User's Manual

YTA Series

YTA70P
Temperature Transmitter

IM 01C50C05-01EN

YOKOGAWA
Yokogawa Electric Corporation

IM 01C50C05-01EN
4th Edition

YTA70P
Temperature Transmitter

IM 01C50C05-01EN 4th Edition

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Revision Information

1. Preface

The YTA70P temperature transmitter is fully factory-tested according to the specifications indicated on the order.

In order for the YTA70P temperature transmitter to be fully functional and to operate in an efficient manner, the manual must be carefully read to become familiar with the functions, operation, and handling of the YTA70P. This manual gives instructions on handling, wiring and maintenance of YTA70P temperature transmitters. Changing the parameter settings requires a terminal dedicated to the HART protocol . For details on how to set the parameters of these transmitters, refer to chapter 8.

Document No.	Explanation
IM 01C50C05-01EN	YTA70P Temperature Transmitter
GS 01C50C05-01EN	YTA70P Temperature Transmitter

These manuals can be downloaded from the website of Yokogawa or purchased from the Yokogawa representatives.

Website address: http://www.yokogawa.com/fld/

■ **Notes on the User's Manual**

- This manual should be delivered to the end user.
- This manual and the identification tag attached on packing box are essential parts of the product; keep them in a safe place for future reference.
- The information contained in this manual is subject to change without prior notice.
- The information contained in this manual, in whole or part, shall not be transcribed or copied without notice.
- In no case does this manual guarantee the merchant ability of the transmitter or its adaptability to a specific client need.
- Should any doubt or error be found in this manual, submit inquiries to your local dealer.
- No special specifications are contained in this manual. When products whose suffix code or optional codes contain code "Z" and an exclusive document is attached, please read it along with this manual.
- Changes to specifications, structure, and components used may not lead to the revision of this manual unless such changes affect the function and performance of the transmitter.

■ **Notes on Safety and Modifications**

- This product is designed to be used by a person with specialized knowledge.
- Before handling the YTA70P, it is absolutely imperative that users of this equipment read and observe the safety instructions mentioned in each section of the manual in order to ensure the protection and safety of operators, the YTA70P itself and the system containing the transmitter. We are not liable for any accidents arising out of handling that does not adhere to the guidelines established in the safety instructions.

■ **Notes on Factory settings**

- Model YTA70P is shipped with the ordering settings from the factory. The label information is shown in Chapter 2.1. The factry setting information refer to Chapter 7.1.

■ **For Safe Use of Product**

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.
- 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.

(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

■ **Symbols used in this manual**

The YTA70P temperature transmitter and this manual use the following safety related symbols and signals.

WARNING

Contains precautions to protect against the chance of explosion or electric shock which, if not observed, could lead to death or serious injury.

CAUTION

Contains precautions to protect against danger, which, if not observed, could lead to personal injury or damage to the instrument.

IMPORTANT

Contains precautions to be observed to protect against adverse conditions that may lead to damage to the instrument or a system failure.

NOTE

Contains precautions to be observed with regard to understanding operation and functions.

Some of the diagrams in this manual are partially omitted, described in writing, or simplified for ease of explanation. The screen drawings contained in the instruction manual may have a display position or characters (upper/lower case) that differ slightly from the full-scale screen to an extent that does not hinder the understanding of functions or monitoring of operation.

■ **Warranty**

The warranty period of the instrument is as of condition shown when purchasing.

Any trouble arising during the warranty period shall be replaced at free of charge.

The following problems or troubles shall not be eligible of charge-exempt repair.

- Caused by improper usage or storage of the customer which exceeds the specification requirements.
- Caused by mishandling or modification.
- Caused by fire, earthquake or other acts of God that are not directly a result of problems of the instrument.

- **Conditions not eligible for charge-exempt repair.**

- Problems caused by improper or insufficient maintenance on the part of the customer.
- Trouble or damage caused by mishandling, misusage, or storage that exceeds the design or specification requirements.
- Problems caused by improper installation location or by maintenance conducted in a non-conforming location.
- Trouble or damage was caused by modification or repair that was handled by a party or parties other than our consigned agent.
- Trouble or damage was caused by inappropriate relocation following delivery.
- Trouble or damage was caused by fire, earthquake, wind or flood damage, lightning strikes or other acts of God that are not directly a result of problems with this instrument.

■ **Waste Electrical and Electronic Equipment (WEEE) Directive**
(This directive is only valid in the EU)

This product complies with the WEEE Directive marking requirement. The following marking indicates that you must not discard this electrical/electronic product in domestic household waste.

Product Category

With reference to the equipment types in the WEEE directive Annex 1, this product is classified as a “Monitoring and Control instrumentation” product.

Do not dispose in domestic household waste.

When disposing products in the EU, contact your local Yokogawa Europe B.V. office.

■ **The Authorized Representative for this product in the EEA is:**

Yokogawa Europe B.V.
Euroweg 2, 3825 HD Amersfoort, THE NETHERLANDS.

■ **Manual number**

The last two characters of the manual number and general specification number indicate the language in which the manual is written.

■ **Trademarks**

- HART is a trademark of the HART Communication Foundation.
- Registered trademarks or trademarks appearing in this manual are not designated by a TM or ® symbol.
- Other company names and product names used in this manual are the registered trademarks or trademarks of their respective owners.

■ Control of Pollution Caused by the Product

This is an explanation for the product based on “Control of Pollution caused by Electronic Information Products” in the People’s Republic of China.

電子情報製品污染制御管理弁法（中国版RoHS）

产品中有害物质或元素的名称及含量

型号	部件名称	有害物质					
		铅（Pb）	汞（Hg）	镉（Cd）	六价铬（Cr(VI)）	多溴联苯（PBB）	多溴二苯醚（PBDE）
YTA70P 温度变送器	壳体	×	○	○	○	○	○
	基板组件	×	○	○	○	○	○
	电源连接线	×	○	○	○	○	○

○：表示该部件的所有均质材料中的有害物质的含量均在 GB/T26572 标准中所规定的限量以下。

×：表示至少该部件的某些均质材料中的有害物质的含量均在 GB/T26572 标准中所规定的限量以上。

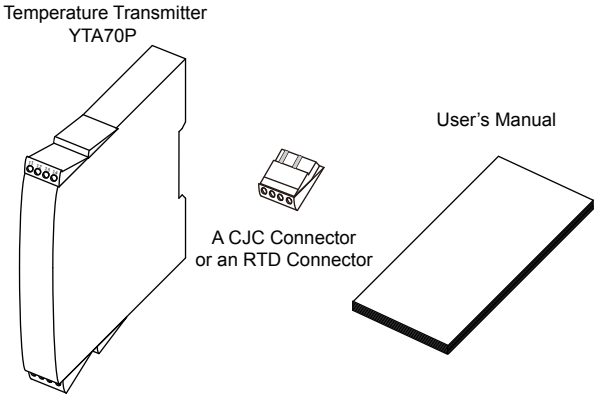
环保使用期限：

该标识适用于 SJ /T11364 中所述，在中华人民共和国销售的电子电气产品的环保使用期限。

注）该年数为“环保使用期限”，并非产品的质量保证期。

2. Notes on Handling

The YTA70P temperature transmitter is fully factory tested upon shipment. When the YTA70P is delivered, check the appearance for damage, and also check that the transmitter parts shown in Figure 2.1 are included with your shipment.



