

# 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

- 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.
- 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.
- Install on a device panel to use.** Failure to follow this instruction may result in electric shock.
- 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.
- Check 'Connections' before wiring.** Failure to follow this instruction may result in fire.
- 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

- When connecting the power input and relay output, use AWG 28 to 12 (0.50 mm<sup>2</sup>) 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.
- Use the unit within the rated specifications.** Failure to follow this instruction may result in fire or product damage.
- 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.
- 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

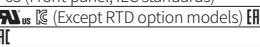

This is only for reference, the actual product does not support all combinations. For selecting the specified model, follow the Autonics website.

T	C	3	Y	F	-	①	②	③
<b>① Control output for refrigeration</b>			<b>② Power supply</b>			<b>③ Control output</b>		
1: Compressor			1: 12-24 VDC≐			R: Relay		
2: Compressor + Defrost			4: 100-240 VAC~ 50/60 Hz					
3: Compressor + Defrost +Evaporation-fan								

### Product Components

- Product
- Instruction manual
- Bracket × 2
- NTC sensor (5 k $\Omega$ ) × 1  
(Except RTD option models)

### Specifications

Series		TC3YF Series	
Power supply	AC DC	100 - 240 VAC~ 50/60 Hz 12-24 VDC≐	
Permissible voltage range	90 to 110% of rated voltage		
Power consumption	AC DC	$\leq$ 4 VA $\leq$ 8 W	
Sampling period	500 ms		
Input specification	Refer to 'Input Type and Using Range'.		
Display accuracy	At room temperature (23 $\pm$ 5 $^{\circ}$ C); (PV $\pm$ 0.5% or 1 $^{\circ}$ C higher one) rdg $\pm$ 1 digit Out of room temperature range: (PV $\pm$ 0.5% or 1 $^{\circ}$ C higher one) rdg $\pm$ 1 $^{\circ}$ 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 $^{\circ}$ C, 2 to 50 $^{\circ}$ F		
Relay life cycle	Mechanical	$\geq$ 20,000,000 operations	
	Electrical	• COMP, DEF: $\geq$ 50,000 operations (load resistance: 250 VAC~ 5 A) • FAN $\geq$ 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	$\geq$ 100 M $\Omega$ (500 VDC≐ megger)		
Noise immunity	AC	$\pm$ 2 kV square shaped noise (pulse width 1 $\mu$ s) by noise simulator	
	DC	R-phase, S-phase $\pm$ 500 V square shaped noise (pulse width 1 $\mu$ s) by noise simulator R-phase, S-phase	
Memory retention	$\approx$ 10 years (non-volatile semiconductor memory type)		
Ambient temperature	-10 to 50 $^{\circ}$ C, storage: -20 to 60 $^{\circ}$ 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 DC	 (Except RTD option models)  ENEC	
Unit weight (packaged)	$\approx$ 143 g ( $\approx$ 229 g)		

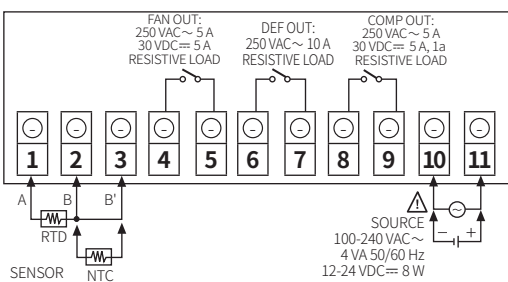
### Input Type and Using Range

Input type	Using range ( $^{\circ}$ C)	Using range ( $^{\circ}$ F)
Thermistor	-40.0 to 99.9	-40 to 212
RTD <sup>01)</sup>	DPT100 $\Omega$ -99.9 to 99.9	-148 to 212

01) RTD input type is option.

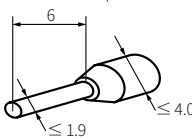
\* Allowable line resistance per wire:  $\leq$  5  $\Omega$

### Connections



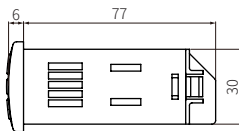
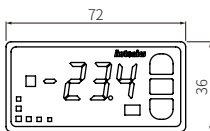
### Crimp Terminal Specifications

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

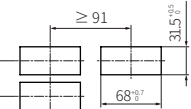


### Dimensions

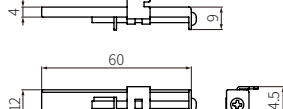
- Unit: mm, For the detailed drawings, follow the Autonics website.



