Autonics TEMPERATURE CONTROLLER TC3YF SERIES





Thank you very much for selecting Autonics products. For your safety, please read the following before using.

Caution for your safety

*Please keep these instructions and review them before using this unit.

*Please observe the cautions that follow;

Marning Serious injury may result if instructions are not followed. ⚠ Caution Product may be damaged, or injury may result if instructions are not followed.

★The following is an explanation of the symbols used in the operation manual ▲ caution:Injury or danger may occur under special conditions.

⚠ Warning

- In case of using this unit with machineries (Nuclear power control, medical equipment, vehicle, train, airplane, combustion apparatus, entertainment or safety device etc), it requires installing fail-safe device, or contact us for information on type required.
 It may result in serious damage, fire or human injury
 2. It must be mounted on Panel.

- 3. Do not connect terminals when it is power on.
- 4. Before connecting power, check the terminal number.
- 5. Do not disassemble and modify this unit, when it requires. If needs, please contact us.
- It may give an electric shock and cause a fire.

⚠ Caution

- 1. This unit shall not be used outdoors.
- It might shorten the life cycle of the product or give an electric shock.

 2. For wire connection, AWG No. 12~28 should be used and screw bolt on
- terminal block with 0.3N · m to 0.4N · m strength.

 It may result in malfunction or fire due to contact failure
- 3. Please observe specification rating.
- It might shorten the life cycle of the product and cause a fire.

 4. Do not use the load beyond rated switching capacity of Relay contact.
- 5. In cleaning the unit, do not use water or an oil-based detergent
 It might cause an electric shock or fire that will result in damage to the product.
 6. Do not use this unit at place where there are flammable or explosive gas,
- humidity, direct ray the sun, radiant heat, vibration, impact etc.
- 7. Do not inflow dust or wire dregs into inside of this unit.
- 8. Before connecting wires, check the terminal polarity.
- It may cause a fire or explosion

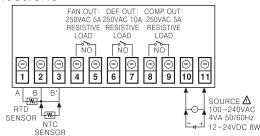
Front panel identification



- 1 DEF(Defrost output lamp) Light on when defrost output is ON
- PAN(Evaporation-fan output lamp):
 Light on when evaporation-fan is ON
 COMP(Compressor output lamp):
- Light on when compressor is ON 4 MD(Mode key):
 For entering, changing, shifting parameters
- 5 ▼ ▲ (Setting key:Up/Down) : Up/Down the data for setting parameters
- 7 FND(Display measuring value) : Display a current value on operation mode. Display a parameter and a set value when setting parameter
- ⑤ (Display a decimal point): Display a decimal point for the temperature unit 'c'
 ⑥ (A, ■, ▼(Variation indication part): SV is standard, PV(Present temperature) △, ▼(Red)/■(Green)
- (**) '

Dimensions 87 Min. 91 65 Autorics MD 40 68+0 (Unit:mm

Connections



Functions

○Adjustable Hysteresis [HY5]

- •This product controls compressor output by ON/OFF control type.
- •Frequent ON/OFF output causes noise and chattering. Proper interval on ON/OFF
- control prevents it and a malfunction on contact and compressor.

 EX)Setting value (SU): -20°C, Hysteresis (M45): 1

 When current temperature is -19°C, compressor outputs ON.
 When current temperature is -21°C, compressor outputs OFF.

 ON/OFF control is also called 2-position control because of OFF output for low temperature and ON output for high temperature with a target value.

○Input correction [I nb]

- •This model corrects the error, which is occurred by inputted signal. •When measuring a temperature, it corrects the error occurred by disturbance or
- extended wire. The corrected temperature and set value is compared for the operation.
- Ex)Current temperature: -18℃, Display value: -20℃ When setting Inb as 2, display value will be -18℃

Defrost function

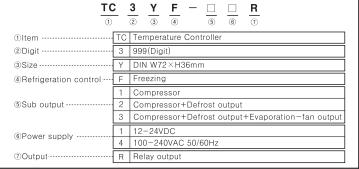
- •When compressor drives for long time, heat efficiency is lowered because evaporator and refrigerator are frozen. In this case, it is called defrost function for removing ice and frost
- Heating defrost method
- After mounting heater around evaporator, operate the heater with deforest period and deforest time setting of controller and remove frost
- Manual defrost method
 It operates defrosting for setting defrost time when press ▲ for 3sec during driving
 the compressor. When pressing ▼ for sec, defrost function is stopped, defrost output
 is turned to OFF and setting defrost period is restarted from OFF.
 After operating defrost for setting defrost time, setting defrost period is restarted.
 In case defrost period is "00", manual defrosting is operated only.

