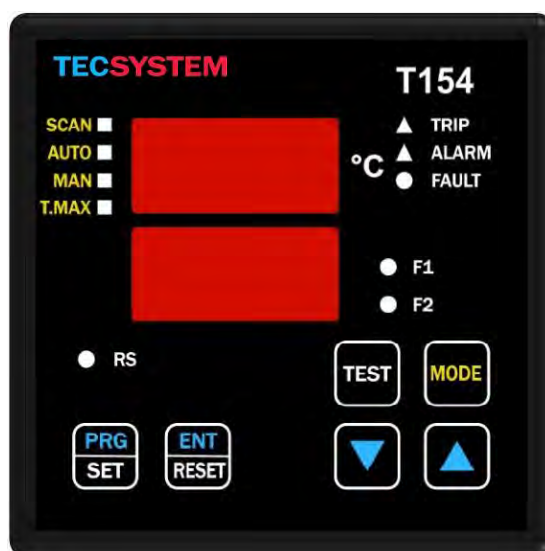


INSTRUCTION MANUAL

T154



1MN0101 REV. 0

TECSYSTEM
temperature protection relays & ventilation



operates with ISO9001 certified quality system

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R. 1.6 06/09/17

ENGLISH

INTRODUCTION

First of all we wish to thank you for choosing to use a **TECSYSTEM** product and recommend you read this instruction manual carefully: You will understand the use of the equipment and therefore be able to take advantage of all its functions.

ATTENTION! THIS MANUAL IS VALID AND COMPLETE FOR THE CONTROL UNIT T154

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SAFETY REQUIREMENTS



ATTENTION :

Read the manual carefully before starting to use the control unit. Keep the instructions for future reference.



Do not open the device, touching any internal components can cause electric shock. Contact with voltage over 50 Volts can be fatal. To reduce the risk of electric shock, do not dismantle the back of the device for any reason. Moreover its opening would void the warranty.

Before connecting the device to the power supply, make sure that all the connections are correct. Always disconnect the unit from the supply before any cabling modification.



Any work on the equipment must be entrusted to a qualified engineer.

Failure to comply with these instructions can cause damages, fires or electric shock, and possible serious injuries!

POWER SUPPLY

The series T154 ED16 has UNIVERSAL power supply, i.e. it can be supplied by 24 to 240 Vac-Vdc, irrespectively of polarity in Vdc. Before using it, make sure the power cable is not damaged, knotted or pinched. Do not tamper with the power cable. Never disconnect the unit by pulling the cable, avoid touching the pins. Do not carry out any connecting/disconnecting with wet hands. To disconnect the device, do not use objects such as levers. Immediately disconnect the device if you smell burning or see any smoke: contact technical service.

LIQUIDS

Do not expose the equipment to splashes or drops, do not position it in places with humidity exceeding 90% and never touch with wet or humid hands during storms. If any liquid penetrates the control unit, disconnect it immediately and contact technical service.

CLEANING

Disconnect the power cable before cleaning the control unit, use a dry cloth to dust it, without any solvent or detergents, and compressed air.

OBJECTS

Never insert any objects into the cracks of the control unit. If this happens, disconnect the control unit and contact an engineer.

USE RESERVED TO QUALIFIED PERSONNEL

The purchased goods are a sophisticated electronic device that is totally unsuitable to be used by non-qualified personnel. Any work must be carried out by a specialist engineer.

ACCESSORIES

The use of non-original accessories or spare parts can damage the unit and endanger users' safety. In the event of faults, contact technical service.

LOCATION

Install the control unit indoors, in a place protected from water splashes and sun rays. Do not place near heat sources exceeding the parameters stated in this manual. Position on a stable surface, far from any possible vibrations. Position the unit as far as possible from any intense magnetic fields.

REPAIRS

Do not open the control unit. For any fault, always use qualified personnel. The opening of the control unit and/or the removal of the series identifying label entails the automatic forfeiture of the warranty. The Warranty seal is applied to all devices, any attempt to open the unit would break the seal and cause the consequent automatic forfeiture of the warranty.

FUNCTION

To control the transformer correctly from a temperature point of view, enabling the VOTING function is allowed where the load distributed between the phases of the transformer is adequately balanced.

TECHNICAL INFORMATION

Mail: campisi@tecsystem.asia — tel: +86 21 39905855

ACCESSORIES

The following objects are present inside the box:

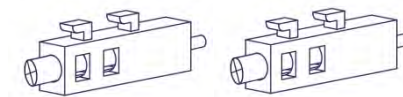
Control unit



INSTRUCTION MANUAL (CD)



2 blocks for panel mounting



1 supply terminal 3 poles pitch 5
Code: 2PL0367- Screws tightening torque 0.5Nm



1 relay terminal 10 poles pitch 5
Code: 2PL0394 -Screws tightening torque 0.5Nm



1 Pt100 sensor terminal 12 poles pitch 3.81
Code: 2PL0420- Screws tightening torque 0,25Nm



1MN0030 REV. 2

ATTENTION: always install the device using the terminals included in the pack. The use of terminals other than those included with the control unit might cause malfunctions.

TECHNICAL SPECIFICATIONS

T154

POWER SUPPLY

Supply rated values

24-240 Vac-Vdc
50/60Hz

Maximum and minimum supply values

20-270 Vac-Vdc
50/60Hz

Vdc with reversible polarities

•

INPUTS

4 inputs for RTD sensors, Pt100 type with 3 wires (max section 1.5mm²)

•

Connections on removable terminal strips

•

Input channels protected against electromagnetic interference

•

Cable compensation for thermistors

500 m (1 mm²)

OUTPUTS

2 alarm relays (ALARM AND TRIP) **SPDT**

•

1 sensor or operating failure (FAULT) relay **SPST**

•

1 ventilation management relays **SPST FAN 1**

•

Output relay with 10A-250Vac-res COS Φ =1 contacts.

•

DIMENSIONS

100x100 mm– din43700-depth 131mm (terminal block included)

Hole 92 x 92 mm

TESTS AND PERFORMANCE

Construction in compliance with CE regulations

•

Protection from electrical interference EN 61000-4-4

•

Dielectric strength 1500 Vac for a min. between output relays and sensors, relays and power supply, power supply and sensors

•

Accuracy $\pm 1\%$ full scale value, ± 1 digit

•

Ambient operating temperature from -20°C to $+60^{\circ}\text{C}$

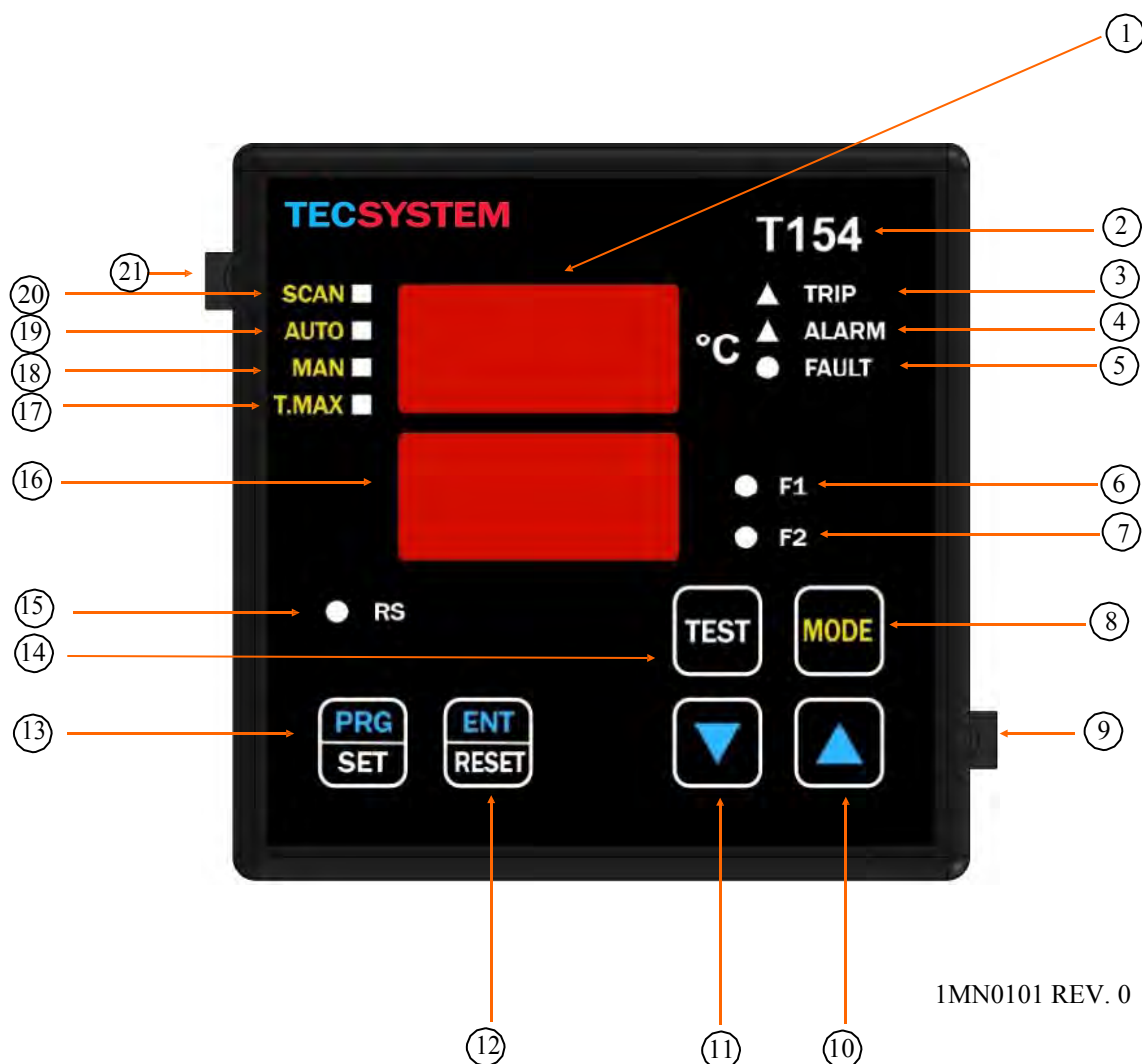
•

Humidity 90% non-condensing

•

TECHNICAL SPECIFICATIONS	T154
TESTS AND PERFORMANCE	
Frontal film polycarbonate IP65	•
Housing NORYL 94_V0	•
Absorption 7,5VA	•
Data memory 10 years minimum	•
Digital linearity of sensor signal	•
Self-diagnostic circuit	•
Protection treatment of the electronic part	Option
DISPLAY AND DATA MANAGEMENT	
2x13mm displays with 3 digits to display temperatures, messages and channels	•
3 LEDs to display the state of the alarms of the selected channel (ALARM-TRIP-FAULT)	•
4 leds selection of display mode (SCAN-AUTO-MAN-T-MAX)	•
1 LEDs to display the state of FAN1	•
Temperature control from 0°C ÷ to 240°C	•
2 alarm thresholds for channels 1-2-3	•
2 alarm thresholds for channel 4	•
1 ventilation ON-OFF thresholds FAN 1	•
Sensor diagnostics (Fcc-Foc-Fcd)	•
Data memory diagnostics (Ech)	•
Access to programming through front keyboard	•
Automatic exit from relay programming, display and test after 1 minute's inactivity	•
Incorrect programming warning	•
Selection between channel automatic scanning, hottest channel or manual scanning	•
Storage of maximum temperatures reached by channels and alarm status	•
Front key to reset the alarms	•
Failsafe function	•

FRONT PANEL



1MN0101 REV. 0

1)	3-digit temperature display	12)	Enter/Reset button
2)	Control unit series	13)	Programming / Setting button
3)	TRIP (red) LED	14)	LED/relay test button
4)	ALARM (yellow) LED	15)	RS (green) LED (not used)
5)	FAULT (red) LED	16)	3-digit channel display
6)	FAN 1 (yellow) LED	17)	T-max mode selection (red) LED
7)	FAN 2 (yellow) LED (not used)	18)	Man mode selection (yellow) LED
8)	Display mode selection button	19)	Auto mode selection (green) LED
9)	Fixing block	20)	Scan mode selection (yellow) LED
10)	UP key	21)	Fixing block
11)	DOWN key		

DISPLAY

The first display is dedicated to the visualisation of temperatures.

