TLR-D5P
Intelligent Package Unit Controller, Base & Terminal





Features

- Temperature control for 2-pipe or 4-pipe package units (fan supported dual heating or cooling stages with reversing valve)
- Temperature control for 2-pipe package units (fan supported dual heating or cooling stages)
- Temperature control for 4-pipe package units (fan supported heating and cooling 1. stage + optional 2 stage heating or cooling)
- Relays switching for outputs each up to 10(6)A
- Large temperature range from
  –20°C to 70°C (-4°F to 158°F).
- 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
- 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
  - Setpoint range limitation
  - Access control for setpoints, fan speeds and mode change
  - Access control for heat/cool change and time programs
  - Select your display contents
  - Selectable behavior after return from power failure
- 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

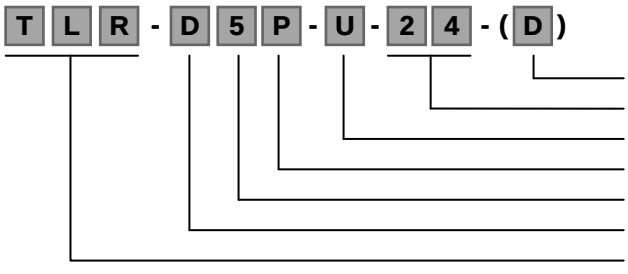
- Air Only Systems: fan supported heating or/and cooling stages e.g. compressors, electric heaters.
- Air/Water Systems: Induction units, fan supported dual coil units for 2- and 4-pipe systems

General Description

The TLR-D5P is a stand-alone electronic package unit controller with one control loop. The TLR-D5P includes 1 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 fans with switching power of up to 10 (6) A.

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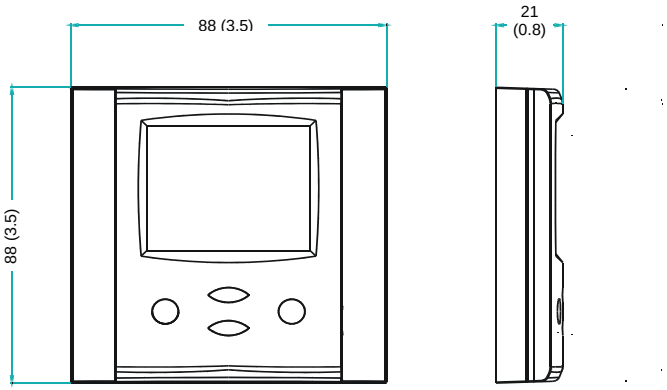
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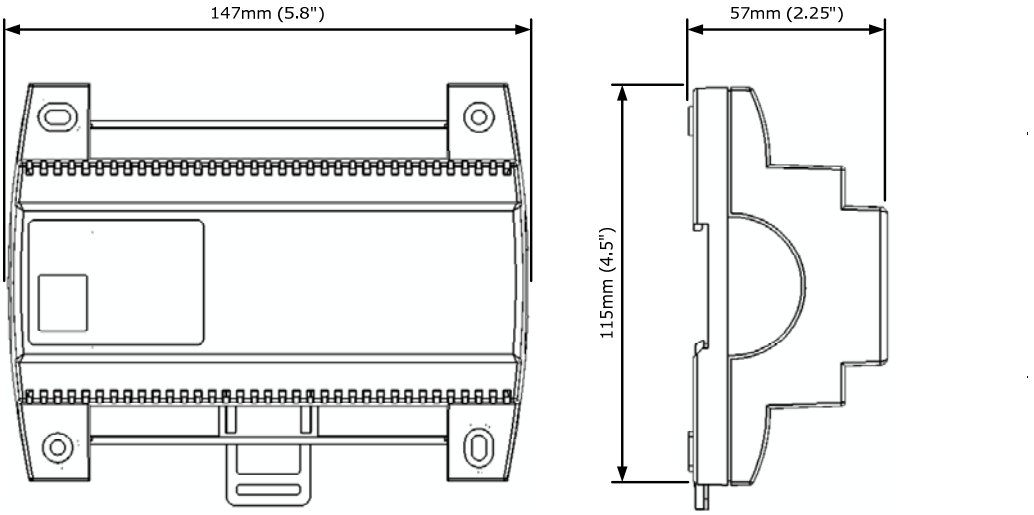


Ordering

Item name	Item code	Variant	Mounting size	Power	Key-data
TLR-D5P-24	40-11 0013	Standard	88mm x 88mm	24VAC	Package unit controller with: 1 TI int or ext 1 DO (Relay) Fan control 2 DO (Relay) Cooling output 2 DO (Relay) Heating output
TLR-D5P-24-D	40-11 0014	Deluxe			
TLR-D5P-230	40-11 0015	Standard	88mm x 88mm	230VAC	
TLR-D5P-230-D	40-11 0016	Deluxe			
Accessories					
AER-D5-24	40-11 0017				Base unit only 24V
AER-D5-230	40-11 0018				Base unit only 230V
OPR-1	40-50 0001			2xAAA bat	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		
SOA-Tn10	40-20 0006		Outdoor sensor		