A CJC or an RTD connector is attached to the product as specified in the order, and the connector not attached to the product is included in the package.

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Figure 2.1 Transmitter parts

2.1 Label

The model name and configuration are indicated on the Label. Verify that the configuration indicated in the “Model and Suffix Code” in Chapter 7 is in compliance with the specifications written on the order sheet.

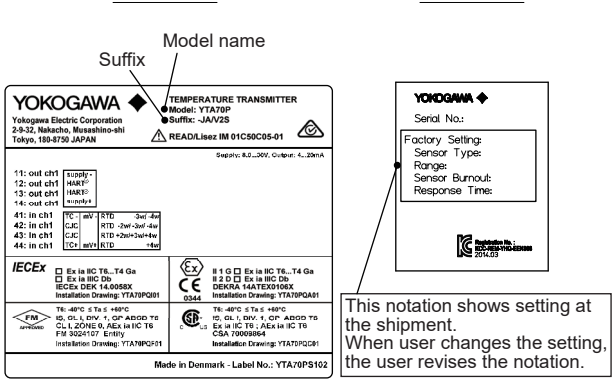

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Figure2.2 Labels

2.2 Transport

To prevent damage while in transit, leave the transmitter in the original shipping container until it reaches the installation site.

2.3 Storage

When an extended storage period is expected, observe the following precautions:

1. If at all possible, store the transmitter in factory shipped condition, that is, in the original shipping container.
2. Choose a storage location that satisfies the following requirements.

- A location that is not exposed to rain or water.
- A location that is not exposed to direct sunlight.
- A location subject to a minimum of vibration or impact.
- The following temperature and humidity range is recommended. Ordinary temperature and humidity (25°C, 65%) are preferable.
  Temperature: -40 to 85°C
  Humidity: 0 to 95% RH (Non-Condensation)

2.4 Choosing the Installation Location

Although the temperature transmitter is designed to operate in a vigorous environment, to maintain stability and accuracy, the following is recommended:

(1) Ambient Temperature
It is preferable to not to expose the instrument to extreme temperatures or temperature fluctuations. If the instrument is exposed to radiation heat a thermal protection system and appropriate ventilation is recommended.

(2) Environmental Requirements
Do not allow the instrument to be installed in a location that is exposed to corrosive atmospheric conditions. When using the instrument in a corrosive environment, ensure the location is well ventilated. The unit and its wiring should be protected from exposure to rainwater and direct sunlight.

(3) Impact and Vibration
It is recommended that the instrument be installed in a location that is subject to a minimum amount of impact and vibration.

2.5 Use of a Transceiver

Although the temperature transmitter is designed to resist influence from high frequency noise; use of a transceiver in the vicinity of installation may cause problems. Installing the transmitter in an area free from high frequency noise (RFI) is recommended.

2.6 Withstand Voltage Test

CAUTION

- Overvoltage of the test voltage that is so small that it does not cause an dielectric breakdown may in fact deteriorate insulation and lower the safety performance; to prevent this it is recommended that the amount of testing be kept to a minimum.
- The voltage for the withstand voltage test must be 500 VAC or lower. Failure to heed these guidelines may cause faulty operation.

Withstand voltage test procedure

■ Testing between the output terminal and the input terminal

1. Lay transition wiring between 11 and 14 of connector. *1
2. Lay transition wiring between all input terminals (except CJC) of connector. *1
3. Connect the withstand voltage tester (with the power turned OFF) between the transition wiring shown in steps 1 and 2 above.
4. After setting the current limit value of the withstand voltage tester to 10 mA, turn the power ON, and carefully increase the impressed voltage from 0 V to the specified value.
5. The voltage at the specified value must remain for duration of one minute.
6. Upon completion of the test, carefully reduce the voltage so that no voltage surge occurs.

*1: Refer to Figure 5.3 for terminal Number.

2.7 Installation of Explosion Protected Type Transmitters

In this section, further requirements and differences and for explosion protected type instrument are described. For explosion protected type instrument, the description in this chapter is prior to other description in this user's manual.

CAUTION

To preserve the safety of explosion protected type instrument requires great care during mounting, wiring.
Safety requirements also place restrictions on maintenance and repair activities. Please read the following sections very carefully.

2.7.1 ATEX Certification

See Appendix.1 ATEX Installation drawing YTA70PQA01

2.7.2 FM Certification

See Appendix.2 FM Installation drawing YTA70PQF01

2.7.3 IECEx Certification

See Appendix.3 IECEx Installation drawing YTA70PQI01

2.7.4 CSA Certification

See Appendix.4 CSA Installation drawing YTA70PQC01

2.7.5 Label of Explosion Protected Type

See Appendix.5 Label of Explosion Protected Type

NOTE

The YTA70P is a single sensor input model.
Please ignore the loop construction of CH2.

3. Part Names

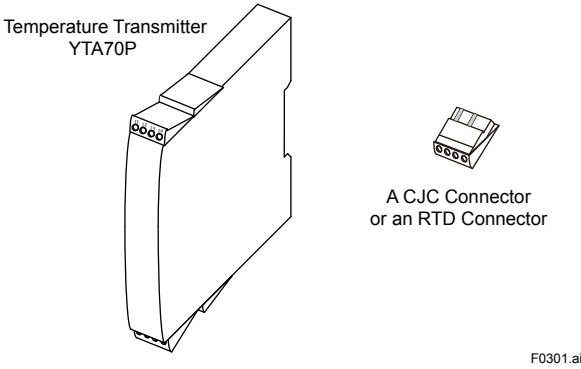
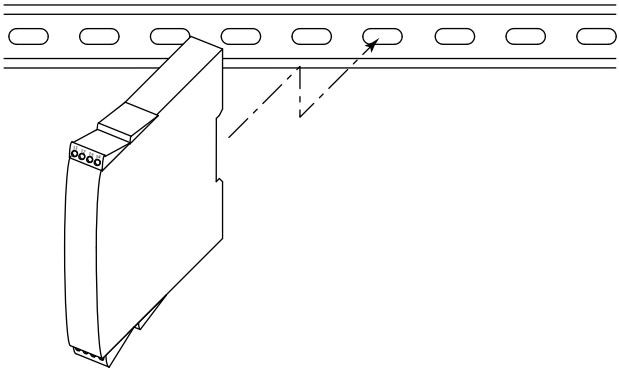


Figure 3.1 Part Names

4. Installation

For details of choosing the installation location, refer to the guidelines outlined in Section 2.4, “Choosing the installation location”.



Mounting on DIN rail

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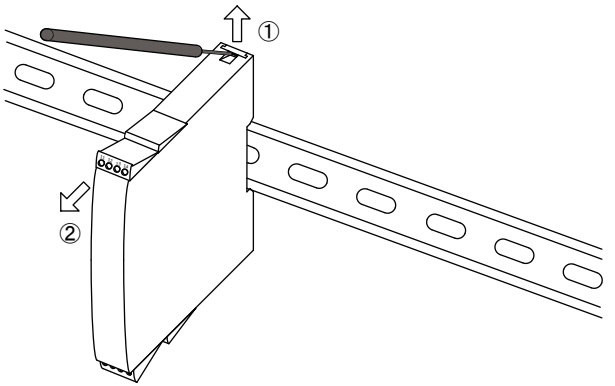
Figure 4.1 Mounting the Transmitter



First, remember to turn off power supply and remove output signal cable.
Detach the device from the DIN rail by lifting the lock.

