

## TLR-D5P with OPU-D5P

### Heat pump & package unit controller.

### Cabinet mounted base, wall mounted operation terminal.

#### Features

- Temperature control for 2-pipe or 4-pipe package units or heat pumps (fan supported dual heating or cooling stages with reversing valve)
- Temperature control for 2-pipe package units or heat pumps (fan supported dual heating or cooling stages) with optional electric re-heat.
- Temperature control for 4-pipe package units (fan supported heating and cooling 1. stage + optional 2 stage heating or cooling)
- Relays switching up to 10(6) A
- Control for heating, cooling and fan only operation
- Adjustable start and stop delays to protect compressors and switching elements
- Cost saving option with economy functionality and set point limitations
- 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
- Password protected programmable user and control parameters
- Temperature display in Fahrenheit



#### Deluxe Version:

- Clock and time schedule functions with special options for schools and universities
- Clock keeps running for 48 h 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: fan supported heating or/and cooling stages e.g. compressors, electric heaters.
- Air/water systems: Induction units, fan supported dual coil units for 2- and 4-pipe systems

#### General description

The TLR-D5P is a stand-alone electronic package unit controller with one control loop. The TLR-D5P includes one internal NTC temperature sensor, one open/contact or external NTC temperature input and five binary outputs (relays).

A detailed adaptation to local conditions is possible with the use of a simple configuration routine. The TLR-D5P can be configured using the standard operation terminal. No special tools or software is required.

The TLR-D5P has been specifically developed to switch larger loads with switching power of up to 10(6) A for each binary outputs.

#### Ordering

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

Item name	Item code	Function	Type	Key-data
TLR-D5P-24	40-11 0013	24 VAC	Base unit	Fan coil controller with: 1 TI int or ext
TLR-D5P-230	40-11 0015	230 VAC		
OPU-D5P	40-10 0095	Standard	Operation terminal	1 DO (Relay) Fan control 4 DO (Relay) Binary control
OPU-D5P-D	40-10 0096	Deluxe		


#### 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
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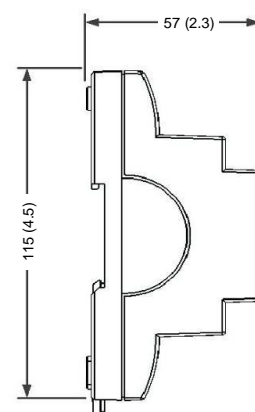
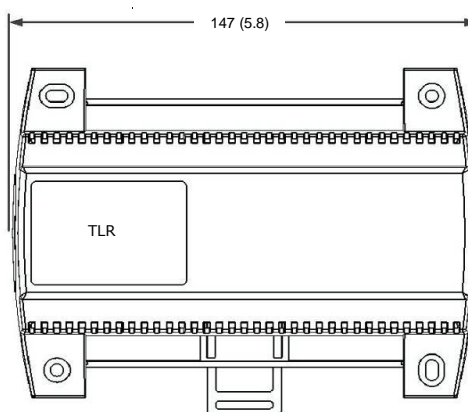
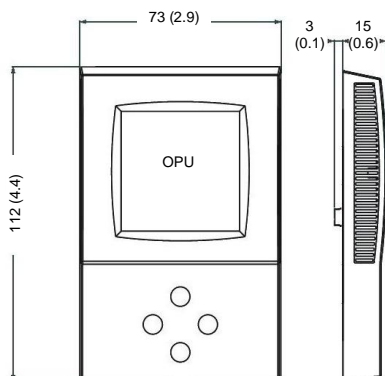
#### Accessories

