TWSK-Y Oil-Immersed Transformer Temperature Controller

User Manual

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Read me

When you use TWSK Oil-Immersed Transformer Temperature Controller, be sure to carefully read this user manual, and be able to fully understand the implications, the correct guidance of operations in accordance with user manual, which will help you make better use TWSK Oil-Immersed Transformer Temperature Controller, and help to solve the various problems at the scene.

1. Before the meter turning on the power supply, be sure that the power supply within the provisions of the instrument;

2. When installation, the current input terminal must non-open, voltage input terminals must Non-short circuit;

3. Communication terminal (RS232 or RS485) is strictly prohibited to impose high pressure;

4. Be sure the instrument wiring consistent with the internal system settings;

5. When communicating with the PC, instrument communication parameters must be consistent with the PC.

- **Please read carefully before using this user manual**
- **Please save this document**

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Directory

1.- SUMMARIZE

The TWSK-Y intelligent temperature controller is specially designed for oil-immersed transformers. It continuously monitors transformer oil temperature and provides clear digital display. Based on oil temperature conditions, it automatically controls the cooling fan and activates over-temperature alarm and trip protection to ensure safe and stable transformer operation.

The controller uses a YT Series armored PT100 oil temperature sensor with a three-wire connection and cable length of up to 20 m. It provides accurate temperature measurement without temperature compensation or calibration. With built-in RS485 communication, the controller supports remote monitoring and management of transformer operating data.

FEATURES

- Real-time oil temperature monitoring;
- High-accuracy three-wire PT100 oil temperature sensor;
- Oil temperature monitoring from -40 ~ 150°C;
- Automatic/ manual cooling control;
- Over-temperature alarm and trip;
- RS485/ Modbus RTU communication;

APPLICATION

- Distribution transformers;
- Oil-immersed power transformers;
- Industrial power transformer solutions;
- Transformer oil condition monitoring;
- Transformer cooling & protection systems;

2.- SPECIFICATIONS

Working power	
Power supply	220VAC, 50Hz
Consumption	≤5VA
Measurement	
Oil temp. measure range	-40 ~ 150°C
Resolution	0.1
Response speed	<1s
I/O module	
Relay output	5A@AC250V
Analog output	DC 4~20mA
Communication	RS485/ Modbus RTU
Safety	
Withstand voltage	2kV AC RMS 1 minute, between input / output / case / power supply; 1kV AC RMS 1 minute, between output and power supply.
Insulation	Input, output and power supply to the chassis >1 MΩ
Environment	
Protection (TH)	Anti-containing acid, alkali, salt gas
Work environment	-40~65°C; Noncondensing
Storage environment	-40~70°C; Noncondensing
Others	
Display method	Programmable 2-rows LED switching display
Dimension	160W*80H*81Dmm; Hole size: 152×72mm

3.- INSTALLATION AND START-UP

The manual you hold contains information and warnings that -users should follow in order to guarantee a proper operation of all the instrument functions and keep it in safety conditions. The instrument must not be powered on and used until its definitive assembly is on the cabinet's door.

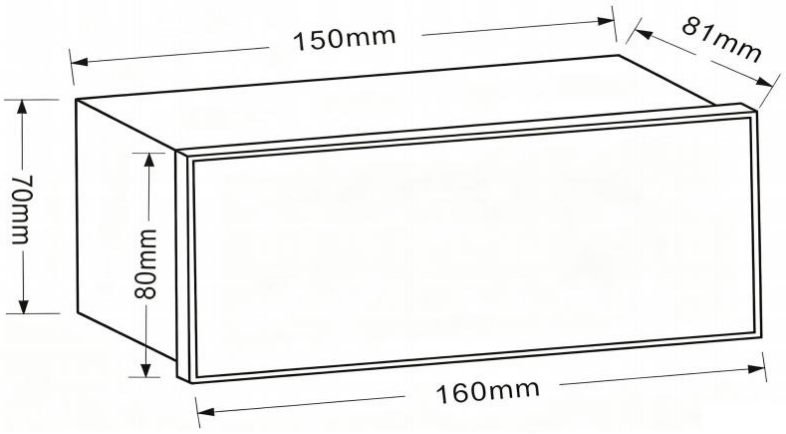
If the instrument is not used as manufacturer's specifications, the protection of the instrument will be damaged.