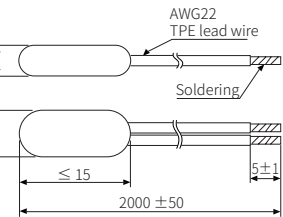
#### ■ Panel cut-out



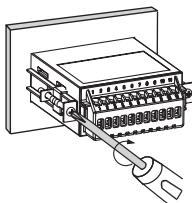
#### ■ Bracket



#### ■ NTC sensor (5k $\Omega$ )



### Installation Method



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

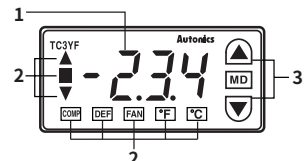
### Errors

Display	Description	Troubleshooting
$\circ P n$	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. <sup>01)</sup>	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. <sup>01)</sup>	
LbR	ERR and error display are cross flashed when input sensor is normal but freezer temperature does not change more than 1.0 $^{\circ}$ C (2 $^{\circ}$ 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

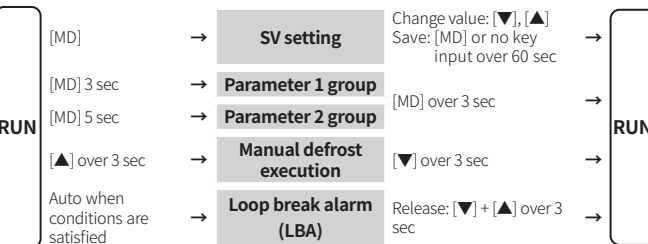
#### 3. Input key

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

#### 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.
$^{\circ}$ C, $^{\circ}$ F	Temperature unit	Displays selected unit (parameter).

### 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 ( $\geq$  3 sec)
- [▲], [▼] key: Select parameter / Change setting value

#### ■ Parameter 1 group

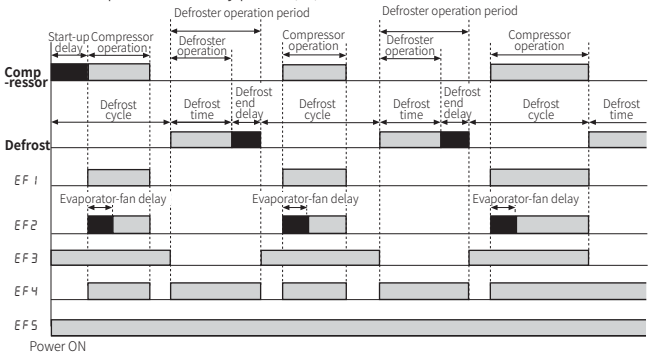
Parameter	Display	Default	Setting range	Condition
1-1 Hysteresis	H Y S	L 0	0.5 to 5.0 $^{\circ}$ C, 2 to 50 $^{\circ}$ F	-
1-2 Defrost cycle	d I n	4	0 (manual defrost) to 24 hours	-
1-3 Defrost Time	d E t	3 0	0 to 59 min	-
1-4 LBA time	L b R	0	0 to 999 sec	-
1-5 Input correction	I n b	0 0	-10.0 to 10.0 $^{\circ}$ C, -18 to 18 $^{\circ}$ F	-
1-6 SV low limit	L S u	- 4 0 0	Refer to 'Input Type and Using Range'.	-
1-7 SV high limit	H S u	9 9 9		-

#### ■ Parameter 2 group

Parameter	Display	Default	Setting range	Condition
2-1 Compressor start up delay and restart delay time	S d L	0 2 0	0 min 10 sec to 9 min 59 sec	-
2-2 Compressor Min. operation time	a n t	0 2 0	0 min 10 sec to 5 min 00 sec	-
2-3 Defrost end delay and evaporator-fan delay time	d r P	L 0 0	0 min 00 sec to 5 min 59 sec	-
2-4 Evaporation-fan operation mode	F R n	E F 1	Refer to 'Evaporation-fan Operation Mode'	-
2-5 Error, compressor operation cycle	C L E	0	0 to 20 min	-
2-6 Error, compressor duty ratio	d U t	5 0	0 to 100%	2-5 Error, compressor operation cycle: > 0
2-7 Temperature unit	U n t	$^{\circ}$ C	$^{\circ}$ C, $^{\circ}$ F	-
2-8 Lock	L o c k	a F F	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
EF 1	When compressor operates, evaporator-fan also operates. When compressor operation is finished, evaporator-fan also operation turns OFF.
EF 2	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 compressor operation)
EF 3	When power turns ON, evaporator-fan operates. When defroster operates, evaporator-fan stops. (regardless of compressor operation)
EF 4	Evaporator-fan operates only when operating compressor or defrost. Evaporator-fan stops when compressor and defroster stops. (for above zero temperature control)
EF 5	Evaporator-fan operates from power ON to power OFF. (regardless of compressor, defroster operation)