

## TLR-D5 with OPU-D5

### Intelligent Fan Coil controller: Cabinet mounted base, wall mounted operation terminal.

#### Features

- Temperature control for 2 and 4-pipe fan coil systems.
- Relays switching up to 10(6)A
- Automatic fan control for three stage fans.
- Control for heating, cooling and fan only operation
- Cost saving option with Economy functionality and set point limitation
- For large rooms: Master – Slave option: One terminal may drive up to 8 base units in parallel.
- External sensor or open contact for remote control, external heat – cool change or auto-changeover on supply or outdoor temperature with selectable activation limits One terminal may control up to 8 base units in parallel mode
- Password protected programmable user and control parameters
- Temperature display in Celsius or Fahrenheit

#### Deluxe Version:

- Clock and time schedule functions with special options for schools and universities
- Clock keeps running for 48h in case of power failure
- Display with blue backlight
- Infrared remote controller option:  
With special features for Boost and delayed switching on or off



#### Applications

- Air Only Systems: Three stage fans for single duct systems.
- Air/Water Systems: Induction units, fan coil units for 2- and 4-pipe systems

### General Description

The TLR-D5 is a stand-alone electronic single loop controller with a fan control option and a binary sequence. The controller includes 1 NTC room temperature sensor and 3+2 relays outputs. A detailed adaptation to local conditions is possible with the use of a simple configuration routine. The TLR-D5 can be configured using the standard operation terminal. No special tools or software is required.

The TLR-D5 has been specifically developed to switch larger fans with switching power of up to 10(6)A.

#### Ordering

A working controller consists of one operation terminal and at least one base unit.

| Item name  | Item code  | Function | Type                            | Key-data                                     |
|------------|------------|----------|---------------------------------|--|
| TLR-D5-24  | 40-11 0017 | 24VAC    | Base unit                       | Fan coil controller with:<br>1 TI int or ext |
| TLR-D5-230 | 40-11 0018 | 230VAC   |                                 |  |
| OPU-D5     | 40-10 0091 | Standard | Operation Terminal<br>(88x88mm) | 3 DO (Relay) Fan control                     |
| OPU-D5-D   | 40-10 0092 | Deluxe   |                                 | 2 DO (Relay) Binary control                  |


#### Parameter preset

|      |               |              |   |
|------|---------------|--------------|---|
| -W01 | 40-10 00xx-01 | Cooling only | Add -Wx at the end of the Item Name or -x at the end of item code to order pre-configured model |
|------|---------------|--------------|---|

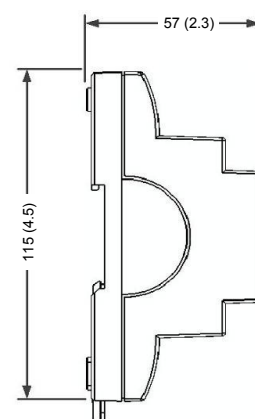
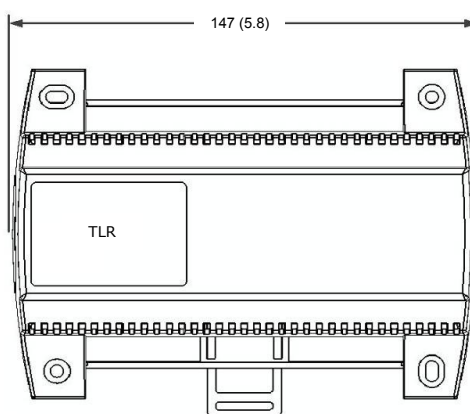
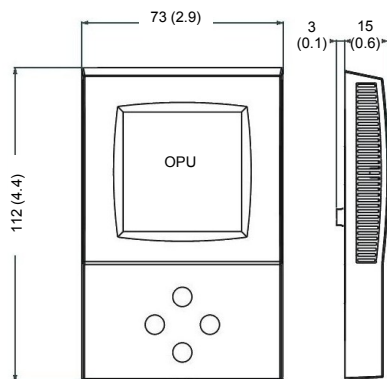
#### Accessories

|              |            |  |                            |
|--------------|------------|--|----------------------------|
| OPR-1        | 40-50 0001 | 2xAAA bat  | Infrared remote controller |
| S-Tn10-2     | 40-20 0001 | Flying lead sensor with 2 m cable                      |                            |
| SD-Tn10-12-2 | 40-20 0002 | Flying lead duct sensor 12cm immersion depth, 2m cable |                            |
| SD-Tn10-20-2 | 40-20 0003 | Flying lead duct sensor 20cm immersion depth, 2m cable |                            |
| SDB-Tn10-12  | 40-20 0051 | Duct sensor with housing, 12cm immersion depth         |                            |
| SDB-Tn10-20  | 40-20 0004 | Duct sensor with housing, 20cm immersion depth         |                            |
| SRA-Tn10     | 40-20 0005 | Room sensor  |                            |
| SOD-Tn10     | 40-20 0059 | Outdoor sensor   |                            |

