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SELECTION GUIDE

BULLETIN 900-TC
Single-Loop Electronic Temperature/Process Controllers

Bulletin 900 — Temperature/Process Controllers

Bulletin 900 Controllers with Enhanced Features

Both the hardware and function set of the Bulletin 900-TC8 and 900-TC16 temperature controller product lines offer an enhanced feature set as compared to the 900-TC32. The controller enhancements allow the Bulletin 900-TC8 and 900-TC16 line a much wider range of process applications. Key enhancements include:

- Analog voltage and current inputs
- The combination of thermocouple and platinum RTD controller types into one Global Temperature (GT) controller which incorporates both sensor input types
- A second voltage (SSR) or Triac (electronic relay) control output without loss of an alarm output
- 0...20 mA analog output in addition to the existing 4...20 mA output
- Analog transfer output function to allow easy connection to a strip chart recorder or PLC input
- Manual control of the output from the controller keypad, with bumpless transfer to the Automatic PID mode
- 11-segment alphanumeric LED readouts to display the controller parameters in a more understandable format
- Single- and three-phase heater burnout and short circuit detection
- Faster sampling rate to 250 ms
- Direct connection to your PC's USB port and 4-pin serial port on the controller using the 900-CPOEM1 cable. Allows 1-to-1 (non-network) parameter configuration and monitoring without the need of an option communication unit/module.
- ModBus® RTU (master/slave) protocol

Bulletin 900-TC8 and 900-TC16 Series B Added Features and Functions

In addition to the above enhanced features/functions associated with the Bulletin 900-TC8 and 900-TC16 controllers, the Series B version (released in October 2008) offers additional features over the series A controllers.

New Series B Feature/Functionality ✶	900-TC8	900-TC16
MV (Manipulated Variable) Display	Yes	No
PF Key (addition to keypad: allows one touch assignment of Auto/Manual, Run/Stop, etc)	Yes	No
Thermocouple Types: Added W and PL II	Yes	Yes
Thermocouple Accuracy: Improved from +/-0.5% of PV to +/-0.3% of PV	Yes	Yes
RTD Accuracy: Improved from +/-0.5% of PV to +/-0.2% of PV	Yes	Yes
Analog Output Resolution: Expanded from 2,700 to 10,000	Yes	Yes
Max. Network Communications Rate: Increased to 57.6 Kbps	Yes❄	Yes ‡
Simultaneous Network and USB Cable (900-CPOEM1) communications	Yes	Yes
Modbus Communications: 1 data, 2-byte mode added	Yes	Yes
Manipulated Variable Limiter	Yes	Yes
40% Auto-tuning	Yes	Yes
Auto-tuning for cooling when heating & cooling is selected	Yes	Yes
Direct/Reverse mode change selection by input interrupt	Yes §	Yes ♣
Square Root extraction function for analog input	Yes	Yes
PV rate of change alarm	Yes	Yes
Over current alarm	Yes ➢	Yes ➢

✶ Version 1.2 of 900BuilderLite is required to configure Series B controllers if the software configuration option is used versus the controller keypad. NOTE: Version 1.1 saved parameter cannot be downloaded using Version 1.2

❄ Requires the use of a communication option unit: 900-TC8232 (Series B) for RS232C or 900-TC8COM (Series B) for RS485 communications.

‡ Requires the use of a Series B RS485 communication option unit: Refer to Table “Option Units”. NOTE: Series A option units cannot be used with Series B controllers and vice versa.

§ Requires the use of an event Input option unit: 900-TC8EIM (Series B)

♣ Requires the use of a Series B Event Input option unit: Refer to Table “Option Units”. NOTE: Series A option units cannot be used with Series B controllers and vice versa.

➢ Requires the use of a current transformer: 900-CT1 or 900-CT2

Single-Loop Temperature/Process Controller

Product Overview/Quick Selection

Bulletin 900 — Temperature/Process Controllers

Bulletin 900-TC32

Bulletin 900-TC16

Bulletin 900-TC8

Bulletin 900 — Temperature/Process Controllers

- Single-Loop, High Value, ON/OFF, or Analog Output Controllers
- 1/8 DIN (Bulletin 900-TC8), 1/16 DIN (Bulletin 900-TC16), and 1/32 DIN (Bulletin 900-TC32) Sizes
- Various Sensor Inputs
  - Thermocouple
  - Platinum RTD
  - Non-Contact Temperature Sensor
  - Analog Input **4...20 mA, 0...20 mA, 1...5, 0...5 or 0...10V DC** and 0…50 mV (TC8 and TC16)
- Auto-Tuning and Self-tuning Available to Simplify Startup
- Heating, Cooling, or Heating/Cooling Control Available
- **Manual Output Control (TC8 and TC16)**
- High Visibility 4-digit, 11-segment LED Displays, Easy to See in High Levels of Ambient Light
- Integral Keypad with Tactile Feedback for Setup and Modification of Parameters
- Security Modes/Levels
- Event Input (TC8 and TC16) for Multiple SP Selection, Controller RUN/STOP and Auto/Manual Mode Change
- Water-Resistant Construction UL Type 4X or IP66 for Indoor Use
- On-Board Wiring Diagrams to Simplify Startup
- cULus, CE

Bulletin 900-TCx Quick Selection

Item		Bulletin No. 900-TC8	**Bulletin No. 900-TC16**	Bulletin No. 900-TC32
Dimensions		48 x 96 x 78 mm	48 x 48 x 78 mm	48 x 24 x 100 mm
Alphanumeric Display Types		PV, SV, MV	PV, SV	PV, SV
Sample Rate		250 ms		500 ms
Indication Accuracy		Thermocouple: ±0.3% of PV; RTD: ±0.2% of PV; Analog: ±0.2% of F.S.		±0.5% PV +1 digit max.
Heating/Cooling Control Mode		Yes	Yes	Yes
Control Method		ON/OFF or 2-PID (auto-tune and self-tune) with time proportioning ON/OFF outputs or Analog Output (900-TC8 & 900-TC16)		
Inputs	Thermocouple Input and 0...50 mV	Yes	Yes	Yes
	Platinum Resistance Temperature Sensor	Yes	Yes	Yes
	Analog Input 0...20 mA, 4...20 mA, 1...5V DC, 0...5V DC, 0...10V DC	Yes	Yes	No
	Non-Contact Temperature Sensor	Yes	Yes	Yes
Control Output 1 Type	ON/OFF Relay Output (Electro-Mechanical)	Yes	Yes	Yes
	ON/OFF Voltage Output for Solid-State Relay	Yes	Yes	Yes
	ON/OFF Triac (AC Only)	No	Yes	No
	4…20 and **0...20 mA** (DC) Analog	Yes	Yes	No
Control Output 2 Types	ON/OFF Relay	No ⌘	No ⌘	No ⌘
	ON/OFF Triac	Yes ➢	No	No
	ON/OFF Voltage SSR	Yes ➢	Yes ‡	No
Maximum Number of Auxiliary/ Alarm Outputs	None	No	No	Yes❄
	1 Output	No	No	Yes
	2 Outputs	No	Yes	No
	3 Outputs	Yes	Yes	No
RS-232C Communications Function		Yes §	No	No
RS-485 Communications Function		Yes §	Yes §	Yes ➢
Event Input		Yes §	Yes§	No
Run/Stop via Keypad or Interrupts		Yes	Yes	Keypad
Multiple SP Selection via Keypad or Interrupts		Yes ♣	Yes ♣	Keypad
Manual Output Control via Keypad or Interrupts		Yes ♣	Yes ♣	No
Transfer Output Function (Requires Analog Output)		Yes	Yes	No
Heater Burnout, Heater Overcurrent or Heater Short Alarm (Single or 3-Phase)		Yes✦	Yes✦	No

❄ When RS-485 communication is required.
‡ Requires an option unit with an SSR output.
§ Requires an option unit. Refer to Option Unit table on page 6
♣ Interrupts require an event input option unit. Refer to Option Unit table on page 6.
➢ Determined by controller catalog number.
⌘ One of the controller alarm relays can be used as a second control output (i.e., a heating and cooling application).
✦ Requires addition of hardware. One current transformer (900-CT1 or 900-CT2) for single-phase and two current transformers for 3-phase detection. For the 900-TC16, the appropriate option unit must be purchased. Refer to Option Units in Product Selection on page 6.

Bulletin 900-TC8 Controller Models

Bulletin No.	DIN Size (DImensions) (mm)	Sensor Input Type	Power Supply Voltage	Max No. of Auxiliary Outputs Supported ➢	Control Output 1 Type	Control Output 2 Type	Supports Heater Burnout (Open) and Heater Short-Circuit Alarm	Controller Cat. No.
900-TC8 ✶❄	1/8 DIN 48 mm (W) x 96 mm (H) x 78 mm (D)	Thermocouple or RTD	100…240V AC	3	Relay	—	No	**900-TC8RGTZ25**
						—	Yes (1-Phase)	**900-TC8RGTH1Z25**
						Voltage (for driving SSR)	No	900-TC8RVGTZ25
						—	Yes (3-Phase)	900-TC8RGTH3Z25
					Voltage (for driving SSR)	—	No	**900-TC8VGTZ25**
						—	Yes (1-Phase)	**900-TC8VGTH1Z25**
						Triac ♣	No	**900-TC8VYGTZ25**
						Voltage (for driving SSR)	No	900-TC8VVGTZ25
						—	Yes (3-Phase)	900-TC8VGTH3Z25
					0...20 or 4...20 mA Analog Output	—	No	**900-TC8ACGTZ25**
						Triac ♣	No	900-TC8ACYGTZ25
						Voltage (for driving SSR)	No	**900-TC8ACVGTZ25**
		Thermocouple or RTD	24V AC/DC	3	Relay	—	No	**900-TC8RGTU25**
						—	Yes (1-Phase)	**900-TC8RGTH1U25**
					Voltage (for driving SSR)	—	No	900-TC8VGTU25
						—	Yes (1-Phase)	900-TC8VGTH1U25
					0...20 or 4...20 mA Analog Output	—	No	900-TC8ACGTU25
		Analog Current & Voltage 0...20 and 4...20 mA 0...5, 1...5, and 0...10V DC	100…240V AC	3	Relay	—	Yes (1-Phase)	900-TC8RABH1Z25
					Relay	—	No	900-TC8RABZ25
					Voltage (for driving SSR)	—	Yes (1-Phase)	900-TC8VABH1Z25
					Voltage (for driving SSR)	—	No	900-TC8VABZ25
					Voltage (for driving SSR)	Triac ♣	No	900-TC8VYABZ25
					0...20 or 4...20 mA Analog Output	—	No	**900-TC8ACABZ25**

Bulletin 900-TC16 Controller Models

Bulletin No.	DIN Size (DImensions) (mm)	Sensor Input Type	Power Supply Voltage	Max No. of Auxiliary Outputs Supported ➢	Control Output Type §	Supports Heater Burnout (Open) and Heater Short-Circuit Alarm	Controller Cat. No.
900-TC16 ✶❄	1/16 DIN 48 mm (W) x 48 mm (H) x 78 mm (D)	Thermocouple or RTD	100…240V AC	2	Relay Output	Yes‡	**900-TC16RGTU25**
					Triac ♣	Yes‡	**900-TC16YGTZ25**
					Voltage output (for driving SSR)	Yes‡	**900-TC16VGTZ25**
					0...20 or 4...20 mA Analog Output	No	**900-TC16ACGTZ25**
		Thermocouple or RTD	24V AC/DC	2	Relay Output	Yes‡	**900-TC16RGTU25**
					Voltage output (for driving SSR)	Yes‡	**900-TC16VGTU25**
					0...20 or 4...20 mA Analog Output	No	**900-TC16ACGTZ25**
		Analog Current & Voltage 0...20 and 4...20 mA 0...5, 1...5, and 0...10V DC	100…240V AC	2	Relay	Yes ‡	**900-TC16RABZ25**
					Triac ♣	Yes ‡	900-TC16YABZ25
					Voltage (for driving SSR)	Yes ‡	900-TC16VABZ25
					0...20 or 4...20 mA Analog Output	No	**900-TC16ACABZ25**
			24V AC/DC		Relay	Yes ‡	**900-TC16RABU25**
					Voltage (for driving SSR)	Yes ‡	900-TC16VABU25
					0...20 or 4...20 mA Analog Output	No	**900-TC16ACABU25**

✶ A current transformer (CT) is not provided with the unit.

