mm	140 W	12 l/h
1200 - 1399 mm	243 W	21 l/h
1400 - 1599 mm	349 W	31 l/h
1600 - 1799 mm	457 W	40 l/h
1800 - 1999 mm	564 W	50 l/h
2000 - 2199 mm	670 W	59 l/h
2200 - 2399 mm	775 W	68 l/h
2400 - 2599 mm	878 W	78 l/h
2600 - 2799 mm	990 W	87 l/h
2800 - 2999 mm	1108 W	98 l/h
3000 - 3199 mm	1227 W	108 l/h
3200 - 3399 mm	1347 W	119 l/h
3400 - 3500 mm	1467 W	129 l/h

Heat output III

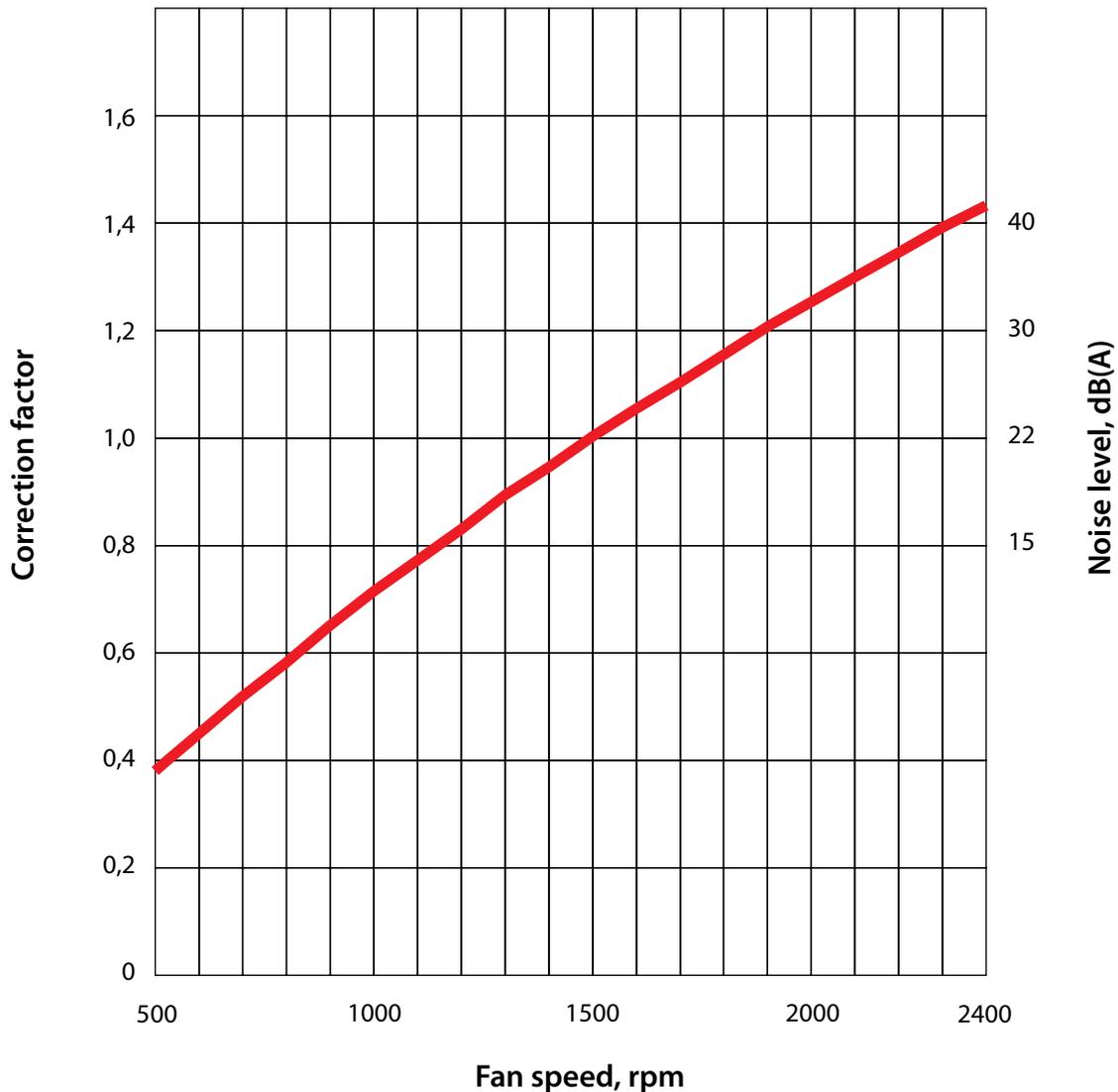
Temperature set: 70/50/20 °C		(Fan speed: 1500 RPM)
Panel length	Heat output	Flow
1000 - 1199 mm	64 W	3 l/h
1200 - 1399 mm	134 W	6 l/h
1400 - 1599 mm	212 W	9 l/h
1600 - 1799 mm	295 W	13 l/h
1800 - 1999 mm	380 W	17 l/h
2000 - 2199 mm	467 W	21 l/h
2200 - 2399 mm	555 W	24 l/h
2400 - 2599 mm	643 W	28 l/h
2600 - 2799 mm	732 W	32 l/h
2800 - 2999 mm	821 W	36 l/h
3000 - 3199 mm	910 W	40 l/h
3200 - 3399 mm	1000 W	44 l/h
3400 - 3500 mm	1089 W	48 l/h