The second display to the visualisation of the monitored channel.

When the device is switched on or following a reset, the display shows: the control unit model, T154 (BAS no options, C01 T154-V-) with VER "00" (firmware version) and temperature range of the unit.

Pressing MODE key, the display mode is loaded:

- **SCAN:** the monitoring unit displays all the activated (°C) and deactivated (NO) channels scanning every 2 seconds.
- **AUTO:** the monitoring unit displays the hottest channel automatically.
- **MAN:** manual reading of the channel temperature using the up/down keys ▲▼.
- **T.MAX:** the monitoring unit displays the highest temperature reached by the sensors and any situation of alarm or fault occurred, after the last reset. Select channels with cursors ▲▼, reset values with RESET.

OPERATING PROGRAM CONTROL

To control the protection levels programmed, press the PRG button twice to access the **VIS** display mode. By repeatedly pressing the PRG button, you can scroll through all the previously loaded values in sequence. After 1 minute's keyboard inactivity, the programming display procedure is automatically abandoned.

To stop the display, press the ENT button.

NOTES ON SCAN AND MAN FUNCTIONS

During the SCAN and MAN modes, the operation of the T154 can be displayed.

- 1) RUN cPU:** This message appears when the unit operates regularly without any system error.
- 2) Ech Err:** This message appears when a damage in the EEPROM memory is detected. Pressing Reset will cancel the message and restore the original default parameters, listed in the programming paragraph on page 12. Return the control unit to TECSYSTEM for repairs.
- 3) CAL Err:** This message appears when damage is found in the measurement circuit. The temperature values displayed might be incorrect. Return the control unit to TECSYSTEM for repairs.
- 4) Pt Err:** This message appears when it is detected that one or more PT100 sensors are not working correctly, FOC, FCC and FCD indications in the temperature sensor diagnostics paragraph on page 15. In case of **Err** the FAULT relay will be de-energised.

The above messages will be displayed following the 1-2-3-4 priority stated.

NOTE: regardless of the display mode, in case of a sensor fault (fcc, foc or fcd), the control unit will automatically switch to **SCAN (PRIVILEGED SCAN) mode**, immediately allowing you to see the fault on the relative channel **CH (Mode key is disabled)**.

LED TEST

We suggest carrying out the control unit LED test regularly.

For this operation, press the TEST key briefly; all the displays turn on for 2 seconds.

If one of the LEDS does not work, please return the control unit to TECSYSTEM for repair.

ALARM RELAY TEST

This function allows carrying out a test of the relay operation without having to use any other devices.

To start the test procedure, keep the TEST button pressed for about 5 seconds: TST appears for 2 seconds, confirming you have entered Relay Test mode.

The LED that is lit shows the relay to be tested; use the cursors ▲▼ to select the desired relay.

Press the SET and RESET keys to energise and de-energise the relay to be tested; the display will show ON- OFF. After 1 minute's keyboard inactivity, the RELAY TEST procedure will be automatically abandoned. To stop the RELAY TEST procedure, press the TEST key.

Alternatively, you can use the PT100 simulator model: SIM PT100.

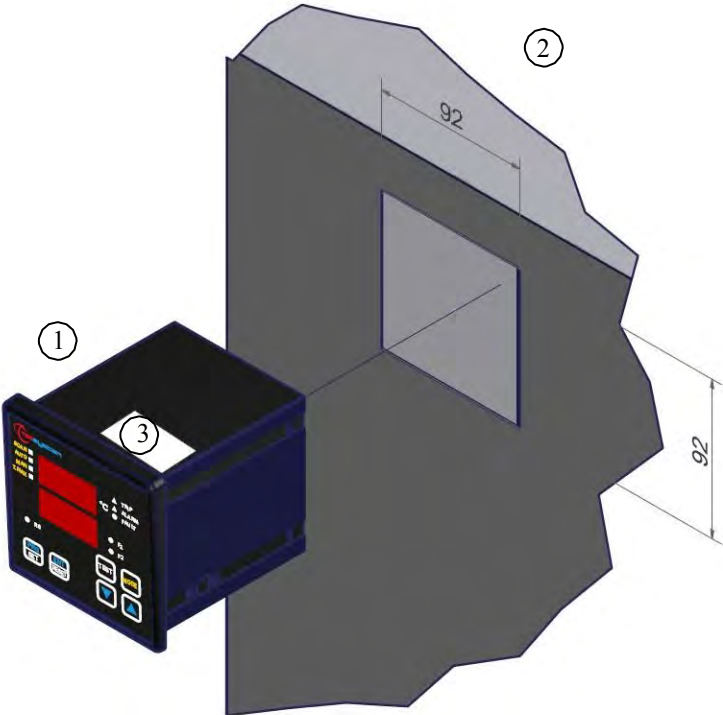
ALARM RELAY SILENCING

If you want to silence the ALARM signal, press the RESET key: the relay de-energises and the ALARM LED, which was fixed, will start flashing.

Silencing is automatically disabled when the temperature goes below the ALARM threshold.

MOUNTING

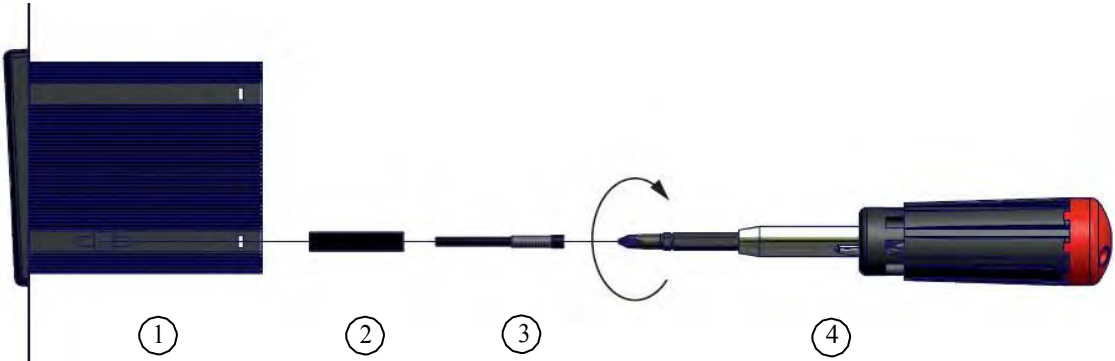
Drill a 92 x 92 mm hole in the panel sheet.



1MN0007 REV. 0

1)	Control unit	2)	Panel hole dimensions (+0.8mm tolerance)
3)	Identification label		

Fix the unit securely with the blocks supplied.

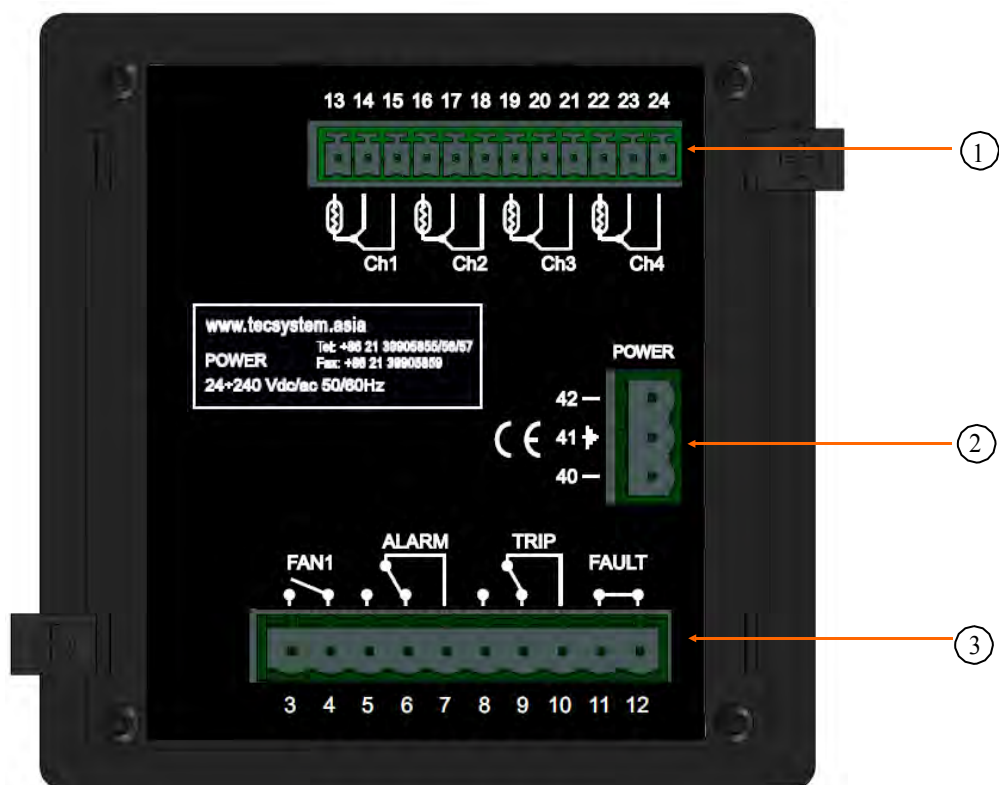


1MN0008 REV.0

1)	Control unit	3)	Fixing screw
2)	Fixing block	4)	Crosshead screwdriver #1X100mm

ELECTRICAL CONNECTIONS

T154

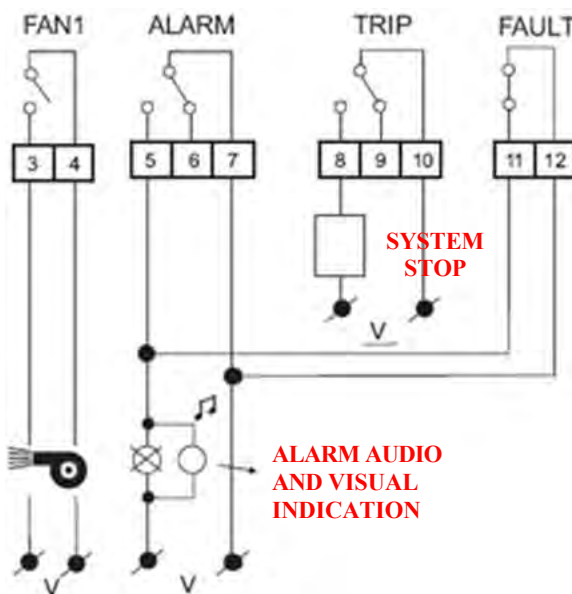


1MN0125 REV. 0

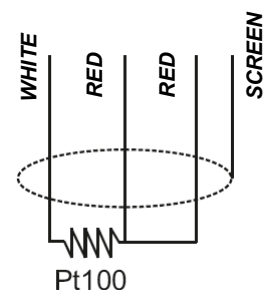
1)	Pt100 sensors (white-red-red)	3)	Relays (FAN1-ALARM-TRIP-FAULT)
2)	Supply 24-240Vac-dc 50/60Hz.		

