TRU COMPONENTS
TX4S-14R LCD PID
Temperature Controllers

TRU COMPONENTS TX4S-14R LCD PID Temperature Controllers Instruction Manual

Contents

TRU COMPONENTS TX4S-14R LCD PID Temperature Controllers

Specifications

- **Series:** TX4S-14R
- **Power supply:** AC 100-240V
- **Permissible voltage range**: 85-264V AC/DC
- **Power consumption**: 5VA max
- **Sampling period**: 0.5 seconds
- **Input specification**: Thermocouple, RTD, linear current, linear voltage
- **Control output:** Relay
  - **Alarm output:** Relay
- **Display type**: LCD
- **Control type**: Heating, Cooling
  - Hysteresis
  - Proportional band (P)
  - Integral time (I)
  - Derivative time (D)
  - Control cycle (T)
  - Manual reset
  - Relay life Mechanical

Read and understand the instruction manual before using the product.

- For your safety, read and follow the below safety considerations before using. For your safety, read and follow the considerations written in the instruction manual.
- Keep this instruction manual in a place where you can find easily.
- The specifications, dimensions, etc are subject to change without notice for product improvement.

Safety Considerations

- Observe all ‘Safety Considerations’ for safe and proper operation to avoid hazards.
- symbol indicates caution due to special circumstances in which hazards may occur.

Warning Failure to follow instructions may result in serious injury or death

1. Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss.(e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)
   Failure to follow this instruction may result in personal injury, economic loss or fire.
2. Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact or salinity may be present.
   Failure to follow this instruction may result in explosion or fire.
3. Install on a device panel to use.
   Failure to follow this instruction may result in fire or electric shock.
4. Do not connect, repair, or inspect the unit while connected to a power source.
   Failure to follow this instruction may result in fire or electric shock.”)
5. Check ‘Connections’ before wiring.
   Failure to follow this instruction may result in fire.
6. Do not disassemble or modify the unit.
   Failure to follow this instruction may result in fire or electric shock.

Caution Failure to follow instructions may result in injury or product damage

1. When connecting the power input and relay output, use AWG 20 (0.50 mm2) cable or over, and tighten the terminal screw with a tightening torque of 0.74 to 0.90 N m.
2. When connecting the sensor input and communication cable without dedicated cable, use AWG 28 to 16 cable and tighten the terminal screw with a tightening torque of 0.74 to 0.90 N m.
   Failure to follow this instruction may result in fire or malfunction due to contact failure.
3. Use the unit within the rated specifications.
   Failure to follow this instruction may result in fire or product damage
4. Use a dry cloth to clean the unit, and do not use water or organic solvent.
   Failure to follow this instruction may result in fire or electric shock.
5. Keep the product away from metal chip, dust, and wire residue which flow into the unit.
   Failure to follow this instruction may result in fire or product damage.

Cautions during Use

- Follow instructions in ‘Cautions during Use’. Otherwise, it may cause unexpected accidents.
- Check the polarity of the terminals before wiring the temperature sensor. For RTD temperature sensor, wire it as 3-wire type, using cables in same thickness and length.
  For thermocouple (TC) temperature sensor, use the designated compensation wire for extending wire.
- Keep away from high voltage lines or power lines to prevent inductive noise. In case installing power line and

input signal line closely, use line filter or varistor at power line and shielded wire at input signal line. Do not use near the equipment which generates strong magnetic force or high frequency noise.

- Do not apply excessive power when connecting or disconnecting the connectors of the product.
- Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.
- Do not use the unit for other purpose (e.g. voltmeter, ammeter), but temperature controller.
- When changing the input sensor, turn off the power first before changing. After changing the input sensor, modify the value of the corresponding parameter.
- Do not overlapping communication line and power line. Use twisted pair wire for communication line and connect ferrite bead at each end of line to reduce the effect of external noise.
- Make a required space around the unit for radiation of heat. For accurate temperature measurement, warm up the unit over 20 min after turning on the power.
- Make sure that power supply voltage reaches to the rated voltage within 2 sec after supplying power.
- Do not wire to terminals which are not used.
- This unit may be used in the following environments.
    - Indoors (in the environment condition rated in ‘Specifications’)
    - Altitude Max. 2,000 m
    - Pollution degree 2
    - Installation category II

Product Components

- Product (+ bracket)
- Instruction manual

Manual
For proper use of the product, refer to the manuals and be sure to follow the safety considerations in the manuals.

