OPA2-2T(H)-VC
Operation terminal for TCX2

Features

- Remote access to controller state, setpoints, inputs and outputs
- Access to time schedule and clock settings
- Access to configuration parameters
- RS485 peer to peer communication according to proprietary protocol of Vector Controls GmbH
- The terminal adapts itself to the TCX2 controller used. One terminal thus fits all the configuration variations of the TCX2 product range.
- Internal temperature sensor
- Internal humidity sensor (H version) or with AES-HT-A3 for example
- 2 passive inputs: (only available with firmware version V1.1 and up)

Applications

- Configuration and operation of TCX2 controllers
- Remote supervision (RS485)

General Description

The OPA2-2T(H)-VC is a remote display and operation terminal for TCX2 series controllers.

Ordering

Item Name	Item Code	Description/Option
OPA2-2T-VC	40-50-0047	Operation terminal for TCX2-type controller with peer to peer RS485 communication and internal temperature sensor and 2 passive inputs
OPA2-2TH-VC	40-50-0023	As above with internal humidity sensor

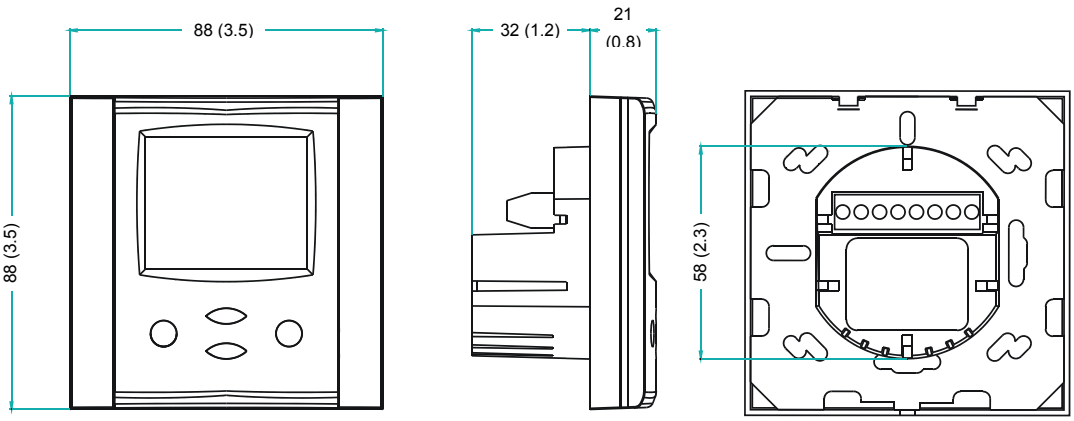
Mounting location

- Install the operation terminal on an easy accessible interior wall, approx. 1.5 m above the floor in an area of average temperature.
- Avoid direct sunlight or other heat sources, e.g. the area above radiators and heat emitting 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

1. Connect the wires to be connected to the terminals of the power case according to wiring diagram
2. Install the mounting plate to the flush mounting box. Make sure that the nipple with the front holding screw is facing to the ground. Make sure the mounting screw heads do not stand out more than 5 mm (0.2”) off the surface of the mounting plate.
3. Ensure that the jumpers are set correctly.
4. Slide the two latches located on the top of the front part into the hooks at the upper side of the mounting plate.
5. Carefully lower the front part until the interconnector reaches the mounting-plate. Continue pressing in a gentle way until the front part is fully connected. While inserting the connectors, a slight resistance can be felt. This is normal. Do not use excessive force!
6. 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.

Dimensions [mm] (in)



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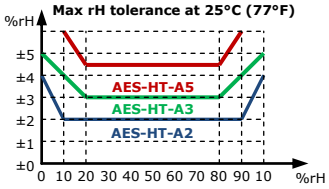
Technical Specification

