

**YTA710
Temperature Transmitter
(BRAIN Protocol)**

IM 01C50T03-02EN

YTA710

Temperature Transmitter

(BRAIN Protocol)

IM 01C50T03-02EN 2nd Edition

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Revision Information

1. Introduction

Thank you for purchasing the YTA710 Temperature Transmitter.

The YTA710 Temperature Transmitters are correctly calibrated at the factory before shipment. To ensure correct and efficient use of the instrument, please read this manual thoroughly and fully understand how to operate the instrument before operating it. This manual describes BRAIN communication functions of the YTA710 temperature transmitters and the various settings for temperature transmitter functions that can be set via the BT200 handheld terminal. The BT200 BRAIN terminal is required to change the settings of internal transmitter parameters.

See User's Manual IM 01C00A11-01E for details related to using the BT200 BRAIN terminal. For details of mounting, wiring and maintenance of this transmitter, see the separate User's Manual IM 01C50G01-01EN.

■ Regarding This Manual

- This manual should be passed on to the end user.
- The contents of this manual are subject to change without prior notice.
- All rights reserved. No part of this manual may be reproduced in any form without Yokogawa's written permission.
- Yokogawa makes no warranty of any kind with regard to this manual, including, but not limited to, implied warranty of merchantability and fitness for a particular purpose.
- If any question arises or errors are found, or if any information is missing from this manual, please inform the nearest Yokogawa sales office.
- The specifications covered by this manual are limited to those for the standard type under the specified model number break-down and do not cover custom-made instrument.
- Please note that changes in the specifications, construction, or component parts of the instrument may not immediately be reflected in this manual at the time of change, provided that postponement of revisions will not cause difficulty to the user from a functional or performance standpoint.
- The following safety symbol marks are used in this Manual:



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.



IMPORTANT

Indicates that operating the hardware or software in this manner may damage it or lead to system failure.



NOTE

Draws attention to information essential for understanding the operation and features.

■ For Safe Use of Product

For the protection and safety of the operator and the instrument or the system including the instrument, please be sure to follow the instructions on safety described in this manual when handling this instrument. In case the instrument is handled in contradiction to these instructions, Yokogawa does not guarantee safety. Please give your attention to the followings.

(a) Installation

- The instrument must be installed by an expert engineer or a skilled personnel. The procedures described about INSTALLATION are not permitted for operators.
- In case of high process temperature, care should be taken not to burn yourself because the surface of the case reaches a high temperature.
- All installation shall comply with local installation requirement and local electrical code.

(b) Wiring

- The instrument must be installed by an expert engineer or a skilled personnel. The procedures described about WIRING are not permitted for operators.
- Please confirm that voltages between the power supply and the instrument before connecting the power cables and that the cables are not powered before connecting.

(c) Maintenance

- Please do not carry out except being written to a maintenance descriptions. When these procedures are needed, please contact nearest YOKOGAWA office.
- Care should be taken to prevent the build up of drift, dust or other material on the display glass and name plate. In case of its maintenance, soft and dry cloth is used.

(d) Modification

- Yokogawa will not be liable for malfunctions or damage resulting from any modification made to this instrument by the customer.

(e) Product Disposal

The instrument should be disposed of in accordance with local and national legislation/regulations.

(f) Authorized Representative in EEA

In relation to the CE Marking, The authorized representative for this product in the EEA (European Economic Area) is:
Yokogawa Europe B.V.
Euroweg 2, 3825 HD Amersfoort, The Netherlands

■ Warranty

- The warranty shall cover the period noted on the quotation presented to the purchaser at the time of purchase. Problems occurred during the warranty period shall basically be repaired free of charge.
- In case of problems, the customer should contact the Yokogawa representative from which the instrument was purchased, or the nearest Yokogawa office.
- If a problem arises with this instrument, please inform us of the nature of the problem and the circumstances under which it developed, including the model specification and serial number. Any diagrams, data and other information you can include in your communication will also be helpful.
- Responsible party for repair cost for the problems shall be determined by Yokogawa based on our investigation.
- The Purchaser shall bear the responsibility for repair costs, even during the warranty period, if the malfunction is due to:
 - Improper and/or inadequate maintenance by the purchaser.
 - Failure or damage due to improper handling, use or storage which is out of design conditions.
 - Use of the product in question in a location not conforming to the standards specified by Yokogawa, or due to improper maintenance of the installation location.
 - Failure or damage due to modification or repair by any party except Yokogawa or an approved representative of Yokogawa.
 - Malfunction or damage from improper relocation of the product in question after delivery.
 - Reason of force majeure such as fires, earthquakes, storms/floods, thunder/lightening, or other natural disasters, or disturbances, riots, warfare, or radioactive contamination.

2. Connecting the BT200

2.1 Interconnection Between YTA and BT200



IMPORTANT

- Analog output may change temporarily in connecting with BRAIN terminal due to an initial current flowed to it. To prevent communication signal affecting the upper system, it is recommended to install a lowpass filter (approximately 0.1s).
- Communication signal is superimposed on analog output signal. It is recommended to set a low-pass filter (approximately 0.1s) to the receiver in order to reduce the output effect from communication signal. Before online-communication, confirm that communication signal does not give effect on the upper system.



WARNING

Do not attempt to use the BT200 in a dangerous environment where explosive gas or inflammable vapor is generated.

The BRAIN communication signal is superimposed onto the 4 to 20 mA DC analog signal. Since the modulated wave is a communication signal, superimposing it on the normal signal will, from basic principles, cause no error in the DC component of the analog signal. Thus, monitoring can be performed via the BT200 while the transmitter is on-line.

As shown in Figure 2.1, there are two methods of connecting the transmitter and the BT200: the first is to use the BT200 connection hook provided in the terminal box and the other is to use a terminal board or relay terminals on the transmission line.

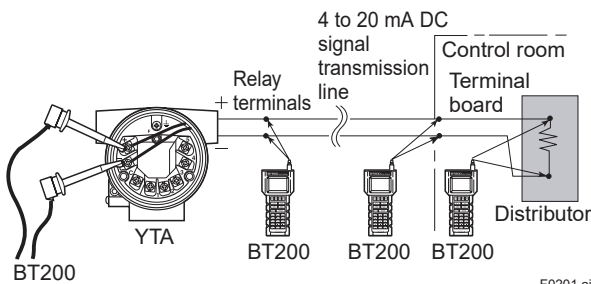


Figure 2.1 Connecting the BT200

2.2 Communication Line Requirements

[Protocol specification] Yokogawa original protocol

[Modulation] Burst modulation

0: 2400Hz

1: Signal without carrier

[Baud rate] 1200bps

[Communication signal]

host to device: +/- 0.5V (load resistance 250Ω)

device to host: +/- 2mA

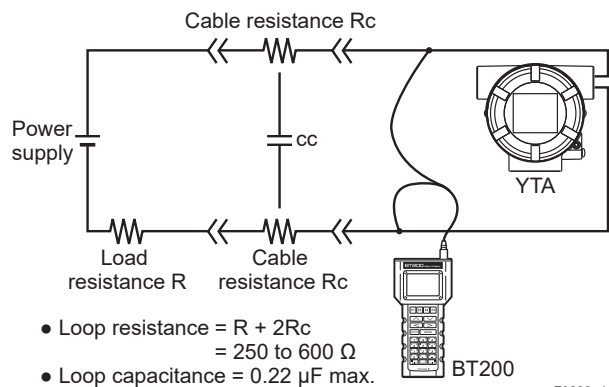


Figure 2.2 Communication Line Requirements

3. Parameter Setting



IMPORTANT

Do not turn off the power to the transmitter immediately after setup on the BT200. If the transmitter is turned off in less than 30 seconds after parameters have been set, the current parameter settings will not be stored in the transmitter.

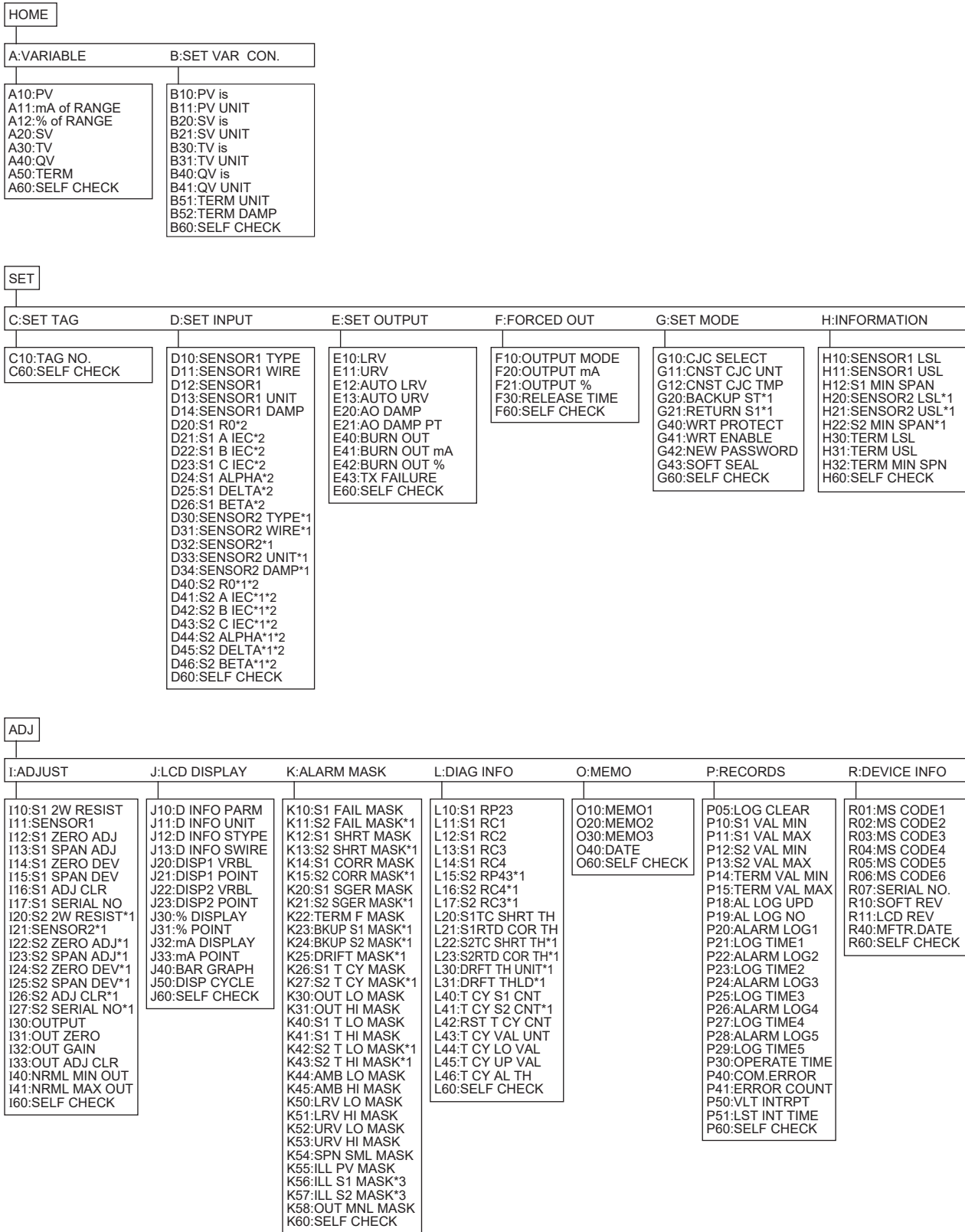


NOTE

Parameters and functions in regards to Sensor2 are offered only for 2-input specification.

3.1 Menu Tree of Display

The following shows the menu structure of YTA710 parameters.



*1: Only displayed when the 2-input specifications are supported.
 *2: Only displayed when the additional specification code/CM1 is specified.
 *3: Reserved.

3.2 Parameter Description

The following outlines the setting items for YTA BRAIN protocol. Before starting operations, review the entire configuration of the transmitter to confirm that it meets the requirements of the current application.

- **Checking Sensor Connection (→3.2.1)**

Confirm that the sensor is correctly connected.

- **Sensor Configuration (→3.2.2)**

Set the “sensor type” and “number of wire connections” of the sensor connected to the input terminal of the temperature transmitter. (Set the “sensor type” and “number of wire connections” of Sensor1 or Sensor2.)

- **Process Variable Mapping (→3.2.3)**

Process variable is to be assigned as primary (PV), secondary (SV), tertiary (TV) and quaternary (QV) Variables. They can be monitored on the integral indicator or by using the configuration tool. The process variable mapped to the PV is handled as the 4 to 20 mA DC output.

- **Unit (→3.2.4)**

An engineering unit of “degC” or “K” (Kelvin) can be chosen for process variables. When voltage value or resistance is specified as an input type, the unit is automatically set as mV or ohms.

- **PV Range (→3.2.5)**

Change the range of PV [primary variable] to be output as the 4 to 20 mA DC.

There are two ways to set the range value: Setting by keyboard, and setting by applying a value.

- **Damping (→3.2.6)**

Adjust the response time to smooth the output with rapid changes in input.

The damping time constant of the process variable can be set from 0 to 100 seconds.

- **Device Information (Tag number, writing in note) (→3.2.7)**

Not only a tag number but also an optional memo can be set for each instrument.

- **Test Output (→3.2.8)**

This function can output any value as DC output. Use it for loop check. An output of any value between 3.6 mA and 21.6 mA can be set.

- **Burnout Function (→3.2.9)**

Configure the current output value of 4 to 20 mA DC if the input sensor circuit is opened or if the hardware has failed.

- **Integral Indicator Display Mode (→3.2.10)**

Allow to select items to be displayed on the LCD panel if the integral indicator is mounted.

- **Write Protect (→3.2.11)**

Enable or disable parameter writing.

- **Sensor trim (→3.2.12)**

Correct the factory default characteristics to match the input signal.

- **Analog Output trim (→3.2.13)**

Fine tune the 4 to 20 mA DC output.