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Figure 4.2 Detach the Transmitter

5. Wiring

5.1 Notes on Wiring

IMPORTANT

- Lay wiring as far away as possible from electrical noise sources such as large transformers, motors and power supplies.
- To prevent electrical noise, the signal cable and the power cable must not be housed in the same conduit.

5.2 Loop Construction

The YTA70P is a two-wire temperature transmitter that uses the output power supply wiring and signal wiring alternately.
The transmission loop requires DC power. Connect the transmitter with the distributor as shown in Figure 5.1 or Figure 5.2.
For the transmission loop, the load resistance of the distributor or other instrument to be installed in the loop and the lead wire must be within the range shown in Figure 5.3.

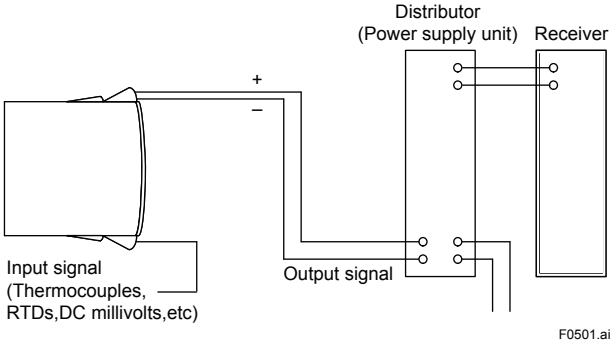

Figure 5.1 Loop Construction (for General-use Type)

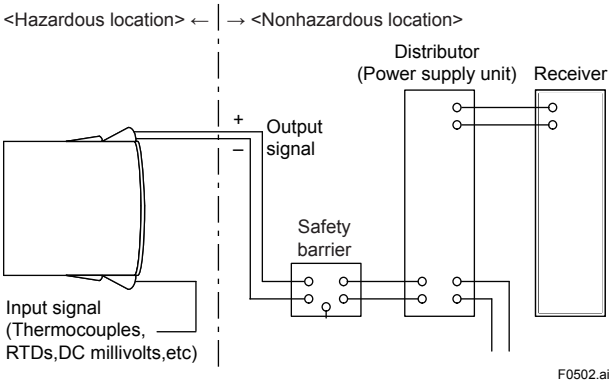

Figure 5.2 Loop Construction (for Intrinsically Safe Type)

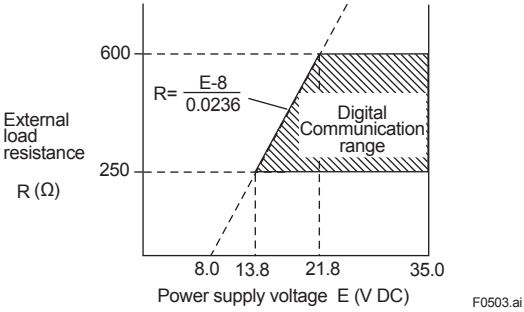

Figure 5.3 Relation between Power Supply Voltage and Load Resistance

Note: For intrinsic safe explosion protected type units, the internal resistance of the safety barrier is also included in the load resistance.

5.3 Cable Selection

5.3.1 Input signal Cable Selection

A dedicated cable is used for connection between the temperature sensor and the temperature transmitter.
When a thermocouple is used as the temperature sensor, a compensation wire which is appropriate for the type of thermocouple must be used (refer to compensating cables for IEC584 thermocouples). When a resistance temperature sensor (RTD) is used as the temperature sensor, 2-core/3-core/4-core cable must be used (refer to resistance thermometer sensor IEC751).

5.3.2 Output Signal Cable Selection

- Use cables of 0.13 to 2.08 mm^2 / AWG26 to 14.
- For wiring in areas susceptible to electrical noise, use shielded wires.
- For wiring in high or low temperature areas, use wires or cables suitable for such temperatures.
- For use in an atmosphere where harmful gases or liquids, oil, or solvents are present, use wires or cables made of materials resistant to those substances.

5.4 Cable and Terminal Connections

Wiring Diagram

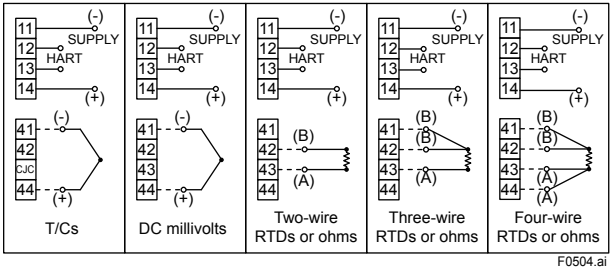

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Figure 5.4 YTA70P Wiring Diagram

6. Maintenance

6.1 General

Each component of this instrument is configured in units to make maintenance easier.
This chapter contains trim adjustment and troubleshooting for maintenance of the affected instrument.

IMPORTANT

Maintenance of this instrument should be performed in a service shop where the necessary tools are provided.

6.2 Trim adjustment

This instrument is fully factory-tested and is guaranteed for the intended accuracy, eliminating the need for the trim adjustment. When the trim adjustment needs, the following procedure is recommended.

6.2.1 Trim Procedure

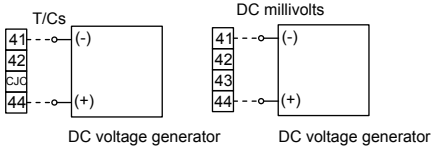
1. Trim sensor

The sensor trim procedure allows you to adjust for local conditions, changing how the transmitter calculates process variables. There are two ways to trim the sensor: Device variable zero trim and Device variable trim. Device variable zero trim is a one-point adjustment typically used to compensate for zero shifts. Device variable trim is a two-point process, in which two accurate end-point sensor input are applied (equal to or greater than the range values), and all output is linearized between them.

- Procedure to call up the D/A trim display
  Device setup → Diag/Service → Calibration → Dev var zero trim
  Device variable trim

In Device variable trim, if the output value is different from the trim setting value, repeat device variable trim procedure.

a. Example of wiring for thermocouples or DC millivolts input



b. Example of wiring for thermometer resistor 4-core type

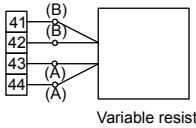


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Figure 6.1 Example of Wiring for Trim sensor

2. Trim Analog Output

Fine current output adjustment is carried out with D/A trim. D/A trim is to be carried out if the calibration digital meter does not exactly read 4.000 mA and 20.000 mA with an output signal of 0% and 100%.