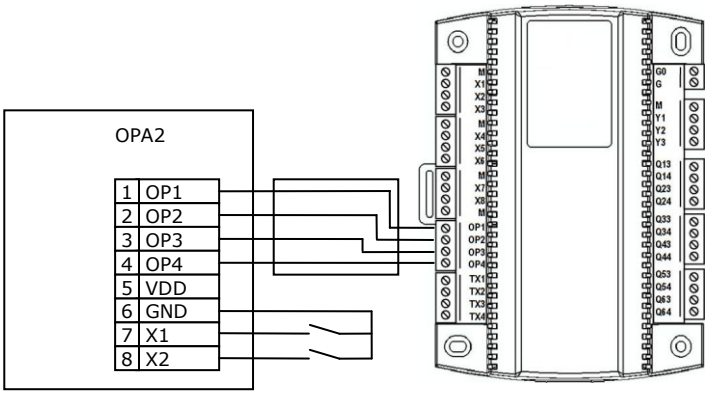
Power Supply	Operating voltage	10-30VDC, 10-26V AC
	Power consumption	Max 0.5 VA
	Electrical Connection	Terminal Connectors, wire 0.34…2.5 mm² (AWG 24…12)
Inputs	Internal temperature	
	Range	0…50 °C (32…122 °F)
	Accuracy	0.5 K
	Humidity Sensor AES-HT-Ax:	Capacity sensor
	Range	0…100 % rH
	Measuring Accuracy	See Figure to the right
	Hysteresis	± 1%
	Repeatability	± 0.1%
	Stability	< 0.5% / year
	Passive inputs	X1, X2
	Range	Open contact to GND
Communication	Communication type	RS485
	Cable type	shielded twisted pair
	Cable impedance	impedance between 100 and 130Ω.
	Cable capacitance	capacitance ≤ 100 pF/m (30 pF/foot)
Environment	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
	Temperature	-25…70 °C (-13…158 °F)
	Humidity	<95 % r.H. non-condensing
	Mechanical Conditions	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	EN 60 730 –1
	Special requirement on temperature dependent controls	EN 60 730 – 2 – 9
	Pollution Class	Normal acc. to EN 60 730
	Degree of Protection	IP30 to EN 60 529
	Safety Class	III
General	Dimensions (H x W x D)	Front part: 88 x 88 x 21 mm (3.5” x 3.5” x 0.8”) Power case: ø 58 x 32 mm (ø 2.3” x 1.3”)
	Housing Material	Fire proof ABS plastic
	Mounting Plate	Zinc coated steel
	Standard Color	White RAL 9003
	Weight (including package)	220 g (7.8 oz)



Connection Diagram

Description

OP1-OP4	Connection to TCX2 controller
VDD	5VDC output: Do not connect
GND	Common for potential free contacts
X1	Passive input for dry contact. Open = 0, Closed = 1
X2	Passive input for dry contact. Open = 0, Closed = 1



