

OPA2-VC Communicating Operation terminal

Features

- Display and change of operation state and set points
- Display input values according to real values not voltage signals
- Display and change of configuration parameters
- Integrated temperature sensor (-T)
- Surface mounting

Applications

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



General Description

The OPA2-VC is a remote display and operation terminal for TCX2 series controllers.

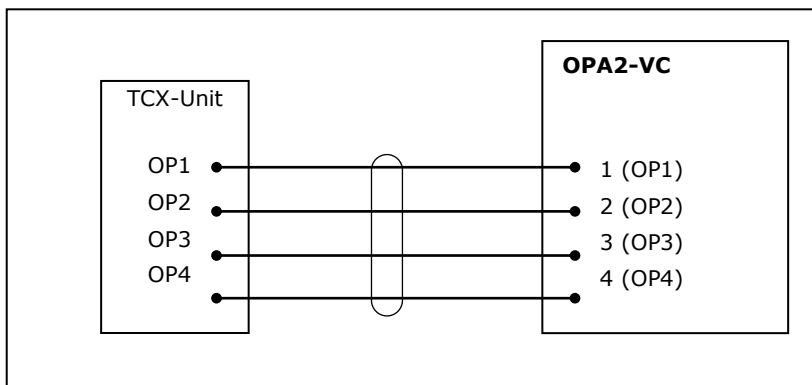
Ordering

Electrical connections

Normal cables may be used for wiring in an EMC-safe environment. In an extremely impaired EMC environment use only shielded cables. Observe wire specification for data lines between terminal and base.

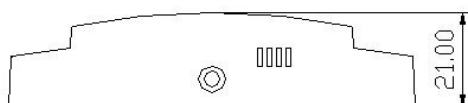
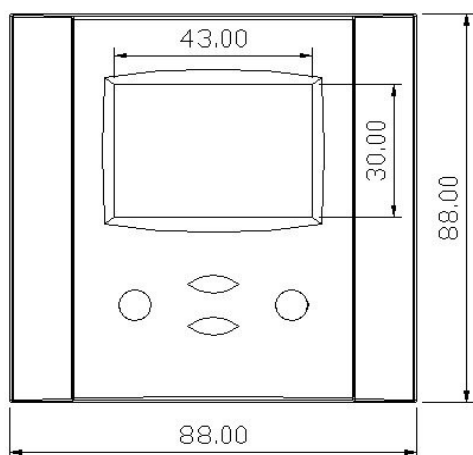
The operating voltage must comply with the requirements for safety extra-low voltage (SELV) as per EN 60 730.

