TCY-MT-U Intelligent Temperature PID controller

Features

- Temperature PID control for HVAC systems.
- Up to 2 modulating outputs for DC 0...10V with 10mV resolution.
- 1 internal temperature sensor and up to 2 external sensor inputs
- Multiple remote control functions on external input
- Password protected programmable user and control parameters
- Blue backlight

Applications

- Various temperature control applications
- Stand alone VAV control for pressure independent actuators
- Water Only Systems: Radiator, floor heating or chilled ceilings
- Individual room control for offices, residential, hotel rooms, meeting rooms, etc.

General Description

The TCY-MT-U is a stand-alone electronic universal controller with one temperature control loop. It may use up to 2 PID sequences. The TCY-MT-U features 1 internal NTC temperature sensor, one external sensor, one binary input and one analog output. The configuration has been reduced to a minimum to allow for a simple and off the shelve usage. For more advanced features and current in- and outputs the TCI product range is recommended. The TCY-MT-U can be configured using the standard operation terminal. No special tool or software is required.

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TCY-MT2-U
   | ||| └──── Housing:          U = Vertical (2" x 4") housing, Standard is square housing
   | ||└────── Function:         2 = 2-pipe, 4 = 4-pipe
   | |└─────── Input             T = Temperature
   | └──────── Output:          B = Binary
   └────────── Series Indication TCY
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Item Name	Item code	Variant	Features
TCY-MT2-U-W1	40-10 0044-1	Cooling only	Compact PID controller with: 2 TI, 1 AO
TCY-MT2-U-W2	40-10 0044-2	Heating only	
TCY-MT2-U	40-10 0044	2-Pipe system	
TCY-MT4-U	40-10 0046	4-Pipe system	1 TI, 2 AO
Accessories			
S-Tn10-2	40-20 0001	Flying lead sensor with 2 m cable	
SD-Tn10-12-2	40-20 0002	Flying lead duct sensor 12cm immersion depth, 2m cable	
SD-Tn10-20-2	40-20 0003	Flying lead duct sensor 20cm immersion depth, 2m cable	
SDB-Tn10-12	40-20 0051	Duct sensor with housing, 12cm immersion depth	
SDB-Tn10-20	40-20 0004	Duct sensor with housing, 20cm immersion depth	
SOA-Tn10	40-20 0006	Outdoor sensor	

Selection of actuators and sensors

Use only our approved NTC sensors to achieve maximum accuracy. Recommended is SDB-Tn10-20 as Duct sensor, SRA-Tn10 as Room sensor and SDB-Tn10-20 with AMI-S10 as immersion sensor.

Modulating Actuators:
Choose actuators with an input signal type of 0-10V DC or 2-10V DC.

Mounting location

- On an easy accessible interior wall, approx. 1.5 m (4.5') above the floor in an area of average temperature.
- Avoid exposure to direct sunlight or other heat sources, e.g. the area above radiators and heat emitting electrical 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.

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Technical Specification

Power Supply	Operating Voltage	24 V AC/DC ± 10 %, 50…60 Hz
	Power Consumption	Max. 1.5 VA
	Electrical Connection	Terminal Connectors, wire 0.34…2.5 mm² (AWG 24…12)
Signal inputs	Temperature Input	
	Range	0…50 °C (32…122 °F)
	Accuracy	0.5 K
Signal outputs	Analog Outputs	AO1, For TCY-MT4 AO2
	Output Signal	DC 0…10 V
	Resolution	9.76 mV (10 bit)
	Maximum Load	10 mA
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
	Mechanical Conditions	class 2MT2
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
	Degree of Protection	IP30 to EN 60529
	Safety Class	III (IEC 60536)
Housing	Cover, back part Mounting Plate	Fire proof ABS plastic (UL94 class V-0) Galvanized Steel
General	Dimensions (H x W x D)	Front part: 112 x 73 x 15 mm (4.4" x 2.9" x 0.6") Power case: ø 58 x 32 mm (ø 2.3" x 1.3")
	Weight (including package)	270 g (9.5 oz)

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: The connection to the temperature sensor may be interrupted or the temperature sensor is damaged. The output is switched off. Verify parameter settings and wiring.