Temperature set: 65/45/20 °C		(Fan speed: 1500 RPM)
Panel length	Heat output	Flow
1000 - 1199 mm	49 W	2 l/h
1200 - 1399 mm	108 W	5 l/h
1400 - 1599 mm	174 W	8 l/h
1600 - 1799 mm	245 W	11 l/h
1800 - 1999 mm	319 W	14 l/h
2000 - 2199 mm	394 W	17 l/h
2200 - 2399 mm	470 W	21 l/h
2400 - 2599 mm	548 W	24 l/h
2600 - 2799 mm	625 W	27 l/h
2800 - 2999 mm	703 W	31 l/h
3000 - 3199 mm	781 W	34 l/h
3200 - 3399 mm	859 W	38 l/h
3400 - 3500 mm	938 W	41 l/h

Output/Fan speed - correction factors

If the required panel length for achieving sufficient heat cannot be installed, the heat output can be increased by raising fan speed above the nominal 1500 rpm. As shown below, the heat output increases almost proportional to the speed of the fan.

Please take into consideration when raising the fan speed that both the panel noise and the power supply load will increase. Make sure the noise level remains acceptable and the power supply is not overloaded.



Example:

An InLine panel of 3000 mm provides, at a flow of 21 l/h, fan speed at 1500 rpm and a temperature set of 70/40/20° an output of 709 W.

Increasing the output to 900 W will result in a correction factor of $900/709 = 1.26$. According to the diagram the fan speed has to be 1950 rpm, creating a noise level of approximately 32 dB(A).

Table is based upon actual measurements of the InLine comfort panel's heat output.

Measurements are performed in accordance with the standard EN 442.

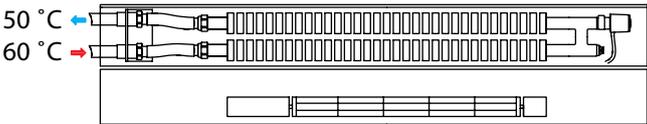
Calculating pressure loss

This example is only valid for panels with a nominal fan speed (1500 rpm).

K_v values for each panel variant are calculated based on a 3500 mm panel.

Example: Stand-alone panel

Stand-alone panel (ST)



Conditions:

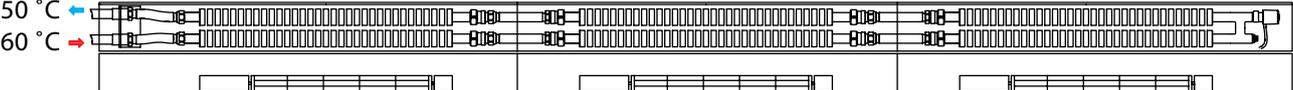
Temperature set:	60/50/20 °C
Panel length:	3450 mm
Heat output (see table, page 12):	983 W
Flow (see table, page 12):	86 l/h
K_v values (see pages 8-9):	0.9

Pressure loss Δp is calculated using the formula $\Delta p = (q/K_v)^2$ where q is given as m^3/h .

Pressure loss in this example is therefore: $\Delta p = (0.086/0.9)^2 = \mathbf{0.01 \text{ bar}}$

Example: Panels in series

	<i>Connection panel (C)</i> 3500 mm	<i>Extension panel (E)</i> 2500 mm	<i>Return panel (RT)</i> 3500 mm
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Output:	983 W	605 W	983 W
Flow:	86 l/h	53 l/h	86 l/h
K_v value:	1.4	1.4	0.9

*Information on output and flow can be found in the table, page 12-14.
 K_v values for each panel variant can be found on pages 8-9.*

Total output:	$\Sigma P = P_1 + P_2 + P_3$	$983 + 605 + 983 = 2571 \text{ W}$
Total flow:	$\Sigma q = q_1 + q_2 + q_3$	$86 + 53 + 86 = 225 \text{ l/h}$
Total K_v value:	$K_v = \sqrt{\frac{1}{K_{v1}^2} + \frac{1}{K_{v2}^2} + \frac{1}{K_{v3}^2}}$	$\Sigma K_v = \sqrt{\frac{1}{1.4^2} + \frac{1}{1.4^2} + \frac{1}{0.9^2}} = \mathbf{0.67}$

