Refrigeration Temperature Controllers

TC3YF Series

INSTRUCTION MANUAL

TCD210158AB

Autonics

Thank you for choosing our Autonics product.
Read and understand the instruction manual and manual thoroughly 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, other manuals and Autonics website.
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 Some models may be discontinued without notice.
Follow Autonics website for the latest information.

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

01. 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.
02. 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.
03. Install on a device panel to use.
Failure to follow this instruction may result in electric shock.
04. 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.
05. Check 'Connections' before wiring.
Failure to follow this instruction may result in fire.
06. 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

01. When connecting the power input and relay output, use AWG 28 to 12 (0.50 mm^2) cable or over and tighten the terminal screw with a tightening torque of 0.3 to 0.4 N·m.
When connecting the sensor input without dedicated cable, use AWG 28 to 16 cable and tighten the terminal screw with a tightening torque of 0.3 to 0.4 N·m.
Failure to follow this instruction may result in fire or malfunction due to contact failure.
02. Use the unit within the rated specifications.
Failure to follow this instruction may result in fire or product damage
03. 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.
04. 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 (CT) 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.
- 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.
- 12-24 VDC⎓ power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- 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

Ordering Information

This is only for reference, the actual product does not support all combinations.
For selecting the specified model, follow the Autonics website .

T C 3 Y F - ❶ ❷ ❸

❶ Control output for refrigeration
1: Compressor
2: Compressor + Defrost
3: Compressor + Defrost +Evaporation-fan

❷ Power supply
1: 12-24 VDC⎓
4: 100-240 VAC～ 50/60 Hz

❸ Control output
R: Relay

Product Components

- Product
- Bracket ×2
- Instruction manual
- NTC sensor (5 kΩ) × 1 (Except RTD option models)

Specifications

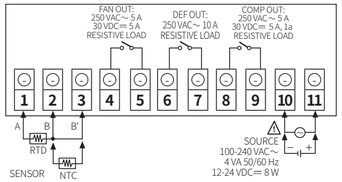
Series		TC3YF Series
Power supply	AC	100 - 240 VAC～ 50/60 Hz
	DC	12-24 VDC⎓
Permissible voltage range		90 to 110% of rated voltage
Power consumption	AC	≤ 4 VA
	DC	≤ 8 W
Sampling period		500 ms
Input specification		Refer to 'Input Type and Using Range'.
Display accuracy		At room temperature (23 ±5 °C): (PV ±0.5% or 1 °C higher one) rdg ±1 digit Out of room temperature range: (PV ±0.5% or 1 °C higher one) rdg ±1 °C
Control output	Compressor (COMP)	250 VAC～ 5 A 1a, 30 VDC⎓ 5 A 1a
	Defrost (DEF)	250 VAC～ 10 A 1a
	Evaporation-fan (FAN)	250 VAC～ 5 A 1a, 30 VDC⎓ 5 A 1a
Display type		7 segment (red), LED type
Control type		ON/OFF Control
Hysteresis		0.5 to 5.0 °C, 2 to 50 °F
Relay life cycle	Mechanical	≥ 20,000,000 operations
	Electrical	• COMP, DEF: ≥ 50,000 operations (load resistance: 250 VAC～ 5 A) • FAN ≥ 100,000 operations (load resistance: 250 VAC～ 10 A)
Dielectric strength		Between the charging part and the case: 2,000 VAC～ 60 Hz for 1 min
Vibration		0.75 mm amplitude at frequency of 10 to 55Hz in each X, Y, Z direction for 2 hours
Malfunction vibration		0.5mm amplitude at frequency of 10 to 55Hz in each X, Y, Z direction for 10 min
Insulation resistance		≥ 100 MΩ (500 VDC⎓ megger)
Noise immunity	AC	±2 kV square shaped noise (pulse width 1 μs) by noise simulator R-phase, S-phase
	DC	±500 V 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		IP65 (Front panel, IEC standards)
Certification	AC	cULus, CE (Except RTD option models) EAC
	DC	EAC
Unit weight (packaged)		≈ 143 g (≈ 229 g)

Input Type and Using Range

Input type		Using range (°C)	Using range (°F)
Thermistor	5 kΩ	-40.0 to 99.9	-40 to 212
RTD[01]	DPt100 Ω	-99.9 to 99.9	-148 to 212

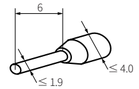
01) RTD input type is option.
• Allowable line resistance per wire: ≤ 5 Ω

Connections



Crimp Terminal Specifications

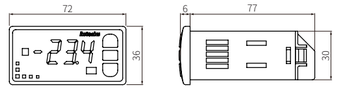
- Unit: mm, Use the crimp terminal of follow shape.



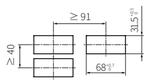
Wire ferrule

Dimensions

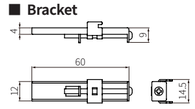
- Unit: mm, For the detailed drawings, follow the Autonics website.



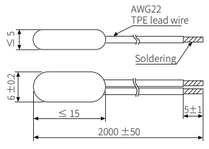
■ **Panel cut-out**



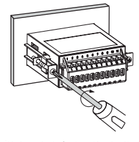
■ **Bracket**



■ **NTC sensor (5kΩ)**



Installation Method



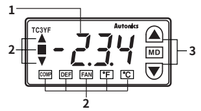
Mount the product to panel with bracket, fasten the bolts by using screwdriver..