Specifications

Series		TX Series
Power supply		100 - 240 VAC~ 50/60 Hz
Permissible voltage range		90 to 110 % of rated voltage
Power consumption		≤ 8 VA
Sampling period		50 ms
Input specification		Refer to 'Input Type and Using Range'.
Control output	Relay	250 VAC~ 3 A, 30 VDC ⎓ 3 A, 1a
Alarm output	Relay	AL1/2: 250 VAC~ 3 A 1a
Display type		11 Segment (White, Green, Yellow), LCD type
Control type	Heating, Cooling	ON/OFF, P, PI, PD, PID Control
Hysteresis		1 to 100 (0.1 to 50.0) °C/°F
Proportional band (P)		0.1 to 999.9 °C/°F
Integral time (I)		0 to 9,999 sec
Derivative time (D)		0 to 9,999 sec
Control cycle (T)		0.5 to 120.0 sec
Manual reset		0.0 to 100.0%
Relay life cycle	Mechanical	≥ 5,000,000 operations
	Electrical	≥ 200,000 operations (resistance load: 250 VAC~ 3 A)
Dielectric strength		Between the charging part and the case: 3,000 VAC~ 50/60 Hz for 1 min
Vibration		0.75 mm amplitude at frequency 5 to 55Hz in each X, Y, Z direction for 2 hours
Insulation resistance		≥ 100 MΩ (500 VDC ⎓ megger)
Noise immunity		±2 kV square shaped noise (pulse width 1 μs) by noise simulator R-phase, S-phase
Memory retention		≈ 10 years (non-volatile semiconductor memory type)
Ambient temperature		-10 to 50 °C, storage: -20 to 60 °C (no freezing or condensation)
Ambient humidity		35 to 85%RH, storage: 35 to 85%RH (no freezing or condensation)
Protection structure		IP50 (Front panel, IEC standards)
Insulation type		Double or reinforced insulation (mark: ⧈, dielectric strength between primary circuit and secondary circuit: 3 kV)
Certification		CE UKCA c UL us EAC
Unit weight (packaged)		TX4S: ≈ 87 g (≈ 146 g)

1. When using the unit at low temperature (below 0°C), display cycle is slow.

Input Type and Using Range

The setting range of some parameters is limited when using the decimal point display.

Input type		Decimal point	Display	Using range (°C)	Using range (°F)
Thermo -couple	K (CA)	1	K CA.H	-50 to 1,200	-58 to 2,192
		0.1	K CA.L	-50.0 to 999.9	-58.0 to 999.9
	J (IC)	1	J IC.H	-30 to 800	-22 to 1,472
		0.1	J IC.L	-30.0 to 800.0	-22.0 to 999.9
	L (IC)	1	L IC.H	-40 to 800	-40 to 1,472
		0.1	L IC.L	-40.0 to 800.0	-40.0 to 999.9
	T (CC)	1	t CC.H	-50 to 400	-58 to 752
		0.1	t CC.L	-50.0 to 400.0	-58.0 to 752.0
	R (PR)	1	R PR	0 to 1,700	32 to 3,092
	S (PR)	1	S PR	0 to 1,700	32 to 3,092
RTD	Cu50 Ω	1	CU5.H	-50 to 200	-58 to 392
		0.1	CU5.L	-50.0 to 200.0	-58.0 to 392.0
	DPt100 Ω	1	dPt.H	-100 to 400	-148 to 752
		0.1	dPt.L	-100.0 to 400.0	-148.0 to 752.0

Display accuracy

Input type	Using temperature	Display accuracy
Thermocouple RTD	At room temperature (23°C ±5 °C)	(PV ±0.3% or ±1 °C higher one) ±1-digit • Thermocouple R, S below 200 °C: (PV ±0.5% or ±3 °C higher one) ±1-digit Over 200 °C: (PV ±0.5% or ±2 °C higher one) ±1digit • Thermocouple L, RTD Cu50 Ω: (PV ±0.5% or ±2 °C higher one) ±1-digit
	Out of room temperature range	(PV ±0.5% or ±2 °C higher one) ±1-digit • Thermocouple R, S: (PV ±1.0% or ±5 °C higher one) ±1digit • Thermocouple L, RTD Cu50 Ω: (PV ±0.5% or ±3 °C higher one) ±1digit