Relay output is operating for ON/OFF output by using relay contact. It repeats ON/OFF the load in order to heating or cooling operation continuously. In this case, drive magnetic S/W or power relay(big capacity) can be used by using relay contact.

•For using relay contact, do not exceed relay capacity.

- Otherwise a relay can be damaged and it can cause fire.
- When using relay contact to control main relay or magnetic switch, please use surge absorber in order not to inflow of counter electromotive force, caused from the coil of relay and magnet, into the inner body.
- Life cycle of relay(electrical/mechanical) is indicated in "■Specifications" Please design the system after checking the life cycle of relay
- * The above specifications are subject to change and some models may be discontinued without notice.

Ordering information



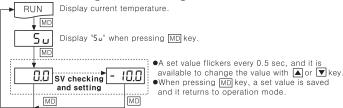
Specifications

Model(★	r1)	TC3YF-11R	TC3YF-14R	TC3YF-21R	TC3YF-24R	TC3YF-31R	TC3YF-34R	
Power su	upply	12-24VDC	100-240VAC 50/60Hz	12-24VDC	100-240VAC 50/60Hz	12-24VDC	100-240VAC 50/60Hz	
Allowable	voltage range	90 to 110% of rated voltage						
Power co	onsumption	8W	4VA	8W	4VA	8W	4VA	
Indicatio	n method	7Segment LED Display(Red)						
Display		NTC: -40.0~99.9℃(40~212°F), RTD: -99.9~99.9℃(-148~212°F)						
Display method		[PV ±0.5% or 1°C Max.] rdg ±1digit(Room temperature : 23 ±5°C)						
Sampling period		Min. 0.5sec						
Input sensor		NTC: Thermistor, RTD: DPT 100Ω(★2)						
Input of line resistance		Tolerance line resistance is max. 5Ω						
Control method		ON/OFF control:Adjustment sensitivity(HYS) variable(0.5~5.0℃, 2~50°F)						
Control output			ressor C 5A 1a)	(250VA) Defrost	ressor C 5A 1a) coutput c 10A 1a)	Defrost output (250VAC 10A	(1a) n-fan output	
Insulation resistance		Min. 100MΩ (at 500VDC mega)						
Dielectric strength		2000VAC 60Hz for 1 minute(between external terminal and case)						
Noise strength		±500V R-phase and S-phase(pulse width 1µs)[12-24VDC] ±2kV R-phase and S-phase(pulse width 1µs)[100-240VAC]						
Memory retention		Approx. 10 years(When using non-volatile semiconductor memory type)						
Relay life cvcle	COMP	Mechanical: Min.20,000,000 times Electrical: Min.50,000 times(250VAC 5A resistive load)						
	DEF	Mechanical: Min.20,000,000 times Electrical: Min.100,000 times(250VAC 10A resistive load)						
Cycle	FAN	Mechanical: Min.20,000,000 times Electrical: Min.50,000 times(250VAC 5A resistive load)						
Vibration	Mechanical	0.75mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours						
	Malfunction	0.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 10 minutes						
Ambient temperature		-10 ~ 50℃ (at non-freezing status)						
Storage temperature		-20 ~ 60℃(at non-freezing status)						
Ambient humidity		35 ~ 85%RH						
Protection		IP65						
Approval		—— (★ 3)	.TP:	—— (★ 3)		— (★ 3)	.74.	
Weight		Approx. 143g						

- *Indication accuracy of section except for room temperature is ambient temperature range [The bigger one between PV $\pm 0.5\%$ or 1°] rdg $\pm 1^{\circ}$ C * $\{\star\,1\}$ There is no relay point of contract output where defrost lamp is lighted for 11R/14R.

- ★(★3)No UL certificate is acquired for this model

SV checking and setting



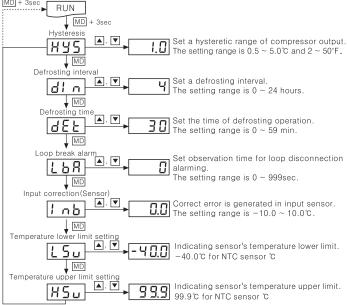
#When there is no input for 60 sec, it returns to operation mode.

