TCI-C series cabinet mounted universal controller



Features

- Universal PID and/or binary control for any analog input/output signal and range
- Multiple auxiliary functions: heat-cool auto changeover, automatic enable, set point compensation
- Differential, averaging, min. and max. functions
- Cascading of control loops (-C22 type)
- Alarm monitoring of low and high limits on all inputs
- Programmable reaction in case of alarm
- Feedback function for inputs and set points
- Functions for dehumidifying, set point shift, cascade control
- Password protected programmable user and control parameters

TCI-C22 also includes

- Power cap protected real-time clock with 48 hr power backup
- 7-day programmable schedules, with options including change of set points and direct position of manual outputs
- Blue backlight

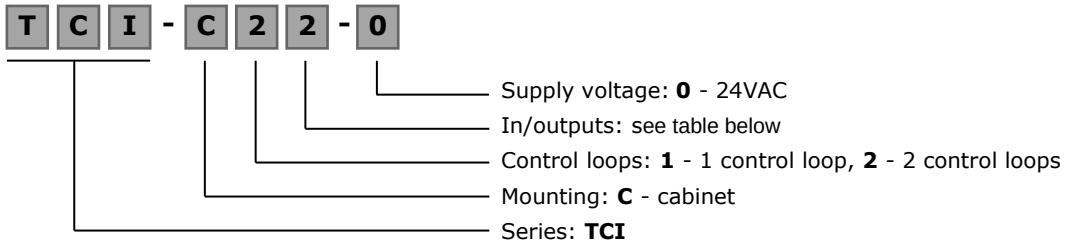
Applications

- Heat exchangers
- Zoning
- Boilers
- VAV
- Air handlers
- Fan, pump control
- Humidifiers
- Dehumidifiers
- Ventilation
- Radiant heating
- Radiant cooling
- Pressurization

General

- TCI-C11: 1 independent control loop, 2 universal inputs (analog/binary/temp), 2 binary outputs, 1 analog output
- TCI-C22: 2 independent control loops, 4 universal inputs, 2 binary outputs, 2 analog output2.
- Flexible application configuration is made with a parameter-setting routine using the standard operation terminal.

Name



Ordering

Model	Order code	Power	Option	Loop	Input	Temp	Binary output	Analog output
TCI-C11-0	40-11 0060	24 VAC	Standard	1	2	NTC	2 relays	1
TCI-C13-0	40-11 0064	24 VAC	Standard	1	2	NTC	2 TRIAC	1
TCI-C22-0	40-11 0062	24 VAC	Schedules	2	4	NTC	2 relays	2
TCI-C14-0	40-11 0071	24 VAC	Standard	1	2	PT/NI1000	2 relays	1
TCI-C15-0	40-11 0067	24 VAC	Standard	1	2	PT/NI1000	2 TRIAC	1
TCI-C24-0	40-11 0070	24 VAC	Schedules	2	4	PT/NI1000	2 relays	2
TCI-C25-0	40-11 0068	24 VAC	Schedules	2	4	PT/NI1000	2 TRIAC	2

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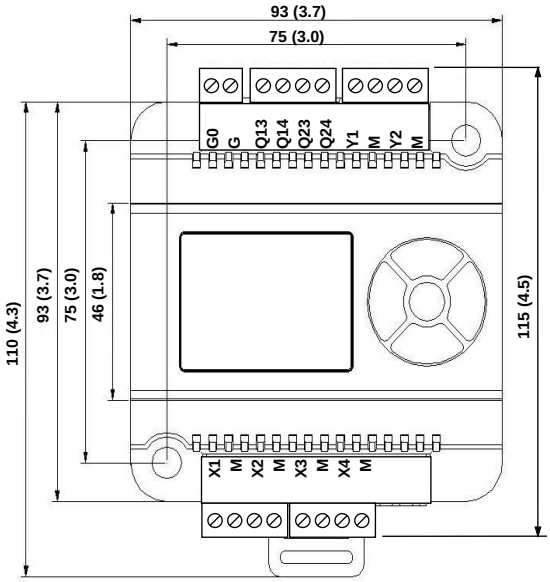
Technical specifications

Caution! This device is intended to be used for comfort applications. Where a device failure endangers human life and/or property, it is the responsibility of the owner, designer and installer to add additional safety devices to prevent or detect a system failure caused by such a device failure. Vector Controls or its affiliates cannot be held liable for any damage caused by such a failure. Failure to follow specifications and local regulations may endanger life, cause equipment damage and void warranty.