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 12 cm immersion depth, 2 m cable	
SD-Tn10-20-2	40-20 0003	Flying lead duct sensor 20 cm immersion depth, 2 m cable	
SDB-Tn10-12	40-20 0051	Duct sensor with housing, 12 cm immersion depth	
SDB-Tn10-20	40-20 0004	Duct sensor with housing, 20 cm 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-D5P-24	24 VAC $\pm$ 10 %, 50/60 Hz, SELV to HD 384, Class II transformer, 48 VA max
		TLR-D5P-230	230 VAC $\pm$ 10 %, 50/60 Hz
	Power consumption	TLR-D5P-24	Max. 3 VA
		TLR-D5P-230	Max. 5 VA
	Electrical connection	Terminal connectors	Wire 0.34...2.5 mm <sup>2</sup> (AWG 22...13)
	Deluxe type only: Power backup for real time clock		Min 48 h if charged for 24 h
<b>Signal inputs</b>	Temperature input	Range	0...50 °C (32...122 °F)
		Accuracy	0.5 °C, 1 °F
<b>Signal outputs</b>	Digital switching outputs		DO1 to DO5
	Switching type		Relays
	AC Switching power		0...240 VAC 10(6) A max. each output
	Insulation strength		
	between relays contacts and system electronics:		3750 VAC to EN 60730-1
	between neighboring relays contacts		1250 VAC to EN 60730-1 1<>2<>3, 4<>5
	between relay groups:		3750 VAC to EN 60730-1 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...13), shielded twisted pair
<b>Environment</b>	Operation		To IEC 721-3-3
	Climatic conditions		class 3K5
	Temperature		0...50 °C (32...122 °F)
	Humidity		< 95% RH non-condensing
	Transport & storage		To IEC 721-3-2 and IEC 721-3-1
	Climatic conditions		class 3K3 and class 1K3
	Temperature		-25...70 °C (-13...158 °F)
	Humidity		< 95% RH non-condensing
	Mechanical conditions		class 2M2
<b>Standards</b>		conformity	
		EMC directive	2004/108/EC
		Low voltage directive	2006/95/EC
	Product standards		
	Automatic electrical controls for household and similar use		EN 60730-1
	Special requirement on temperature dependent controls		EN 60730-2-9
	Electromagnetic compatibility for domestic sector		Emissions: EN 60730-1
			Immunity: EN 60730-1
<b>General terminal</b>	Safety class		III (IEC 60536)
	Degree of protection		IP30 to EN 60529
	Material	Cover, back part	ABS plastic (UL94 class V-0)
		Mounting plate	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-D5P	180 g (6.3 oz)
<b>General base</b>		OPU-D5P-D	190 g (6.7 oz)
	Safety class		II (IEC 60536)
	Degree of protection		IP20 to EN 60529
	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-D5P-24	345 g (12.2 oz)
		TLR-D5P-230	445 g (15.7 oz)

