



Instructions for Installation



EcoStrip XP

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- ESSENTIAL SAFETY RULES

Read this manual carefully before starting unpacking and assembly operations!

All persons involved in the installation, commissioning and use of this product are required to transmit this manual to those involved and in parallel, or subsequently, to the end user or to the operator responsible for the installation.

Keep this manual until its final decommissioning!

Frenger radiant panels are built according to the standards and recognised safety rules. However, use may cause hazards for people or damage to the product or other property if it is not installed and commissioned correctly or used improperly.

Frenger radiant panels must be used exclusively for heating indoor environments, therefore it is not suitable to be used:

- for outdoor installations;

- for installations in damp environments such as, for example, swimming pools;

- for installation in explosive atmospheres;

- for installation in corrosive atmospheres.

During storage and installation, the products must be protected against moisture.

If in doubt, use must be agreed with the manufacturer. Any other or further use is considered an improper use. The installer/operator is held solely responsible for any damage caused. Proper use also includes compliance with the installation instructions described in this manual.

The installation of this product requires skills in the heating sector. This knowledge, which is usually taught in vocational training in the employment fields mentioned above, is not described separately. Malfunctions or damage due to improper installation are the responsibility of the installer.

-SAFETY REQUIREMENTS

Attention! Radiant panels may have sharp edges that can cause injuries. Handling the panel incorrectly can result in bruising and breaking bones due to its weight.

For this reason, during assembly wear gloves, a hard hat and safety shoes and, if possible, only move panels with mechanical lifting devices.

- USING AND STORING THE MANUAL

This instruction manual is intended for the machine user, owner and technical installer and must always be available for consultation.

The instruction manual indicates the intended use of the machine, its technical features and provides indications as to its correct use, cleaning, adjustments and use. It also provides important indications for maintenance, for residual risks and anyhow to carry out operations with particular attention.

This manual must be considered as a part of the machine and must be kept for future reference until the final scrapping of the product.

The instruction manual must always be available for consultation and preserved in a dry and protected area.

Should it be lost or damaged, the user can request a new manual from the manufacturer or retailer, indicating the product model and its code displayed on the ratingplate.

This manual reflects the state of technology at the moment it was drafted. The manufacturer reserves the right to update production and following manuals without being obliged to update previous versions as well.

The manufacturer will not be held liable in case of:

- improper use or misuse;

- use nonconforming to that expressly specified in this publication;

- changes to the product or any other unauthorised intervention;

- total or partial failure to comply with the instructions;

- exceptional events.

- DELIVERY AND STORAGE

Frenger radiant panels are supplied on wooden pallets with cardboard separators to prevent damage. Upon receipt, make sure that the material is intact and corresponds to the supply.

The vehicle unloading operations are the responsibility of the recipient.

To prevent the separators from staining the painted surface of the panel, avoid storing the material outside, exposed to the elements (rain and/or fog). The panels must in any case be stored in a dry place away from the elements.



- HANDLING

Panels must be handled by at least two people.



- PRODUCT INDENTIFICATION

Each panel features an identification label indicating the manufacturer's details and the relative model. The Frenger EcoStrip XP series is CE marked in compliance with European Standard EN 14037-1.

- DISPOSAL

Consumables and replaced parts should be disposed of safely and in accordance with the environmental protection legislation.

The person performing installation and maintenance throughout the entire service life of the device must carefully follow the instructions below and comply with the following requirements:

The packaging consists of recyclable materials such as cardboard and polystyrene (EPS). Also the paper instructions, bags and protective polythene sheets (PE) are made with recyclable material.

If the system has antifreeze liquid added to it, the latter must not be discharged freely, because it is a polluting substance. It must be collected and suitably disposed of. Oil, grease, detergents, solvents and paint residues must be disposed of in accordance with current laws and regulations.

The materials resulting from dismantling the appliances must be separated and disposed of in authorised collection centres in accordance with the laws and regulations in force.

Insulation material is considered as non-hazardous waste; it must be removed and disposed of in authorised collection centres in accordance with the laws and regulations in force.