Unit Descriptions

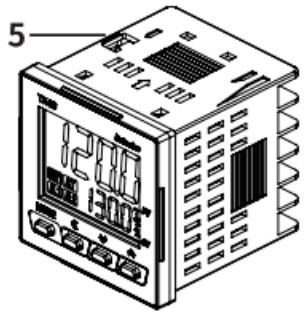
1. PV display part (White)
- Run mode: displays PV (Present value)
- Setting mode: displays parameter name

2. SV display part (Green)
- Run mode: displays SV (Setting value)
- Setting mode: displays parameter setting value

3. Input key

Display	Name
[MODE]	Mode key
[◄], [▼], [▲]	Setting value control key

Indicator



4. Indicator

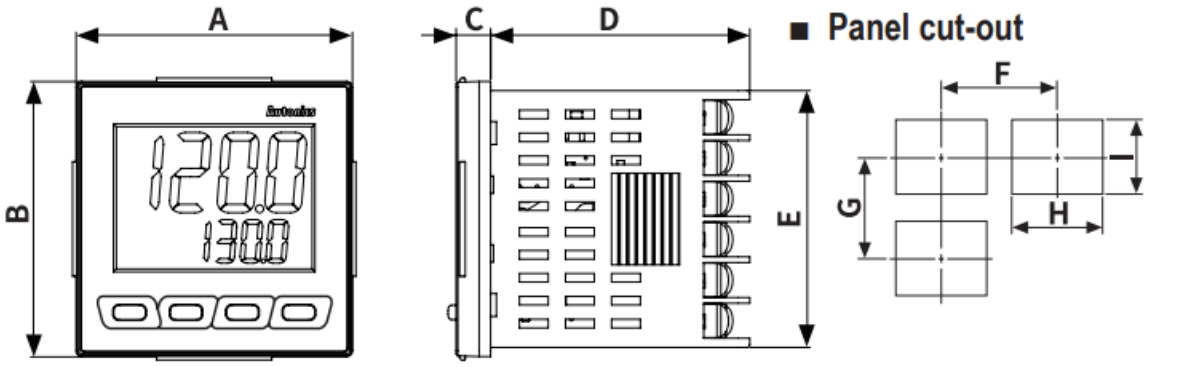
Display	Name	Description
°C, %, °F	Unit	Displays selected unit (parameter)
AT	Auto tuning	Flashes during auto tuning every 1 sec
OUT1	Control output	Turns ON when control output 1 is ON
AL1	Alarm output	Turns ON when each alarm output is ON

Errors

Display	Description	Troubleshooting
oPEn	Flashes when input sensor is disconnected or sensor is not connected.	Check input sensor status.
HHHH	Flashes when PV is higher than input range.[01)]	When input is within the rated input range, this display disappears.
LLLL	Flashes when PV is lower than input range.[01)]	

Dimensions

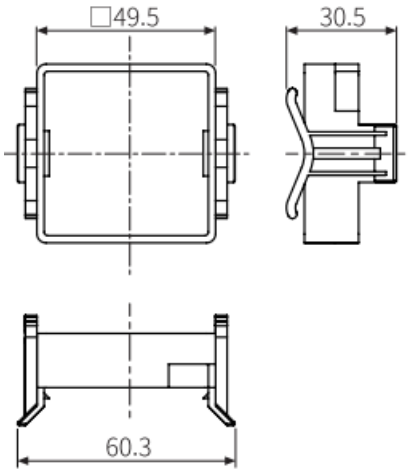
- Unit: mm



	Body					Panel cut-out			
	A	B	C	D	E	F	G	H	I
TX4S	48	48	6	45	44.8	≥ 65	≥ 65	$45^{+0.6}_{0}$	$45^{+0.6}_{0}$

