Temperature Controller of Dry Transformer

BWDK-3206A Series manual

Safety Guidance

Please read the instructions carefully before installing and operating the controller, and proper keeping.

⚠️ ⚠️ Warning

◆ Please read the instructions and wiring diagram carefully before using the controller.
◆ The controller monitors dangerous power transformers. If users do not obey a prescribed procedure to operate, that will lead to property damage or serious injury or even death.
◆ Only qualified technical personnel are allowed to operate the controller, and all safety instructions, installation, operation and maintenance procedures in the manual should be known before operating.
◆ Make sure that all electrical connections are correct and secure. The controller must be grounded reliably.
◆ After the controller is powered on, some terminals are energized, please be careful.
◆ **The sensor cable plug and the power cord should be separated from the controller before the transformer voltage test, so as not to damage the controller!**

⚠️ Attention

◆ The controller may only be used for the purpose specified by our company, and unauthorized modifications may cause the controller to malfunction or even fail.
◆ Please note the use conditions of the controller, especially the humid environment.
◆ The controller is avoided to be used in the atmosphere contains sulfur dioxide, hydrogen sulfide and other corrosive gases using, otherwise it will be damaged.
◆ Do not apply a voltage or current that is greater than the rated value on the output terminals.
◆ Do not use a lighter to grill the sensor, otherwise the sensor will fail.
◆ Undefined terminals are not allowed to use.
◆ Please put the instructions in an easy place and give it to all users.

Special Product Description:

If the contents of the instruction do not conform to the product, the wiring diagram of the actual

product shall prevail.

Contents

01 The Description and Type Selection of General Functions

Product overview

Dry-type transformers need to be equipped with dry-type transformer temperature controller and terminal box, customers need to purchase separately, and installed in different locations, the process is slightly cumbersome. BWDK-3206A series of dry-type transformers temperature controller integrated dry-type transformer temperature monitoring, terminal box and other expansion features, so that customers experience better, more convenient installation. **Functional features**
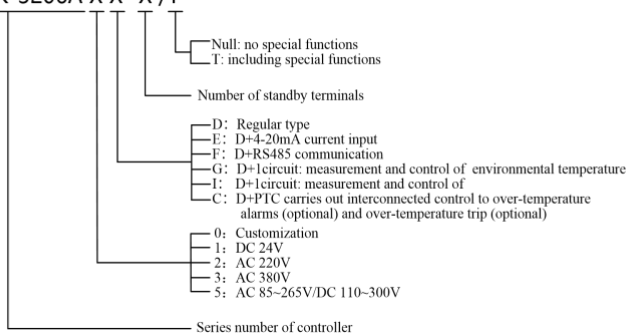
Temperature monitoring of dry-type transformer: three-phase circuit measurements and display; the maximum display; input open circuit and failure self-inspection display and output; cooling draught fan manual/automatic start-stop display and output; over-temperature alarms, over-temperature trip display and output; displayed value compensation of all channels; "black box"; control for timing start-stop of the draught fan; Temperature simulation. The full series uses the principle of number uniqueness to define input& output terminal functions, in order to facilitate the client drawing design, field wiring and control box change. Communication/simulation current is output from the terminals, no need to the intermediate conversion terminal. For the sensor cable interface, the front-end installation method is adopted to provide easy installation for clients.

Terminal box: Air switches and a certain number of terminals will be added and sufficient space will be reserved for wiring, in order to achieve the functions of the terminal box.

Extended functions: Monitor and control the ambient temperature and humidity as ll as carry out relevant functional expansion based on client demands.

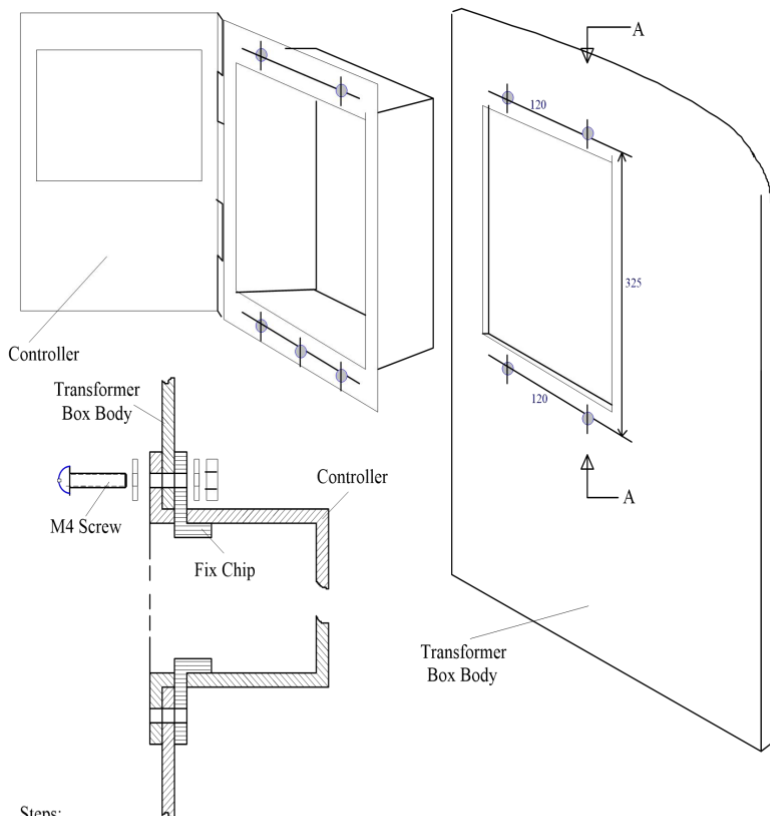**Type selection (any combination between E, F, G, I and C)**