- Parts Diagram



- 1 Threaded male connections (1/2" 3/4" 1" 1 1/4")
- 2 Water drain connection 3/8"
- 3 Air vent connections 3/8"
- 4 First or end header
- 5 Steel pipe
- 6 Steel radiant panel
- 7 Hanging bracket
- 8 Fibreglass Insulation
- 9 Insulation retaining clip
- 10 Anti-convective skirts (on request)
- 11 Flat cover (on request)
- 12 Make-up joint (supplied as standard)
- 13 Pressfitting (supplied by others)
- 14 Make-up joint between panel and header
- 15 Ball guard (on request)

- TECHNICAL SPECIFICATIONS

SERIES ESXP:

- Radiant plate made of 0.8 mm thick high qualitysteel.
- 18 mm diameter electrowelded steel pipes with smooth ends for joining with clamp-on sleeves.
- Pipe/plate coupling through spot welding.
- Pipe pitch 100 mm (ESXP-03) or 75 mm (ESXP-04).
- Square section manifolds welded at the factory on the start and end heads.
- Possibility of raised manifold.
- Angular suspension crosspieces.
- Sheet metal strips for fastening the insulation padding.
- Contoured and painted connector cover plates for covering the junction area.
- Protection with a special phosphodegreasing process and epoxy-polyester powder coating, dried in a furnace at

180°C - RAL 9016 (white) or RAL 9002 (light grey), in compliance with Directive 76/769/EEC.

- Insulation padding available (supplied in bulk rolls) with 30 mm standard thickness, or 40 mm on request, with 25 micron aluminium sheet support:

- fire behaviour: Class A1 according to Standard EN 13501-1;
- thermal conductivity at 20°C: 0.036 W/mK for 30 mm thickness, 0.034 W/mK for 40 mm thickness;;
- density: 20 kg/m³ for 30 mm thickness, 25 kg/m³ for 40 mm thickness;
- thermal resistance: 0.83 m²K/W for 30 mm thickness, 1.17 m²K/W for 40 mm thickness.
- Emission of the radiant surface $\varepsilon = 0.96$.

- INSTALLATION

On the other hand, there are limitations in terms of the minimum installation height of the radiant surfaces, according to the average temperature values of the heating fluid. The recommended minimum values are shown in the table below, applicable for horizontal installations and in relation to people who carry out stationary work.

MINIMUM RECOMMENDED ASSEMBLY HEIGHT (in m compared to the floor) H₂O average

		ESXP-03-06		
	ESXP-03-03	ESXP-03-09	ESXP-03-12	ESXP-03-15
	ESXP-04-03	ESXP-04-03	ESXP-04-09	ESXP-04-12
60°	3.00	3.10	3.20	3.30
70°	3.10	3.20	3.30	3.40
80°	3.20	3.30	3.40	3.50
90°	3.30	3.50	3.70	3.80
100°	3.40	3.70	3.90	4.00
110°	3.50	4.00	4.30	4.40

SUSPENSION METHODS

The EcoStrip XP radiant panels can be suspended in various ways from the structures of the buildings. The illustrations in this manual show several suspension examples.

By fitting the tie rods in the relevant holes of the stiffeningcrosspieces, on the upper part of the radiant panels, it is possible to create non-visible suspensions arranged with fixed and modular pitches of approximately 2 or 3m. Since suspensions with a different pitch, ranging between 1 and 2.5 m, are envisaged, the tie rods must support the panel on the bottom side of the plate, or be provided as indicated in the next pages.

Installation example:

The suspension tie rods are not included in the supply of the radiant panels and must be provided by the installer.. They can be installed with steel cables, with threaded rods, with chains or with perforated straps and must be adjustable.

The length of the suspension tie rods must be proportionate to the total thermal expansion of the radiant strip: it is therefore necessary to take into account both the total maximum length and the average operating temperature of the heat transfer fluid, in order to limit the angular displacement of the tie rods to acceptable values. The minimum length of the tie rods recommended for the various lengths and for the various operating temperatures of the EcoStrip XP radiant panels are indicated in the relevant table.

Check that the chosen ceiling fastening system is compatible with the weight of the panel and complies with the standards in force.

The head and intermediate modules of the EcoStrip XP radiant panels can be joined together by clamp-on sleeves, in order to compose all the desired lengths.

The maximum distance between each suspension is 2.1m.