❄ When the heating and cooling function or the heater burnout alarm is used, one of the relay alarm outputs can be used as the heating or cooling output or heater burnout alarm.

‡ To implement the single-phase or three-phase heater burnout and heater short alarm function, an option module must be inserted into the 900-TC16 controller. For a list of 900-TC16 option modules, refer to the Option Units table, page 6. The heater burnout and heater short alarm is available by mounting the appropriate option module into any 900-TC16 controller that supports (yes) the heater burnout (open) or heater short-circuit feature.

§ The Bulletin 900-TC16 can have a second ON/OFF control output (SSR) by adding an option unit to the controller. Refer to Option Units table on page 6.

♣ For AC voltage operation only

➢ Typically used for alarms or cooling output in a heat/cool application

Bulletin 900-TC32 Standard Controller Models

Bulletin No.	DIN Size (DImensions) (mm)	Power Supply Voltage	Max No. of Alarms Supported ➢	Control Output Type	Supports Heater Burnout (Open) and Heater Short-Circuit Alarm	Controller Cat. No. with Thermocouple Support	Controller Cat. No. with Platinum RTD Support
900-TC32 ✶❄	1/32 DIN 48 mm (W) x 24 mm (H) x 100 mm (D)	100…240V AC	1	Relay Output	No	**900-TC32RTZ25**	**900-TC32RPZ25**
				Voltage output (for driving SSR)		**900-TC32VTZ25**	900-TC32VPZ25
		24V AC/DC	1	Relay Output	No	**900-TC32RTU25**	900-TC32RPU25
				Voltage output (for driving SSR)		**900-TC32VTU25**	**900-TC32VPU25**
		100…240V AC	RS485	Relay Output	No	**900-TC32CRTZ25**	900-TC32CRPZ25
				Voltage output (for driving SSR)		**900-TC32CVTZ25**	900-TC32CVPZ25
		24V AC/DC	RS485	Relay Output	No	900-TC32CRTU25	**900-TC32CRPU25**
				Voltage output (for driving SSR)		900-TC32CVTU25	900-TC32CVPU25

✶ If the heating/cooling function is used, ALM1 will be used for the cooling control output and so the alarm output relay will not be available.
❄ Cat. Nos. with a C designator (e.g., Cat. No. 900-TC32C___) include RS-485 communications, but do not have an alarm (or cooling) output.
➢ Typically used for alarms or cooling output in a heat/cool application

Option Units (Bulletins 900-TC8 and 900-TC16 — Only One Option Unit per Controller)

The unit provides communications or event input functionality.

Bulletin No.	Name	Function	Cat. No.
900-TC8	Communications Unit	RS-232C communications‡	900-TC8232(B)❖
		RS-485 communications	900-TC8COM(B)❖
	Event Input Unit	Event input⌘	**900-TC8EIM**
900-TC16	Communications and 1-Phase Heater Burnout Unit and Heater Short	RS-485 communications with single-phase heater burnout (open) and heater short-circuit failure detection✦	**900-TC16NCOM**(B)♠§
	Event Input Unit with 1-Phase Heater Burnout and Heater Short	Event Input with single-phase heater burnout (open) and heater short-circuit failure detection⌘✦	**900-TC16NEIM**(B)♠
	Event Input Unit	Event Input⌘	**900-TC16NACEIM**(B)♠
	Communications Unit	RS-485 communications	**900-TC16NACCOM**(B)♠§
	Communications and 3-Phase Heater Burnout and Heater Short Unit	RS-485 communications with 3-phase heater burnout (open) and heater short-circuit failure detection	**900-TC16NCOMP3**(B)♠§
	Communications and Second Voltage (SSR) Output Unit	RS-485 communications and a second voltage (SSR) output	**900-TC16NCOMV2**(B)♠§
	1-Phase Heater Burnout and second voltage (SSR) output	1-Phase Heater burnout (open) and heater short-circuit failure detection with a second control voltage (SSR) output	**900-TC16P1V2**(B)♠

‡ Enables direct RS-232 connection to personal computer using 900BuilderLite™ software. A Cat. No. 900-CP1X cable or equivalent is also required.
⌘ Provides two event inputs. Allows selecting up to 4 different pre-configured set points, controller Run/Stop or Auto/Manual mode, from 2 external inputs.
✦ Heater burnout is not available for 0...20 or 4…20 mA analog output style 900-TC16 controllers such as the 900-TC16AC.
❖ To obtain 57.6 k baud rate, Series B communication units must be used with any 900-TC8 controller catalog number from the Product Selection table on the previous page.
♠ Series B option units must be used with Series B 900-TC16 controllers. Series A option units cannot be used with Series B controllers and vice versa.
§ Series B provides 57.6 K baud rate.

Accessories

Current Transformer (Use with Bulletins 900-TC8 and 900-TC16 Only for Heater Burnout or Heater Short)

For Use With Bulletin No.	Hole Diameter *	Cat. No.
900-TC8, 900-TC16	5.8 dia.	**900-CT1**
	12.0 dia.	**900-CT2**

* The hole diameter is the only functional difference between the Cat. No. 900-CT1 and the Cat. No. 900-CT2. Current output to controller is the same.

900BuilderLite™ Personal Computer Configuration Software for Bulletin 900-TC8 and 900-TC16 Controllers

Free software. Allows online configuration and monitoring (direct or network) plus program upload/download capability to/from PC disk media for any Bulletin 900-TC8 or 900-TC16 controller.

Note 1: To obtain the free software, go to http://www.ab.com and use the A-Z Product Directory under "Resources" to locate the Temperature Controller home page. With the Bulletin 900-TC Single-Loop website displayed, go to the "Get Software" selection in the upper right and click on 900BuilderLite. Follow the download instructions.

Note 2: Version 1.2 of 900BuilderLite is required to configure Series B controllers. Version 1.1 saved parameter cannot be downloaded to a Series B controllers using Version 1.2.

Accessory	Cat. No.
Free configuration software for Enhanced Functionality Bulletin 900-TC8 and 900-TC16 controllers.	**900-BLDLTSW1**

900Builder™ Personal Computer Configuration Software (for Bulletin 900-TC32 Controllers)

Allows online and offline graphical configuration and online (direct or network) monitoring of controller parameters with data-logging and trending, plus program upload/download capability for any Bulletin 900-TC32 controller.

Accessory	Cat. No.
900Builder™ Personal Computer Configuration Software for Bulletin 900-TC32 Temperature Controllers (available in CD format only)	**900-BLDSW1**

USB Direct Communication Cable

This cable allows direct 1-to-1 (no network capability) communication between a PC USB port and the serial port of a Bulletin 900-TC16 or a 900-TC8 controller. No communication option unit is required. The cable can be used with the 900BuilderLite™ software to modify parameters, monitor controller operation, and upload or download parameters to/from PC disk media.

Accessory	Cat. No.
USB-Serial Conversion Cable	**900-CPOEM1**

Interface Converter (RS-232/USB to RS-485) Model

Converts personal computer RS-232 or USB (Ser. B or later) communications to RS-485. Use for interface with a single Bulletin 900-TC8, or Bulletin 900-TC16 with a Cat. No. 900-TCxxCOM unit installed or a single Cat. No. 900-TC32C_ designated controller. Also allows interface to up to 31 controllers connected on a RS-485 link/network. See Bulletin 900-CONV, page 24 for additional details.

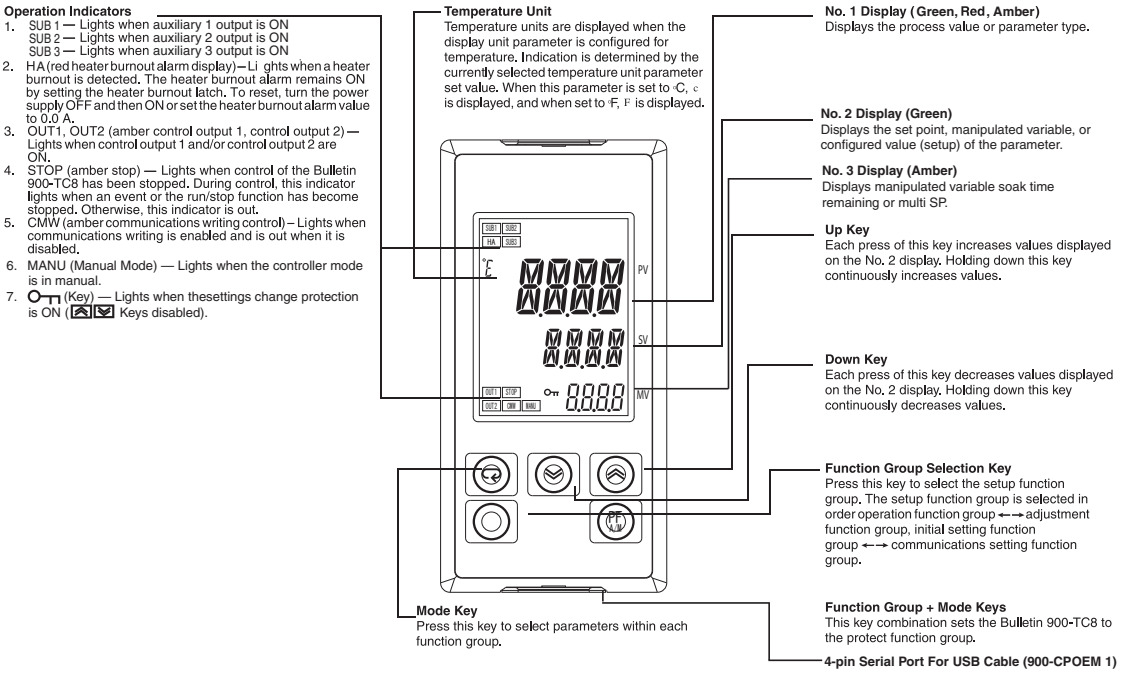
Bulletin No.	Size	Power Supply Voltage	Cat. No.
900-CONV	30 mm (W) x 80 mm (H) x 78 mm (D)	100…240V AC	**900-CONVZ25**
		24V AC/DC	**900-CONVU25**

RS-232 Interface Cable

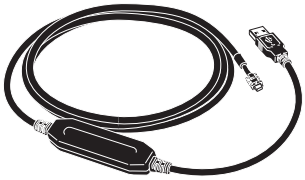
Allows connection between a 900-TC8 with a 900-TC8232 option unit and a PC using 900BuilderLite software (see page 25) or PC with software and a 900-CONV RS232-to-RS485 converter (see Bulletin 900-CONV, page 24).