BWDK-3206A X X -X /T

- Null: no special functions
- T: including special functions

Number of standby terminals

- D: Regular type
- E: D+4-20mA current input
- F: D+RS485 communication
- G: D+1circuit: measurement and control of environmental temperature
- I: D+1circuit: measurement and control of
- C: D+PTC carries out interconnected control to over-temperature alarms (optional) and over-temperature trip (optional)

- 0: Customization
- 1: DC 24V
- 2: AC 220V
- 3: AC 380V
- 5: AC 85~265V/DC 110~300V

Series number of controller

02 Technical Parameters

Basic technical parameters

Ambient temperature (℃)	Relative humidity (%RH)	Measurement range (℃)	Sensor type
-20 ~ 55	< 95 (25℃)	-30.0 ~ 240.0	Pt100 (Three-wire)

Power frequency (Hz)	Power voltage (V)	Power consumption of controller (W)	Resolution (℃)
50/60(±2)	AC220 (-15%, +10%)	≤8	0.1

Contact capacity		Accuracy grade	
Fan: 6A 250VAC (cosφ=0.4) Other: 5A 250VAC/5A 30VDC (resistive)		Grade 1 (controller: grade 0.5; sensor: grade B)	
Conforming to the relevant standards		Dimension (mm)	
JB/T7631-2016，ISO9001:2008，IEC61000-4:2002，GB/T17626-2008		Opening222^{+1}×312^{+1} Appearance240×345×95	

03 Installation Instructions

Controller

Transformer Box Body

M4 Screw

Controller

Fix Chip

A

120

325

120

A

Transformer Box Body

Steps:

① An inlaid hole and four retaining holes are tapped on the transformer box body as shown in the installation dimension figure.

② The temperature controller door is opened and the temperature controller is inserted into the inlaid hole.

③ Temperature controller is fixed properly with M6 screws and Fixed film.

04 Wiring Diagram Example and Instructions

BWDK-3206A2F-26-type controller
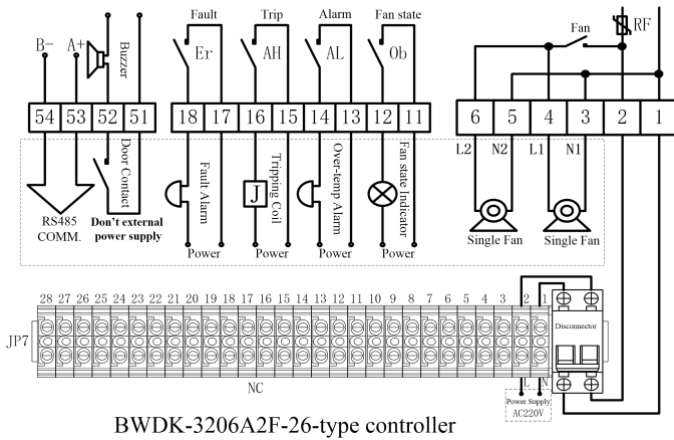
Notes: The terminal with "JP7" and without cables is a standby terminal. There is no definition for the standby terminal.

- Terminal 1 and 2 are controller working power supply and connected to AC220V (please indicate in orders if any special things exist).

- Terminal 3, 4, 5 and 6 are draught fan active output. Users cannot use outer power supply when connecting the draught fan.

- Terminal 11 and 12 are signal output of far eastone of draught fan (passive contact).

- Terminal 13 and 14 are over-temperature alarm output (passive contact).

- Terminal 15 and 16 are over-temperature trip output (passive contact).

- Terminal 17 and 18 are fault alarm output (passive contact).

- Terminal 51 and 52 are door contact signals input (do not use the outer power supply because of internal power supply).

- Terminal 53 and 54 are RS485 communications (F-type functions).

- The model and number of standby terminals are remarked when users order goods.