Dimensions [mm] (inch)





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Technical specifications

Power Supply	Operating Voltage TLR-D5P-24 TLR-D5P-230	 24 V AC ± 10 %, 50…60 Hz 230 V AC ± 10 %, 50…60 Hz
	Power Consumption TLR-D5P-24 TLR-D5P-230	 Max. 3 VA Max. 5 VA
	Electrical Connection	Terminal Connectors, wire 0.34…2.5 mm^2 (AWG 24…12)
	Internal rectification:	Full wave rectified
	Deluxe type only: Power backup for real time clock	 Min 48h if charged for 24h
Signal inputs	Temperature Input	
	Range	Int. NTC: 0…50 °C (32…122 °F) Ext. NTC (Sxx-Tn10 sensor): -20…70 °C (-4…158 °F)
	Accuracy	-20…0 °C (-4…32 °F): 0.5 K 0…50 °C (32…122 °F): 0.2 K 50…70 °C (122…158 °F): 0.5 K
Signal outputs	Relays Outputs AC Voltage Insulation resistance	DO1…DO5 0…250 VAC, 10 (6) A max. each output 3750 VAC acc. to EN 60 730-1
Communication Base - Terminal	Communication Type Cable Type Max Distance	Digital: peer to peer Copper wire 0.8…2.5 mm^2 (AWG18…AWG13) 200m (650ft) use shielded wire in an EMC challenged environment. Conductor resistance must be compensated if external sensor is used
Environment	Operation Climatic Conditions Temperature Humidity	To IEC 721-3-3 class 3 K5 0…50 °C (32…122 °F) <95 % r.H. non-condensing
	Transport & Storage Climatic Conditions Temperature Humidity Mechanical Conditions	To IEC 721-3-2 and IEC 721-3-1 class 3 K3 and class 1 K3 -25…70 °C (-13…158 °F) <95 % r.H. non-condensing class 2M2
Standards	CE conform according to EMC Standard 89/336/EEC EMEI Standard 73/23/EEC	 EN 61 000-6-1/ EN 61 000-6-3
	Product standards Automatic electrical controls for household and similar use Special requirement on temperature dependent controls	 EN 60 730 –1 EN 60 730 – 2 – 9
General Terminal	Degree of Protection	IP30 to EN 60 529
	Safety Class	III (IEC 60536)
	Housing Material Cover, back part Mounting Plate	 Fire proof ABS plastic (UL94 class V-0) Galvanized Steel
	Color	White RAL 9003
	Dimensions (H x W x D)	88 x 88 x 21 mm (3.5” x 3.5” x 0.8”)
	Weight (controller only)	70 g (2.8 oz)
General Base	Degree of Protection	IP30 to EN 60 529
	Safety Class	Base: II (IEC 60536)
	Housing Material	Fire proof 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, base + terminal) TLR-D5P-24 TLR-D5P-230	 520 g (1.15 lb) 570 g (1.25 lb)

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Selection of actuators and sensors

Temperature Sensors:

Use only our approved NTC sensors to achieve maximum accuracy. Recommended is SDB-Tn10-20 as Duct sensor, SRA-Tn10 as Room sensor and SDB-Tn10-20 with AMI-S10 as immersion sensor.

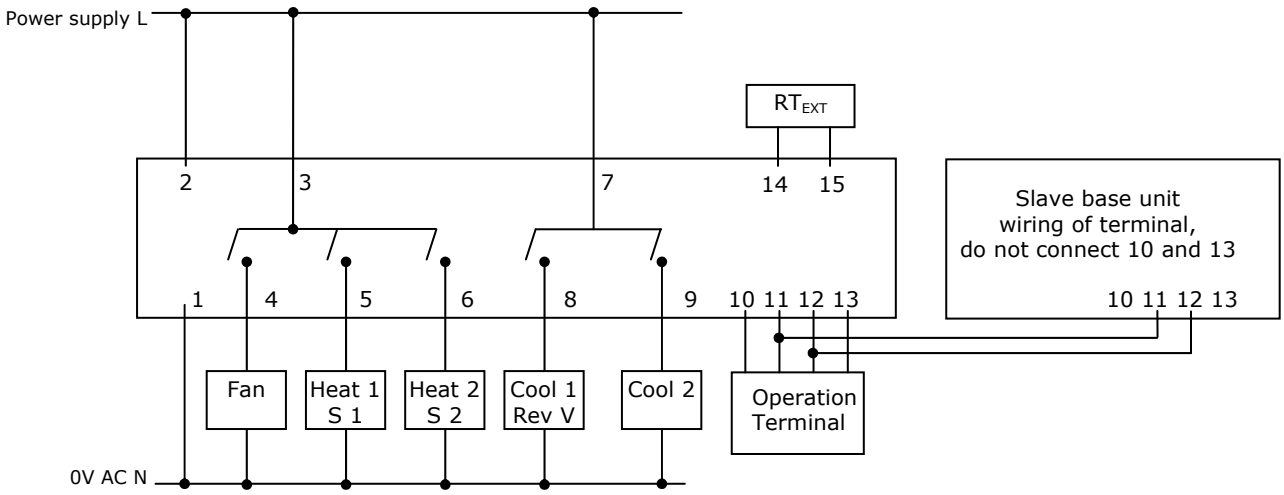
Binary auxiliary devices:

