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

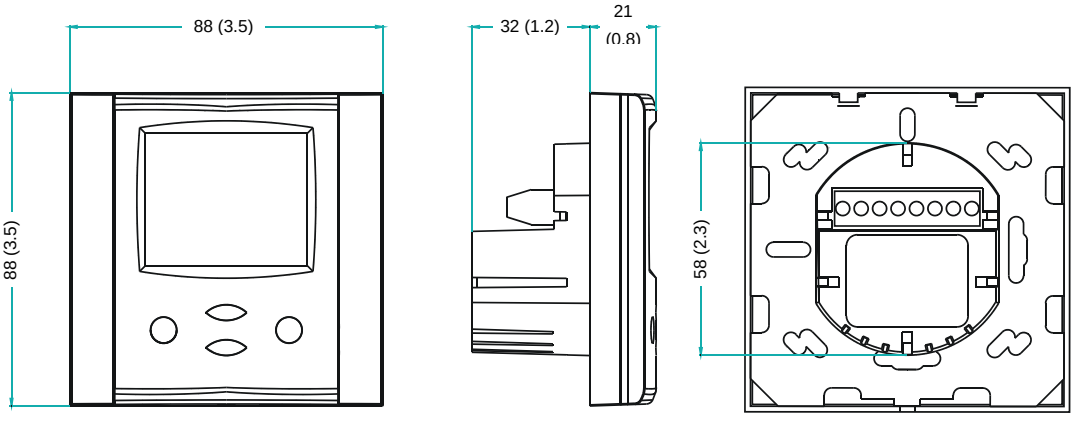
Mounting location

- 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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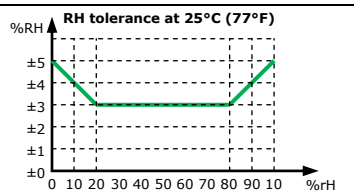
Technical Specification

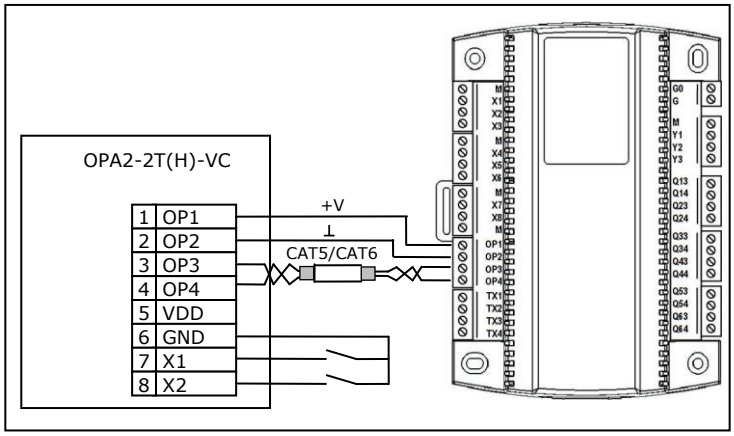
Important notice and safety advice

This device is for use as operating controls. It is not a safety device! Where a device failure endangers human life and/or property, it is the responsibility of the client, installer and system designer to add additional safety devices to prevent a system failure caused by such a device failure. Ignoring specifications and local regulations may cause equipment damage and endangers life and property. Tampering with the device and misapplication will void warranty.

Power Supply	Operating voltage	12-30VDC
	Power consumption	Max 1 VA
	Electrical Connection	Terminal Connectors, wire 0.34…2.5 mm^2 (AWG 24…12)
Inputs	Internal temperature Range Accuracy	 0…50 °C (32…122 °F) 0.5 K
	Humidity Sensor: Range Measuring Accuracy Hysteresis Repeatability Stability	Capacity sensor 0…100 % RH See Figure to the right ± 1% ± 0.1% < 0.5% / year
	Passive inputs Range	X1, X2 Open contact to GND
Communication	Communication Type Protocol	RS485, Peer to peer, VCPP: Vector Controls Proprietary Protocol
	Cabling Impedance Nominal capacitance Nominal velocity	Shielded Twisted Pair (STP), CAT5 or CAT6. balanced 100 to 120 ohm 50 pF/m 16pF/ft or lower 65% or higher
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
	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)	250 g (8.8 oz)