Note: relay contact image in non-alarm condition, with the exception of the FAULT relay that switches: contact 11-12 open (NO), contacts 11-12 closed (NC) fault condition identification. Read the Alarms and Ventilation paragraph on page 11 and see the fault contact switching.

RELAY CONNECTION EXAMPLE



Pt100 CONNECTION EXAMPLE



Note: Before connecting the sensors to the control unit, read the Measurement signal transfer paragraph on page 14 carefully.

Output relay with 10A-250Vac-res COS Φ =1 contacts

POWER SUPPLY

The T154 ED16 series has UNIVERSAL power supply, i.e. it can be supplied by 24 to 240 Vac-Vdc, 50/60Hz irrespectively of polarity in Vdc (terminals 40-42).

This is obtained thanks to the use of a tested power supply unit, newly designed and manufactured, that frees installers from worrying about the correct Vac and Vdc supply.

The ground must always be connected to terminal 41.

When the unit is supplied directly by the secondary of the transformer to protect, it can be burnt out by strong overvoltages. This happens if the main switch is closed and the transformer has no load (blank test). The above-mentioned problems are much more evident when the 220 Vac voltage is taken directly from the transformer secondary bars and there is a fixed capacitor battery to phase the transformer itself.

To protect the monitoring device from line overvoltages, we suggest you use the PT-73- 220 electronic discharger, designed by TECSYSTEM Shanghai for this specific purpose. As an alternative we suggest using 110 Vac or, even better, 110 Vdc supply voltages.

If an existing control unit must be replaced with a new one, to guarantee its correct and safe operation, the sensor/relay/supply connecting terminals must be replaced with the new terminals supplied.

ALARMS AND VENTILATION

Carry out the electrical connections on the removable terminal blocks only after disconnecting them from the unit. When the control unit is in one of the modes mentioned below, it does not monitor the temperature and the relays are all blocked. The fault contact switches and the fault LED flashes.

- Vis. programming display
- PRG programming
- Relay test

The ALARM and TRIP relays switch only when the set temperature thresholds are exceeded.

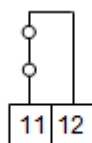
The FAULT contact, programmed in failsafe mode (default YES), switches when the equipment is powered only if the unit detects no fault on start up, and stays in this condition until one of the following events occurs:

- Data storage fault (Ech message).
- Pt100 sensor fault (FCC short-circuited sensor, FOC interrupted sensor or Fcd quick temperature increase)
- CAL damage to the measurement circuit.
- Insufficient supply voltage.
- During the power on reset after programming (PRG), displaying the data (VIS) and Test relay.

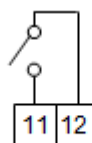
The FAULT failsafe can be disabled selecting FAULT failsafe "NO" see step 26-31 programming page 13.

NOTE: do not connect the FAULT relay to the transformer tripping circuit to avoid unwanted system interruptions.

FAULT CONTACT SWITCHING (failsafe enabled)



FAULT 11-12 NC: ALARM FAULT OR POWER OFF



FAULT 11-12 NO: POWER ON OR NO FAULT

The FAN1 contact can be used to control the cooling fans, or it can be included in the conditioning system of the transformer room, see paragraph Fan control on page 15.

NOTE: always disconnect the unit before performing any electrical connections.

FAULT AND RESET MESSAGE SEQUENCE

Find below the sequence of fault messages and RESET function condition.

1) ECH	Eeprom fault	erasable message
2) CAL	Measurement circuit fault	erasable message
3) FCD	Temp. quick increase fault	resettable condition
4) ERR PT	FOC or FCC sensor fault	non- resettable condition

PROGRAMMING

T154

STEP	PRESS	EFFECT	PRESS	NOTES
1		Keep the PRG key pressed until the display shows PRG SET		
2		Select PRG SET for entering in the programming mode or PRG 1 to restore the default programmed value.	 	PRG 1 default value
3		The ALARM threshold for (CH 1 - 2 -3) is displayed Set the desired threshold, the Alarm LED flashes	 	Default 90°C
4		The TRIP threshold for (CH 1-2-3) is displayed and the Trip LED flashes.		
5		Set the desired threshold	 	Default 119°C
6		1.2.3 is displayed the Fan1 LED flashes.		
7		Select YES or NO	 	Default YES
8		The display shows (CH4) CH4 enabling		
9		Set YES or NO	 	with YES CH4 is enabled, with NO CH4 is disabled.
10		The ALARM threshold for (CH4) is displayed, the Alarm LED flashes.		If CH4=NO go to step 16, Default NO
11		Set the desired threshold	 	Default 120°C
12		The TRIP threshold for (CH4) is displayed and the Trip LED flashes.		
13		Set the desired threshold	 	Default 140°C
14		CH4 is displayed the Fan1 LED flashes.		IF CH1.2.3 enabled CH4= NO it can't be enabled
15		Set YES or NO	 	Default NO
16		FAN ON is displayed the FAN1 LED flashes.		If FAN1=NO go to step 20
17		Set the desired FAN1 ON threshold	 	Default 70°C
18		FAN OFF is displayed, the FAN1 LED flashes		
19		Set the desired FAN1 OFF threshold	 	Default 60°C

20		HFN (NO) is displayed The FAN1 LEDs flashes		Cyclical test of the fans for 5 minutes every "n" hours
21		Set the desired number of hours	 	Default NO = function disabled
22		FCD (NO) is displayed		Fault due to quick temperature increase (°C/sec)
23		Set the desired value (FCD page 16)	 	Default "no" (function excluded)
		for version T154 (BAS) jump to the step 26		
24		VOT (YES) is displayed (See VOTING on page 19)		C01 T154 -V-
25		Set YES or NO	 	Default YES solo per C01 T154 -V- (function enable)
26		The display shows FLS (ALARM) flashing LED ALARM (info FAIL SAFE on page 18)		
27		Set YES or NO	 	Default NO
28		The display shows FLS (TRIP) LED flashes TRIP		
29		Set YES or NO	 	Default NO
30		The display shows FLS (FAULT) LED flashes FAULT		
31		Set YES or NO	 	Default YES
32		END is displayed		End of programming
33		Press ENT to store the settings and exit programming		Err: incorrect programming of the LED values (note 6)
34		Return to step 1		

- 1) The **MODE** key allows reversing the programming steps according to the sequence 26-23-8-1.
- 2) The **TEST** key allows exiting programming without saving the modified data.
- 3) After 1 minute's keyboard inactivity, programming is exited without saving the data.
- 4) During programming the control unit does not control/protect the monitored machine.
- 5) At the end of programming the control unit is restarted and the **FAULT** relay is disabled until the unit is fully restarted.
- 6) If pressing **ENT**, "Err" appears, it means that one of the following mistakes has been made:

ERR ALL. = ALARM \geq TRIP
ERR FAN = FAN-OFF \geq FAN-ON. (FAN1)

The device automatically switches to the programming step of the mistake.

NOTE: EVERY TIME THE CONTROL UNIT IS PROGRAMMED WITH DATA SAVING CONFIRMATION, THE VALUES STORED IN T-MAX ARE RESET TO THE TIME OF SAVING.



ATTENTION :

We recommend you check the unit's programming before starting the device.

The default parameters set by TECSYSTEM might not match your requirements.

Programming the device is the end user's responsibility, the settings of the alarm thresholds and the enabling of the functions described in this manual must be checked (by a specialized engineer) according to the application and features of the system where the control unit is installed.

TEMPERATURE SENSORS

Each Pt100 thermometric sensor has one white and two red wires (CEI 75.8 regulations).

The CH2 channel must be always referred to the central column of the transformer.

The CH4 channel must be always referred either to the core of the transformer or to the Pt100 ambient sensor, if you wish to thermo-regulate the transformer room using the T154 control unit.

MEASUREMENT SIGNAL TRANSFER

All the cables transferring the Pt100 measurement signals must comply with the following under all circumstances:

1. Every Pt100 must be connected with a three-wire cable having a minimum section of 0.35mm² and a maximum of 1 mm².
2. The extension cable must be screened with a tinned copper braid with 80% cover.
3. Conductors must be twisted, maximum recommended step 60mm.
4. The cable screening must be grounded only with a termination, preferably on the unit side.
5. The sensors' signal transfer cable must not be near any electrical cables, either low or medium-high voltage.
6. The Pt100 cable and the signal transfer cable must be laid in a straight line, without any winding.
7. Any caps used to butt conductors must be crimped properly to avoid false contacts.

NOTE: to install the sensors and signal transferring cable correctly, read the SCS / SENSOR installation rules manual.

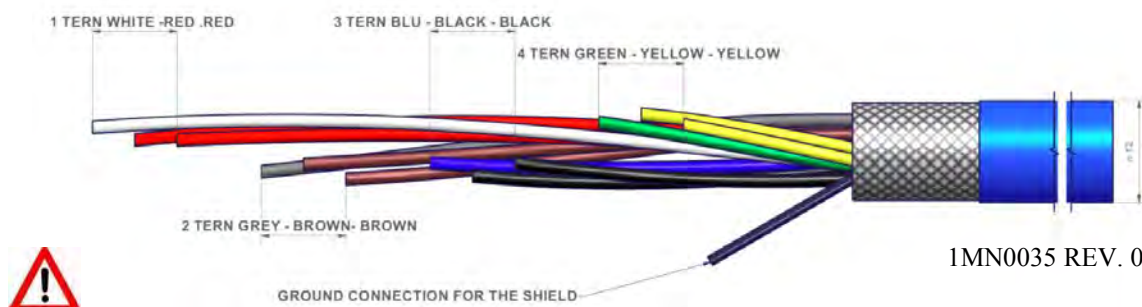
What may happen when installation rules are not complied with.

- 1) The electrical field propagating from the power line of another circuit, couples capacitively with the conductors (in particular with unscreened cables). The effect of this coupling creates a signal that overlaps the signal transmitted by the nearby conductors, causing incorrect readings.
- 2) The variations in magnetic flux in the power lines may induce an electromotive force on the signal transferring cables (in particular non-twisted cables), that, being a closed circuit, generates a current. This interference current, multiplied by the circuit resistance, gives a voltage value that overlaps the signal to be transmitted, distorting the sensor measurement.
- 3) False contacts can alter the signal with the consequent variation in the temperature detected.

In specific cases, when the rules for connecting the Pt100 sensors are not complied with, the following anomalies can occur between the SCS box and the temperature control unit:

- a) **incorrect temperature readings, alarms or anomalous tripping**
- b) **mechanical / electrical fault of the Pt100 sensors**
- c) **damage to the Pt100 inputs of the control unit.**

TECSYSTEM Shanghai has designed its own special cable to transfer the measurement signals, CEI-compliant, with all the protection requirements provided for: model **CT-ES**



ATTENTION: the use of cables not complying with the above might cause reading anomalies. It is always important to take into account that any interference on the signal lines might cause anomalies on the Pt100 inputs (CH1-CH2-CH3-CH4...) or the sensors

All T series control units have linearity of the sensor signal, with a maximum error of 1% of full scale value.

TEMPERATURE SENSOR DIAGNOSTICS

In case of failure or exceeded minimum/maximum full scale value of one of the thermometric sensors installed on the machine to protect, the **FAULT** relay switches immediately with the relative warning of faulty sensor on the corresponding channel (**Pt Err**) :

Fcc indicates sensor short-circuited or minimum full scale value of the control unit exceeded -8°C

Foc indicates sensor interrupted or maximum full scale value of the control unit exceeded 243°C

To eliminate the message and reset **FAULT** switching, it is necessary to check the Pt100 connections and replace the faulty sensor (if any). If the minimum/maximum full scale value has been reached, check that the ambient conditions match the control unit reading.