- Procedure to call up the D/A trim display
  Device setup → Diag/Service → Calibration → D/A trim

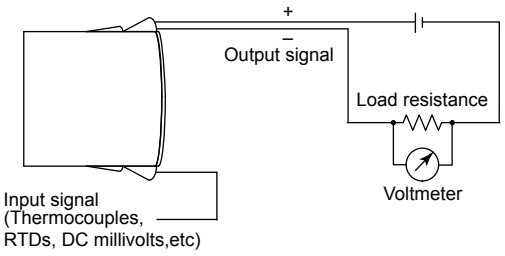

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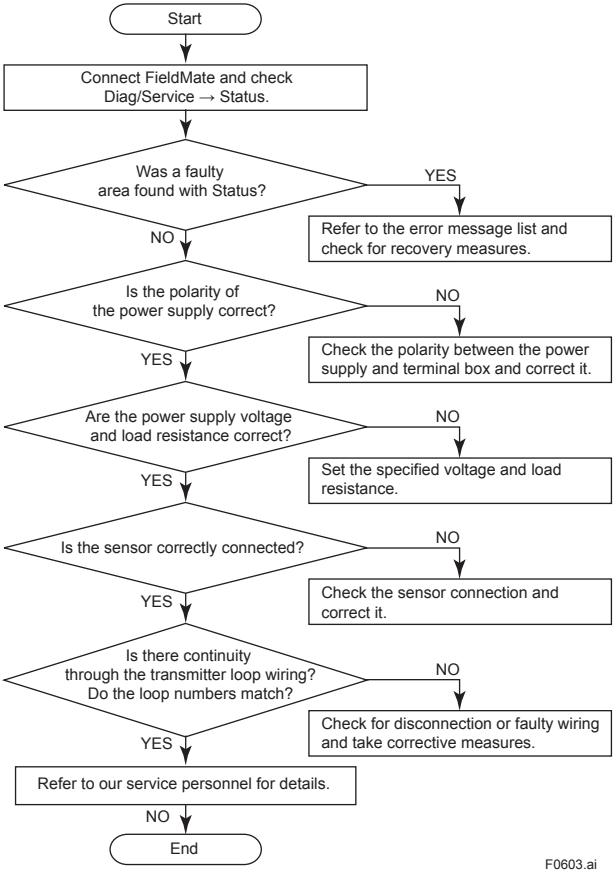
Figure 6.2 Example of Wiring for analog trim

6.3 Troubleshooting

When the measured value is found abnormal, follow the troubleshooting flowchart below.



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Alarms and Countermeasures

Diag/Service → Status		Cause	Action
Sensor errors	Sensor1 (Fld dev stat0-1)	Sensor1 error is detected.	1. Check Sensor1 for damage. 2. Check terminal connection. 3. Check cable resistance value setting. Set double of the cable resistance between the sensor and the device. It is necessary for 2-wire, 3-wire and 4-wire RTDs/ohms to compensate cable resistance.
	Sensor2 (Fld dev stat0-2)	Future use	N/A
	CJC/electronics sensor (Fld dev stat0-3)	CJC failure is detected.	Use CJC connector for thermocouple measurement.
ADC errors	ADC communication (Fld dev stat1-1)	ADC failure is detected.	Contact our service.
	ADC checksum (Fld dev stat1-3)		
	ADC timeout (Fld dev stat1-4)		
Misc. errors	EEPROM readback (Fld dev stat2-1)	EEPROM failure is detected.	Contact our service.
	EEPROM integrity (Fld dev stat2-2)		
	RAM integrity (Fld dev stat2-3)	RAM failure is detected.	
	ADC initialization (Fld dev stat2-4)	ADC failure is detected.	
	Flash integrity (Fld dev stat2-6)	Flash ROM failure is detected.	
	Software (Fld dev stat2-7)	Software failure is detected.	

Diag/Service → Status		Cause	Action
Ext device status	Maintenance required	This bit is set when a sensor error is detected by the device.	1. Check Sensor1 for damage. 2. Check terminal connection.
	Device variable alert	This bit is set if any of the device variables are out of limits. This bit is set when any of the device status bits “PV Values of Of Limits”.	Check PV range.
	Critical power failure	Future use	N/A
Device Diagnostic Status 0	Simulation active	Future use	N/A
	Non-volatile memory failure	EEPROM failure is detected.	Contact our service.
	Volatile memory error	RAM failure is detected.	
	Watchdog reset executed	Software failure is detected.	
	Voltage conditions out of range	The power supply voltage is outside its allowable range.	Check power supply voltage.
	Environmental conditions out of range	Environmental condition is beyond acceptable limits.	Check ambient temperature. Take enough distance from heat source. Or use the heater to raise ambient temperature.
	Electric failure	Hardware failure is detected.	Contact our service.

7. General Specifications

7.1 Standard Specifications

Please refer to the following General Specifications list for the specifications, model, suffix and option codes, and external dimensions of each product. The General Specifications can be downloaded from the website of Yokogawa.
Website address:
https://www.yokogawa.com/solutions/products-platforms/field-instruments/

■ **General Specifications List**

Model	Document Title	Document No.
YTA70P	YTA70P Temperature Transmitter	GS 01C50C05-01EN

If you cannot find it on our website, please contact YOKOGAWA office.

7.2 Optional Specifications

ATEX, FM, IECEx, and CSA Intrinsically safe Approval

ATEX Intrinsically safe Approval

Applicable Standards: EN IEC 60079-0, EN 60079-11

Certificate: DEKRA 14ATEX0106 X

II 1 G Ex ia IIC T6...T4 Ga

II 2 D Ex ia IIIC Db

Amb. temp.:

For EPL Ga: The relation between ambient temperature range and temperature class:

Temperature Class	Ambient temperature range	
	Pi=0.84W	Pi=0.75W
T6	–40°C to +40°C	–40°C to +45°C
T5	–40°C to +55°C	–40°C to +60°C
T4	–40°C to +85°C	–40°C to +85°C

For EPL Db: The surface temperature of the outer enclosure is +20 K above the ambient temperature, determined without a dust layer.
Ambient temperaure range: –40 to 85°C

Supply and output circuit: Ui=30V, Ii=120mA, Pi=0.84W or 0.75W, Ci=1nF, Li=0µH

Sensor circuit: Uo=9.6V, Io=28mA, Po=67.2mW, Co=3.5µF, Lo=35mH

FM Intrinsically safe Approval

Applicable Standards: Class 3600, Class 3610, Class 3611, Class 3810, ANSI/ISA-60079-0:2009, ANSI/ISA-60079-11:2009

Intrinsically Safe for Class I, Division 1, Groups A, B, C & D

Class I, Zone 0, AEx ia, Group IIC, T6

Amb. Temp.: –40 to 60°C

Entity Parameters: V Max=30V, I Max=120mA, Pi=0.84W, Ci=1nF, Li=10µH, Vt=9.6V, It=28mA, Po=67.2mW, Ca=3.5µF, La=35mH

IECEx Intrinsically safe Approval

Applicable Standards: IEC 60079-0, IEC 60079-11

Certificate: IECEx DEK 14.0058X

Ex ia IIC T6...T4 Ga

Ex ia IIIC Db

Amb. temp.:

For EPL Ga: The relation between ambient temperature range and temperature class:

Temperature Class	Ambient temperature range	
	Pi=0.84W	Pi=0.75W
T6	–40°C to +40°C	–40°C to +45°C
T5	–40°C to +55°C	–40°C to +60°C
T4	–40°C to +85°C	–40°C to +85°C

For EPL Db: The surface temperature of the outer enclosure is +20 K above the ambient temperature, determined without a dust layer.
Ambient temperaure range: –40 to 85°C

Supply and output circuit: Ui=30V, Ii=120mA, Pi=0.84W or 0.75W, Ci=1nF, Li=0μH

Sensor circuit: Uo=9.6V, Io=28mA, Po=67.2mW, Co=3.5μF, Lo=35mH

CSA Intrinsically safe Approval

Certificate: 70009864

Applicable Standards:
CAN/CSA-C22.2 No.0-10, CSA Std C22.2 No.142-M1987 (R2009), CSA Std C22.2 No.157-92(R2012), CAN/CSA-C22.2 No.60079-0:11, CAN/CSA- C22.2 E60079-11:11,
Class I, Division 1, Groups A, B, C & D, Ex ia IIC, Ga