- BENDING

Table of vertical bending f according the distance between two suspension points.

BENDING f (mm)							
Model	Distance 2 m						
ES2-03	3						
ES3-03	1,5						
ES2-06	3,5						
ES3-06	2						
ES2-09	3,5						
ES3-09	2						
ES2-12	3,7						
ES3-12	2,5						

The table indicates the maximum bending expressed in mm between two suspension points of the radiant panels. The values refer to two distances between the suspension points: 2 m and 3 m.

Models with a panel width between 900 and 1500 mm cannot be suspended with distances between tie rods exceeding 2.1 metres.

Avoid loading the radiant panels with a weight greater than once the weight of the radiant panel.

The maximum curvature with respect to the longitudinal axis on 6 m panels is 10 mm.

-CORRECT SPACING BETWEEN THE RA-DIANT PANELS



It has been experimentally and practically found that the good uniformity of heat irradiation over a central area of a building (where the cooling effect of the o uter walls can be considered null) is obtained when the centre-to-centre distance between two adjacent EcoStrip XP radiant panels is equal to or less than the height from the floor. For example, where the installation height of the radiant panels is 4 m above the floor, the centre-to-centre distance of the adjacent EcoStrip XP panels must be set at 4 m or less, in order to achieve the best heating uniformity.



- SUSPENSION SYSTEMS



- ANCHORING POINTS

For radiant panels with a width of 1200 and 1500mm, the suspensions must have the distances indicated in the table below:

Mod	120	150		
а	780	965		
b	1200	1500		



- ANCHORING POINTS FOR HANGING PANELS

For radiant panels with a width of 300 to 900mm



- INSTALLATION

If the panels are to be mounted on the ceiling in buildings measuring over four meters in height, the safest and cheapest way to do this is to use lifting platforms with a lifting capacity of over 400 kg and which can reach the highest parts of the building.

These machines can be hired nationally.



Start by securing the suspension ties to the roof. The ties are not included in the supply. They can consist of chains, steel cables, threaded bars or other devices.

On the ground, place the insulation on the panels and secure it by positioning the supplied sockets every two metres.

Once the insulation is positioned, stack three or four modules, according to the capacity of the lifting platform, and load them onto the platform using a forklift truck. Move the panels onto the roof and attach them, one at a

time, to the previously positioned suspensions.

Once the entire panel has been installed (consisting of various 4 and/or 6-metre modules), join the head pipes of two adjacent modules.

The cover of the connector adheres perfectly to the pipes and also becomes a bright surface.

The presence of shaped plate side edges, the easy insulation installation, the head welding of the perfectly aligned pipes and the easy insertion of the connector cover reduce and simplify assembly time and therefore installation costs.

- SLOPES, AIR VENTS, WATER DRAINS

The radiant panels, with the pipes connected to each other in parallel by means of manifolds, must be installed as follows:

- the transversal axis, even in the case of horizontal installation, must slope slightly upwards towards the inlet connection of the heat transfer fluid;

- the longitudinal axis must slope upwards towards the inlet connection of the heat transfer fluid;

- the fluid inlet connection is the highest point of the heating body, in order to facilitate air venting, while the heat transfer fluid outlet connection is the lowest point from which it is possible to drain.

The supply pipes of the radiant panels must be designed in order to absorb the thermal expansions without affecting the heating bodies.

- MANIFOLDS

The manifolds are available with connections measuring: 1/2", 3/4", 1" and 1%".

Mod.	03	06	09	12	15
L	300	600	900	1200	1500



Mod	03	06	09	12	15
L	300	600	900	1200	1500
Α	200	500	800	1100	1400



Warning

The "D" and "D+D" type manifolds are not suitable for operation with superheated water or steam.

Manifold "D" can be used with hot water up to lines with a maximum length of 50 and using slow and soft opening valves.

-MINIMUM WATER FLOW VALUES INSIDE THE PANELS

If the speed of the water in the panel pipes is too low, the water will not be able to discharge the air.

This could cause a blockage in the circulation of the water with a substantial reduction in the thermal emission of the panel.

When determining the size of the systems, it is advisable to make sure that the speed of the water in every single pipe is never lower than the values shown in the diagram.