## Technical specifications

|                                      |  |                                    |  |
|--------------------------------------|--|------------------------------------|--|
| <b>Power Supply</b>                  | Operating voltage  | TLR-D5-24                          | 24 V AC $\pm$ 10 %, 50/60 Hz, SELV to HD 384, Class II transformer, 48VA max |
|                                      |  | TLR-D5-230                         | 230 V AC $\pm$ 10 %, 50/60 Hz  |
|                                      | Power consumption  | TLR-D5-24                          | Max. 3 VA  |
|                                      |  | TLR-D5-230                         | Max. 5 VA  |
| <b>Signal inputs</b>                 | Electrical connection  | Terminal Connectors                | Wire 0.34...2.5 mm <sup>2</sup> (AWG 24...12)                                |
|                                      | Deluxe type only: Power backup for real time clock   |                                    | Min 48h if charged for 24h   |
|                                      | Temperature Input  | Range<br>Accuracy                  | 0...50 °C (32...122 °F)<br>0.5°C, 1°F  |
| <b>Signal outputs</b>                | Digital switching outputs  |                                    | DO1 to DO5   |
|                                      | Switching type   |                                    | Relays   |
|                                      | AC switching power   |                                    | 0...240V AC 10(6)A max. each output  |
|                                      | Insulation strength  |                                    |  |
|                                      | between relays contacts and system electronics:  |                                    | 3750V AC to EN 60 730-1  |
|                                      | between neighboring relays contacts  |                                    | 1250V AC to EN 60 730-1 1<>2<>3, 4<>5  |
|                                      | between relay groups:  |                                    | 3750V AC to EN 60 730-1 1/2/3<>4/5   |
| <b>Communication Base - Terminal</b> | Communication type   |                                    | Digital: peer to peer  |
|                                      | Cable type:  |                                    | Copper wire 0.8...2.5 mm <sup>2</sup> (AWG18...AWG13), shielded twisted pair |
| <b>Environment</b>                   | Operation  |                                    | To IEC 721-3-3   |
|                                      | Climatic conditions  |                                    | class 3 K5   |
|                                      | Temperature  |                                    | 0...50 °C (32...122 °F)  |
|                                      | Humidity   |                                    | <95 % r.H. non-condensing  |
|                                      | Transport & storage  |                                    | To IEC 721-3-2 and IEC 721-3-1   |
|                                      | Climatic conditions  |                                    | class 3 K3 and class 1 K3  |
| <b>Standards</b>                     | Temperature  |                                    | -25...70 °C (-13...158 °F)   |
|                                      | Humidity   |                                    | <95 % r.H. non-condensing  |
|                                      | Mechanical conditions  |                                    | class 2M2  |
|                                      |  conformity<br>EMC Directive<br>Low voltage directive |                                    | 2004/108/EC  |
|                                      |  |                                    | 2006/95/EC   |
|                                      |  |                                    |  |
| <b>General Terminal</b>              | Product standards  |                                    |  |
|                                      | Automatic electrical controls for household and similar use  |                                    | EN 60 730 -1   |
|                                      | Special requirement on temperature dependent controls  |                                    | EN 60 730 - 2 - 9  |
|                                      | Electromagnetic compatibility for domestic sector  |                                    | Emissions: EN 60 730-1<br>Immunity: EN 60 730-1                              |
|                                      | Safety class   |                                    | III (IEC 60536)  |
|                                      | Degree of protection   |                                    | IP30 to EN 60 529  |
| <b>General Base</b>                  | Material   | Cover, back part<br>Mounting plate | ABS plastic (UL94 class V-0)<br>Galvanized Steel                             |
|                                      | Color  |                                    | White RAL 9003   |
|                                      | Dimensions (H x W x D)   |                                    | 112 x 73 x 18 mm (4.4 x 2.9 x 0.8 in)  |
|                                      | weight including package   | OPU-D5<br>OPU-D5-D                 | 180g (6.3 oz)<br>190g (6.7 oz)   |
|                                      | Safety class   |                                    | II (IEC 60536)   |
|                                      | Degree of protection   |                                    | IP20 to EN 60 529  |
| <b>General Base</b>                  | Housing material   |                                    | PC+ABS plastic (UL94 class V-0)  |
|                                      | Color  |                                    | Gray (RAL 7001 / 7035)   |
|                                      | Dimensions (H x W x D)   |                                    | 57 x 147 x 115 mm (2.25 x 5.8 x 4.5 in)                                      |
|                                      | weight including package   | TLR-D5-24<br>TLR-D5-230            | 345g (12.2 oz)<br>445g (15.7 oz)   |
|                                      | Safety class   |                                    | II (IEC 60536)   |
|                                      | Degree of protection   |                                    | IP20 to EN 60 529  |