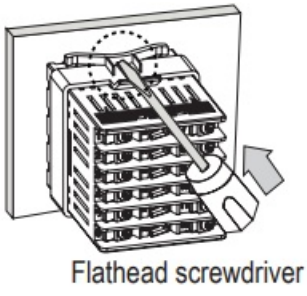
Bracket

TX4S



Installation Method

TX4S



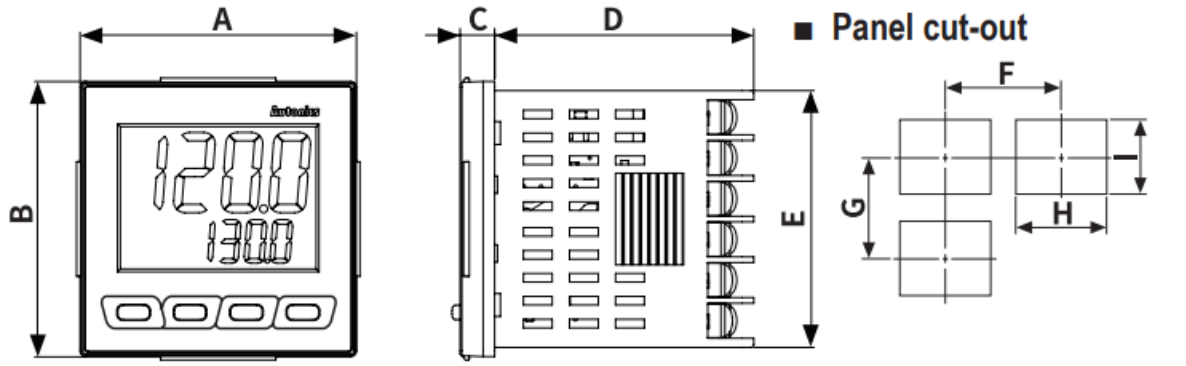
After mounting the product to panel with bracket, insert the unit into a panel, fasten the bracket by pushing with tools with a flathead screwdriver.

Connections

- Shaded terminals are standard model.

TX4S

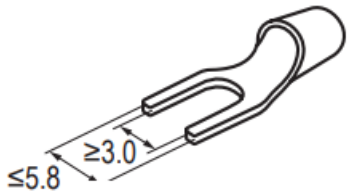
- Unit: mm



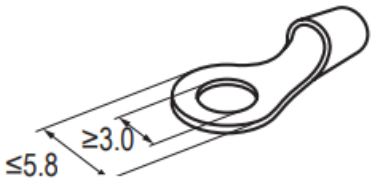
	Body					Panel cut-out			
	A	B	C	D	E	F	G	H	I
TX4S	48	48	6	45	44.8	≥ 65	≥ 65	$45^{+0.6}_{0}$	$45^{+0.6}_{0}$

Crimp Terminal Specifications

Unit: mm, use the crimp terminal of the following shape.

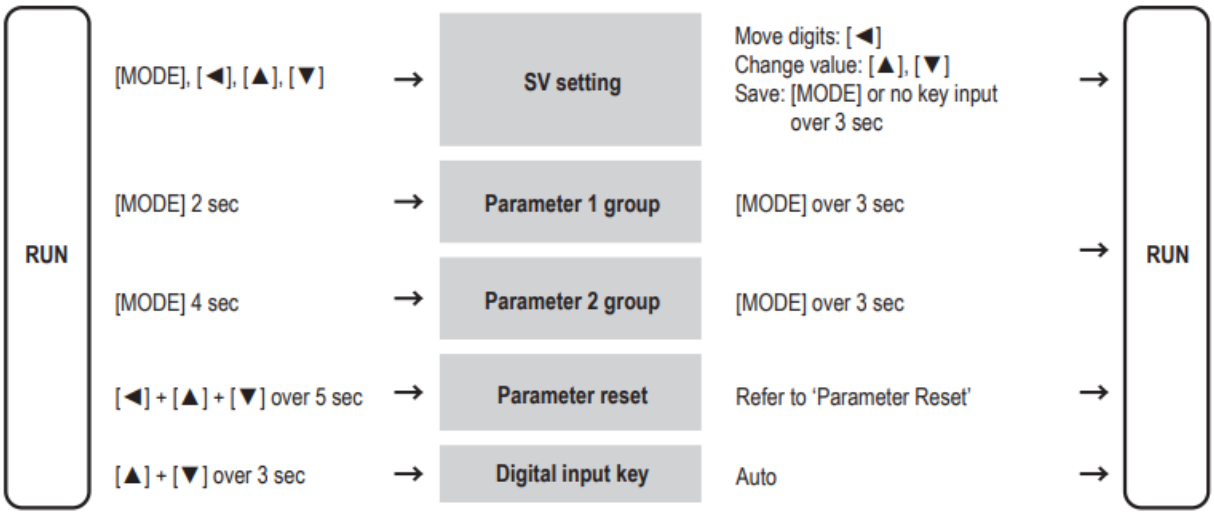


Fork crimp terminal



Round crimp terminal

Mode Setting



Parameter Reset

1. Press the [◄] + [▲] + [▼] keys for over 5 sec. in run mode, INIT turns ON.
2. Change the setting value as YES by pressing the [▲] , [▼] keys.
3. Press the [MODE] key to reset all parameter values as default and to return to run mode.