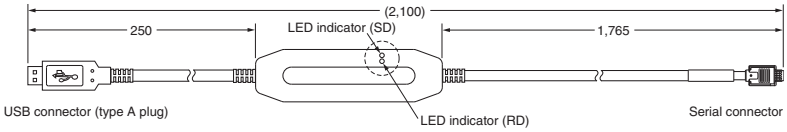
Accessory	Cat. No.
RS-232 cable with 9-pin female D shell and 3 flying leads (3 m)	**900-CP1X**

Bulletin 900-TC8



USB-Serial Conversion Cable (900-CPOEM1)





- **Note:** To use the cable you must first download a USB driver (free download). To get the driver, go to http://www.ab.com and use the A-Z Product Directory under "Resources" to locate the Temperature Controller home page. When the Bulletin 900-TC Single-Loop Controller website is displayed, go to "Get Software" selection in the upper right and click on 900-CPOEM1 driver. Follow the instructions.
- Do not connect or disconnect the Conversion Cable connector repeatedly over a short period of time. The computer may malfunction.
- After connecting the Conversion Cable to the computer, check the COM port number before starting communications. The computer requires time to recognize the cable connection. This delay does not indicate failure.
- Do not connect the Conversion Cable through a USB hub. Doing so may damage the Conversion Cable.
- Do not use an extension cable to extend the Conversion Cable length when connecting to the computer. Doing so may damage the Conversion Cable.

Bulletin 900-TC16

Bulletin 900-TC16

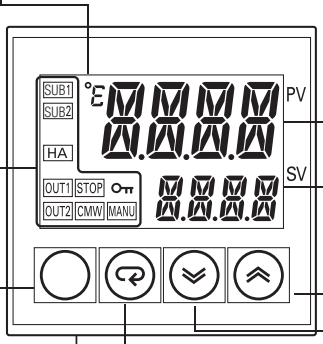
Operation Indicators

1. SUB1 — Lights when auxiliary 1 output is ON.
   SUB2 — Lights when auxiliary 2 output is ON.
2. HA (red heater burnout alarm display)—Lights when a heater failure (open or short) is detected. The heater burnout alarm remains ON by setting the heater burnout latch. To reset turn the power supply OFF and then ON or set the heater burnout alarm value to 0.0 A
3. OUT1, OUT2 (amber control output 1, control output 2) — Lights when control output 1 and/or control output 2 (cool) are ON.
4. STOP (amber stop) — Lights when control of the Bulletin 900-TC16 has been stopped. During control, this indicator lights when an event or the run/stop function has become stopped. Otherwise, this indicator is out.
5. CMW (amber communications writing control) — Lights when communications writing is enabled and is out when it is disabled.
6. MANU (Manual Mode) — Lights when the controller mode is in manual.
7. (Key) — Lights when thesettings change protection is ON (Keys disabled).

Temperature Unit
Temperature units are displayed when the display unit parameter is configured for temperature. Indication is determined by the currently selected temperature unit parameter set value. When this parameter is set to °C, c is displayed, and when set to °F, F is displayed.

No. 1 Display (Programmable Red, Green or Amber)
Displays the process value or parameter type.

No. 2 Display (Green)
Displays the set point, manipulated variable, or configured value (setup) of the parameter.



Up Key
Each press of this key increases values displayed on the No. 2 display. Holding down this key continuously increases values.

Down Key
Each press of this key decreases values displayed on the No. 2 display. Holding down this key continuously decreases values.

Function Group Selection Key
Press this key to select the setup function group. The setup function group is selected in order operation function group ←→ adjustment function group, initial setting function group ←→ communications setting function group.

Mode Key
Press this key to select parameters within each function group.

Function Group + Mode Keys
This key combination sets the Bulletin 900-TC16 to the protect function group.

4 Pin Serial port

Bulletin 900-TC32

Bulletin 900-TC32

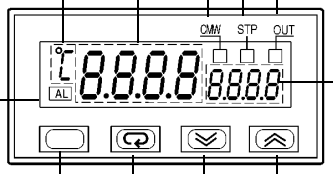
Operation Indicators

1. AL (red alarm) — Lights when alarm output is ON.
2. CMW (amber communications writing control) — Lights when communications writing is enabled and is out when it is disabled.
3. STP (amber stop) — Lights when control of the Bulletin 900-TC32 has been stopped. During control, this indicator lights when an event or the run/stop function has become stopped. Otherwise, this indicator is out.
4. OUT (amber control output) — Lights when control output is ON.

Temperature Unit
Temperature units are displayed when the display unit parameter is configured for temperature. Indication is determined by the currently selected temperature unit parameter set value. When this parameter is set to °C, c is displayed, and when set to °F, F is displayed.

No. 1 Display (Red)
Displays the process value or parameter type.

No. 2 Display (Green)
Displays the set point, manipulated variable, or set value (setup) of the parameter.



Up Key
Each press of this key increases values displayed on the No. 2 display. Holding down this key continuously increases values.

Down Key
Each press of this key decreases values displayed on the No. 2 display. Holding down this key continuously decreases values.

Function Group + Mode Keys
This key combination sets the Bulletin 900-TC32 to the protect function group.

Function Group Selection Key
Press this key to select the setup function group. The setup function group is selected in order operation function group ←→ adjustment function group, initial setting function group ←→ communications setting function group.

Mode Key
Press this key to select parameters within each function group.

Global Temperature (Thermocouple/RTD) and Analog Ranges and Selections

Temperature Sensor Input Ranges (In Degrees C)

900-TC8 and 900-TC16 Input Ranges

Input type	Platinum resistance thermometer					Thermocouple														Infrared temperature sensor				Analog input
Name	Pt100			JPt100		K		J		T		E	L	U		N	R	S	B	W	PL II	10 to 70°C	60 to 120 °C	115 to 165 °C	140 to 260 °C	0 to 50 mV
Temperature range (°C)	850	500.0	100.0	500.0	100.0	1300	500.0	850	400.0	400	400.0	600	850	400	400.0	1300	1700	1700	1800	2300	1300	90	120	165	260	Usable in the following ranges by scaling: −1999 to 9999 or −199.9 to 999.9
	−200	−199.9	0.0	−199.9	0.0	−200	−20.0	−100	−20.0	−200	−199.9	−200	−100	−200	−199.9	−200	0	0	100	0	0	0	0	0	0	
Setting number	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	24	25	19	20	21	22	23

∗ Applicable standards by input type are as follows:
K, J, T, E, N, R, S, B: JIS C1602-1995
L: Fe-CuNi, DIN 43710-1985
U: Cu-CuNi, DIN 43710-1985
W:W5Re/W26Re, ASTM E998-1990
PLII: According to Platinel II electromotive force charts from BASF (previously Engelhard)
❄ JPt100: JIS C1604-1989, JIS C1606-1989
Pt100: JIS C1604-1997, IEC 751
‡ The non-contact temperature sensor must be configurable for type K thermocouple output within either of the four specified ranges. For example, an OMRON ES1A or Calex EL Series (Convir) infrared sensor.
§ Shaded setting number indicates default setting for thermocouple or platinum RTD type 900-TC8xGT or 900-TC16xGT controllers.

Bulletin 900-TC8 and 900-TC16

Controllers with Analog Inputs ∗

Input Type	Current		Voltage		
Input Specification	4...20 mA	0...20 mA	1...5V DC	0...5V DC	0...10V DC
Setting Range	Usable in the following ranges by scaling: -1999...9999, -199.9...999.9, -19.99...99.99 or -1.999...9.999				
Setting Number	0	1	2	3	4

∗ Shaded area is the default setting for analog input type (AB) 900-TC8xAB or 900-TC16xAB controllers.

900-TC32 Input Ranges

		Platinum Resistance Thermometer Input					Thermocouple Input																				
Input Type		Platinum Resistance Thermometer ❄					Thermocouple ✶															Non-Contact Temperature Sensor ‡				Analog Input
Name		Pt100			JPt100		K		J		T		E	L	U		N	R	S	B	K10… 70°C	K60… 120°C	K115… 165°C	K160… 260°C	0… 50 mV
Temperature Range	1800																			1800					
	1700																	1700	1700						
	1600																								
	1500																								
	1400																								
	1300						1300										1300								
	1200																								
	1100																								
	1000																								
	900	850							850					850											Usable in the following ranges by scaling: -1999… 9999 or -199.9… 999.9
	800																								
	700																								
	600												600												
	500		500.0		500.0			500																	
	400									400	400	400			400	400.0									
	300																							260	
	200																					120	165		
	100			100		100														100	70				
	0			0		0		-20		-20			0					0	0		0	0	0	0	
	-100								-100					-100											
	-200																								
		-200	-199.9		-199.9		-200				-200	-199.9			-200	-199.9	-200								
Set Value		0 §	1	2	3	4	0 §	1	2	3	4	17	5	6	7	18	8	9	10	11	12	13	14	15	16

✶ Applicable standards by input type are as follows:
K, J, T, E, N, R, S, B: JIS C1602-1995
L: Fe-CuNi, DIN 43710-1985
U: Cu-CuNi, DIN 43710-1985
❄ JPt100: JIS C1604-1989, JIS C1606-1989
Pt100: JIS C1604-1997, IEC 751
‡ The non-contact temperature sensor must be configurable for type K thermocouple output within either of the four specified ranges. For example, an OMRON ES1A or Calex EL Series (Convir) infrared sensor.
§ Shaded areas indicate default setting for thermocouple (900-TC32xT) or platinum RTD (900-TC32xP) type 900-TC32 controllers.