## Dimensions [mm] (inch)

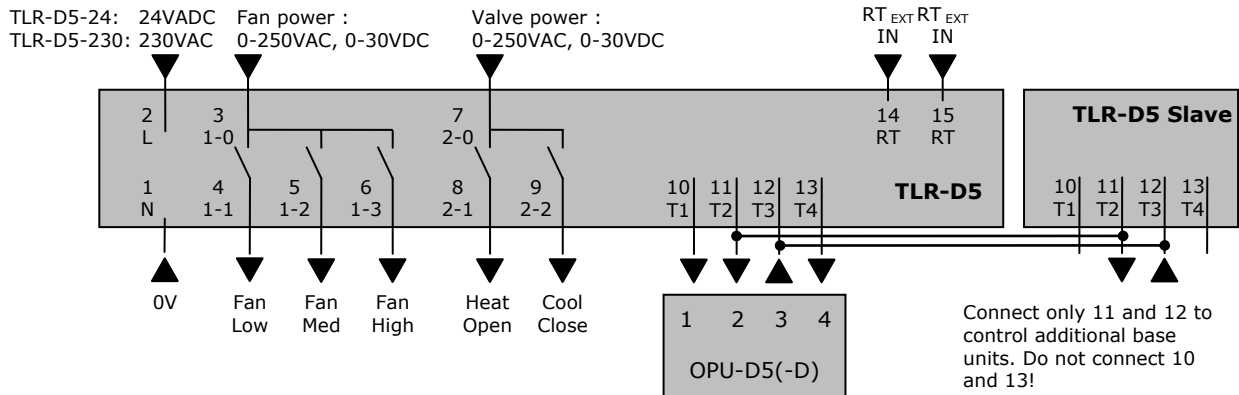


## Selection of actuators and sensors

Temperature Sensors: Use only approved NTC sensors to achieve maximum accuracy. See ordering for details.

Binary auxiliary devices: E.g. fans and on/off valves. Do not directly connect devices that exceed maximum switching currents as detailed under technical specifications. Observe startup current of fans.

## Wiring Diagram



## Description:

|           |              |                             |   |
|-----------|--------------|-----------------------------|---|
| <b>1</b>  | <b>N</b>     | Power supply:               | TLR-D5-24: 0V AC, 24V DC                                      |
| <b>2</b>  | <b>L</b>     | Power supply:               | TLR-D5-230: 0V AC   |
| <b>3</b>  | <b>1-0</b>   | Switched common for fan:    | TLR-D5-24: 24V AC, 24V DC                                     |
| <b>4</b>  | <b>1-1</b>   | Binary output:              | TLR-D5-230: 230V AC   |
| <b>5</b>  | <b>1-2</b>   | Binary output:              | 0-250VAC, 0-30VDC   |
| <b>6</b>  | <b>1-3</b>   | Binary output:              | Fan speed low   |
| <b>7</b>  | <b>2-0</b>   | Switched common for valve:  | Fan speed medium  |
| <b>8</b>  | <b>2-1</b>   | Binary output:              | Fan speed high  |
| <b>9</b>  | <b>2-2</b>   | Binary output:              | 0-250VAC, 0-30VDC   |
|           |              |                             | Valve (Heating in 4-pipe mode, open for three state outputs)  |
|           |              |                             | Valve (Cooling in 4-pipe mode, close for three state outputs) |
| <b>10</b> | <b>Term1</b> | Terminal connection 1       | Connect to operation terminal                                 |
| <b>11</b> | <b>Term2</b> | Terminal connection 2       | Connect to operation terminal                                 |
| <b>12</b> | <b>Term3</b> | Terminal connection 3       | Connect to operation terminal                                 |
| <b>13</b> | <b>Term4</b> | Terminal connection 4       | Connect to operation terminal                                 |
| <b>14</b> | <b>RT</b>    | External temperature input: | Sxx-Tn10 or open contact                                      |
| <b>15</b> | <b>RT</b>    | External temperature input: | Sxx-Tn10 or open contact                                      |

## Installation Base

The housing of the TLR base unit is a robust plastic enclosure. The controller may be mounted in any orientation by surface mounting on a wall or in a cabinet. 4 mounting-holes for screws up to 4mm diameter are provided. Mounting onto a standard 35mm DIN rail is also possible.

When mounting note the following:

- The controller should not be freely accessible after mounting. A protective housing should be used, if mounted outside an electrical cabinet.
- Ensure adequate air circulation to dissipate heat generated during operation.**
- Local installation regulations must be observed.

