

## I-O Module TCX2-00863

The TCX2 is a programmable I-O-module with communication capabilities. The TCX2 uses the universal X2 operating system. Serial communication options are realized with Modbus RTU/ASCII and BACnet MS/TP. There is also a Wi-Fi and an Ethernet communication option available which supports Modbus TCP and BACnet IP. An embedded webserver provides a web interface to operate the controller or change the connection settings. Complete parameter sets may be copied by use of an accessory called AEC-PM1 or exchanged with a PC using an RS485-USB converter, Wi-Fi or Ethernet communication and the EasySet program.

### Functions

- Differential, averaging, min and max functions, enthalpy and dew point calculations
- Transmitter function for inputs and set points
- 8 selectable universal inputs (VDC, mA, NTC)
- 3 universal analog outputs (VDC, mA) and 6 relays with each a normally open contact (SPST)
- 8 freely assigned alarm conditions, selectable state of outputs on alarm condition
- Password protected programmable user and control parameters
- Peer to peer communication to optional X2 operation terminal OPxx-VC
- Communication over Modbus, BACnet, Ethernet or Wi-Fi (optional interface required)
- Webserver that supports TCX2 operation through mobile devices or EasySet IP access (Ethernet or Wi-Fi interface required)

### Types and Ordering

Product Name	Product No.	Loop	UI	DO	AO	Functions
TCX2-00863-MOD	40-110137	0	8	6 Relays	3	Communication with Modbus RTU or ASCII
TCX2-00863-BAC	40-110138					Communication with BACnet MS/TP
TCX2-00863-ETM	40-110139					Communication with Modbus TCP over Ethernet plug
TCX2-00863-ETB	40-110140					Communication with BACnet IP over Ethernet plug

UI = Universal inputs, DO = Digital outputs, AO = Analog outputs

### Accessories

Product Name	Product No.	Description
AEC-USB-01	40-500046	USB to RS-485 converter cable kit used for EasySet tool. Not needed for -WIM or -WIB type
AEI-4UI	40-500138	Accessory for additional 4 universal inputs on a X2 device
AMM-1	40-510022	Mounting kit for panel mounting of the TCX2
AEC-PM2	40-500130	Plug-In memory module for saving and fast copying of parameter sets

#### External Operation Terminal

OPT1-xx-VC	40-50xxxx	A large range of external operation terminals may be found on our website <a href="http://www.vectorcontrols.com">www.vectorcontrols.com</a> . All -VC type operation terminals work with this controller.
OPF2-xx-VC	40-50xxxx	

**Safety**

**DANGER! Safety advice**

This device is for use as an operating controller. It is not a safety device. Where a device failure could endanger human life and property, it is the responsibility of the client, installer and system designer to add additional safety devices to prevent 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.

**Technical specifications**

<b>Power supply</b>	Operating voltage	24 VAC $\pm$ 10%, 50/60 Hz, 15...34 VDC
	Power consumption	Max. 10 VA
	Safety extra-low voltage (SELV)	HD 384, class II
	Clock backup	Min. 48 hours
<b>Signal inputs</b>	Universal input	Input jumper set for voltage or current
	Input signal	0...10 VDC or 0...20 mA
	Resolution	9.76 mV or 0.019 mA (10 bit)
	Impedance	Voltage: 98 k $\Omega$ Current: 500 $\Omega$
	Passive input	Input jumper set to temperature (RT) or digital input (DI)
Type:	NTC (Sxx-Tn10) 10 k $\Omega$ @25 $^{\circ}$ C	
Range	-40...100 $^{\circ}$ C (-40...212 $^{\circ}$ F)	
<b>Signal outputs</b>	Analog outputs: Output signal	0...10 VDC or 0...20 mA
	Resolution	9.76 mV or 0.019 mA (10 bit)
	Maximum load	Voltage: $\geq$ 1k $\Omega$ , Current: $\leq$ 250 $\Omega$
	Relay outputs: AC Voltage	0...250 VAC, full-load current 3 A, locked-rotor 18 A
	(SPST NO) DC Voltage	0...30 VDC, full-load current 3 A, locked-rotor 18 A
Insulation strength between relays contacts and system electronics: between neighboring contacts:	4000 VAC to EN 60 730-1 1250 VAC to EN 60 730-1	
<b>Electrical connections</b>	Connector type	Removable connectors, wire 0.34...2.5 mm <sup>2</sup> (AWG 24...12)
	Remote terminal	RS485 in accordance with EIA/TIA 485, Shielded twisted pair cable
<b>Environment</b>	Operation	To IEC 721-3-3
	Climatic conditions	class 3K5
	Temperature	0...50 $^{\circ}$ C (32...122 $^{\circ}$ F)
	Humidity	<85 % RH non-condensing
	Transport & storage	To IEC 721-3-2 and IEC 721-3-1
	Climatic conditions	class 3K3 and class 1K3
	Temperature	-25...70 $^{\circ}$ C (-13...158 $^{\circ}$ F)
Humidity	<95 % RH non-condensing	
Mechanical conditions	class 2M2	
<b>Standards</b>	Electromagnetic compatibility for industrial and domestic sector	Emissions: EN 60 730-1 Immunity: EN 60 730-1
	Degree of protection	IP30 to EN 60 529
	Pollution class	II (EN 60 730-1)
	Safety class: Local regulations must be observed!	III (IEC 60536) if SELV is connected to DO II (IEC 60536) if line voltage is connected to DO.
	Overvoltage category	III (EN 60 730-1)
<b>General</b>	Material	Fire proof ABS plastic (UL94 class V-0)
	Dimensions (H x W x D)	56 x 147 x 115 mm (2.3 x 5.8 x 4.5 in)
	Weight (including package)	TCX2-40863: 430g (15.2 oz) TCX2-40863-OP: 490g (17.3 oz)