Note: exceeding the maximum/minimum full scale value may be caused also by possible interference on the sensor lines, in this case we recommend you to check the sensors and the extension cable in particular are installed correctly (as stated in the MEASUREMENT SIGNAL TRANSFER paragraph on page 15).

We recommend you to enable the FCD (on page 16) function, only after carefully assessing the system conditions.

CAL message display: it appears when damage is found in the measurement circuit. The temperature values displayed might be incorrect. Return the control unit to TECSYSTEM for repairs

PROGRAMMED DATA DIAGNOSTICS

In case of failure of the internal memory or alteration of the programmed data, at start-up **Ech** is displayed with the relative warning of the Fault contact.

In this case, for safety reasons, the default parameters are loaded automatically (see programming table on pages 13-16).

Eliminate **Ech** by pressing RESET and run programming to enter the desired values.

Finally switch the unit off and back on to check the memory works correctly, if it is damaged **Ech** will be displayed again (send the control unit to TECSYSTEM Shanghai for repairs).

TEMPERATURE DIAGNOSTICS

When one of the temperature sensors senses a temperature 1°C higher than the alarm threshold, 5 seconds later the **ALARM** relay switches and the **ALARM** LED of the affected channel (**CHn**) lights up.

When the trip temperature threshold is exceeded, the **TRIP** relay switches and the **TRIP** LED of the interested channel (**CHn**) lights up. As soon as the temperature goes back to values equal to or lower than the threshold set for the **ALARM** and **TRIP** relays, these relays deenergise and the relative LEDs switch off.

The **ALARM** and **TRIP** values are kept in the internal memory: they can be recalled by entering the Vis mode (programmed parameter display) and modified in PRG (programming) mode.

COOLING FAN CONTROL

The T154 control unit is fitted with one FAN contacts (FAN1), if programmed correctly, can control the fans switching ON and OFF to cool the transformer.

The FAN1 contact can manage cooling the transformer or the room where it is installed.

The fans can be controlled in two different ways:

- Using the temperatures sensed by the sensors on the three columns **CHF 1.2.3**
(ex. ON at 70°C - OFF at 60°C)
- With an extra sensor (**CH4/YES**) dedicated to the ambient temperature inside the transformer room **CHF 4**
(ex. ON at 45°C - OFF at 35°C)

The ON and OFF values are programmable according to the device range. FAN ON must always be greater by at least 1 ° C since FAN OFF (recommended Δ FAN (POWER ON-OFF) + 10 ° C).

The FAN 1 LED lights up when the temperature exceeds 1°C the FAN ON threshold, the corresponding relay switches, and turns off when the temperature goes below 1°C the FAN OFF threshold, the corresponding relay switches

FAN TEST

By programming (**HFn**), it is possible to have the fans operating 5 minutes every "xxx" hours, regardless of the column or ambient temperature values (i.e.: with HFn=001 the fans are activated for 5 minutes every hour).

This function aims at verifying the fan operation and their control apparatus periodically.

By setting **NO** this function is inhibited.

To enable the Hfn function, read the programming section on pages 12-13.

IMPORTANT WARNING



Before carrying out the isolation test of the electrical panel the control unit is installed on, disconnect it together with the sensors from the power supply, to prevent it from being seriously damaged.

TECHNICAL SPECIFICATIONS OF Pt100 EXTENSION CABLE

1. Cable 20 x AWG 20/19 Cu/Sn
2. Section 0.55 mm²
3. Flame retardant insulation PVC105
4. CEI 20.35 IEC 332.1 regulations
5. Maximum operating temperature: 90°C
6. Conformation: 4 sets of three twisted and coloured conductors
7. Shield in Cu/Sn
8. Flame retardant PVC sheath
9. External diameter 12mm
10. Standard conformation in 100m coils

FCD FUNCTION

The T series equipment boasts an innovative control function combined with the dynamic status of the Pt100 sensor.

Activating FCD, the control unit analyses the increase in temperature ΔT (*) recorded in a second (°C/sec).

Enabling the function, the user can select the value (ΔT) from a minimum of 1°C/sec to a maximum of 30°C/sec. If the value sensed is higher than the value set by the user, the control unit inhibits the possible activation of the ALARM and TRIP alarms and switches the FAULT relay (11-12), displaying the message "Fcd fault".

Example: if we set the function to 5°C, FAULT will switch for FCD only if the control unit senses an increase in ΔT of over 5°C in a second on the monitored system.

Setting "no" disables the FCD function.

When a channel is in FAULT for FCD, the relative Alarm and Trip warnings are inhibited on the single channel; therefore only the over-quick temperature increase is highlighted.

Press Reset to delete the FCD warnings on all channels and reset the FAULT relay.

Possible FCD applications

Identification of a possible induced interference on the Pt100 sensor line

If the installation instructions are not complied with (see page 14), any disturbance on the Pt100 sensor line can cause false readings or anomalous alarms.

Setting the FCD function in a temperature range of between 1°C and 10°C (5°C recommended), the effects caused by false readings can be suppressed and the alarm relay activation can be prevented, as shown above.

Corrective actions: check the installation of the sensor extension cable is in line with the instructions given in the paragraph on the measurement signal transfer on page 14.

Identification of a sensor fault or faulty connection

In case of a faulty connection or sensor fault, a quick positive or negative variation in temperature might occur, leading to the system tripping or the alarms of the monitored system to be triggered.

In this specific case we recommend the FCD function to be set in a temperature range of between 10°C and 20°C.

Corrective actions: check the terminals the sensor is connected to are tightened and replace the faulty sensor, if required.

Identification of the electrical motor rotor block

In case of temperature control of the electrical motors, the quick temperature increase might be due to a blocked rotor.

In this specific case we recommend the FCD function to be set in a temperature range of between 20°C and 30°C. This setting is recommended in order to prevent the FCD function from activating during motor startup, or where the ΔT /sec. increase varies quickly.

(*) The ΔT value shows the temperature range for each second

WARRANTY CONDITIONS

The Product purchased is covered by the manufacturer's or seller's warranty at the terms and conditions set forth in the "TecsysteM Shanghai's General Conditions of Sale", available at www.tecsystem.asia and / or in the purchase agreement.

The warranty is considered valid only when the product is damaged by causes attributable to TECSYSTEM Shanghai, such as manufacturing or components defects.

The warranty is invalid if the Product proves to have been tampered with / modified, incorrectly connected, because of voltages outside the limits, non-compliance with the assembly and use technical data, as described in this instruction manual.

TROUBLESHOOTING	CAUSES AND SOLUTIONS
The control unit does not switch on and the supply to terminals 40-42 is correct.	Check that: the connector is correctly inserted into its housing, the wires are tightened, there is no evidence of burning on the connectors. Disconnect the power supply, carry out the above and reconnect.
CH4 is in FAULT because of FOC (only the 3 Pt100 sensors are connected)	Programming error of the CH4 / YES control unit. <i>Check and repeat programming as per page 12-13, select CH4 / NO.</i>
One of the three/four channels is in FAULT due to FOC/FCC	Check the connections of the Pt100 sensors, check the instructions given in the paragraphs: <i>measurement signal transfer and temperature sensor diagnostics on page 14-15.</i>
When turning on, the display shows "ECH"	Strong interference has damaged the stored data. See the paragraph Programmed data diagnostics on page 15.
All the PT100 sensors are in FCC.	Incorrect sensor connection, the terminal block has been inserted upside down. <i>Check the connections and the terminal board.</i>
The temperature shown by one or more channels is wrong.	Contact the <i>TECSYSTEM Technical Department.</i>
Sudden trip of the main switch. The temperature is on standard levels. Just one channel has caused the trip.	Check the temperatures recorded in T-MAX, check the instructions given in the paragraphs: <i>measurement signal transfer and temperature sensor diagnostics on pages 14-15. Activate the FCD function.</i>
FCD warning	See the FCD function on page 16.
Contact <i>TECSYSTEM Technical Department</i> if the problem persists.	

EQUIPMENT DISPOSAL

European directives 2012/19/EC (WEEE) and 2011/65/EC (RoHS) have been approved to reduce electrical and electronic waste and promote the recycling and reuse of the materials and components of said equipment, cutting down on the disposal of the residues and harmful components of electrical and electronic materials.



All the electrical and electronic equipment supplied after 13 August 2005 is marked with this symbol, pursuant to European directive 2002/96/EEC on electrical and electronic waste (WEEE). Any electrical or electronic equipment marked with this symbol must be disposed of separately from normal domestic waste.

Returning used electrical devices: contact TECSYSTEM or your TECSYSTEM agent for information on the correct disposal of the devices.

TECSYSTEM is aware of the impact its products have on the environment and asks its customers active support in the correct and environmentally-friendly disposal of its devices.

FAILSAFE FUNCTION

The T154 has n.o selection (contact open) / n.c (normally closed contact) for ALARM, TRIP and FAULT relays, programming steps 26 to 31 page 13. The selection of the setting YES/NO introduces functions Fail Safe and No Fail Safe.

ALARM AND TRIP

Setting NO (NO Fail safe) normally open contacts are in positions 5-7 Alarm and 8-10 Trip, they switch only when limits are reached preset temperature.

Setting YES (Fail Safe) normally closed contacts are in positions 5-7 Alarm and 8-10 Trip, they switch only when limits are reached preset temperature.

FAULT

Setting YES (Fail safe) the contact 11-12 is positioned as normally open, switches (closed) when a fault condition is identified; see section on page 11 alarms and ventilation.

Setting NO (NO Fail safe) the contact 11-12 is positioned as normally closed, switches (open) when a fault condition is identified; see section on page 11 alarms and ventilation.

Disabling the failsafe function on the fault contact the unit will no longer be able to report the fault for lack of power. In this case it is suggested that the enabling of the fail safe on the ALARM contact for the above indication.

NOTE: When the unit is located in one of the methods described below does not monitor heat, also the relay will all be banned, the FAULT led start blinking.

- Vis. display programming.
- PRG programming.
- Test of the relays.

The FAIL SAFE is temporarily disabled The FAULT relay switches.

USEFUL CONTACTS

TECHNICAL INFORMATION: campisi@tecsystem.asia

COMMERCIAL INFORMATION: georgeyang@tecsystem.asia
miawang@tecsystem.asia

UL SPECIFICATION AND RATINGS

CABLE SPECIFICATION	Dimension for main circuit 18AWG, working temperature over 105°C
MASS OF THE EQUIPMENT	0,45 Kg
INPUT SUPPLY	24 – 240 Vac / Vdc ($\pm 10\%$), 50/60 Hz, 7,5VA max
PROTECTION	External switch or circuit breaker
OUTPUTS RELAYS	5 Relay Output: 10A 250Vca-res COS=1
Suitable for use on a flat surface of a type 1 enclosure if Back panel is provided with two short fixing screws tightening torque : 0.57Nm	

C01 T154 -V- ED16 CHANGES VERSION

When at the starting the device shows the message T154 C01 means that: you have purchased the model T 154 -V-

What are the changes introduced in the T154 model -V-:

Programming with default values: ALARM 120 ° C (CH1-2-3) - TRIP 135 ° C (CH1-2-3) - FAN YES (CH1-CH2-CH3) - FAN ON 90 ° C - 80 ° C FAN OFF - CH4 YES - ALARM 130 ° C (CH4) - TRIP 145 ° C (CH4) - HFN NO - NO FCD - VOT YES.