Power supply	Power requirements	24 VAC ±10%, 50/60 Hz,24 VDC ±10% SELV to HD 384, Class II transformer, 48 VA max.
	Power consumption	Max. 3 VA
	Electrical connection	Removable terminal connectors, wire 0.34…2.5 mm^2 (AWG 22…13)
	Clock backup	Min. 48 hours
Signal inputs	Universal input Inputs signal Resolution	Input configured for voltage or current 0…10 V or 0…20 mA 9.76 mV or 0.019 mA (10 bit)
	Passive input TCI-C11, TCI-C15, TCI-C22 Type & range: TCI-C14, TCI-C15, TCI-C24, TCI-C25 Type & range:	Input configured to remote temperature (RT) or digital input (DI) NTC (Sxx-Tn10): -40…140 °C (-40…284 °F) PT1000 (Sxx-Tp2): -50…205 °C (-58…401 °F) NI1000 (Sxx-Tk5): -50…180 °C (-58…356 °F)
Signal outputs	Analog outputs Output signal Resolution Maximum load	 DC 0…10 V or 0…20 mA (500 Ω max.) 9.76 mV resp. 0.019 mA (10 bit) 20 mA, 250 Ω max.
	Relay outputs AC voltage DC voltage	TCI-C11, TCI-C22, TCI-C14, TCI-C24 0…250 VAC, 5 (3) A max. each output 0…30 VDC, 5 (3) A max. each output
	TRIAC outputs AC voltage	TCI-C13, TCI-C15, TCI-C25 24…250 VAC, 3A max., 250 VA max. each output
	Insulation strength between relays or TRIAC contacts and system electronics: between neighboring contacts:	 3750 V AC to EN 60 730-1 1250 V AC to EN 60 730-1
Environment	Operation Climatic conditions Temperature Humidity	To IEC 721-3-3 class 3K5 0…50 °C (32…122 °F) <95 % RH non-condensing
	Transport & storage Climatic conditions Temperature Humidity Mechanical conditions	To IEC 721-3-2 and IEC 721-3-1 class 3K3 and class 1K3 -25…70 °C (-13…158 °F) <95 % RH non-condensing class 2M2
Standards	CE conformity EMC directive Low voltage directive	 2004/108/EC 2006/95/EC
	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
	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 if mounted correctly
	Pollution class	II (EN 60 730-1)
	Safety class:	III (IEC 60536) if SELV is connected to DO II (IEC 60536) if line voltage is connected to DO. Local regulations must be observed!
	Overvoltage category	III (EN 60 730-1)
General	Cover, back part	Fire proof ABS plastic (UL94 class V-0)
	Dimensions (H x W x D)	60 x 93 x 115 mm (2.4 x 3.7 x 4.5) inch
	Weight (including package)	TCI-C11, TCI-C14: 280g (9.9oz) TCI-C13, TCI-C15, TCI-C22, TCI-C24: 295 g (10.4 oz) TCI-C25: 305 g (10.8 oz)

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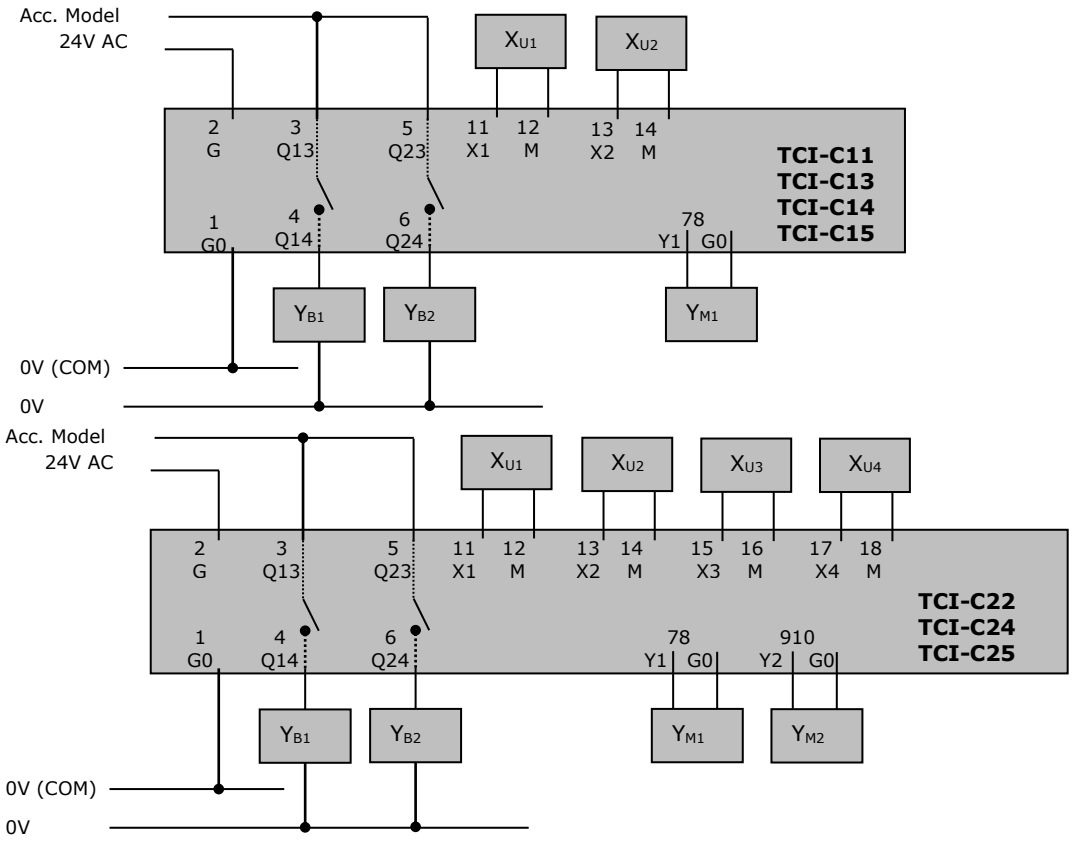
Dimensions, mm (inch) and installation