**Technical specification for serial communication -MOD and -BAC types**

<b>Network</b>	Hardware interface	RS485 in accordance with EIA/TIA 485
	Max nodes per network	128
<b>Modbus (-MOD)</b>	Max nodes per segment	64 (Vector devices only)
	Conductors	Shielded Twisted Pair (STP) cable
	Impedance	100 - 130 ohm
	Nominal capacitance	100 pF/m 16 pF/ft. or lower
	Galvanic isolation	The communication circuitry is isolated
	Line termination	A line termination resistance (120 ohm) shall be connected between the terminals (+) and (-) of the furthestmost node of the network
	Network topology	Daisy chain according EIA/TIA 485 specifications
	Recommended maximum length per chain	1200 m (4000 ft.)
	Communication standard	Modbus (www.modbus.org)
	Default setting	19200 baud rate, RTU 8 data bits, 1 even parity bit, 1 stop bit
Communication speed	4800, 9600, 19200, 38400	
Protocol: Data bits	RTU - 8 data bits, ASCII - 7 data bits,	
Parity - stop bit	no parity - 2 stops, even or odd parity - 1 stop	
<b>BACnet (-BAC)</b>	Communication standard	BACnet MS/TP over RS485 BTL tested and listed B-ASC
	Communication speed	9600, 19200, 38400, 57600, 76800, 115200



**Technical specification for TCP/IP communication -WEM, -WEP, -ETM and -ETB types**

<b>Wi-Fi</b>	Standards	Wi-Fi Alliance FCC/CE-RED/IC/TELEC/KCC/SRRC/NCC 802.11 b/g/n (802.11n up to 150 Mbps) A-MPDU and A-MSDU aggregation and 0.4 µs guard interval support
	Frequency range	2.4 GHz ~ 2.5 GHz
	Antenna	External
	<b>Ethernet</b>	Compliant with
	Speed	10/100 BASE-T (10Mbit/s, 100Mbit/s)
<b>Modbus TCP (-WEM) (-ETM)</b>	Standard	IEC 61158
	Communication protocol	Modbus TCP (www.modbus.org)
	Transport Layer	TCP/IP
<b>BACnet/IP (-WEB) (-ETB)</b>	TCP/IP Port	502
	Communication standard	BACnet/IP BTL tested and listed B-ASC
	Transport Layer	UDP
	UDP Port	47808