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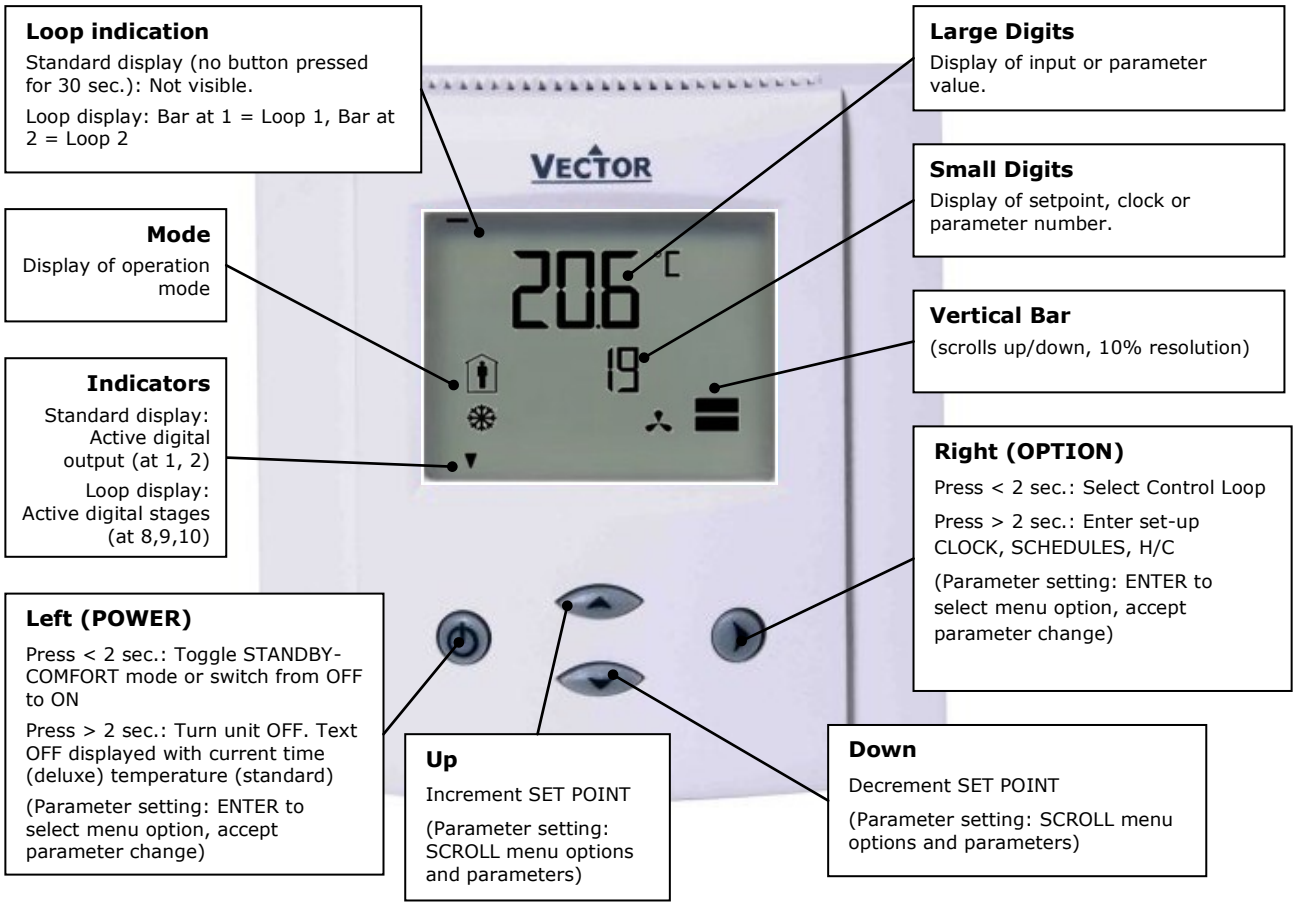
Display and Operation



Operation mode symbols		Control symbols	
	Standby (unoccupied):		Heating (Reverse) Active
	Comfort (occupied)		Cooling (Direct) Active
OFF	Energy Hold Off		Schedule Set
Comfort: All control functions operating per set points.			Override Cascade Control
Standby: Set points shifted according to *Parameters 1L07, 2L07*.		*	Fan Active
Energy Hold Off: Outputs are off, inputs monitored for alarm condition			

Standard display

- Active when UP/DOWN or OPTION have not been pressed for 30 seconds.
- Contents may be chosen with parameters.

Loop display

- Active when changing set points. Large digits show input value. Small digits show set point. Vertical bars show analog output value. Arrows on 8, 9, 10 show binary (digital) output stages

Override of secondary set point in cascade control

- If cascade control is active (with VAV for example) you can override the primary loop and manually select the set point of the secondary loop (the loop is now changed to CAV). Typically for tuning the VAV system.
- While the secondary loop is displayed change the set point with UP/DOWN. Override Cascade symbol appears.
- Press OPTION to move back to the temperature loop and cancel cascade override.

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Extended User operation

The controller contains a quartz clock with battery back-up. Up to 12 time schedule events based on time and day of the week may be programmed. Time schedule events are change of operation mode, state or position of an output or change of setpoint. A blinking clock indicates that the time has not been set or 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)

Enable/disable time schedules

Press OPTION > 2 sec. SEL and current time displayed Press UP: SEL and PRO displayed, clock symbol blinks Press OPTION: Time schedule status displayed OFF or ON: Press OPTION OFF/ ON blinks, UP/DOWN to change, OPTION to save	SEL PRO 	Pro OFF/ON

Creating time schedules

Step 1: Select a switching time (Up to 12, Pr01–Pr12)

Press UP while PRO-ON displayed: Large digits display Pr01, small digits display 00:00 Press OPTION: 00:00 blinks Press UP/DOWN to select Pr01 switching time from 00:00–23:45 Press OPTION to save switching time (bar appears indicating step 1 complete): DAY 1 blinks	**08:00** Pr01

Step 2: Apply selected switching time (Pr01) to DAY1 (Mon) – DAY 7 (Sun)