## Dimensions [mm] (inch)



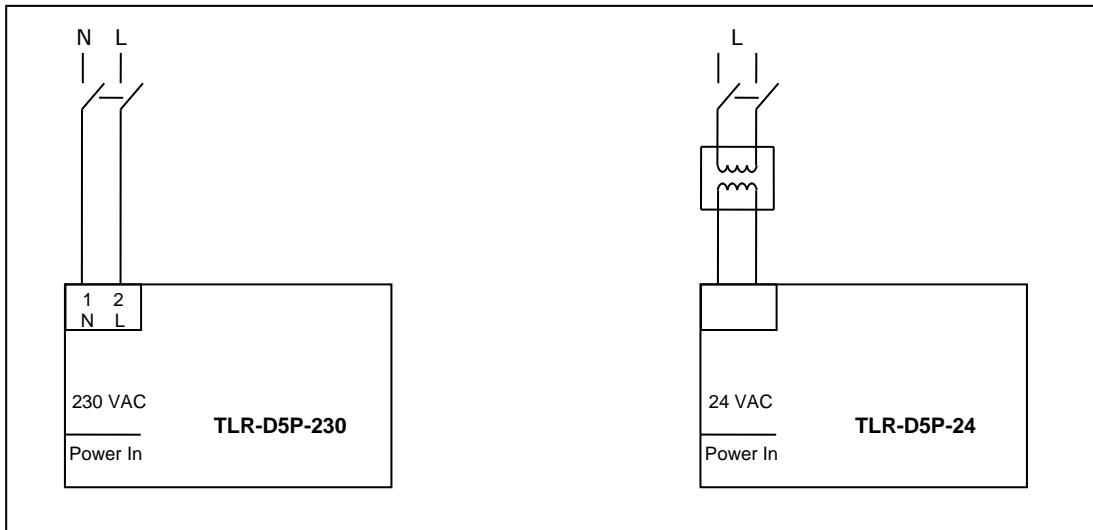
## Selection of actuators and sensors

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

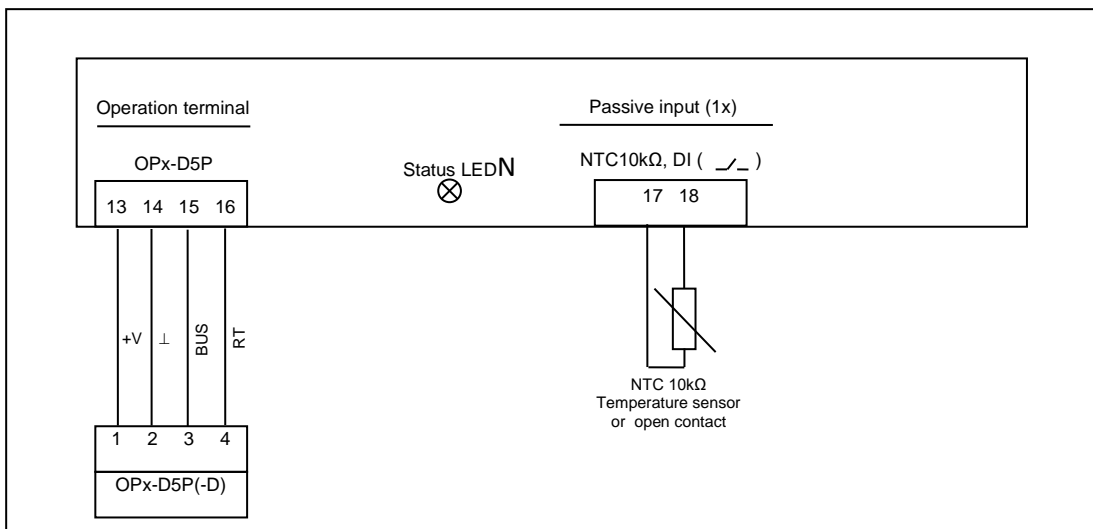
Binary auxiliary devices: E.g. fans and on/off valves. Do not directly connect devices that exceed maximum switching currents as detailed under technical specifications. Observe startup current of fans.