- **Sensor Backup Function (→3.2.14)**

When the Backup mode is selected, Sensor2 operates as a backup sensor of Sensor1. If the Sensor1 circuit is opened or if a problem occurs in this circuit, the signal output is switched to Sensor2 output automatically.

- **Sensor Matching Function (→3.2.15)**

If the transmitter has the optional specifications or CM1, the accuracy of the temperature transmitter can be improved by changing the specific sensor constants.

- **CJC Selection (→3.2.16)**

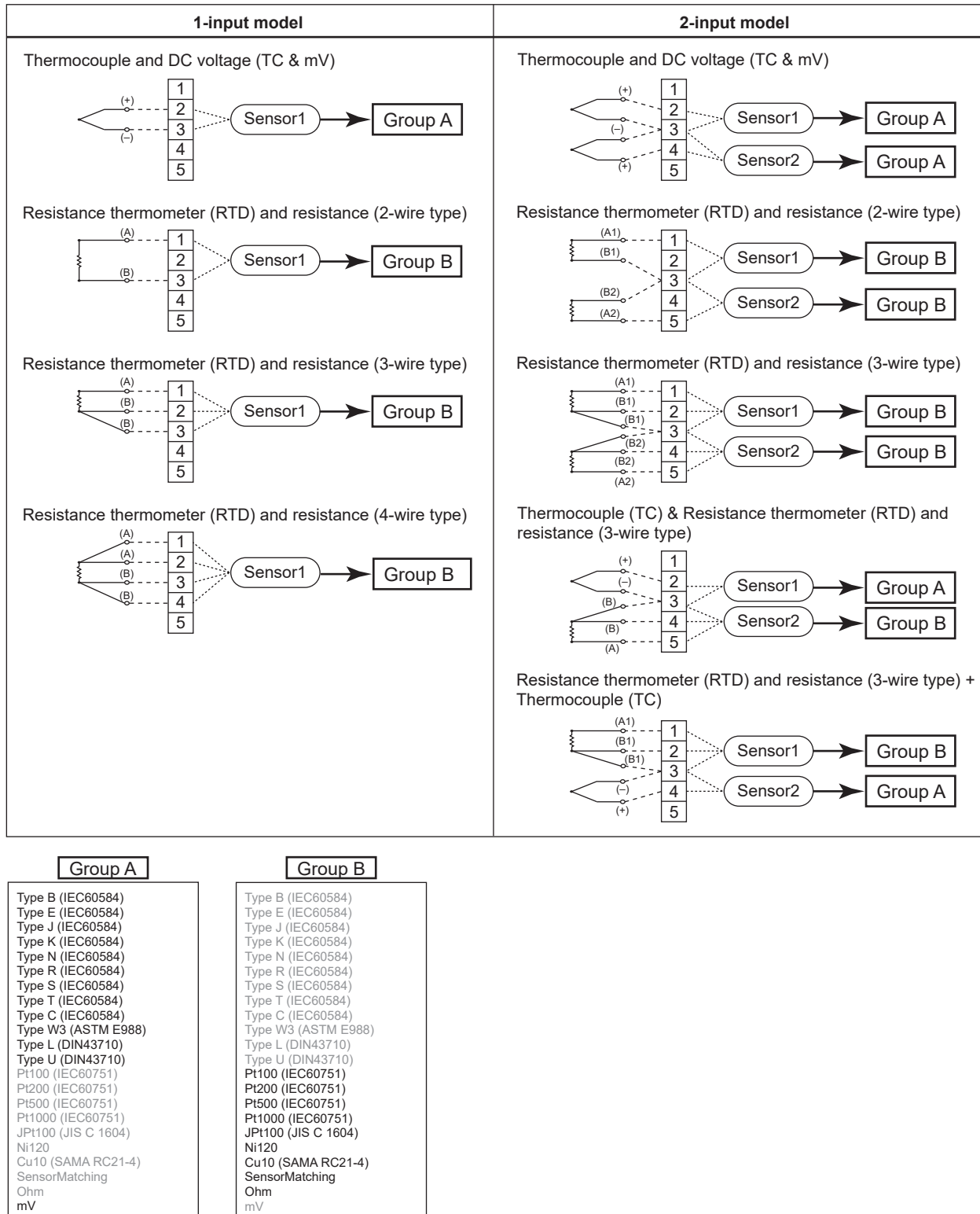
Select whether to use the terminal block temperature for cold contact compensation or to use the arbitrary constant set by the user.

- **Output Fluctuation Suppression (→3.2.17)**

Set when you do not want to reach alarm level due to sudden output fluctuation such as sensor disconnection.

3.2.1 Checking Sensor Connection

Confirm that the wires are connected correctly as shown below according to the sensor type to be used. Group A is thermocouple or DC voltage, and Group B is resistance temperature detector or resistance.



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Figure 3.1 Wire connection and sensor types

3.2.2 Sensor Settings

When changing sensor type, it is necessary to change the parameters related to each sensor. Figure 3.1 shows both the wire connection to input terminals of the transmitter, and sensor type selection for parameters in each connection case. Note that thermocouples and voltage value input are categorized as Group A, and resistance temperature detectors and resistance are categorized as Group B. Check the connection between input terminals and temperature sensors, and set the correct sensor type and the number of wire connections in “Sensor1” or “Sensor2” (for 2-input model).

The following shows the standard setup.

(1) Setting the sensor type

Set a sensor type using the following parameters.

Setting item	“Sensor1” parameter	“Sensor2” parameter
Sensor type	D10:SENSOR1 TYPE	D30:SENSOR2 TYPE

A sensor type can be selected from the following table.

Table 3.1 Selection of a sensor type

Setting value	Type	Group	Remarks
Type B IEC60584	Thermocouple	A	
Type E IEC60584	Thermocouple	A	
Type J IEC60584	Thermocouple	A	
Type K IEC60584	Thermocouple	A	
Type N IEC60584	Thermocouple	A	
Type R IEC60584	Thermocouple	A	
Type S IEC60584	Thermocouple	A	
Type T IEC60584	Thermocouple	A	
Type C IEC60584	Thermocouple	A	
Type W3 ASTM988	Thermocouple	A	
Type L DIN43710	Thermocouple	A	
Type U DIN43710	Thermocouple	A	
Pt100 IEC60751	Resistance temperature detector	B	
Pt200 IEC60751	Resistance temperature detector	B	
Pt500 IEC60751	Resistance temperature detector	B	
Pt1000 IEC60751	Resistance temperature detector	B	
JPt100 JIS	Resistance temperature detector	B	

Setting value	Type	Group	Remarks
Ni120 STI INC	Resistance temperature detector	B	
Cu10 SAMA RC21-4	Resistance temperature detector	B	
Sensor Matching	Resistance temperature detector	B	Only selectable when additional spec code/CM1 is given
ohm	Resistance	B	
mV	DC voltage	A	
No connection	No connection	-	



NOTE

If a sensor of Group A is used, the number of wire connections is automatically changed to “2 WIRE”. In such a case, it is not necessary to “set the number of wire connections” of Item (2) below. If “No connection” is set, a number of wire connections can be set, however, it is made invalid.

(2) Setting the number of wire connections

Set a number of wire connections using the following parameters. However, this setup is only required when the Group of the sensor type is “B”. This setup is not required for a sensor of Group A.

Setting item	“Sensor1” parameter	“Sensor2” parameter
Number of wire connections	D11:SENSOR1 WIRE	D31:SENSOR2 WIRE

Select a number of wire connections from the following options.

Sensor	Option	Remarks
Sensor1	2 WIRE, 3 WIRE, 4 WIRE	If “4 WIRE” is selected, “Sensor2” cannot be used.
Sensor2	2 WIRE, 3 WIRE	



NOTE

If “4 WIRE” is selected as the number of wire connections of Sensor1, Sensor2 cannot be used even for a 2-input model temperature transmitter. Therefore, the sensor type at Sensor2 side is changed to “No connection” automatically.

3.2.3 Process Variable Mapping

The YTA temperature transmitter can handle four process variables: primary variable (PV), secondary variable (SV), tertiary variable (TV), and quaternary variable (QV).

These variables can be referred to as digital values through the BRAIN protocol.

The PV value is processed for 4 to 20 mA output.

(→ 3.2.5 Range Setting)

Set Sensor1 and Sensor2 (for the 2-input model only) before starting the process variable mapping.

(→ 3.2.2 Sensor Settings)

(1) Setting the mapping

The following explains the PV to QV setting.

Mapping means the assignment of PV to QV inputs.

Set the following parameters for mapping.

Variable	Setting parameter
PV	B10:PV is
SV	B20:SV is
TV	B30:TV is
QV	B40:QV is

Select an input to be mapped as the mapping destination from the following options.

Table 3.2 Mapping assignment list

Input	Description	1-input model	2-input model	Remarks
Sensor1	Sensor1 value	✓	✓	
Sensor1-Terminal	Temperature difference between Sensor1 and terminal block	✓	✓	Sensor1 must be a temperature sensor.
Terminal	Terminal block temperature	✓	✓	
Sensor2	Sensor2 value		✓	
Sensor2-Terminal	Temperature difference between Sensor2 and terminal block		✓	Sensor2 must be a temperature sensor.
Sensor1-Sensor2	Difference between Sensor1 and Sensor2		✓	Sensor1 and Sensor2 must be the sensors to measure the same physical quantity.
Sensor2-Sensor1	Difference between Sensor2 and Sensor1		✓	Same as above

Input	Description	1-input model	2-input model	Remarks
Average	Mean value of Sensor1 and Sensor2		✓	Same as above
Sensor Backup	Sensor Backup (See 3.2.14 "Sensor Backup".)		✓	Same as above



NOTE

An input related to Sensor2 cannot be selected for the 1-input model.



NOTE

- When the user sets "Sensor1-Terminal", Sensor1 must already be set as a sensor (thermocouple or resistance temperature detector) to measure the temperature.
- When the user sets "Sensor2-Terminal", Sensor2 must already be set as a sensor (thermocouple or resistance temperature detector) to measure the temperature.
- When the user sets "Sensor1-Sensor2", "Sensor2-Sensor1", "Average", or "Sensor Backup", Sensor1 and Sensor2 must be able to measure the same physical quantity (such as same temperature, the same DC voltage, and the same resistance).

If the above requirements are not satisfied, an "AL.60 Illegal PV Cfg" alarm occurs.

3.2.4 Unit

A unit of the terminal block temperature can be set for process variables PV to QV, Sensor1, and Sensor2 (the 2-input model only).

Set the following parameters. When the unit is set, it is used to display the parameters that are shown in the “affecting parameters” column.

Target	Parameter	Affecting parameter
PV	B11:PV UNIT	A10, E10 to 11
SV	B21:SV UNIT	A20
TV	B31:TV UNIT	A30
QV	B41:QV UNIT	A40
Sensor1	D13:SENSOR1 UNIT	D12, H10 to H12, I11 to I15, P10 to 11
Sensor2	D33:SENSOR2 UNIT	D32, H20 to H22, I21 to I25, P12 to 13
Terminal block Temperature	B51:TERM UNIT	A50, H30 to 32, P14 to P15

Select a unit from the following options.

Option	Unit	Description
degC	°C	Degrees centigrade
K	K	Kelvin
degF	°F	Degrees Fahrenheit
degR	°R	Degrees Rankine



NOTE

If the target unit is DC voltage, the unit “mV” is used to display the parameter values in the “Affecting parameters” column, regardless of the above unit setting. Similarly, the unit of resistance is set to “ohms”.

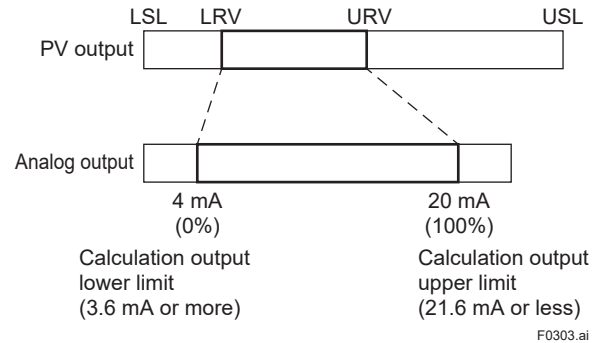


NOTE

The units of PV to QV are fully independent of the units of Sensor1, Sensor2 (for 2-input model only), and terminal block temperature. For example, even if Sensor1 is mapped to the PV, the unit used for PV display is the unit that has been set by “B11:PV UNIT”. It is not affected by the unit of “D13:SENSOR1 UNIT”.

3.2.5 Range Setting

The range setting refers to assigning an output range of 4 to 20 mA to an area (LRV to URV) within the PV digital output range (LSL to USL).



However, the following restrictions apply when setting the range.

- Both LRV and URV must be within the range between LSL (lower limit of the sensor measurement range) and USL (upper limit of the sensor measurement range).
- The width of LRV and URV must be greater than the minimum span of sensors.

For the measurement range and minimum span for each sensor type, see Chapter 7 “Standard Specifications” in IM 01C50G01-01EN document.



NOTE

If the PV value is outside the range of LRV to URV, the current below 4 mA or the current above 20 mA is output. In this case, the output is calculated in the same ratio. However, even in this case, the upper and lower limit values of the current to be output are limited to the range between the computation output lower limit value and the computation output upper limit value.



NOTE

The LRV can also be set to a value larger than URV. In this case, the output is inverted, and the output current falls when the PV value increases.

(1) Setting LRV and URV

There are two ways to set the LRV and URV: by entering LRV and URV numeric values directly, and by providing real input.

- a) Specify LRV and URV directly as numerical values.

Directly set the LRV and URV using the following parameters. The unit specified by “B11:PV UNIT” is used.

Setting target	Setting parameter
LRV	E10:LRV
URV	E11:URV

- Example: Change the measurement range from “0 to 100°C” to “0 to 150°C”.

