

TLC3-ECO-230, Programmable Economizer

Features

- Compares outdoor temperature with indoor or control temperature. Activates free heating or cooling.
- Low power energy consumption: < 1W per unit
- Relays switching for outputs each up to 300W
- Optional external temperature control input
- Choose between one 3-point actuator and 2 binary outputs. (1 outdoor damper, 1 mechanical enable or fan.)
- Password protected programmable user and control parameters
- TLC3-ECO-D also includes**
 - Power cap protected real-time clock with 48hr power backup
 - Time schedule events, with many options
 - Blue backlight
 - Infrared remote control receiver

Ordering

Item name	Item code	Variant	Features
TLC3-ECO-230	40-10 0214	Standard	Binary controller with: 1 RT int, 2 RT ext
TLC3-ECO-230-W01	40-10 0214-01	Cooling only	
TLC3-ECO-D-230	40-10 0215	Deluxe	2 DO (relay) binary valve control
TLC3-ECO-D-230-W01	40-10 0215-01	Cooling only	

Selection of actuators, binary devices and sensors

Temperature sensors: Use only our approved NTC sensors to achieve maximum accuracy. Recommended is SDB-Tn10-15 as duct sensor, SRA-Tn10 as room sensor and SDB-Tn10-15+AMI-10 as immersion sensor. Choose cable types of wired temperature sensors based on temperature of application.

Binary auxiliary devices: E.g. valves and actuators. Do not directly connect devices that exceed 2A.

Mounting location

- Install the controller 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.

Operation mode

	Comfort (occupied)	All control functions operating per set points.
	Economy (unoccupied):	Set points shifted according to <i>Parameters CP04</i> . Economy mode and setpoint shift may be disabled with UP06
OFF	Energy hold Off	Outputs are off
	Heating	Output activates if control temperature lower than setpoint. While blinking, free heating is active. Outside temperature is higher than inside temperature.
	Cooling	Output activates if control temperature higher than setpoint. While blinking, free cooling is active. Outside temperature is lower than inside temperature.
	Manual mode	Deluxe only: Override of time schedule active.
	Schedule	Deluxe only: Time schedule is active
	Fan	If present: Fan is running
	External limit switch	External limit switch is off, output is deactivated

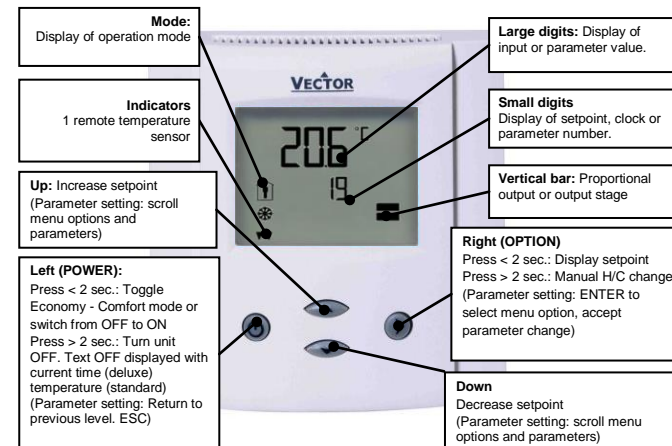
Power failure

Upon power-interruption, all parameters and setpoints are memorized in non-volatile memory and therefore do not have to be re-entered again.

Error messages

Err1: Error temperature sensor. The internal temperature sensor may be damaged or not present.
FP: Steady: Frost protection is active.
 Blinking: Frost protection activated in the past and is now inactive. Confirm with OPTION key.