05 Human Machine Interface

Key instructions

Buttons	Functions	Instructions
SET	Setup key	Make sure and enter into the next step.
▲	Added key/manual key	Functions 1: Set plus 1 for parameters, which could be done rapidly by long pressing. Functions 2: Start and stop the draught fan by hands (when the temperature display interface and draught fan are not started automatically).
▼	Reduced key/maximum key	Functions 1: Set cut 1 for parameters, which could be done rapidly by long pressing. Functions 2: Always display the highest temperature in all phases.
Fn+ESC	Reset button	Press this button for over 1 second to reset the controller.

Common function codes diagram
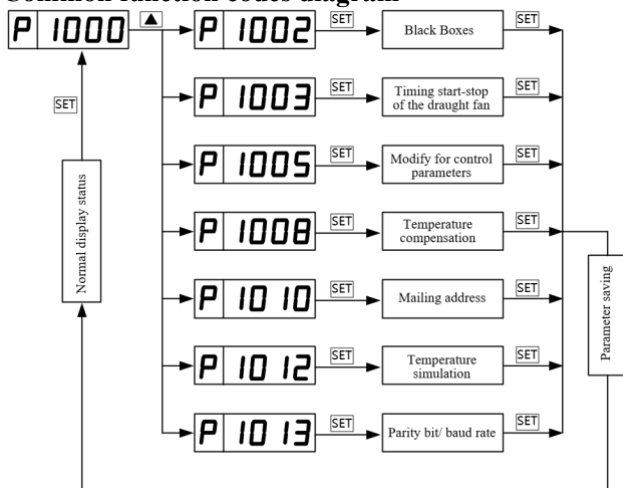
Note 1: When displaying the function prompts, press SET key to enter into the corresponding data display window; and with multiple function parameters, repeat pressing the SET key to set up from the larger numbers from the lower serial number.

Note 2: The following parameters are conventional default values. Details are subject to the controller certification or the wiring figure.

Black box(P1002)

No.	Display	Instructions	Remarks
1	P-EE-	Power failure records	Display the temperature during the power failure, and press the ▲ key to check the temperature of all phases during the power failure.

Timing Start-Stop of the Draught Fan (P1003)

No.	Display	Instructions	Default (h)	Range (h)
1	P-00-	Timing start-stop setting of the Draught Fan	0	0-150

Modification of Control Parameters (P1005)

● Setting of Conventional Control Parameters

No.	Display	Instructions	Default (℃)	Range (℃)
1	P-Ob-	Start-stop target values of the Draught Fan	90.0	-30.0-240.0
2	P-dF-	Start-stop return differences of the Draught Fan	10.0	0.0-15.0
3	P-AH-	Over-temperature trip target values	150.0	-30.0-240.0
4	P-AL-	Over-temperature alarm target values	130.0	-30.0-240.0

● G-type control parameter setting (following the conventional control parameter setting serial number 4)

No.	Display	Instructions	Default (℃)	Range (℃)
5	P-ObJ	Start-stop target values of fans in the machine room	35.0	-30.0-240.0

6	P-dFJ	Start-stop return differences of fans in the machine room	2.5	0.0-15.0
7	P-AHJ	Target values of trips in the machine room	70.0	-30.0-240.0

● I-type control parameter setting (following the conventional control parameter setting serial number 4)

No.	Display	Instructions	Default (℃)	Range (℃)
5	P-ALJ	Target values of iron core alarm	130.0	-30.0-240.0

Notes: The default value of the target value return difference is 0.3℃ unless otherwise indicated; When the corresponding temperature is higher than the total values of target values and return differences, its corresponding functions are output.

Temperature Compensation (P1008)

No.	Display	Instructions	Default (℃)	Range (℃)
1	A-Ad-	Temperature compensation entering the phase A	0.0	-19.9-19.9
2	b-Ad-	Temperature compensation entering the phase b		
3	C-Ad-	Temperature compensation entering the phase C		
4	d-Ad-	Temperature compensation entering the phase d		

Mailing Address Setting (P1010)

No.	Display	Instructions	Default	Range
1	P-dd-	Mailing address setting	1	1-247

Temperature Simulation (P1012)

No.	Display	Instructions	Simulation Range (℃)
1	A-AA-	Entering the temperature simulation	-30.5-240.5

Notes: The simulation temperature is not involved in controlling over-temperature trip!

