General Specification

TC10 Temperature Controller

GS 05C01E81-01EN

■ General

The TC10 is a compact single loop temperature controller with easy-to-read 3 dynamic colors led display. The short depth of the controller helps save instrument panel space. The TC10 supports easy configuration with codes for quick start-up.

■ Features

- 3 Dynamic Colors Led Display
- Compact size: 48 x 48 mm (1/16 DIN), depth 48 mm + 14 mm (terminals)
- Universal Input: (TC, mV, V, mA, Pt100-Pt1000)
- 3 configurable alarms as absolute, deviation and band
- 4 selectable Set Point
- Serial Communication (optional): RS-485 Modbus
- PID control with single or double action with overshoot control, ON/OFF, ON/OFF Neutral Zone, Auto-tuning, Self-tuning
- Standby mode of display (selectable)
- User calibration for sensor position compensation

■ Functional Specifications

Control Specifications
Control Mode: On/Off heating, On/Off cooling, On/Off with neutral zone (H/C), PID heating, PID cooling, PID double action (H/C)
Auto-tuning and Self-tuning algorithms, Overshoot control

Alarm Functions
Absolute high/low, Absolute inside/outside the band, Sensor break, Deviation high/low, Deviation inside/outside the band.
They are combined with Not active at power up, Latched, Acknowledgeable, and Not active at set point change for Deviation alarm.

Digital Input Functions
Alarm reset, Alarm acknowledge, Hold of the measured value, Stand-by mode, Manual mode, Heat with SP1 and Cool with SP2, Sequential set point selection, SP1/SP2 selection, Binary selection of the set point, Work in parallel with Up/down key.

Communication Function
Interface type: Isolated (50 V) RS-485
Protocol: Modbus RTU
Baud rate: 1200, 2400, 9600, 19200, 38400 bps
Byte format: 8bit with no parity, one stop bit.
Instrument address: 1 to 254

■ Hardware Specifications

Display Specifications
Main display: 4 digit height 15.5 mm, 3 color red, green and amber
Secondary display: 4 digit height 7 mm, green color
Display updating time: 500 ms

Universal Input Specifications

TC J	-50 to +1000°C	-58 to +1832°F
TC K	-50 to +1370°C	-58 to +2498°F
TC S [*]	-50 to +1760°C	-58 to +3200°F
TC R	-50 to +1760°C	-58 to +3200°F
TC T	-70 to +400°C	-94 to +752°F
Pt100	-200 to +850°C	-328 to +1562°F
Pt1000	-200 to +850°C	-328 to +1562°F
Linear 0 to 60 mV		
Linear 12 to 60 mV		
Linear 0 to 20 mA (this selection forces Out 4 = TX)		
Linear 4 to 20 mA (this selection forces Out 4 = TX)		
Linear 0 to 5 V		
Linear 1 to 5 V		
Linear 0 to 10 V		
Linear 2 to 10 V		

Sampling time: 130 ms
Resolution: 30000 counts
Total Accuracy: ±0.5% of F.S. ±1 digit
          *: ±1.0% of F.S. ±1 digit
Resistance-temperature detector (RTD) measured current; Pt100: 150 µA, Pt1000: 15.5 µA
Response time: 2 second or less, 63% (10 - 90%)
(The time required for transmission output to reach 63% of the maximum excursion when PV abruptly changes from 10% to 90%)

Output Specifications

OUT 1: Relay SPST - NO 4A/250 Vac or voltage to drive SSR 13V max. @1mA

Analog output: 0/4 to 20 mA, galvanically isolated, RL max. 600Ω ±0.2% of F.S. or 0/2 to 10 V, galvanically isolated, RL min.: 500Ω ± 0.3% F.S.

OUT 2: Relay SPST -NO 2A/250 Vac or voltage to drive SSR 13V max. @1mA, 10.5 min @15mA ±10%

OUT 3: Relay SPST -NO 2A/250 Vac or voltage to drive SSR 13V max. @1mA, 10.5 min @15mA ±10%

OUT 4: programmable: voltage output to drive SSR 13V max. @1mA, 10.5 min. @15mA ±10%, 12 VDC (20 mA) transmitter power supply or 2nd digital input

Note: Either control output or retransmission output can be used for analog output.