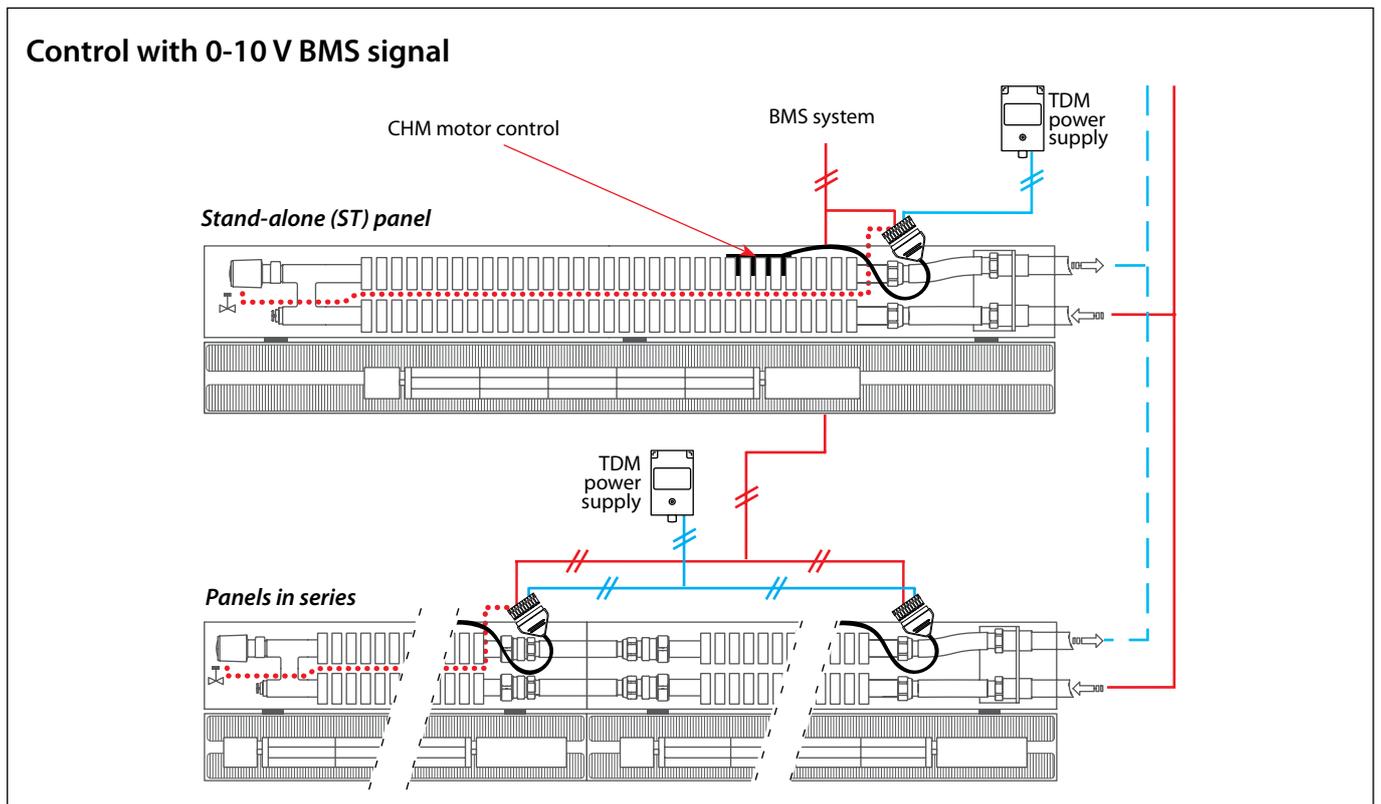
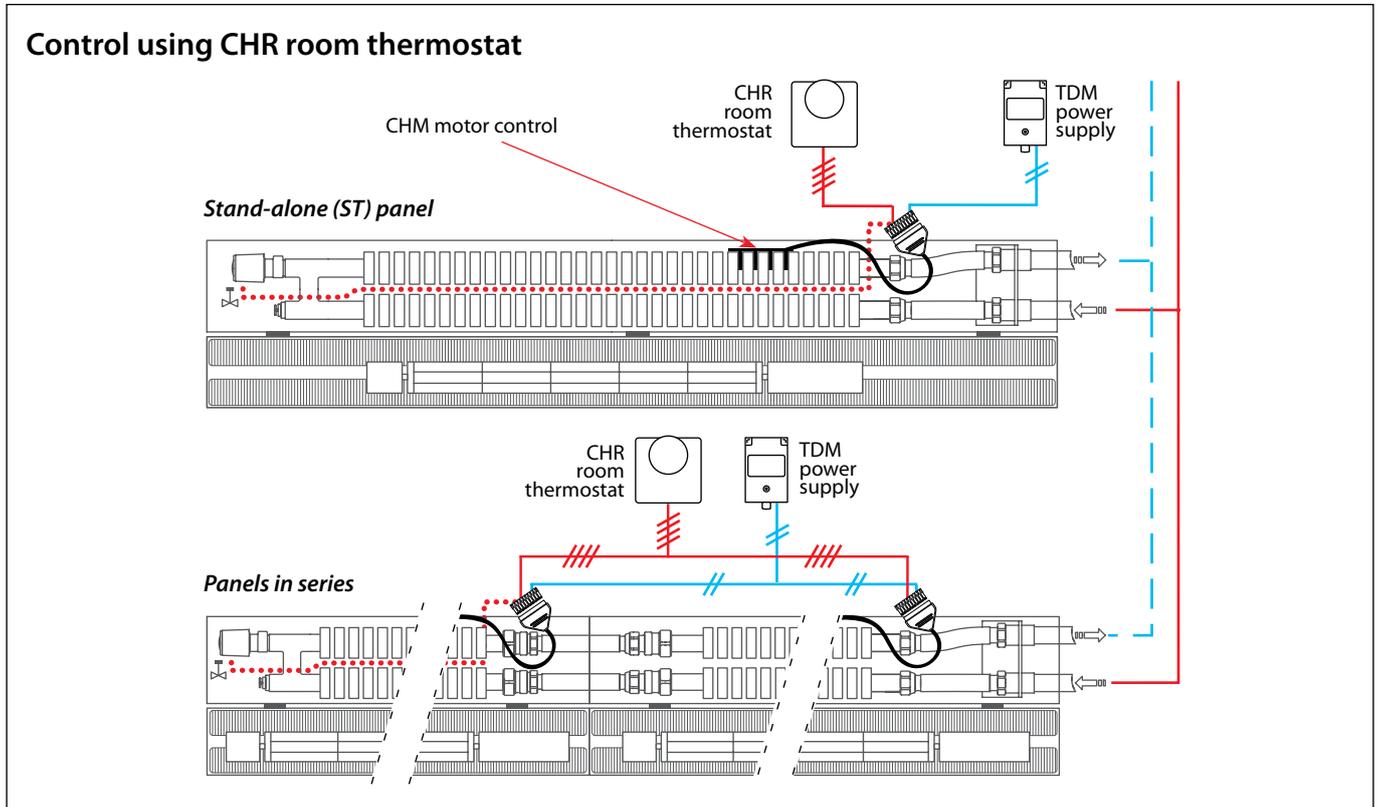
Pressure loss Δp is calculated using the formula $\Delta p = (q/K_v)^2$ where q is given as m^3/h .