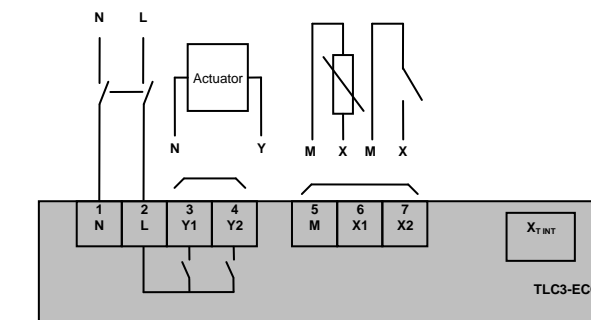
Display and operation



Technical specification

Power supply	Operating voltage	210 – 250 V AC 50/60 Hz
	Power consumption	Max 1W, 1.5VA
	Electrical connection	Terminal connectors
	Deluxe type only: Power backup for real time clock	Min 48h if charged for 24h
Signal inputs	Temperature inputs Range Accuracy	RT Internal 0...50 °C (32...122 °F) 0.5°C (1°F)
	Input type: Range Accuracy	External (Sxx-Tn10 sensor) -40...150°C (-40...302°F) 0.5°C (1°F) if 0...50°C (32...122°F) 1.0°C (2°F) if -40...100°C (-40...212°F) 5°C (10°F) if > 100°C (212°F)
Signal outputs	Digital switching outputs Switching type AC Switching power Insulation strength between relays contacts and system electronics: between open relays contacts	Y1 to Y2 Relays 0...250V AC 1.25A max. each output 4000V AC 1000V AC
	Environment	Operation Climatic conditions Temperature Humidity Transport & storage Climatic conditions Temperature Humidity Mechanical conditions
Standards	conformity: RoHS directive EMC directive Low voltage directive	2011/65/EU 2004/108/EC 2006/95/EC
	Product standards	EN 60 730 – 1:2011 EN 60 730 – 2 – 9:2010
	Automatic electrical controls for household and similar use Special requirement on temperature dependent controls	
	Electromagnetic compatibility for domestic sector	Emissions: EN 60 730-1:2011 Immunity: EN 60 730-1:2011
	Degree of protection	IP30 to EN 60 529
	Pollution class	II (EN 60 730-1:2011)
	Safety class	II (IEC 61140:2001 + A1:2004)
	Overvoltage category	III (EN 60 730-1:2011)
	Restriction of the use of hazardous substances	EN 50581:2012
	General	
	Dimensions (H x W x D)	Front part: 21 x 88 x 88 mm (0.8 x 3.5 x 3.5 in.) Power case: 60 x 50 x 32 mm (2.4 x 2.0 x 1.3 in.)
	Material:	Cover, back part: ABS plastic (UL94 class V-0) Mounting plate: Galvanized steel
	Weight (including package)	Standard: 295g (10.4oz) Deluxe (-D): 305g (10.7oz)

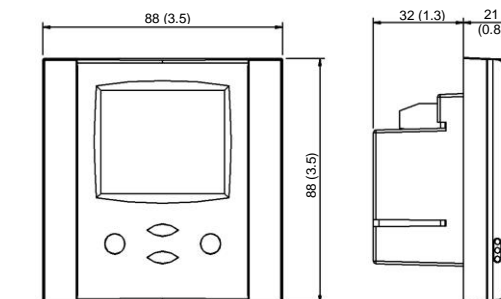
Wiring diagram



Description:

- | | | | |
|---|----|--------------------------|-------------------------------------------------------------------------|
| 1 | N | Power supply: | 0V AC Neutral |
| 2 | L | Power supply: | 230 V AC |
| 3 | Y1 | Binary output 230 VAC: | Outdoor damper for spring return actuator
Open for 3-point actuators |
| 4 | Y2 | Binary output 230 VAC: | Fan or mechanical heating or cooling
Close for 3-point actuators |
| 5 | M | Signal ground | Signal ground for external inputs. |
| 6 | X1 | NTC 10kΩ @ 25 °C (77 °F) | Outdoor sensor |
| 7 | X2 | NTC 10kΩ @ 25 °C (77 °F) | External temperature sensor |
| | | Open contact to SGND | Enable input |

Dimensions



Space required in flush mounting box: (H x W x D) 60 x 50 x 32 mm (2.4 x 2.0 x 1.3 in.)
 Distance for mounting screws: Horizontal and vertical: 45 to 63 mm (1.8 to 2.5 in.)

Configuration parameters for firmware version 1.0

The TLC3-ECO can be adapted to wide variety of applications. The adaptation is done with parameters. The parameters can be changed on the unit without the need of additional equipment.

Identifying the firmware version

The parameters and functionality of controller depend on its firmware revision. It is therefore important to use a matching product version and parameter set. The firmware version is shown on the large LCD digits when pressing UP and DOWN buttons for more than 3 seconds simultaneously.

Changing parameters

The parameters may only be accessed by entering a code. There are two levels of parameters: User operation parameters for access control settings and expert parameters for control functions and unit setup. The codes for user levels and expert levels are different. Only control experts should be given the control parameter code.