Compressors, heat stages on/off valves, etc. Do not directly connect devices that exceed 250 VAC, 10(6) A. Observe startup current on inductive loads.

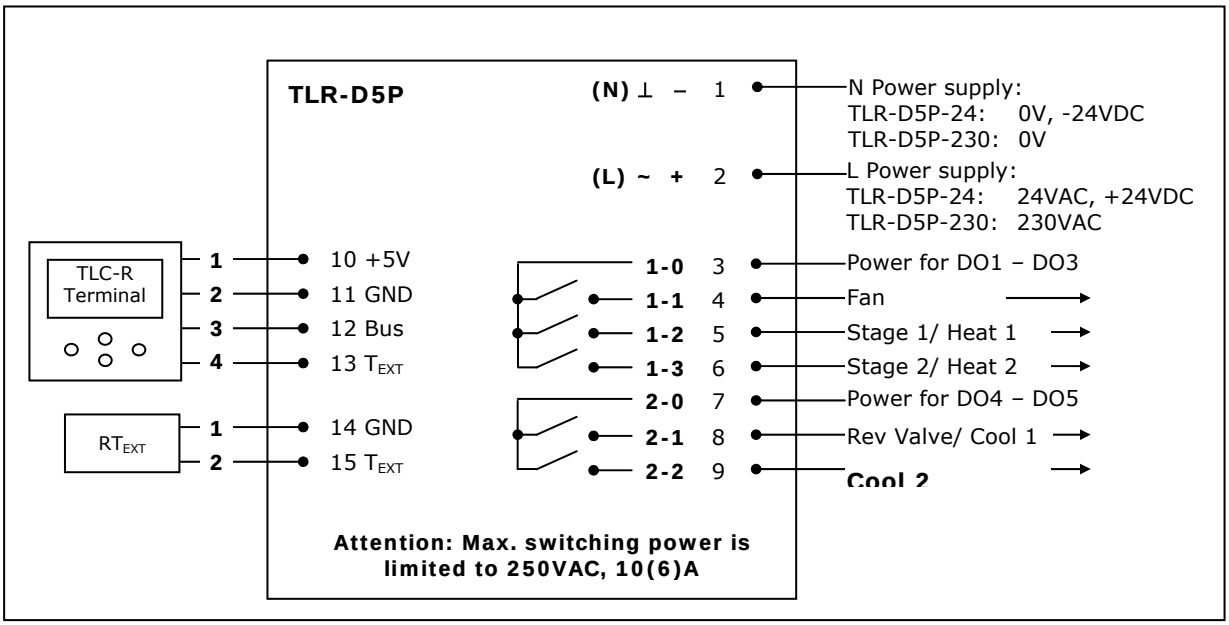
Fan motors:

Observe power limits and startup currents. Do not connect fans that exceed 6A inductive load. Note: startup currents may be a multiple of the rated current of the fan. Verify with the fan supplier if unclear. Do not connect directly motors larger than 1kW.

Connection diagram



Connection terminals



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Mechanical design and installation

The unit consists of two parts: The base unit and the terminal.

Installation base

The housing of the TLR base unit is a compact enclosure. The controller may be mounted in any orientation by surface mounting on a wall or in a cabinet with two screws or on a 35mm DIN rail.
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.

Mounting location terminal

- On an easy accessible interior wall, approx. 1.5 m (4.5') above the floor in an area of average temperature.
- Avoid exposure to direct sunlight or other heat sources, e.g. the area above radiators and heat emitting electrical equipment.
- Avoid locations behind doors, outside walls and below or above air discharge grills and diffusers.
- Location of mounting is less critical if external temperature sensors are used

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 to the ground. 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. With a Philips-type screw driver of size #2, carefully tighten the front holding screw to secure the front part to the mounting plate. This screw is located on the front lower side of the unit. There is no need to tighten the screw too much.