## Schematics

### Power supply

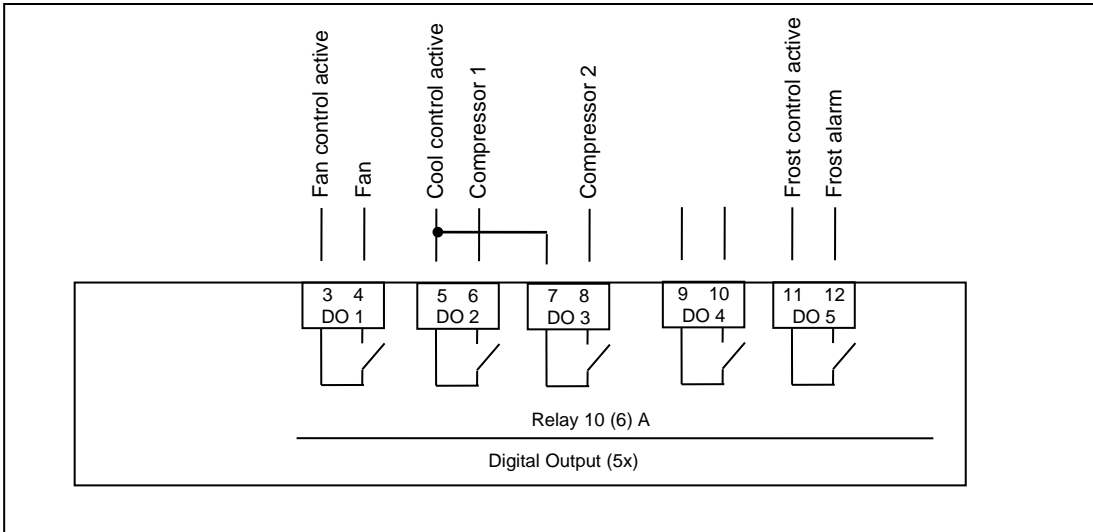


### Inputs and operation terminal

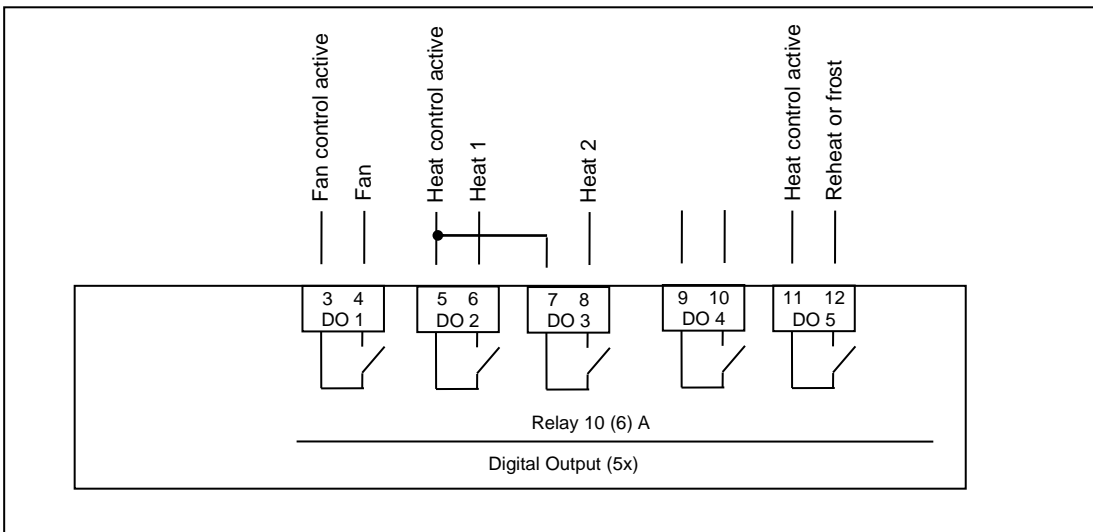


## Outputs

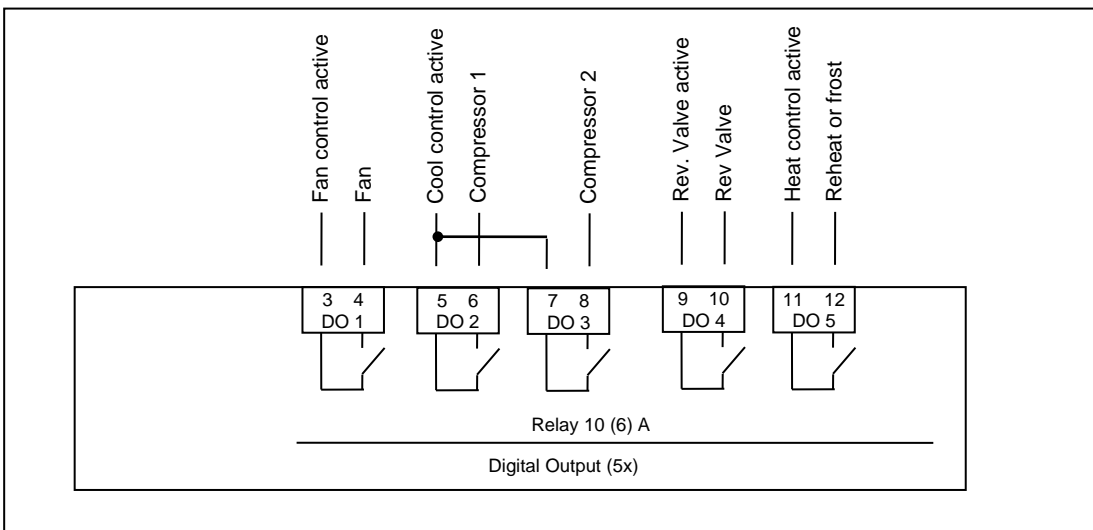
### CP11 = 0, Cooling only



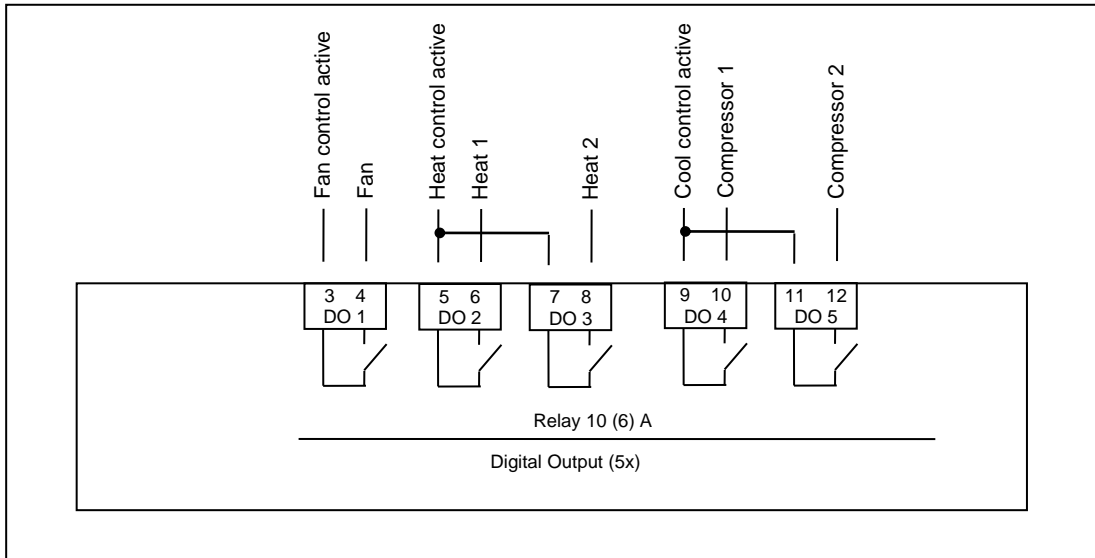
### CP11 = 1, Heating only



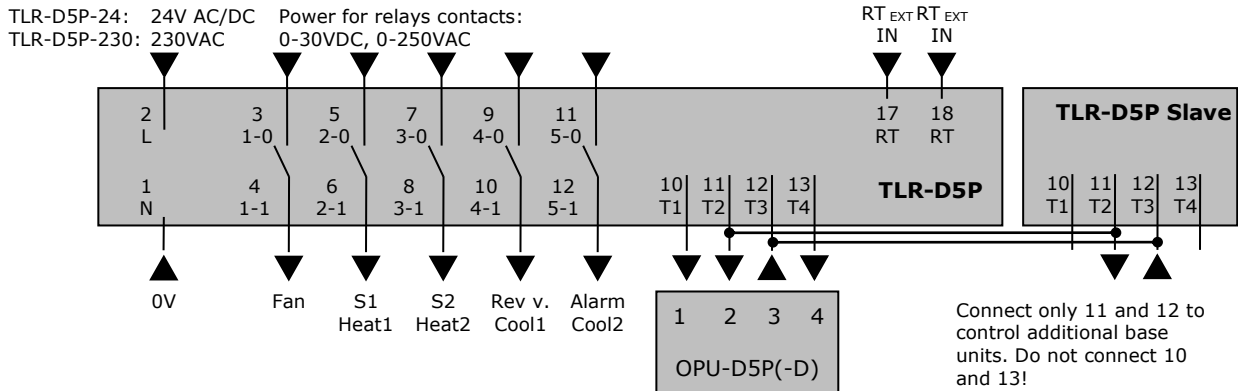
### CP11 = 2, 2-pipe



CP11 = 3, 4-pipe



## Wiring Diagram



### Description:

1	N	Power supply:	TLR-D5P-24: 0V AC, 0V DC
2	L	Power supply:	TLR-D5P-230: 0V AC
3	1-0	Switched common for fan:	TLR-D5P-24: 24V AC, 24V DC
4	1-1	Binary output:	TLR-D5P-230: 230V AC
5	1-2	Binary output:	0-250VAC, 0-30VDC
6	1-3	Binary output:	Fan
7	2-0	Switched common for valve:	2-pipe: Stage 1 heat/cool,
8	2-1	Binary output:	2-pipe: Stage 2 heat/cool,
9	2-2	Binary output:	0-250VAC, 0-30VDC
			2-pipe: Reversing valve
			2-pipe: Alarm
10	Term1	Terminal connection 1	4-pipe: Heating stage 1
11	Term2	Terminal connection 2	4-pipe: Heating stage 2
12	Term3	Terminal connection 3	4-pipe: Cooling stage 1
13	Term4	Terminal connection 4	4-pipe: Cooling stage 2
14	RT	External temperature input:	Sxx-Tn10 or open contact
15	RT	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 4 mm diameter are provided. Mounting onto a standard 35 mm 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.

