

DELIVERED UNCONNECTED



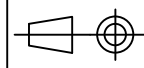
ELECTRICAL SWITCHBOARD (ELECTRICAL ENTREPRENEUR)

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| Name<br>CONTROL CHART  |          |         |      | Weight kg                |                           |
| Enervent Oy, enervent@enervent.com<br>Tel +358 207 528 800, www.enervent.com<br>Kipinätie 1, FIN-06150, Porvoo |          |         |      | Unit<br>LTR-6-190 eAir W | Change<br>-<br>Sheet<br>1 |

Filter change guards and Constant duct pressure regulation can be added or removed from the schematic by turning the layer ON or OFF

| 11             | 12  | 13                       | 14                             | 15                              | 16 | 17 | 18 | 19 |
|----------------|---|--------------------------|--------------------------------|---------------------------------|----|----|----|----|
| Unit catalogue | Name                                      | Equipment                | Technical data                 | Note                            |    |    |    |    |
| OP20           | Control panel                             | Standard delivery        | eAir delivery, contains cabel  |                                 |    |    |    |    |
| TE01           | Fresh air temperature                     | Standard                 | NTC-10                         |                                 |    |    |    |    |
| TE05           | Supply air, after heat recovery           | Standard                 | NTC-10                         |                                 |    |    |    |    |
| TE10           | Supply air temperature                    | Standard                 | NTC-10                         |                                 |    |    |    |    |
| RHT30          | Extraxt air; temperature and humidity     | Standard                 | Sender                         |                                 |    |    |    |    |
| TE32           | Exhaust air temperature                   | Standard                 | NTC-10                         |                                 |    |    |    |    |
| SU1            | Fresh air filter                          | Standard                 | Standard M5                    | Alternatively F7                |    |    |    |    |
| SU30           | Extract air filter                        | Standard                 | Standard M5                    | Alternatively F7                |    |    |    |    |
| LT075          | Rotating heat exchanger                   | Standard                 |                                |                                 |    |    |    |    |
| M75+SC75       | HRW motor + control                       | Standard                 | EC motor, max effect 15W       |                                 |    |    |    |    |
| TF10+M10+SC10  | Supply fan                                | Standard                 | EC motor                       |                                 |    |    |    |    |
| PF30+M30+SC30  | Exhaust fan                               | Standard                 | EC motor                       |                                 |    |    |    |    |
| SLP45          | Supply air reheater, electrical           | E-Models                 |                                | Effect acc. to Unit size        |    |    |    |    |
| W45            | Supply air reheater, water                | W-Models                 |                                | Effect acc. to Unit size        |    |    |    |    |
| TL45+SV45      | Valve actuator + 2-way control valve      | W-models                 | Kvs-value acc. to Unit size    |                                 |    |    |    |    |
| TL50+SV50      | Valve actuator+ 3-way control valve       | CG-models                | Kvs-value acc. to Unit size    |                                 |    |    |    |    |
| CG50           | Supply air cooler                         | CG-models                |                                | Effect acc. to Unit size        |    |    |    |    |
| HP             | Heat pump unit                            | HP-models                | Effect acc. to Unit size       |                                 |    |    |    |    |
| TE02           | Preheated outdoor air                     | Preheated models         | NTC-10                         |                                 |    |    |    |    |
| TE07           | Temperature measurement                   | Dehum-models             | NTC-10                         |                                 |    |    |    |    |
| TE31           | Temperature measurement                   | HP-models                | NTC-10                         |                                 |    |    |    |    |
| CO2            | CO2-measurement                           | Optional equipment       | 200-2000ppm, 0-10Vdc           |                                 |    |    |    |    |
| RH             | Realtive humidity measurement             | Optional equipment       | 0-100% RH, 0-10Vdc             |                                 |    |    |    |    |
| HS             | Extra time, switch                        | Optional equipment       | Pushbutton                     |                                 |    |    |    |    |
| HZ             | Emergency stop                            | Not included in delivery | Normally open (NO) as standard |                                 |    |    |    |    |
| FG01           | Fresh air dampers+Damper motor            | Optional equipment       |                                |                                 |    |    |    |    |
| FG39           | Exhaust air dampers+Damper motor          | Optional equipment       |                                |                                 |    |    |    |    |
| PDE01          | Fresh air filter guard                    | Optional equipment       | 0-200Pa, 0-10Vdc               | Pressure measurearea changeable |    |    |    |    |
| PDE31          | Extract air filter guard                  | Optional equipment       | 0-200Pa, 0-10Vdc               | Pressure measurearea changeable |    |    |    |    |
| PDE10          | Supply air channel pressure-error sender  | Optional equipment       | 0-200Pa, 0-10Vdc               | Pressure measurearea changeable |    |    |    |    |
| PDE30          | Extract air channel pressure-error sender | Optional equipment       | 0-200Pa, 0-10Vdc               | Pressure measurearea changeable |    |    |    |    |
| TE20           | Room temperature measurement              | Optional equipment       | NTC-10                         |                                 |    |    |    |    |

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|  |          |         |   | Name<br>UNIT CATALOGUE   | Weight kg          |            |
| Enervent Oy, enervent@enervent.com<br>Tel +358 207 528 800, www.enervent.com<br>Kipinätie 1, FIN-06150, Porvoo |          |         |   | Unit<br>LTR-6-190 eAir W | Change<br>-        | Sheet<br>1 |

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## General description of functions, eAir automation

### The Air Handling Unit in operation

Stop operating mode is disabled in user mode Home. The default operating mode is Stop mode in user mode Office.. In office mode the unit can be activated by time-schedules or by external control.