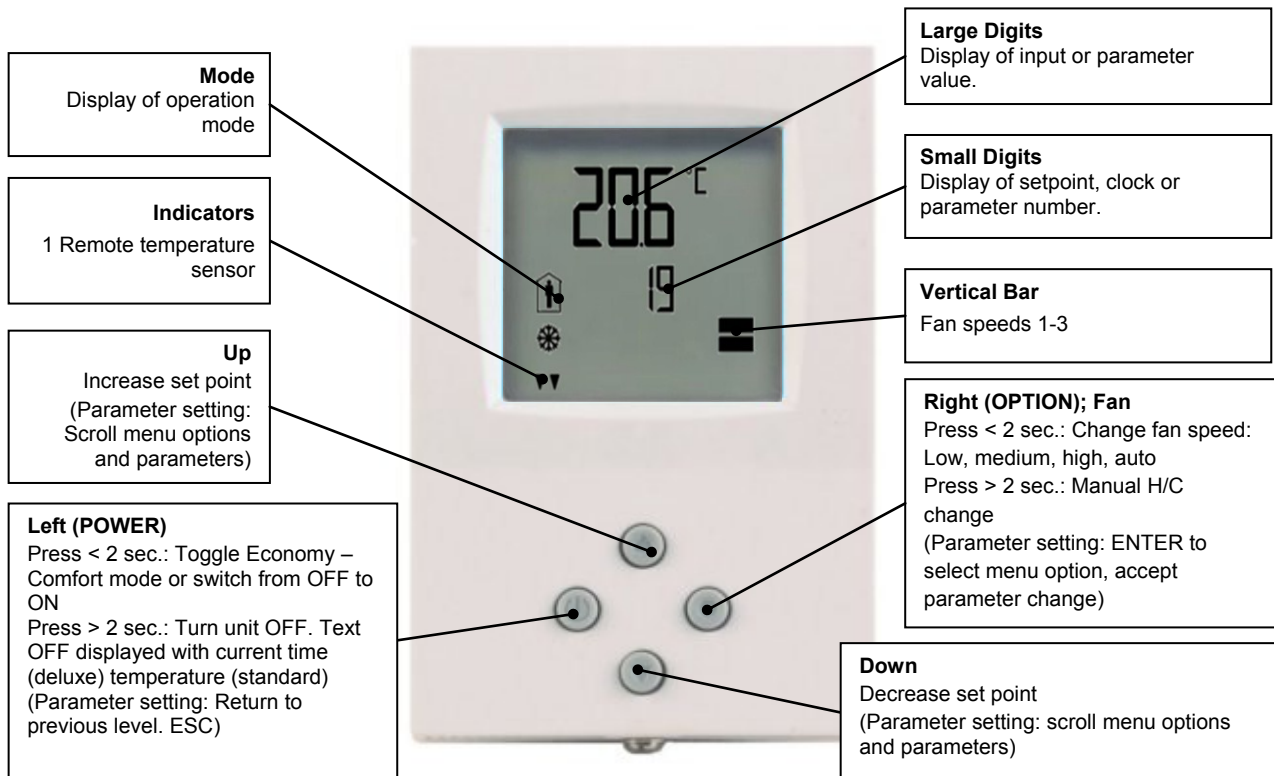
## Installation Terminal






- Install the mounting plate to the electrical connection box. Make sure that the nipple with the front holding screw is facing down. Make sure the screw heads do not stand out more than 5 mm of the surface of the mounting plate.
- Connect the wires of the terminals to the communication wires according wiring diagram
- Slide the two latches located on the top of the front part into the hooks of the mounting plate.
- Lower the front part until located flat on the wall and the mounting plate is not visible anymore. Make sure the connection cable does not get into the way.
- Tighten the front holding screw to secure the front part to the mounting plate.

## Connection base to terminal

- Max. Distance: 200m (565 ft.)
- Twisted pair copper wires maybe used for wiring in an EMC-save environment. In an impaired EMC environment use only shielded cables. The operating voltage must comply with the requirements for safety extra-low voltage (SELV) as per EN 60 730.
- 1 terminal may drive up to 8 base units. See wiring for parallel connections. Total wire distance should not exceed 200 m.
- Conductor resistance will influence external temperature reading. 450 Ω will result in an increase of 1°C (2°F). Compensate using UP-08 if external temperature is used to control unit.

## Display and Operation



| Operation mode  |                       |  |
|---|-----------------------|--|
|  | Comfort (occupied)    | All control functions operating per set points.  |
|  | Economy (unoccupied): | Set points shifted according to <i>Parameters FC04</i> . Economy mode and setpoint shift may be disabled with UP06 |
| <b>OFF</b>  | Energy Hold Off       | Outputs are off, inputs monitored for alarm condition  |
|  | Heating               | Output activates if temperature lower than setpoint  |
|  | Cooling               | Output activates if temperature higher than setpoint   |
|  | Fan                   | Fan is running, the vertical bars show active speed 1-3  |

### Power Failure

All the parameters and set points are memorized and do not need to be reentered. Depending on **UP05** the unit will remain switched off, switch on automatically or return to the operation mode it was in before the power failure.  
*Deluxe version only:* Timer operation and daytime setting will be retained for 24h. The controller has to be connected to a power supply for at least 10 hours for the backup function to operate accordingly.