UL Std No. 913 Ed. 8 , UL Std No. 916 Ed. 4, UL 60079-0 Ed 5, UL Std No. 60079-11 Ed. 6
Class I, Division 1, Groups A, B, C & D
Class I, Zone 0, AEx ia IIC, Ga

Temperature Class: T6
Amb. Temp.: –40 to 60 °C

Input entity parameters: Ui(Vmax)=30V, Ii(I max)=120mA, Pi=0.84W, Ci=1nF, Li=10µH
Output entity parameters: Uo(Uoc)=9.6V, Io(Isc)=28mA, Po(Pmax)=67.2mW, Co(Ca)=3.5µF, Lo(La)=35mH

7.3 EMC Conformity

EN 61326-1 Class A, Table2
EN 61326-2-3

CAUTION

This instrument is a Class A product, and it is designed for use in the industrial environment. Please use this instrument in the industrial environment only.

7.4 EU RoHS Directive

Applicable standard: EN IEC 63000

- Applicable production sites are shown below
  The condition of the RoHS compliant production site are as follows:
  Singapore, China
  The production sites can be confirmed by the serial number shown in the frame of “No.” in the name plate of the product.
  Serial numbers (9 letters): AAnnnnnnn
  AA: Identification code of production site
  Singapore: Use “C2” or “C0” China: Use “S5”

8. HART Communicator Operation

8.1 Connection and Requirements

A standard HART communicator can be used for programming the YTA70P. The HART communicator must be loaded with the appropriate DDL driver for YTA70P.

Minimum loop resistance is 250 Ω. If the receiving equipment has a lower resistance, a serial resistor must be inserted to communicate with the HART communicator.

[Connection]

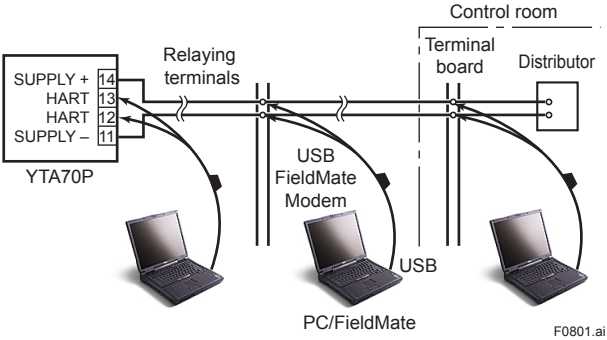


Figure 8.1 Connecting the HART configuration Tool

[Communication requirement]

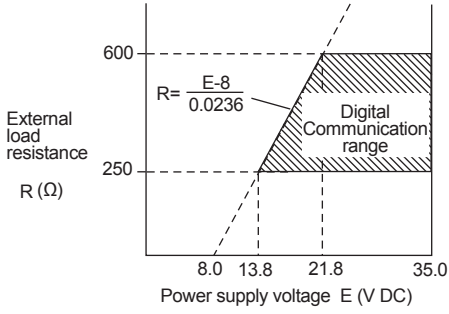
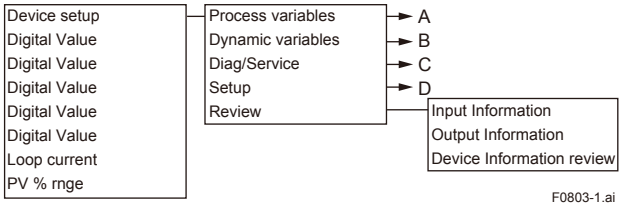


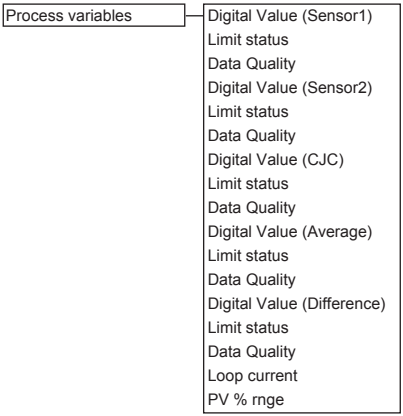
Figure 8.2 Relationship between Power Supply Voltage and External Load Resistance

Note: For intrinsic safe explosion protected type units, the internal resistance of the safety barrier is also included in the load resistance.

8.2 Parameters

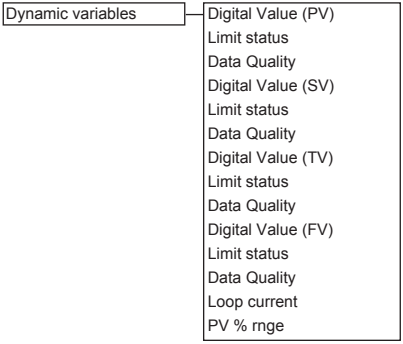


A



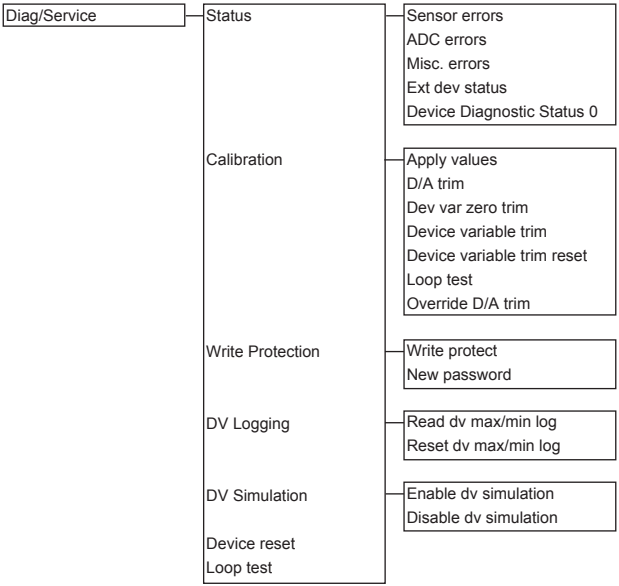
F0803-2.ai

B



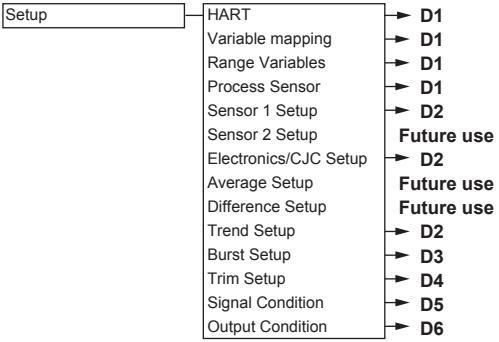
F0803-3.ai

C


Diag/Service
Status
Sensor errors
ADC errors
Misc. errors
Ext dev status
Device Diagnostic Status 0
Calibration
Apply values
D/A trim
Dev var zero trim
Device variable trim
Device variable trim reset
Loop test
Override D/A trim
Write Protection
Write protect
New password
DV Logging
Read dv max/min log
Reset dv max/min log
DV Simulation
Enable dv simulation
Disable dv simulation
Device reset
Loop test