Pressure loss in this example is therefore: $\Delta p = (0.225/0.67)^2 = \mathbf{0.1 \text{ bar}}$

Controls

InLine comfort panels can either be controlled by a CHR room thermostat or via an external 0-10 V BMS signal. When using a CHR room thermostat, panel and thermostat

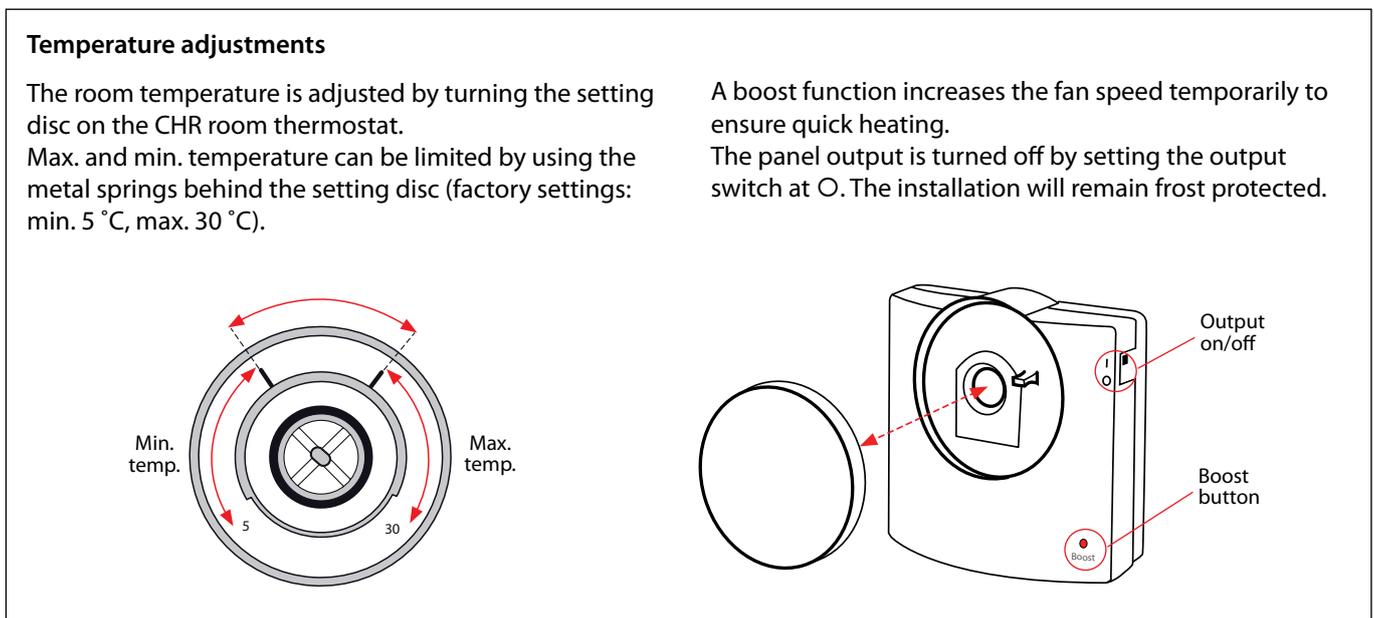
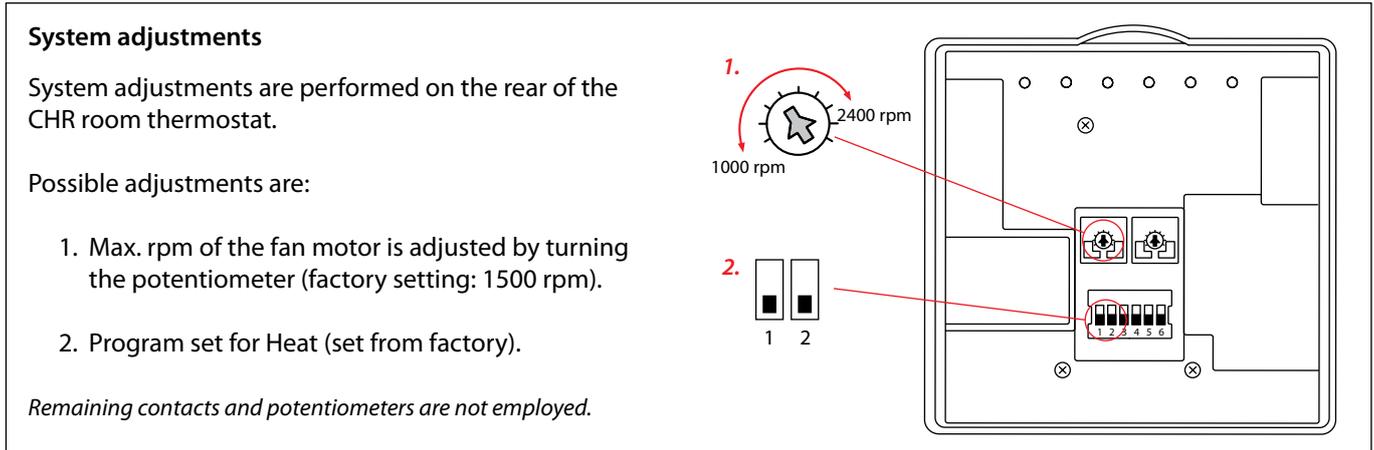
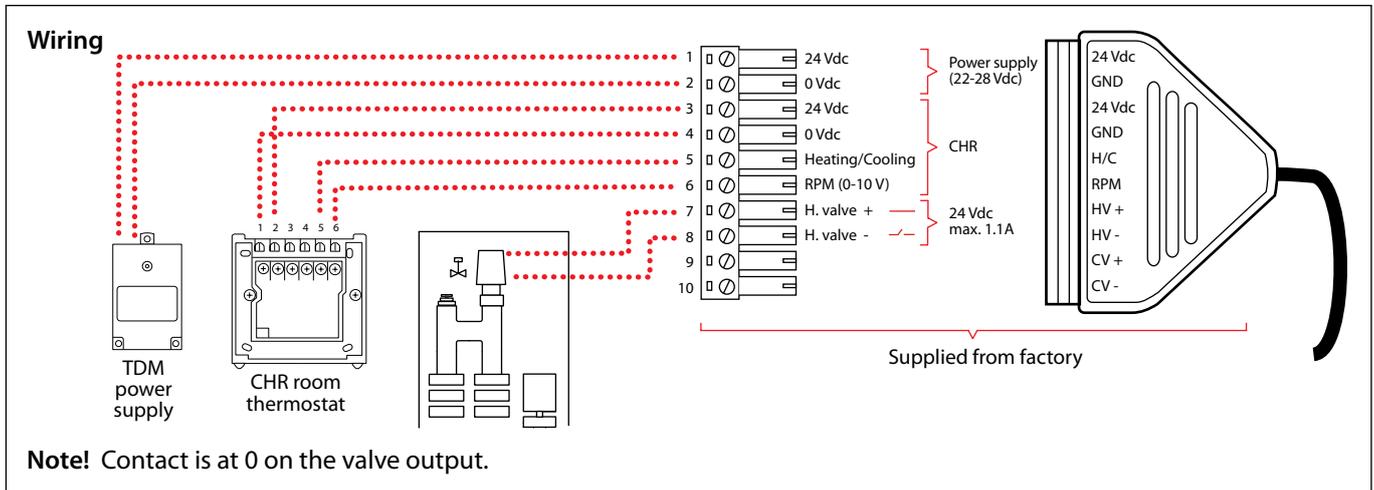
are connected with a 4-lead cable. When using a 0-10 V BMS signal the BMS system and the panel is connected with a 2-lead cable.