Wiring Diagram

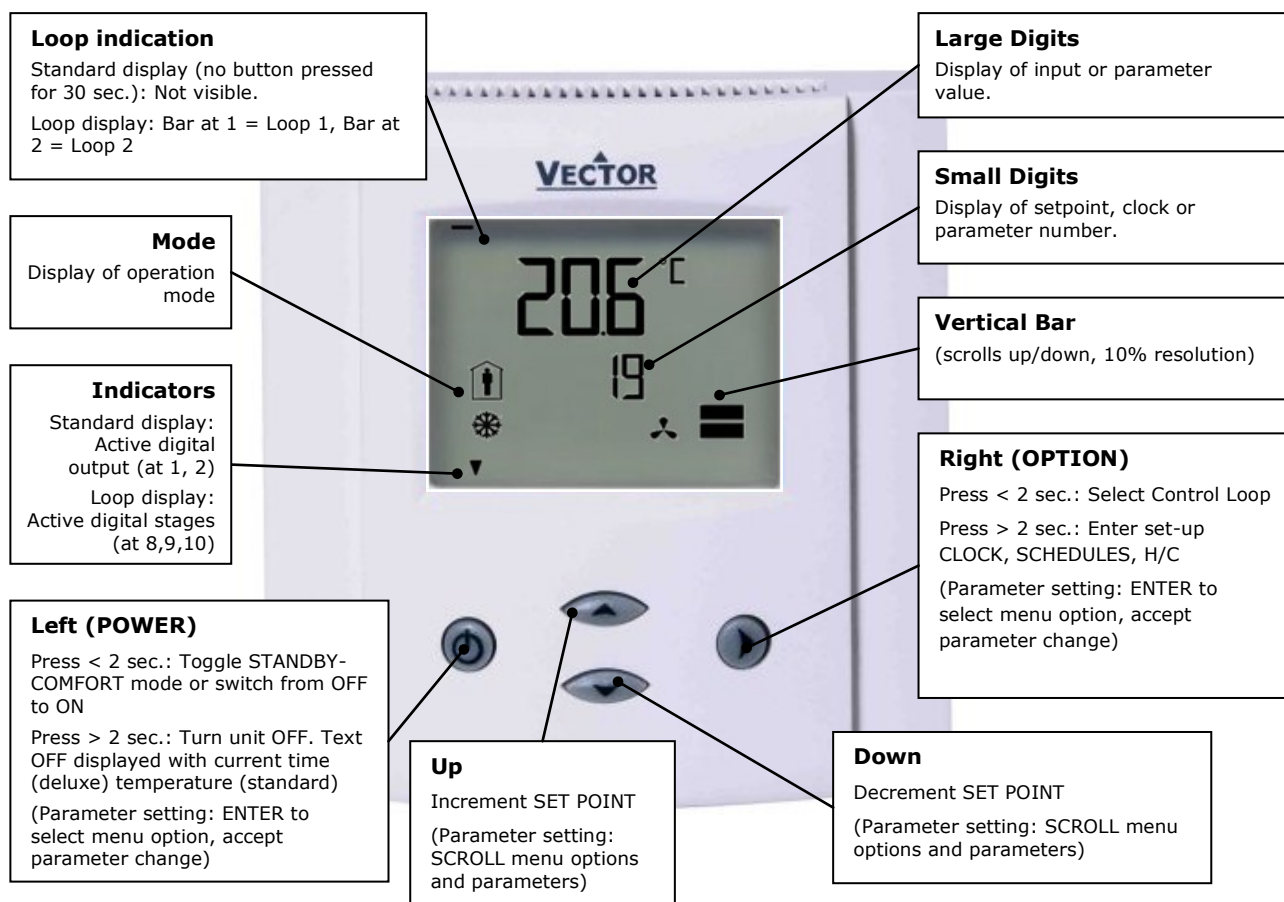









Technical Specification

Power Supply	Operating voltage	10-30VDC, 10-26V AC
	Power consumption	Max 0.5 VA
	Electrical Connection	Terminal Connectors, wire 0.34...2.5 mm ² (AWG 24...12)
Temperature Input	Type	NTC 10kΩ @ 25°C (77°F)
	Range	0...50 °C (32...122 °F)
	Accuracy	0.2 K
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
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
	OPA Dimensions (H x W x D)	88 x 88 x 21 mm (3.5" x 3.5" x 0.8")
	Housing Material	Fire proof ABS plastic
	Mounting Plate	Zinc coated steel
General	Standard Color	White RAL 9003
	Weight (including package)	185 g (6.5 oz)

Dimensions OPA


Display and Operation



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

Standard display (Parameters UP08, UP09, UP10)

- 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

Power Failure

- All parameters and set points are memorized and do not need to be re-entered.
- Upon return of power: Set *Parameter UP05* to keep the unit off, switch on, or operation mode before power failure.
- Clock and time schedule settings retained for 48 hours (after powered for at least 10 hours).

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.


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 (2 nd 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 Pr01, DAY1–DAY7 is completed (Pr01 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(3 rd 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 (5 th bar indicates step 5 complete) Press UP/DOWN to select, OPTION to complete	25% Pr01 
---	--

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 eeprom. Restart product. If error reappears, replace product.
- Err4:** Configuration error. Parameter settings are conflicting. Verify control setup.
- Err5:** Parameter copy mode: Copy error – if external module is addressed, communication error with external product
- Err6:** Parameter copy mode: Checksum mismatch of eeprom data. Data in external eeprom corrupt.

Configuration of the controller

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

1. Set jumpers for inputs and outputs
2. Connect power supply and inputs
3. Program input parameters
4. Program control parameters
5. Program output parameters
6. Test function of unit
7. Switch off power
8. Connect outputs
9. Test control loop
10. Set user settings

Configuration parameters for firmware version 1.0

The TCX2 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. The OPA2-VC will read the configuration of the controller and offer access to all the available parameters. Details of these parameters and their settings are described in the documentation of the controller.

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").

Control Parameters (password 241)

Warning! Only experts should change these settings! The parameters are grouped according to following control 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

Setting of engineering parameters

1. Press UP and DOWN button simultaneously for three seconds. The display will indicate the firmware version in the upper large digits and the revision in the lower small digits. Pressing any key will show: CODE.
2. Select a password using UP or DOWN buttons. Dial 0241 in order to get access to the engineering parameters. Press OPTION after selecting the correct password.
3. Once logged in the parameter group can be selected with the UP and DOWN key. Enter the group with the OPTION key.
4. Select the item number with UP and DOWN keys. Enter the item number with the OPTION key
5. Once the item is selected, the parameter is displayed immediately
6. 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.
7. After you are done, press OPTION or POWER in order to return to the parameter selection level.
8. 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.
9. The unit will return to normal operation if no key is pressed for more than 5 minutes.

The copy feature

It is now possible to backup and refresh the entire parameter set to a second onboard memory (default memory) or a plug-in memory.

Removable plug-in memory

The plug-in memory is an accessory that can be plugged in on the side of the TCX2. Once connected the power LED should light up. The memory can hold up to 4 individual parameter sets. It is thus easy for a distributor or site engineer to update a variety of standard installations.

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.

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 target will be erased
 1. RUN ⇔ Run time memory
 2. DFLT ⇔ Default: On board backup memory
 3. EEP1 ⇔ External plug-in folder 1
 4. EEP2 ⇔ External plug-in folder 2
 5. EEP3 ⇔ External plug-in folder 3
 6. EEP4 ⇔ External plug-in folder 4
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 plug-in folder 1
 4. EEP2 ⇔ External plug-in folder 2
 5. EEP3 ⇔ External plug-in folder 3
 6. EEP4 ⇔ External plug-in folder 4
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 power up the controller. The parameter set with the smallest index will be loaded, if in one plug-in several parameter sets have the auto flag set.
6. Press the OPTION key to conclude the selection. The Data LED on the plug-in should light up 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.