- Mount in standard cabinet to DIN 43880
- Surface mount to top-hat rail to EN 60715
- Surface mount with 2 #4 screws.
- A protective housing must be used if mounted outside an electrical cabinet.
- Ensure adequate air circulation to dissipate heat generated during operation.
- Observe local regulations.
- Do not mount in a wet or condensation prone environment.

See installation sheet no. 70-000537 (www.vectorcontrols.com)

Connection



Terminal description

G0	Power supply:	0 V, -24 VDC; common for power supply, analog outputs
G	Power supply:	24 VAC, +24 VDC
M	Signal ground:	Common for universal inputs. Internally connected to G0
Q..	Binary outputs:	Potential free switching contacts, relays or TRIAC depending on type
X..	Universal input:	NTC 10kΩ or PT1000/NI1000 depending on type, 0…10 V or 0…20 mA
Y..	Analog output:	0…10 V or 0…20 mA

Use copper, twisted pair, conductors only. The operating voltage must comply with the requirements for safety extra-low voltage (SELV) as per EN 60 730. Use safety insulating transformers class II with double insulation as per EN 60 742; they must be designed for 100% ON-time. When using several transformers in one system, the connection terminal 1 must be galvanically connected. TCI is designed for operation of AC 24 V safety extra-low voltage and is short-circuit-proof. Supplying voltages above AC 24 V to low voltage connections may damage the controller or other devices. Connection to voltages exceeding 42 V endangers personnel safety.

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Selection of sensors and actuators

Temperature sensors: Use Vector Controls NTC or PT1000/NI1000 sensors to achieve maximum accuracy: SDB-Tn10-20 (duct), SRA-Tn10 (room), SDB-Tn10-20 + AMI-S10 as immersion sensor for NTC (used with TCI-C11, TCI-C13 and TCI-C22). SDB-Tp2-20 (duct), SRA-Tp2 (room), SDB-Tp2-20+AMI-S10 (immersion), SOD-Tp2 (outdoor) for PT1000 used with TCI-Cx4 and TCI-Cx5.

Actuators: Choose modulating actuators with an input signal type of 0-10 V DC or 4-20 mA (min. and max. signal limitations may be set with parameters. 3-point actuators with constant running time are recommended.

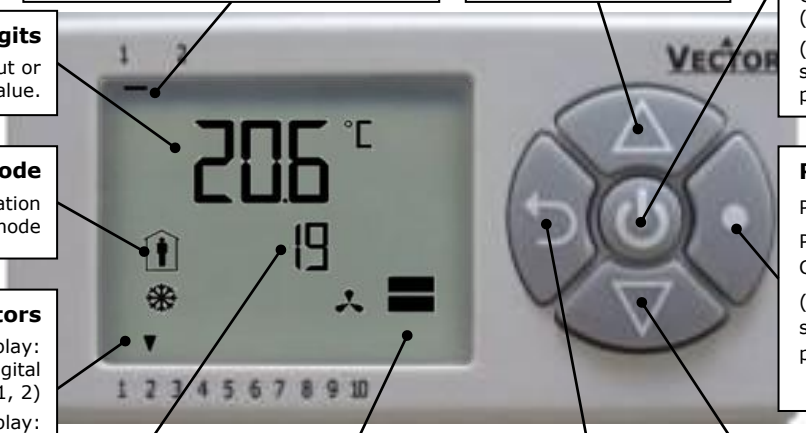
Binary auxiliary devices (e.g. pumps, fans, on/off valves, humidifiers, etc.): Do not directly connect devices that exceed specified limits in technical specifications – observe startup current on inductive loads.

