MLM FAN COIL UNIT CONTROLLER

- Integrates with MLM & the BMS
- Two and four-pipe fan coil units
- With or without electric heating
- EC & 3 speed fans
- 220V AC - 12V DC power supply
- PIR, door & window switch override
- Auto water supply temp detection
- Adjust settings with Rickard Stat
- Free MLM FCU commissioning & management software
**FEATURES**

Rickard’s latest Fan Coil Unit Controller takes Fan Coil Unit control to the next level. By incorporating traditional Fan Coil Unit functionality with our state of the art MLM system, commissioning, managing and integrating your Fan Coil Units with the BMS is made easier than ever before.

The Fan Coil Controller is capable of managing the operation of both two and four-pipe fan coil units with or without electric heating. Fan coils with EC fans, 3-speed fans, AC valves, and electric heating can be controlled with the appropriate Fan Coil Controller model. A built in 220V AC to 12V DC Switch Mode Power Supply (SMPS) removes the need for an external power supply unit or transformer.

To conserve energy, the Fan Coil Unit Controller can override the operation of the Fan Coil Unit if the room is unoccupied and or if a window or door is left open. Two dry contact inputs are supplied allowing a PIR and/or door or window reed switch to trigger the override. In addition, a loosely regulated 12V supply is available allowing devices such as PIRs to be directly powered from the Fan Coil Controller.

The Fan Coil Controller can automatically detect a water supply change-over from hot to cold and vice versa, with the aid of a change-over temperature sensor. This allows two-pipe Fan Coil Units to be operated without the need for electric heating.

The setpoint of the Fan Coil Controller can be configured externally via Rickard’s Fan Coil Unit Wall Thermostat or MLM application.

**HARDWARE FEATURES**

- Internal 220V AC SMPS.
- Capable of driving:
  - 220V, 2kW heating elements directly.
  - AC Valves for both heating and cooling.
  - 3-speed fan.
  - EC fan.
  - Analogue position-controlled valves.
- Two dry contact inputs.
- 12V DC supplementary supply.

**ACCESSORIES**

- Rickard Fan Coil Wall Thermostat.
  - Toggles Power
  - Adjusts Fan Speed
  - Sets Temperature
  - Shows Room Temperature

**PRODUCT SPECIFICATION**

- **Power Supply**
  - 220Vac ± 10%, 45Hz-65Hz
  - Power Consumption: 3.3W absolute max (excluding heater, fan and valves)

- **Environmental**
  - Operating Temperature Range: 0 to +50ºC
  - Storage Temperature Range: 0 to +70ºC

- **Maximum Electrical Ratings**
  - Heater Element: 220V, 2kW
  - 3-Speed Fan: 220V, 3A/contact
  - AC Valves: 220V, 100mA
  - Aux 12V DC supply: 13V ± 1V, 100mA
  - Analogue Controlled EC Fan: 0-10V, 1mA max (10k minimum impedance)
  - Analogue Controlled Valves: 0-10V, 1mA max (10k minimum impedance)

**AVAILABLE VARIANTS**

Only Variant A (FCU Controller) is currently available. Simpler versions of variant A will be made available as required.

<table>
<thead>
<tr>
<th>Variant</th>
<th>A (FCU Controller)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric Heater</td>
<td>YES</td>
</tr>
<tr>
<td>3 Speed Fan</td>
<td>YES</td>
</tr>
<tr>
<td>220V Valves</td>
<td>YES</td>
</tr>
<tr>
<td>Dry Contact Inputs</td>
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</tr>
<tr>
<td>EC FAN</td>
<td>YES</td>
</tr>
<tr>
<td>Analogue Valves</td>
<td>YES</td>
</tr>
<tr>
<td>Temperature Sense</td>
<td>YES</td>
</tr>
<tr>
<td>MLM Interface</td>
<td>YES</td>
</tr>
<tr>
<td>12V aux supply</td>
<td>YES</td>
</tr>
</tbody>
</table>
CONTROL SCHEME

A single Proportional-Integral (PI) control loop controls all the control elements (heater, valves and fan). All analogue outputs are directly mapped to the percentage of control indicated by the control loop, whereas discrete outputs such as the 3-speed fan, AC valves and electric heater operate at predefined control levels meant to approximate the controls output. The below Table indicates the switching points of each discrete control element.

<table>
<thead>
<tr>
<th>Control Element</th>
<th>3 Speed Fan</th>
<th>220V Valves</th>
<th>Heater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method</td>
<td>PI Controlled Approximation</td>
<td>PI Controlled Approximation</td>
<td>PI Controlled Approximation</td>
</tr>
<tr>
<td></td>
<td>0 = off Low = 7.5% ± 2.5% Medium = 33% ± 3% High = 66% ± 3%</td>
<td>On and off limits configured via SDO</td>
<td>On and off limits configured via SDO</td>
</tr>
</tbody>
</table>

INSTALLATION AND COMMISSIONING

The Fan Coil Controller can be fitted to a standard MLM 24 installation and can interface with the MLM Tool V8.16 u4 for commissioning and diagnostics. Up to 15 FCU controllers can be connected to each MCU Channel. FCU's, PCD's and diffusers should not be mixed on the same channel.