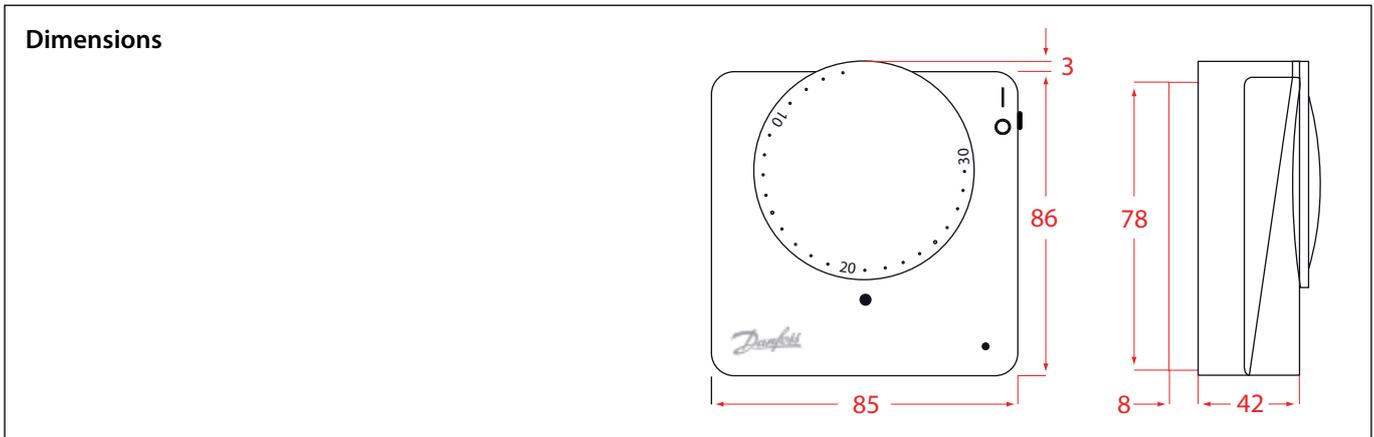
CHR room thermostat

The CHR is the electronic room thermostat for Convec comfort panels. A single CHR can control up to 10 Convec panels in the same room.

The CHR is a PI-regulator with a small P-band. It measures the room temperature and controls the output of the panel by transmitting a 0-10 V control signal to the motor control.