When any protection failure is suspected to exist (for example, it presents external visible damages), the instrument must be immediately powered off. In this case contact a qualified service representative.

3.1.- Installation

Dimension: 160W*80H*81Dmm; Hole size: 152×72mm

Controller is to be mounted on panel. All connections keep inside the cabinet.



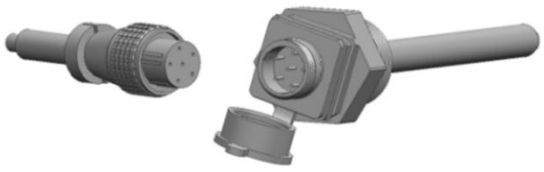
1. Insert the controller through the panel cutout.

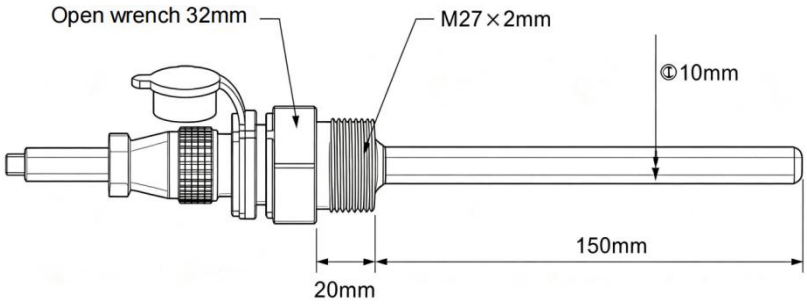
2. Insert the mounting bracket into the mounting groove at the top and bottom of the controller and push the mounting bracket forward until the bracket stops at panel wall.

3. Completion status

Warning: The controller must not be power on until this is completely installed!

Oil temperature sensor installation

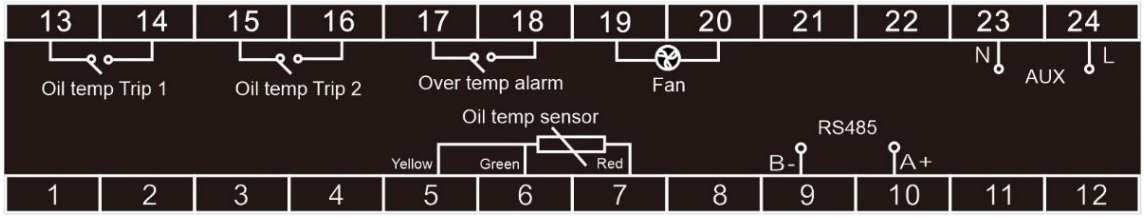




Note:

When remove and installation the temperature sensor, please pay attention to the concave and convex parts of the sensor connection. After confirming that the concave and convex parts are aligned, you can forcefully connect the two parts of the sensor together to prevent damage to the oil temperature sensor.

3.2.-Terminal connection



Upper terminal

No.	Marked	Notes
13-14	**Trip 1**	Oil over temperature trip output 1
15-16	**Trip 2**	Oil over temperature trip output 2
17-18	**Over temp**	Over temperature alarm output
19-20	**Fan**	Fan control
23-24	**AUX**	Power supply

Lower terminal

No.	Marked	Notes
5-7	**Oil temp sensor**	Oil temperature sensor input
9-10	**RS485**	RS485 communication interface

Note:

The terminal pin definition may change depends on customer order; please refer to the label on the meter!

3.3.- LED indicator light description

Fan	Lights up when the fan is turned on.
Heat	Lights up when heater starts for low-temperature heating function. (optional)
O.T.	Lights up when the oil temperature reaches the alarm threshold.
Trip	Lights up when the over temperature trip threshold is reached.

3.4.- Button description

AT/MT	Press to manually control the fan start or stop.
▼ ▲	Press to switch parameter pages and increase or decrease values.
SET	Press to enter the parameter settings page.

4.- FUNCTIONS INTRODUCTION

4.1.- Oil Temperature Sensor Fault Protection

When the oil temperature sensor is disconnected, “----” is displayed on the upper display, and all oil temperature-related outputs are disabled.

4.2.- Over Temperature Alarm

When the transformer oil temperature ≥ the over temperature alarm threshold, the over temperature alarm output closed and the O.T. indicator lights up. When the oil temperature ≤ alarm threshold − 3.0°C, the output disconnected and the indicator turns off.