HARDWARE INSTALLATION

The Fan Coil Controller manages the operation of either a two or four-pipe Fan Coil Unit with, or without electric heating. EC fans, 3-speed fans, AC valves, and electric heating can also be controlled. The Fan Coil Controller incorporates a 220V AC to 12V DC SMPS removing the need for a separate power supply or transformer.

Two dry contact inputs are supplied allowing a PIR and/or door or window reed switch to override the operation of the Fan Coil Controller. In addition, a loosely regulated 12V supply is available allowing devices such as PIRs to be directly powered from the Fan Coil Controller. Please see the User Manual for complete Installation and Commissioning Instructions.

OPERATION CONFIGURATION

There are various operational controls that can be configured by the user. These include the minimum fan speed, turn-on and turn-off limits for the discretely controlled outputs (AC valves and electric heater), the PI loop control variables, and master command (space-temperature measurement, change-over temperature measurement, and setpoint control).

The FCU Controller can control both 2 and 4 pipe systems, with one or 2 valves respectively. When a 4 pipe system is used, the controls have the ability to be configured to control the coils in 2 different configurations. Either one coil will be hot and the other cold or both coils can run hot or both cold. In the former, the controls will supply more or less hot or cold water depending on the setpoint. A temperature sensor is used to determine the water temperature of each coil. The controls need a distinct difference in water temperature to ensure proper control. Please contact Rickard for these values.

FAN COIL OPERATING MODES

The Fan Coil Controller utilises multiple control modes of operation. These modes include:

- **Heating**: In this mode the fan coil is attempting to heat the room/space.
- **Cooling**: In this mode the fan coil is attempting to cool the room/space.
- **Idle**: In this mode the fan coil will not control the room/space temperature or fan speed.
- **Fan Only**: In this mode the fan operates and temperature is not controlled. The fan operates at a fixed speed set by the Wallstat.
- **Override**: This mode is activated by the door/window input, the occupancy input or by placing the Fan Coil Controller into manual control.
- **Test Button**: The test button activates a display mode in the MLM Tool Application and does not alter the operation of the Fan Coil Controller. The Fan Coil Unit can then be identified on the MLM Tool.
**FAN COIL CONFIGURATIONS & ORDERING**

**Secondary FCU’s:** If the FCU is operating as a secondary unit, only an inter-controller cable is required to link the primary (onboard or remote sensing) and secondary FCU controller. Please order an inter-controller cable and specify the required length. Use the MLM tool to zone primary & secondary FCU’s.

**Primary FCU’s with Onboard Sensing:** The FCU has an onboard controller built in. The FCU controller can operate without a wall thermostat provided it is fitted with a correctly placed room temperature sensor. Commissioning of the unit can be done using the MLM tool. Please order a room temperature sensor with the correct length.

**2 Pipe Fan Coil Units with hot and cold water supply:** In this case it is necessary to sense water pipe temperature when the supply temperature changes. Please order the correct length change over sensor. Our standard length is 0.5m.

**Secondary FCU with Remote Sensing:** Please order a Rickard FCU Wall Thermostat. 8m RJ45 cable included.

**Rickard mini-BMS or BACnet BMS:** A MCU and cabling is required. Each FCU controller requires a 3 core inter-controller cable connection. One RJ9 cable connects one of up to 15 FCU controllers to 1 of 4 MCU channels. Please order an RJ9 cable/channel ≤ 150m.

**FAN COIL WALLSTAT**

The Fan Coil Wallstat can alter the operational mode of the Fan Coil Controller, adjust the fan speed, set the setpoint, display the space temperature and cause the Fan Coil Controller to power off.

The Fan Coil Wallstat utilises four user control buttons, these being, power, display cycle, increment and decrement.

**FAN COIL WALLSTAT MODES**

- **Off:**
- **Automatic Control:** Control of valves, heater and fan in order to reach the setpoint temperature.
- **Manual Fan Only Control:** Temperature control is turned off and the fan speed can be set to low, medium or high.

**DISPLAY**

The Fan Coil Wallstat can indicate three possible displays.

1. **Room Temperature**
   - A bracketed thermometer indicates temperature display.
   - The room temperature value is displayed.

2. **Fan Speed Control**
   - A bracketed fan shows fan speed adjustment.
   - A value of 1-3 or A for Automatic and a corresponding bar graph indicates the fan speed.

3. **Set Point Display**
   - The abbreviation SP indicates setpoint adjustment. The setpoint value is displayed.

**STANDARD OFFERING**

The standard Rickard Fan Coil Unit Controller is supplied without a power cable, inter-controller cable, wallstat or sensors.

**OPTIONS**

- **Power cable and plug top:** Please specify cable length and plug type. Please see “Electric Plug Ordering Guide” for plug top ordering information.

- **Inter-controller cables:** Our standard length is 8m. Please specify special lengths.

**ACCESSORIES**

- **Fan Coil Wallstat:** One wallstat is required per controller.

- **Master Communications Unit (MCU):** 15 FCU controllers can connect to 1 MCU channel. An MCU has 4 channels to connect to up to 60 FCU controllers.

- **Temperature sensors:** For room sensing, change over/supply air sensing and intermediate temperature sensing.