Three-phase Power Controller

EFS is a power controller 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.

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

Controller EFS

- Built-in PI controller
- Temperature sensor input
- External controller input
- Remote setpoint
- Power doubling relay

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.

**INSTALLATION**

**Controller installation**

EFS controllers can be mounted on a wall or in a control panel. 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).

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**PROGRAMME**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>ENCL</th>
<th>PRODUCT</th>
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<tbody>
<tr>
<td>EFS-9402</td>
<td>B+C</td>
<td>Power controller 3x40A, 230 / 16kW, 400V / 28kW</td>
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**CONTROLLERS AND ACCESSORIES**

- ETT-6 Step controller with 6 steps
- EFRP-900 Potentiometer for manual setting (0-100%), for wall mounting
- EFRP-31 Proportional controller for DIN rail mounting
- EFRP-91 Proportional controller for wall mounting

**TECHNICAL DATA**

- Supply voltage: 230/400V AC ±10%, 50/60Hz
- Voltage input: 0/2-10V DC, 10 kΩ
- Current input: 0/4-20 mA (Voltagedrop 1V)
- Temperature range: 0/+40°C
- Sensor input: NTC (ETF-x99x is suitable)
- Heat loss from heat sink: EFS-9x2x approx. 2W/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: 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
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