PARAM
E10:LRV 0 degC

E11:URV 100 degC

E12:AUTO LRV
NO EXEC

[DATA] [DIAG] [PRNT] [ESC]

1. Select “E11:URV”, and press [ENTER].

PARAM
E11:URV 0 degC

+ 150

[DEL] [CLR] [ESC]

2. Enter value “150”, and press [ENTER] twice.
3. Press [OK].
<Setting has completed.>

Note: Units specified in “B11:PV UNIT” are used. If the unit is changed by B11, the units used in E10 and E11 are also changed.

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- b) Changing the range by applying an actual input
Enter a value in the transmitter, and set the PV value in the LRV or URV unit. Use the following parameters for unit setting.

Setting target	Setting parameter
LRV	E12:AUTO LRV
URV	E13:AUTO URV

The following shows the procedure.

1. Give the input equivalent to LRV to the transmitter and stabilize it.
2. Select “EXEC” from “E12:AUTO LRV”, and press the [ENTER] key twice.
3. The value set as LRV is displayed. Confirm it, and press [OK].
4. Similarly, set the URV using “E13:AUTO URV”.



NOTE

With E12 and E13, after execution by selecting EXEC, the system returns to the NO EXEC state automatically.

(2) Setting the calculation output lower limit and calculation output upper limit

Set the calculation output lower limit and calculation output upper limit by using the following parameters.

Setting target	Setting parameter	Allowable range
Calculation output lower limit	I40:NRML MIN OUT	3.6 to 4.0 mA
Calculation output upper limit	I41:NRML MAX OUT	20.0 to 21.6 mA

3.2.6 Damping Time Constant

This function adjusts the response speed against sudden input fluctuations in terminal block temperature, Sensor1 and Sensor2 digital outputs, and 4 to 20 mA analog output. The terminal block temperature and Sensor1 and Sensor2 damping settings are also reflected on the PV to QV digital outputs, which are their mapping destinations. There are two types of damping setting items: the damping time constant, and the damping calculation threshold. Of these, the damping calculation threshold is set only by damping of analog output.

The following shows the target of damping setting and its setting parameters.

Setting target	Damping time constant	Damping calculation Threshold
Terminal block temperature	B52:TERM DAMP	—
SENSOR1	D14:SENSOR1 DAMP	—
SENSOR2	D34:SENSOR2 DAMP	—
Analog output	E20:AO DAMP	E21:AO DAMP PT

(1) Setting the damping time constant

The temperature transmitter calculates 63% of the input range to be output after the time period set by the damping time constant has elapsed.

The damping time constant can be set between 0 and 100 seconds (an integer). If set to 0 seconds, damping is skipped.

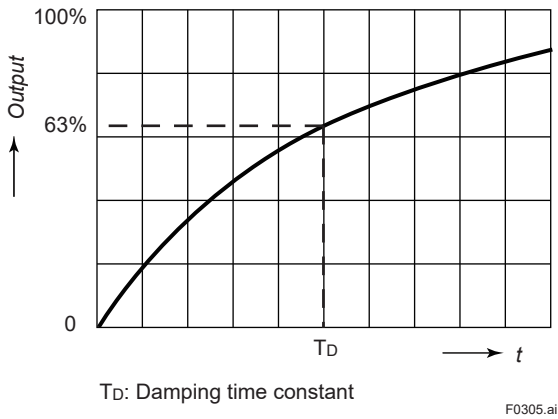


Figure 3.3 Output response if a step change (100%) occurs at time 0

(2) Damping calculation threshold

The temperature transmitter does not perform damping if the variation amount is larger than the damping calculation threshold. However, this function is only effective for damping of analog output.

The damping calculation threshold is set by the percentage (%) that is relative to the output range (the output change rate per calculation cycle). This threshold can be set between 0 and 99% (an integer). If set to 0%, damping is skipped.

The output if the range is set to 0 to 100°C and if the damping calculation threshold is set to 10%
Range: 0 to 100%

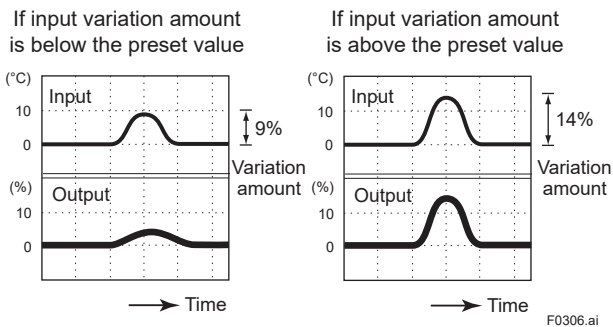


Figure 3.4 Example of damping operation

NOTE

If the software revision is R1.02.01 or later, the following operation is performed.
The damping function also works if the input goes beyond the current output range.
Current output range: -2.5% (3.6 mA) to 110% (21.6 mA)

3.2.7 Device Information (tag number, and memory writing)

Parameter	Format	Remarks
C01:TAG NO.	Up to 16 characters	If the tag number is specified at the time of ordering, it is set prior to factory shipment.
O10:MEMO1	Up to 16 characters	If you need to write more than 16 characters, set the excess characters in MEMO2 and MEMO3 fields.
O20:MEMO2	Up to 16 characters	
O30:MEMO3	Up to 16 characters	
O40:DATE	“yyyy/mm/dd” format	It is only the date recording function. There is no built-in clock function, and the date is not updated.

3.2.8 Test Output

The constant current of 3.6 mA (2.5%) to 21.6 mA (110%) can be output from the temperature transmitter.

This function is useful for performing the loop check.

The following shows the setting parameters related to the test output.

Parameter	Settings	Remarks
F10: OUTPUT MODE	Switches between Test Output and Normal Output.	NORMAL MODE: Normal Output MANUAL MODE: Test Output
F20: OUTPUT mA	Specify the Test Output value in mA.	Also reflected in F21
F21: OUTPUT %	Specify the Test Output value in percentage.	Also reflected in F20
F30: RELEASE TIME	Set the release time of Test Output.	10 MINUTES 30 MINUTES 60 MINUTES 3 HOURS 6 HOURS 12 HOURS

* Either F20 or F21 can be set, and they are reflected mutually.



IMPORTANT

- The Test Output by the forced output function is automatically canceled 10 minutes (it is changeable by F30:RELEASE TIME setting) after changing to MANUAL MODE. Even if the power of the configuration tool is turned off or if the communication cable is disconnected during test output execution, the Test Output state is maintained.
- If you wish to cancel the Test Output immediately, select the NORMAL MODE with “F10:OUTPUT MODE”. Also, when the temperature transmitter is turned off, the Test Output is canceled.
- If “I30:OUTPUT” is set to 4 mA or 20 mA, the MANUAL MODE cannot be set using F10.



NOTE

If the temperature transmitter has the integral indicator, “TEST” is displayed in the lower row along with its output level (% indication) during test output.

Also, “AL.70” alarm (Output Man Mode alarm) is generated during Test Output. This informs that the Test Output is in progress; this is not abnormal.

3.2.9 Burnout Function

(1) Setting the output state at sensor burnout

If a sensor mapped to the PV value is broken or if it has become disconnected from the terminal, you can set the output state.

The following shows the setting parameters related to the sensor burnout.

Parameter	Settings	Remarks
E40: BURN OUT	Operation setting of burnout function	HIGH (21.6 mA) LOW (3.6 mA) USER (The value set in E41 or E42) OFF (Hold with previous output value)
E41: BURN OUT mA	Specify the burnout output in mA when “USER” is selected.	It is also reflected in E42
E42: BURN OUT %	Specify the burnout output in % format when “USER” is selected.	Also reflected in E41

* Either E41 or E42 can be set, and they are reflected mutually.
If a sensor is burnt out, alarm AL.09, AL.10 to AL.13, or AL.22 occurs.



CAUTION

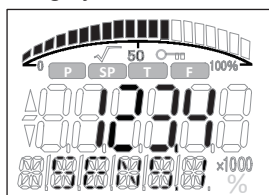
There is a time lag between sensor failure and sensor abnormality detection.
Since the failed measurement value is output, the current output also becomes undefined.
When an error is detected, it becomes the output set with this parameter.
However, when sensor burnout is set to OFF, it may be held with indefinite measurement value, so please understanding this point.

(2) Display of output state of hardware abnormal value

Parameter name	Display	Description
E43:TX FAILURE	HIGH: 110% (21.6 mA) LOW: -5% (3.2 mA)	The output state at hardware abnormality setting can be set by the slide switch of the MAIN assembly.

3.2.10 Integral Indicator Display Mode

If the temperature transmitter has an integral indicator, you can set the display items and the updating cycle.



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(1) Setting the display items

The integral indicator can display up to four channels (Disp Out1, Disp Out2, Disp %, and Disp mA, except for alarm indication).

Of these, Disp % is “% of RANGE”, and Disp mA is a dedicated channel of “mA of RANGE”. As the display content is fixed, you can only specify ON or OFF.

Any process variables PV to QV can be specified for “Disp Out1” and “Disp Out2”. One of the process variables must always be specified for the “Disp Out1” channel. The “Disp Out2” channel can be set not to display by setting it to “Not Used”.

Table 3.1 shows process variables that can be specified for each display channel.

Process variable \ Display channel	Disp Out1	Disp Out2	Disp %	Disp mA
PV	✓	✓		
SV	✓	✓		
TV	✓	✓		
QV	✓	✓		
mA of RANGE				✓
% of RANGE			✓	

The following shows the setting parameters of each display channel.

Display channel	Variable selection	Remarks
Disp Out1	J20:DISP1 VRBL	Select from PV to QV.
Disp Out2	J22:DISP2 VRBL	Select from PV to QV, or “Not Used”.
Disp %	J30:% DISPLAY	Select from ON or OFF.
Disp mA	J32:mA DISPLAY	Select from ON or OFF.

(2) Selecting the decimal-point position

You can specify the position of the decimal point (the number of digits displayed after the decimal point) for each display channel.

Specify the number of display digits (an integer from 0 to 3) after the decimal point.

Display channel	Decimal-point position
Disp Out1	J21:DISP1 POINT
Disp Out2	J23:DISP2 POINT
Disp %	J31:% POINT
Disp mA	J33:mA POINT

(3) Setting the display cycle

Set the display switching cycle. When the time corresponding to the preset display cycle has elapsed, the following information is displayed. Set the cycle using the “J50:DISP CYCLE” parameter. Select the “HIGH”, “MID”, or “LOW” cycle.

Selection value	Display switching cycle
HIGH	1200 ms
MID	2400 ms
LOW	3600 ms

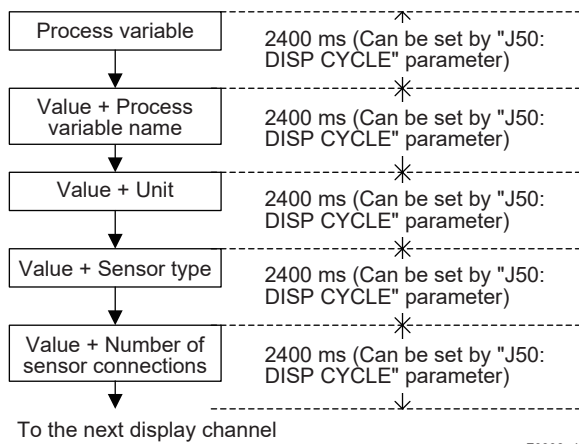
(4) Setting the display information

When the numerical information of each display channel is displayed on the upper part of the display meter, the information attached to the process variable can be displayed in the lower row.

To display the incidental information, turn the display ON or OFF using the following parameters. This setting is valid for all display channels.

Setting parameter	Incidental information
J10:D INFO PARM	Process variable name
J11:D INFO UNIT	Unit of process variable
J12:D INFO STYPE	Sensor type
J13:D INFO SWIRE	Number of sensor wire connections

The display order is switched in the following order for each display cycle.



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If the display setting is turned OFF, the incidental information display is skipped. If the display of many items of incidental information is turned ON, it will take a long time to shift to the next display channel.

(5) Setting the bar graph display

When “Disp %” and “Disp mA” channels are being displayed, and when the display target of “Disp Out1” and “Disp Out2” is PV, a bar graph is displayed at the top of the display panel. You can see the appropriate percentage of that level relative to the output range.

Set the bar graph display by turning the “J40:BAR GRAPH” parameter ON or OFF.



NOTE

If there is an abnormality in the transmitter or sensors, if their settings are incorrect, or if the measured value deviates from the range, an alarm is generated. If an alarm has occurred, the last display channel is indicated, and the generated alarm number and name are displayed. If burnt out, a bar graph is displayed regardless of “J40:BAR GRAPH” parameter setting.

3.2.11 Write Protect

This function disables parameter writing, and protects the data set in the temperature transmitter. The Write Protect function can be set in one of the following three ways.

1. Slide switch of MAIN assembly

When the slide switch is set to the ON position, protection is enabled. When set to the OFF position, the protection is canceled. The protection cancel state continues until this function is turned ON again. See Section 3.2 “Burnout and Write Protect Switch when Hardware Error Occurs” of IM 01C50G01-01EN.

2. Setting using integral indicator

You can enable the protection by setting a password using “WRT.PRT” of Local Parameter Setting.” If the protection is already set, write protection is released when the same password is entered again in the “WRT.PRT”. The protection cancel state continues until a password is set by “WRT.PRT”. For the local parameter setting, see Section 3.4 “Local Parameter Setting” of IM 01C50G01-01EN.

3. Setting by BRAIN parameter

You can enable the protection by setting a password using “G42:NEW PASSWORD”. When a password set by G42 is entered in “G41:WRT ENABLE” parameter, write protection is released. The protection cancel state continues for 10 minutes only. However, if the parameter is written via BRAIN protocol, it will continue for 10 more minutes from that point. This chapter focuses on this method.

The temperature transmitter holds the above three as the independent state. If any one of them is set, it enters a protected state and no parameter can be written.



NOTE

Although the three protection states listed above are kept as independent states, the procedure to individually check those states is complicated. Therefore, when using multiple methods in combination, special attention is required to manage the protection information of each instrument.