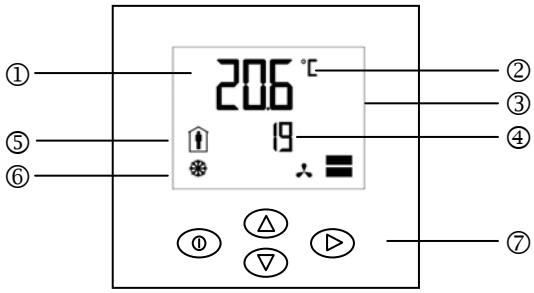
Connection base to terminal

- Max. Distance: 200m (650ft)
- Normal cables 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.
- One terminal may drive up to 8 base units. See wiring for parallel connections. Total wire distance should not exceed 200 m (650ft).
- 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.

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Display and Operation

The operation terminal uses an LCD display and four operation buttons.



Legend:

1. 4-digit display of current value, time, control parameter or setpoint
2. Unit of displayed value, °C, °F, % or none
3. Indication of fan speeds
4. 4-digit display of current value, time, control parameter or setpoint
5. Operation modes: Comfort mode, Economy mode, **OFF** Energy Hold Off
6. Symbols:

Heating Active	Cooling Active	Schedule Set	Fan Active	Manual Override	Frost Protection

7. Buttons for operating the controller

   POWER button: Pressing the button less than 2 sec toggles economy and comfort mode. Pressing the button for more than 2 seconds switches the unit off.

   UP and DOWN buttons: change setpoints and parameters
   OPTION button: used for changing fan speed and accessing advanced setup. Acts as Enter in parameter changing menu.

8. While the fan is in operation, the Fan symbol will be indicated and the active Fan speed is displayed in the vertical scale. Activation of heating or cooling coil is indicated by the blinking of the respective symbol in the lower left corner of the display.

Power Failure

All the parameters and set points are memorized and don't 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.
The deluxe version includes a real time clock with a 48h backup battery powered through a super capacitor. The time does not need to be re-entered after a power failure.

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

Operation Modes

- Comfort: The unit is in full operation mode. All the control functions are operating according to their setpoints. The unit displays occupied mode.
- Economy: The set point is shifted according to parameters CP-04. The heating parameter is shifted down and cooling parameter up. The unit displays unoccupied mode. Fan speeds are limited to maximum medium fan speed. Economy operation may be disabled with UP-06.
- Energy Hold Off (EHO): The unit is switched off. All outputs are off. The temperature will still be monitored in order to activate the unit in case of frost. (If frost protection is enabled). Off and current time is displayed.

Activation of operation modes

- Via operation terminal
- Clock: (Deluxe version only) Operation modes may automatically be switched according to daytime and weekday. The clock symbol will be indicated if time programs are activated.
- Infrared Remote Controller: (Deluxe version only) use OPR-1 to control the unit remotely
- Via external contact (comfort/economy)

Note: Time programs will not operate, if operation mode is set to OFF by remote control or if time is not set.

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Clock Operation and Time Schedules (Deluxe Version)

TLR-D5P-D contains a real time clock. Up to 16 mode changes (not defined, Off, Economy, Comfort, University mode) based on weekdays and time may be programmed. See chapter operation on how to program switch times.
The different scheduled mode changes have these effects:

Name on display	Function	Override reset
no	Switching event not used	
OFF	Operation mode changes to off mode	Reset is active
ECO	Operation mode changes to economy mode	Reset is not active
ON	Operation mode changes to comfort mode	Reset is not active
UNI	Operation mode does not change	Reset is not active

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.
Override reset function: The override reset applies when the unit is manually switched on, while in scheduled off mode. The unit will switch automatically off when the reset time defined in UP13 expires. Setting UP13 to 0, disables the override reset.
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.

Occupation Sensor, External Heat / Cool change, Auto change over

Remotely control comfort and economy mode for example with an occupation sensor or key switch. If the binary input is deactivated for a selectable time the unit will change to economy mode. For a key switch, set delay time to 0. The external input may as well be configured to change heating and cooling mode by a binary signal or by measuring the supply temperature.

Error messages

The TLR-D5P may display the following error condition:
Err1: Temperature sensor faulty. The temperature sensor is damaged.
Err2: External input for heat / cool auto change over missing or damaged.
FP: Frost protection is active.

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Operation of the terminal unit

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 POWER button for less than 2 seconds toggles between ECONOMY and COMFORT modes. Economy mode may be disabled with **UP06**.

Switching OFF

Pressing the POWER button for more than 2 seconds, will switch the unit off. OFF and current time will be displayed in the LCD for the deluxe unit. Current temperature and OFF is displayed for the basic unit.