Single-Loop Temperature/Process Controller

Specifications ✶

Bulletins 900-TC8, 900-TC16, and 900-TC32

Technical/Control Ratings				
Supply Voltage (Line)			100…240V AC, 50/60 Hz	24 V AC, 50/60 Hz or, 24 V DC
Operating Voltage Range (Line)			85…110% of rated supply voltage	
Power Consumption	900-TC8		5.4 VA @120V AC, 9 VA @ 240V AC	5 VA @ 24 V AC, 4 W @ 24 V DC
	900-TC16		3.0 VA @120V AC, 7.5 VA @ 240V AC	4 VA @ 24 V AC, 3 W @ 24 V DC
	900-TC32		4.3 VA @ 120V AC, 7 VA @ 240V AC	4 VA @ 24 V AC, 2.5 W @ 24 V DC
Temperature Input	Thermocouple		J, K, T, E, L, U, N, R, S, B [also W and PL11 for 900-TC8x & 900-TC16x] (controller applies cold junction compensation)	
	Platinum Resistance Thermometer		Pt100, JPt100 (controller RTD excitation current: approx. 1 mA) 2- or 3-wire configuration	
	Non-Contact Temperature Sensor		10…70 °C, 60…120 °C, 115…165 °C, 140…260 °C	
	MIllivolt Input		0…50 mV	
900-TC8 and 900-TC16	Analog Voltage Input		1...5V DC, 0...5V DC and 0...10V DC	
	Analog Current Input		4...20 mA and 0...20 mA	
Analog Input Impedance	Current Input:		150 Ω max.	
	Voltage:		1 MΩ min.	
Control Output	Electro-mechanical Relay output	900-TC8	SPST-NO, 250V AC @ 5 A, 30V DC @ 10 A (max. resistive load), electrical life: 100 000 operations, min. load 5V, 10 mA	
		900-TC16	SPST-NO, 250V AC @ 3 A, 30V DC @ 10 A (max. resistive load), electrical life: 100 000 operations, min. load 5V, 10 mA	
		900-TC32	SPST-NO, 250V AC @ 2 A, 30V DC @ 2 A (max. resistive load), electrical life: 100 000 operations	
	Voltage output (SSR compatible)	900-TC8	12V DC +15%/-20% (PNP), max. load current: 40 mA, with current limit protection Output 2 max. load current 21 mA	
		900-TC16	12V DC ±15% (PNP), max. load current: 21 mA, with current limit protection	
		900-TC32	12V DC (PNP), max. load current: 21 mA, with current limit protection	
	Triac output (AC only)	900-TC8	SPST-No, 250V AC @ 3 A (max. resistive load)§	
		900-TC16	SPST-NO, 250V AC @ 3 A (max. resistive load)§	
		900-TC32	NA	
	Analog Output	900-TC8	DC: 4...20 mA, 0...20 mA, max. load 600 ohms, resolution 10,000	
		900-TC16	DC: 4...20 mA, 0...20 mA, max. load 600 ohms, resolution 10,000	
		900-TC32	NA	
Auxiliary Output	900-TC8, 900-TC16		SPST-NO, 250V AC @ 3 A, 30V DC @ 5 A (max. resistive load), electrical life: 100 000 operations, min. load 1V, 1 mA	
	900-TC32		SPST-NO, 250V AC @ 1 A, 30V DC @ 2 A (max. resistive load), electrical life: 100 000 operations, min. load 1V, 1 mA	
Event Input ‡	Contact		ON: 1K Ω (max.) OFF: 100K Ω (min.)	
	Non-contact		ON: Voltage Drop 1.5V (max.) OFF: Leakage current 0.1 mA (max.)	
Control Method			ON/OFF control or 2-PID (auto-tune and self-tune)	
Configuration Method			Digital configuration using front panel keys or 900BuilderLite software for 900-TC8x and 900-TC16x, 900Builder software for 900-TC32x	
Indication Method			11-segment digital display and individual indicators: Bulletin 900-TC8 and 900-TC16. 7-segment for Bulletin 900-TC32	
Character Height	900-TC8		Process Value Display: 11.8 mm; Set Point Display: 8.1 mm; MV Display: 5.8	
	900-TC16		Process Value Display: 11 mm; Set Point Display: 6.5 mm	
	900-TC32		Process Value Display: 7.0 mm; Set Point Display: 3.5 mm	
Indication Accuracy	Thermocouple		900-TC8 and 900-TC16 ±0.3 % of indicated value, 900-TC32 ±0.5% of indicated value or ±1°C, whichever greater ±1 digit max. ❄	
	Platinum Resistance Thermometer (RTD)		900-TC8 and 900-TC16 ±0.2 % of indicated value, 900-TC32 ±0.5% of indicated value or ±1°C, whichever greater ±1 digit max.	
	Analog Input (900-TC8, 900-TC16)		±0.2% FS±1 digit max.	
	CT Input (900-TC8, 900-TC16)		±5% FS±1 digit max.	
Affect of Signal Source Resistance			Thermocouple: 0.1°C/ohm max. (100 ohm max.)♣ Platinum RTD: 900-TC8 and 900-TC16, 0.1°C/ohm max., 900-TC32, 0.4°C/ohm max. (10 ohm max.)	

✶ Unless noted, specifications apply to Bulletins 900-TC8, 900-TC16, and 900-TC32.

❄ The indication of K thermocouples in the –200…+1300 °C range, and T and N thermocouples at a temperature of –100 °C or less, and U and L thermocouples at any temperature is ±2 °C ±1 digit maximum. The indication of B thermocouples at a temperature of 400 °C or less is not specified. The indication of R and S thermocouples at a temperature of 200 °C or less is ±3 °C ±1 digit maximum.

‡ Applies to 900-TC8 or 900-TC16.

§ Electrical life: 1 million operations, Load Power Supply voltage: 75 to 250V AC (NA DC), Minimum Load: 5V, 10 mA, Leakage Current:5 mA at 250V AC 60 Hz.

♣ 900-TC8 and 900-TC16, 0.1°C/ohm max. for all thermocouple types, 900-TC32,B, R, and S sensors: 0.2° C/ohm max. (100 ohm max.)

Bulletins 900-TC8, 900-TC16, and 900-TC32, Continued

Technical/Control Ratings	
Influence of Ambient Temperature✦ and Line Voltage✦	• R, S, B, W, PL II Thermocouple Inputs: ±1% of PV or ±10°C, whichever is great, ±1 digit max. • Other Thermocouple Inputs: ±1% of PV or ±4°C, whichever is greater ±1 digit max. Note: For a Type-K thermocouple for -100°C or less ±10°C • RTD Sensors: ±1% of PV or ±2°C, whichever is greater. ±1 digit max. • Analog Inputs: ±1% of full scale ±1 digit max.
Hysteresis (Controller with Temperature Inputs)	0.1…999.9 EU (in units of 0.1 EU)➢
Hysteresis (Controller with Analog Inputs)	0.01 to 99.99% FS (in units of 0.01% Full Scale)
Proportional Band (P) Controller with Temperature Inputs	0.1…999.9 EU (in units of 0.1 EU)➢
Proportional Band Controller with Analog Inputs	0.1 to 999.9% FS (in units of 0.1% FS)
Integral Time (I)	0…3999 s (in units of 1 s)
Derivative Time (D)	0…3999 s (in units of 1 s)⌘
Control Period	0.5, 1…99 s (in units of 1 s)
Manual Reset Value	0.0…100.0% (in units of 0.1%)
Alarm Setting Range	–1999…+9999 (decimal point position depends on input type)
Sampling Period	250 or 500 ms (900-TC8 or 900-TC16), 500 ms (900-TC32)
Other Functions	According to Controller model

➢ Engineering Unit (EU) is used as the unit after scaling. For a temperature sensor, the EU is °C or °F.
⌘ When Robust Tuning (RT) is on, the differential is is 0.0... 999.9 in units of 0.1 sec.
✦ Conditions: Ambient temperature: -10°C to 23°C to 55°C. Voltage Range: -15% to +10% of rated voltage.

General/Environmental Ratings		
Weight (includes carton)	900-TC8	Approx. 360 g (12.7 oz.) with mounting bracket
	900-TC16	Approx. 160 g (5.6 oz.) with mounting bracket
	900-TC32	Approx. 160 g (5.6 ounces)
	900-TC8232, COM, EIM	Approx. 20 g (0.7 ounces)
	900-TC16COM, EIM	Approx. 35 g (1.2 ounces)
Ambient Temperature		–10…+55 °C (with no condensation or icing)
Ambient Humidity		25…85%
Storage Temperature		–25…+65 °C (with no condensation or icing)
Insulation Resistance		20 MΩ min. (at 500V DC)
Dielectric Strength		2300V AC, 50 or 60 Hz for 1 min. (between terminals with different charge)
Maximum Operating Vibration		10…55 Hz, 20 m/s² (2 G) for 10 minutes each in X, Y, and Z directions
Maximum Shock Operating		100 m/s² (10 G), 3 times each in X, Y, and Z directions.
Protective Structure		Front panel: Type 4X (UL 50)✶ IP66 (IEC61010-1) Rear case: IP20, Terminals: IP00
Installation Environment		Installation category II, pollution class 2 (IEC 61010-1 compliant)
Memory Protection		EEPROM (non-volatile memory) (number of writes: 100 000)
EMC	EMI	EN 61326
	Radiated Interference Electromagnetic Field Strength	EN 55011 Group 1, class A
	Noise Terminal Voltage	EN 55011 Group 1, class A
	EMS	EN 61326
	ESD Immunity	EN 61000-4-2
	Electromagnetic Field Immunity	EN 61000-4-3
	Burst Noise Immunity	EN 61000-4-4
	Conducted Disturbance Immunity	EN 61000-4-6
	Surge Immunity	EN 61000-4-5
	Power Frequency Magnetic Field Immunity	EN 61000-4-8
	Voltage Dip/Interrupting Immunity	EN 61000-4-11
Conformed Standards		Conforms to EN61010-1, IEC 61010-1, and VDE 0106/part 100 (finger protection) when the terminal cover is installed, Pollution Level 2, Overcurrent Category II

✶ The temperature controller is mounted on the flat surface of an enclosure that is rated and marked "Type 4X for Indoor Use Only"

Single-Loop Temperature/Process Controller

Specifications, Continued

Bulletins 900-TC8, 900-TC16, and 900-TC32, Continued

Communications		
Transmission Path Connection		RS485 Multiple points
Communications Method ✶	900-TC8	RS-232C or RS-485 (2-wire, half duplex)
	900-TC16	RS-485 (2-wire, half duplex)
	900-TC32	RS-485 (2-wire, half duplex)
Synchronization Method		Start-stop synchronization
Protocol		900TC or Modbus RTU Slave
Baud Rate ❄		1200/2400/4800/9600/19 200, 38400 bps, 57600 (900-TC8 and -TC16)
Data Bit Length ❄		7 or 8 bits
Stop Bit Length ❄		1 or 2 bits
Error Detection		Vertical Parity (None, even, odd) BCC or with ModBus CRC-16
Flow Control		Not available
Interface	900-TC8 ✶	RS-485/RS-232C
	900-TC16 ✶	RS-485
	900-TC32 ✶	RS-485
Retry Function		Not available
Communications Response Wait Time		0...90 ms (Default: 20 ms)
Communications Buffer		900-TC8 and TC-16, 217 bytes

✶ RS-232C communications is only supported for Bulletin 900-TC8 (Cat. No. 900-TC8232 option board installed). All controllers support RS-485 communications (32 linked/networked devices) by appropriate option unit or correct controller catalog number.

❄ The baud rate, data bit length, stop bit length, or vertical parity can be individually set using the communications configuration function group.

‡ When the configured value of the alarm is 00 A, the alarm will always be OFF for heater burnout and ON for SSR failure. When the configured value is 50.0 A, the heater burnout alarm will always be ON and the SSR failure will be OFF.