Parameter Setting

Some parameters are activated/deactivated depending on the model or setting of other parameters. Refer to the descriptions of each item.
[MODE] key: Move to next item after saving / Return to RUN mode after saving (≥ 3 sec) / Return to previous parameter after saving (within 1 sec returning to RUN mode)
[◄] key: Select parameter / Move digits / Return to the upper level without saving (≥ 2 sec) / Return to RUN mode without saving (≥ 3 sec)][▲] , [▼] key: Select parameter / Change setting value

- Return to the upper level without saving when there is no key input for more than 30 seconds.
- The range in parentheses '( )' is the setting range when the set value of the 'input specification' parameter is used with one decimal point.
- Recommended parameter setting sequence: Parameter 2 group → Parameter 1 group → SV setting mode

Disposal

This symbol must appear on any electrical and electronic equipment placed on the EU market. This symbol indicates that this device should not be disposed of as unsorted municipal waste at the end of its service life. Owners of WEEE (Waste from Electrical and Electronic Equipment) shall dispose of it separately from unsorted municipal waste. Spent batteries and accumulators, which are not enclosed by the WEEE, as well as lamps that can be removed from the WEEE in a non-destructive manner, must be removed by end users from the WEEE in a non-destructive manner before it is handed over to a collection point.

Distributors of electrical and electronic equipment are legally obliged to provide free take-back of waste. Conrad provides the following return options free of charge (more details on our website):

- in our Conrad offices
- at the Conrad collection points
- at the collection points of public waste management authorities or the collection points set up by manufacturers or distributors within the meaning of the ElektroG

End users are responsible for deleting personal data from the WEEE to be disposed of.
It should be noted that different obligations about the return or recycling of WEEE may apply in countries outside of Germany.

Parameter 1 group

Parameter		Display	Default	Setting range	Condition
1-1	AL1 alarm temperature	AL 1	1250	Deviation alarm: -F.S. to F.S. °C/°F Absolute value alarm: Within input range	2-16/19 AL1 alarm Operation: AM1 to AM6, HBA
1-3	Auto tuning	AT	oFF	OFF: Stop, ON: Execution	-
1-4	Proportional band	P	10.0	0.1 to 999.9 °C/°F	2-8 Control type: PID
1-5	Integral time	I	240	0 (OFF) to 9,999 sec	
1-6	Derivative time	d	49	0 (OFF) to 9,999 sec	
1-7	Manual reset	RESET	50.0	0.0 to 100.0%	2-8 Control type: PID & 1-5 Integral time: 0
1-8	Hysteresis	HYS	2	1 to 100 (0.1 to 50.0) °C/°F	2-8 Control type: ONOF

Parameter 2 group

Parameter		Display	Default	Setting range	Condition
2-1	Input specification[01]	IN-T	KCA.H	Refer to 'Input Type and Using Range'	-
2-2	Temperature unit[01]	UNIT	°C	°C, °F	-
2-3	Input correction	IN-b	0	-999 to 999 (-199.9 to 999.9) °C/°F	-
2-4	Input digital filter	MAV.F	0.1	0.1 to 120.0 sec	-
2-5	SV low limit[02]	L-SV	-50	Within '2-1 Input specification: using range'	-
2-6	SV high limit[02]	H-SV	1200	L-SV ≤ H-SV - 1-digit °C/°F H-SV ≥ L-SV + 1-digit °C/°F	-
2-7	Control output mode	o-FT	HEAT	HEAT: Heating, COOL: Cooling	-
2-8	Control type[03]	C-Md	PID	PID, ONOF: ON/OFF	-
2-9	Control output	oUT	CURR	[Selectable current or SSR drive output model] CURR: Current, SSR	-
2-12	Control cycle	t	20.0 (Relay)	0.5 to 120.0 sec	2-8 Control type: PID
2-13	AL1 alarm operation	AL-1	AM LA □□□■	□□□ AM0: Off AM1: Deviation high limit alarm AM2: Deviation low limit alarm AM3: Deviation high, low limit alarm AM4: Deviation high, low reverse alarm AM5: Absolute value high limit alarm AM6: Absolute value low limit alarm SBA: Sensor break alarm LBA: Loop break alarm (LBA)	-
2-14	AL1 alarm option			■ A: Standard alarm B: Alarm latch C: Standby sequence 1 D: Alarm latch and standby sequence 1 E: Standby sequence 2 F: Alarm latch and standby sequence 2 • Enter to option setting: Press [◀] key in 2-13 AL-1 alarm operation.	-