Standard display

Standard display is enabled with parameter **UP08**. This display mode is active if no UP/DOWN or OPTION key has been pressed during the previous 30 seconds. The contents of the large and small digits may be chosen with parameters **UP09** to **UP10**.
Should Standard display be disabled, the selected loop setpoint will be displayed in the small digits, the associated input in the large digits and the output in the right hand scale.

Changing of set points

Change the set point with the UP/DOWN buttons. Changing of set points may be disabled with **UP01**.

Change Automatic, Fan, Heat or Cool only mode

Select fan only mode by pressing the OPTION key for less than 3 seconds. Repeatedly pressing the OPTION key will toggle these selections: Fan only→ Heat only → Cool only → Auto. Any other selection than Auto will display the manual override sign. Manually override may be disabled with UP-02

Accessing advanced settings

Pressing the option button for more than three seconds will start the advanced setup menu. The basic version will only show heat/cool setup. The deluxe version will allow access to the time setting function.
The large LCD digits display SEL. The advanced setup menu accesses these settings: Heat / Cool change, Clock setup, Time schedule. The menu may be left by pressing the POWER button or by not pressing a button for more than 5 minutes.

- Heat / Cool / Fan only change. Pressing the OPTION button toggles Heating – Cooling – Fan only mode. Access to Heat/Cool change may be disabled with UP-03

Clock Setup and Time Schedule (only available on Deluxe versions)

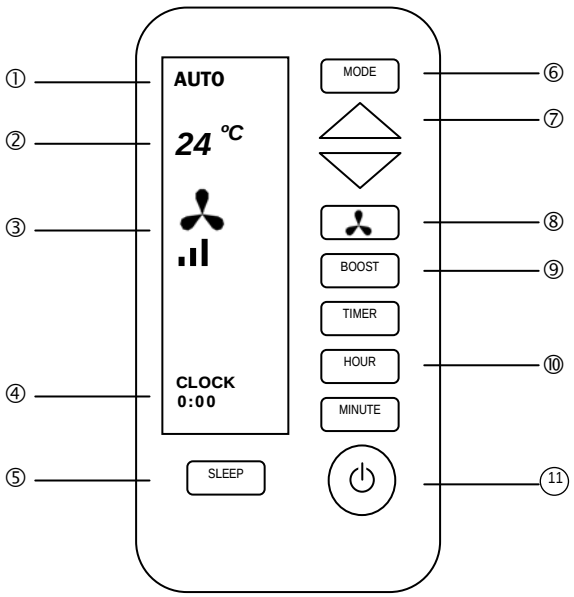
- Clock Setup. The current time is displayed in the small digits. Pressing the OPTION button will enter the clock setup. The minutes are blinking and may be changed with the UP/DOWN buttons. Pressing OPTION saves the minutes and steps to the hours. The hours are blinking. Pressing the OPTION button again will step to the weekday. DAY1-7 is displayed. Day 1 stands for the first working day (Monday) of a 5-day working week. (See schedule). Select the day according to current weekday. Pressing Option again saves the settings and moves back to the SELECT menu.
- Time Schedules: press the option button while Pro is displayed in the small digits. Pro1 is now shown in the large digits, while the number 1 is blinking. Select time program by using UP/DOWN buttons. There are a total of 4 time programs with each 4 switching times available. Enter the time program by pressing the OPTION button.
  1. Activate or deactivate the time program. Choose ON or OFF with the UP/DOWN buttons
  2. Select weekday(s) = d1-7, d1-5, d6-7, day1, day2, day3, day4, day5, day6, day7
     The next steps define the switching mode and time. The bar indicator on the right side shows programming progress. There are four switch times for each program.
  3. Select desired operation mode. (no, OFF, ECO, ON, UNI), press OPTION to continue
     - no = disables this switching time
     - OFF = switches unit Off, enables reset timer
     - ECO = sets operation mode to On and Economy, disables reset timer
     - ON = sets operation mode to On and Comfort, disables reset timer
     - UNI = Does not change operation mode, only disables reset timer
  4. Select switching time 00:00 to 23:45 in 15-minute steps; press OPTION to continue.
  5. Repeat steps 3 and 4 for each switching time.

  Access to time schedules may be disabled with UP-04

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Operation with OPR-1

The deluxe version may also be operated through 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.

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.

Clock settings

The remote controller contains a daytime clock. The receiving TLR-D5P controller will adopt the OPR-1's own clock whenever it received a command from it.
In order to set the clock in the OPR-1, 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.
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 keys.

Mode changes

Repeatedly pressing the mode button may activate the following operation modes: HEAT, COOL and FAN ONLY. The mode change function on the TLR-D5P may be disabled using the **UP00** parameters.