Current Transformer (Sold Separately) Ratings (Use with Bulletins 900-TC8 and 900-TC16 Only)		
Dielectric Strength		1000V AC (1 min.)
Vibration Resistance		50 Hz 98 m/s² (10 G)
Weight (includes carton)	900-CT1	Approx. 19 g (0.67 ounces)
	900-CT2	Approx. 65 g (2.3 ounces)
Heater Burnout and Heater Short-Circuit Failure Alarm (Use with Bulletins 900-TC8 and 900-TC16 Only—Current Transformer Required)		
Max. Heater Current	Single-Phase AC	50 A
Input Current Readout Accuracy		±5%FS ±1 digit max.
Alarm Setting Range		0.1…49.9 A (0.1 A units) ‡
Min. Detection ON Time		100 ms §
Approved Standards		
Standards		NEMA/EEMAC ICS 2 (Industrial Controls and Systems) UL 61010-1, CSA C22.2 No. 1010.1

§ When the heater ON/OFF time is less than 100 ms, heater current cannot be measured and the heater burnout alarm (ON) or SSR failure alarm (OFF) will not activate.

♣ B, R, and S series: 0.2°C/Ohm max. (100 Ohm max.)

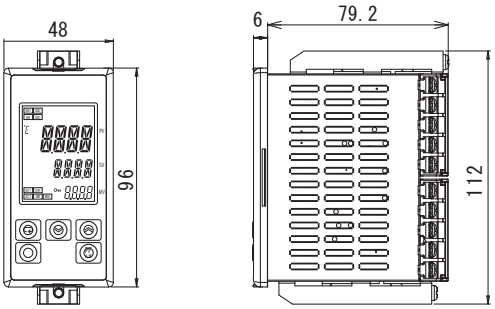
USB-Serial Cable (900-CPOEM1)	
Applicable OS	Windows 2000, XP or Vista
Applicable Configuration Software	900BuilderLite
Applicable Models	900-TC8 and 900-TC16
USB Interface Standard	Conforms to USB Specification 1.1
DTE Speed	38400 bps
Connector Specifications	Computer: USB (type A plug) Temperature Controller : 3-pin Serial
Power Supply	Bus Power (Supplied from USB host controller)
Power Supply Voltage	5V DC
Current Consumption	70 mA
Ambient Operating Temperature	0...55°C (with no condensation or icing)
Ambient Operating Humidity	10%...80%
Storage Temperature	-20...-60°C (with no condensation or icing)
Storage Humidity	10%...80%
Altitude	2000 m max.
Weight	Approx. 100 g

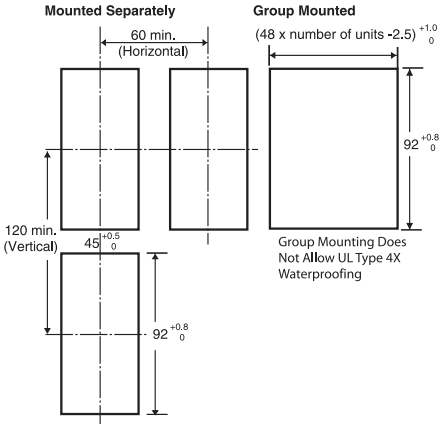
Note: A USB driver (available for free from Allen-Bradley) must be installed in the personal computer before the cable can be used.

Approximate Dimensions

Approximate dimensions are shown in millimeters unless otherwise indicated (to convert to inches, multiply by 0.0394). Dimensions are not to be used for manufacturing purposes.

Bulletin 900-TC8

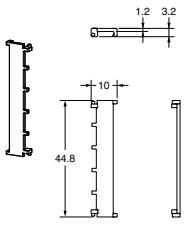




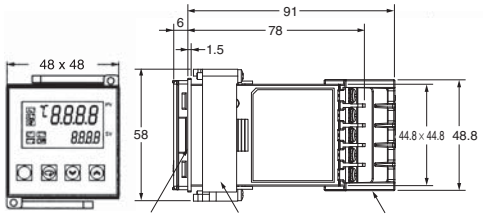
Panel Cutouts

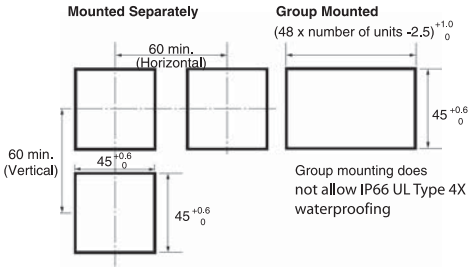
- Recommended panel thickness is 1…8 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between controllers when they are group mounted. UL Type 4X is not possible when group mounting.)
- To mount the unit so that it is waterproof, apply the waterproof gasket to the unit
- When two or more units are mounted together, make sure that the surrounding ambient temperature does not exceed the allowable operating temperature specification.

Safety Terminal Cover*



Bulletin 900-TC16

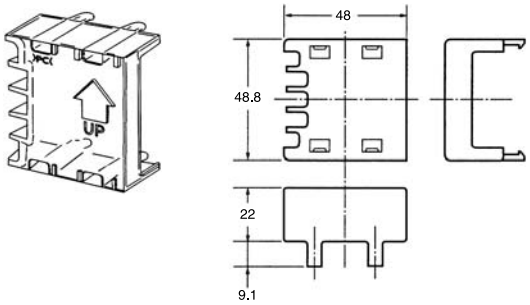




Panel Cutouts

- Recommended panel thickness is 1…5 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers when they are group mounted. IP66 UL Type 4X is not possible when group mounting.)
- To mount the unit so that it is waterproof, apply the waterproof gasket to the unit.
- When two or more units are mounted together, make sure that the surrounding ambient temperature does not exceed the allowable operating temperature specification.

Safety Terminal Cover*



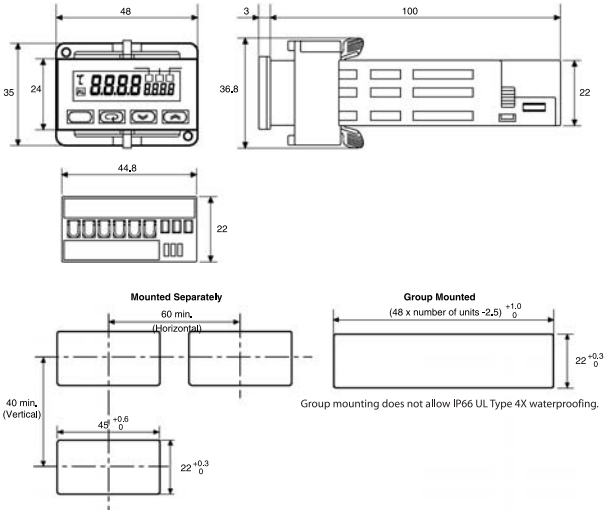
* Conforms to VDE 0106 (finger protection) when installed on the controller.

Digital Temperature Controller

Approximate Dimensions, Continued

Approximate dimensions are shown in millimeters unless otherwise indicated (to convert to inches, multiply by 0.0394). Dimensions are not to be used for manufacturing purposes.

Bulletin 900-TC32

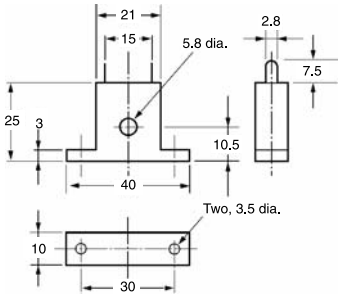


Panel Cutouts

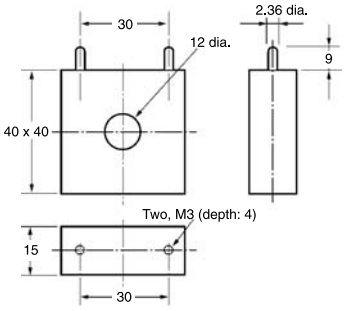
- Recommended panel thickness is 1…5 mm.
- When carrying out maintenance on the unit, the I/O wiring terminal block can be removed from the module with the terminal leads still attached.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between controllers when they are group mounted. IP66 UL Type 4X is not possible when group mounting.)
- To mount the unit so that it is waterproof, apply the waterproof gasket to the unit.
- When two or more units are mounted together, make sure that the surrounding ambient temperature does not exceed the allowable operating temperature specification.

Current Transformer (Sold Separately) (Bulletins 900-TC8 and 900-TC16 Only)

Cat. No. 900-CT1

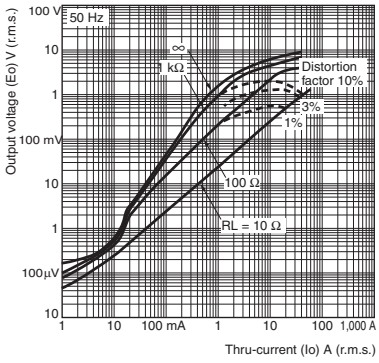


Cat. No. 900-CT2

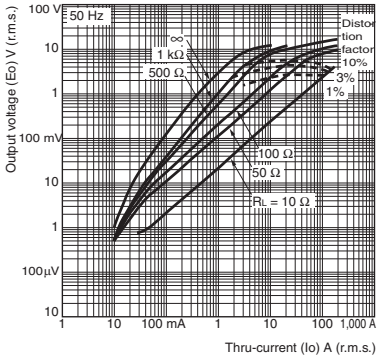


Note: The hole diameter is the major functional difference between the Cat. No. 900-CT1 and the Cat. No. 900-CT2. The current output signal is the same.