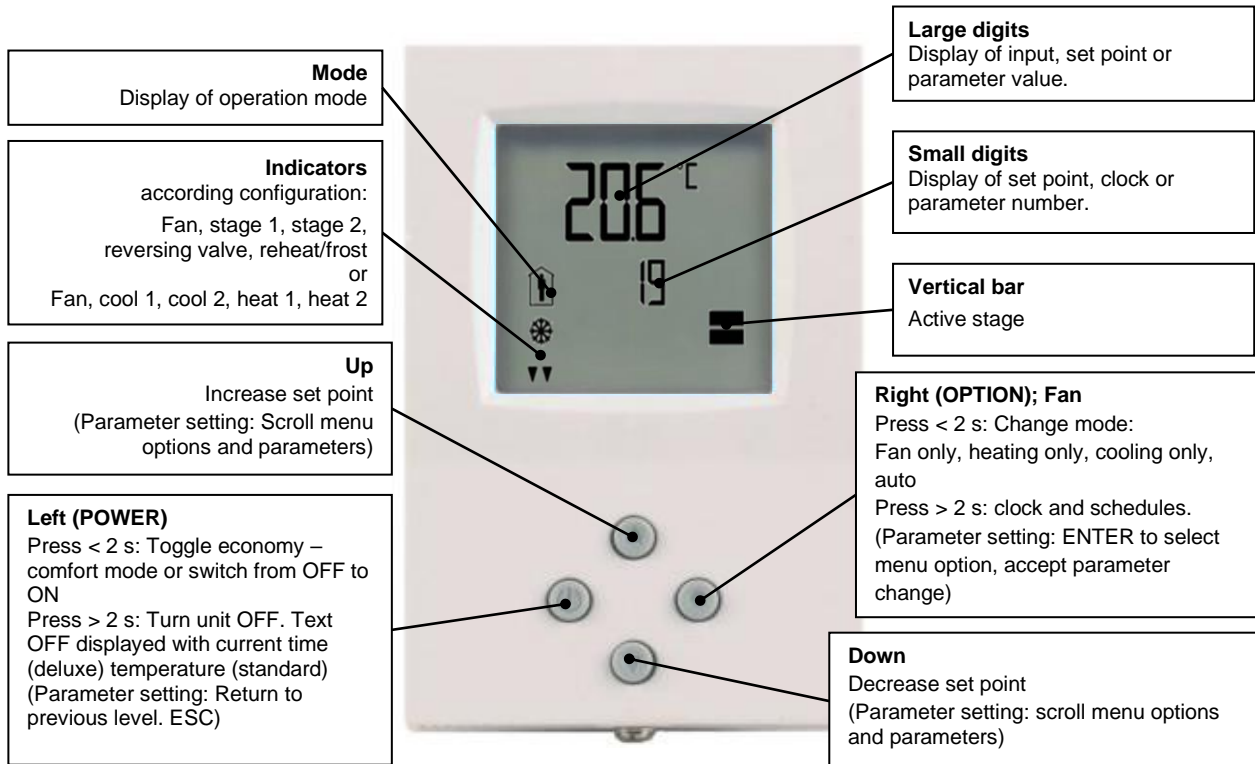
## Installation terminal

1. Install the mounting plate straight to the wall or the flush mounting 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.
2. Connect the wires of the terminals to the communication wires according wiring diagram
3. Slide the two latches located on the top of the front part into the hooks of the mounting plate.
4. 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.
5. Tighten the front holding screw to secure the front part to the mounting plate.

## Connection base to terminal

- Max. Distance: 200 m (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 60730.
- 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  $\Omega$  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 modes and symbols

	Comfort (occupied)	All control functions operating per set points.
	Economy (unoccupied):	Set points shifted according to <i>parameters FC04</i> . Economy mode and set point 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 set point
	Cooling	Output activates if temperature higher than set point
	Fan	Fan is running
	Manual	Fan only mode or override of time schedule
	Time schedule	A time schedule is active

## Display of set point instead of current temperature

As standard the current temperature is shown in the large digits. Should only the set point be shown, select UP10 = 1. The current temperature will then not be visible anymore.

## 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 24 h. 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 1 s: Error, terminal – base unit do not match or signal is not clear  
 Blink every 2 s: Normal communication, base unit detected  
 Blink every 5 s: 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 s SEL and current time displayed  
 Press OPTION < 2 s 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 s 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

Pr01  
08:00

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After completing the 4<sup>th</sup> switching event, the process returns to the selection of the time schedule on step 1.

- 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 set point
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

Toggle between manual and automatic fan.

### 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

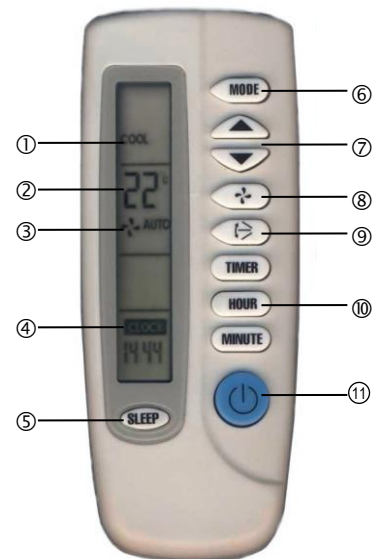
The unit may be delayed switched on or off using the timer button. Pressing the timer button once will display Timer ON if currently in OFF mode or TIMER OFF if currently in ON mode. Set the time when the unit is supposed to switch on or off using the HOUR and MINUTE buttons.