(1) Checking the status

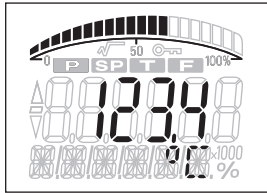
You can check the current write protection state using the following two methods. However, you can check the protection state of the entire temperature transmitter. You cannot check the three setting states individually as described above.

Check by parameters:

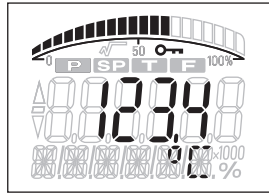
Parameter	Value	Description
G40:WRT PROTECT	NO	Not protected (Parameter writing enabled)
	YES	Protected (Parameter writing disabled)

Checking by integral indicator:

If the integral indicator is mounted, you can check the write protection state by reading an indication of a key symbol as shown below.



Not protected



Protected

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(2) Setting the password and write protection

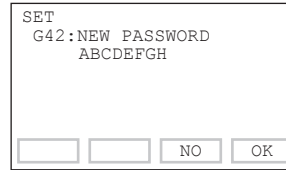
The following explains the BRAIN parameter settings.

When you set a password, write protection must be canceled. Check the write protection state using the method described in (1) "Confirmation of state". If the system is protected, release the protection first.

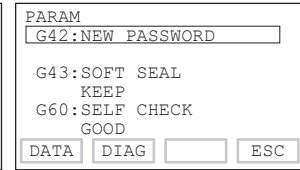
Write the desired password in the following parameter.

Parameter	Password	Remarks
G42:NEW PASSWORD	Eight blank characters	This is a special password. If this password is set, write protection is always canceled, and the protection status is maintained until another password is set.
	Other than the above	Write protection is enabled. The protection is maintained until the password, that has been set by "G41:WRT ENABLE" parameter, is written.

This set password is only displayed on the confirmation screen immediately after it is set. After that, the eight blank characters are always displayed during normal parameter reading.



Confirmation screen immediately setting



Normal display

F0310.ai

The password can contain the following characters and symbols only.

- Uppercase (A to Z) and lowercase (a to z) alphabet characters
- Numbers (0 to 9)
- Blank
- Symbols (15 types shown at right) / . - , + *) (' & % \$ # " !

(3) Releasing write protection

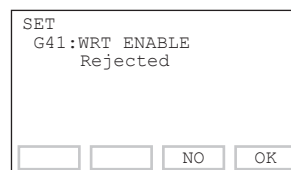
The following explains how to cancel write protection if it has been set by the BRAIN parameter. The write protection cancel state continues for 10 minutes only. However, if the parameter is written via BRAIN protocol, it will continue for 10 more minutes from that point.

Write the desired password in the following parameter.

Parameter	Password
G41:WRT ENABLE	Write the same password as that specified by "G42:NEW PASSWORD" parameter.

Immediately after writing the password in the above parameter, the confirmation message is displayed on the screen. You can check the success or failure of protection release by reading this message.

Message	Description
Released	Protection was canceled successfully
Rejected	Protection failed to cancel (due to incorrect password)
Blank	Protection has already been canceled, or the password contains eight blank characters.



Confirmation screen example

F0311.ai



NOTE

If you wish to set the protection state back to the protection state, do not write the parameter for 10 minutes and wait until the protection state is set again. However, if a new password is set for "G42:NEW PASSWORD", the protection state is set immediately.



NOTE

If an incorrect password is entered in "G41:WRT ENABLE", the state that existed before the password was entered is maintained (the protection is not released from the protected state, and the canceled state is maintained if it has already been released).



NOTE

If "G40:WRT PROTECT" remains YES (or the key mark of the integral indicator remains displayed) even though "Released" is displayed on the confirmation screen, protection has been set by the slide switch of the MAIN assembly or by the integral indicator. It will be necessary to release protection using each method separately.



NOTE

If you forget your password, you can temporarily cancel the write protection function using the "Joker" password. For the "Joker" password, contact Yokogawa sales office.

(4) Software Seal

If the write protection function is canceled by using the "Joker" password, it can be identified by the Software Seal function.

You can check the Software Seal state by reading the following parameter.

Parameter	Value	Description
G43:SOFT SEAL	KEEP	The seal is not broken ("Joker" password is not used)
	BREAK	The seal is broken ("Joker" password is used)



NOTE

The broken software seal state is maintained even after the unprotected state using the "Joker" password ends. To return to the KEEP state again, it is necessary to cancel protection by using the password that was set G42:NEW PASSWORD.

3.2.12 Input Adjustment

The YTA temperature transmitter is adjusted prior to factory shipment based on the standard characteristics of sensors, and the process variables are output with these characteristics. The input adjustment is made to correct both the shipping characteristics of the temperature transmitter and the internal calculation value of input signals. (See Figure 3.4.) Even when the input adjustment is made, the characteristics that exist during factory shipment are retained. Therefore, the characteristics can be restored during factory shipment.

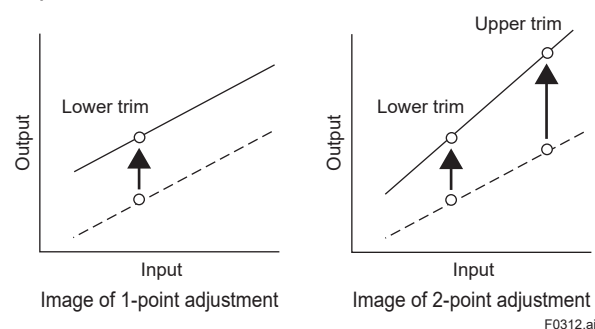


Figure 3.4 Image of input adjustment

F0312.ai

[Adjustment method]

Set the sensors before input adjustment. (→ 3.2.2 Sensor Settings)

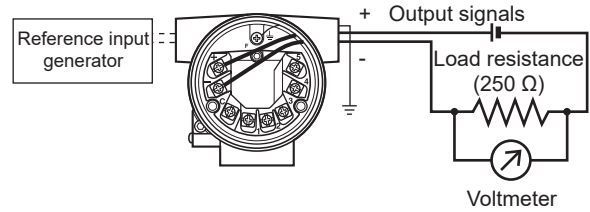
Use the following parameters for adjustment purposes.

Sensor1 parameter	Sensor2 parameter	Usage
I11:SENSOR1	I21:SENSOR2	Output value. Check the output value before and after adjustment.
I12:S1 ZERO ADJ	I22:S2 ZERO ADJ	Zero adjustment value. Set the target value of the zero adjustment point.
I13:S1 SPAN ADJ	I23:S2 SPAN ADJ	Span adjustment value. Set the target value of span adjustment point.
I14:S1 ZERO DEV	I24:S2 ZERO DEV	Zero adjustment amount. The difference between the zero adjustment point target value and the unadjusted output value is displayed.
I15:S1 SPAN DEV	I25:S2 SPAN DEV	Span adjustment amount. The difference between the span adjustment point target value and the unadjusted output value is displayed.
I16:S1 ADJ CLR	I26:S2 ADJ CLR	When "EXEC" is written, the user adjustment is reset to the default characteristics.

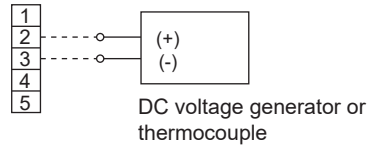
The following explains the Sensor1 input adjustment. For input adjustment of Sensor2, read the parameters based on the above table.

- (1) Connect the calibration equipment to the temperature transmitter in a stable ambient temperature environment, and warm up for three or more minutes. (See Figure 3.5. For Sensor2 adjustment, check wiring methods (b) and (c) of Section 5.4 "Connecting Cables and Terminals" of IM 01C50G01-01EN.)
- (2) Apply the input, that corresponds to the zero adjustment value, to Sensor1.

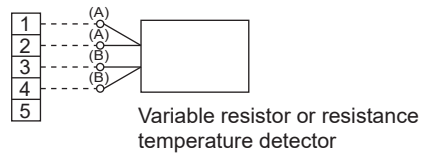
a. Power supply and output wiring



b. Wiring example for thermocouple or DC voltage input (in case of 1-input model)



c. Wiring example of resistance temperature detector 4-wire type (1-input model)



F0313.ai

Figure 3.5 Wiring example of calibration equipment

- (3) Check the output value of Sensor1 from "I11:SENSOR1". (Presence or absence of difference with expected value for input of (2))
- (4) Write the expected value for input of (2) to "I12:S1 ZERO ADJ".
Example:
When input corresponding to a temperature of 0°C is given to Sensor1, write "0" in "I12:S1 ZERO ADJ".

The 1-point adjustment ends in Step (4). For 2-point adjustment, perform Steps (5) and (6).

- (5) Now, adjust the span. Apply the input, that corresponds to the span adjustment value, to Sensor1.
- (6) Write the expected value for input of (5) to "I13:S1 SPAN ADJ".



NOTE

When "EXEC" is written in the "I16:S1 ADJ CLR" parameter (or when "EXEC" is written in "I26:S2 ADJ CLR" for Sensor2), the user adjustment is reset to the default characteristics. After the reset, this parameter value is returned to "NOEXEC".

3.2.13 Output Adjustment

The Output Adjustment function adjusts analog output values. When a precision ammeter (for calibration) is connected, when the 0% and 100% are output, and if there is a deviation in PV value, the Output Adjustment is executed.

Use the following parameters for adjustment purposes.

Parameter	Usage
I30:OUTPUT	Sets the Output mode. Set the analog output to NORMAL (Normal Output), 4 mA, or 20 mA.
I31:OUT ZERO	Output adjustment: Zero-point adjustment
I32:OUT GAIN	Output adjustment: Gain point adjustment
I33:OUT ADJ CLR	Output adjustment: Clear of data

[Adjustment method]

- (1) Write "4 mA" in "I30:OUTPUT", and output 4 mA current.
- (2) Read the actual output PV value using the precision ammeter for calibration.
- (3) Write the PV value that was read in Step (2), in "I31:OUT ZERO".
If only the zero-point adjustment is required, skip Steps (4), (5) and (6), and proceed to Step (7).
- (4) Write "20 mA" in "I30:OUTPUT", and output 20 mA current.
- (5) Read the actual output PV value using the precision ammeter for calibration.
- (6) Write the PV value that was read in Step (5), in "I32:OUT GAIN".
- (7) Write "NORMAL" in "I30:OUTPUT", and return to the normal output.

3.2.14 Sensor Backup (for the 2-input model only)

If Sensor1 has failed, the Sensor Backup function automatically uses Sensor2 as output.

Even if Sensor1 is recovered during backup operation, Sensor2 will continue to be used until the backup operation is reset by the parameter or by switching the power OFF. If Sensor2 has failed during backup operation, the temperature transmitter generates an AL.24 "Backup Sns2 Fail" alarm and outputs the sensor burnout.

(1) Setting the sensor backup function

- a) Set the "sensor type" and "number of wire connections" of Sensor1 and Sensor2. If Sensor1 and Sensor2 must measure the same target (both should measure the temperature or voltage).

- b) Set an alarm mask appropriately.

Setting parameter	Target Alarm	Default value	Setting value
K10:S1 FAIL MASK	AL.10 S1 Failure	NO MASK	NO MASK
K11:S2 FAIL MASK	AL.11 S2 Failure	NO MASK	NO MASK
K12:S1 SHRT MASK	AL.12 S1 Short	MASK	MASK/ NO MASK
K13:S2 SHRT MASK	AL.13 S2 Short	MASK	MASK/ NO MASK
K23:BKUP S1 MASK	AL.23 Backup S1 Fail	NO MASK	NO MASK
K24:BKUP S2 MASK	AL.24 Backup S2 Fail	NO MASK	NO MASK



IMPORTANT

Always set "K10:S1 FAIL MASK", "K11:S2 FAIL MASK", "K23:BKUP S1 MASK", and "K24:BKUP S2 MASK" parameters to NO MASK.

To activate the Sensor Backup function even if the sensor short-circuit is detected, set "K12:S1 SHRT MASK" and "K13:S2 SHRT MASK" to "NO MASK". If the Sensor Backup function is not required when a short-circuit occurs, set them to "MASK".



CAUTION

There is a time lag between sensor failure and sensor abnormality detection. Since the failed measurement value is output, the current output also becomes undefined. For this reason, until failure of Sensor1 switches to Sensor2, or "Output state at sensor burnout" due to failure of Sensor2 The output becomes undefined until switching to the output. When an abnormality is detected, it is output according to the measured value of Sensor2 or "Output state at sensor burnout".

- c) Set the PV mapping to the Sensor Backup function.

Setting parameter	Setting value
B10:PV is	Sensor Backup

For details about mapping, refer to Section 3.2.3. "Process Variable Mapping".

- d) Execute the parameter of the Sensor Backup return instruction.

Setting parameter	Setting value	Remarks
G21:RETURN S1	EXEC	After execution, the system returns to the NO EXEC state automatically.

(2) Checking the sensor backup state

To check the backup state, read the following parameter.

Parameter	Value	Remarks
G20:BACKUP ST	N/A	Sensor Backup function is disabled. (Sensor1 and Sensor2 are used to measure the different targets.)
	SENSOR1	The temperature transmitter outputs an input of Sensor1.
	SENSOR2	The temperature transmitter outputs an input of Sensor2.

(3) Returning from the backup status (Release of “AL.23 Backup S1 Fail” alarm)

Even if Sensor1 is recovered to the normal operation state during backup operation (an “AL.23 Backup S1 Fail” alarm has occurred), the temperature transmitter outputs an input of Sensor2 until the backup operation is reset by the parameter or by switching the power OFF.

To return the output back to the Sensor1 input, execute the parameter of the Sensor Backup return instruction.

Setting parameter	Setting value	Remarks
G21:RETURN S1	EXEC	After execution, the system returns to the NO EXEC state automatically.

(4) Releasing the “AL.24 Backup S2 Fail” alarm

When the Sensor Backup function is enabled and if Sensor2 has failed, the temperature transmitter outputs an input of Sensor1 as it is, however, an “AL.24 Backup S2 Fail” alarm occurs. To release this failure, follow the procedure below.