900-CT1 Thru-current (Io) vs. Output Voltage (Eo) Reference Values



900-CT2 Thru-current (Io) vs. Output Voltage (Eo) Reference Values



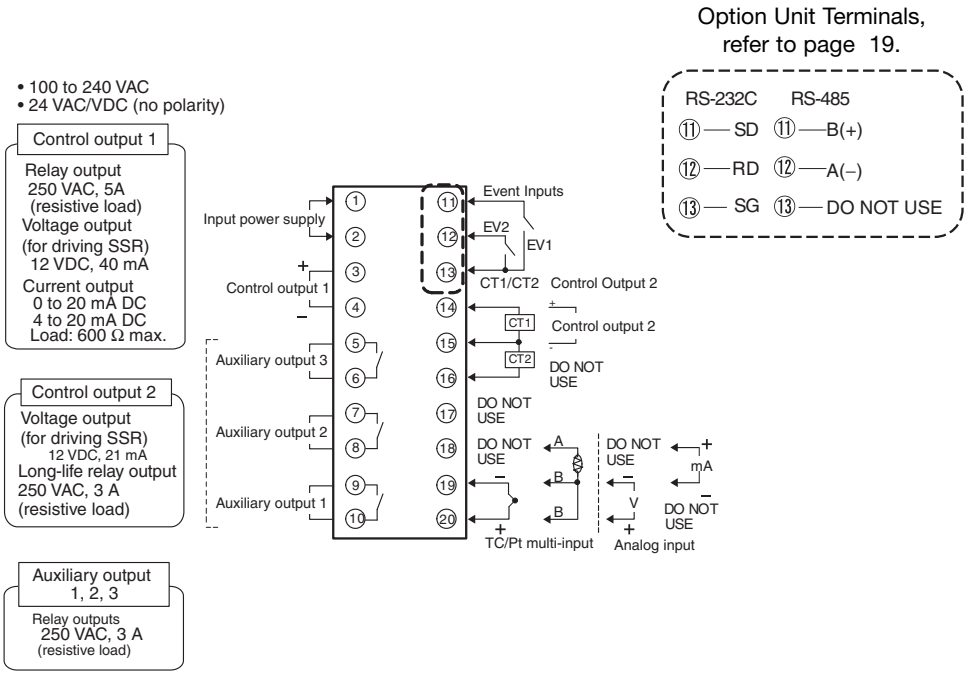
Bulletins 900-TC8 and 900-TC16

Wiring Terminals — General Guidelines

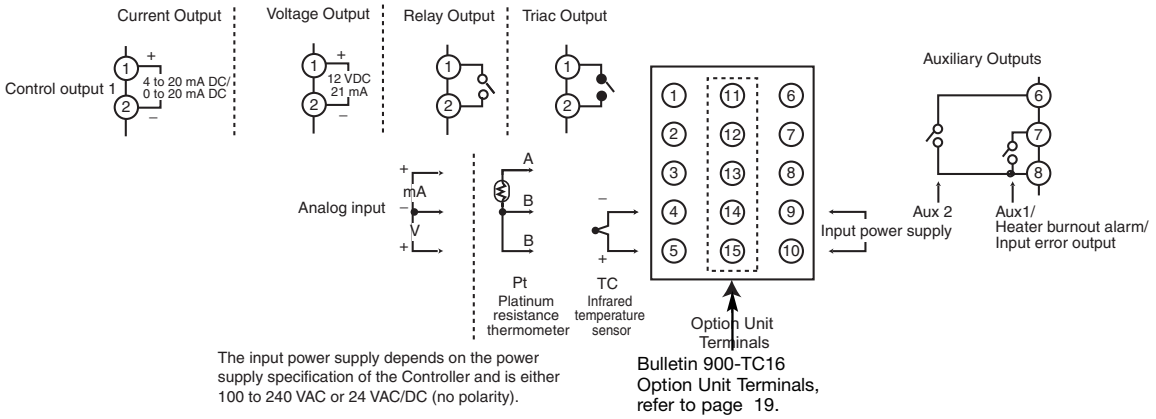
- The voltage output (SSR control output) is not electrically isolated from the controller's internal circuits. When using a grounded thermocouple, do not connect the control output terminals to earth ground. If the control output terminals are connected to earth ground, errors will occur in the measured temperature values as a result of ground loop leakage current.
- Standard insulation ratings exist between any of the following: power supply terminals, input terminals, output terminals, and communication terminals. If reinforced insulation is required, provide additional insulation, such as spatial distance or material insulation, as defined by IEC 60664.
- Separate input leads and power lines to protect the Bulletin 900-TC8/900-TC16 and its lines from external noise.
- Solderless lugs are recommended when wiring to the Bulletin 900-TC8/900-TC16 wire terminals. However, if lugs are not used, the controller's screw terminals will accept two solid or stranded wires (no mixing) 14…24 AWG.
- Tighten the terminal screws using a torque 1.13…1.36 N•m (10…12 lb-in).
- Use the following type of solderless lugs for M3.5 screws.

Note: Input power supply available: 100…240 V AC, or 24 V AC/DC

Bulletin 900-TC8 — Wiring Terminals



Bulletin 900-TC16 — Wiring Terminals



Bulletin 900-TC16 Option Unit Terminals, refer to page 19.

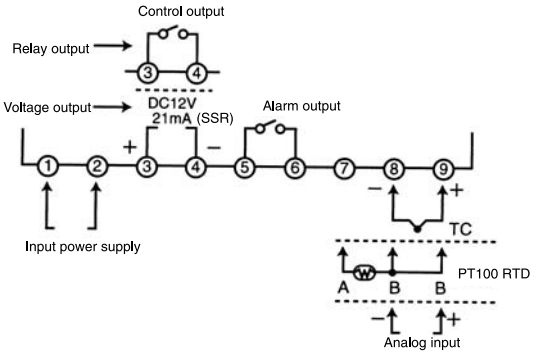
Bulletin 900-TC32 — Wiring Terminals

Wiring Terminals — General Guidelines

- The voltage output (SSR control output) is not electrically isolated from the controller's internal circuits. When using a grounded thermocouple, do not connect the control output terminals to earth ground. If the control output terminals are connected to earth ground, errors will occur in the measured temperature values as a result of ground loop leakage current.
- Standard insulation ratings exist between any of the following: power supply terminals, input terminals, output terminals, and communication terminals. If reinforced insulation is required, provide additional insulation, such as spatial distance or material insulation, as defined by IEC 60664.
- Separate input leads and power lines to protect the Bulletin 900-TC8/900-TC16 and its lines from external noise.

Note: Input power supply available: 100...240 V AC, or 24 V AC/DC

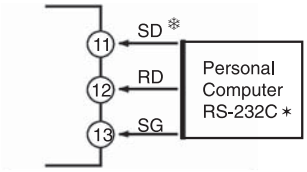
Bulletin 900-TC32



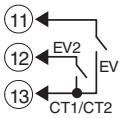
Option Units

Bulletin 900-TC8 — Option Unit Wiring

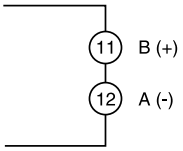
Cat. No. 900-TC8232
RS-232C Communications Unit
(Series B) §



Cat. No. 900-TC8EIM
Event Input Unit



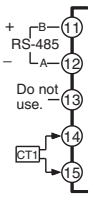
Cat. No. 900-TC8COM
RS-485 Communications Unit
(Series B) ‡§



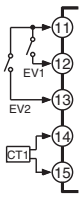
∗ With 900BuilderLite Software
❄ 900-CP1x or equivalent cable provides the physical connection between the PC and controller.
‡ Typically, an RS-232 to RS-485 converter such as the Cat. No. 900-CONVZ25 (see page 9-215) will be required between the personal computer (with 900Builder software) and the Bulletin 900-TCx controller. In that case, a 900-CPx or equivalent cable provides the physical connection between the converter and the PC. RS-485 allows linking up to 31 controllers with a single personal computer.
§ Series B provides baud rates up to 57.6 K bps.

Bulletin 900-TC16 — Option Unit Wiring

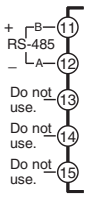
900-TC16NCOM
Communications/
CT §



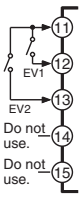
900-TC16NEIM
Event inputs/
CT



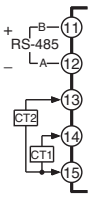
900-TC16NACCOM
Communications §



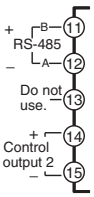
900-TC16NACEIM
Event inputs



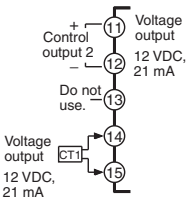
900-TC16NCOMP3
Communications/
Two CTs §



900-TC16NCOMV2
Communications/
Control output 2 §



900-TC16PIV2
Control output 2/
CT



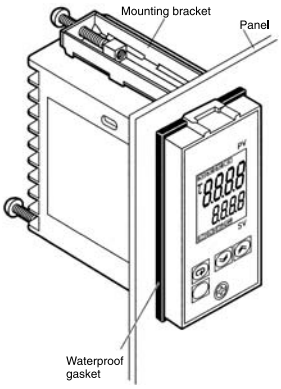
Attach the appropriate terminal labels.

§ Series B provides baud rates up to 57.6 K bps.

Bulletin 900-TC8

Panel Mounting

1. Insert the Bulletin 900-TC8 into the mounting hole in the panel from the front (panel thickness:1 to 8 mm). Ensure the waterproof gasket is in place if this is a UL Type 4X enclosure.
2. Push the mounting bracket along the Bulletin 900-TC8 body from the rear terminals up to the panel, and secure it temporarily.
3. Tighten the screw on each mounting bracket alternately until the ratchet stops tightening.

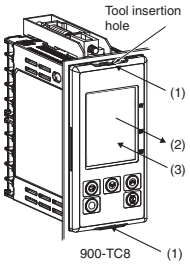


Bulletin 900-TC8

Removing the Unit from its Case

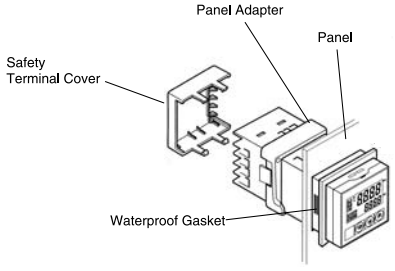
1. Insert a flat-blade screwdriver into the two tool insertion holes (one on the top and one on the bottom) to release the hooks.

2. Insert the flat-blade screwdriver in the gap between the front panel and rear case (two on the top and two on the bottom), and use it to pry and pull out the front panel slightly. Then, pull out on the front panel gripping both sides. Be sure not to impose excessive force on the panel.



3. When inserting the body of the Temperature Controller into the case, make sure the printed circuit boards are parallel to each other, make sure that the sealing rubber is in place, and press the 900-TC8 toward the rear case until it snaps into position. While pressing the 900-TC8 into place, press down on the hooks on the top and bottom surfaces of the rear case so that the hooks securely lock in place. Make sure that electronic components do not come into contact with the case.

Bulletin 900-TC16



Mounting the Bulletin 900-TC16 in a Panel/Enclosure

1. Insert the Bulletin 900-TC16 into the mounting hole in the panel (panel thickness:1 to 8 mm). Ensure the waterproof gasket is in place if this is a IP66 UL Type 4X enclosure.
2. Push the panel adapter along the Bulletin 900-TC16 body from the rear terminals up to the panel, and secure it temporarily.
3. Tighten the two screws on the adapter. When tightening the two screws, tighten them alternately, keeping the torque to 0.29…0.39 N•m (2.57…3.45 lb•in).

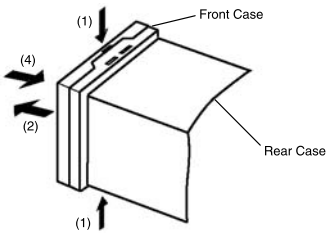
Attaching the Safety Terminal Cover

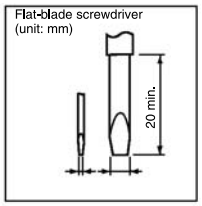
Make sure that the UP arrow mark is facing up, and then fit the terminal cover into the holes on the top and bottom of the controller. All Bulletin 900-TC16 controllers are provided with a terminal cover.

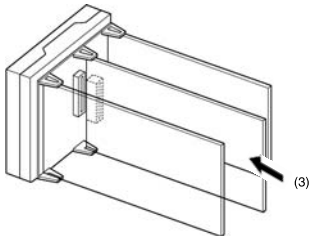
Installing the Option Units

If communications, event input, or heater burnout functions are required, mount the applicable option unit into the controller. The heater burnout function is supported on either the 900-TC16EIM or 900-TC16COM units. One option unit (max.) per controller.