The parameters can be changed as follows:

- Press UP and DOWN button simultaneously for three seconds. The display shows the software version in the large digits and the software revision in the small digits.
- Pressing the OPTION button will indicate CODE on the small digits and 000 on the large digits.
- The code for accessing the user parameters is 009
- Select this using UP or DOWN buttons.
- Press OPTION button after selecting the correct code.
- Once logged in, the parameter is displayed immediately.
- Select the parameters with the UP/DOWN buttons. Change a parameter by pressing the OPTION button. The MIN and MAX symbols show up and indicate that the parameter may be modified now. Use UP or DOWN buttons to adjust the value.
- After you are done, press OPTION or POWER in order to return to the parameter selection level.
- Press the POWER button again so as to leave the menu. The unit will return to normal operation if no button is pressed for more than 5 minutes.

User parameters (access code: 009)

Parameter	Description	Range	Standard
UP 00	Enable change of operation modes,	ON, OFF	ON
UP 01	Enable change of set points	ON, OFF	ON
UP 02	Parameter not used	ON, OFF	ON
UP 03	Enable manual Heat/Cool change	ON, OFF	W00 = ON W01 = OFF
UP 04	Enable access to time programs	ON, OFF	ON
UP 05	State after power failure: 0 = OFF, 1 = ON, 2 = Last State	0, 1, 2	2
UP 06	Enable economy (unoccupied) mode. Shift the setpoint to a lower temperature in winter or higher temperature in summer in order to save energy. May be activated through the POWER button.	ON, OFF	ON (Economy)
UP 07	Celsius or Fahrenheit, OFF for Celsius, ON for Fahrenheit	ON, OFF	OFF
UP 08	Calibrate internal temperature sensor -10° to +10° in 0.1° steps. (Sensor is factory calibrated, use this feature for field adjustment only as required.)	-10...10	0
UP 09	Calibrate outdoor temperature sensor X1 -10° to +10° in 0.1° steps.	-10...10	0
UP 10	Calibrate external temperature sensor X2 -10° to +10° in 0.1° steps.	-10...10	0
UP 11	Select contents of Large LCD display in standard mode:	0...6	02 Temperature
	00 = OFF 01 = Setpoint 02 = Control temperature sensor ^{*)} 03 = Output Mode		
UP 12	Select contents of small LCD display in standard mode	0...6	05 Outdoor Sensor
	00 = OFF 01 = Setpoint 02 = Control temperature sensor ^{*)} 03 = Output Mode		
UP 13	Clock display type: Only available for deluxe version OFF = Show 24hour clock ON = Show 12hour clock (AM, PM)	ON, OFF	OFF (24h)
UP 14	Reset timer for override mode: Only available for deluxe version 0 = Reset of override mode is not active. 1...255 = delay in minutes to switch off device if ON/Economy mode is activated while the unit is scheduled to be in OFF mode	0...255	60 (Min)

*)1) Control temperature sensor or alternate sensor depends on which sensor is selected as control input with CP18.

If CP18 = 1: Control temperature sensor is X2 and alternate sensor is internal temperature sensor

If CP18 ≠ 1: Control temperature sensor is internal sensor and alternate sensor is X2.

Control parameters (access code: 241)

Warning! Only experts should change these settings!

Setpoint limits

Parameter	Description	Range	Standard
CP 00	Minimum set point limit in heating mode	-40-60°C	16°C (61°F)
CP 01	Maximum set point limit in heating mode	-40-60°C	30°C (87°F)
CP 02	Minimum set point limit in cooling mode	-40-60°C	16°C (61°F)
CP 03	Maximum set point limit in cooling mode	-40-60°C	30°C (87°F)

Controls Configuration

CP 04	Economy (unoccupied) mode temperature shift: The comfort (occupied) setpoint is shifted by the value set with parameter. If heating is active the comfort setpoint will be decreased, if cooling is active, the setpoint will be increased. (Enable with UP06.)	0-10.0 °C	5°C (10 °F)
CP 05	Dead zone span: The dead zone span lies between the heating and the cooling setpoint. The output is off while the temperature is within the dead zone span. A negative dead zone is not possible.	0-100 °C	1.0 °C (2 °F)
CP 06	Heat/Cool changeover delay (if set to CP12 = 3): A demand to switch between heating and cooling must persist for the length of time set with this parameter before the controller switches. Prevents activation of a sequence during a short-term change in temperature in order to protect equipment (with control overshoot for example)	0...255 min	5 min
CP 07	Min. temperature difference required to start free heating	0-10.0 °C	2.0 °C (4.0 °F)
CP 08	Min. temperature difference required to start free cooling	0-10.0 °C	2.0 °C (4.0 °F)
CP 09	Switching hysteresis is the difference between switching on and switching off. A small hysteresis will increase the number of switching cycles and thus the wear on associated equipment.	0-10.0 °C	0.5 °C (1 °F)
CP 10	Delay OFF (Minimum running time) The minimum time the damper is open	0...255 s	30 s
CP 11	Delay ON (Minimum stopping time) The minimum time the damper is closed.	0...255 s	30 s
CP 12	Control option: 0 = Cooling only 1 = Heating only 2 = Manual heat – cool switching 3 = Demand based heat – cool switching	0...3	Default = 3 W01 = 0 W02 = 1 W03 = 2 W04 = 3