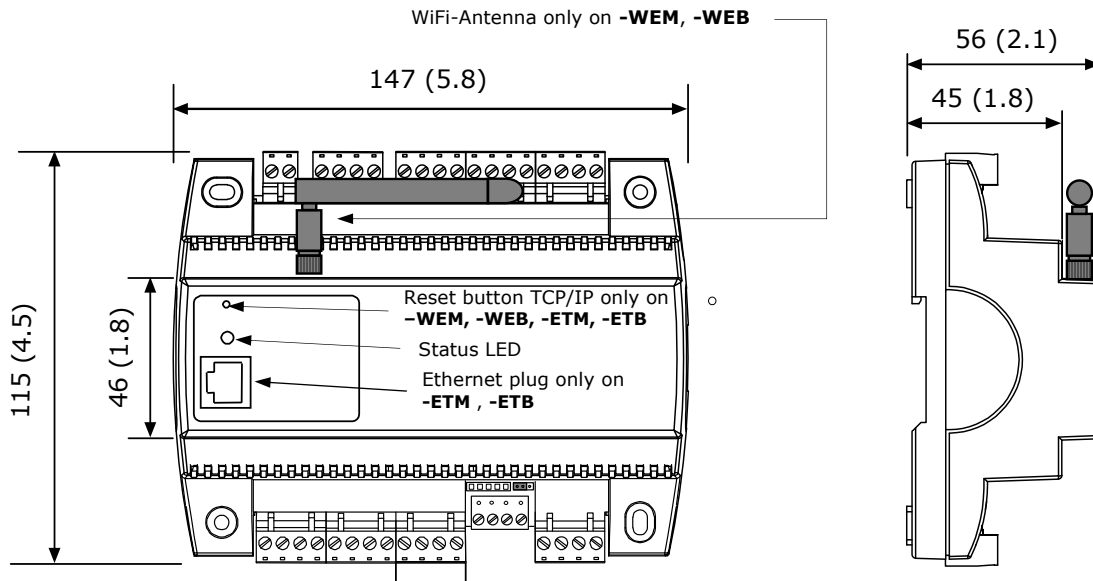
**Product testing and certification**



Declaration of conformity

Information on the conformity of our products can be found on our website [www.vectorcontrols.com](http://www.vectorcontrols.com) on the corresponding product page under "Downloads".

**Dimensions, mm (inch)**



**Mounting and Installation**

**Mounting location**

- In a cabinet on a flat surface
- In a cabinet on a top-hat rail
- In a panel (cabinet door) with the optional panel mounting kit
- The following mounting locations should be avoided:
  - For the types with wireless transmission (**-WEM** or **-WEB**), avoid locations that interfere with the radio signals, e.g. metal boxes or devices that generate electrical interferences.

**Mounting instructions**



See the TXC2-40863 installation sheet, document no. 70-00-0599 or 70-00-0884 ([www.vectorcontrols.com](http://www.vectorcontrols.com)).

**Selection of sensors and actuators**

▲ **Temperature sensors**

Use Vector Controls NTC sensors to achieve maximum accuracy: SDB-Tn10-20 (duct), SRA-Tn10 (room), SDB-Tn10-20 + AMI-S10 as immersion sensor.