Regulatory Compliance

● CE marking, UL(USA/CANADA)

EMC Directive:

EN 61326-1 Class A, Table 2 (For use in industrial locations)

EN 55011 Class A, Group 1

(During the test, the instrument continues to operate at the measurement accuracy within specification.)

LV Directive:

EN 61010-1, EN 61010-2-030

UL 61010-1 CSA 61010-1

Installation category: II

Pollution category: 2

EU RoHS Directive: EN IEC 63000

Power Supply Specification and Isolation Voltage

● 24 VAC/DC (±10% of the nominal value)

● 100 to 240 VAC (-15 to +10% of the nominal value)

Power consumption: 4.5 VA max. (24 VAC/DC)

6.0 VA max. (100 to 240 VAC)

● Isolation Voltage

3000 V AC for 1 minute between primary and secondary terminals

(Primary terminals = Power [*] and relay output terminals, Secondary terminals = Analog I/O signal terminals, contact input terminals, and communication terminals.)

*: Power terminals for 24 V AC/DC models are the secondary terminals.

PV (Universal) input terminal		
DI1, DI2, OUT4		
OUT1, 2 (SSR output)		
OUT1 (Analog output)	Internal Circuits	Power Supply
RS485 (Communication)		
OUT1 (Relay output)		
OUT2 (Relay output)		
OUT3 (Relay output)		

————— Reinforced insulation (Isolation Voltage 3000VAC)

--------- Functional insulation (Isolation Voltage 50VAC)

Environmental Conditions

● Normal Operating Conditions

Operating temperature: 0 to 50°C (32 to 122°F)

Humidity: 20 to 90% RH, not condensing

● Temperature Effects

Analog input: It is part of the global accuracy
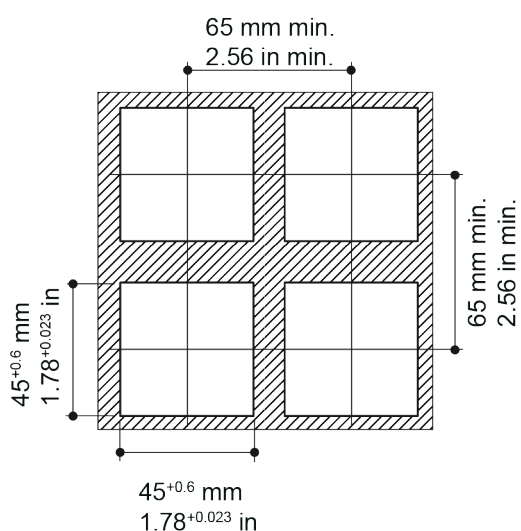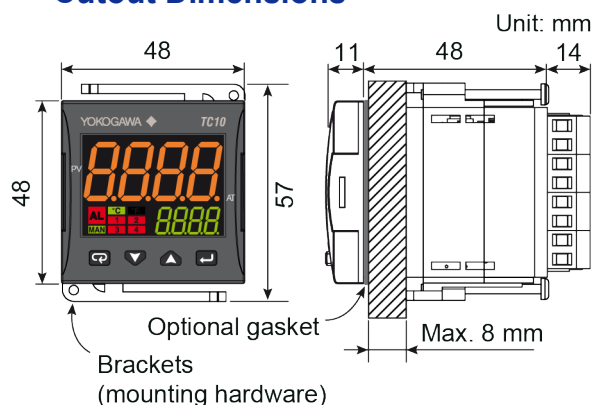
Reference junction compensation: ±0.1°C/°C or less

Analog output: ±0.05% of F.S./°C or less

● Storage temperature

Storage temperature: -20 to +70°C (-4 to +158°F)

Humidity: 20 to 95% RH, not condensing

■ External Dimensions and Panel Cutout Dimensions

Unit: mm

Optional gasket

Max. 8 mm

Brackets
(mounting hardware)

65 mm min.
2.56 in min.