Connection Diagram



Description

OP1-OP4	Connection to TCX2 controller via RS485
VDD	5VDC output: Do not connect
GND	Common for potential free contacts
X1	Passive input for dry contact. VI3
X2	Passive input for dry contact. VI4

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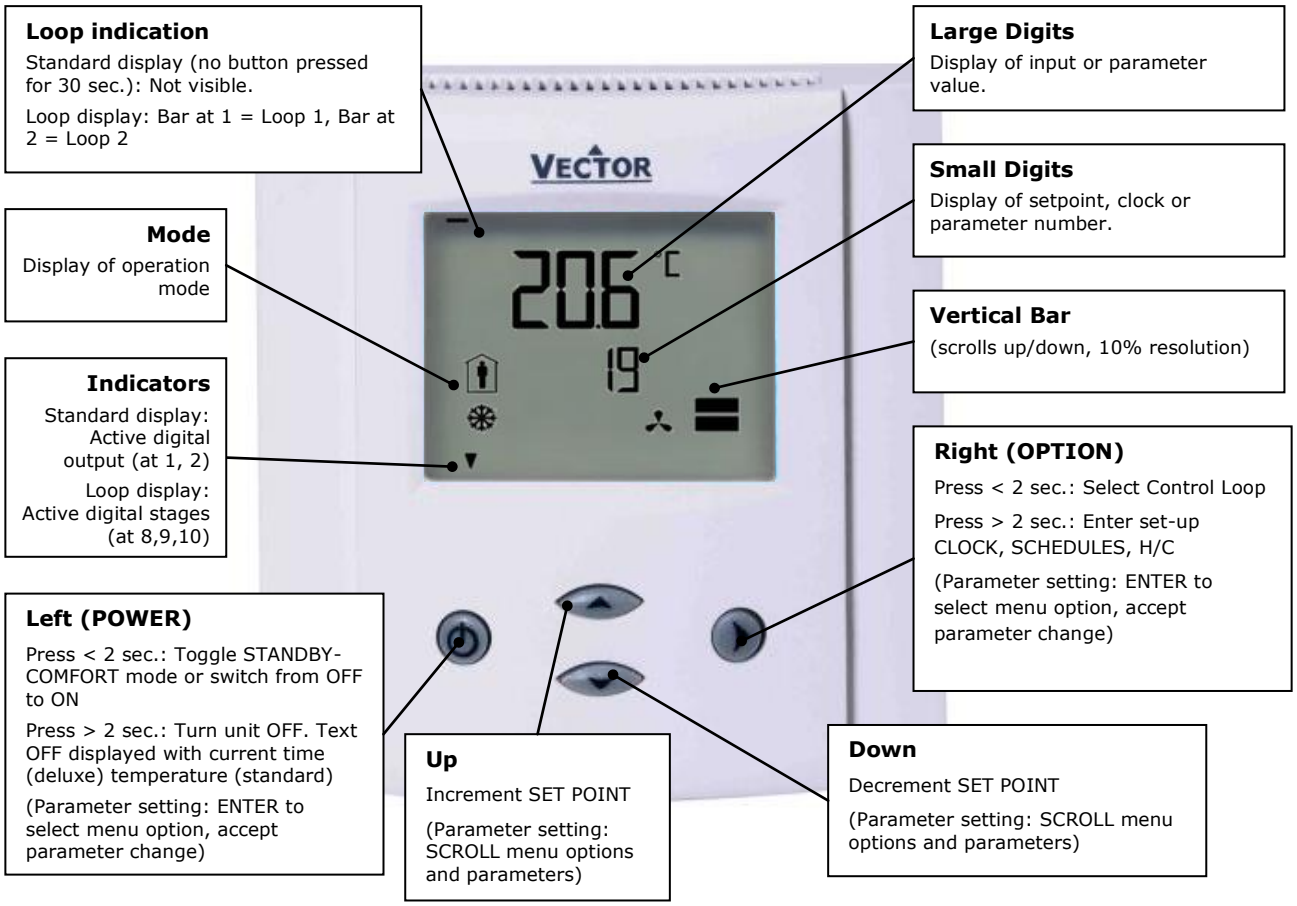
Display and Operation



Operation modes		Control symbols	
	Occupied: (Comfort) All control functions operating per set points.		Heating (reverse) active
	Unoccupied: (Standby, Economy) If enabled, alternative setpoints are used with the intention to reduce energy consumption.		Cooling (direct) active
OFF	OFF: (Energy Hold Off, EHO) Normal control functions are inactive, inputs are monitored for alarms.		Schedule set
			Manual override, delay on enable function
		*	Fan active

Idle display

- The idle display is activated when no key has been pressed for 30 seconds.
- The contents of the idle display are selectable through parameters UP08 to UP14.
- Setting UP08 to OFF will disable idle display. Last active control loop or manual output will remain displayed.