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

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Setting of parameters

The TLR-D5P is an *intelligent* controller and can be adapted to fit perfectly into your 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 shows the software version in the large digits and the software revision in the small digits.
2. Pressing the OPTION button will indicate CODE on the small digits and 000 on the large digits.
3. The code for accessing the user parameters is 009
4. Select this using UP or DOWN buttons.
5. Press OPTION button after selecting the correct code.
6. Once logged in, the parameter is displayed immediately.
7. Select the parameters with the UP/DOWN buttons. Change a parameter by pressing the OPTION button. The MIN and MAX symbols show up and indicate that the parameter may be modified now. Use UP or DOWN buttons to adjust the value.
8. After you are done, press OPTION or POWER in order to return to the parameter selection level.
9. Press the POWER button again so as to leave the menu. The unit will return to normal operation if no button is pressed for more than 5 minutes.

User Parameters

Parameter	Description	Range	Default
UP 00	Enable access to operation modes	ON, OFF	ON (Enabled)
UP 01	Enable access to 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 for 2 pipe systems	ON, OFF	W00: ON (Enabled) W01: OFF (Disabled)
UP 04	Enable access to time programs:	ON, OFF	ON (Enabled)
UP 05	State after power failure: 0 = off, 1 = on, 2 = state before power failure	0, 1, 2	2
UP 06	Enable Economy functionality	ON, OFF	ON (Economy)
UP 07	Celsius or Fahrenheit, ON for Fahrenheit, OFF for Celsius	ON, OFF	OFF (Celsius)
UP 08	Calibration value of temperature sensor. If required it is possible to shift the temperature −10° to +10° in 0.1K steps.	-10…10	0
UP 09	Enable frost protection	ON, OFF	W00 = ON (Frost Protection) W01 = OFF (No Frost Protection)
UP 10	Select contents of Large LCD display in standard mode: 00 = OFF 01 = Setpoint 02 = Temperature Input of control loop 03 = Output Fan Speed 04 = Clock 05 = Alternate Temperature Sensor	0…5	2
UP 11	Select contents of small LCD display in standard mode	0…5	4, 1
UP 12 Deluxe only	Clock display type: OFF = Show 24hour clock ON = Show 12hour clock (AM, PM)	ON, OFF	OFF (24h)
UP 13 Deluxe only	Reset timer for override mode: Only available for deluxe version 0 = Reset of override mode is not active. 1…255 = delay in minutes to switch off device if ON/Economy mode is activated while the unit is scheduled to be in OFF mode	0…255	60 (Min)

Subject to alteration

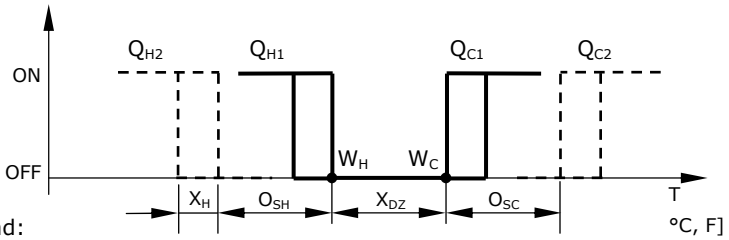
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Control Functions

The controller is designed to control package units with up to two heating or cooling stages and one support fan. The unit may be controlled to run in fan only mode or automatic. In automatic mode, the controller will change heating or cooling stages according to the temperature difference of room temperature and setpoint. The fan will run while there is a stage active. Selecting mold protection will let the fan run continuously while the operation mode is ON or ECONOMY. See below for control logic of 2- or 4-pipe systems.

Control parameters:

- **Economy set point shift X_{SBY}**: This function shifts the set point while the operation mode is Economy. The heating set point W_H is reduced and the cooling set point W_C increased by the value of the Economy set point shift X_{SBY}.
- **Minimum and Maximum Set Point Limits**: Limits the adjustable range of the loop set point. The limits for heating and cooling sequence may be chosen individually.
- **Switching offset** for cooling and heating determines the temperature difference required for the second stage to activate.
- **Switching Hysteresis** defines when a fan speed change is reversed. The aim is to avoid unnecessary switching of fan speeds and thus to increase the life span of fan and relays.
- **Mold Protection.** The fan will not stop when the setpoint is reached while this parameter is activated. This way the room will still be ventilated although there is no need to vary the temperature. The valve will still be controlled according to temperature need. Mold protection should not be used for fan-only systems!
- **Reversing Valve:** Enable the reversing valve where the compressor is used for heating and cooling. The reversing valve will activate either in heating or cooling mode depending on CP19.
  Due to physical limitations of the controller, only one stage may be active if reversing valve is enabled. See Control Logic for further information.