### Frost Protection

The controller will enter frost protection mode if the room temperature drops below 5°C (41°F). All heating outputs will be fully opened. Frost protection mode will be left once the temperature reaches 10°C (50°F). Frost protection display will remain until a button is pressed. Frost protection can be enabled/disabled using user parameter UP-09

### Error messages

**Err1:** Temperature sensor faulty. The temperature sensor is damaged.  
**Err2:** External input for heat / cool auto change over missing or damaged.  
**FP:** Steady: Frost protection is active.  
 Blinking: Frost protection activated in the past and is now inactive. Confirm with OPTION key.

### Status LED


The status LED is located on the TLR-D5 base unit between the two low power terminal connector groups. The status LED may display the following feedback:

No light: No power or unit is damaged  
 Blink every 1s: Error, terminal – base unit do not match or signal is not clear.  
 Blink every 2s: Normal communication, base unit detected  
 Blink every 5s: Base unit operates normal, no terminal detected

## Manual heat – cool change

To manually change heating or cooling mode press the OPTION key for more than 2 seconds. Access to manual heat – cool change may be disabled by parameters.

For standard models: Press OPTION > 2 sec. SEL and H-C is displayed.  
 For deluxe models: Press OPTION > 2 sec. SEL and current time is displayed.  
 Press UP key twice. SEL and H-C is displayed.  
 Press OPTION again to toggle Heating, Cooling and Fan only modes.

SEL  
H-C  


## Clock operation

The deluxe model contains a quartz clock with battery back-up. Up to 4 time schedules with each 4 mode changes based on time and day of the week may be programmed. A blinking clock indicates that the time has not been set or if the unit was without power for longer than 48 hours. The time needs to be set to allow time schedules to operate.

### Clock setup

Press OPTION > 2 sec. SEL and current time displayed  
 Press OPTION < 2 sec. to change time,  
 Minutes blink: UP/DOWN to changes, OPTION to save,  
 Hours blink: UP/DOWN to changes, OPTION to save,  
 Press OPTION to save time,  
 DAY1 blinks: UP/DOWN to change, OPTION to save

SEL  
00:00  
DAY1 (Mon)

## Creating time schedules

### Step 1: Selection and enabling of time schedules

Press OPTION > 2 sec. SEL and current time displayed  
 Press UP:  
 SEL and PRO displayed, clock symbol blinks  
 Press OPTION:  
 PRO1 shows with 1 blinking. UP/DOWN select time schedule group  
 Press OPTION  
 OFF/ ON blinks, UP/DOWN to change, OPTION to save

SEL  
PRO  


Pro1-Pro4  
OFF/ON

### Step 2: Select weekdays

This time schedule will be active during the selected weekdays  
 Press UP/DOWN to step through available options:  
 d1-7, d1-6, d1-5, d6-7, day1, day2, day3, day4, day5, day6, day7  
 Day 1 stands for Monday, day 2 for Tuesday and so forth  
 Press OPTION to save day selection

Pro1  
d1-7

### Step 3: Selected action of first switching event

One bar on the right side indicates the first switching event  
 Press UP/DOWN to select action for first switching event:  
 No = switching event not active  
 OFF = switches unit off, Reset (UP17) active if switched to ON manually.  
 Eco = sets operation mode to On and Economy (Not occupied),  
 reset (UP17) active if set to comfort manually  
 On = sets operation mode to On and Comfort (Occupied)  
 Uni = University mode, Reset (UP17) not active if manually activated  
 Press OPTION to select switching time of first event

Pr01  
no

—

### Step 4: Selected time of first switching event

Press UP/DOWN to select switching time:  
 Select switching time 00:00 to 23:45 in 15-minute steps  
 Press OPTION to complete and select action of second switching event

Pr01  
08:00

—

### Step 5: Select actions and time of switching event 2 - 4

Repeat Step 3 and Step 4 for the remaining switching events.  
 If a switching event is not needed, set it to "no"  
 The bars on the right side indicate number of switching event  
 After completing the 4<sup>th</sup> switching event, the process returns to the selection of the time schedule on step 1.

Pr01  
08:00

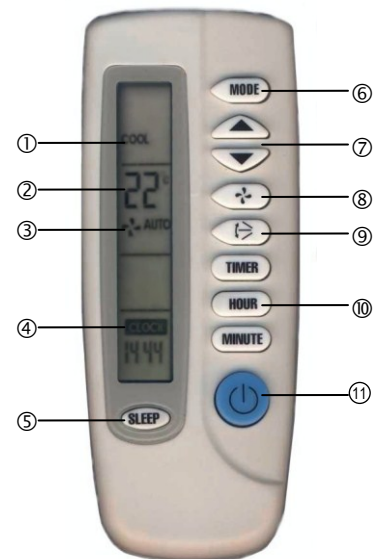
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- ➔ UNI: University mode: This switching mode is used for rooms such as lecture rooms and auditoriums that might be occupied during a certain time. During this time the reset is not active. The unit will not start itself when UNI mode is active. It still needs to be manually activated. This is to avoid unnecessary heating or cooling of such rooms while they are not occupied.
- ➔ A blinking clock indicates that the time needs to be set. Time programs will not operate if the time is not defined. See chapter operation, advanced settings for instructions on how to set the time.
- ➔ Access to time schedules may be disabled with UP-04

## Operation with OPR-1

The deluxe version may be alternatively operated with an infrared remote controller.