Errors

Display	Description	Troubleshooting
oPn	ERR and error display are cross flashed when input sensor is disconnected or sensor is not connected.	Check input sensor status.
HHH	ERR and error display when if the input value is above the input range.[01]	When input is within the rated input range, this display disappears.
LLL	ERR and error display are cross flashed if the input value is below the input range.[01]	
LbA	ERR and error display are cross flashed when input sensor is normal but freezer temperature does not change more than 1.0 °C (2 °F) during loop break alarm (LBA) time.	Check setting method.

01) Be careful that when HHH / LLL error occurs, the control output may occur by recognizing the maximum or minimum input depending on the control type.
• When an error occurs, the compressor is operated to protect the control object according to the 'Error, compressor operation cycle/duty ratio' parameter setting values.

Unit Descriptions



1. Temperature display part (Red)
• Run mode: Displays PV (Present value)
• Setting mode: Displays parameter name

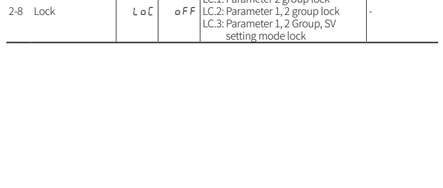
2. Indicator

Display	Name	Description
▲ ■ ▼	Deviation	Displays deviation of PV (Present value) based on SV (Setting value).
COMP	Compressor output	Turns ON when compressor output is ON. Flashes when output is OFF or protection operation.
DEF	Defrost output	Turns ON when defrost output is ON. Flashes when defrost delay operation.
FAN	Evaporation-fan output	Turns ON when evaporator-fan output is ON. Flashes when evaporator-fan output delay operation.
°C, °F	Temperature unit	Displays selected unit (parameter).

3. Input key

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

Mode Setting



Parameter Setting

- Some parameters are activated/deactivated depending on the model or setting of other parameters. Refer to the descriptions of each item.
- [MD] key: Move to next item after saving / Return to RUN mode after saving (≥ 3 sec)
  [▲], [▼] key: Select parameter / Change setting value

■ Parameter 1 group

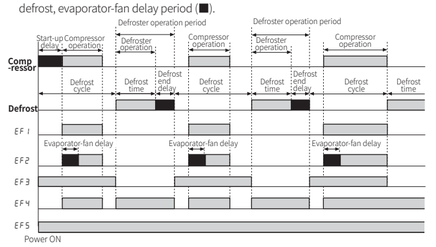
Parameter		Display	Default	Setting range	Condition
1-1	Hysteresis	HYS	1.0	0.5 to 5.0 °C, 2 to 50 °F	-
1-2	Defrost cycle	dIn	4	0 (manual defrost) to 24 hours	-
1-3	Defrost Time	dEt	30	0 to 59 min	-
1-4	LBA time	LbA	0	0 to 999 sec	-
1-5	Input correction	Inb	0.0	-10.0 to 10.0 °C, -18 to 18 °F	-
1-6	SV low limit	LSv	-40.0	Refer to 'Input Type and Using Range.	-
1-7	SV high limit	HSv	99.9		

■ Parameter 2 group

Parameter		Display	Default	Setting range	Condition
2-1	Compressor start up delay and restart delay time	SdL	0.20	0 min 10 sec to 9 min 59 sec	-
2-2	Compressor Min. operation time	ont	0.20	0 min 10 sec to 5 min 00 sec	-
2-3	Defrost end delay and evaporator-fan delay time	drP	1.00	0 min 00 sec to 5 min 59 sec	-
2-4	Evaporation-fan operation mode	FAn	EF1	Refer to 'Evaporation-fan Operation Mode'	-
2-5	Error, compressor operation cycle	CLE	0	0 to 20 min	-
2-6	Error, compressor duty ratio	dUt	50	0 to 100%	2-5 Error, compressor operation cycle: > 0
2-7	Temperature unit	Unt	°C	°C, °F	-
2-8	Lock	LoC	oFF	OFF: No lock LC.1: Parameter 2 group lock LC.2: Parameter 1, 2 group lock LC.3: Parameter 1, 2 Group, SV setting mode lock	-

Evaporation-fan Operation Mode

- Output does not turn ON but the dedicated indicator flashes at the compressor, defrost, evaporator-fan delay period (■).



Parameter	Description
EF1	When compressor operates, evaporator-fan also operates. When compressor operation is finished, evaporator-fan also operation turns OFF.
EF2	When compressor operates, evaporator-fan operates after the set evaporator-fan start-up delay time. When compressor operation is finished, evaporator-fan operation turns OFF. (regardless of defroster operation)
EF3	When power turns ON, evaporator-fan operates. When defroster operates, evaporator-fan stops. (regardless of compressor operation)
EF4	Evaporator-fan operates only when operating compressor or defrost. Evaporator-fan stops when compressor and defroster stops. (for above zero temperature control)
EF5	Evaporator-fan operates from power ON to power OFF. (regardless of compressor, defroster operation)

18, Bansong-ro 513Beon-gil, Haeundae-gu, Busan, Republic of Korea, 48002
www.autonics.com | +82-2-2048-1577 | sales@autonics.com

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