65 mm min.
2.56 in min.

$45^{+0.6}$ mm
$1.78^{+0.023}$ in

$45^{+0.6}$ mm
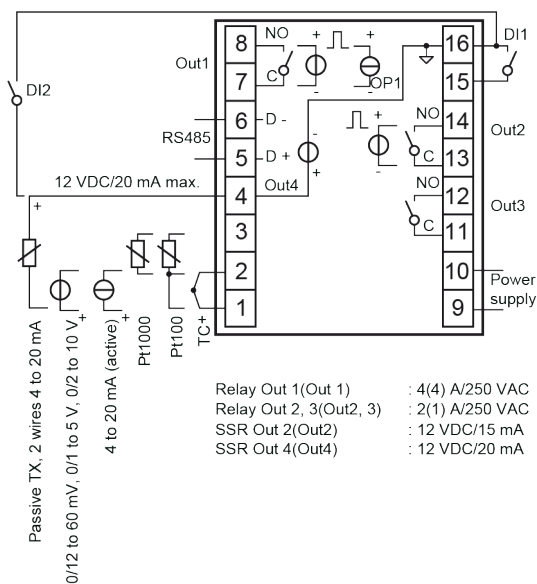$1.78^{+0.023}$ in

Dimensions: 48 x 48, depth 62 mm
(1.89 x 1.89 x 2.87 in.)
Panel cutout: 45[-0, +0.6] x 45[-0, +0.6] mm
(1.78[- 0.000, +0.023] x 1.78[- 0.000, +0.023] in.)
Weight: 180 g max.

■ Terminal Arrangement

Relay Out 1(Out 1)	: 4(4) A/250 VAC
Relay Out 2, 3(Out2, 3)	: 2(1) A/250 VAC
SSR Out 2(Out2)	: 12 VDC/15 mA
SSR Out 4(Out4)	: 12 VDC/20 mA

■ Construction, Mounting, and Wiring

Case: Plastic, self-extinguishing degree: V-0 according to UL 94

Front protection: IP 65 (when the optional panel gasket is mounted) for indoor locations according to EN 60070-1

Terminals protection: IP 20 according to EN 60070-1
Installation: Panel mounting
Terminal block: 16 screw terminals for cables of 0.25 to 2.5 mm^2 (AWG22 to AWG14) with connection diagram, tightening torque 0.5 Nm;

■ Model and Suffix Code

Model Code	Suffix codes									Description
TC10	-N	□	C	□	□	□	D	□	F		Temperature Controller with an universal input, one logic input, and one selectable I/O
Fixed code	-N										Always "-N"
Power supply		L									24 VAC/DC (Custom order)
		H									100 to 240 VAC
Fixed code			C								Always "C"
OUT1-3				R	N	N					Relay output for On/Off control
				R	R	R					Relay output with two alarm relays, or On/Off Heat/Cool control with one alarm
				V	N	N					DCV output for SSR
				V	R	R					DCV output for SSR with two alarm relays, or DCV and Relay output for Heat/Cool control with one alarm
				V	V	R					Two DCV outputs for SSR with one relay (Custom order)
				A	R	R					Analog output with two alarm relays, or Analog output and Relay output for Heat/Cool control with one alarm
IN/OUT4(Fixed code)							D				Selectable I/O (logic input / 12V SSR drive output / 12VDC 20mA transmitter power supply)
Serial communication								S			RS-485 communication Modbus/RTU
								N			None
Fixed code									F		Always "F"
Option code										/GK	Panel gasket for IP65

■ Items to be specified when ordering

Model and suffix code.

■ Standard accessories

Brackets (mounting hardware), Quick Guide

■ Optional accessory

Panel gasket for IP65: A00336

■ User's Manual

Product user's manuals can be downloaded or viewed at the following URL.

URL: http://www.yokogawa.com/ns/tc10/im