### 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/heating only/cooling only/auto	ON, OFF	ON (enabled)
UP 03	Enable manual change of heating/cooling/fan only mode 0 = manual mode change disabled 1 = fan only enabled 2 = manual heat/cool mode change enabled 3 = manual heat/cool/fan only mode enabled	0, 1, 2, 3	W00: 3 (heat/cool/fan only) W01: 1 (fan only)
UP 04	Enable access to Time programs	ON, OFF	ON (enabled)
UP 05	State after power failure: 0 = switched OFF, 1 = switched ON, 2 = state before power failure	0, 1, 2	2
UP 06	Enable economy (unoccupied) mode. 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. 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 (Frost protection) W01 = OFF (No frost protection)
UP 10	Select contents of Large LCD digits in standard mode:	0...5	02 Temperature
	00 = OFF 01 = Set point 02 = Temperature sensor 03 = Output fan speed 04 = Clock 05 = Alternative sensor		
UP 11	Select contents of small LCD digits in standard mode:	0...4	04 Deluxe: show clock 01 Standard: show set point
	00 = OFF 01 = Set point 02 = Temperature sensor 03 = Output fan speed 04 = Clock 05 = Alternative sensor *1) Note: if UP10 = 1, the set point will be shown instead of the measured temperature also in controls display.		
UP 12 Deluxe only	Clock display type: OFF = Show 24 hour clock ON = Show 12 hour clock (AM, PM)	ON, OFF	OFF (24 h)
UP 13 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. 0 = Reset of override mode is not active. 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
CP 00	Minimum set point limit in heating mode	-40...60 °C (160 °F)	16 °C (61 °F)
CP 01	Maximum set point limit in heating mode	-40...60 °C (160 °F)	24 °C (75 °F)
CP 02	Minimum set point limit in cooling mode	-40...60 °C (160 °F)	18 °C (64 °F)
CP 03	Maximum set point limit in cooling mode	-40...60 °C (160 °F)	30 °C (86 °F)

### Controls configuration

CP 04	Economy (unoccupied) mode temperature shift: The comfort (occupied) set point is shifted by the value set with parameter. If heating is active the comfort set point will be decreased, if cooling is active, the set point will be increased. (Enable with UP06.)	0...10.0 °C (20.0 °F)	5.0 °C (10 °F)
CP 05	Switching span in heating mode: Temperature difference between room temperature to set point required for second heat stage to be activated. Setting this value to 0 disables the second stage in heating mode	0...10.0 °C (20.0 °F)	0.9 °C (3 °F)
CP 06	Switching Span in cooling mode: Temperature difference between room temperature to set point required for second cooling stage to be activated. Setting this value to 0 disables the second stage in heating mode	0...10.0 °C (20.0 °F)	0.7 °C (2 °F)
CP 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)
CP 08	Mold protection: In mold protection, the fan keeps running independent of temperature as long as the unit is switched on.	ON, OFF	OFF
CP 09	Delay OFF (minimum running time)	0...2550 s	100s
CP 10	Delay ON (minimum stopping time)	0...2550 s	100s
CP 11	Control option: 0 = Cooling only 1 = Heating only <b>2 = 2-pipe system (standard for heat pumps)</b> 3 = 4-pipe system	0...3	<b>W00 = 2</b> W01 = 0
CP 12	Dead zone span: The dead zone span lies between the heating and the cooling set point. The output is off while the temperature is within the dead zone span. A negative dead zone is not possible.	0...10.0 °C (20.0 °F)	1.0 °C (2 °F)
CP 13	Heat/cool change-over delay (if set to FC11 = 3): 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

**Input configuration**

Parameter	Description	Range	Standard
CP 14	External input: 0 = No external input 1 = External temperature sensor 2 = Occupation sensor – comfort / economy 3 = Occupation sensor – comfort / off 4 = Heat / cool change by open contact. Contact open = heat 5 = Heat / cool change by open contact. Contact open = cool 6 = Auto-changeover based on supply temperature 7 = Auto-changeover based on outside temperature 8 = Key card with alternative set point	0...8	0
CP 15	Activation delay (minutes) = the time the binary input needs to be open before economy/off mode is activated.	0...255 min	5
CP 16	Auto-changeover limit cooling for supply temperature CP14 = 6 Auto-changeover limit heating for outside temperature CP14 = 7 or economy set point in heating mode if CP14 = 8	-40...60 °C (-40...160 °F)	16 °C (61 °F)
CP 17	Auto-changeover limit heating for supply temperature CP14 = 6 Auto-changeover limit cooling for outside temperature CP14 = 7 or economy set point in cooling mode if CP14 = 8	-40...60 °C (-40...160 °F)	28 °C (83 °F)