- a) Recover Sensor2 (by repairing wiring, replacing the sensor, and other measures).
- b) Execute the parameter of the Sensor Backup return instruction.

Setting parameter	Setting value	Remarks
G21:RETURN S1	EXEC	After execution, the system returns to the NO EXEC state automatically.

3.2.15 Sensor Matching Function

This function is only available when optional specification/CM1 is specified.

The sensor matching function sets specific sensor constants in the temperature transmitter to significantly improve the temperature measurement accuracy.

(1) Sensor matching function of YTA710

The properties of the RTD sensor for the YTA 710 comply with the standard specified in IEC 60751.

As the characteristics of the RTD sensor, there are variations within the range permitted by the standard, and they may cause measurement errors. The Sensor Matching function improves the precision of temperature measuring by programming the Callendar-Van Dusen constants, specific numbers defined for each RTD sensor, in the temperature transmitter.

The following relationship exists between the resistance (Rt) of a RTD sensor and the temperature (t) at that time.

$$R_t = R_0 \left\{ 1 + \alpha (1 + 0.01\delta) t - \frac{\alpha\delta}{10^4} t^2 - \frac{\alpha\beta}{10^8} (t - 100) t^3 \right\}$$

- i where, R_t=Resistance (ohms) at temperature t (°C)
 R₀=Sensor-specific constant (Resistance at 0°C)
 α (alpha)=Sensor-specific constant
 δ (delta)=Sensor-specific constant
 β=Sensor-specific constant (0 if t>0°C)

The exact values for R₀, α, δ and β are specific to each RTD sensor, and are obtained by testing each individual sensor at various temperatures.

Generally, constants A, B and C are also used as the characteristic coefficients of the RTD instead of α, δ and β. The relationship is described as follows.

$$R_t = R_0 \{ 1 + At + Bt^2 + C (t - 100) t^3 \}$$

- ii where, R_t=Resistance (ohms) at temperature t (°C)
 R₀=Sensor-specific constant (Resistance at 0°C)
 A=Sensor-specific constant
 B=Sensor-specific constant
 C=Sensor-specific constant (0 if t>0°C)

These two equations are equivalent. Model YTA710 can cope with either case (α, δ and β, or A, B and C) as above mentioned.



IMPORTANT

- This function is only effective when the sensor type is set to “Sensor Matching”.
- Enter the appropriate R_0 value corresponding to the sensor type. For example, if you are using the Pt100, enter a value of approximately 100Ω for R_0 .

(2) Setting the sensor matching function

a) Set a sensor type.

Set a sensor type and a number of wire connections using the following parameters.

Setting Item	Parameter for S1	Parameter for S2 (2-input model only)	Value to be selected
Sensor type	D10:SENSOR1 TYPE	D30:SENSOR2 TYPE	Sensor Matching
Number of wire connections	D11:SENSOR1 WIRE	D31:SENSOR2 WIRE	Set them according to the actual number of wire connections.

b) Setting of Sensor Matching constant

Set each constant using the following parameters. However, only one pair of A, B and C or one pair of α , δ and β must be set. The other pair is calculated automatically by the temperature transmitter, and it is set automatically.

Constant	Parameter for S1	Parameter for S2 (2-input model only)	Exponent (Cannot be changed)	Factory default	Setting example
R_0	D20:S1 R0	D40:S2 R0	Not applicable	+ 100.00 ohms	+ 100.05 ohms
A	D21:S1 A IEC	D41:S2 A IEC	E-3 (10 ⁻³)	+3.90830 E-3	+3.90800 E-3
B	D22:S1 B IEC	D42:S2 B IEC	E-7 (10 ⁻⁷)	-5.77500 E-7	-5.80200 E-7
C	D23:S1 C IEC	D43:S2 C IEC	E-12 (10 ⁻¹²)	-4.18300 E-12	-4.00000 E-12
α	D24:S1 ALPHA	D44:S2 ALPHA	E-3 (10 ⁻³)	+3.85055 E-3	+3.85000 E-3
δ	D25:S1 DELTA	D45:S2 DELTA	E0 (10 ⁰)	+1.49979 E0	+1.50700 E0
β	D26:S1 BETA	D46:S2 BETA	E-1 (10 ⁻¹)	+1.08634 E-1	+1.00000 E-1



IMPORTANT

When entering R_0 , α , δ , β , A, B, C in the YTA, the following restrictions apply.

- α , δ , β , A, B and C must be normalized with the value of the exponent determined for each constant. The number of decimal places that can be entered is five. Since the position of the decimal point is fixed, pad it with zeros if lower digits are unnecessary. (See the above setting example.)
- The decimal point can be set arbitrarily for R_0 . However, the input possible range is from +0.0000 to +32000.



NOTE

If a value that has significantly deviated from the factory default value is set for each sensor matching constant, an “AL.07 Temp R-Calc Fail” alarm may occur. In such a case, set the correct constant again or change the sensor type (to Pt100 for example). In either case, the temperature transmitter needs to be restarted afterwards.

3.2.16 CJC Function Selection

For thermocouple input, the terminal temperature measured by an internal sensor of the temperature transmitter is used for Cold Junction Compensation function (CJC function). The constant value set by the user can be used for the compensation function in place of the measured terminal block temperature.

Set the CJC function in the following procedure.

(1) Mode selection of CJC function

Select a mode of CJC function by the following parameters.

Parameter	Setting value	Remarks
G10:CJC SELECT	Internal CJC	Perform cold junction compensation at terminal block temperature.
	Constant CJC	Perform cold junction compensation using the user-specified constant (temperature).



NOTE

If you have selected the internal CJC, the settings in Steps (2) and (3) are not required.

(2) Unit setting of cold junction compensation temperature

Set the unit of cold junction compensation temperature using the following parameters.

Parameter	Setting value	Remarks
G11:CNST CJC UNT	degC	Set the cold junction compensation temperature in degrees of centigrade (°C).
	K	Set the cold junction compensation temperature in Kelvin (K).
	degF	Set the cold junction compensation temperature in degrees of Fahrenheit (°F).
	degR	Set the cold junction compensation temperature in degrees of Rankine (°R).

(3) Setting of cold junction compensation temperature

Set the cold junction compensation temperature using the following parameters.

Parameter	Setting range	Remarks
G12:CNST CJC TMP	-40 to 85 degC	When units other than degC are set in (2), the setting range is the value converted from the temperature shown on the left to the setting unit.

3.2.17 Output Fluctuation Suppression

Large fluctuations may be output due to sudden factors such as sensor disconnection or corrosion. If you want to reduce this fluctuation, please set the following.

* This feature is available in software revision R1.02.01 or later.

E21:AO DAMP PT: 99%

E20:AO DAMP: See the following description.

Calculate the time constant that does not reach the alarm level of the instrumentation system even if fluctuation occurs during normal operation.

Upper Permissible fluctuation rate
 = (High alarm level - Upper control level) /
 (PV% upper limit - Upper control level)

Lower Permissible fluctuation rate
 = (Lower control level - Low alarm level) /
 (Lower control level - PV% lower limit)

The smaller of Upper and Lower permissible fluctuation rate is Permissible fluctuation rate.

Permissible fluctuation rate
 = min (Upper permissible fluctuation rate,
 Lower permissible fluctuation rate)

Select and set the time constant for which the fluctuation rate is smaller than the permissible fluctuation rate from Table 3.3

Fluctuation rate < Permissible fluctuation rate

Table 3.3 Time constant and Fluctuation rate

Time constant (s)	Single input (1 s later)	Dual input (1.6 s later)
1	55.6%	69.1%
2	36.0%	49.0%
3	26.5%	37.7%
4	21.0%	30.6%
5	17.4%	25.7%
6	14.8%	22.1%
7	12.9%	19.5%
8	11.4%	17.4%
9	10.2%	15.7%
10	9.3%	14.3%

Table 3.4 Glossary

Term	Description
Upper control level	Maximum value in the operating range. For example, When operating at 20% to 80%, 80% applies.
Lower control level	Minimum value in operating range For example, When operating at 20% to 80%, 20% applies.
Sudden change	The amount of output fluctuation that occurs due to a sudden factor.
High alarm level	Upper level for alarming in the instrumentation system.
Low alarm level	Lower level for alarming in the instrumentation system.
PV% upper limit	Upper limit of PV%. Fixed at 110%.
PV% lower limit	Lower limit of PV%. Fixed at -2.5%.
Fluctuation rate	Rate of change after one second in the time constant.
Permissible fluctuation rate	Fluctuation rate that reaches the alarm level from the upper and lower limits of normal operation.
Upper permissible fluctuation rate	Rate of change from upper control level to upper alarm level.
Lower permissible fluctuation rate	Rate of change from lower control level to lower alarm level.
Time constant	AO Damping setting value.



NOTE

It is recommended to set the sensor damping (D14:SENSOR1 DAMP, D34:SENSOR2 DAMP, B52:TERM DAMP) to 0 seconds.
If enabled, duplicate dumping function works.

- Setting example of time constant (AO damping)

Input: Single input

High alarm level: 90%

Low alarm level: 10%

Upper control level: 80%

Lower control level: 20%

Upper Permissible fluctuation rate

$$= \frac{(\text{High alarm level} - \text{Upper control level})}{(\text{PV\% upper limit} - \text{Upper control level})}$$

$$= \frac{(90 - 80)}{(110 - 80)}$$

$$= 33.3 (\%)$$

Lower Permissible fluctuation rate

$$= \frac{(\text{Lower control level} - \text{Low alarm level})}{(\text{Lower control level} - \text{PV\% lower limit})}$$

$$= \frac{(20 - 10)}{(20 - (-2.5))}$$

$$= 44.4 (\%)$$

Permissible fluctuation rate

$$= \min(\text{Upper permissible fluctuation rate}, \text{Lower permissible fluctuation rate})$$

$$= \min(33.3, 44.4)$$

$$= 33.3 (\%)$$

See Table 3.3 and set the time constant to 3 seconds or more to satisfy the fluctuation rate <33.3 (%).

Table 4.1 Alarm List

Indicator display	BRAIN configuration tool display	Cause	Output operation upon error	Action
AL.00	CPU Failure	The main CPU has failed.	Data output and communication do not occur if the transmitter has failed.	Device Replacement
AL.01	Snsr NV Failure	CRC mismatching of the sensor's non-volatile memory has occurred, or normal data wiring has failed.	Data output and communication are permitted if the transmitter has failed.	
AL.02	Temp NV Failure	CRC mismatching of TEMP ASSY non-volatile memory has occurred, or Write/Read Verify mismatching has occurred. (System cannot start up normally.)		
AL.03	AD Conv Failure	Hardware failure at input side		
AL.04*1	Main R-Calc Fail	Mismatching of MAIN ASSY CPU inverse computation has occurred.		
AL.05	Temp R-Calc Fail	Mismatching of TEMP ASSY CPU inverse computation has occurred.		
AL.06	Temp Volt Fail	Abnormal TEMP ASSY power voltage		
AL.07	Comm NV Fail	CRC mismatching of communication non-volatile memory has occurred, or normal data wiring has failed.		
AL.08	Temp NV Warning	CRC mismatching of TEMP ASSY non-volatile memory has occurred, or Write/Read Verify mismatching has occurred. (System can start up but may fail.)	The output continues.	
AL.09	Int Comm Fail	Internal communication error	The output and communication for sensor burnout are permitted.	
AL.10	S1 Failure	The Sensor1 input circuit is open or disconnected from the terminal.	See Table 4.2.	<ul style="list-style-type: none"> • Check the soundness of the temperature sensor. • Check the sensor connection.
AL.11	S2 Failure	The Sensor2 input circuit is open or disconnected from the terminal.		
AL.12	S1 Short	Sensor1 has shorted.		
AL.13	S2 Short	Sensor2 has shorted.		
AL.14	S1 Corrosion	Sensor1 has corroded.	Normal operation	Check the sensors, terminals, and cables.
AL.15	S2 Corrosion	Sensor2 has corroded.	Normal operation	
AL.20	S1 Signal Error	The Sensor1 input has error	Normal operation	<ul style="list-style-type: none"> • Check the soundness of the temperature sensor. • Check the sensor type.
AL.21	S2 Signal Error	The Sensor2 input has error	Normal operation	
AL.22*2	Term Sensor Fail	The terminal block temperature is abnormal. The terminal block temperature sensor has failed, or its circuit is open.	See Table 4.2.	Device Replacement

Indicator display	BRAIN configuration tool display	Cause	Output operation upon error	Action
AL.23	Backup S1 Fail	Sensor1 has failed during sensor backup, and the Sensor2 data is output.	Output the backup side data. If the backup side sensor has also failed, data is output by the burnout setting.	Check the soundness of Sensor1.
AL.24	Backup S2 Fail	Sensor2 has failed during sensor backup.	Normal operation	Check the soundness of Sensor2.
AL.25	Sensor Drift	Sensor drift	Normal operation	Check the soundness of the sensor.
AL.26	S1 Temp Cycle	Temperature cycle count of Sensor1 has exceeded the threshold.	Normal operation	Reset the temperature cycle count.
AL.27	S2 Temp Cycle	Temperature cycle count of Sensor2 has exceeded the threshold.	Normal operation	Reset the temperature cycle count.
AL.30	Output Too Low	The PV value has dropped below the lower limit.	Lower limit: 3.68 mA (-2%)	Check and correct the lower limit setting.
AL.31	Output Too High	The PV value has exceeded the upper limit.	Upper limit: 20.8 mA (105%)	Check and correct the upper limit setting.
AL.40	S1 Temp Low	The measurement temperature of Sensor1 is too low.	Normal operation	Check the sensor type.
AL.41	S1 Temp High	The measurement temperature of Sensor1 is too high.	Normal operation	
AL.42	S2 Temp Low	The measurement temperature of Sensor2 is too low.	Normal operation	
AL.43	S2 Temp High	The measurement temperature of Sensor2 is too high.	Normal operation	
AL.44	Amb Temp Low	The ambient temperature is below -40°C.	Normal operation	
AL.45	Amb Temp High	The ambient temperature is above 85°C.	Normal operation	Place the transmitter away from the heat source.
AL.50	LRV Too Low	The LRV has been set below the temperature range of sensor specifications.	Normal operation	Check and correct the lower limit setting.
AL.51	LRV Too High	The LRV has been set above the temperature range of sensor specifications.	Normal operation	
AL.52	URV Too Low	The URV has been set below the temperature range of sensor specifications.	Normal operation	Check and correct the upper limit setting.
AL.53	URV Too High	The URV has been set above the temperature range of sensor specifications.	Normal operation	
AL.54	Span Too Small	The span has been set below the recommended minimum span.	Normal operation	Check and correct the upper and lower limit settings.
AL.60	Illegal PV Cfg	The sensor (or sensor value) mapped to PV has been set incorrectly.	Hold to the output upon error. 4-mA current is output if it occurred during startup.	Check the PV mapping.
AL.61	Reserved	Reserved		
AL.62	Reserved	Reserved		
AL.70	Output Man Mode	Forced Output mode has been selected.	The set value of Forced Output mode	Set to the normal mode.