Introduction of the Voting feature, activated by default, voting programming pages 12-13 steps 24-25.

VOTING FUNCTION

The voting function derives from the redundancy concept that consists in duplicating the components of a system to increase their **reliability**.

How does VOTING work?

Using the redundancy principle, we use the sensors installed on the three phases U-V-W to monitor the transformer's operation, and at the same time ascertain the sensors are working correctly, discriminating against any false alarms (generated by installation errors).

By activating the **VOTING "YES"** function, the control unit compares the temperature values recorded on the monitored CH1-CH2-CH3 channels and enables the switching of the **TRIP** contact only if the **TRIP** threshold has been exceeded on at least two channels over the same period T.

By selecting **VOTING "NO"** the function will be disabled.

Note: by setting Voting "Yes" the switching of the **ALARM** contact will anyway indicate the alarm threshold on each individual channel has been exceeded.

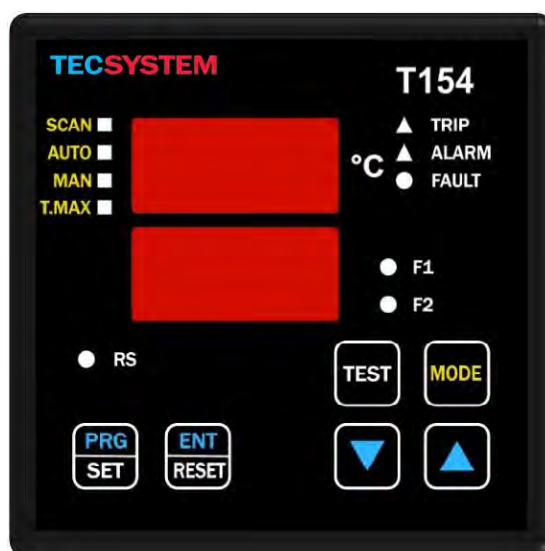
To disable the Voting function, read the programming section on pages 12-13.



Attention: To control the transformer correctly from a temperature point of view, enabling the VOTING function is allowed where the load distributed between the phases of the transformer is adequately balanced. In addition, any conditions of FAULT: FCC-FCC-FCD on two or more channels, with active voting, can determine the TRIP contact inhibition.

产品说明手册

T154



1MN0101 REV. 0

TECSYSTEM
temperature protection relays & ventilation



符合 ISO9001 认证质量体系

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R. 1.6 06/09/17

中文

说明

首先，感谢您选择使用 **TECSYSTEM** 产品，我们建议您仔细阅读本说明手册：您将了解设备的使用，并因此而能够运用它的所有功能。

注意！本手册是关于控制装置 **T154** 的有效完整说明

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安全性要求



注意:

开始使用控制装置前，请先阅读本手册。并妥善保存以备日后查阅。



禁止打开设备，触摸任何内部零件可能遭到电击。接触超过 50 伏的电压可能导致致命。为了减少电击危险，禁止因任何原因拆下设备背板。
打开背板将使保修失效。

连接设备的电源之前，请确保所有连接正确。对电缆进行任何修改前，始终要断开装置的电源。



对设备进行的任何操作都必须由合格的工程师执行。

拒绝遵守这些说明可能导致损坏、起火或电击，还有可能造成严重的人身伤害！

电源

T154 ED16 系列控制装置使用通用电源，即可以通过 24-240 Vac-Vdc 电源供电，直流电源不考虑极性。使用电源前，确保电源线未损坏、打结或压扁。切勿篡改电源线。断开装置电源时，切勿拉扯电源线，避免触摸引脚。切勿用湿手进行任何连接/断开操作。切勿使用操作杆等物体断开设备电源。如果闻到烟味或看到烟雾，请立即断开设备电源，并联系技术服务人员。

液体

切勿让液体溅到或滴到设备上，设备放置区域的湿度不得超过 90%，切勿在暴风雨天气用有水或潮湿的手触摸装置。如果有任何液体渗透到控制装置中，请立即断开电源并联系技术服务人员。

清洁

清洁控制装置前，请先断开电源，再使用干抹布擦拭，无需使用任何溶剂或洗涤剂，最后用压缩空气吹净

物体

切勿将任何物体插入控制装置的缝隙中。否则，请断开控制装置电源，并联系工程师。

专供合格人员使用

您购买的产品是精密电子设备，禁止由不具备合格资质的人员使用。任何作业均须由专业工程师执行。

配件

使用非原装配件或备件可能损坏装置并危及使用者的性命安全。出现故障时，请联系技术服务人员。

位置

将控制装置安装在室内，防止雨淋和日晒。装置附近不得存在超出本手册规定参数的热源。放在稳固平面上，远离任何可能的震动。装置尽可能远离任何强烈磁场。

修理

请勿打开控制装置。如果出现故障，始终应联系具有合格资质的人员。打开控制装置和/或撕除序列识别标签将导致保修自动失效。所有设备都有保修封条，试图打开装置将破坏封条，进而导致保修自动失效。

功能

通过温度正确控制变压器，从而当变压器相间负载均衡分配时允许启用冗余功能。

技术信息

Mail: campisi@tecssystem.asia— tel: +86 21 39905855

配件

包装盒中包含以下物品:

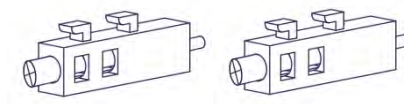
控制装置



产品说明书(CD 光盘)



2 个面板安装块



1 个电源接线端子 3 个接线柱间距 5

代码: 2PL0367- 螺丝拧紧力矩 0.5Nm



1 个继电器接线端子 10 个接线柱间距 5

代码: 2PL0394 -螺丝拧紧力矩 0.5Nm



1 个 Pt100 传感器接线端子 12 个接线柱间距 3.81

代码: 2PL0420-螺丝拧紧力矩 0, 25Nm



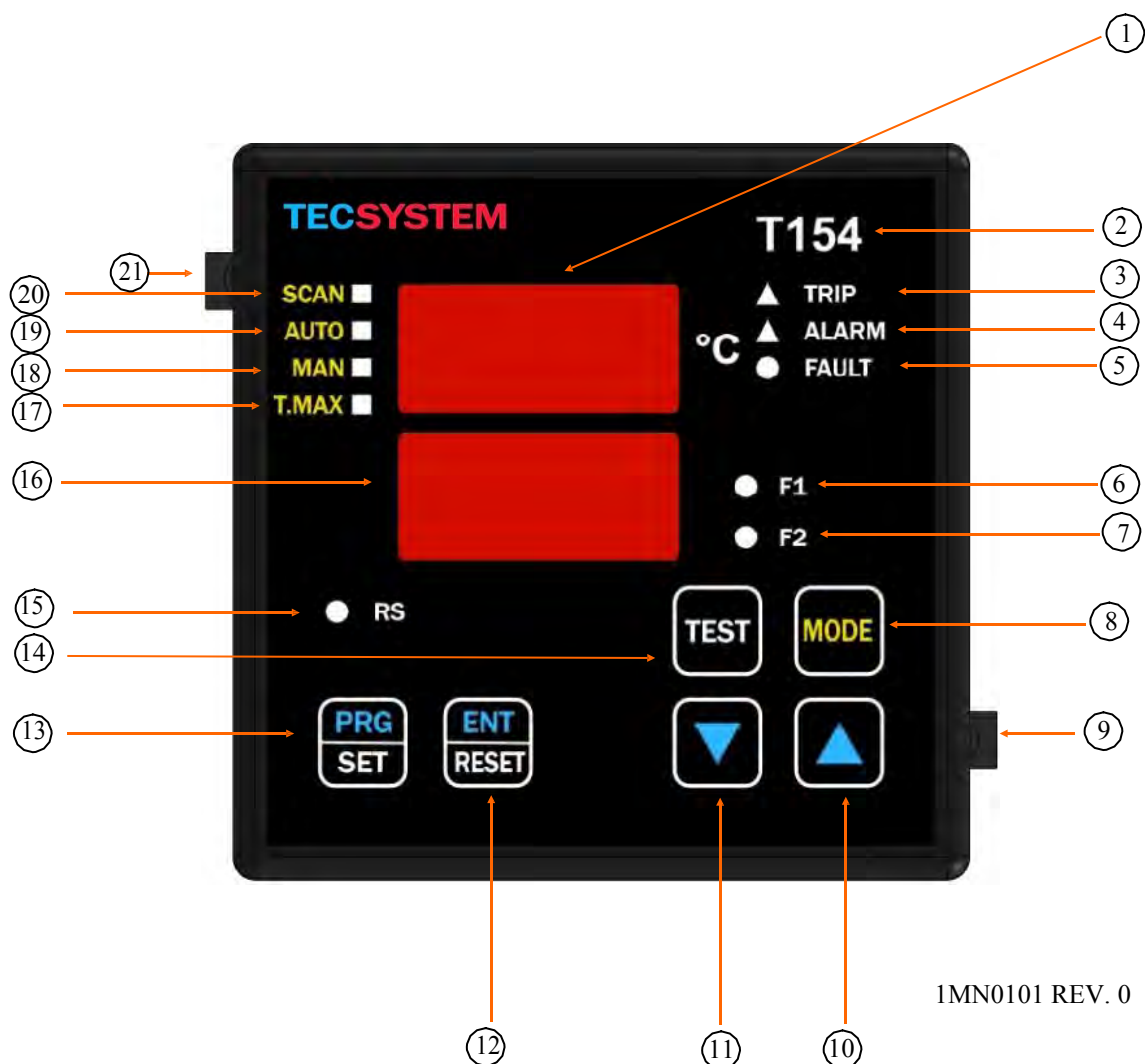
1MN0030 REV. 2

注意: 请始终使用包装中提供的接线端子安装设备。除控制装置中提供的接线端子以外, 使用其他接线端子可能导致装置出现故障。

技术规格	T154
电源	
电源额定值	24-240 Vac-Vdc 50/60Hz
最大电源值和最小电源值	20-270 Vac-Vdc 50/60Hz
Vdc, 极性可逆	●
输入	
4 个 RTD 传感器输入, Pt100 类型, 3 芯 (最大截面积 1.5mm ²)	●
可卸除式接线端子上的连接线	●
受电磁干扰保护的输入通道	●
热敏电阻器电缆补偿	500 m (1 mm ²)
输出	
2 个警报继电器 (警报和跳闸) SPDT	●
1 个传感器或运行故障 (故障) 继电器 SPST	●
1 个通风管理继电器 SPST FAN 1	●
带 10A-250Vac-res COS Φ=1 触点的输出继电器。	●
尺寸	
100x100 mm - din43700-depth 131mm (含接线端子)	孔 92 x 92 mm
测试和性能	
构造符合 CE 标准	●
电气干扰保护 EN 61000-4-4	●
输出继电器与传感器之间、继电器与电源之间、电源与传感器之间的电介质强度 1500 Vac, 持续 1 分钟	●
准确度 ±1% 全量程值, ±1 位数	●
环境工作温度 - 20° C 至 +60° C	●
湿度 90%, 不凝结	●