1. Mode indication, Auto, Dry, Cool, Fan, Heat
2. 2-digit display of setpoint
3. Fan indication
4. 4-digit display of current time or delayed switching time
5. Economy button: Toggles Economy/Comfort mode
6. Mode button, changes operation modes
7. UP/DOWN Button: Set point adjustment buttons
8. FAN Button: Changes fan speed, low – medium – high or Auto
9. Boost button, activates full output for 5 Minutes
10. Time related buttons: Timer, Hour, Minute
11. POWER Button: Operation mode ON – OFF



### Switching ON

The unit is switched on by pressing the POWER button. It will start up in comfort mode.

### Changing between COMFORT and ECONOMY

Pressing the SLEEP button toggles between ECONOMY and COMFORT modes.

### Switching OFF

Pressing the POWER while the unit is on, will switch the unit off. The current time will be displayed in the LCD of OPR-1.

### Changing of set points

Only the set points for the temperature loop may be changed. Set point range is 15 to 30 °C.

### Changing of fan speeds

Repeatedly pressing the fan speed button steps through low, medium, high and automatic fan speeds. Automatic fan speed will not be activated in FAN ONLY mode.

### Boost

Pressing the boost button activates a 5 minute boost. The output will be fully opened for the period of 5 minutes independent of demand. This may be used to change stale air during a meeting break or when entering the room.

### Clock settings

The remote controller contains a daytime clock. In order to set the clock, press HOUR and MINUTE button together until the clock starts blinking. Then set the correct time with the HOUR and MINUTE buttons. Confirm by pressing the TIMER button. The clock of the OPR will set the clock of the controller.

### Delayed switching

The unit may be delayed switched on or off using the timer button. Pressing the timer button once will display Timer ON if currently in OFF mode or TIMER OFF if currently in ON mode. Set the time when the unit is supposed to switch on or off using the HOUR and MINUTE buttons.

### Mode changes

Repeatedly pressing the mode button may activate the following operation modes: HEAT, COOL and FAN ONLY. The mode change may be disabled using the UP parameters.

Note:

The remote controller is currently only available in °C mode.



## Setting of user parameters

The TLR-D5 is an *intelligent* controller and can be adapted to fit perfectly into your fan coil application. The control operation is defined by parameters. The parameters are set during operation by using the standard operation terminal. The parameters are password protected. There are two levels of parameters: User operation parameters for access control settings and Expert parameters for control functions and unit setup. The passwords for user levels and expert levels are different. Only control experts should be given the control parameter password.

The parameters can be changed as follows:

1. Press UP and DOWN button simultaneously for three seconds. The display will indicate the firmware version in the upper large digits and the revision in the lower small digits. Pressing any key will show: CODE.
2. Select a password using UP or DOWN buttons. Select 009 in order to get access to the user parameters, 241 for controls parameters.  
Press OPTION after selecting the correct password.
3. Once logged in, the parameter is displayed immediately
4. Select the parameters with the UP/DOWN keys. Change a parameter by pressing the OPTION key. The MIN and MAX symbols show up and indicate that the parameter may be modified now. Use UP and DOWN key to adjust the value.
5. After you are done, press OPTION or POWER in order to return to the parameter selection level.
6. Press the POWER key again so as to leave the menu. The unit will return to normal operation if no key is pressed for more than 5 minutes.