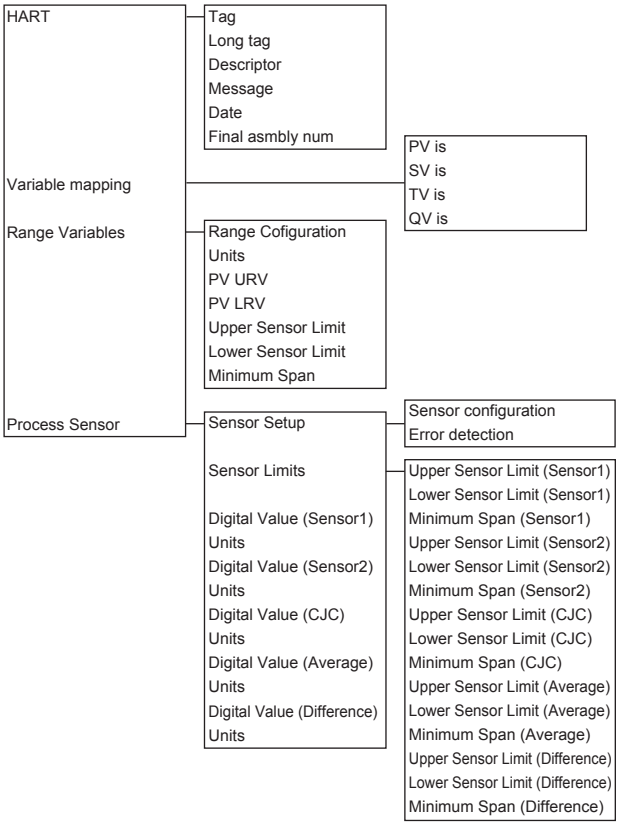
F0803-4.ai

D


Setup
HART
Variable mapping
Range Variables
Process Sensor
Sensor 1 Setup
Sensor 2 Setup
Electronics/CJC Setup
Average Setup
Difference Setup
Trend Setup
Burst Setup
Trim Setup
Signal Condition
Output Condition
D1
D1
D1
D1
D2
Future use
D2
Future use
Future use
D2
D3
D4
D5
D6

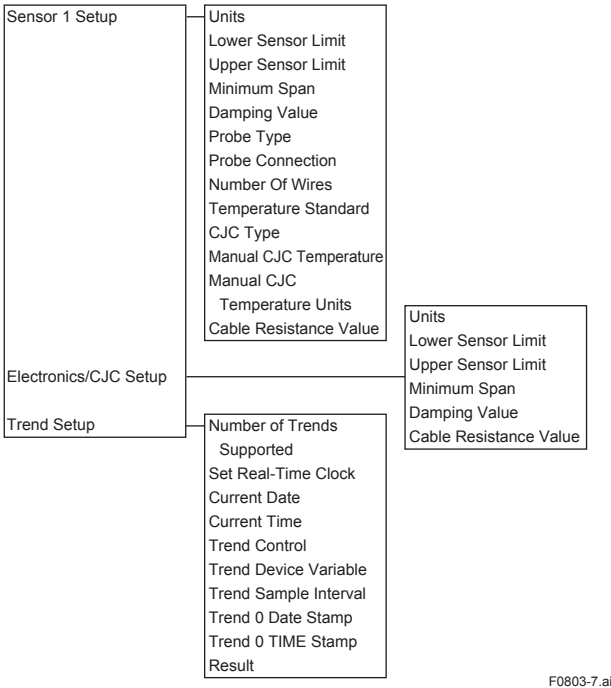
F0803-5.ai

D1


HART
Tag
Long tag
Descriptor
Message
Date
Final asmbly num
Variable mapping
PV is
SV is
TV is
QV is
Range Variables
Range Cofiguration
Units
PV URV
PV LRV
Upper Sensor Limit
Lower Sensor Limit
Minimum Span
Process Sensor
Sensor Setup
Sensor configuration
Error detection
Sensor Limits
Upper Sensor Limit (Sensor1)
Lower Sensor Limit (Sensor1)
Minimum Span (Sensor1)
Upper Sensor Limit (Sensor2)
Lower Sensor Limit (Sensor2)
Minimum Span (Sensor2)
Upper Sensor Limit (CJC)
Lower Sensor Limit (CJC)
Minimum Span (CJC)
Upper Sensor Limit (Average)
Lower Sensor Limit (Average)
Minimum Span (Average)
Upper Sensor Limit (Difference)
Lower Sensor Limit (Difference)
Minimum Span (Difference)
Digital Value (Sensor1)
Units
Digital Value (Sensor2)
Units
Digital Value (CJC)
Units
Digital Value (Average)
Units
Digital Value (Difference)
Units

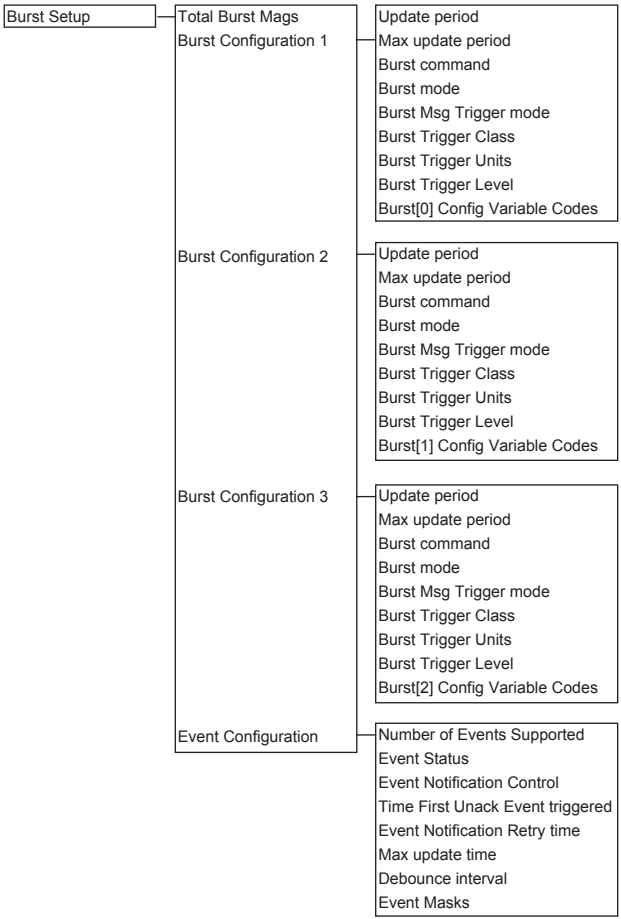
F0803-6.ai

D2


Sensor 1 Setup
Units
Lower Sensor Limit
Upper Sensor Limit
Minimum Span
Damping Value
Probe Type
Probe Connection
Number Of Wires
Temperature Standard
CJC Type
Manual CJC Temperature
Manual CJC
Temperature Units
Cable Resistance Value
Electronics/CJC Setup
Units
Lower Sensor Limit
Upper Sensor Limit
Minimum Span
Damping Value
Cable Resistance Value
Trend Setup
Number of Trends
Supported
Set Real-Time Clock
Current Date
Current Time
Trend Control
Trend Device Variable
Trend Sample Interval
Trend 0 Date Stamp
Trend 0 TIME Stamp
Result