Assembly Directions





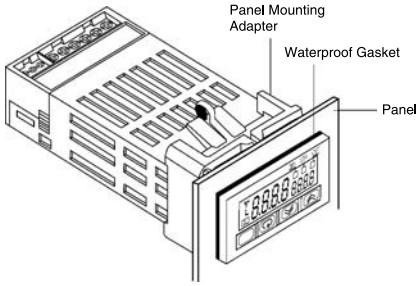


1. Insert the tools (see drawing above) into the slots (one on the top and one on the bottom) and release the case hooks.
2. Insert the tool in the space between the front and rear case selections and slightly pull out the front case. Hold the top and bottom of the front case and pull it toward yourself to remove it.
3. Mount the option unit in the center position. Match the upper and lower option unit (board) retaining claws with the connection points and insert/lock the option unit in place.
4. Before inserting the unit into the panel/enclosure, confirm that the waterproof gasket is in place. Insert the front case into the rear case until you hear a click. When inserting the front case, press down the hooks on the top and bottom of the rear case so that they firmly hook together. Make sure that electronic parts do not come in contact with the case.

Bulletin 900-TC32

Panel Mounting

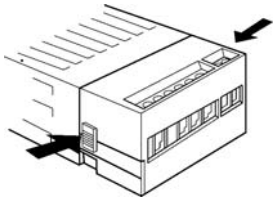
1. Insert the Bulletin 900-TC32 into the mounting hole in the panel from the front. Ensure the waterproof gasket is in place if this is a IP66 UL Type 4X enclosure.
2. Push the panel mounting adapter along the Bulletin 900-TC32 body from the rear terminals up to the panel, and secure it temporarily.
3. Tighten the two screws on the adapter. When tightening the two screws, tighten them alternately, keeping the torque to within approximately 0.29…0.39 N•m (2.57…3.45 lb•in).



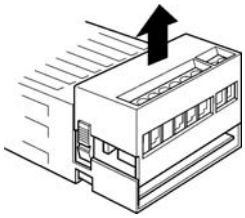
Removing and Attaching the Wiring Terminal Cover Plate

A damaged Bulletin 900-TC32 can quickly be replaced by removing the field terminal plate.

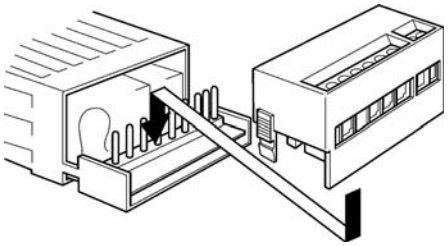
1. Press in firmly on the fasteners at both sides of the terminals to unlock the terminal plate and pull it upwards.



2. Remove the terminal plate with the field wires attached.



3. Before you replace/insert the terminal plate on the replacement Bulletin 900-TC32, make sure that the pins match the positions of the holes in the terminal plate, and press it into place on the controller.



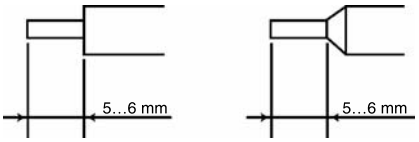
Wiring Precautions

Bulletin 900-TC32

Connect the terminals as specified below.

Terminal No.	Cables	Pin Terminals
1…6	AWG 24…14	2.1 mm dia. max.
7…9	AWG 28…22	1.3 mm dia. max.

The exposed current-carrying part to be inserted into terminals must be 5…6 mm.

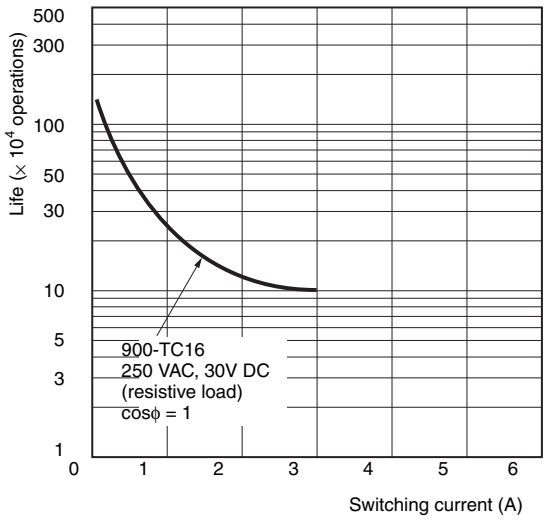


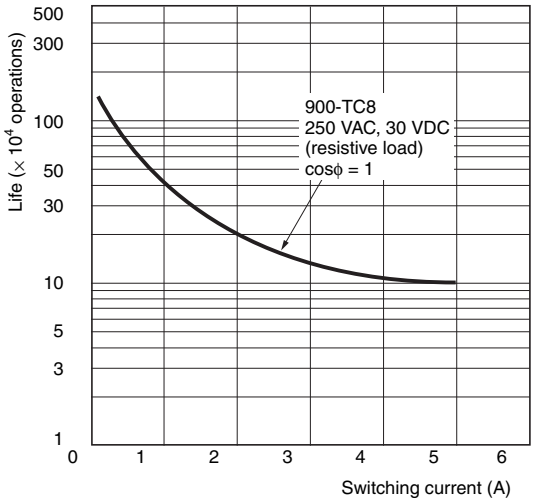
Electrical wire Pin terminal

Tighten the terminal screws to the torque specified below.

Terminal No.	Screw	Maximum Tightening Torque
1…6	M2.6	0.23…0.25 N•m (2.04…2.21 lb•in)
7…9	M2	0.12…0.14 N•m (1.06…1.24 lb•in)

Electrical Life Expectancy Curve for Electro-Mechanical Relays (Reference Values)

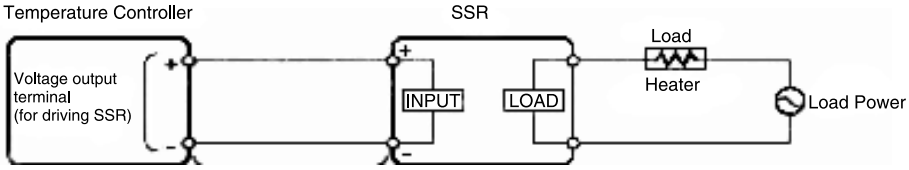




Peripheral Devices

Temperature Controller Connection to a Solid-State Relay (SSR)

The 12V DC output of a temperature controller is typically used to interface to an SSR, such as the Allen-Bradley Bulletin 700-Sx line. An SSR provides high current (e.g., 40 A) switching capability plus longer life than a mechanical relay. See the Relays and Timers Selection Guide (Publication 700-SG003x-EN-P) for additional information.



Bulletin 700-SX

Controller Configuration from Keypad

Controller configuration of parameters can be done using the four keys on the bottom of the controller along with the two LED displays. The configuration system is structured, which means a set path must be followed to get from one parameter to another.
User manuals, which provide details about configuring the Bulletin 900-TCx controllers, are available on-line at the Literature Library web site http://literature.rockwellautomation.com/idc/groups/public/documents/webassets/browse_category.hcst:

- Bulletin 900-TC8:Series B, Publication 900-UM007C-EN-E
- Bulletin 900-TC16: Series B, Publication 900-UM007C-EN-E
- Bulletin 900-TC32: Series A, Publication 900-UM003B-EN-E

Bulletin 900 — Interface Converter

- Enables RS-232 or USB ✶ (ser. B or later converter) to RS-485 Communications between a Personal Computer (PC) using 900BuilderLite™ (900-TC8/ 900-TC16) or 900Builder™ (900-TC32) Software and up to 31 Bulletin 900-TCx Controllers — Ideal for Industrial Applications
- All Signal Lines have 1500V AC Insulation at the RS-232C (USB: 500 V AC) and RS-485 Sides Using Opto-Couples; Power Supply Lines have 1500V AC Insulation Using a Transformer
- Diagnostic LEDs Indicate Power Available and Active Data Transmission
- On-Board Wiring and Data Configuration Diagrams Simplify Startup
- DIN Rail or Panel Mountable
- cURus, CE

Table of Contents

✶ To use the USB mode requires the download of free software onto your PC. This software can be found at the Bulletin 900 Temperature Controller website: http://www.ab.com/industrialcontrols/products/relays_timers_and_temp_controllers/single_loop_temp-heater_controllers/900tc.html
Once at this site, go to "Get Software" (upper right of screen) and click on "Virtual Communications Port USB Driver" and follow the instructions.

Product Selection

Standard Models

Bulletin No.	Size	Power Supply Voltage	Cat. No.
900-CONV❄	30 mm (W) x 80 mm (H) x 78 mm (D)	100…240V AC	**900-CONVZ25**
		24V AC/DC	**900-CONVU25**

❄ Converts personal computer RS-232/USB communications to RS-485. Use for interface with a single Bulletin 900-TCx, or multiple (up to 31) controllers with RS-485 communications.

Specifications

Technical/Control Ratings				
Communications Method	Master Device (PC)		RS-232C	
	Slave Device (900-TCx Controller)		RS-485 (2-wire, half duplex) (selectable)	
Synchronization Method			Start-stop synchronization	
Master Device (PC)	RS-232C Interface	Max. transmission distance	15 m	
		Max. number of connectable units	1 unit	
	USB Interface	Max. transmission distance	5 m or when the total time (hub delay time plus the cable delay time) is less than or equal to 70 ns	
		Max. number of connectable slave units	1 unit	
		USB Standard	V1.1	
Slave Device (900-TCx) RS-485 Interface		Max. transmission distance	500 m	
		Max. number of connectable slave units	31 units (for multi-drop connection)	
Baud Rate			1200/2400/4800/9600/19 200/38 400 bps (Default setting: 9600)	
Data Bit Length			7 or 8 bits (Default setting: 7)	
Stop Bit Length			1 or 2 bits (Default setting: 2)	
Communications Parity			None, even, odd (Default setting: Even)	
Echoback Selection			Echoback: With/without (Default setting: Without)	
Selection Switch Response Delay			Approx. 30 ms	
General/Environmental Ratings				
Supply Voltage			100…240V AC, 50/60 Hz	24 V AC, 50/60 Hz or 24 V DC
Operating Voltage Range			85…110% of rated supply voltage	
Power Consumption			5 VA max.	24 V AC: 3 VA max., 24 V DC: 3 W max.
Ambient Temperature		RS-232C	–10…+55 °C (with no icing)	
		USB	0...+55 °C (with no icing)	
Ambient Humidity			25…85% (with no condensation)	
Storage Temperature			–20…+65 °C	

Specifications, Continued

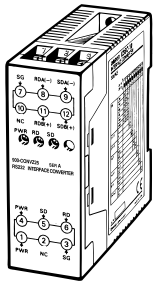
General/Environmental Ratings			
Insulation Resistance			20 MΩ min. measured at 500V DC between the following: External terminals ↔ casing RS-232C terminals ↔ RS-485 terminals power supply terminals
	Isolation Method	Communications	Phototransistor coupler
		Power supply	Isolating transformer
Dielectric Strength			1,500 V AC for 1 min. between the external terminal and case, and between the RS-232C RS-485 block power supply terminal
Noise Immunity			500 V AC for 1 min. between the RS-232C/USB block and RS-485 block
Vibration (Max.)			10…55 Hz, 0.5 mm single amplitude for 10 min. each in X, Y, and Z directions (1 G)
Shock (Max.)			98 m/s² (10 G), 3 times each in X, Y, and Z directions
Weight			Approx. 150 g
Enclosure Rating	Front Panel Operation Parts		Conforms to IEC standards, equivalent to IP20 (when terminal cover mounted) ✶
	Terminals		Equivalent to VDE 0106/100 (when terminal cover mounted) ✶
Memory Protection			No protective functions (communications data is not protected for power interruptions during communications)
EMC	Radiated Emission		EN61326 class A
	Conducted Emission		EN61326 class A
	Immunity ESD		EN61000-4-2: 4 kV contact discharge (level 2); 8 kV air discharge (level 3)
	Immunity RF-Interference		EN61000-4-3: 10V/m (amplitude modulated, 80 MHz…1 GHz) (level 3) 10V/m (pulse modulated, 900 MHz)
	Immunity Conducted Disturbance		EN61000-4-6: 10V (0.15…80 MHz) (level 3)
	Immunity Burst		EN61000-4-3: 2 kV power-line (level 3); 2 kV I/O signal-line (level 4)
Conformity to Standards			UL508, CSA C22.2 No. 14-95 Conforms to EN50081-2, EN50082-2, EN61010-1 (IEC 61010-1) Conforms to VDE 0106/part 100 (Finger Protection), when the terminal cover is mounted.