While Pr01 is displayed and DAY1 is blinking: Press UP: Activate Pr01 switching time for DAY1 (triangle appears on 1), Press DOWN: Deactivate Pr01 switching time for DAY1 (triangle disappears) Press OPTION to save Pr01 DAY1 (2nd bar indicates step 2 complete): Repeat for DAY2 – DAY7	**DAY1** Pr01 ▼ 1 2 3 4 5 6 7

Step 3: Select action for switching time (Pr01+Days)

After Pro1, DAY1–DAY7 is completed (Pro1 switching time activate or deactivate on desired days), press POWER to come to desired event for Pro1. The following options appear in order: No = switching time not active OP = operation mode (select ON, OFF, COMFORT, STANDBY) LP = set point AO = Position of analog output (Analog output must be in manual mode) FAN = Fan state (fan must be in manual mode) do = Position of binary output (3-point or PWM), Output must be in manual mode. Press UP/DOWN to scroll through the possible events(3nd bar indicates step 3 complete) Press Option to complete selection of event	**LP** Pr01

Step 4: Select ID (For example: LP01 or FAN2)

For all non-operation mode changes, it is required to select the output or control loop in this step. For example for setpoint LP1, LP2, etc. or for an output the number of the output that should be changed. Press UP/DOWN to select, OPTION to complete	**LP01** Pr01

Step 5: Complete switching event

Choose operation mode, setpoint or position of output Characteristics of action (e.g. 0–100% for A1) appear (5th bar indicates step 5 complete) Press UP/DOWN to select, OPTION to complete	**25%** Pr01

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Manual heat–cool changeover

Press UP/DOWN Small digits display H-C: Press OPTION Currently active H or C symbol displayed: Press OPTION again to toggle H or C	**H-C** SEL

Display of input and output values

Step 1: Select type or in- or output

Press UP/DOWN Small digits display SEL, Large digits show: UI = universal inputs AO = Analog outputs FAN = Fan outputs do = Binary, 3-point or PWM outputs Press OPTION to display state of In- or Output	**UI** SEL

Step 2: Select number of in- or output

Press UP/DOWN to step through the number of available in- or outputs Large digits show in-output type & number, Small digits show value	**UI 01** 25%

Step 3: Display total run time for binary outputs

While in binary output mode, Press OPTION key to display the total number of hours the binary output has been ON. Large digits show in-output type & number, Small digits show running time in hours. If the running time is larger than 9999 hours, 10000 hours are shown as level on the vertical bar. The example on the right equals 50345h running time. (Maximum runtime is 65535h = 7.5 years)	**UI 1** 345h

Error messages

Err1: Communication Error

Err2: Internal data corrupt. Replace product.

Err3: Problem with the internal real-time clock or internal memory. Restart product. If error reappears, replace product.

Err4: Configuration error. Parameter settings are conflicting. Verify control setup. Most likely an input which is used for a control loop or function is not enabled.

Err5: Parameter copy mode: Copy error – if external module is addressed, communication error with external product. Verify that external module is plugged in and operating

Err6: Parameter copy mode: Checksum mismatch of memory data. Data in external memory is corrupt or most likely the memory is not initialized and does not contain a valid parameter set.

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Setting parameters to configure the controller

Parameters are grouped according to modules:

Module	Description
LP	Control loops
	1L = control loop 1
UI	Universal input
	01u = universal input 1
AL	Alarm configuration
	1AL = alarm 1
Fu	Functions
	1Fu = Remote enable
	2Fu = Remote Comfort – Standby switchover
	3Fu = Heat – Cool change
	4Fu = Summer – Winter Compensation
	5Fu = Economizer
Ao	Analog output
	1Ao = Analog output 1
FAN	Fan output functions
	1FA = Fan output 1
Fo	Floating output
	1Fo = Floating output 1
Do	Binary output
	1Do = Binary output 1
Co	Communication setup (refer to separate communication brochure)
COPY	copy mode to copy full parameter sets between run, default and an external eeprom with up to 4 saving locations