CHR room thermostat



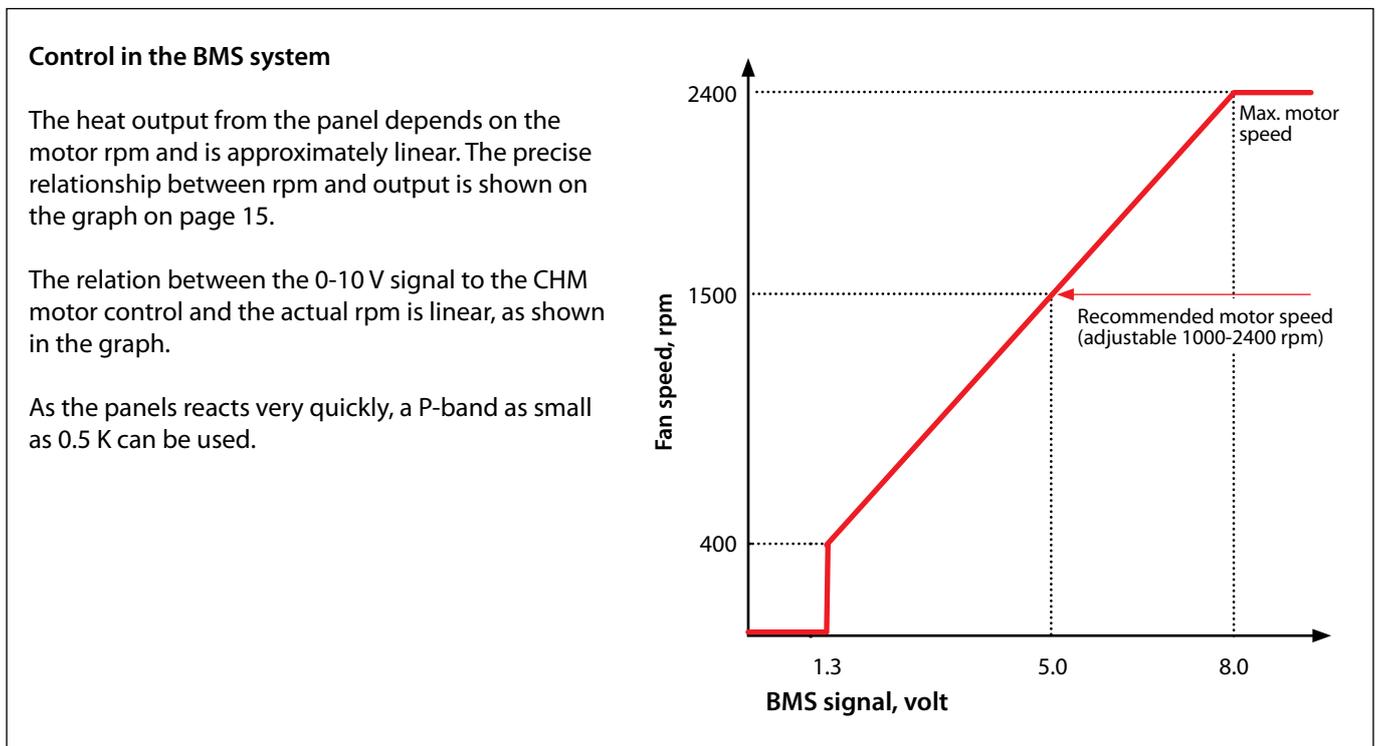
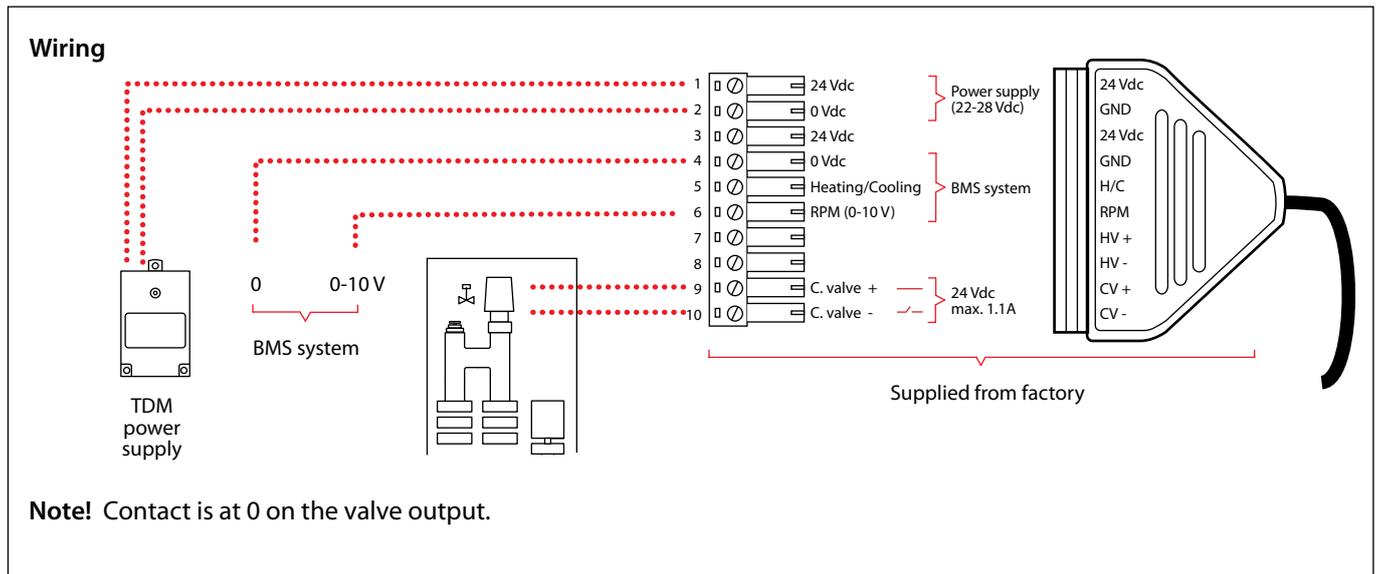
Technical information - CHR room thermostat