4.3.- Over Temperature Trip

When the transformer oil temperature ≥ the over temperature trip threshold, the over temperature trip output closed and the trip indicator lights up. When the oil temperature ≤ trip threshold − 3.0°C, the output disconnected and the indicator turns off.

4.4.- Fan Control

Automatic Control: automatically controls fan operation according to the preset fan start and stop temperatures.

Manual Control: press the AT/MT button to manually start or stop the fan.

5.- Parameter Query and Settings

After power-on, the controller cyclically displays the winding temperatures of phases A, B, and C. Press the **SET** button to query/ set the operating parameters and threshold in sequence. each press of the **SET** button displays the next parameter. After the last parameter is displayed, the controller returns to the temperature cycling display.

Parameter Query:

Code	Item	Range	Default
1.T-H	Fan start temperature	-40~99°C	40°C
2.T-A	Fan start temperature hysteresis	1~20°C	5°C
3.T-b	Temperature correction	-9.9-9.9°C	0
4.H-H	Reserved		
5.T-C	Oil over temp. alarm	-40°C~ oil over temp. trip setting value °C	85°C
6.T-T	Oil over temp. trip	Oil over temp. alarm setting value °C ~149°C	95°C
7.Co	Reserved		
8.Adr	Communication address	1-247	1

6.- COMMUNICATION INTERFACE

6.1.- Connection for RS485 BUS

The composition of the RS-485 cabling must be carried out with a meshed screen cable (minimum 3 wire), diameter of not less than 0.5mm^2, with a maximum distance of 1,200 m between the controller and the master unit.

6.2.- MODBUS © protocol

Modbus RTU Frame Format:

Address code	**1 BYTE**	*Slave device address **1-247***
Function code	**1 BYTE**	*Indicates the function codes like read coils / inputs*
Data code	**4 BYTE**	*Starting address, high byte* *Starting address, low byte* *Number of registers, high byte* *Number of registers, low byte*
Error Check code	**2 BYTE**	*Cyclical Redundancy Check (**CRC**)*

MODBUS FUNCTIONS:

Code	Meaning	Description
FUNCTION 03/04	Read holding registers	*Read the binary contents of holding registers in the slave.*
FUNCTION 10	Write multiple registers	*Writes values into a sequence of holding registers*

Note: Float data follow **IEEE754**, float low bit first, high bit next. (**CD AB**)

6.3.- Register map

6.3.1.- Read and write communication and other parameters. function 03 to read / function to write.

Register	Data	Byte mode		Instruction
0x00	Working mode	INT	2	0 = Heating mode (default) 1 = Cooling mode
0x01	Fan start temperature	INT	2	Range: -40~99°C, default 40°C
0x02	Reserved	INT	2	/
0x03	Fan start temperature hysteresis	INT	2	Range: 1~20°C,default 5°C
0x04	Temperature correction	INT	2	Range: -9.9-9.9°C,default 0
0x05	Over temperature alarm	INT	2	-40°C~ oil over temp. trip setting value °C, default 85
0x06	Over temperature trip	INT	2	Oil over temp. alarm setting value °C ~149°C,default 95
0x07	Communication address	INT	2	Range: 1-247, default 1
0x0C	Oil temperature measurement value (read only)	INT	2	-40~150°C

7. - SAFETY CONSIDERATIONS

All installation specification described at the previous chapters named: **INSTALLATION AND STARTUP, INSTALLATION MODES and SPECIFICATIONS.**

Please note that with the instrument powered on, the terminals could be dangerous to touching and cover opening actions or elements removal may allow accessing dangerous parts. This instrument is factory-shipped at proper operation condition.

◆ The device must have a professional installation and maintenance.
◆ Any operation of the device, you must cut off the input signal and power.

8.- MAINTENANCE

The TWSK series controller does not require any special maintenance. No adjustment, maintenance or repairing action should be done when the instrument is open and powered on, should those actions are essential, high-qualified operators must perform them.

Before any adjustment, replacement, maintenance or repairing operation is carried out, the controller must be disconnected from any power supply source.

When any protection failure is suspected to exist, the controller must be immediately put out of service. The controller's design allows a quick replacement in case of any failure.

For any inquiry about the instrument performance or whether any failure happens, contact to Blue Jay's technical service.

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