OPA-D5P, OPU-D5P operation terminal for TLR-D5P base units

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)
- Adjustable start and stop delays to protect compressors and switching elements
- Control for heating, cooling and fan only operation
- Cost saving option with economy functionality and set point limitation
- Password protected programmable user and control parameters
- External sensor or open contact for remote control, external heat – cool change or auto-changeover on supply temperature with selectable activation limits
- One terminal may control up to 8 base units in parallel mode

Deluxe version:

- Clock and time schedule functions with 48 h power backup
- Blue backlight for LCD
- Infrared remote controller option:
  With special features for boost and delayed switching on or off

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	Package unit controller with:
TLR-D5P-230	40-11 0015	230 VAC		1 TI int or ext
OPA-D5P	40-10 0087	Standard	Operation Terminal (88x88)	1 DO (Relay) Fan control
OPA-D5P-D	40-10 0088	Deluxe		4 DO (Relay) Binary control
OPU-D5P	40-10 0095	Standard	Operation terminal (2x4")	
OPU-D5P-D	40-10 0096	Deluxe		
Parameter preset				Add –Wx at the end of the Item Name or –x at the end of item code to order pre-configured model
OPA-D5P-xx	40-11 00xx	4-Pipe system		
OPA-D5P-xx-W01	40-11 00xx -01	Cooling only		

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		
SOB-Tn10	40-20 0059	Outdoor sensor		

Selection of valve actuators, fans and sensors

Temperature sensors: Use only our approved NTC sensors to achieve maximum accuracy.

Binary auxiliary devices: E.g. fans and on/off valves. Observe power limits and startup currents.
Note: startup currents may be a multiple of the rated current of a fan. Verify with the fan supplier if unsure.

Installation terminal

1. Install the mounting plate to the electrical connection 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. Tighten the front holding screw to secure the front part to the mounting plate.

Connection base to terminal

- Max. distance: 200 m (565 ft.)
- Normal 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 Ω will result in an increase of 1 °C (2 °F). Compensate using UP-08 if external temperature is used to control unit.

Technical specification

Power supply	Operating voltage	5 VDC ±10%
	Power consumption	30 mA max
	Electrical connection	Terminal connectors
	Deluxe type only: Power backup for real time clock	Min 48 h if charged for 24 h
Signal inputs	Temperature inputs	
	Range	0…50 °C (32…122 °F)
	Accuracy	0.5 °C, 1 °F
Communication Base - Terminal	Communication type	Digital: peer to peer
	Cable type	Use twisted pair copper wire 0.8…2.5 mm² (AWG18…AWG13) 200 m (650 ft) use shielded wire in an EMC challenged environment.
	Max distance	Conductor resistance must be compensated if external sensor is used
Environment	Operation	To IEC 721-3-3
	Climatic conditions	class 3K5
	Temperature	0 °C …50 °C (32 °F…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	-10 °C…70 °C (14 °F…158 °F)
	Humidity	< 95% RH non-condensing
	Mechanical conditions	class 2M2
Standards	CE 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
General terminal	Safety class	III (IEC 60536)
	Degree of Protection	IP30 to EN 60529
	Material: Cover	Fire proof ABS plastic (UL94 class V-0)
	Mounting Plate	Galvanized steel
	Color	White RAL 9003
	Dimensions (H x W x D) : OPA : OPU :	88 x 88 x 24 mm (3.5 x 3.5 x 0.9 in) 112 x 73 x 18 mm (4.4 x 2.9 x 0.8 in)
	Weight including package: OPA-D5P, OPU-D5P OPA-D5P-D, OPU-D5P-D	180 g (6.3 oz) 190 g (6.7 oz)

Power failure

All the parameters and set points are memorized and don't need to be reentered. The clock will need to be reset.
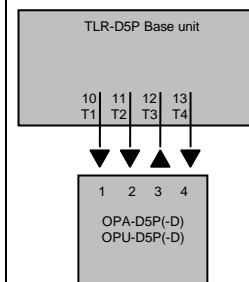
Status LED

The status LED is located on the 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
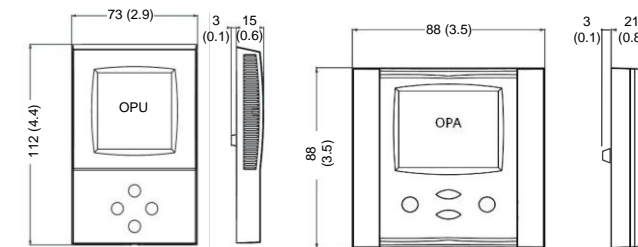
Error messages

Err1:   Error temperature sensor. The internal temperature sensor may be damaged or not present.
Err2:   External input for heat / cool auto-change-over missing or damaged.
FP: Frost protection is active.