Minimum water flow rates



- ASSEMBLY WITH FITTINGS

See chap. "Assembly with fittings".



HYDRAULIC CIRCUIT

Water parameters

Maximum permissible values for the water used inside a closed loop

cooling	or	heating	circu	ıit
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Parameter		Unit	Value
pH value (a 20°C)	-	-	8 - 9
Conductivity (a 20°C)	-	μS/cm	< 700
Oxygen content	02	mg/l	< 0,1
Total hardness	-	°dH	1 - 15
Sulphur lons	S	-	not detectable
Sodium Ions	Na⁺	mg/l	< 100
Iron lons	Fe ²⁺ , Fe	mg/l	< 0,1
Manganese lons	Mn ²⁺	mg/l	< 0,05
Ammonia lons	NH ₄₊	mg/l	< 0,1
Chlorine Ions	Cl -	mg/l	< 100
Sulphate lons	SO ₄₂₋	mg/l	< 50
Nitrite Ions	NO ₂	mg/l	< 50
Nitrate ions	NO ₃	mg/l	< 50

In open circuits (for example when using well water), the water used must be purified from suspended materials by means of a filter w hich m ust be fitted on the inlet (otherwise there is the risk of erosion by suspended particles). It is also necessary to ensure that the unit is protected from dust and other substances that cause an acid or alkaline reaction when combined with water (aluminium corrosion).

The "Standard" EcoStrip XP radiant panels can be supplied with hot water at a maximum temperature of 120°C and with a maximum hydraulic pressure of 10 bar. The "Special" panels can even be supplied with superheated water, up to 16 bar of hydraulic pressure. Please note that, in the event of operation with superheated water, it is mandatory to fit t he c onnections w ith flanges and non-rubber seals.

NOTE: The "D" and "D+D" type manifolds are not suitable for operation with superheated water or steam.

Special attention needs to be paid to the choice of the mixing valve serving the radiant panels. In fact, in order to prevent problems due to the different pipe-sheet metal expansion, in the cold start phase and when changing between the reduced temperature and the comfort temperature, the flow water temperature can easily reach 45°C without any limitation, beyond which it can rise from 45°C up to 85°C, with an increase of 10°C every 3 minutes for radiant panels equipped with manifold "B", and an increase of 10°C every 4 minutes for radiant panels with manifold"D".

Provide hydraulic flow shut-off valves.

The supply pipes of the radiant panels must be designed in order to absorb the movements created by thermal expansions. If necessary, fit a dilator in the circuit.

Put a tap or a vent valve on the inlet manifold in the relevant \emptyset 3/8" threaded connection, to eliminate air from the circuit and, on the outlet manifold, a tap for draining the water. Plug the other \emptyset 3/8" connections.

- CONNECTION DIAGRAMS

Example diagram of connection with manifold "B". For the other connection diagrams, see chap. "Connection diagrams".





MODELS AND DIMENSIONS SERIES ESXP

ø18mm Pipes spaced 100mm apart



ESXP-3-06; 6 TUBES



ESXP-3-09; 9 TUBES



ESXP-3-12; 12 TUBES



ESXP-3-15; 15 TUBES



ø18mm Pipes spaced 100mm apart



ESXP-4-06; 8 TUBES



ESXP-4-09; 12 TUBES



ESXP-4-12; 16 TUBES



SERIES ESXP: Modular lengths and crosspiece pitches



SERIES ESXP: Modular lengths and crosspiece pitches



ASSEMBLY WITH FITTINGS









CONNECTOR COVER PLATE

Model	L	ø	No. pipes	Ρ	Code	Kg
SXP-3-03	302	18	3	100	9090A221	0.5
ESXP-3-06	602	18	6	100	9090A223	0.8
ESXP-3-09	902	18	9	100	9090A225	1.2
Model	L	ø	No. pipes	Ρ	Code	Kg
	1202	18	12	100	9090A227	1.6
ESXP-3-12	1202					

Model	L	ø	No. pipes	Ρ	Code	Kg
ESXP-4-03	302	18	4	75	9090A241	0.5
ESXP-4-06	602	18	8	75	9090A243	0.9
ESXP-4-09	902	18	12	75	9090A245	1.3
Model	L	ø	No. pipes	Ρ	Code	Kg
ESXP-4-12	1202	18	16	75	9090A247	1.7