→ Control logic free cooling

If the room temperature is above the setpoint, the controller will open the outside damper if the outdoor temperature is below the room temperature with a minimum difference as specified under CP08.
Once the outdoor damper is open, it will stay open until the setpoint is reached or outdoor temperature is higher than room temperature.
If the outdoor damper closed because the setpoint is reached, it will re-open after the indoor temperature increased for the amount specified under hysteresis CP09.

→ Control logic free heating

If the room temperature is below the setpoint, the controller will open the outside damper if the outdoor temperature is above the room temperature with a minimum difference as specified under CP07.
Once the outdoor damper is open, it will stay open until the setpoint is reached or outdoor temperature is lower than room temperature.
If the outdoor damper closed because the setpoint is reached, it will re-open after the indoor temperature decreased for the amount specified under hysteresis CP09.

Output configuration

CP 13	Y1: Output setting, spring return or 3-point: 0 = Spring return open/close 1 = 3-point binary output (Y1 open, Y2 close)	0...1	0 Spring return
CP 14	Running time in 3-point mode or delay for fan in seconds Delay for mechanical heating or cooling in minutes	0...255	90
CP 15	Y2: only valid if Y1 = Spring return 0 = Not used 1 = mechanical cooling 2 = mechanical heating 3 = mechanical heating and cooling 4 = fan	0...4	0

→ On-Off control

Two devices may be controlled in case the output setting is 0 (CP13). Y1 controls the outdoor damper. Y2 may enable mechanical heating or cooling or a fan.

→ 3-point output

A 3 point actuator has an open and a close input. Applying power to the open input will drive the valve or damper open, applying power to the close input will drive the valve or damper to the closed position.

The running time of the actuator may be preset. We recommend to enter the maximum running time under maximum load in order to make sure that the damper can fully close and fully open in any circumstance.

In order to open the damper Y1 will be activated for the preset amount of time. After the expiration of the running time Y1 and Y2 will both be OFF. The damper is closed by activating Y2 for the preset amount of time.

If 0 is entered as running time, the binary output will remain constantly active in open or closed position.

→ Function of mechanical heating or cooling activation

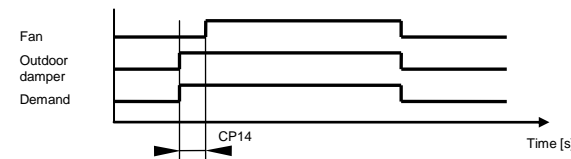
If there is heating or cooling demand. The controller verifies if free heating or cooling is possible based on control logic mentioned on the last page. If it is not possible, mechanical heating or cooling will be enabled by closing contact of Y2.

If free heating or cooling is active, the timer specified in CP14 will start to run. The timer counts the number of minutes. If the set point cannot be reached after defined number for minutes, mechanical heating or cooling is enabled. (outdoor damper will remain open until free heating / cooling conditions are not met anymore.

Setting delay to 0, will not activate mechanical heating or cooling while free heating or cooling is active independent of time.

→ Function of Y2 in fan mode

In fan mode, the fan activates with a delay defined under CP14 after the outdoor damper starts to open. This will give the damper time enough to fully open before the fan starts blowing. The fan switches off when the outdoor damper starts to close.



Input configuration X2

CP 16	Input X1: Minimum outdoor temperature. If outdoor temperature is lower than this temperature, the outdoor damper will close, independent of demand. There is a 5 °C hysteresis before reset.	-40-60 °C	5 °C (9°F)
CP 17	Input X1: Maximum outdoor temperature. If outdoor temperature is higher than this temperature, the outdoor damper will close, independent of demand. There is a 5 °C hysteresis before reset.	-40-60 °C	45 °C (113°F)
CP 18	Input X2, configuration: 0 = No external input 1 = Alternative control input instead of internal sensor 2 = Close damper if contact is open (high humidity, low air quality)	0...2	1 external control input