技术规格	T154
测试和性能	
前面板覆膜聚碳酸酯 IP65	•
外壳改性聚苯醚 94 _V0	•
吸收 7.5VA	•
数据存储最低 10 年	•
传感器信号数字线性化	•
自诊断电路	•
电子零部件保护处理	选项
显示器和数据管理	
2X13mm 显示器, 3 位数, 显示温度、消息和通道	•
3 个 LED 显示选定通道的警报状态 (警报-跳闸-故障)	•
4 个 led 显示模式的选择(扫描-自动-手动-最高温)	•
1 个 LED 显示 FAN1	•
温度控制从 0° C 至 240° C	•
通道 1-2-3 的 2 个警报阈值	•
通道 4 的 2 个警报阈值	•
1 个通风开-关阈值 FAN1	•
传感器诊断 (Fcc-Foc-Fcd)	•
数据存储诊断 (Ech)	•
通过前部键盘进入编程	•
不活动状态持续 1 分钟后自动退出继电器编程、显示器和测试	•
错误编程警告	•
在通道自动扫描、最高温通道或手动扫描之间选择	•
存储通道和警报状态达到的最高温度	•
前部按键重置警报	•
失效保护功能	•

前部面板



1MN0101 REV. 0

1)	3 位数温度显示	12)	输入/重置按钮
2)	控制装置序列	13)	编程/设定按钮
3)	跳闸（红色）LED	14)	LED/继电器测试按钮
4)	警报（黄色）LED	15)	RS（绿色）LED（未使用）
5)	故障（红色）LED	16)	3 位数通道显示
6)	FAN1（黄色）LED	17)	最高温度模式选择（红色）LED
7)	FAN2（黄色）LED（未使用）	18)	手动模式选择（黄色）LED
8)	显示模式选择按钮	19)	自动模式选择（绿色）LED
9)	固定块	20)	扫描模式选择（黄色）LED
10)	向上键	21)	固定块
11)	向下键		

显示器

第一个显示器专用于显示温度。

第二个显示器专用于显示受监测的通道。

设备打开或重置后，显示器显示：控制装置模式、T154（BAS 无选项，C01 T154-V-）带版本号“00”（固件版本）和装置的温度范围。

按“模式”键加载显示模式：

- **扫描：**监测装置每隔 2 秒钟显示所有已激活(°C)和未激活(NO)的通道扫描。
- **自动：**监测装置自动显示最高温通道。
- **手动：**使用向上/下键▲▼手动读取通道温度
- **最高温度：**监测装置显示传感器达到的最高温度和在上一次重置后发生任何警报或故障的情形。使用光标▲▼选择通道，使用“重置”重置值。

操作程序控制

要控制编程的保护级别，按“PRG”按钮两次以进入 VIS 显示模式。反复按“PRG”按钮多次可一次滚动浏览之前加载的所有值。

键盘持续 1 分钟没有任何操作时，编程显示程序自动取消。要停止显示，按“ENT”按钮。

扫描和手动功能说明

在“扫描”和“手动”模式中，可以显示 T154 的操作。

1) 运行 CPU：装置正常运行，不出现任何系统错误时，显示该消息

2) Ech Err：检测到 EEPROM 内存被损坏时，显示该消息。按“重置”将取消该消息并还原第 12 页编程部分列出的原始默认参数。将控制装置返还给 TECSYSTEM 进行修理。

3) CAL Err：测量电路中发现损坏时，显示该消息
显示的温度值可能不正确。将控制装置返还给 TECSYSTEM 进行修理。

4) Pt Err：检测到一个或多个 PT100 传感器不正常工作，以及出现第 15 页温度传感器诊断部分所述的 FOC、FCC 和 FCD 指示时，显示该消息，如果出现**错误**，故障继电器将断电。

上述消息将按照 1-2-3-4 的优先顺序进行显示。

说明：无论处于任何一种显示模式，传感器发生故障时（fcc、foc 或 fcd），控制装置都将自动切换到**扫描（基于权限的扫描）模式**，您可以立即在相关通道 **CH**（模式键已禁用）上看到故障。

LED 测试

我们建议定期执行控制装置 LED 测试。

要进行此操作，短按“测试”键；所有显示器将打开 2 秒钟。

如果其中一个 LED 不工作，请将控制装置返还给 TECSYSTEM 进行修理。

警报继电器测试

该功能可在不使用任何其他设备的情况下测试继电器的运行情况。

要启动测试程序，按住“测试”按钮约 5 秒钟：TST 持续显示 2 秒钟，确认您已经进入“继电器测试”模式。

亮起的 LED 显示要测试的继电器；使用光标▲▼选择要测试的继电器。

按“设定”和“重置”键使要测试的继电器通电和断电；显示器将显示 ON-OFF。键盘持续 1 分钟没有任何操作时，“继电器测试”程序自动取消。要停止“继电器测试”程序，按“测试”键。

或者您也可以使用 PT100 模拟器（型号：SIM PT100）。

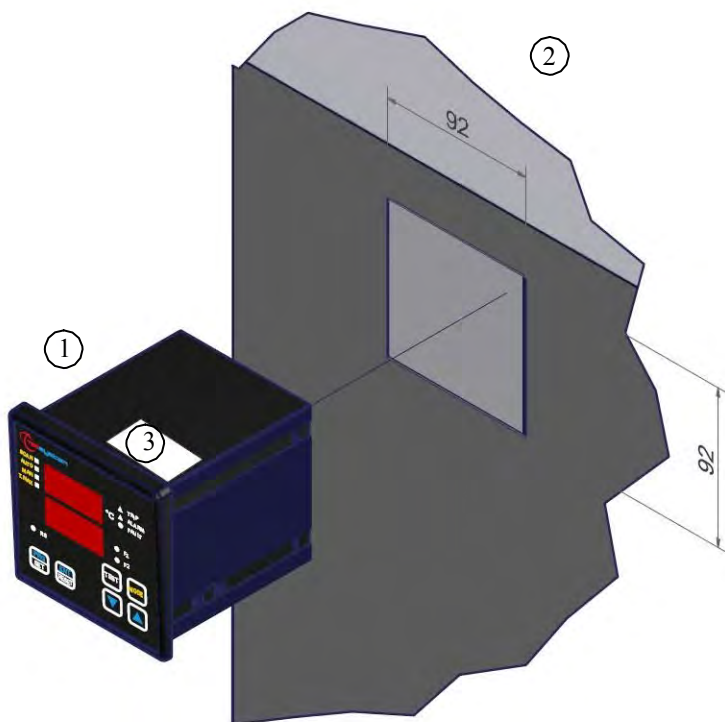
警报继电器消音

如果要给警报信号消音，按“重置”键；继电器断电，且固定的“警报 LED”开始闪烁。

温度低于警报阈值时，消音自动被禁用。

安装

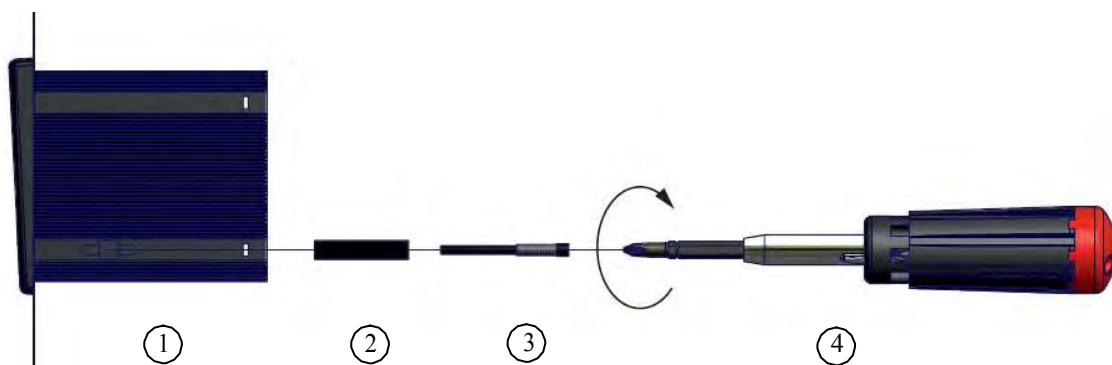
在面板中钻一个 92 x 92 mm 的孔



1MN0007 REV. 0

1)	控制装置	2)	面板孔尺寸 (+0.8mm 公差)
3)	识别标签		

使用随附的固定块牢牢固定装置.

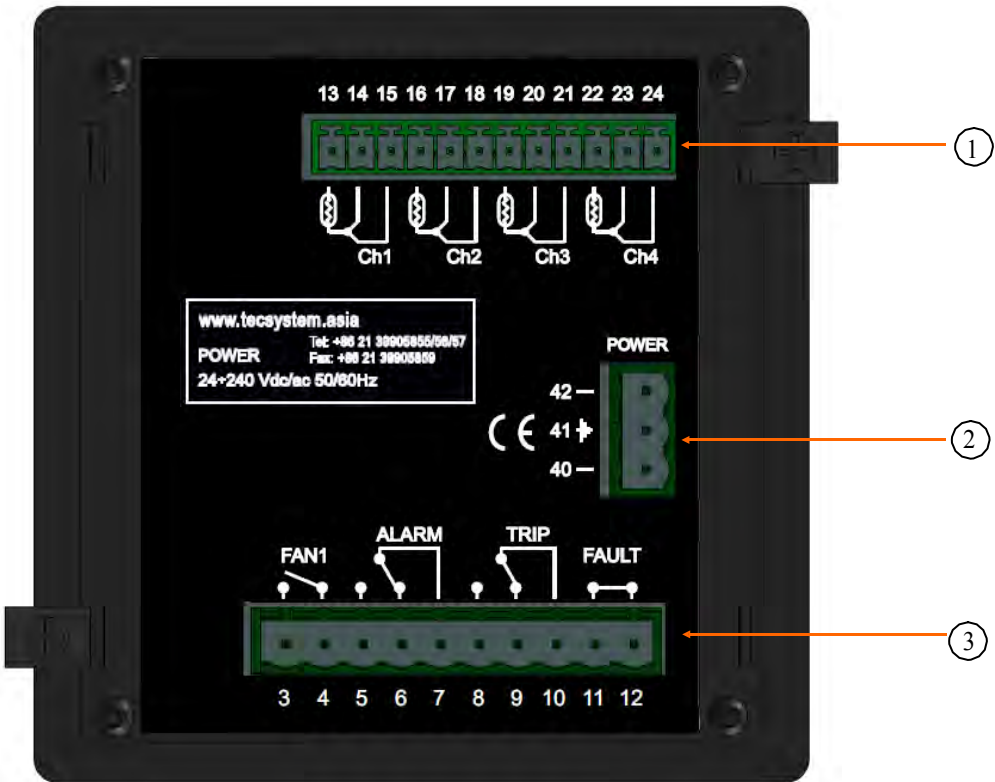


1MN0008 REV.0

1)	控制装置	3)	固定螺钉
2)	固定块	4)	十字头螺丝起子#1X100mm

电气连接

T154

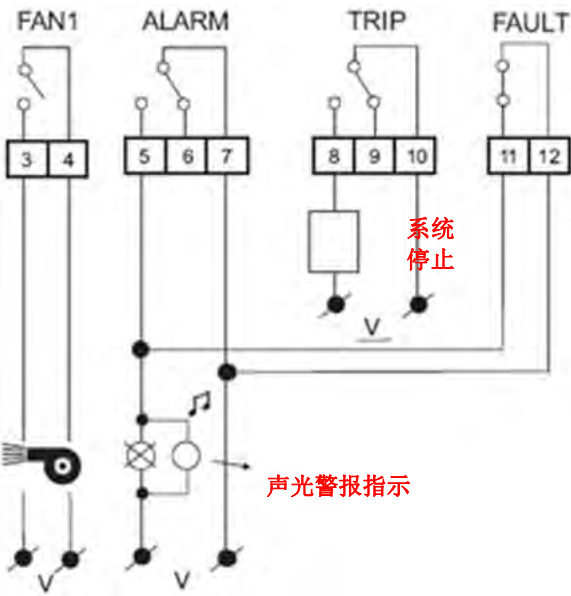


1MN0125 REV. 0

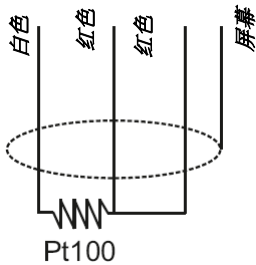
1)	Pt100 传感器（白色-红色-红色）	3)	继电器（FAN1-警报-跳闸-故障）
2)	电源 24-240Vac-dc 50/60Hz		