*1: In software revision R1.01.01, AL04 may be generated even when abnormality or disconnection of the terminal block temperature sensor occurs.

*2: In software revision R1.01.01, Even if abnormality or disconnection of the terminal block temperature sensor occurs, AL22 may not be output and AL04 may be generated.

The sensor burnout conditions depend on the setting of current output mapping, and the alarm occurred. These conditions are as follows.

Table 4.2 Output Operations

Current output mapping	S1 Failure	S2 Failure	S1 Short	S2 Short	Term Sensor Fail*2
SENS.1	Sensor burnout	Normal operation	Sensor burnout	Normal operation	Normal operation
S.1-TER	Sensor burnout	Normal operation	Sensor burnout	Normal operation	Sensor burnout
TERM	Normal operation	Normal operation	Normal operation	Normal operation	Sensor burnout
SENS.2	Normal operation	Sensor burnout	Normal operation	Sensor burnout	Normal operation
S.2-TER	Normal operation	Sensor burnout	Normal operation	Sensor burnout	Sensor burnout
S.1-S.2	Sensor burnout	Sensor burnout	Sensor burnout	Sensor burnout	Normal operation
S.2-S.1	Sensor burnout	Sensor burnout	Sensor burnout	Sensor burnout	Normal operation
AVG	Sensor burnout	Sensor burnout	Sensor burnout	Sensor burnout	Normal operation
BACKUP	*1	*1	*1	*1	Normal operation

*1: If both Sensor1 and Sensor2 have failed, a Sensor Burnout is output.

*2: In software revision R1.01.01, the output is held at the value immediately before the alarm occurs.



NOTE

While the Sensor Backup function is active, if both AL.23 Backup S1 Fail and AL.24 Backup S2 Fail occur, sensor burnout will occur. For details about sensor backup refer to Section 3.2.14 "Sensor Backup Function".



IMPORTANT

If S1 Failure, S2 Failure, S1 Short, S2 Short, Term Sensor Fail, Backup S1 Fail, and Backup S2 Fail are masked, the sensor burnout due to these events is also suppressed.

If it is necessary for the sensor burnout event to occur, release the alarm mask (NOMASK setting).

4.2 History Functions

The YTA710 temperature transmitter has the following history functions.

(1) Alarm history

a) Number of history records

Up to 59 history records are stored in the temperature transmitter memory, and any five of them can be referred to simultaneously. If more than 59 records are stored, history records will be deleted in order starting from the oldest and overwritten by new history records.

b) History data buffer

The same 59 history records are held in the buffer that is constantly updated and in the parameter display buffer of the temperature transmitter.

Before displaying the parameters, synchronize the parameter display buffer with the buffer that is constantly updated. Then, update them to the latest information.

Execute the following parameters to synchronize the data.

Parameter	Option	Remarks
P18:AL LOG UPD	NO EXEC	Nothing occurs even if this value is written. In normal circumstances, this value is displayed.
	EXEC	When this value is written, the buffers are synchronized explicitly. When synchronization has finished, the system returns to the NO EXEC state automatically.



NOTE

Also, the buffers are synchronized when the temperature transmitter is turned on.

- c) History number
Up to 59 records are assigned with history numbers 0 to 58. The record assigned history number 0 is the latest one.
- d) Parameter Display window
The Parameter Display buffer holds all 59 data records, however, it holds only five display parameter records. Therefore, you can select and display any five records out of the 59 records. The selected five records are called records of the "Parameter Display window". The five records of the Parameter Display window are called LOG1 to LOG5 (and LOG1 has the latest record).

0		
1		
2		
3		
...		
24		
25	LOG 1(P20:ALARM LOG1, P21:LOG TIME1)	Parameter Display window
26	LOG 2(P22:ALARM LOG2, P23:LOG TIME2)	
27	LOG 3(P24:ALARM LOG3, P25:LOG TIME3)	
28	LOG 4(P26:ALARM LOG4, P27:LOG TIME4)	
29	LOG 5(P28:ALARM LOG5, P29:LOG TIME5)	
30		
...		
57		
58		

Set the following parameters to set up the Parameter Display window.

Parameter	Setting value	Remarks
P19:AL LOG NO	0 to 55	Specify a history number to position the beginning of the Parameter Display window. The fifth record from the history number you specified is the Parameter Display window. If "55" is specified, the LOG5 is made invalid.

- e) Log data
The log data of LOG1 to LOG5 consists of the alarm data and the time information at this time. When the following parameters are read, the log data is displayed.

Parameter	Description
P20:ALARM LOG1	Alarm data of LOG1
P21:LOG TIME1	Record time of LOG1
P22:ALARM LOG2	Alarm data of LOG2
P23:LOG TIME2	Record time of LOG2
P24:ALARM LOG3	Alarm data of LOG3
P25:LOG TIME3	Record time of LOG3
P26:ALARM LOG4	Alarm data of LOG4
P27:LOG TIME4	Record time of LOG4
P28:ALARM LOG5	Alarm data of LOG5
P29:LOG TIME5	Record time of LOG5

The alarm data of P20, P22, P24, P26 and P28 is the same as obtained by A to L, O to P, R 60:SELF CHECK of each item.

The recording time of P21, P23, P25, P27 and P29 is equivalent to the period of time when the transmitter is shipped from the factory and when the transmitter operating time (until LOG1) is recorded. The operating time is displayed in "DDDDdHH:MM" format. "DDDDD" is the number of days. The number of digits may increase or decrease within the range of 1 to 5 days according to the actual number of days. "HH" is hours, and "MM" is minutes.

- f) Empty log data
Although the maximum number of history records is 59, in actuality, less than 59 records may have been recorded, such as when the operating time span from when the temperature transmitter was started is short. In such a case, unrecorded logs may be included, depending on the setting of the Parameter Display window. At this time, the value of recording time parameters (P21, P23, P25, P27, and P29) is blank for the data of unrecorded logs. Therefore, it is possible to judge the validity of log data using these values.

(2) History of maximum and minimum measurement values

The maximum and minimum measurement values of Sensor1, Sensor2 (for the 2-input model only), and terminal block, obtained after factory shipment (or after these values are cleared) for each measurement value of terminal block temperature (TERM) have been recorded in the temperature transmitter.

The maximum and minimum values can be checked by referring to the following parameters.

Item	Sensor1	Sensor2 (2-input model only)	TERM
Minimum value	P10:S1 VAL MIN	P12:S2 VAL MIN	P14:TERM VAL MIN
Maximum value	P11:S1 VAL MAX	P13:S2 VAL MAX	P15:TERM VAL MAX



NOTE

The above variables may become large due to sensor disconnection or others. If it occurs, clear them by following the procedure below.

Also, you can clear the maximum and minimum values of Sensor1 and Sensor2 (for the 2-input model only). If cleared, the subsequent maximum and minimum values start to be updated immediately. Use the following parameters to clear these values.

Parameter	Option	Remarks
P05:LOG CLEAR	NO RESET	The values are not cleared. This is usually used. System returns to this state after clearing of values.
	RST SENSOR1	Only Sensor1 is cleared.
	RST SENSOR2	Only Sensor2 is cleared. (It is displayed for the 2-input model only.)
	RST S1&S2	Sensor1 and Sensor2 are cleared. (It is displayed for the 2-input model only.)

(3) Operating time

The operating time of the transmitter after factory shipment is shown. It can be checked using the following parameters.

Parameter	Remarks
P30:OPERATE TIME	The operating time is displayed in “DDDDdHH:MM” format. “DDDD” is the number of days. The number of digits may increase or decrease within the range of 1 to 5 days according to the actual number of days. “HH” is hours, and “MM” is minutes.



NOTE

The operating time is saved in the non-volatile memory every 15 minutes.

4.3 Self Check Function

The YTA has the following self-check functions.

(1) Hardware failure

This function detects a failure of CPU, AD converter, memory and others.

(2) Sensor failure

This function detects an open circuit of sensors. The transmitter flows the current, and outputs an open-circuit alarm if the resistance exceeds the threshold.

Parameter setting: Not required

Alarm output: If the resistance exceeds the threshold, an S1 Failure (AL.10) or S2 Failure (AL.11) alarm is output.

(3) Terminal block failure

This function detects an open circuit of CJC. The transmitter measures the CJC resistance and notifies of a terminal block failure if the resistance exceeds the threshold.

Parameter setting: Not required

Alarm output: If the resistance exceeds the threshold, a Term Sensor Fail (AL.22) alarm is output.

(4) TC short-circuit (TC)

This function detects a short-circuit of the TC sensor. The transmitter flows current, and outputs a short-circuit alarm if the sensor resistance (S1 RP23 for L10, or S2 RP43 for L15) is below the threshold.

Set the threshold (resistance) using the following parameters.

Threshold setting parameter	Alarm detected	Remarks
L20:S1TC SHRT TH	S1 Short (AL.12)	
L22:S2TC SHRT TH	S2 Short (AL.13)	2-input model only



NOTE

In order to output the S1 (or S2) Short alarm, "K12:S1 SHRT MASK" and "K13:S2 SHRT MASK" must be set to "NO MASK". (The alarm is masked by default.)

(5) "RTD" or "ohm" short-circuit (for 3-wire/4-wire type only)

This function detects a short-circuit of the sensor during "RTD" or "ohm" measurement. If the sensor resistance drops below the threshold (L11: S1 RC1 to L14: S1 RC4, L17: S2RC4, L16: S2RC4), a short-circuit alarm is output.

The threshold is fixed to 5Ω, and parameter setting is not required.

Threshold setting parameter	Alarm detected	Remarks
Not applicable	S1 Short (AL.12)	
Not applicable	S2 Short (AL.13)	2-input model only



NOTE

- The alarm mask must be released in order to output the S1 (or S2) Short alarm. (The alarm is masked by default.)
- In the case of 3-wire RTD or ohm connection, if actual connection and connection setting are imbalanced, an unforeseen alarm may be generated.

(6) RTD Corrosion (for 3-wire/4-wire type only)

This function detects any corrosion between terminal block and measurement cables. If the resistance between the terminal block and cables (L11:S1 RC1 to L14:S1 RC4, L17:S2 RC3, L16:S2 RC4) exceeds the threshold, a corrosion alarm is output.

Set the threshold using the following parameters.

Threshold setting parameter	Alarm detected	Remarks
L21:S1RTD COR TH	S1 Corrosion (AL.14)	
L23:S2RTD COR TH	S2 Corrosion (AL.15)	2-input model only



NOTE

The alarm mask must be released in order to output the S1 (or S2) Corrosion alarm. (The alarm is masked by default.)

(7) Sensor drift (for 2-input model only)

When the difference between Sensor1 and Sensor2 temperatures exceeds the threshold, a Sensor Drift alarm is output. When the temperature at the same position is measured by two sensors, this alarm indicates that there is a problem with either Sensor1 or Sensor2.

Set the threshold using the following parameters.

Setting parameter	Settings	Target alarm	Remarks
L30:DRFT TH UNIT	Sets a unit of threshold.	AL.25 Sensor Drift	Set this parameter first.
L31:DRFT THLD	Threshold		Set this parameter after unit setting.



NOTE

If the threshold (L31:DRFT THLD setting value) is "0.0", self-checking is skipped. Sensor1 and Sensor2 must be the sensors to measure the same physical quantity.

(8) Temperature cycle diagnostics

This function displays the number of temperature fluctuations that may cause the sensor to fail. This function is only enabled when the Sensor Type is set to TC or RTD. It indicates how many times the temperature alternately hits (or crosses) the upper and lower limits. The number of times, that exceeds the upper temperature threshold (L45:T CY UP VAL) and that exceeds the lower temperature threshold (L44:T CY LO VAL) (or when the value exceeds the upper temperature threshold after exceeding the lower temperature threshold) is counted. If this count (L40:T CY S1 CNT, L41:T CY S2 CNT display values) exceeds the alarm judgment threshold, a temperature cycle alarm (AL.26 S1 Temp Cycle, AL.27 S2 Temp Cycle) is output.

Check the current settings and state using the following parameters.

Parameter	Description	Remarks
L43:T CY VAL UNIT	Sets the upper/lower threshold temperature unit.	The unit to be used for L44 and L45 setting.
L44:T CY LO VAL	Sets the lower temperature threshold.	
L45:T CY UP VAL	Sets the upper temperature threshold.	
L46:T CY AL TH	Sets an alarm judgment threshold.	If it is set to "0", self-checking is skipped.
L40:T CY S1 CNT	Displays the Sensor1 round trip count.	If this count exceeds the L46 set value, an "AL.26 S1 Temp Cycle" alarm is output.
L41:T CY S2 CNT	Displays the Sensor2 round trip count.	For the 2-input model only If this count exceeds the L46 set value, an "AL.27 S2 Temp Cycle" alarm is output.
L42:RST T CY CNT	Resets the round trip count.	The count can be reset for Sensor1 and Sensor2 separately.