How to change parameters

1. Press UP/DOWN buttons simultaneously for three seconds. The display will show firmware version and revision number. Press the OPTION button to start login.
2. CODE is shown in small display. Select 241 using the DOWN button. The access numbers are fixed and cannot be changed.
3. Press OPTION after selecting the correct code. The user/display parameters are displayed immediately.
4. Once logged in with 241 control modules are displayed (Lp1, Lp2, 1u, 2u, etc.) – select with UP/DOWN and open with OPTION. As soon as the module is open its parameters are displayed.
5. Select the parameters with the UP/DOWN buttons. Change a parameter by pressing the OPTION button. Three arrows are displayed to indicate that the parameter may be modified. Use UP/DOWN buttons to adjust the value.
6. After you are done, press OPTION to save the new value and return to the selection level (arrows disappear when selection is saved). Pressing left hand POWER button without pressing OPTION will discard the value and return without saving.
7. Press POWER to leave parameter selection and return to control module selection.
8. Press the POWER to leave the menu. The unit will return to normal operation if no button is pressed for more than 5 minutes.

How to select active alarms on outputs and special functions

1. Select the parameter as described above
2. Press OPTION to start selecting alarms. AL 1 is now shown in the large digits.
3. Press UP to select the alarm 1, press DOWN to deselect the alarm 1. A selected alarm is visible by a dark triangle on the bottom line of the LCD. The output or function will activate if the corresponding alarm is triggered.
4. Press OPTION to step to alarm 2. Repeatedly press OPTION key to step through all available alarms and select or deselect them by pressing UP or DOWN.

Press POWER to leave the alarm selection routine and return to the parameter selection level.

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Copying and restoring the entire parameter set

It is now possible to backup and refresh the entire parameter set to a second onboard memory (default memory) or a plug-in memory. This simplifies substantially the programming of multiple controllers with identical parameter sets.

Removable plug-in memory AEC-PM1

The plug-in memory is an accessory that can be plugged in on the side of the TCX2. Once connected the power LED on the AEC-PM1 lights up. The memory can hold up to 4 individual parameter sets. It is therefore easy for a distributor or site engineer to update a variety of standard installations or for an OEM to program his standard setup.

Auto-load

While copying a parameter set to eeprom, the user may choose the auto-load feature. With this feature set, the parameters load automatically when powering up the controller. It is thus possible for a non-technical person to perform a parameter update by simply powering up the controller with the AEC-PM1 plugged in.

Procedure to copy parameter sets

1. Login to engineering parameters as described above.
2. Press UP or DOWN until COPY is selected
3. Press the OPTION key. Select copy source: These are the options:
    0. CLR ⇨ The copy destination will be erased
    1. RUN ⇨ Run time memory
    2. DFLT ⇨ Default: On board backup memory
    3. EEP1 ⇨ External memory folder 1 on AEC-PM1
    4. EEP2 ⇨ External memory folder 2 on AEC-PM1
    5. EEP3 ⇨ External memory folder 3 on AEC-PM1
    6. EEP4 ⇨ External memory folder 4 on AEC-PM1
4. Press OPTION key. Now select copy destination: These are the options:
    1. RUN ⇨ Run time memory
    2. DFLT ⇨ Default: On board backup memory
    3. EEP1 ⇨ External memory folder 1 on AEC-PM1
    4. EEP2 ⇨ External memory folder 2 on AEC-PM1
    5. EEP3 ⇨ External memory folder 3 on AEC-PM1
    6. EEP4 ⇨ External memory folder 4 on AEC-PM1
5. Press OPTION key. Your selection is shown on the large digits: source ID to target ID. For example run time memory to eep1 is shown as 1to3. After confirming the selection choose YES or AUTO to start the copy process. Select NO to abort. AUTO is only available if the target is the external plug in. By selecting AUTO: The parameters will load automatically when the controller is powered up while the AEC-PM1 is plugged in. If one plug-in has several parameter folders with the AUTO flag set the one with the smallest index will be loaded.
6. Press the OPTION key to conclude the selection. The Data LED on the AEC-PM1 plug-in blinks to indicate data communication in case it is copied to or from. PEND is shown while the copy process takes place.
   There are several possibilities for the result:
    - Good: The copy process was successful
    - Fail: Err5, Communication problem. The plug in module is either damaged or missing
    - Fail: Err6, Checksum mismatch. The checksum of the source data was incorrect. Data corruption. This may happen if the plug-in has not been written to before or data corruption took place.

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