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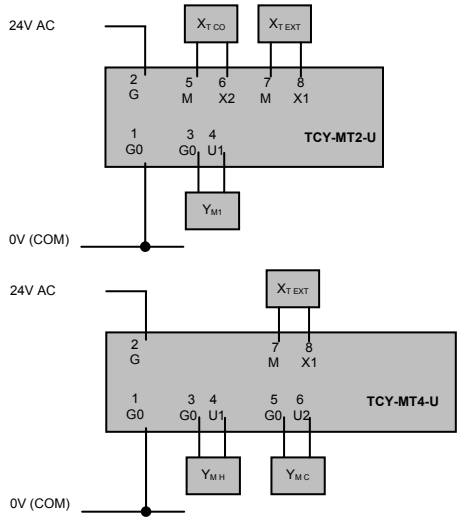
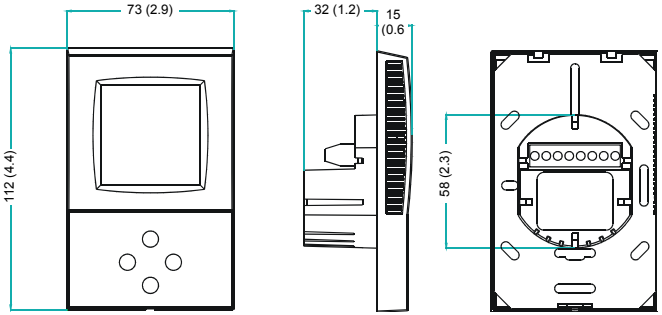
Wiring Diagram



Description:

G0	Power supply:	0V, -24VDC, internally connected to signal common
G	Power supply:	24VAC, +24VDC
M	Signal common:	Common 0 potential for analog inputs and analog outputs.
X1	External temperature input:	NTC 10kΩ @ 25°C (77°F)
TCY-MT2:		
X2	Changeover input:	NTC 10kΩ @ 25°C (77°F)
U1	Analog output:	0…10 V DC
TCY-MT4:		
U1	Analog heating output:	0…10 V DC
U2	Analog cooling output:	0…10 V DC

Dimensions [mm] (in)



Configuration parameters for firmware version 1.1

The TCY-MT-U is preset to work for most applications. For special requirements it can be fine tuned to work ideal with a simple parameter setup routine. 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 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").

Setting of user parameters

The TCY-MT-U can be adapted to fit perfectly into your application. The control operation is defined by parameters. The parameters are set during operation by using the control buttons.
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:

1. Press UP and DOWN button simultaneously for three seconds. The display shows the software version in the large digits and the product code in the small digits.
2. Pressing the OPTION button will indicate CODE on the small digits and 000 on the large digits.
3. The code for accessing the user parameters is 009
4. Select this using UP or DOWN buttons.
5. Press OPTION button after selecting the correct code.
6. Once logged in, the parameter is displayed immediately.
7. Select the parameters with the UP/DOWN buttons. Change a parameter by pressing the OPTION button. Three triangles will show up on the lower right and indicate that the parameter may be modified now. Use UP or DOWN buttons to adjust the value.
8. 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 (Password 09)

Parameter	Description	Range	Default
UP 00	Enable access to operation modes	ON, OFF	ON
UP 01	Enable access to set points	ON, OFF	ON
UP 02	Not used	ON, OFF	OFF
UP 03	Enable manual change of heating / cooling mode Has no influence for TCY-MT2-W1 and TCY-MT2-W2	ON, OFF	ON
UP 04	Not used	ON, OFF	OFF
UP 05	State after power failure: 0 = off, 1 = on, 2 = state before power failure	0, 1, 2	2
UP 06	Enable standby functionality	ON, OFF	ON
UP 07	Celsius or Fahrenheit, ON for Fahrenheit, OFF for Celsius	ON, OFF	OFF (Celsius)
UP 08	Calibration value of temperature sensor. This value is calibrated at manufacturing of the thermostat. If required it is possible to shift the temperature –10° to +10° in 0.1° steps.	-10…10	0
UP 09	Enable Frost Protection	ON, OFF	TCY-MT2-W1: OFF TCY-MT2-W2: ON TCY-MT2: ON TCY-MT4: ON

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Control Parameters (Access Code: 241)

Warning! Only experts should change these settings! See user parameters for login procedure.