Display of control loop

- Active when changing set points. Large digits show input value. Small digits show set point. Horizontal bars top left show which loop is being displayed.

Override of secondary set point in cascade control

- If cascade control is active (with VAV for example) the user can override the primary loop and manually select the set point of the secondary loop (the loop is then changed to constant air volume mode). This function is helpful for tuning the VAV system. This feature may be disabled by setting UP02 to OFF.
- While the secondary loop is displayed change the set point with UP/DOWN. The hand symbol appears.
- Change setpoint again to cancel cascade override. The hand symbol disappears.

Delay on enable function

- During a pending delay the hand symbol will be shown. For example the condition to activate the controller with 1FU is met, but a startup delay is specified. The controller will remain switched off and show the hand symbol until the delay expired.

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Extended user operation

The controller may contain clock operation with time schedules. If this is the case, the clock and time schedules may be changed using this terminal.

Clock setup

Press OPTION > 2 sec. SEL and current time displayed Press OPTION < 2 sec. to change time, Minutes blink: UP/DOWN to change, OPTION to save, Hours blink: UP/DOWN to change, OPTION to save, DAY1 blinks: UP/DOWN to change, OPTION to save weekday Day of month blinks, UP/DOWN to change, OPTION to save Month blinks, UP/DOWN to change, OPTION to save Year blinks, UP/DOWN to change, OPTION to save Press ESC or POWER to return	SEL 00:00 DAY1 (Mon) 01.01. 2014

Enable/disable time schedules

Press OPTION > 2 sec. current time and SEL displayed Press UP: PRO and SEL displayed Press OPTION: Time schedule status displayed OFF or ON ( ) Press OPTION to toggle OFF/ON	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: Press UP or DOWN to SCROLL Pr01 through Pr12, Press OPTION to select desired schedule (e.g. Pr01), 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)

The selection of switching time and weekdays for this time schedule is now completed. Press POWER to come to desired action for Pro1. The following options appear in this order: no = switching time not active OP = operation mode (ON, OFF, OCCUPIED, UNOCCUPIED) LP = set point AO = Position of analog output (output must be in manual mode by parameter setting) FAN = Fan state (output must be in manual mode by parameter setting) do = Position binary output – digital, 3-point or PWM (output must be in manual mode by parameter setting). 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 OPTION > 2 sec. SEL and current time displayed Press UP/DOWN Until 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 in- and output states

Step 1: Select type or in- or output

Press OPTION > 2 sec. SEL and current time displayed Press UP/DOWN Until 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)	**do 01** 345h ▬

Error messages

Err1: Communication error

Err2: Internal data corrupt. Replace product.

Err3: Initial power up after firmware update or internal error. Re-start product. If error reappears, replace product.

Err4: Configuration error. Parameter settings are conflicting. Verify control setup; make sure all assigned inputs are enabled and functioning.

Err5: Parameter copy mode: Copy error – if external module is addressed, communication error with external product.

Err6: Parameter copy mode: Check sum mismatch of eeprom data. Data in external eeprom corrupt.

-50°C: Internal temperature measurement is limited to 0°C (32°F). Values lower than 0°C (32°F) will be shown as -50°C (-58°F)

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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 (UI, AL, LP, AO, FAN, DO, CO etc.) – select with UP/DOWN and open with OPTION. Then select the ID with UP/DOWN keys: 1U, 2U, 3U etc., 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.
5. 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 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 right 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 easy for a site engineer to update a variety of standard installations or for an OEM to program his standard setup based on application.

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 s 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.

    New Feature for products with a communication plug-in. Selecting CO15 = 01 will write back an increased address to the AEC-PM1 after a successful copy. This way it is easier to configure large projects.

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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