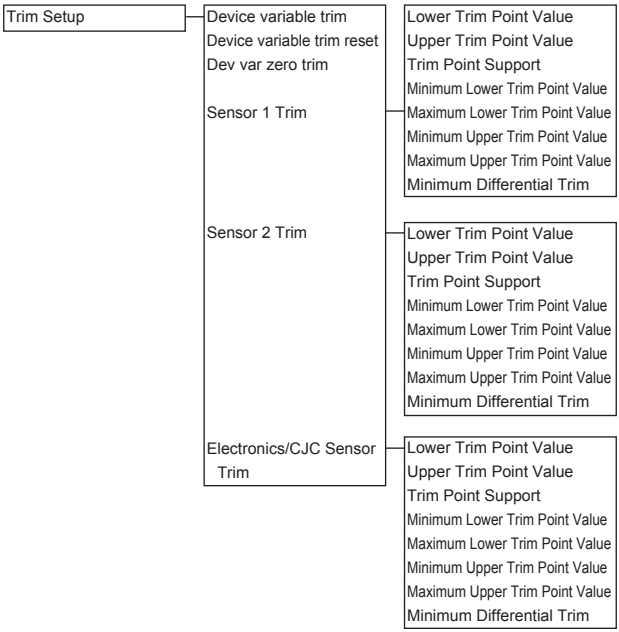
F0803-7.ai

D3


Burst Setup
Total Burst Mags
Burst Configuration 1
Update period
Max update period
Burst command
Burst mode
Burst Msg Trigger mode
Burst Trigger Class
Burst Trigger Units
Burst Trigger Level
Burst[0] Config Variable Codes
Burst Configuration 2
Update period
Max update period
Burst command
Burst mode
Burst Msg Trigger mode
Burst Trigger Class
Burst Trigger Units
Burst Trigger Level
Burst[1] Config Variable Codes
Burst Configuration 3
Update period
Max update period
Burst command
Burst mode
Burst Msg Trigger mode
Burst Trigger Class
Burst Trigger Units
Burst Trigger Level
Burst[2] Config Variable Codes
Event Configuration
Number of Events Supported
Event Status
Event Notification Control
Time First Unack Event triggered
Event Notification Retry time
Max update time
Debounce interval
Event Masks

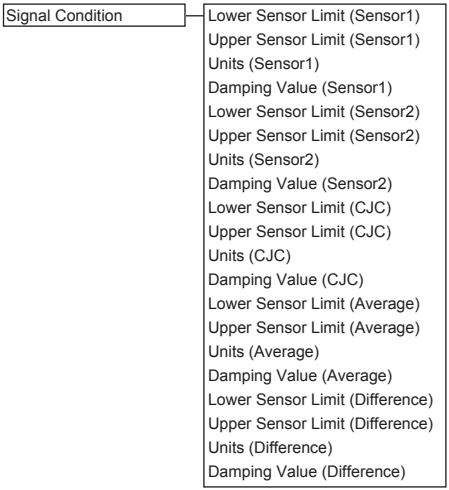
F0803-8.ai

D4


Trim Setup
Device variable trim
Device variable trim reset
Dev var zero trim
Sensor 1 Trim
Sensor 2 Trim
Electronics/CJC Sensor Trim
Lower Trim Point Value
Upper Trim Point Value
Trim Point Support
Minimum Lower Trim Point Value
Maximum Lower Trim Point Value
Minimum Upper Trim Point Value
Maximum Upper Trim Point Value
Minimum Differential Trim
Lower Trim Point Value
Upper Trim Point Value
Trim Point Support
Minimum Lower Trim Point Value
Maximum Lower Trim Point Value
Minimum Upper Trim Point Value
Maximum Upper Trim Point Value
Minimum Differential Trim
Lower Trim Point Value
Upper Trim Point Value
Trim Point Support
Minimum Lower Trim Point Value
Maximum Lower Trim Point Value
Minimum Upper Trim Point Value
Maximum Upper Trim Point Value
Minimum Differential Trim

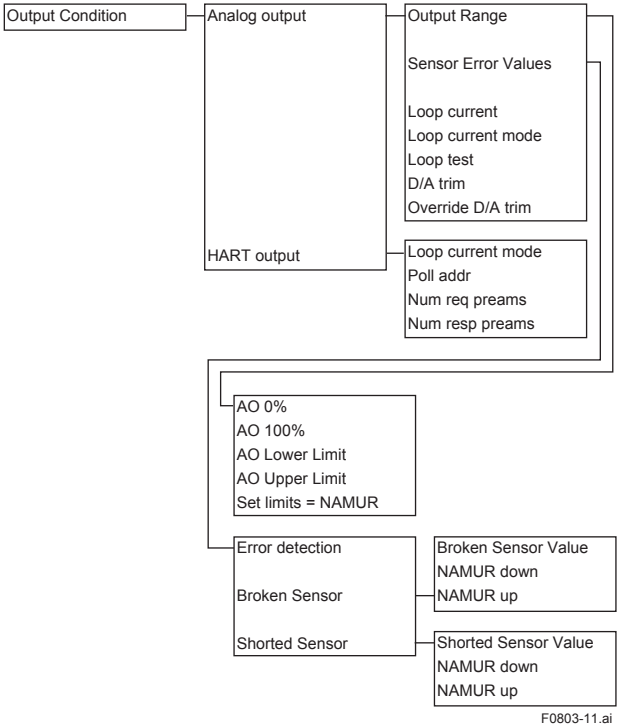
F0803-9.ai

D5



F0803-10.ai

D6

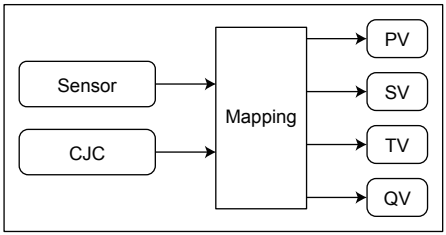


F0803-11.ai

8.3 Device Variables Mapping

There are two device variables available.

1) Sensor
2) CJC



F0804.ai

Burst Parameters

Command Parameter	Burst Command	Burst Msg Trigger Mode	Burst Trigger Source	Burst Trigger Units
PV Temperature value assigned to PV	Cmd1: PV	Continuous	-	-
		Window Rising Falling On-change	PV	Depend on PV assignment
% range/Loop current	Cmd2: % range/ Current	Continuous	-	-
		Window Rising Falling On-change	% range	%
Process variables/Loop current	Cmd3: Dyanamic variables/Current	Continuous	-	-
		Window Rising Falling On-change	PV	Depend on PV assignment
Process vars/% range/Loop current with status	Cmd9: Device variables with status	Continuous	-	-
		Window Rising Falling On-change	Sensor, EI/CJC, PV, SV, TV, QV(*1)	Depend on burst trigger source
Process vars/% range/Loop Current	Cmd33: Device variables	Continuous	-	-
		Window Rising Falling On-change	Sensor, EI/CJC, PV, SV, TV, QV(*1)	Depend on burst trigger source
Self diagnosis information	Cmd48: Additional device status	Continuous	-	-

(*1) Loop current and % range are selectable from menu but not available.