#When pressing MD key for set value display, it returns to operation mode.

#When pressing ▼key for " 23 ", minus values are available to set.

#Pressing ▲key(▼)key continuously, a number is increased/decreased with high-speed.

Flow chart for first setting group

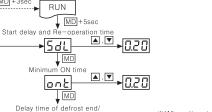


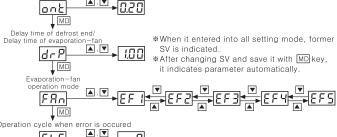
- In operation mode, if pressing MD key for 3 sec. It enters setting group 1
 Parameter is displayed when entering setting group 1.
- Press MDkey during setting operation to save the changed set value and display next parameter
- Press MD[key for 3 min. during setting operation to save the set value and usingly rest parameter.

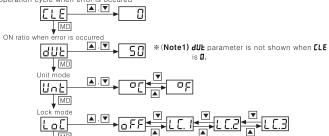
 Press MD[key for 3 min. during setting operation to save the set value and return to operation mode.

 Température upper/lower limit SV refers only to sensor's ambient temperature.(irrelevant to output control)

Flow chart for second setting group







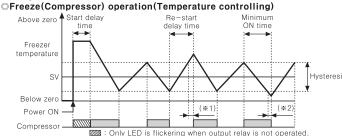
Input specification and range

input specification and range								
Input sensor	Using range							
iliput selisoi	°C	°F						
RTD(DPT 100Ω)	-99.9 ~ 99.9	-148 ~ 212						
Thermistor	-40.0 ~ 99.9	-40 ~ 212						

*A temperature sensor converts temperature into electric signal, and a temperature controller measures the temperature in order to do ON/OFF the control output.

*The setting is available within using range, and set range is fixed with using range

Operation



Compressor

Temperature controlling: Keep the set temperature by repeating ON/OFF operation in the range of hysteresis.

Start delay and re-operation time and re-start delay time [5dL]

•Start delay(Setting range:0m10s-9m59s)
When apply the power again on a compressor after power is failed, the compressor will be under overload. In this case, start delay function prevents curtailing of the life cycle of a compressor.

Re-start delay time (Setting range:0m10s~9m59s)

It does not operate within re-start delay time after compressor OFF to prevent frequent ON/OFF. ON/OFF.

• (*1)For start delay time, compressor output is OFF even when PV(Process Value) is lower than SV(Set Value). It is turned to ON after re-start delay time.

• The output lamp is ON simultaneously after the lamp flickers every one second during delay time.

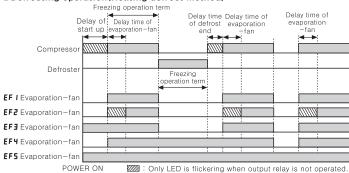
OMinimum ON time [ܩ۾ܠ]

Set a minimum ON time to prevent frequent ON/OFF.

(*2)Compressor output is ON even when PV(Process Value) is lower than SV(Set Value).

It is turned to ON after the minimum ON term.

ODefrosting operation(Heating defrost method)



○Defrost Interval [di n]

Start defrosting for relevant interval. (Setting range:0~24hour)

Defrost Time [dEŁ]

Defroster(heater) is ON during defrost time. (Setting range:0~59m)

Delay time of defrost end/Delay time of evaporation-fan operation [Dripping Time: drP]

•Delay time of defrosting end

It is the time from drops are fallen down to the drops are drained.

After drops are drained, compressor starts operating. (Setting range:0m00s~5m59s)

Delay time of evaporation—fan operation

To improve the efficiency of frosting, the time of evaporation—fan operation is delayed until evaporation plate is frozen after compressor operating.

(Setting range:0m00s~5m59s)

The delay time of defrosting end and the delay time of evaporation—fan operation are used indepen—dently with one setting time(drP).

When the delay time of defrosting end is finished, defrosting is discontinued and

defrosting interval is repeated.

 The output lamp is ON simultaneously after the lamp flickers every one second during ○Evaporation-fan operation mode [トឣ៱]

Operation mode 1[FF]: Operate at the same time with compressor.
OFF for defrost operation.
Operation mode 2[FF2]: Operate after the delay time of evaporation—fan operation.
OFF for defrost operation.
Operation mode 3[FF3]: Keep operating even after compress OFF.
Operation mode 3[FF3]: Operating even after compress OFF. Operation mode of EFS | Neep operating even after compless of the Operation mode of Set only for defrost operation.