2-17	Alarm output hysteresis	AHYS	1	1 to 100 (0.1 to 50.0) °C/°F	2-13/14 AL1 alarm operation: AM1 to 6
2-18	LBA time	LbAt	0	0 (OFF) to 9,999 sec or auto [04]	2-13/14 AL1 alarm operation: LBA
2-19	LBA band	LbAb	2	0 (OFF) to 999 (0.0 to 999.9) °C/°F or auto[05]	2-13/14 AL1 alarm operation: LBA & 2-18 LBA time: > 0
2-20	Transmission output low limit	FS-L	-50	[PV transmission output model] Refer to 'Input Type and Using Range'	-
2-21	Transmission output high limit	FS-H	1200		
2-22	Comm. address	AdRS	1	[Communication output model] 1 to 127	-
2-23	Comm. speed	bPS	96	[Communication output model] 24, 48, 96, 192, 384 (×100) bps	-
2-24	Comm. parity bit	PRty	NoNE	[Communication output model] NONE, EVEN, ODD	-
2-25	Comm. stop bit	StP	2	[Communication output model] 1, 2 bit	-
2-26	Response time	RSWt	20	[Communication output model] 5 to 99 ms	-
2-27	Comm. write	CoMW	ENA	[Communication output model] EN.A: Enable, DIS.A: Disable	-
2-28	Digital input key	dI-K	StoP	STOP: Stop control output, AL.RE: Alarm reset, AT*: Execute auto tuning, OFF	*2-8 Control type: PID
2-29	Sensor error, MV	ERMV	0.0	0.0: OFF, 100.0: ON	2-8 Control type: ONOF
				0.0 to 100.0%	2-8 Control type: PID
2-30	Lock	LoC	oFF	OFF LOC1: Lock parameter 2 group LOC2: Lock parameter 1/2 group LOC3: Lock parameter 1/2 group, SV setting	-

1. Below parameters are initialized when the setting value is changed.
    1. Parameter 1 group: AL1 alarm temperature,
    2. Parameter 2 group: Input correction, SV high/low limit, LBA band, Alarm output Hysteresis
2. If SV is lower/higher than low/high limit when the value is changed, SV is changed to the low/high limit value.
3. When changing the value from PID to ONOF, each value of following parameter is changed. 2- 28 Digital input key: OFF, 2-29 Sensor error, MV: 0.0 (Setting value is lower than 100.0)
4. After auto tuning, the range is set as twice of the integral time automatically. If the previous setting value is outside of the range automatically set, it is set to the nearest Max. or Min. value of the range.
5. After auto tuning, the range is set as 10% of the proportion band automatically. If the previous setting value is outside of the range automatically set, it is set to the nearest Max. or Min value of the range.

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Frequently Asked Questions

- **Q: How do I reset the controller if needed?**
  - **A:** To reset the controller, press and hold the reset button for 5 seconds until the display resets to default settings.
- **Q: Can I use this controller for both heating and cooling applications?**
  - **A:** Yes, this controller supports both heating and cooling applications based on the control type selected.
- **Q: What is the recommended sampling period for optimal performance?**
  - **A:** The recommended sampling period for this controller is 0.5 seconds for accurate temperature control.

Documents / Resources

	TRU COMPONENTS TX4S-14R LCD PID Temperature Controllers [pdf] Instruction Manual TX4S-14R, 3016145, TX4S-14R LCD PID Temperature Controllers, TX4S-14R, LCD PID Temperature Controllers, Temperature Controllers, Controllers

References

- Conrad Electronic » All parts of success
- User Manual