Setting of Parity Bit and Baud Rate (P1013)

| No.	Display	Instructions	Default	Range
1	P-PC-	Parity bit setting	0 (No parity)	0-2
2	P-bL-	Baud rate setting	3 (9600)	0-4

Note 1: Parity bit: 0: No parity (N)   1: Even parity (E)   2: Odd parity (O)

Note 2: Baud rate: 0:1200   1:2400   2:4800   3:9600   4:19200

06 4-20mACurrent Output (E Type)

Technical requirements for current output

- Load resistance: R≤500Ω; Output accuracy: ±1%

- The corresponding curve and relation expression between measured temperature and output current of the controller:
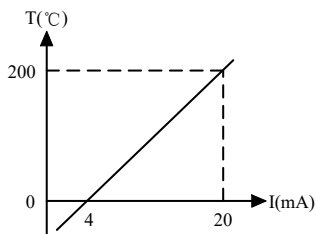
Relation expression of temperature and current: $I=(16T/200)+4$

Therein: T is the temperature value of one phase (℃)

I refers to the current value corresponding to the temperature of this phase (mA)

Functional features

There is a co-linearity relation between 4-20mA current signals and the detected temperature values (0.0-200.0 ℃), and one circuit temperature corresponds to one circuit current. If users have special requirements for current signals, please explain them when placing orders.

07 TheInstructions of RS485 Communication Protocol (FType)

Data Frame Format

Start Bit	Data Length	Parity Bit	Stop Bits
1 bit	8 bits	0 or 1 bit (settable)	1 bit

The Upper Computer Message Format (Example)

Message Format	Instrument Address	Function Code	Reading Register Start Address	Number of Reading Data	CRC Check Code
Telemetry (three routes)	0x01	0x03	0x0000	0x0003	0x05CB
Telemetry (four routes)	0x01	0x03	0x0000	0x0004	0x4409
Remote Communication	0x01	0x04	0x0000	0x0001	0x31CA

Notes: The number of start addresses and reading data can be changed according to actual conditions.

Controller Return Message format (Example)

Message Format	Instrument Address	Function Code	Number of Reading Bytes	Data Reading	CRC Check Code
Telemetry (three routes)	0x01	0x03	0x06	Temperature data of each phase	####
Telemetry (four routes)	0x01	0x03	0x08	Temperature data of each phase	####
Remote Communication	0x01	0x04	0x02	Relay status data	####

The Address Definition and Data Analysis of the Register

● The Address and Data Instructions of Telemetry Register

Attribute Description	Register Address	Data Type	Proportionality Factor	Data Range

Temperature data of phase A	0x0000	int16	0.1	-300~2400
Temperature data of phase b	0x0001	int16	0.1	-300~2400
Temperature data of phase C	0x0002	int16	0.1	-300~2400
Temperature data of d circuit	0x0003	int16	0.1	-300~2400

- The Instructions of Special Telemetering Data

Temperature Data	Failure Status of the Controller	Instructions
0x7000	-OP-	Open circuit
0x8000	-OL-	Beyond the lower limit
0x6000	-OH-	Beyond the upper limit

- The Address and Data Instructions of Remote Communication Register

Attribute Description	Register Address	Data Type	Remarks
Relay status data	0x0000	uint16	One bit stands for the status of one relay.

- The definition of relay status data low eight bits (Bit 0 stands for no actions, while bit 1 stands for actions)

Bit Number	bit7	bit6	bit5	bit4
Functions	Door contact status	Heating and dehumidification	Fan faults	
Bit Number	bit3	bit2	bit1	bit0
Functions	Fault alarm	Over-temperature alarm	Over-temperature trip	Draught fan running

Three-circuit Temperature Measurement (D/E/F)

Bit Number	bit7	bit6	bit5	bit4
Functions	Door contact status	Heating and dehumidification	Fan faults	Fault alarm

Bit Number	bit3	bit2	bit1	bit0
Functions	Iron core alarms or machine room fans	Over-temperature alarm	Over-temperature trip	Draught fan running

<div align="center">Four-circuit Temperature Measurements (G/I)</div>

Notes: Door contact status, heating and dehumidification and Fan faults are used in case of the special function requirement

Remote control (special function, which is put forward during goods ordering)

● The Instructions on the Address Definition of the Remote Control Register

The telecontrol relay address corresponds to the definition of relay status bit in the remote communication function. For example, bit0 corresponds to 0x0000, which is the address of the remote control draught fan relay. By analogy, bit0-bit7 corresponds to 0x0000-0x0007. For details, refer to the definition of the relay status data low eight bits; However, in order to avoid mistrip, the upper computer cannot remotely control the over-temperature trip relay contact.

● Remote Control Draught Fan Message (Example)

Message Format	Instrument Address	Function Code	Address of Telecontrol Delay	Control Commands	CRC Check Code
Remote Control Draught Fan (Start)	0x01	0x05	0x0000	0xFF00	0x8C3A
Remote Control Draught Fan (Stop)	0x01	0x05	0x0000	0x0000	0xCDCA

Notes: In event of normal communications, the upper computer message is consistent with the controller return message.

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The contents listed in this manual are for reference and the manufacturer reserves the right to change the contents