▲ **Actuators**

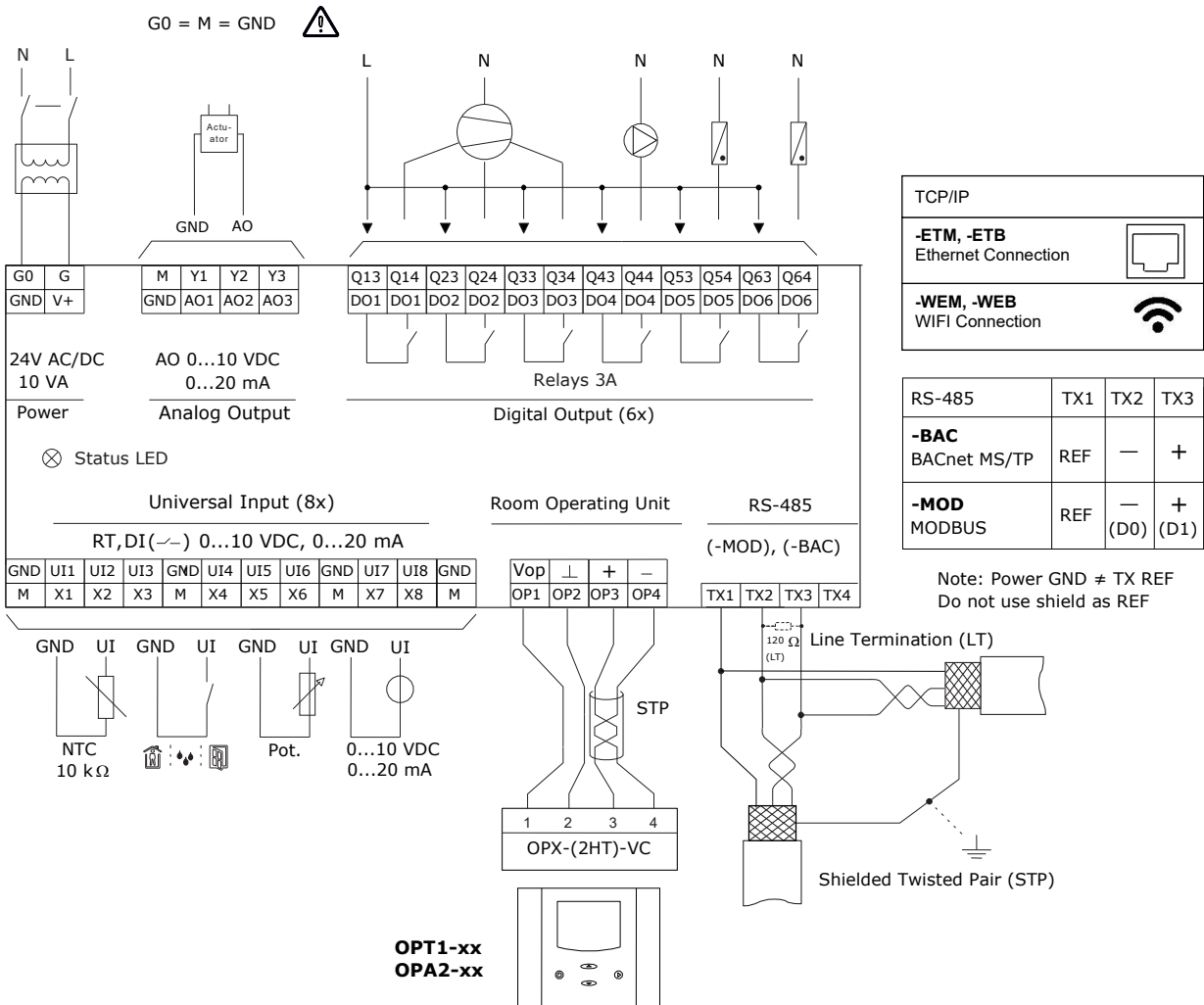
Choose modulating actuators with an input signal type of 0/2-10 VDC or 4-20 mA (min. and max. signal limitations may be set with parameters).

3-point actuators with constant running time are recommended.

**Binary auxiliary devices** (e.g. pumps, fans, on/off valves, humidifiers, etc.)

Do not directly connect devices that exceed specified limits in technical specifications – observe start up current on inductive loads.

## Connection diagram



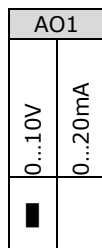
## Configuration of in- and outputs

The inputs and outputs are configured with jumpers. Jumpers are located underneath the controller.

### AO: Selection of analog output type

Left position:  
voltage output (0... 10 V)  
*factory default*

Right position:  
current output (0... 20 mA)

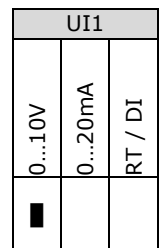


### UI: Selection of universal input type

Left position:  
voltage output (0... 10 V)  
*factory default*

Middle position: current input (0... 20 mA)

Right position: RT or dry contact



See the TXC2-40863 installation sheet, document no. 70-00-0599 or 70-00-0884 ([www.vectorcontrols.com](http://www.vectorcontrols.com)).


## Status-LED

The TCX2 has a status-LED which is located on the upper left side of the controller housing. The location of the LED is described in the installation sheet. The function of the LED is explained in the X2 Operations Manual.

## Reset button TCP/IP (-ETM, -ETB only)

The TCP/IP configuration setting of the TCX2 can be reset by pressing the reset button with a 1 mm pin through the small hole located next to the Status-LED. The function of the TCP/IP reset is explained in the X2 Wi-Fi / Ethernet Configuration Manual.

**BACnet (PICS)****Protocol Implementation Conformance Statement for BACnet MS/TP and BACnet IP network**

 The following is only valid for products with the **-BAC and -WIB** option.

Vendor Name: Vector Controls  
Product Name: TCX2 I-O Module series  
Product description: The TCX2 00863 communicating BACnet controllers are designed as I-O-modules

**▲ Supported BACnet Interoperability Blocks (BIBB)**

The BACnet interface conforms to the B-ASC device profile (BACnet Application Specific Controller).  
The following BACnet Interoperability Building Blocks (BIBB) is supported.