说明：继电器触点图像处于无警报状况，故障继电器切换异常：触点 11-12 打开（常开），触点 11-12 关闭（常闭）故障状况标识。请阅读第 11 页的警报和通风部分，查阅故障触点切换。

继电器连接示例



Pt100 CONNECTION EXAMPLE



说明：将传感器连接到控制装置以前，请先仔细阅读第 14 页的测量信号传输部分。

带 10A-250Vac-res COS Φ=1 触点的输出继电器

电源

T154 ED16 系列使用通用电源，即可以通过 24-240 Vac-Vdc、50/60Hz 电源供电，直流电源不考虑极性（接线端子 40-42）。

这是由于使用了全新设计和制造且经过测试的电源装置，因此安装人员无需担心交流电源和直流电源是否正确。

接地线必须始终连接至接线端子 41。

装置由要保护的变压器二次电压直接供电时，电压过高可能导致装置被烧坏。主开关关闭且变压器没有负载（空载测试）时，将出现这种情况。如果 220 伏交流电压直接来自变压器二次母线，且固定电容蓄电池为变压器本身提供相电压，则上述问题会更加明显。

为了对监测装置提供线路过电压保护，我们建议您使用 TECSYSTEM 公司专为此用途设计的 PT-73- 220 放电装置。作为备选，我们建议使用 110 伏交流电压，或者使用 110 伏直流电压更好。

如果必须使用新的控制装置替代原来的控制装置，为了保证装置的正确和安全运行，必须使用随附的新接线端子更换连接传感器/继电器/电源的接线端子。

警报和通风

对可拆卸式接线端子进行电气连接前，必须先将接线端子从装置上断开。

控制装置处于以下其中一种模式时，不会监测温度，且所有继电器闭锁，故障继电器触点闭合且故障 LED 开始闪烁。

- VIS 编程显示器
- PRG 编程
- 继电器测试

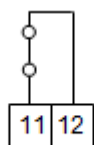
“警报”和“跳闸”继电器仅当超出设定的温度阈值时切换。

仅当设备通电时，如果装置在启动时没有检测到故障，“故障”触点切换一直保持该状况，直到出现以下其中一种情况：

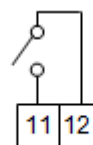
- 数据存储故障（Ech 消息）。
- Pt100 传感器故障（FCC 短路传感器、FOC 中断传感器或 Fcd 温度急增）
- CAL 测量电路损坏。
- 电源电压不足。
- D 编程后上电复位 (PRG) 时，显示数据 (VIS) 和测试继电器。

说明：请勿将“故障”继电器连接至变压器跳闸电路，以便系统意外中断。

故障触点切换



FAULT 11-12 NC: ALARM FAULT OR POWER OFF



FAULT 11-12 NO: POWER ON OR NO FAULT

FAN1 触点可以用于控制冷却风扇，或者可以包含在变电室调节系统中，具体见第 15 页的风扇控制部分。

说明：进行任何电气连接之前，始终要先断开装置电源。

故障和重置消息序列

在下文找到故障消息序列和“重置”功能状况。

1) ECH	Eeprom 故障	可擦除消息
2) CAL	测量电路故障	可擦除消息
3) FCD	温度急增故障	可重置状况
4) ERR PT	FOC 或 FCC 传感器故障	不可重置状况

编程

T154

STEP	PRESS	EFFECT	PRESS	NOTES
1		按住“PRG”键，直到显示器显示“PRG”		
2		按“PRG”确认进入编程模式		
3		显示(CH 1-2-3)的“警报”阈值设定目标阈值，警报 LED 闪烁		默认 90°C
4		显示(CH 1-2-3)的“跳闸”阈值跳闸 LED 闪烁		
5		设定目标阈值		默认 119°C
6		显示 1. 2. 3 Fan1 LED 闪烁		
7		选择 YES 或 NO		默认 YES
8		显示器显示(CH4)CH4 启用		
9		设定为 YES 或 NO		设定为 YES 时，CH4 启用，设定为 NO 时，CH4 禁用。
10		显示(CH4)的“警报”阈值，警报 LED 闪烁		如果 CH4=NO，前往步骤 16，默认为 NO
11		设定目标阈值		默认 120°C
12		显示(CH4)的“跳闸”阈值，跳闸 LED 闪烁。		
13		设定目标阈值		默认 140°C
14		显示 CH4 Fan1 LED 闪烁。		如果 CH1. 2. 3 启用 CH4=NO，则无法启用
15		设定为 YES 或 NO		默认 NO
16		显示 FAN ON，FAN1 LED 闪烁。		如果 FAN1=NO，前往步骤 20
17		设定 FAN1 ON 的目标阈值		默认 70°C
18		显示 FAN OFF，FAN1 LED 闪烁		
19		设定 FAN1 OFF 的目标阈值		默认 60°C

20		显示 HFN (NO), FAN1 LED 闪烁		每“n”小时对风扇进行循环测试, 时间为 5 分钟
21		设定目标小时数	 	默认 NO=功能禁用
22		显示 FCD (NO)		温度急增导致的故障 (° C/秒)
23		设定目标值 (FCD 第 16 页)	 	默认“no”(功能已排除)
		如果为版本 T154 (BAS), 则跳至步骤 26		
24		显示 VOT (YES) (见第 18 页的投票)		C01 T154 -V-
25		设定为 YES 或 NO	 	单独按照 C01 T154 -V-默认为 YES
26		显示 END		编程结束
27		按“ENT”存储设置和退出编程		Err: LED 值编程错误 (说明 6)
28		返回步骤 1		

- 1) “模式”键允许按照 26-23-8-1 的相反顺序进行编程
- 2) “测试”键允许退出编程并且不保存修改的数据。
- 3) 键盘持续 1 分钟没有任何操作时, 退出编程并且不保存数据
- 4) 在编程过程中, 控制装置不控制/保护被监测的机器
- 5) 编程结束时, 控制装置重新启动, 且“故障”继电器禁用, 直到装置完全重启。
- 6) 按“ENT”时, 显示“Err”, 意味着发生以下其中一种错误:

ERR ALL. = 警报 ≥ 跳闸

ERR FAN = 风扇关闭 ≥ 风扇打开。(FAN1)

按“PRG”返回步骤 1 并更正数据。

说明: 每次对控制装置进行编程并确认保存数据时, 最高温度中存储的值被重置为保存时的值。



注意:

我们建议您在启动设备前先检查装置的编程。

TECSYSTEM 设定的默认参数可能对您的要求不适合。

对设备进行编程是最终用户的责任, 必须根据安装控制装置的系统的特定应用和特征检查 (由专业的工程师执行) 本手册中所述的警报阈值的设定情况和功能的启用情况。

温度传感器

每一个 Pt100 温度传感器都有一根白色线缆和两根红色线缆（CEI 75.8 规定）。

CH2 通道必须始终对应变压器中央绕组。

如果要使用 T154 控制装置调节变电室的温度，CH4 通道必须始终对应变压器芯或 Pt100 环境传感器

测量信号传输

传输 Pt100 测量信号的线缆在所有情况下都必须符合以下条件：

1. 每一个 Pt100 都必须与三芯线缆连接，线缆的最小截面积为 0.35mm^2 ，最大截面积为 1mm^2 。
2. 延长电缆必须使用带 80%屏蔽罩的镀锡铜线编织屏蔽。
3. 导线必须为绞线，建议最大步长为 60mm。
4. 电缆屏蔽层必须仅与终端接地，最好是在装置侧。
5. 传感器信号传输电缆附近不得有任何低压或中高压电线。
6. Pt100 电缆和信号传输电缆必须按直线铺设，不得缠绕。
7. 对接导体的任何盖帽必须正确压接，避免错误接触。

说明：为了正确安装传感器和信号传输电缆，请阅读 SCS/传感器安装规则手册。

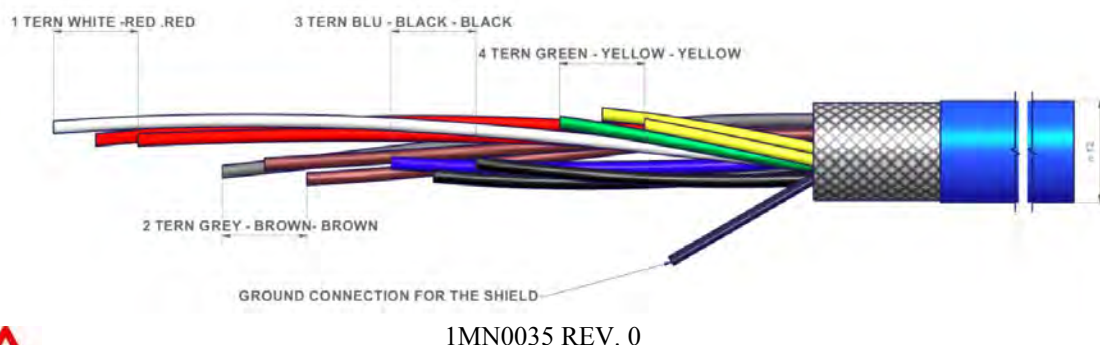
不遵守安装规则可能导致的后果。

- 1) 从其他电路的电线传递过来的电场与导体（尤其是无屏蔽层的电缆）进行电容耦合。这种耦合效果产生的信号与附近导体传输的信号叠合，导致读数不准确。
- 2) 电线中的磁通量变化可以在信号传输电缆（尤其是非绞线电缆）上产生电动势，形成闭合电路，产生电流。干扰电流乘以电路电阻产生的电压值与被传输的信号叠合，干扰传感器的测量。
- 3) 错误接触可以更改信号，导致检测到的温度发生变化

在具体情况下，若未遵守 Pt100 传感器的连接规则，则 SCS 盒与温度控制装置之间会出现以下异常情况：

- a) 温度读数不准确、警报或异常跳闸
- b) Pt100 传感器出现机械/电气故障
- c) 控制装置的 Pt100 输入被损坏

TECSYSTEM 公司设计了自己的特殊电缆以用于传输测量信号，不仅符合 CEI，也满足型号 CT-ES 的所有保护要求



注意：使用不符合以上规则的电缆可能导致读数异常。始终须考虑的重要一点是，对信号线的任何干扰都有可能导致 Pt100 输入 (CH1-CH2-CH3- Ch4...) 或传感器出现异常

所有 T 系列控制装置都使用线性传感器信号，最大错误容差为全量程值的 1%

温度传感器诊断

如果出现故障或超出要保护的机器上安装的其中一个温度传感器的最小/最大全量程值，则立即切换“故障”继电器，并且显示相应通道上的故障传感器相关警告(Pt Err)：

Fcc 表示传感器短路或控制装置的最小全量程值超过-8°C

Foc 表示传感器受到干扰或控制装置的最大全量程值超过 243°C

要清除消息并重置“故障”切换，需检查 Pt100 连接并更换出现故障的传感器（如有）。如果已经达到最小/最大全量程值，则检查环境条件与控制装置的读数是否一致。

说明：传感器线路受到干扰也可能导致超出最小/最大全量程值，在这种情况下，我们建议您具体检查传感器和延长电缆是否正确安装（按照第 15 页“测量信号传输”部分的说明）。