**Configuring the external input**

CP14 = 0	Input not used	<p>The external sensor is the control input. The internal sensor will be disabled.</p> <p>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.</p> <p>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.</p> <p>Switch by open contact: Contact open = heating is active, contact closed = cooling is active.</p> <p>Switch by open contact: Contact open = cooling is active, contact closed = heating is active.</p> <p>Connect a supply media sensor to the input. Cooling will be activated if a temperature below CP16 is measured. Heating is activated if a value above CP17 is measured</p> <p>Connect an outdoor temperature sensor to the input. Cooling will be activated if a temperature above CP17 is measured. Heating is activated if a value below CP16 is measured</p> <p>As with CP14 = 2, the key card function switches economy (unoccupied) and comfort (occupied) modes. Instead of using the set point shift, the set points in unoccupied mode are defined by parameter CP16 in heating mode and CP17 in cooling mode. Fan speed in unoccupied mode is limited to low speed.</p>
CP14 = 1	External control input	
CP14 = 2	Switching economy and comfort modes	
CP14 = 3	Switching energy hold OFF and comfort modes	
CP14 = 4	Heat – cool change-over by contact	
CP14 = 5	Heat – cool change-over by contact	
CP14 = 6	Auto heat cool change-over by supply temperature	
CP14 = 7	Auto heat cool change-over by outdoor temperature	
CP14 = 8	Key card with alternative set point	

**Output configuration**

CP 18	Enable auto heat / cool change based on demand	ON, OFF	OFF
CP 19	Reversing valve action: 0 = off, 1 = heating, 2 = cooling	0...2	0
CP 20	Fan on delay (time the fan runs before stage switch on)	0...255 s	30 s
CP 21	Fan off delay (time the fan keeps running after stage switch off)	0...255 s	90 s
CP 22	For 2-pipe systems: DO5 = Electric reheat or frost protection Set to ON if DO5 is used for electric re-heat Set to OFF if DO5 is used for frost protection alarm	ON, OFF	OFF
CP 23	Delay before electric reheat is activated. If the set point is not reached within delay time, the electric re-heat is activated.	0...255 min	20 min

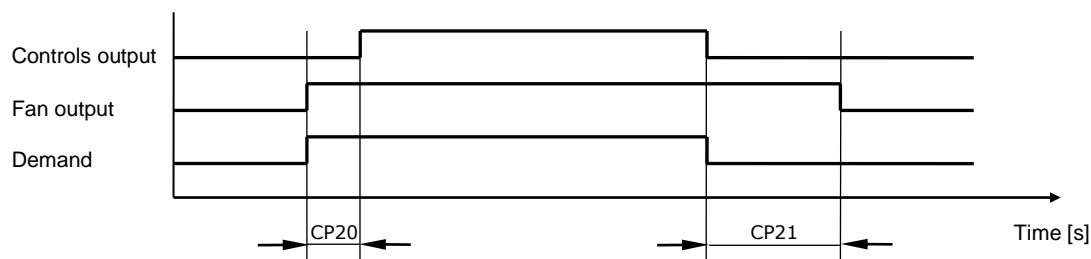
**Control Logic**

Output	DO1	DO2	DO3	DO4	DO5
CP11 = MODE				CP19 = REV VALVE	CP22 = FROST / REHEAT
0 = cooling	FAN	COOL 1	COOL 2		OFF = FROST
1 = heating	FAN	HEAT 1	HEAT 2		OFF = FROST ON = REHEAT
2 = 2-PIPE cooling	FAN	COOL 1	COOL 2	2 = COOL	OFF = FROST
2 = 2-PIPE heating	FAN	HEAT 1	HEAT 2	1 = HEAT	OFF = FROST ON = REHEAT
3 = 4-PIPE	FAN	HEAT 1	HEAT 2	COOL 1	COOL 2

**Fan delay**

Once there is an output demand, the fan will activate first, wait the required start delay time and then activate the control output. This will ensure stable air for heating or cooling and for the reversing valve to run to the correct position before the compressors are started.

The control output will be switched off when the set point is reached. The fan keeps running until stop delay has expired. This delay prevents overheating and condensation on the coils.



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