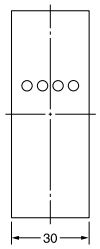
✶ When USB communication is used, the cover must be removed

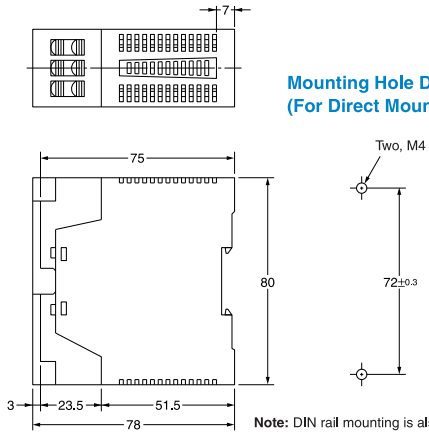
Approximate Dimensions

Approximate dimensions are shown in millimeters unless otherwise indicated (to convert to inches, multiply by 0.0394). Dimensions are not to be used for manufacturing purposes.

Cat. No. 900-CONVZ25



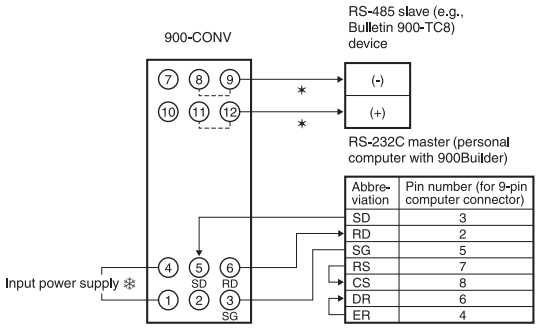




Mounting Hole Dimensions (For Direct Mounting)

Note: DIN rail mounting is also possible.

RS-485 Connection



Abbre-viation	Pin number (for 9-pin computer connector)
SD	3
RD	2
SG	5
RS	7
CS	8
DR	6
ER	4

✶ If RS-485 is selected as the communications method (i.e., pin 9 of the DIP switch is set to OFF), terminals 8 and 9, and terminals 11 and 12 are connected internally.
❄ A 100…240 V AC, 24 V AC, or 24 V DC (not polarity sensitive) input power supply is required.

Terminal Specifications

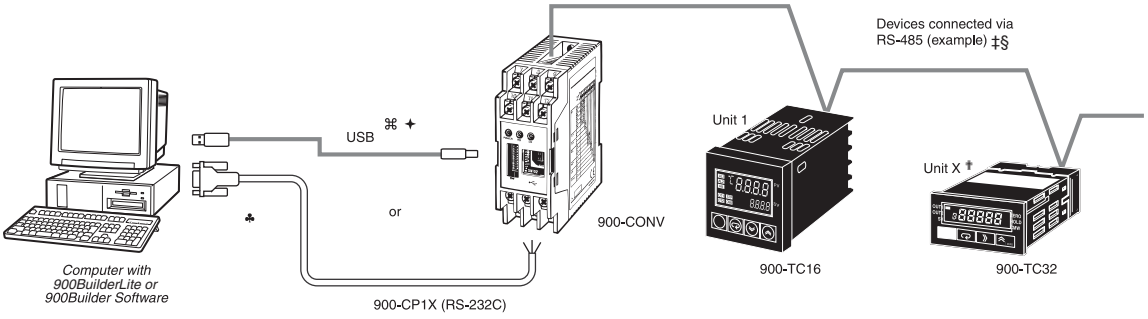
Make sure to check the input and output specifications for the signal pins of connected devices before connecting the terminals.

Function	Terminal Number	Name	Signal Direction	Explanation
For connecting the operating power supply	1 and 4	PWR	—	100…240V AC or 24 V AC/DC model
Connection terminals for RS-232C communications with master device (DIP switch pin 8: OFF)	3	SG	—	Connect to signal ground.
	5	SD	Input	Receives data from SD of the master device.
	6	RD	Output	Sends data to RD of the master device.
Used for RS-485 communications with slave device (DIP switch pin 9: OFF)	8	RDA (–)	Input/ output	SD and RD for RS-485 (cold side) Terminals 8 and 9 are connected internally when pin 9 of the DIP switch is set to OFF.
	9	SDA (–)		
	11	RDB (+)	Input/ output	SD and RD for RS-485 (hot side) Terminals 11 and 12 are connected internally when pin 9 of the DIP switch is set to OFF.
	12	SDB (+)		

Note: Terminals 2 and 10 are not used.

Connection to an RS-232C Master Device

Set the same communications conditions (baud rate, stop bits, data length, and parity) for the master device, the Interface Converter, and slave devices.



‡ With RS-485 communications, connect a terminating resistance (120Ω, 1/2 W recommended) to both ends of the communications link/network.
§ The Bulletin 900-TCx communications number must be set.
♣ A pre-fabricated 3 m RS-232 cable with a 9-pin female D-shell connector on one end and three flying leads at the other is available from Allen-Bradley (Cat. No. 900-CP1X).
➢ RS-485 allows connecting 32 devices.
⌘ Use a commercially available USB cable
✦ To use the USB mode requires the download of free software into your PC. This software can be found at the Bulletin 900 Temperature Controller website: http://www.ab.com/industrialcontrols/products/relays_timers_and_temp_controllers/single_loop_temp-heater_controllers/900tc.html
Once at this site, go to "Get Software" (upper right of screen) and click on "Virtual Communications Port USB Driver" and follow the instructions.

Bulletin 900-CONV Front Display / Operations

Terminal Cover

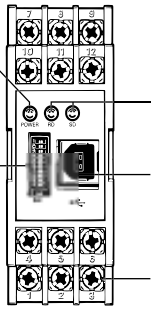
Note: Cover the terminals to prevent electric shock.

Power Indicator
Lights (green) when line power is supplied.

Communications Setting Switch
Used to set the communications conditions for connected devices.

Switch	Setting
1	Baud Rate
2	
3	
4	Data Length
5	
6	Parity
7	
8	Master Device
9	Slave Device
10	Echoback

Bulletin 900-CONVx without Terminal Cover



Communications Status Indicators
RD: Amber lights when receiving RS-485 communications.
SD: Amber lights when sending RS-485 communications.

USB Port
(Use a commercially available USB cable)

M3.5 Terminal Screw

Caution: Make sure to use the Bulletin 900-CONV with the terminal cover mounted when using in machinery that must conform to EN/IEC standards.

Bulletin 900 — 900BuilderLite™ (Version 1.2*) is FREE Personal Computer (PC) Configuration Software for Bulletin 900-TC8 and 900-TC16 Series B Temperature/Process Controllers.

- Provides a tabular fill-in-the-blanks on-line configuration and monitoring option to using the 900-TC8 or 900-TC16 controller's keypad and LED display
- Simplifies controller configuration
- Ability to save parameters to PC storage devices and retrieve as required
- Configuration and monitoring can be done via direct or RS485 networked connection
- Parameters can be saved as a .CSV format for use by Excel

* Version 1.2 must be used with the Series B 900-TC8 and 900-TC16. Version 1.1 must be used with Series A 900-TC8 and 900-TC16.

Table of Contents

Product Selection

Description	Cat. No.
900BuilderLite Personal Computer Configuration Software for Bulletin 900-TC8 and 900-TC16 Temperature/Process Controllers with Enhanced Features	**900-BLDLTSW1** *

* Software is available FREE. To download software, go to the Bulletin 900 website found at: www.ab.com/industrialcontrols/products/relays_timers_and temp_controllers/single_loop_temp-heater_controllers/900tc.html.

Go to "Get Software" (upper right of screen) and click on "900BuilderLite" and follow the download instructions.

Minimum Computer Hardware Requirements

- 300 MHz CPU
- 650 MB free disk space
- SVGA resolution monitor (XGA recommended)
- Microsoft Windows supported mouse
- Available serial 9-pin COM port (COM address 1 to 8) for connection to RS-232 option unit of 900-TC8 or RS-232 to RS-285 converter (Bulletin -CONVxx) for network connection to 31 Bulletin 900-TC8 and/or 900-TC15 controllers
- Available USB port for a direct connection to the 3-pin serial port of a Bulletin 900-TC8 or 900-TC16 using the 900-CPOEM1 to serial communication cable.

Computer Operating System Requirements

The following systems can be used with 900BuilderLite software.

Microsoft Windows 2000/XP/Vista

Bulletin 900 — 900Builder™ Personal Computer (PC) Configuration Software for Bulletin 900-TC32 Temperature Controllers

- Provides a Graphic Configuration Option to Using the Bulletin 900-TC32 Controller's On-Board Keypad and Displays
- Simplifies Controller Configuration by Use of Fill-in-the-Blank Menus
- On-Line Monitoring of Parameters by Controller Simulated Graphic or Bar Chart Faceplates
- Provides Data-Logging and Graphic Trending Feature
- Uses Microsoft® Windows® Environment to Allow Viewing Multiple Applications Simultaneously
- ActiveX Feature Allows Saving Parameters for Use by Other Windows® Applications Such as Excel
- RS-485 Connection with up to 31 Controllers via Bulletin 900-CONV RS-232/RS-485 Converter Module

Table of Contents

Product Selection

Product Name/Description	Cat. No.
900Builder™ Personal Computer Configuration Software for Bulletin 900-TC32 Temperature Controllers (available in CD format only)	**900-BLDSW1**

Computer Hardware Requirements

The software requires a PC with the following minimum hardware:

- Pentium® P90
- 16MB RAM, 32 recommended
- 15MB free disk space
- CD-ROM Drive (4x speed, with 32 bit device driver) (optional)
- SVGA resolution monitor (800 x 600)
- Microsoft® Windows®-supported mouse
- Microsoft® Windows®-supported printer (optional)
- Available serial 9-pin COM Port for connection to controller RS-232 to RS-485 converter (Bulletin 900-CONV) (required for configuration)

Computer Operating System Requirements

Either of the following operating systems can be used with 900Builder

- Microsoft® Windows® 95
- Microsoft® Windows® 98
- Microsoft® Windows NT® 4.0 (service pack 6)
- Microsoft® Windows® 2000

www.rockwellautomation.com

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