### User Parameters (Access code: 009)

| Parameter            | Description   | Range    | Factory Setting  |
|----------------------|---|----------|--|
| UP 00                | Enable change of operation modes  | ON, OFF  | ON (Enabled)   |
| UP 01                | Enable change of set points   | ON, OFF  | ON (Enabled)   |
| UP 02                | Enable manual control of fan speeds   | ON, OFF  | ON (Enabled)   |
| UP 03                | Enable change of heating/cooling mode   | ON, OFF  | W00: ON (Enabled)<br>W01: OFF (Disabled)                             |
| UP 04                | Enable access to Time programs  | ON, OFF  | ON (Enabled)   |
| UP 05                | State after power failure:<br>0 = Switched OFF, 1 = Switched ON, 2 = state before power failure   | 0, 1, 2  | 2  |
| UP 06                | Enable Economy (unoccupied) Mode.<br>Shift the set point to a lower temperature in winter or higher temperature in summer in order to save energy. Economy mode may be activated through the POWER button, or with the external input (typically for key card switches in hotel rooms or motion detectors for meeting rooms.) | ON, OFF  | ON (Economy )  |
| UP 07                | Celsius or Fahrenheit, Select ON for Fahrenheit, OFF for Celsius  | ON, OFF  | OFF (Celsius)  |
| UP 08                | Calibration value of temperature sensor . This value is calibrated at manufacturing of the thermostat. If required it is possible to shift the temperature -10° to +10° in 0.1° K steps.  | -10...10 | 0  |
| UP 09                | Enable Frost Protection.<br>Activates the output independent of operation mode when the control temperature drops below 5°C or 41°F. The controller returns to normal operation when the temperature increases above 10°C or 50°F.  | ON, OFF  | W00 = ON<br>(Frost Protection)<br>W01 = OFF<br>(No Frost Protection) |
| UP 10                | Select contents of Large LCD digits in standard mode:   | 0...5    | 02<br>Temperature  |
|                      | 00 = OFF<br>01 = Setpoint<br>02 = Temperature sensor<br>03 = Output fan speed<br>04 = Clock<br>05 = Alternative sensor  |          |  |
| UP 11                | Select contents of small LCD digits in standard mode:   | 0...5    | 04 Deluxe:<br>show clock<br>01 Standard:<br>show setpoint            |
|                      | 00 = OFF<br>01 = Setpoint<br>02 = Temperature sensor<br>03 = Output fan speed<br>04 = Clock<br>05 = Alternative sensor  |          |  |
| UP 12<br>Deluxe only | Clock display type:<br>OFF = Show 24hour clock<br>ON = Show 12hour clock (AM, PM)   | ON, OFF  | OFF (24h)  |
| UP 13<br>Deluxe only | Reset: applies when the unit is manually switched on, while in scheduled off mode. The unit will switch automatically back to the scheduled mode when the reset time expires.<br>0 = Reset of override mode is not active.<br>1...255 = delay in minutes to switch off device   | 0...255  | 60 (Min)   |

## Control configuration

### Identifying the firmware version

The parameters and functionality of controller depend on its firmware revision. It is therefore important to use a matching product version and parameter set. The firmware version is shown on the large LCD digits when pressing UP and DOWN buttons for more than 3 seconds simultaneously.

### Control Parameters (Access code: 241)

Warning! Only experts should change these settings! See user parameters for login procedure.

| Parameter | Description                            | Range              | Standard    |
|-----------|--|--------------------|-------------|
| FC 00     | Minimum setpoint limit in Heating mode | -40...60°C (160°F) | 16°C (61°F) |
| FC 01     | Maximum setpoint limit in Heating mode | -40...60°C (160°F) | 24°C (75°F) |
| FC 02     | Minimum setpoint limit in Cooling mode | -40...60°C (160°F) | 18°C (64°F) |
| FC 03     | Maximum setpoint limit in Cooling mode | -40...60°C (160°F) | 30°C (86°F) |

### Controls configuration

|       |   |                     |               |
|-------|---|---------------------|---------------|
| FC 04 | Economy (unoccupied) Mode temperature shift:<br>The comfort (occupied) setpoint is shifted by the value set with parameter. If heating is active the comfort setpoint will be decreased, if cooling is active, the setpoint will be increased. (Enable with UP06.)  | 0...10.0°C (20.0°F) | 5.0°C (10°F)  |
| FC 05 | Switching Span Heating  | 0...10.0°C (20.0°F) | 0.9°C (1.8°F) |
| FC 06 | Switching Span Cooling  | 0...10.0°C (20.0°F) | 0.7°C (1.4°F) |
| FC 07 | Switching Hysteresis is the difference between switching on and switching off. A small hysteresis will increase the number of switching cycles and thus the wear on fan and relays contacts.  | 0...10.0°C (20.0°F) | 0.5°C (1°F)   |
| FC 08 | Mold Protection:<br>In mold protection, the fan keeps running independent of temperature as long as the unit is switched on.  | ON, OFF             | OFF           |
| FC 09 | Switching delay min running time of fan speed   | 0...255 s           | 10s           |
| FC 10 | Switching delay min stopping time of fan speed  | 0...255 s           | 10s           |
| FC 11 | 2-pipe or 4-pipe system:<br>OFF = 2-pipe, ON = 4-pipe system<br>A 2 pipe system uses the same output to control heating in winter and cooling in summer. A 4-pipe system consist of individual heating and cooling outputs and can switch based on demand between them.   | ON, OFF             | OFF           |
| FC 12 | Dead Zone Span:<br>The Dead Zone Span lies between the heating and the cooling setpoint. The output is off while the temperature is within the dead zone span. A negative dead zone is not possible.  | 0-100°C (200°F)     | 1.0°C (2°F)   |
| FC 13 | Heat/Cool Changeover Delay (if set to FC11 = 3):<br>A demand to switch between heating and cooling must persist for the length of time set with this parameter before the controller switches. Prevents activation of a sequence during a short-term change in temperature in order to protect equipment (with control overshoot for example) | 0...255 min         | 5 min         |