Legend:

T	Input Signal	X_{DZ}	Dead zone	W_C	Set point Cooling
O_{QH}	Offset Heating	X_{SBY}	Economy set point shift	Q_C,	Binary Output Stage Cooling
O_{QC}	Offset Cooling	W_H	Set point Heating	Q_H	Binary Output Stage Heating

Control Logic

System type	CP19	DO1	DO2	DO3	DO4	DO5
Heating with reversing valve	1 or 2	FAN	Stage 1	Stage 2	Rev. Valve if CP19 = 1	Frost
Cooling with reversing valve	1 or 2	FAN	Stage 1	Stage 2	Rev. Valve if CP19 = 2	Frost
2 pipe system heat or cool	0	FAN	Stage 1	Stage 2		Frost
4 pipe system Heating	0	FAN	Stage 1	Stage 2		
4 pipe system Cooling	0	FAN			Stage 1	Stage 2

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Switching Delays

Delay switching off:

Using this delay will prevent rapid switching of the compressor. After switching on, the compressor will only switch off after the delay switching off time is expired. The selectable range is 0…255 seconds.

Delay switching on:

Using this delay will prevent rapid switching of the compressor. After switching off, the compressor will only restart after the delay switching on time is expired. The selectable range is 0…255 seconds.

Delay on heat / cool change:

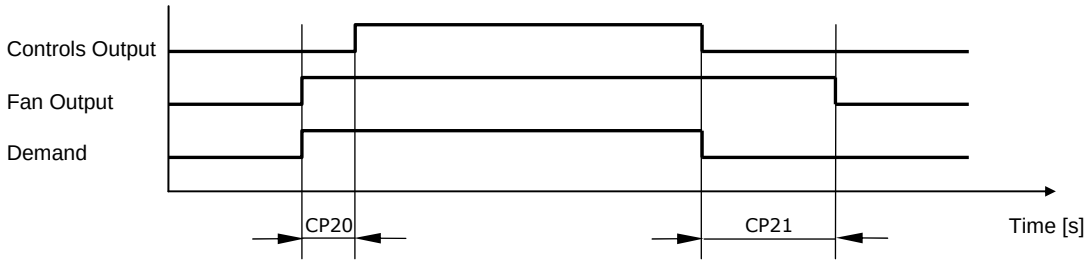
For 4-pipe systems only: This delay prevents rapid switching of heating and cooling. The selectable range is 0…255 minutes. The switching on delay will be reset after a heat - cool change. This will allow a reversing valve to open before a compressor starts. Enough time will therefore be required for the delay-on parameter.

Delay on reversing valve

For systems with reversing valve, it is required to set the fan on delay long enough for the reversing valve to open / close. The reversing valve is activated together with the fan.

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 setpoint is reached. The fan keeps running until stop delay has expired. This delay prevents overheating and condensation on the coils.



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Input configuration

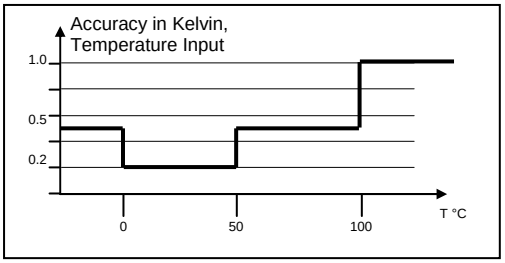
Frost protection

Frost protection will activate if the control temperature sinks below 5°C (41°F). Operation returns back to normal if the control temperature reaches 10°C (50°F). Frost protection alarm is displayed as FP in the smaller digits on the LCD display. An active alarm is indicated by a constant alarm display, once the alarm condition is removed, the alarm display flashes once per second until acknowledged by the OPTION key.
If frost protection is active, the unit will switch to high fan speed and set the analog output to full open.
Frost protection should be disabled for cooling only systems. (Per default on TLR-D41-W01)

Priority for alarm conditions
1. Frost protection
2. Operation mode OFF (EHO)
3. Comfort or Economy

Temperature input

The TLR-D5P includes an NTC-based passive temperature sensor. A sensor of the same type can be connected as alternative control input or as input for additional functions. The accuracy of the temperature input is shown in the table to the right. Specified accuracy can only be guaranteed by using a manufacturer approved temperature sensor. For best results use Sxx-Tn10 sensors.
Choose the active temperature input (intern or extern) for the controller input with **CP14**. Setting **CP14** = 1 uses external input as control input. All other settings use internal sensor as control input



Additional functions of the external temperature input:

Following additional functions are available, in case the external temperature input is not used as control input.