Voltage supply	24 Vdc +4V, -2V
Power consumption	6 mA
Temperature adjustment	5 - 30 °C
P-band, xP	0.5 °C
Adjustment of the fan motor's max. rpm	1000 - 2400 rpm
Fan motor rpm in boost function	2400 rpm
Protection class	IP20
External temperature	0 - 50 °C
Transportation temperature	-20 -60 °C
Pollution level	Level 2
Ball test temperature	75 °C
Software classification	Class A
Dimensions (l x h x d)	85 x 86 x 42 mm
Weight	0.143 kg
Approvals	73/23/EEC, 89/336/EEC, EN60730-1, EN60730-2-9, EN61000-6-3, EN61000-6-1

System with BMS control

The heat output from Convec comfort panels can be controlled by a 0-10 V signal from a BMS system. While the BMS system is managing the min. and max. fan speed, the panel's built-in CHM motor control will continue

to perform the panel control, e.g. stopping the motor if the fan is blocked as well as the management of any connected valves.

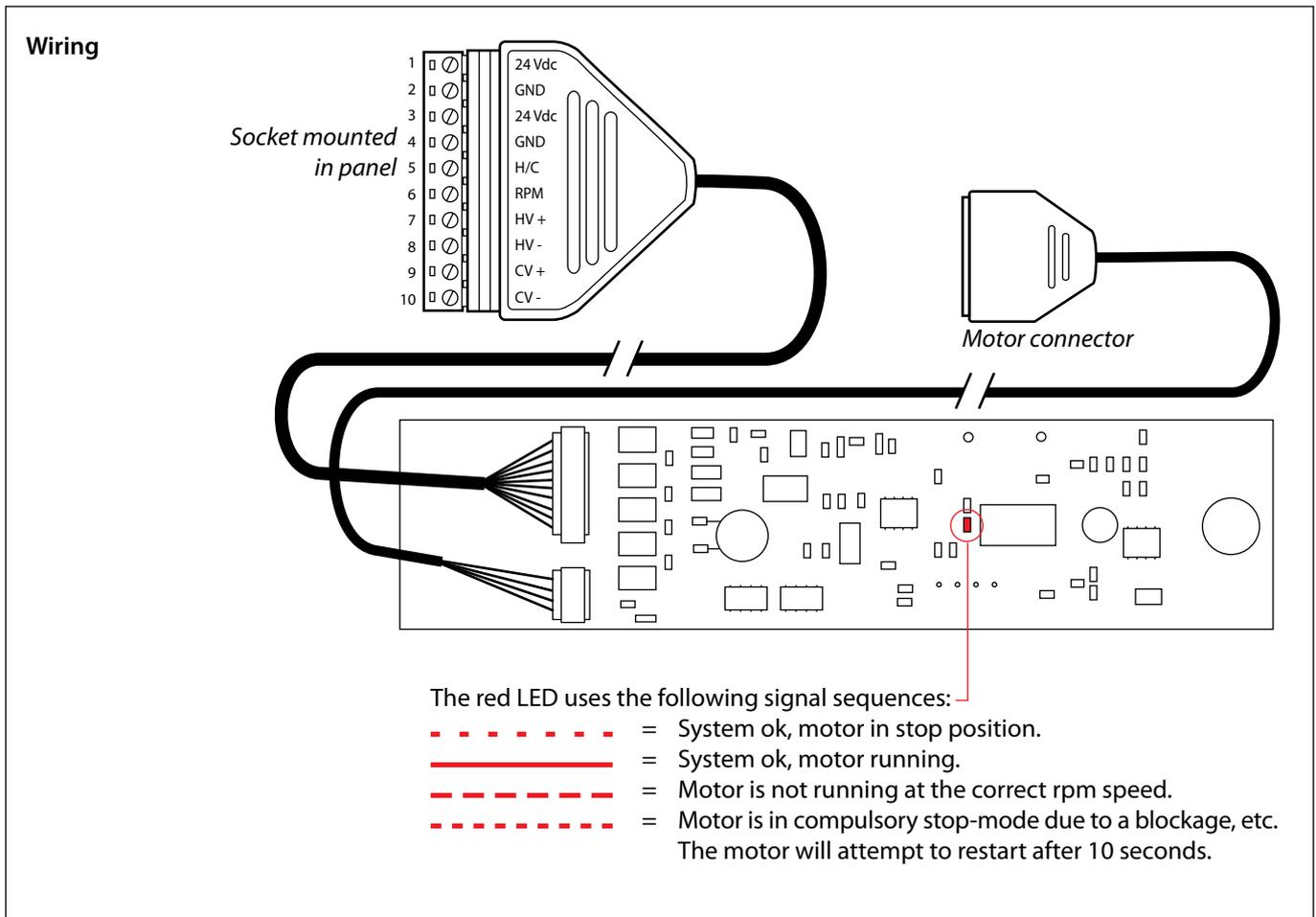


CHM motor control

The CHM motor control is integrated into the Convec panel and controls the fan motor speed using a 0-10 V signal from a CHR room thermostat or from a BMS system. The CHM monitors and controls the fan motor via a 4-lead

cable. If the motor is blocked, it will stop and then attempt to restart after 10 seconds.

CHM motor control can also activate a thermal actuator (e.g. TWA-A (NC)) to supply water to the Convec panel.