NOTE

If the alarm judgment threshold is 0, the temperature cycle check is skipped.

(9) Sensor diagnostic information

Information obtained by the sensor diagnostics is displayed in the parameters below. You can take advantage of the preventive maintenance of sensors by obtaining this information periodically.

Table 4.3 Sensor1 diagnostics information

Parameter	Sensor type		
	TC	RTD 3-wire	RTD 4-wire
L10:S1 RP23 Resistance between terminals 2 and 3	✓	0.0	0.0
L11:S1 RC1 Resistance between terminal and sensor cable being connected to Terminal 1	0.0	0.0	✓
L12:S1 RC2 Resistance between terminal and sensor cable being connected to Terminal 2	0.0	✓	✓
L13:S1 RC3 Resistance between terminal and sensor cable being connected to Terminal 3	0.0	✓	✓
L14:S1 RC4 Resistance between terminal and sensor cable being connected to Terminal 4	0.0	0.0	✓

✓: Display of sensor diagnostics information (Resistance)

Table 4.4 Sensor2 diagnostics information

Parameter	Sensor type	
	TC	RTD 3-wire
L15:S2 RP43 Resistance between terminals 4 and 3	✓	0.0
L16:S2 RC4 Resistance between terminal and sensor cable being connected to Terminal 4	0.0	✓
L17:S2 RC3 Resistance between terminal and sensor cable being connected to Terminal 3	0.0	✓

✓: Display of sensor diagnostics information (Resistance)

5. List of Parameters

Table 5.1 List of Parameters

RW: Display/setting
R: Display only

No.	Name	Description	RW	Remarks	Default	Upload/ download parameter
01	MODEL	Model	R		YTA710	
02	TAG	Tag number	R	Sixteen alphanumeric characters	Specify during ordering.	
03	SELF CHECK	Self-diagnosis	R	GOOD, ERROR	—	
A	VARIABLE	Process variable				
A10	PV	(Primary variable)	R	Value specified in B10, and unit specified in B11	—	
A11	mA of RANGE	Display of output current	R		—	
A12	% of RANGE	Display of output percentage	R		—	
A20	SV	Secondary variable	R	Value specified in B20, and unit specified in B21	—	
A30	TV	Tertiary variable	R	Value specified in B30, and unit specified in B31	—	
A40	QV	Quaternary variable	R	Value specified in B40, and unit specified in B41	—	
A50	TERM	Display of terminal block temperature	R	Unit specified in B51	—	
A60	SELF CHECK	Self-diagnosis	R	See Table 4.1.	—	
B	SET VAR CON.	Process variable setting of process variables				
B10	PV is	PV mapping	RW	See Table 3.2.	Sensor1	✓
B11	PV UNIT	PV unit	RW	degC K degF degR	degC	✓
B20	SV is	SV mapping	RW	Same as B10	Terminal	✓
B21	SV UNIT	SV unit	RW	Same as B11	degC	✓
B30	TV is	TV mapping	RW	Same as B10	Terminal	✓
B31	TV UNIT	TV unit	RW	Same as B11	degC	✓
B40	QV is	QV mapping	RW	Same as B10	Terminal	✓
B41	QV UNIT	QV unit	RW	Same as B11	degC	✓
B51	TERM UNIT	Terminal block temperature unit	RW	Same as B11	degC	✓
B52	TERM DAMP	Dumping of terminal block	RW	0 to 100 sec	2 sec	✓
B60	SELF CHECK	Self-diagnosis	RW	Same as A60	—	
C	SET TAG	Tag setting				
C10	TAG NO.	Tag number	RW	Sixteen alphanumeric characters	—	✓
D	SET INPUT	Input setting				
D10	SENSOR1 TYPE	Sensor1 input type	RW	See Table 3.1.	Pt100 IEC60751	✓
D11	SENSOR1 WIRE	Sensor1 input wiring	RW	2 WIRE 3 WIRE 4 WIRE	3 WIRE	✓
D12	SENSOR1	Sensor1 output value	R		—	
D13	SENSOR1 UNIT	Sensor1 unit selection	RW	degC K degF degR	degC	

No.	Name	Description	RW	Remarks	Default	Upload/ download parameter
D14	SENSOR1 DAMP	Sensor1 dumping	RW	0 to 100 sec	2 sec	✓
D20 *2	S1 R0	Setting of sensor matching reference resistance	RW	The unit is ohms.	100.00 ohms	
D21 *2	S1 A IEC	Primary coefficient setting of sensor matching IEC standard	RW	The unit is fixed to E-3.	+3.90830 E-3	
D22 *2	S1 B IEC	Secondary coefficient setting of sensor matching IEC standard	RW	The unit is fixed to E-7.	-5.77500 E-7	
D23 *2	S1 C IEC	Tertiary coefficient setting of sensor matching IEC standard	RW	The unit is fixed to E-12.	-4.18300 E-12	
D24 *2	S1 ALPHA	Primary coefficient setting of sensor matching CVD	RW	The unit is fixed to E-3.	+3.85055 E-3	
D25 *2	S1 DELTA	Secondary coefficient setting of sensor matching CVD	RW	The unit is fixed to E0.	1.49979 E0	
D26 *2	S1 BETA	Tertiary coefficient setting of sensor matching CVD	RW	The unit is fixed to E-1.	1.08634 E-1	
D30 *1	SENSOR2 TYPE	Sensor2 input type	RW	Same as D10	No Connection	✓
D31 *1	SENSOR2 WIRE	Sensor2 input wiring	RW	2 WIRE 3 WIRE	2 WIRE	✓
D32 *1	SENSOR2	Sensor2 output value	R		—	
D33 *1	SENSOR2 UNIT	Sensor2 unit selection	RW	Same as D13	degC	
D34 *1	SENSOR2 DAMP	Sensor2 dumping	RW	0 to 100 sec	2 sec	✓
D40 *1*2	S2 R0	Setting of sensor matching reference resistance	RW	The unit is ohms.	+100.00 ohms	
D41 *1*2	S2 A IEC	Primary coefficient setting of sensor matching IEC standard	RW	The unit is fixed to E-3.	+3.90830 E-3	
D42 *1*2	S2 B IEC	Secondary coefficient setting of sensor matching IEC standard	RW	The unit is fixed to E-7.	-5.77500 E-7	
D43 *1*2	S2 C IEC	Tertiary coefficient setting of sensor matching IEC standard	RW	The unit is fixed to E-12.	-4.18300 E-12	
D44 *1*2	S2 ALPHA	Primary coefficient setting of sensor matching CVD	RW	The unit is fixed to E-3.	+3.85055 E-3	
D45 *1*2	S2 DELTA	Secondary coefficient setting of sensor matching CVD	RW	The unit is fixed to E0.	1.49979 E0	
D46 *1*2	S2 BETA	Tertiary coefficient setting of sensor matching CVD	RW	The unit is fixed to E-1.	1.08634 E-1	
D60	SELF CHECK	Self-diagnosis	R	Same as A60	—	
E	SET OUTPUT	Output setting				
E10	LRV	Setting of range lower limit	RW	-300 to +5000°C for PV unit -5000 to 5000°C if a differential value such as Sensor1 - Terminal is mapped as PV	0.0	✓
E11	URV	Setting of range upper limit	RW	-300 to +5000°C for PV unit -5000 to 5000°C if a differential value such as Sensor1 - Terminal is mapped as PV	100.0	✓
E12	AUTO LRV	Automatic setting of range lower limit	RW	NO EXEC EXEC	NO EXEC	
E13	AUTO URV	Automatic setting of range upper limit	RW	NO EXEC EXEC	NO EXEC	
E20	AO DAMP	Current output dumping	RW	0 to 100 sec	8 sec	✓

No.	Name	Description	RW	Remarks	Default	Upload/ download parameter
E21	AO DAMP PT	Threshold of current output dumping calculation	RW	0 to 99%	0 %	✓
E40	BURN OUT	Sensor burnout	RW	LOW HIGH USER OFF	HIGH	✓
E41	BURN OUT mA	User output mA value for sensor burnout	RW	3.6 to 21.6 mA	21.6 mA	✓
E42	BURN OUT %	User output % value for sensor burnout	RW	-2.5 to 110%	110.0%	✓
E43	TX FAILURE	Output of hardware failure	R	LOW HIGH	HIGH	
E60	SELF CHECK	Self-diagnosis	R	Same as A60	—	
F	FORCED OUT	Forced output				
F10	OUTPUT MODE	Forced Output mode	RW	NORMAL MODE MANUAL MODE	NORMAL MODE	
F20	OUTPUT mA	Forced output mA value	RW	3.6 to 21.6 mA	4.0 mA	
F21	OUTPUT %	Forced output % value	RW	-2.5 to 110%	0.0%	
F30	RELEASE TIME	Time setting to automatically release the forced output	RW	10 MINUTES 30 MINUTES 60 MINUTES 3 HOURS 6 HOURS 12 HOURS	10 MINUTES	
F60	SELF CHECK	Self-diagnosis	R		—	
G	SET MODE	Various mode setting				
G10	CJC SELECT	CJC mode setting	RW	Internal CJC Constant CJC	Internal CJC	
G11	CNST CJC UNT	CJC unit	RW	degC K	degC	
G12	CNST CJC TMP	CJC temperature setting	RW	-40 to 85 degC	0.0 degC	
G20 *1	BACKUP ST	Display of sensor backup status	R	N/A SENSOR1 SENSOR2	—	
G21 *1	RETURN S1	Recovery instruction of sensor backup mode open-circuit	RW	NO EXEC EXEC	NO EXEC	
G40	WRT PROTECT	Display of write-protection status	R	NO YES	—	
G41	WRT ENABLE	Release of write protection	RW	Eight alphanumeric characters (for password)	Eight blank characters	
G42	NEW PASSWORD	New password setting	RW	Eight alphanumeric characters	Eight blank characters	
G43	SOFT SEAL	Display of software seal	R	KEEP BREAK	KEEP	
G60	SELF CHECK	Self-diagnosis	R	Same as A60	—	
H	INFORMATION	Various information				
H10	SENSOR1 LSL	Lower limit of Sensor1 measurement range	R			
H11	SENSOR1 USL	Upper limit of Sensor1 measurement range	R			
H12	S1 MIN SPAN	Sensor1 minimum span	R			
H20 *1	SENSOR2 LSL	Lower limit of Sensor2 measurement range	R			
H21 *1	SENSOR2 USL	Upper limit of Sensor2 measurement range	R			
H22 *1	S2 MIN SPAN	Sensor2 minimum span	R			

No.	Name	Description	RW	Remarks	Default	Upload/ download parameter
H30	TERM LSL	Lower limit temperature of terminal sensor measuring range	R		-200.0 degC	
H31	TERM USL	Upper limit temperature of terminal sensor measuring range	R		+850.0 degC	
H32	TERM MIN SPN	Terminal sensor minimum span	R		10.0 degC	
H60	SELF CHECK	Self-diagnosis	R	Same as A60	—	
I	ADJUST	Adjustment				
I10	S1 2W RESIST	Resistance for Sensor1 RTD 2-wire correction (Cable resistance)	RW		0.000 ohms	
I11	SENSOR1	Sensor1 output value	R	Same as D12	—	
I12	S1 ZERO ADJ	Sensor1 zero adjustment value	RW	Adjustment point	0.0 degC	
I13	S1 SPAN ADJ	Sensor1 span adjustment value	RW	Adjustment point	100.0 degC	
I14	S1 ZERO DEV	Sensor1 zero adjustment amount	R	Difference between the adjustment point and the unadjusted measured value	0.0 degC	
I15	S1 SPAN DEV	Sensor1 span adjustment amount	R	Difference between the adjustment point and the unadjusted measured value	0.0 degC	
I16	S1 ADJ CLR	Clear of Sensor1 adjustment data	RW	NO EXEC EXEC	NO EXEC	
I17	S1 SERIAL NO	Sensor1 serial number	RW	Sixteen alphanumeric characters	Sixteen blank characters	✓
I20 *1	S2 2W RESIST	Resistance for Sensor2 RTD 2-wire correction (Cable resistance)	RW		0.000 ohms	
I21 *1	SENSOR2	Sensor2 output value	R	Same as D32	—	
I22 *1	S2 ZERO ADJ	Sensor2 zero adjustment value	RW	Adjustment point	0.0	
I23 *1	S2 SPAN ADJ	Sensor2 span adjustment value	RW	Adjustment point	100.0	
I24 *1	S2 ZERO DEV	Sensor2 zero adjustment amount	R	Difference between the adjustment point and the unadjusted measured value	0.0	
I25 *1	S2 SPAN DEV	Sensor2 span adjustment amount	R	Difference between the adjustment point and the unadjusted measured value	0.0	
I26 *1	S2 ADJ CLR	Clear of Sensor2 adjustment data	RW	NO EXEC EXEC	NO EXEC	
I27 *1	S2 SERIAL NO	Sensor2 serial number	RW	Sixteen alphanumeric characters	Sixteen blank characters	✓
I30	OUTPUT	Output setting for user output adjustment	RW	NORMAL 4 mA 20 mA	NORMAL	
I31	OUT ZERO	Zero-point setting for user output adjustment	RW	PV value measured by an external reference meter during 4 mA output	4.0 mA	
I32	OUT GAIN	Gain point setting for user output adjustment	RW	PV value measured by an external reference meter during 20 mA output	20.0 mA	
I33	OUT ADJ CLR	Clear of output adjustment data	RW	NO EXEC EXEC	NO EXEC	