我们建议您仅在仔细评估系统状况后再启用 FCD（第 16 页）功能。

CAL 消息显示：测量电路中发现损坏时，显示该消息。显示的温度值可能不正确。将控制装置返还给 **TECSYSTEM** 进行修理

编程数据诊断

如果内部存储出现故障或编程数据被更改，则在启动时显示 Ech 以及故障触点的相关警报。

在这种情况下，为安全起见，会自动加载默认参数（见第 13-16 页的编程表）。

按“重置”可清除 Ech，再运行编程以进入目标值。

最后关闭装置并返回以检查内存是否正常工作，如果被损坏，将再次显示 Ech（将控制装置寄给 **TECSYSTEM** 公司进行修理）。

温度诊断

当其中一个温度传感器感应到的温度超出警报阈值 1° C 时，5 秒钟后，警报继电器切换，相关通道(CHn)的警报 LED 亮起。

超出跳闸温度阈值时，跳闸继电器切换，相关通道(CHn)的跳闸 LED 亮起。温度值恢复到等于或低于为警报和跳闸继电器设定的阈值后，这些继电器断电，相关 LED 熄灭。

警报和跳闸值保留在内存中：进入 VIS 模式可以调用这些值（编程参数显示）并在 PRG（编程）模式中进行修改。

冷却风扇控制

T154 控制装置配备一个 FAN 触点(FAN1)，如果编程正确，可以控制风扇打开和关闭以冷却变压器。

FAN1 触点可以控制安装了该触点的变压器或变电室的冷却情况。

控制风扇有两种不同的方式：

- 使用 CHF 1.2.3 三个柱栅上的传感器感应到的温度（例如，（70° C 时打开 - 60° C 时关闭）
- 额外使用一个传感器（CH4/YES）专用于变电室 CHF 4 内的环境温度（例如，（45° C 时打开 - 35° C 时关闭）

打开和关闭值是根据设备范围进行编程的，FAN ON 必须始终高出 FAN OFF 至少 1°C（建议 Δ FAN（电源 ON-OFF）+10°C），当温度超过 FAN ON 的阈值 1°C 时 FAN 1 的 LED 变亮，相应的继电器开始动作；当温度低于 FAN OFF 的阈值 1°C 时灯灭，相应的继电器开始动作。

风扇测试

通过编程(HFn)可以使风扇每“xxx”小时运行 5 分钟，无论柱栅或环境温度值（即当 HFn=001 时，风扇每 1 小时运行 5 分钟）。

该功能是为了定期检查风扇运行情况及其控制装置。

设定为 **NO** 时，该功能被禁止。

要启用 Hfn 功能，请阅读第 12-13 页的编程部分。

重要警告



对安装了控制装置的配电板进行绝缘测试前，将它和传感器从电源上断开，防止它遭到严重损坏

Pt100 延长电缆技术规格

1. 电缆 20 x AWG 20/19 铜/锡
2. 截面积 0.55 mm²
3. 阻燃绝缘层 PVC105
4. CEI 20.35 IEC 332.1 规定
5. 最高工作温度：90° C
6. 构造：4 组三绞线和带颜色的导体
7. 铜/锡屏蔽层
8. 阻燃 PVC 外层套
9. 外径 12mm
10. 100m 线圈标准构造

FCD 功能

T 系列设备结合了创新控制功能和 Pt100 传感器的动态状态。

激活 FCD 时，控制装置分析温度上升情况 ΔT (*) 并以秒为单位进行记录 (°C/秒)。

启用该功能后，用户可以从最低值 1° C/秒和最高值 30° C/秒之中选择一个值 (ΔT)。如果感应到的值高于用户设定的值，则控制装置抑制激活“警报”和“跳闸”警报和切换“故障”继电器(11-12)，显示消息“fcd 故障”

例如：我们将该功能设定为 5° C，仅当控制装置感应到被监测系统上的 ΔT 在一秒钟内增加超过 5° C 时，才会切换 FCD 故障。

设定为“no”以禁用 FCD 功能。

当通道为 FCD “故障”时，单通道“警报”和“跳闸”警告被抑制；因此，仅突出显示温度增加过快。

按“重置”以删除所有通道上的 FCD 警告并重置“故障”继电器。

FCD 的可能应用

指示 Pt100 传感器线路上可能产生的干扰

如果未遵守安装说明（见第 14 页），则 Pt100 传感器线路上的任何干扰都有可能導致读数错误或异常警报。

在 1° C 至 10° C 之间设定 FCD 功能时（建议 5° C），可以抑制错误读数造成的结果，阻止激活警报继电器，如上所示。

纠正措施：检查传感器延长电缆的安装是否遵照第 14 页测量信号传输部分的说明。

指示传感器故障或故障连接

如果连接或传感器故障，可能会使温度快速上升或降低，导致系统跳闸或触发被监测系统的警报。

在这种具体情况下，我们建议在 10° C 至 20° C 之间设定 FCD 功能。

纠正措施：检查传感器连接的接线端子已拧紧，必要时更换出现故障的传感器

指示电机转子堵塞

在这种具体情况下，我们建议在 20° C 至 30° C 之间设定 FCD 功能。建议设定为该值是为了防止在电机启动时或 $\Delta T/\text{sec}$. 快速变化时激活 FCD 功能。

(*) ΔT 值显示每一秒的温度范围

保修条件

您购买的产品受制造商或卖方保修条款和条件的保护，具体见 www.tecsystem.asia 和/或购买协议中提供的“TecsysteM 公司一般销售条件”。

仅当产品损坏是由于 TECSYSTEM 导致而成时（例如制造工艺或零部件缺陷），保修方才有效。

如果证实产品被篡改/修改、连接错误、电压超出限值、未遵守装配和使用技术数据（如本说明手册中所述），则保修无效。

故障排除	原因和解决办法
控制装置无法打开，但接线端子 40-42 的电源正确。	检查：连接器正确插入外壳中，线缆拧紧，连接器上没有烧伤的迹象。断开电源，进行如上检查并重新连接。
CH4 出现由于 FOC 导致的故障（仅连接 3 个 Pt100 传感器）	CH4 / YES 控制装置编程错误。按照第 12-13 页检查和重复编程，选择 CH4 / NO。
三/四个通道的其中一个通道出现由于 FOC/FCC 导致的故障	检查 Pt100 传感器的连接，检查第 14-15 页的测量信号传输和温度传感器诊断部分的说明。
打开时，显示器显示“ECH”	强烈干扰损坏了存储的数据。见第 15 页的编程数据诊断部分。
Pt100 传感器全部处于 FCC。	传感器连接不正确、插入接线端子时上面朝下。检查连接线和接线端子。
一个或多个通道显示的温度错误。	联系 TECSYSTEM 技术部。
主开关突然跳闸。温度处于标准水平。仅一个通道引起跳闸。	检查 T-MAX 中记录的温度，检查第 14-15 页的测量信号传输和温度传感器诊断部分的说明。激活 FCD 功能。
FCD 警告	见第 16 页的 FCD 功能。
如果问题仍然存在，请联系 TECSYSTEM 技术部。	

设备处置

设备已通过欧洲指令 2012/19/EC (WEEE)和 2011/65/EC (RoHS)认证，以减少电气和电子废物，提倡回收使用该设备的材料和零部件，减少电气和电子材料残余物和有害零部件的处置。



2005 年 8 月 13 日以后供应的所有电气和电子设备均带有遵循关于电气和电子废物(WEEE)的欧洲指令 2002/96/EEC 的符号标志。带有该符号标志的所有电气或电子设备均须与普通的生活垃圾分开处置。

归还使用过的电气设备：联系 TECSYSTEM 或您的 TECSYSTEM 代理了解有关正确处置设备的信息。

TECSYSTEM 了解其产品的环境影响，因此要求客户积极支持对其设备进行正确和环保的处置。

失效保护功能

T154 为报警，跳闸和故障继电器提供 **n.o** 选择（常开触点）/**n.c**（常闭触点）可根据第 13 页的步骤 26 到 31 设定 YES/NO 选择失效保护和无失效保护功能

报警和跳闸

设定 **NO**（无失效保护）5-7 报警和 8-10 跳闸触点常开，仅当超出预设温度限值时才进行切换。

设定 **YES**（失效保护）5-7 报警和 8-10 跳闸触点常闭，仅当超出预设温度限值时才进行切换。

故障

设置 **YES**（失效保护）触点 11-12 常开，当发生故障时继电器动作（闭合），可以参考第 11 页报警和通风。

设置 **NO**（没有失效保护）触点 11-12 常闭，当发生故障时继电器动作（打开），可以参考第 11 页报警和通风。

禁用关于故障触点的失效保护控制单元不再认为掉电是故障，在这种情况下建议启用失效保护的 **ALARM** 触点进行掉电报警提示。

注意：当控制器处于以下几种情况之一时不会监控温度且继电器禁用，**FAULT LED** 开始闪烁。

- Vis 显示编程
- PRG 编程
- 继电器测试

当失效保护功能临时禁用时 **FAULT** 继电器动作。

有用联系人

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UL 规格和额定值

电缆规格	主电路 18AWG 的尺寸，工作温度超过 105° C
设备重量	0,45 kg
输入电源	24 - 240 Vac / Vdc (±10%), 50/60 Hz, 7.5Va (最大值)
保护	外部开关或电路断路器
输出继电器	5 个继电器输出: 10A 250Vca-res COS=1
如果背部面板提供 2 个拧紧扭矩为 0.57Nm 的短固定螺钉，则适用于类型 1 外壳的平整表面上。	

C01 T154-V-ED16 修订版本

设备开机时显示消息 T154 C01 是指：您已经购买型号 T 154 -V-
T154 型号-V-中引进的更改：

默认值编程：ALARM 120 ° C (CH1-2-3) - TRIP 135 ° C (CH1-2-3) - FAN YES (CH1-CH2-CH3) -
FAN ON 90 ° C - 80 ° C FAN OFF - CH4 YES - ALARM 130 ° C (CH4) - TRIP 145 ° C (CH4) -
HFN NO - NO FCD - VOT YES。

引进冗余功能，默认激活，冗余编程位于第 12-13 页步骤 24-25。

冗余功能

冗余功能源自于冗余的概念，是指在系统中重复使用零部件以增强可靠性。

冗余的作用原理？

基于冗余的原则，我们使用三相 **U-V-W** 上安装的传感器监测变压器的运行状况，同时确保传感器正常工作，以区别任何故障警报（由于安装错误而产生）。

激活冗余“YES”功能后，控制装置将比较受监测的 **CH1-CH2-CH3** 通道上记录的温度值，仅当同一时间段 **T** 内至少有两个通道超出跳闸阈值时，才启用跳闸触点切换。

选择冗余“**No**”时，功能被禁用。

说明：设定冗余“**Yes**”时，警报触点切换将指示超出每个通道的警报阈值

要禁用冗余功能，请阅读第 12-13 页的编程部分。



注意：通过温度正确控制变压器，从而当变压器相间负载均衡分配时允许启用冗余功能。此外，两个或多个通道上出现任何故障状况：**FCC-FCC-FCD**，激活冗余后，都可以确定跳闸触点抑制。