Technical data - CHM motor control

Power supply	24 Vdc (+4 V / -2 V)
Power consumption	11 mA
Actuator output	24 Vdc, max 1.1 mA
Protection class	IP54
External temperature	0 - 50 °C
Transportation temperature	-20 - 60 °C
Pollution level	Level 2
Software classification	Class A
Dimensions (l x h x d)	120 x 29 x 9 mm
Weight	140 g
Approvals	73/23/EEC, 89/336/EEC, EN60730-1, EN60730-2-9, EN61000-6-3, EN61000-6-1

TDM power supply

The TDM power supply supplies 24 Vdc to the Convec comfort panels.

The TDM is available in two versions with a maximum load of 1A and 3 A respectively.

The TDM is mounted directly onto a wall or ceiling.

The TDM is double isolated and meets the EN 61558-2-6 standard.

Dimensioning - TDM power supply

Panel length	Max. power consumption
1000 - 1199 mm	0.04 A
1200 - 1399 mm	0.06 A
1400 - 1599 mm	0.10 A
1600 - 1799 mm	0.13 A
1800 - 1999 mm	0.17 A
2000 - 2199 mm	0.22 A
2200 - 2399 mm	0.25 A
2400 - 2599 mm	0.30 A
2600 - 2799 mm	0.36 A
2800 - 2999 mm	0.39 A
3000 - 3199 mm	0.42 A
3200 - 3399 mm	0.45 A
3400 - 3500 mm	0.49 A

For panel variants ST and RT 0.25 A must be added to cover the power consumption for the TWA-A actuator.

Example:

Panel 1, 1450 mm	0.10 A
Panel 2, 2550 mm	0.30 A
Panel 3 (type RT), 3500 mm	0.25 A + 0.49 A
Panel 4, 3500 mm	0.49 A
Panel 5, 3500 mm	0.49 A

Total power consumption 2.12 A

The power supply can be chosen as 1 x TDM - 3A (088H4541) or 3 x TDM - 1A (088H4394).

If TDM - 1A are chosen, they must all carry loads below 1A.

Technical data - TDM power supply

	1A	3A
Voltage input	230 Vac, 50/60 Hz	230 Vac, 50/60 Hz
Voltage output	24 Vdc	24 Vdc
Power	24 VA	75 VA
Efficiency	> 77%	> 77%
Ripple	< 5% RMS	< 5% RMS
External temperature	Max. 40 °C	Max. 40 °C
Protection class	IP 44	IP 44
Dimensions (l x w x d)	124 x 73 x 61 mm	153 x 106 x 98 mm

If any other power supply is used for Convec comfort panels, make sure the output is within a range of 22 V - 28 V and the ripple is <5% RMS.

Wiring

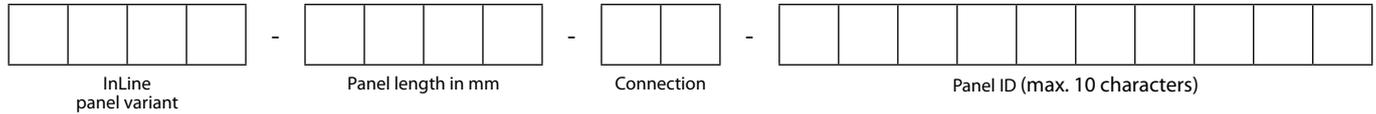
	from CHM motor control to CHR room thermostat / BMS system	from CHM motor control to TDM 1A power supply	from CHM motor control to TDM 3A power supply
Cable 0.25 mm ²	max. 50 m	max. 14 m	max. 5 m
Cable 0.50 mm ²	max. 50 m	max. 28 m	max. 10 m
Cable 0.75 mm ²	max. 50 m	max. 42 m	max. 14 m
Cable 1.0 mm ²	max. 50 m	max. 56 m	max. 19 m

Ordering InLine Comfort Panels

InLine comfort panel is ordered using a unique panel job number, which defines panel variant, length, etc.

The panel order number is created simply and easily using the panel codes below.

Creating a panel order number



Panel order number codes

InLine panel variants

- ILS.** InLine, stand-alone panel
- ILST** InLine, stand-alone panel with TWA-A thermal actuator
- ILC** InLine, connection panel
- ILE.** InLine, panel extension
- ILR** InLine, return panel
- ILRT** InLine, return panel with TWA-A thermal actuator
- ILL.** InLine, series connection panel
- ILF.** InLine, end panel

Connection

- L** Left type panel
- R** Right type panel
- EL** Empty panel without tubing or power, left type
- ER** Empty panel without tubing or power, right type

Panel ID

XXXX . . . Choose your own unique panel description , e.g. HALL002 or ROOM232-03

Example

An InLine stand-alone left type panel with TWA-A thermal actuator and a length of 2345, which is to be used as panel no. 3 in room no. 128, can be defined with the following panel order number:

ILST-2345-L-NO3ROOM128

Accessories

Description	Code number
CHR room thermostat	088H4050
TDM power supply, 24 Vdc , 1 A, class 2 transformer	088H4394
TDM power supply, 24 Vdc , 3 A, class 2 transformer	088H4541
Opener	088H4820
Open ring spanner, 24 mm	088H4821
Fan	088H4803
Bearing block	088H4802
Motor, right	088H4800
Motor, left	088H4801
CHM motor control	088H4051

Placing orders

In order to comply with your request for Convec InLine comfort panels we need to have the following information:

- Customer's (person placing order) name and address.
- Delivery address.
- Requisition number and billing address.
- Desired date of delivery.
- Panel order number.

For further information on Convec InLine comfort panels please contact:

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