Toggle of Economy and comfort operation modes	Economy and Comfort modes are controlled through an external contact by connecting the external temperature input to ground **Activation Delay:** Defines the delay the binary contact has to be open before Economy mode is activated. This function may be used together with key card switches for hotels or motion detectors for offices.
Remote enable	Opening the external temperature input will force the unit into the OFF operation mode. The operation mode cannot be overridden by using the terminal or time schedules. Connecting the external temperature input to GND returns control of the operation mode to the terminal and time schedule. This function may be used as window contact to prevent loss of energy.
Heat-cool changeover with external switch	Control heat and cool setting of your controller from a central location by switching a contact to GND. Note: all ground levels of involved controllers must be the same. Choose if heat or cool is to be active when contact is open.
Auto Changeover with supply media temperature sensor	The external input may be used to automatically determine heating or cooling mode by measuring the temperature of the supply media. Connect a qualified passive sensor to the external input. Heating mode is activated once the supply temperature is above the heating limit. Cooling is activated when the supply temperature is below the cooling limit. The limits may be defined in software. Standard is 16°C (61°F) for cooling and 28°C (83°F) for heating
Auto Changeover with outside temperature sensor	The external input may be used to automatically determine heating or cooling mode by measuring the outdoor temperature. Connect a qualified passive sensor to the external input. Heating mode is activated once the supply temperature is below the heating limit. Cooling is activated when the supply temperature is above the cooling limit. The limits may be defined in software. Standard is 16°C (61°F) for heating and 28°C (83°F) for cooling.
Key Card	The external input is connected to a key card in hotels. If input is closed the unit is in normal operation with the setpoint being chosen by the end user. When input is opened, the unit will change to economy mode. A preset setpoint defined with CP16 for heating and CP17 for cooling is used instead of the selected setpoint. The setpoint shift feature is disabled.

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Configuration of controller

Proceed in the following steps in order to adapt the controller to its application:

1. Connect power supply and inputs
2. Program input parameters (**IP**)
3. Program control parameters (**1L**)
4. Program output parameters (**OP**)
5. Test function of unit
6. Switch off power
7. Connect outputs
8. Test controller
9. Set user settings (**UP**)

Configuration parameters for firmware version 2.2

The TLR-D5P can be adapted to a wide variety of applications. The adaptation is done through parameters. The parameters can be changed on the unit without the need of additional equipment.

Identifying the firmware version

The parameters and functionality of controller depend on its firmware version and revision. It is therefore important to use a matching product version and parameter set. The Firmware version and revision version can be found when pressing simultaneously the ▲ and ▼ keys during several seconds. On the upper 7 segment display, the firmware version can be found, on the lower 7 segment display the current revision index (or "sub-version").

Accessing the control parameters

Warning! Only experts should change these settings!

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 the OPTION will show: CODE.
2. Select a password using UP or DOWN buttons. Dial 0241 in order to get access to the engineering 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 and return to the group selection. Press POWER while in the group selection to return to normal operation.
7. The unit will return to normal operation if no key is pressed for more than 5 minutes.

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Control Parameters (Access Code: 241)

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

Setpoint limitations

Parameter	Description	Range	Default
CP 00	Minimum setpoint limit in Heating mode	-40…60°C (160°F)	16°C (61°F)
CP 01	Maximum setpoint limit in Heating mode	-40…60°C (160°F)	24°C (76°F)
CP 02	Minimum setpoint limit in Cooling mode	-40…60°C (160°F)	18°C (65°F)
CP 03	Maximum setpoint limit in Cooling mode	-40…60°C (160°F)	30°C (87°F)

Fan control sequence

Parameter	Description	Range	Default
CP 04	Economy temperature shift	0…10.0°C (20.0°F)	5.0°C (10.0°F)
CP 05	Switching Span Heating	0…10.0°C (20.0°F)	0.9°C (1.8°F)
CP 06	Switching Span Cooling	0…10.0°C (20.0°F)	0.7°C (1.4°F)
CP 07	Switching Hysteresis	0…10.0°C (20.0°F)	0.5°C (1.0°F)
CP 08	Mold Protection: OFF = Disabled, ON = Enabled	ON, OFF	OFF
CP 09	Delay OFF (Minimum running time)	0…255 s	10s
CP 10	Delay ON (Minimum stopping time)	0…255 s	10s
CP 11	2-pipe or 4-pipe system: OFF = 2-pipe, ON = 4-pipe system	ON, OFF	OFF
CP 12	Dead zone between heating & cooling set point X_{DZ}	0…10.0°C (20.0°F)	1.0°C (2.0°F)
CP 13	Delay on Heat/Cool change over	0…255 min	5 min

Input configuration

Parameter	Description	Range	Default
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 setpoint	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 setpoint in heating mode if CP14 = 8	-40…60°C (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 setpoint in cooling mode if CP14 = 8	-40…60°C (160°F)	28°C (83°F)

Output configuration

Parameter	Description	Range	Default
CP 18	Enable auto heat / cool change based on temperature	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

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