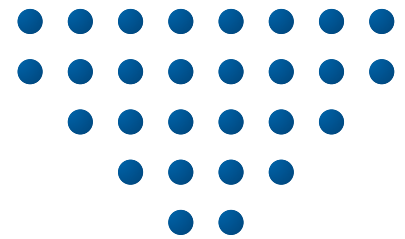


Controller
EFS



HVAC CONTROLS AND POWER

Three-phase Power Controller

EFS is a series of power controllers designed to control temperature via electric heating elements, e.g. in ventilation systems, electric radiators, electric underfloor and ceiling heating systems or radiant heaters.

EFS is particularly suitable for infinitely variable control of large power outputs, e.g. in ventilation systems where supply air temperature is accurately controlled using electric heating elements.

EFS need simply be connected to an electric heating element and a temperature sensor to create a complete heating system.

EFS power controllers are sturdily designed to provide our customers with an advantageous combination of high quality, precise control and low life-cycle costs.

EFS FUNCTIONS

Simple installation

EFS has a built-in P/PI controller and temperature setting potentiometer, allowing a complete heating system to be formed by simply connecting the unit to a temperature sensor and an electric heating element. Control type is set for the application concerned by means of DIP switches, and the P-band can also be set as required.

External controller

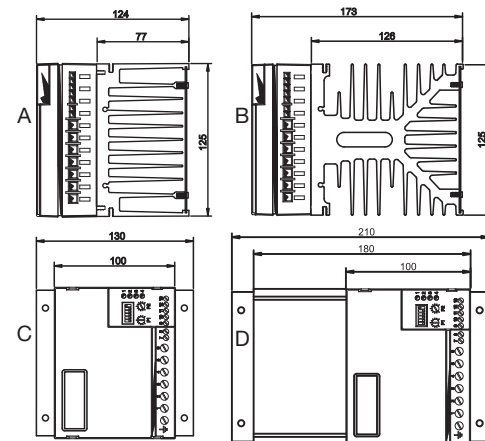
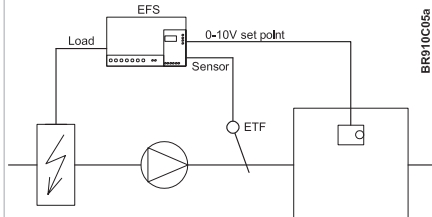
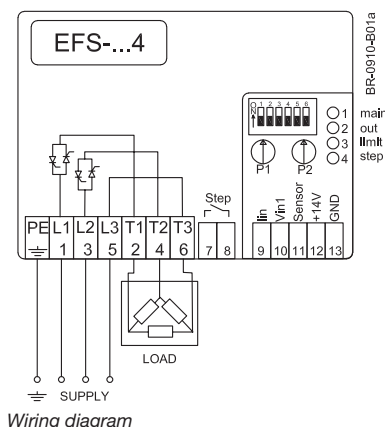
If the EFS is to be used together with an external controller, e.g. in a ventilation unit or BMS system, the built-in controller can be disconnected using the DIP switches. Output can thus be controlled direct by a 0-10 V signal, e.g. from an EFRP controller.

Remote temperature setting

A range of accessories is available to allow remote temperature setting, e.g. a plain yet stylish temperature sensor with built-in potentiometer for wall mounting.

Built-in power doubling relay

EFS has a built-in power doubling relay, providing complete proportional control of twice the output so long as it is distributed between two heating elements of equal size. The second heating element is simply connected to the power doubling relay via a contactor, making the complete system easy to install and very cost effective. If proportional control of even greater outputs is required, the EFS controller can be connected to an ETT-6 step controller.



No electrical interference

EFS has powerful thyristors, which are activated at each zero crossing of the supply voltage. EFS is therefore free of electrical interference and the power cable can be dimensioned with a very low installation factor.

Heat sink in ventilation duct

EFS is designed to allow its heat sink to be built into the ventilation shaft. In this way, heat dissipating from the controller can help heat the supply air, thus saving energy. Special brackets for building the unit into the ventilation duct are available as accessories.

Asymmetric loads

Asymmetric star loads can be controlled without difficulty using a type EFS-9xx3, which has active control in all three phases.

TECHNICAL DATA

Supply voltage	230/400V AC $\pm 10\%$, 50/60Hz		
Voltage input	0/2-10V DC, 10 k Ω		
Current input	0/4-20 mA (Spændingstab 1V)		
Temperature range	0/+40°C		
Sensor input	NTC (ETF-x99x is suitable)		
Heat loss from heat sink	EFS-9xx2 approx. 2W/A, EFS-9xx3 approx. 3W/A		
Ambient temperature	-10/+40°C		
Min. output	400W		
Insulation voltage	2500V RMS		
Internal power loss	5VA		
Enclosure	IP20		
Load type	Star/delta, ohmic		
Power output	+14V DC/25mA		
Power doubling relay	NO SPST, 5A, 250V AC		
P-controller	P-band: 1-6°C, period time: 20 seconds		
PI-controller	P-band: 1-6°C, I = 8 min, period time: 20 seconds		
Weight / dimensions	Type	weight	Dim. (W x D x H)
	EFS-9252	1,8 kg	125 x 124 x 130 mm
	EFS-9402	2,85 kg	125 x 173 x 130 mm
	EFS-9632	4,35 kg	125 x 173 x 210 mm
	EFS-9253	2,85 kg	125 x 173 x 130 mm

CE MARKING

EFS meets the requirements contained in the following standards:

EMC DIRECTIVE	LOW-VOLTAGE DIRECTIVE
EN 60947-4-3	EN 60947-4-3

INSTALLATION

Controller installation

EFS controllers can be mounted on a wall or in a control panel. To mount EFS controllers on DIN rails, EFSA-5 DIN brackets must be used. If EFSA-1 duct brackets are used, EFS controllers can be mounted with their heat sinks inserted into the ventilation shaft. Always ensure that there is sufficient air circulation around the heat sink cooling fins.

Cable connections

The control signal cable from an external controller may be up to 50 m in length. It must be kept separate from mains-carrying cables as voltages may be produced that can damage the controller.

The control signal cable need not be screened, but the use of screened cable increases EFS resistance to interference, which is particularly important in industrial installations. The screen should be connected to terminal 13 (GND).

PRODUCT PROGRAMME

TYPE	ENCL.	PRODUCT
EFS-9252	A+C	Power controller 3x25A, 230 / 10kW, 400V / 17kW
EFS-9402	B+C	Power controller 3x40A, 230 / 16kW, 400V / 28kW
EFS-9632	B+D	Power controller 3x63A, 230 / 25kW, 400V / 44kW
EFS-9253	B+C	Power controller 3x25A, 230 / 10kW, 400V / 17kW

CONTROLLERS AND ACCESSORIES

ETT-6	Step controller with 6 steps
EMRF-99	Temperature sensor with $\pm 5^\circ\text{C}$ offset, for wall mounting
EFRP-900	Potentiometer for manual setting (0-100%), for wall mounting
ETFV-P-999-E	Temperature sensor with 0-40°C potentiometer
EFRP-31	Proportional controller for DIN rail mounting
EFRP-91	Proportional controller for wall mounting
EFSA-1	Flange for ventilation duct mounting
EFSA-5	Bracket for DIN rail mounting