No.	Name	Description	RW	Remarks	Default	Upload/ download parameter
I40	NRML MIN OUT	Setting of operation output lower limit	RW	3.60 to 4.00 mA	3.68 mA	✓
I41	NRML MAX OUT	Setting of operation output upper limit	RW	20.00 to 21.60 mA	20.8 mA	✓
I60	SELF CHECK	Self-diagnosis	R	Same as A60	—	
J	LCD DISPLAY	Indicator				
J10	D INFO PARM	Display setting of DISP1/2 process variable name	RW	OFF ON	ON	✓
J11	D INFO UNIT	Display setting of DISP1/2 unit	RW	OFF ON	ON	✓
J12	D INFO STYPE	Display setting of DISP1/2 sensor type	RW	OFF ON	OFF	✓
J13	D INFO SWIRE	Display setting of DISP1/2 sensor connection wires	RW	OFF ON	OFF	✓
J20	DISP1 VRBL	DISP1 display - Process variable selection	RW	PV SV TV QV	PV	✓
J21	DISP1 POINT	DISP1 - Decimal point position setting	RW	0 1 2 3	1	
J22	DISP2 VRBL	DISP2 display - Process variable selection	RW	PV SV TV QV Not used	Not used	
J23	DISP2 POINT	DISP2 - Decimal point position setting	RW	0 1 2 3	1	
J30	% DISPLAY	% output display setting	RW	OFF ON	OFF	✓
J31	% POINT	% output - Decimal point position setting	RW	0 1 2 3	1	
J32	mA DISPLAY	Current output - Display setting	RW	OFF ON	OFF	✓
J33	mA POINT	Current output - Decimal point position setting	RW	0 1 2 3	2	
J40	BAR GRAPH	Bar graph display setting	RW	OFF ON	ON	✓
J50	DISP CYCLE	Display cycle setting	RW	HIGH MID LOW	MID	✓
J60	SELF CHECK	Self-diagnosis	R	Same as A60	—	
K	ALARM MASK	Alarm Mask				
K10	S1 FAIL MASK	Mask setting for S1 Failure alarm *3	RW	NO MASK MASK	NO MASK	
K11 *1	S2 FAIL MASK	Mask setting for S2 Failure alarm *3	RW	NO MASK MASK	NO MASK	
K12	S1 SHRT MASK	Mask setting for S1 Short alarm *3	RW	NO MASK MASK	MASK	
K13 *1	S2 SHRT MASK	Mask setting for S2 Short alarm *3	RW	NO MASK MASK	MASK	

No.	Name	Description	RW	Remarks	Default	Upload/ download parameter
K14	S1 CORR MASK	Mask setting for S1 Corrosion alarm	RW	NO MASK MASK	MASK	
K15 *1	S2 CORR MASK	Mask setting for S2 Corrosion alarm	RW	NO MASK MASK	MASK	
K20	S1 SGER MASK	Mask setting for S1 Signal Error alarm	RW	NO MASK MASK	NO MASK	
K21 *1	S2 SGER MASK	Mask setting for S2 Signal Error alarm	RW	NO MASK MASK	NO MASK	
K22	TERM F MASK	Mask setting for Term Sensor Failure alarm *3	RW	NO MASK MASK	NO MASK	
K23 *1	BKUP S1 MASK	Mask setting for Backup S1 Failure alarm *3	RW	NO MASK MASK	NO MASK	
K24 *1	BKUP S2 MASK	Mask setting of Backup S2 Failure alarm *3	RW	NO MASK MASK	NO MASK	
K25 *1	DRIFT MASK	Mask setting for Sensor Drift alarm	RW	NO MASK MASK	MASK	
K26	S1 T CY MASK	Mask setting for S1 Temp Cycle alarm	RW	NO MASK MASK	MASK	
K27 *1	S2 T CY MASK	Mask setting for S2 Temp Cycle alarm	RW	NO MASK MASK	MASK	
K30	OUT LO MASK	Mask setting for Output Too Low alarm	RW	NO MASK MASK	NO MASK	
K31	OUT HI MASK	Mask setting for Output Too High alarm	RW	NO MASK MASK	NO MASK	
K40	S1 T LO MASK	Mask setting for S1 Temp Low alarm	RW	NO MASK MASK	NO MASK	
K41	S1 T HI MASK	Mask setting for S1 Temp High alarm	RW	NO MASK MASK	NO MASK	
K42 *1	S2 T LO MASK	Mask setting for S2 Temp Low alarm	RW	NO MASK MASK	NO MASK	
K43 *1	S2 T HI MASK	Mask setting for S2 Temp High alarm	RW	NO MASK MASK	NO MASK	
K44	AMB LO MASK	Mask setting for Amb Temp Low alarm	RW	NO MASK MASK	NO MASK	
K45	AMB HI MASK	Mask setting for Amb Temp High alarm	RW	NO MASK MASK	NO MASK	
K50	LRV LO MASK	Mask setting for LRV Too Low alarm	RW	NO MASK MASK	NO MASK	
K51	LRV HI MASK	Mask setting for LRV Too High alarm	RW	NO MASK MASK	NO MASK	
K52	URV LO MASK	Mask setting for URV Too Low alarm	RW	NO MASK MASK	NO MASK	
K53	URV HI MASK	Mask setting for URV Too High alarm	RW	NO MASK MASK	NO MASK	
K54	SPN SML MASK	Mask setting for Span Too Small alarm	RW	NO MASK MASK	NO MASK	
K55	ILL PV MASK	Mask setting for Illegal PV Cfg alarm *4	RW	NO MASK MASK	NO MASK	
K56	ILL S1 MASK	Reserved	RW	NO MASK MASK	NO MASK	
K57 *1	ILL S2 MASK	Reserved	RW	NO MASK MASK	NO MASK	
K58	OUT MNL MASK	Mask setting for Output Man Mode alarm	RW	NO MASK MASK	NO MASK	
K60	SELF CHECK	Self-diagnosis	R	Same as A60	NO MASK	
L	DIAG INFO	Self-diagnosis information				
L10	S1 RP23	Sensor1 diagnostic resistance (Resistance between pins #2 and 3)	R			

No.	Name	Description	RW	Remarks	Default	Upload/ download parameter
L11	S1 RC1	Sensor1 diagnostic resistance (Resistance between pin #1 and sensor)	R			
L12	S1 RC2	Sensor1 diagnostic resistance (Resistance between pin #2 and sensor)	R			
L13	S1 RC3	Sensor1 diagnostic resistance (Resistance between pin #3 and sensor)	R			
L14	S1 RC4	Sensor1 diagnostic resistance (Resistance between pin #4 and sensor)	R			
L15 *1	S2 RP43	Sensor2 diagnostic resistance (Resistance between pins #4 and 3)	R			
L16 *1	S2 RC4	Sensor2 diagnostic resistance (Resistance between pin #4 and sensor)	R			
L17 *1	S2 RC3	Sensor2 diagnostic resistance (Resistance between pin #3 and sensor)	R			
L20	S1TC SHRT TH	Threshold for Sensor1 short-circuit diagnosis	RW		0.0 ohms	
L21	S1RTD COR TH	Threshold for Sensor1 corrosion diagnosis	RW		50.0000 ohms	
L22 *1	S2TC SHRT TH	Threshold for Sensor2 short-circuit diagnosis	RW		0.0 ohms	
L23 *1	S2RTD COR TH	Threshold for Sensor2 corrosion diagnosis	RW		50.0000 ohms	
L30 *1	DRFT TH UNIT	Threshold unit selection for temperature sensor drift diagnosis	RW	degC K degF degR	degC	
L31 *1	DRFT THLD	Threshold for temperature sensor drift diagnosis	RW	0 to 2500	0.0 degC, ohms, mV	
L40	T CY S1 CNT	Sensor1 temperature cycle count	R		0	
L41 *1	T CY S2 CNT	Sensor2 temperature cycle count	R		0	
L42	RST T CY CNT	Reset of temperature cycle count	RW	NO RESET RST SENSOR1 RST SENSOR2 *1 RST S1&S2 *1	NO RESET	
L43	T CY VAL UNT	Upper and lower limit unit selection for temperature cycle diagnosis	RW	degC K degF degR	degC	
L44	T CY LO VAL	Setting of temperature lower limit in temperature cycle	RW		-273.15 degC	
L45	T CY UP VAL	Setting of temperature upper limit in temperature cycle	RW		2000.00 degC	
L46	T CY AL TH	Threshold of temperature cycle diagnostic alarm	RW	0 to 999999	0	
L60	SELF CHECK	Self-diagnosis	R	Same as A60	—	
O	MEMO	Memo setting				
O10	MEMO1	Memo1 setting	RW	Sixteen alphanumeric characters	Sixteen blank characters	✓
O20	MEMO2	Memo2 setting	RW	Sixteen alphanumeric characters	Sixteen blank characters	✓
O30	MEMO3	Memo3 setting	RW	Sixteen alphanumeric characters	Sixteen blank characters	✓
O40	DATE	Date setting	RW	yyyy/mm/dd	1900/01/01	✓

No.	Name	Description	RW	Remarks	Default	Upload/ download parameter
O60	SELF CHECK	Self-diagnosis	R	Same as A60	—	
P	RECORDS	Record setting				
P05	LOG CLEAR	Clear of process variable history	RW	NO RESET RST SENSOR1 RST SENSOR2 *1 RST S1&S2 *1	NO RESET	
P10	S1 VAL MIN	Sensor1 minimum value	R		2500.00 degC	
P11	S1 VAL MAX	Sensor1 maximum value	R		-273.15 degC	
P12	S2 VAL MIN	Sensor2 minimum value	R		2500.00 degC	
P13	S2 VAL MAX	Sensor2 maximum value	R		-273.15 degC	
P14	TERM VAL MIN	Minimum value of terminal block temperature	R		2500.00 degC	
P15	TERM VAL MAX	Maximum value of terminal block temperature	R		-273.15 degC	
P18	AL LOG UPD	Update of alarm history	RW	NO EXEC EXEC	NO EXEC	
P19	AL LOG NO	Start number to read alarm history	RW	0 to 55	0	
P20	ALARM LOG1	Alarm history 1	R	Same as the alarm	—	
P21	LOG TIME1	Occurrence time of alarm history 1	R		Sixteen blank characters	
P22	ALARM LOG2	Alarm history 2	R	Same as the alarm	—	
P23	LOG TIME2	Occurrence time of alarm history 2	R		Sixteen blank characters	
P24	ALARM LOG3	Alarm history 3	R	Same as the alarm	—	
P25	LOG TIME3	Occurrence time of alarm history 3	R		Sixteen blank characters	
P26	ALARM LOG4	Alarm history 4	R	Same as the alarm	—	
P27	LOG TIME4	Occurrence time of alarm history 4	R		Sixteen blank characters	
P28	ALARM LOG5	Alarm history 5	R		—	
P29	LOG TIME5	Occurrence time of alarm history 5	R		Sixteen blank characters	
P30	OPERATE TIME	Operating time	R		0d00:00	
P40	COM.ERROR	Communication error descriptions	R		0	
P41	ERROR COUNT	Number of times of communication error occurrence	R		0	
P50	VLT INTRPT	Number of times of instantaneous shutdown	R		0	
P51	LST INT TIME	Latest instantaneous shutdown time	R		0d00:00	
P60	SELF CHECK	Self-diagnosis	R	Same as A60	—	
R	DEVICE INFO	Device information				
R01	MS CODE1	MS code 1	R	Sixteen alphanumeric characters	YTA710	
R02	MS CODE2	MS code 2	R	Sixteen alphanumeric characters	Sixteen blank characters	
R03	MS CODE3	MS code 3	R	Sixteen alphanumeric characters	Sixteen blank characters	
R04	MS CODE4	MS code 4	R	Sixteen alphanumeric characters	Sixteen blank characters	
R05	MS CODE5	MS code 5	R	Sixteen alphanumeric characters	Sixteen blank characters	
R06	MS CODE6	MS code 6	R	Sixteen alphanumeric characters	Sixteen blank characters	
R07	SERIAL NO.	Serial number	R	Sixteen alphanumeric characters	Sixteen blank characters	
R10	SOFT REV	Software revision	R	Rx.xx.xx		

No.	Name	Description	RW	Remarks	Default	Upload/ download parameter
R11	LCD REV	LCD revision	R	Rx.xx		
R40	MFTR.DATE	Manufacturing date	R	yyyy/mm/dd		
R60	SELF CHECK	Self-diagnosis	R	Same as A60	—	

- *1: Only displayed when the 2-input specifications are supported.
- *2: Only displayed when the additional specification code/CM1 is specified.



IMPORTANT

- *3: If S1 Failure, S2 Failure, S1 Short, S2 Short, Term Sensor Fail, Backup S1 Fail, and Backup S2 Fail are masked, the sensor burnout due to these events is also suppressed.
If it is necessary for the sensor burnout event to occur, release the alarm mask (NOMASK setting).
- *4: If the "Illegal PV Cfg" alarm masking is required, set "NOMASK" for it.

5.1 Parameter Copy

Using the upload and download functions, the user can copy the YTA710 setting data to another YTA710 temperature transmitter. Use the procedure below to copy the data.

(1) Upload

Attach the BT200 to the source YTA710 transmitter in order to record the setting data to the non-volatile memory of BT200. This operation is called uploading. For BT200 operations during uploading, see Section 5.1 "Collective Setup of Data" of Manual "IM 01C00A11-01".

(2) Download

Attach the BT200 to the destination YTA710 in order to write the setting data being recorded in the non-volatile memory of BT200. This operation is called downloading. For BT200 operations during downloading, see Section 5.1 "Collective Setup of Data" of Manual "IM 01C00A11-01".



NOTE

The user can upload or download the parameters identified by the symbol "✓" and shown as "Upload target" on Table 5.1 "List of Parameters". Note that the user cannot upload or download all setting parameters. If a parameter is not identified by the symbol "✓", set it separately.

Revision Information

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- Manual No. : IM 01C50T03-02EN

Edition	Date	Page	Revised Item
1st	Mar. 2018	—	New Publication
2nd	July 2019	1-3	Delete ATEX
		3-3	Add Output Fluctuation Suppression (→3.2.17)
		3-9	Add NOTE
		3-10	Add CAUTION
		3-16	Add CAUTION
		3-19, 3-20	Add 3.2.17 Output Fluctuation Suppression