Operation mode of Set only it maintains former output status during compressor ON or defrost operation and delay time of defrost end. The output will be OFF when compressor output and defrost output is OFF. (for controlling higher than zero point)

Operation mode of Set operate right after inputting power.

Error display

• **EFr** mark and error content are flickering every 0.5 sec. when error is occurred. • **Display Error** Input sensor disconnected (Operate after connecting sensor) oPn

Input sensor is normal or refrigerator temperature change is in LbR 1°C or 2°F for observation time of loop disconnection. LLL Measured sensor input is lower than displayed range HHH Measured sensor input is higher than displayed range

**For the Errors(oPn/LLL/HHH), after solving the problems(Connecting sensor/Changing measured value within displayed range), it operates normally.
 **For Error(LDA), if press both ▼and ▲ key for 3 sec. after checking compressor, it operates normally. When LbA is 0, the function is OFF.

Compressor operation for error

 Controller does not operate normally in error.
 To protect the inside of compressor, compressor keeps repetitive operation until error The cycle of compressor •The cycle of compressor operation in error[ELE] operation

Compressor operates ON/OFF during set operation cycle.

The ratio of compressor ON in erro[dut]

During set operation cycle, compressor operates ON as much as set ratio.

Compressor OFF The operation cycle of compressor is "0". Compressor OFF
When error is occurred, ON/OFF cycle is not operated and compressor operation is OFF. Compressor ON ratio (100%) parameter is not displayed.

The ratio of compressor ON is "100". Compressor is ON when error is occurred.

○Lock function [Lar]
•Limit the change of SV a

SV and parameter

Loc.2: Setting group 1, Setting group 2 Lock oFF : Lock off LoC. 1: Setting group 2 Lock LoC3: Setting group 1, Setting group 2, Set value Lock

Factory default

•	First setting group								
	Mode	Setting value	Mode	Setting value					
	HY5	1.0	l nb	0.0					
	dl n	4	L5u	-40.0					
	4EF	30	H5.	99.9					

Second setting group Mode Setting value Mode 5dL 0.20 [LE 0 ont 0.20 dut drP 1.00 Unt FAn EF1 LoC 50

● Setting value (5 ... Mode Setting value 0.0

ompressor ON ratio(%)

L B R 0 NTC sensor input ℃ Caution for using

Installation environment ①It shall be used indoor. ②Altitude Max. 2000m.

③Pollution Degree 2.④Installation Category II.

2. Please use separated line from high voltage line or power line in order to avoid inductive noise
3. Please install power switch or circuit—breaker in order to cut power supply off.
4. The switch or circuit—breaker should be installed near by users.
5. Do not use this product as Volt—meter or Ampere—meter, this is a temperature controller
6. In case of using RTD sensor, 3wire type must be used. If you need to extend the line

3wires must be used with the same thickness as the line. It might cause the deviation of temperature if the resistance of line is different.

In case of making power line and input signal line close, line filter for noise protection should be installed at power line and input signal line should be shielded.

Keep away from the high frequency instruments. (High frequency welding machine & sewing machine, big capacitive SCR controller) ★It may cause malfunction if above instructions are not followed.

Major products

■ Laser marking system(Fiber, CO₂, Nd:YAG)
■ Laser welding/soldering system

| Major products
| Photolectic sensors | Temperature controllers
| Door sensors | SkPPower controllers
| Door sensors | SkRPPower controllers
| Door sensors | SkRPPower controllers
| Area sensors | Timers
| Area sensors | Timers
| Proximity sensors | Tachometer/Pulse(Rate)meters
| Rotary encoders | Timers
| Rotary encoders | Skpley units
| Connector/Sockets | Sensor controllers
| Switching mode power supplies
| Control switches/Lamps/Buzzers
| Vo Terminal Blocks & Cables
| Slepper motors/drivers/motion controllers
| GraphicLogic panels
| Field network devices
| Laser marking system(Fiber, Co₂, Nd:YAG)

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■ HEAD QUARTERS:

18, Bansong-ro 513beon-gil, Haeundae-gu, Busan, Korea
■ OVERSEAS SALES:

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Wonmi-gu, Bucheon, Gyeonggi-do, Korea TEL: 82-32-610-2730 / FAX: 82-32-329-0728 E-mail: sales@autonics.com

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