Mounting and installation

Install the controller in an electrical cabinet, on a top-hat rail or with two screws, as shown in the dimension drawing above.
Mount and connect the controller as shown in the installation sheet supplied with the device, and wire it according to the connection diagram above.

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Display and operation



Loop indication
Standard display (no button pressed for 30 sec.): Not visible.
Loop display: Bar at 1 = loop 1, bar at 2 = loop 2

Up
Increase SET POINT
(Parameter setting: SCROLL menu options and parameters)

Center (POWER)
Press < 2 sec.: Toggle ECONOMY-COMFORT mode or switch from OFF to ON
Press > 2 sec.: Turn unit OFF. Text OFF displayed with current time (deluxe) temperature (standard)
(Parameter setting: ENTER to select menu option, accept parameter change)

Large Digits
Display of input or parameter value.

Mode
Display of operation mode

Indicators
Standard display: Active digital output (at 1, 2)
Loop display: Active digital stages (at 8,9,10)

Right (OPTION)
Press < 2 sec.: Select control loop
Press > 2 sec.: Enter set-up CLOCK, SCHEDULES, H/C
(Parameter setting: ENTER to select menu option, accept parameter change)

Down
Decrease SET POINT
(Parameter setting: SCROLL menu options and parameters)

Small Digits
Display of set point, clock or parameter number.

Vertical Bar
(scrolls up/down, 10% resolution)

Left (ESC)
Select control loop
(Parameter setting: ESCAPE menu option, discard parameter setting)

Operation mode symbols		Control symbols	
	Comfort (occupied): All control functions operating per set points		Heating (reverse) active
	Economy (unoccupied): Set points shifted according to *1L07, 2L07*		Cooling (direct) active
OFF	Energy hold off: Outputs are off, inputs monitored for alarms		Schedule set
			Manual override
		*	Fan active

Standard display (parameters UP08, UP09, UP10)

- Active when no key has 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) the user 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. This feature may be disabled with UP02.
- 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.

Power failure

- All parameters and set points are memorized and do not need to be re-entered.
- Upon return of power: Set p*arameter 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).

Error messages

Err1: An assigned input is not enabled or missing. All control loops, functions and outputs tied to this input will be disabled. Verify input connections, jumper settings and parameter settings for the input involved.
Err3: A function refers to a disabled input. Disable the function or enable the input.
Err4: Internal failure. Product must be replaced.

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Manual heat – cool change

To manually change heating or cooling mode press the OPTION key for more than 2 seconds. Access to manual heat – cool change may be disabled by parameters.

For TCI-C11: Press OPTION > 2 sec. SEL and H-C is displayed. For TCI-C22: Press OPTION > 2 sec. SEL and current time is displayed. Press UP key twice. SEL and H-C is displayed. Press OPTION again to toggle H or C.	SEL H-C

Display input values

For TCI-C11: Press OPTION > 2 sec. SEL and H-C is displayed. Press UP key once: UI1 and its value are displayed For TCI-C22: Press OPTION > 2 sec. SEL and current time is shown. Press UP key three times. UI1 and value are displayed. Press UP key again to step through the next active input Note: disabled inputs will not be shown.	75% UI 1

Clock operation

TCI-C2x contains a quartz clock with battery back-up (not available in TCI-C1x). Up to 8 mode changes based on time and day of the week may be programmed. Also position an output or select a set point directly with a time schedule. A blinking clock indicates that the time has not been set or if 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 8, Pr01–Pr08)

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 Pr01switching time from 00:00–23:45 Press OPTION to save switching time (bar appears indicating step 1 complete):DAY 1 blinks	Pr01 08:00

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	Pr01 DAY1 ▼ 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 OPTION again to come to desired action for Pro1. The following options appear in order: No = switching time not active OP = operation mode (select ON (comfort/occupied), ECO (economy/unoccupied), OFF) L1 = set point of loop 1 (select set point) L2 = set point of loop 2 (select set point) d1 = ON/OFF status of do1 (output must be in manual mode) d2 = ON/OFF status of do2 (output must be in manual mode) A1 = set point (0-100%) of AO1 (output must be in manual mode) A2 = set point (0-100%) of AO2 (output must be in manual mode) After repeatedly pressing OPTION through DAY7: First available action no appears, blinking: Press UP/DOWN to scroll through the 8 possible actions (3nd bar indicates step 3 complete)	Pr01 no

Step 4: Complete switching event (e.g. Pro1 = 08:00, DAY 1, comfort mode)

Available actions blink as you scroll through them, press OPTION to select one: Characteristics of action (e.g. 0–100% for A1) appear (4th bar indicates step 4 complete) Press UP/DOWN to select, OPTION to complete	Pr01 08:00

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