BIBB	Type	Name
DS-RP-B	Data sharing	Read property - B
DS-RPM-B	Data sharing	Read property multiple - B
DS-WP-B	Data sharing	Write property - B
<b>DS-COV-B</b> * <sup>1)</sup>	Data sharing	Change of value - B
DM-DCC-B	Device management	Device communication Control - B
DM-DDB-B	Device management	Dynamic device binding - B
DM-DOB-B	Device management	Dynamic object binding - B
DM-TS-B	Device management	Time synchronisation - B
DM-UTC-B	Device management	UTC Time synchronisation - B
DM-RD-B	Device management	Reinitialize device - B

\*<sup>1)</sup> With -BAC, a maximum of 5 COV objects can be activated at the same time. This limitation does not apply to -WIB.

**▲ Supported standard BACnet application services**

- ReadProperty
- ReadPropertyMultiple
- WriteProperty
- DeviceCommunication (password protected)
- I-Am
- I-Have
- TimeSynchronisation
- UTCTimeSynchronisation
- ReinitializeDevice ("cold" or "warm") (password protected)

**▲ Supported standard Object types**

- Device
- Analog input
- Analog value
- Binary value
- Multi-state Value

## Operation and Configuration

### ▲ Documentation

This controller uses the latest generation X2 operating system. Detailed operation instructions for all devices equipped with this operating system can be found on our website.

Also available are programming instructions for technicians and an application database.

### ▲ Configuration



**The device can be fully configured and commissioned using the EasySet program.**

EasySet may be downloaded free of charge from our website [www.vectorcontrols.com](http://www.vectorcontrols.com).

## X2 Functional Scope

The controller has the following X2 functions and elements:

Group	Modules	QTY	Description
UP	-	-	User and display parameters
UI	01U to 08U	8	Universal inputs, selectable with jumper: RT/DI, mA, VDC
	09U to 12U	4	Virtual inputs for operation terminals, bus modules or special functions
AL	1AL to 8AL	8	Alarm conditions
LP		0	Control loops
AO	1A to 3A	3	Analog outputs, selectable with jumper: mA, VDC
FAN	1F to 2F	2	Fan or lead lag modules, 1 to 3 fan speeds, up to 3 switching lead-lag stages each
DO	1d to 6d	6	Binary outputs with a normally open (NO) relays contact
FU	1FU	0	Remote Enable: Activation of the controller based on signal and alarm conditions
	2FU	0	Change Operation Mode: Switching occupied and unoccupied with control signals
	3FU	0	Heat/Cool Change: Switching heating and cooling based on a control signal
	4FU	0	Setpoint Compensation: Summer/winter compensation of setpoint
	5FU	0	Economizer (free heating or cooling due to the condition of outside and room air)
CO	-	-	Communication (if a communication module is available)
COPY	-	-	Copying complete parameter sets between run, default and external memory with up to 4 memory locations (AEC-PM1)
RTC	-	0	Real time clock module with 48-hour power back up (keeps clock running during power failure)
PRO	Pr01 to Pr12	0	Time schedule programs for 7 days or annual switching events



More detailed information on the X2 functions can be found in the "X2 Engineering Manual" on our website [www.vectorcontrols.com](http://www.vectorcontrols.com).

## Documentation overview

Document Type	Document No.	Description
TCX2-00863 Data Sheet	70-00-0174	Product data sheet (this document)
TCX2-40863/00863 Install	70-00-0599	Mounting and installation manual -OP, -MOD, -BAC
TCX2-40863/00863 Install TCP/IP	70-00-0884	Mounting and installation manual -WEM, -WEB, -ETM, -ETB
X2 Operations Manual button display	70-00-0950	Operations instructions of X2 system with button display
X2 Web Interface operation manual	70-00-0952	Operations instructions of X2 Web interface
X2 Engineering Manual	70-00-0737	Guidelines for configuring the X2 system
X2 Modbus Communication Module	70-00-0290	Manual Modbus (MOD)
X2 Modbus Communication Module	70-00-0925	Manual Modbus TCP (WEM, ETM)
X2 BACnet Communication Module	70-00-0218	Manual BACnet (BAC)
X2 BACnet/IP Communication Module	70-00-0899	Manual BACnet/IP (WEB, ETB)
X2 Wi-Fi / Ethernet Communication	70-00-0900	Manual TCP/IP (-WEM, -WEB, -ETM, -ETB )

Note: The above list is not complete. The documents on the website are relevant.

## Smart Sensors and Controls Made Easy!

### Quality - Innovation – Partnership

Vector Controls GmbH  
Switzerland

[info@vectorcontrols.com](mailto:info@vectorcontrols.com)  
[www.vectorcontrols.com](http://www.vectorcontrols.com)