Wiring diagram

Dimensions terminal

Configuration parameters for firmware version 2.4

This controller can be adapted to wide variety of package unit applications. The adaptation is done with 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 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.

Changing parameters

The parameters may only be accessed by entering a code. There are two levels of parameters: User operation parameters for access control settings and expert parameters for control functions and unit setup. The codes for user levels and expert levels are different. Only control experts should be given the control parameter code.
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 (access code: 009)

Parameter	Description	Range	Standard
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 = OFF, 1 = ON, 2 = Last state	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. 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, OFF for Celsius, ON for Fahrenheit	ON, OFF	OFF (Celsius)
UP 08	Calibrate internal temperature sensor –10 ° to +10 ° in 0.1 ° steps. (Sensor is factory calibrated, use this feature for field adjustment only as required.)	-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 W01 = OFF
UP 10	Select contents of large LCD display in standard mode: 00 = OFF 03 = Output fan speed 01 = Set point 04 = Clock 02 = Temperature sensor 05 = Alternative sensor *1) Note: if UP10 = 1, the set point will be shown instead of the measured temperature also in controls display.	0…5	02 Temperature
UP 11	Select contents of small LCD display in standard mode 00 = OFF 03 = Output Fan Speed 01 = Set point 04 = Clock 02 = Temperature Sensor 05 = Alternative Sensor	0…5	Standard: 01 Set point Deluxe: 04 Clock
UP 12	Clock display type: Only available for deluxe version OFF = Show 24 hour clock ON = Show 12 hour clock (AM, PM)	ON, OFF	OFF (24 h)
UP 13	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)

Control parameters (access code: 241)

Warning! Only experts should change these settings!

Set point limit Parameters

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 (76 °F)
CP 02	Minimum set point limit in cooling mode	-40…60 °C (160 °F)	18 °C (65 °F)
CP 03	Maximum set point limit in cooling mode	-40…60 °C (160 °F)	30 °C (87 °F)

Control Loop Parameters

Parameter	Description	Range	Standard
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 ° (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 ° (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 ° (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 ° (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	100 s
CP 10	Delay ON (minimum stopping time)	0…2550 s	100 s
CP 11	Control option: 0 = Cooling only 1 = Heating only 2 = 2-pipe system (standard for heat pumps) 3 = 4-pipe system	0…3	W00 = 2 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 ° (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 parameters

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 min
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 function of the external input**

CP14 = 0	Input not used	
CP14 = 1	External control input	The external sensor is the control input. The internal sensor will be disabled.
CP14 = 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. Opening the input will force the unit into the OFF operation mode.
CP14 = 3	Switching energy hold OFF and Comfort modes	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.
CP14 = 4	Heat – cool changeover by contact	Switch by open contact: Contact open = heating is active, contact closed = cooling is active.
CP14 = 5	Heat – cool change-over by contact	Switch by open contact: Contact open = cooling is active, contact closed = heating is active.
CP14 = 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 CP16 is measured. Heating is activated if a value above CP17 is measured
CP14 = 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 CP17 is measured. Heating is activated if a value below CP16 is measured
CP14 = 8	Key card with alternative set point	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.

Output Parameters

Parameter	Description	Range	Standard
CP 18	For 4-pipe systems: 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

System type	CP19	DO1	DO2	DO3	DO4	DO5
Heating with rev. valve	1 or 2	FAN	Stage 1	Stage 2	Rev. Valve if CP19 = 1	FP Alarm
Cooling with rev. valve	1 or 2	FAN	Stage 1	Stage 2	Rev. Valve if CP19 = 2	FP Alarm
Heat only, cool only or 2-pipe system	0	FAN	Stage 1	Stage 2		FP Alarm
4 pipe system heat	0	FAN	Stage 1	Stage 2		
4 pipe system cool	0	FAN			Stage 1	Stage 2