Setpoints for fan speeds and temperatures are set separately for each operating mode (Home (at the office) / Away / Boosting). Operation-modes can be changed from the operating panel, by time-schedules or by external control (time-scheduled program bypasses the external control).

### Fieldbus connections

Modbus-RTU is included in the standard delivery of the eAir automation. The units can be connected to a KNX-bus by a gateway adapter (accessory). Measurements can be read and setpoints and time-schedules changed via fieldbus.

### Fan control

Fan control is by constant speed or by constant pressure. With constant pressure control the rotation speed of the fans is controlled by a PI controller to maintain the measured pressure differential at the setpoint. With Constant speed control the rotation speed is set directly in percent (%).

### Temperature control

Supply air temperature measurement is kept at its setpoint by cooling functions (if applicable), heat recovery and reheating of the supply air.

#### Supply air control

The temperature setpoint set by the user is directly the setpoint for the TE10 measurement..

#### Extract air control

The automation uses a cascade controller to keep the TE30 temperature measurement at its setpoint by varying the supply air temperature between the supply air minimum and maximum limits.

#### Room air control

The automation uses a cascade controller to keep the calculated room temperature average temperature at its setpoint by varying the supply air temperature between the supply air minimum and maximum limits.

#### Heating/Cooling limitation control

When the extract air (or room temperature) measurements remain within preset limiting values, only heat recovery is used to control temperature. When the extract air (or room temperature) measurements are outside the preset limiting values also active cooling (if applicable) and heating is allowed to control temperature.

## Boost

### Humidity boost

All eAir air handling units are equipped with a built in relative humidity sensor in the extract air. Users can activate the humidity boost function. When activated, the eAir automation increases the fan speeds if the humidity limit is exceeded.

### Temperature boost (not in Kotilämpö)

The user can activate temperature boost function. When activated the fan speed will increase if the temperature setpoint cannot be achieved.

### CO2-boost (Extra equipment)

Activation of CO2-boost is possible, if an internal or external CO2-sensor is connected to the system (extra equipment). If the function is activated, the fan speed will increase if the preset CO2 limit is exceeded.

## Heat Pump models

The operation of the compressor is regulated by temperature. In models with heat pump, fan speeds are boosted to a set minimum speed when the compressor is running.

### Circulation air function (Pallas)

The circulation air function is activated by timer program. The circulation air function is disabled if the extract air limiting values for relative humidity or CO2 levels are exceeded.

## General safety features and deactivations

In units where the fans constitute a danger, the unit shuts down if the service hatch is opened.

### Dampers:

The dampers are controlled by a damper relay. As long as the air handling unit is operating the potential free relay contact is closed.

## Models with electrical heater

Air handling units equipped with more than 2 kW supply air electrical heaters have pressure differential monitoring of the supply air fan. The electrical heater is disabled if pressure differential over the supply air fan is missing. In user mode Office the fans keep on running for a short time period after entering stop-mode, in order to cool down the electrical heater.

## Models with water heater

### Freeze protection

When the unit is restarted, the TL45 modulating valve is opened by the eAir automation according to the outside air temperature. When the unit is in stop mode, valve TL45 is regulated by the measurement for return water temperature TE45 so that constant return water temperature can be maintained. If the return water temperature under operation-mode or stop-mode decreases below the alarm limit for return water temperature an A-alarm is activated and the air handling unit shuts down, valve TL45 remains in a fully open position and the circulation pump remains on.

### Summer function

All pump controlling outputs are equipped with pump summer control. This starts the pump occasionally to prevent seizure of the pump.

## Alarms

### A-alarm

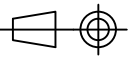
In case of an A alarm the air handling unit shuts down and an alarm is indicated in the operating panel display, and the alarm relay activates. The unit can be restarted when the reason for the alarm is fixed and the alarm acknowledged.

### AB-alarm

In case of AB alarm the air handling unit goes into fail-safe mode, meaning that the supply and extract air fans are operating at minimum power. The alarm is automatically acknowledged and the air handling unit restarted to standard operation mode when the reason for the alarm is fixed.

### B-alarm

In case of B class alarm the alarm is indicated in the control panel. If the alarm occur during the allowed B-alarm forwarding time period, the alarm relay is also energized.

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|  |          |         |   | Name<br>FUNCTIONAL DESCRIPTION | Weight kg          |            |
| Enervent Oy, enervent@enervent.com<br>Tel +358 207 528 800, www.enervent.com<br>Kipinätie 1, FIN-06150, Porvoo |          |         |   | Unit<br>LTR-6-190 eAir W       | Change<br>-        | Sheet<br>1 |

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