CONNECTION DIAGRAMS

MANIFOLD "B" - Compensated lines

MANIFOLD "B" - Lines in series



MANIFOLD "D" - Compensated lines

MANIFOLD "B" - Coupled lines





System with radiant panels featuring greater thermal efficiency near the perimeter walls Type "B" and "D" compensated manifolds



MANIFOLD "D" - Lines in series



MANIFOLD "D+D"



Accessories

- 10. Anti-convective skirt
- 11. Flat cover
- 13. Press-fitting
- 14. Pipe cover between panel and manifold
- 15. Junction element for upper cover for gyms



INSULATION PADDING (FACTORY FITTED)

Code	н	L	Specific weight kg/m3	Weight kg/m
1050201		300		0,18
1050203		600		0,36
1050205	30	900	20	0,54
1050207		1200		0,72
1050203 + 1050205		1500		0,90

Code	Н	L	Specific weight kg/m3	Weight kg/m
1050211		300		0,30
1050213		600		0,60
1050215	40	900	25	0,90
1050217		1200		1,20
1050203 + 1050205		1500		1,50





FLAT REAR PROTECTIVE COVER (OPTIONAL EXTRA ITEM)







BALL GUARDS (OPTIONAL EXTRA ITEM)

1 <i>m</i>	2 <i>m</i>	3 <i>m</i>	4m	5m	6 <i>m</i>	
А	A - A	A - B - A	A - B - B - A	A - B - B - B - A	A - B - B - B - B - A	



	1 <i>m</i>	2 <i>m</i>	3m	4m	5m	6 <i>m</i>
A	1	2	2	2	2	2
В			1	2	3	4



		1	1	-										
			1m		2m		3m		4m		5m		6m	
Model	L	Н	Code	Kg	Code	Kg	Code	Kg	Code	Kg	Code	Kg	Code	Kg
ESXP-3-03 ESXP-4-03	272	38	9090A001	1,4	9090A011	2,8	9090A021	4,3	9090A031	5 <i>,</i> 8	9090A041	7,3	9090A051	8,8
ESXP-3-06 ESXP-4-06	572	58	9090A003	2,6	9090A013	5,2	9090A023	7,9	9090A033	10,6	9090A043	13,3	9090A053	16
ESXP-3-09 ESXP-4-09	872	77	9090A005	3,9	9090A015	7,8	9090A025	11,8	9090A035	15,8	9090A045	19,8	9090A055	23,8
ESXP-3-12 ESXP-4-12	1172	97	9090A007	5,1	9090A017	10,2	9090A027	15,4	9090A037	20,6	9090A047	25,8	9090A057	31
ESXP-3-15	1472	117	9090A009	6,4	9090A019	12,8	9090A029	19,3	9090A039	25,8	9090A049	32,3	9090A059	38,8









MAKE UP COVER PANEL TO HEADER

The pipe cover between the panel and the manifold consists of a single piece for panel widths 300, 600 and 900mm and two pieces for panel widths 1200 and 1500mm.







RAISED MANIFOLD COVER

KIT	L	Н	kg	Code
ESXP-3-03	302	65	0,62	9090A191
ESXP-4-03	302	65	0,62	9090A201
ESXP-3-06	602	65	0,95	9090A193
ESXP-4-06	602	65	0,95	9090A203
ESXP-3-09	902	65	1,31	9090A195
ESXP-4-09	902	65	1,31	9090A205
ESXP-3-12	1202	65	1,69	9090A197
ESXP-4-12	1202	65	1,69	9090A207
ESXP-3-15	1502	65	1,9	9090A199







ANTI-CONVECTIVE SKIRT (OPTIONAL EXTRA ITEM)













SLIDING SUSPENSION BRACKET (OPTIONAL EXTRA ITEM)

Note: As standard there are suspension brackets at every 1m centres (approximately). If you require different suspension positions this optional extra suspension bracket can be slid and bolted into position.

Kit	L	Code	Kg
300	297	9090A081	0.4
600	597	9090A083	0.8
900	897	9090A085	1.2