Parameter	Description	Range	Default
CP 00	Minimum setpoint limit in Heating mode	0…60°C (32..160°F)	16°C (61°F)
CP 01	Maximum setpoint limit in Heating mode	0…60°C (32..160°F)	30°C (86°F)
CP 02	Minimum setpoint limit in Cooling mode	0…60°C (32..160°F)	18°C (65°F)
CP 03	Maximum setpoint limit in Cooling mode	0…60°C (32..160°F)	30°C (86°F)
Controls configuration			
CP 04	Economy temperature shift	0…100°C (200°F)	5.0°C (10°F)
CP 05	TCY-MT4 only: Dead zone between heating & cooling set point X_{DZ}	0…100°C (200°F)	1.0°C (2°F)
CP 06	TCY-MT4 only: Delay on Heat/Cool change over	0…255 min	5 min
CP 07	P – band heating X_{PH}	0…100°C (200°F)	2.0°C (4.0°F)
CP 08	P – band cooling X_{PC}	0…100°C (200°F)	2.0°C (4.0°F)
CP 09	K_{IH}, Integral gain heating, in 0.1 steps, (TI is fixed to 4s) 0 disables ID part low value = slow reaction high value = fast reaction	0…25.5	0.0
CP 10	K_{IC}, Integral gain cooling, in 0.1 steps, 0 disables I part	0…25.5	0.0
CP 11	Configuration of operation mode 0 = TCY-MT2-W1 = Cooling mode Y_{C1} 1 = TCY-MT2-W2 = Heating mode: Y_{H1} 2 = TCY-MT2 = Heat and Cool (2 pipe system), Y_{H1} + Y_{C1} 3 = TCY-MT4 = Heat and Cool (4 pipe system), Y_{H1} + Y_{C1}	TCY-MT2: 0 - 2 TCY-MT4: 0 – 3	TCY-MT2-W1: 0 TCY-MT2-W2: 1 TCY-MT2: 2 TCY-MT4: 3
Output configuration			
CP 12	Manual override of analog outputs OFF = Control mode ON = Manual mode (0 – 100%)	ON, OFF	OFF
CP 13	Min output for AO1 (For TCY-MT4 = Heating output)	0 – 100 %	0%
CP 14	Max output for AO1 (For TCY-MT4 = Heating output)	0 – 100 %	100%
CP 15	Min output for AO2 (For TCY-MT4 = Cooling output)	0 – 100 %	0%
CP 16	Max output for AO2 (For TCY-MT4 = Cooling output)	0 – 100 %	100%
CP 17	Maximum limitation in standby mode	0 – 100 %	50%
Input configuration			
CP 18	Configuration of remote control input (X1) 0 = Control input if temperature sensor connected 1 = Occupation sensor – Comfort / Standby 2 = Remote enable – Comfort / OFF 3 = Keycard function: fixed setpoint	0…3	0
CP 19	Activation delay (Minutes) = the time the binary input needs to be open before standby/off mode is activated.	0…255 min	5
CP 20	Fixed setpoint for key card function in heating mode	0…60°C (32..160°F)	17°C (63°F)
CP 21	Fixed setpoint for key card function in cooling mode	0…60°C (32..160°F)	27°C (81°F)
CP 22	For TCY-MT2 only: Enable Auto changeover	ON, OFF	OFF
CP 23	For TCY-MT2 only: Auto-changeover limit heating	0…60°C (32..160°F)	30°C (86°F)
CP 24	For TCY-MT2 only: Auto changeover limit cooling	0…60°C (32..160°F)	15°C (59°F)

Auto change over instructions (TCY-MT2 only):

To switch heating – cooling based on supply media, mount a strap-on sensor to the water pipe with the supply media and set auto changeover limit heating to 25°C(77°F), set changeover limit cooling to 18°C (64°F).
To switch heating – cooling based on outdoor temperature, mount an outdoor probe in a shady place and set auto changeover limit heating to 15°C(59°F) and changeover limit cooling to 25°C (77°F).
The controller detects the mode automatically. If heating limit is above cooling limit, supply media mode is selected. If heating limit is below cooling limit, outdoor mode applies.
To switch with open contact and activate heating with closed contact, set heating limit higher than cooling limit. To activate cooling mode with closed contact, select cooling limit higher than heating limit.

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