### Output Parameters

|       |  |           |      |
|-------|--|-----------|------|
| FC 14 | Output setting, Binary or 3-point:<br>OFF = Binary (DO4 Heating, DO5 Cooling)<br>ON = 3-point output (DO4 OPEN, DO5 CLOSE)   | ON, OFF   | OFF  |
| FC 15 | Reversing valve in binary mode<br>0 = no reversing valve (DO4 Heating, DO5 Cooling)<br>1 = reversing valve while heating (DO4 R. Valve, DO5 comp.)<br>2 = reversing valve while cooling (DO4 Comp, DO5 R. valve) | 0...2     | 0    |
| FC 16 | Running Time in 3-point mode   | 0...255 s | 90 s |

#### → 3-point floating:

For floating point outputs the running time of the actuator used needs to be specified with FC16. Running time is defined as the time required for the actuator to run from fully open to fully closed and vice versa. Actuators with a fixed running time are recommended. Once fully open or fully closed the running time for the actuator is extended for a full run-time cycle. This will allow the actuator position to be synchronized in case it has been moved during off time or an actuator with variable running time was used.



## Input configuration

| Parameter | Description   | Range              | Standard    |
|-----------|---|--------------------|-------------|
| FC 17     | External input:<br>0 = No external input<br>1 = External temperature sensor<br>2 = Occupation sensor – Comfort / Economy<br>3 = Occupation sensor – Comfort / Off<br>4 = Heat / Cool change by open contact. Contact open = Heat<br>5 = Heat / Cool change by open contact. Contact open = Cool<br>6 = Auto-changeover based on supply temperature<br>7 = Auto-changeover based on outside temperature<br>8 = Key card with alternative setpoint<br>9 = Key card with full reset after inserting card | 0...9              | 0           |
| FC 18     | Activation delay (Minutes) = the time the binary input needs to be open before economy/off mode is activated.   | 0...255 min        | 5           |
| FC 19     | Auto-changeover limit cooling for supply temperature FC17 = 6<br>Auto-changeover limit heating for outside temperature FC17 = 7<br>or economy setpoint in heating mode if FC17 = 8  | -40...60°C (160°F) | 16°C (61°F) |
| FC 20     | Auto-changeover limit heating for supply temperature FC17 = 6<br>Auto-changeover limit cooling for outside temperature FC17 = 7<br>or economy setpoint in cooling mode if FC17 = 8  | -40...60°C (160°F) | 28°C (82°F) |
| FC 21     | Comfort setpoint in heating mode if FC17 = 9  | -40...60°C (160°F) | 21°C (70°F) |
| FC 22     | Comfort setpoint in cooling mode if FC17 = 9  | -40...60°C (160°F) | 24°C (75°F) |

## Configuring the external input

|          |   |   |
|----------|---|---|
| FC17 = 0 | Input not used                                    |   |
| FC17 = 1 | External control input                            | The external sensor is the control input.   |
| FC17 = 2 | Switching Economy and Comfort modes               | Economy (unoccupied) and Comfort (occupied) modes are controlled through an external contact by connecting the input through a dry contact to signal common. This function may be used together with key card switches for hotels or motion detectors for offices.                                      |
| FC17 = 3 | Switching Energy Hold OFF and Comfort modes       | Opening the input will force the unit into the OFF operation mode. The operation mode cannot be overridden by using the terminal. Connecting the input to signal common returns control of the operation mode to the terminal. This function may be used as window contact to prevent loss of energy.   |
| FC17 = 4 | Heat – Cool changeover by contact                 | Switch by open contact: Contact open = heating is active, contact closed = cooling is active.   |
| FC17 = 5 | Heat – Cool changeover by contact                 | Switch by open contact: Contact open = cooling is active, contact closed = heating is active.   |
| FC17 = 6 | Auto heat cool change-over by supply temperature  | Connect a supply media sensor to the input. Cooling will be activated if a temperature below FC19 is measured. Heating is activated if a value above FC20 is measured   |
| FC17 = 7 | Auto heat cool change-over by outdoor temperature | Connect an outdoor temperature sensor to the input. Cooling will be activated if a temperature above FC20 is measured. Heating is activated if a value below FC19 is measured   |
| FC17 = 8 | Key card with alternative setpoint                | As with FC17 = 2, the key card function switches economy (unoccupied) and comfort (occupied) modes. Instead of using the setpoint shift, the setpoints in unoccupied mode are defined by parameter FC19 in heating mode and FC20 in cooling mode. Fan speed in unoccupied mode is limited to low speed. |
| FC17 = 9 | Key card with full reset                          | Similar as FC17 = 8 with the difference that setpoints, fan speed and operation mode are reset each time the key card is inserted. This is helpful for business hotels.   |

**Notes:**