8.4 Parameter List

Item		Parameter name	Descriptions	Initial setting
Process variables		Digital Value	Device variable value in engineering unit (Sensor2, Average and Difference is for future use)	N/A
		Limit status	Data quality and limit status of device variables	N/A
		Data Quality		N/A
		Loop current	Output value in mA	N/A
		PV % rnge	Output value with respect to the range in %	N/A
Dynamic variables		Digital value (PV/SV/TV/QV)	Dynamic variables	N/A
		Limit status	Data quality and limit status of PV/SV/TV/QV	N/A
		Data Quality		N/A
		Loop current	Output value in mA	N/A
		PV % rnge	Output value with respect to the range in %	N/A
Diag/ Service	Status	Sensor errors	Show error status related to a sensor. When any one of the errors turns “ON”, check the sensor and wiring	N/A
		ADC errors	Show error status related to analog to digital conversion. When any one of the errors turns “ON”, restart the device. If error remains, replace the device	N/A
		Misc. errors	Show error status related to a device. When any one of the errors turns “ON”, restart the device. If error remains, replace the device.	N/A
		Ext device status	This bit is set if any Device Variable is in an Alarm or Warning State	N/A
		Device Diagnostic Status 0	Device status of diagnostic	N/A

Item		Parameter name	Descriptions	Initial setting
Diag/ Service	Calibration	Apply values	Rerange by actual input	N/A
		D/A trim	Allows the calibration of a selected analog output with an external reference at the operating endpoint	N/A
		Dev var zero trim	Sensor and CJC ZeroTrimming	N/A
		Device variable trim	Sensor and CJC Trimming. If the output value is different from the trim setting value, repeat device variable trim procedure.	N/A
		Device variable trim reset	Reset sensor trim for factory setting	N/A
		Loop test	Change the output manually for testing the loop. 4mA, 20mA, or value within 3.5 to 23mA	N/A
		Override D/A trim <Clear D/A trim>	Overrides any previous D/A trimming by restoring factory calibration values	N/A
	Write Protection	Write protect	Sets a password to disable write protection	N/A
		New password	New password setting	N/A
	DV logging	Read dev var max/min log	Reads the maximum/ minimum PV stored in the memory	N/A
		Reset dev var max/min log	Clears the PV maximum/ minimum log and restart logging	N/A
	DV Simulation	Enable DV simulation	Execution of device variable simulation	N/A
		Disable DV simulation		
	Device reset <Master reset>		Software reset	N/A
	Loop test		Change the output manually for testing the loop. 4mA, 20mA, or value within 3.5 to 23mA	N/A

Item		Parameter name	Descriptions	Initial setting
Setup	HART	Tag	Tag number, up to 8 alphanumerical characters	N/A
		Long Tag	Tag number, up to 32 alphanumerical characters.	N/A
		Descriptor	Text which can be used by user in any way. Up to 16 alphanumerical characters	N/A
		Message	Text which can be used by user in any way. Up to 32 alphanumerical characters	N/A
		Date	Date information. MM/DD/YY. Not incremented. The date is updated whenever changing on figuration via configuration tool	N/A
		Final assembly num	Assembly number	N/A
	Variable mapping	PV is/SV is/TV is/FV is	Setting an assignment for PV/SV/TV/QV	PV=Sensor, SV=EI/CJC, TV=QV=None
	Range Variables	Range configuration	Range setting for PV LRV/PV URV	*1
		Units	Unit of PV	*1
		PV LRV/PV URV	Lower/upper range value to defines the 0%/100% value of the measurement	Depend on range configuration
		Apply values	Rerange by actual input	N/A
		Upper Sensor Limit/Lower Sensor Limit	Maximum/minimum values for range setting	Depend on sensor setup
		Minimum Span	PV minimum span	
	Process Sensor → Sensor Setup	Sensor configuration	Sensor type and related settings.	*1
		Error detection	Type of sensor errors to be detected for burnout operation	broken and shorted sensor
	Process Sensor → Sensor Limits	Upper Sensor Limit/Lower Sensor Limit	Maximum/minimum values for the sensor	Depend on sensor setup
		Minimum Span	Minimum span of the sensor	

Item		Parameter name	Descriptions	Initial setting
Setup	Process Sensor → Sensor1 Setup	Units	Sensor1 unit setting	degC
		Lower Sensor Limit/Upper Sensor Limit	Maximum/minimum values of Sensor1	Depend on sensor setup
		Minimum Span	Minimum span of Sensor1	
		Damping Value	Damping time constant in seconds: 0.4 to 60.0s	*1
		Probe Type	Sensor type setting.	*1
		Probe Connection	Single	N/A
		Number of Wires	Setting the number of sensor connection wires	*1
		Temperature Standard	International Temperature Scale of 1990 (ITS-90)	N/A
		CJC Type	Selecting of Internal CJC or Fixed CJC	Internal sensor
		Manual CJC Temperature	Fixed CJC value setting	N/A
		Manual CJC Temperature Units	Unit of Fixed CJC value setting	N/A
		Cable Resistance Value	Resistance of sensor cable setting Set double of the cable resistance between the sensor and the device. It is necessary for 2-wire, 3-wire and 4-wire RTDs/ ohms to compensate cable resistance	5.0Ω
	Process Sensor → Electronics/ CJC Setup	Units	Unit of CJC setting	degC
		Lower Sensor Limit/Upper Sensor Limit	Maximum/minimum values of CJC	N/A
		Minimum Span	CJC minimum span	N/A
		Damping Value	Damping time constant in seconds: 0.4 to 60.0s	0.4
		Cable Resistance Value	CJC cable resistance	0Ω

Item		Parameter name	Descriptions	Initial setting
Setup	Sensor2 Setup/Average Setup/ Difference Setup	All parameters	Future use	N/A
	Trend Setup	Number of Trends Supported	Data trending support function	N/A
		Set Real-Time Clock	Setting for date and time of clock.	1900/1/1 0:00
		Current Date	Date and Time of clock	N/A
		Current Time		N/A
		Trend Control	Trend data setting	Disable
		Trend Device Variable	Device variable value selecting for Trend data	N/A
		Trend Sample Interval	Sampling interval of Trend data	N/A
		Trend 0 Date Stamp	Date and Time information of latest Trend data	N/A
		Trend 0 TIME Stamp		N/A
		Result	Result of Trend data	N/A
	Burst mode	Total burst msgs	The number of burst mode functions	N/A
		Update period	Update period for burst message	N/A
		Max update period	Maximum update period for burst message	N/A
		Burst command	Setting for burst command	N/A
		Burst mode	Setting for burst mode	Off
		Burst Msg Trigger mode	Burst trigger mode selection from “Continuous”, “Window”, “Rising”, “Falling”, or “On change”	N/A
		Burst Trigger Class	Device variable not classified	N/A
		Burst Trigger Units	Setting for unit of burst trigger level	N/A
		Burst Trigger Level	Setting for burst trigger level	N/A

Item		Parameter name	Descriptions	Initial setting
Setup	Burst mode	Burst variable code	Setting for device variable of cmd9 or cmd33	N/A
	Event notification	Number of Events supported	Maximum number of event support	N/A
		Event status	Display event status	N/A
		Event Notification control	Enable event notification on token-passing data link layer	Off
		Time First Unack Event triggered	Display event time	N/A
		Event Notification Retry time	Event notification retry time	N/A
		Max update time	Maximum update time for event notification	N/A
		Debounce interval	Debounce Interval to detect an event	N/A
		Event mask	Event masking	N/A
	Trim Setup	Device variable trim	Sensor and CJC Trimming. If the output value is different from the trim setting value, repeat device variable trim procedure.	N/A
		Device variable trim reset	Reset sensor trim for factory setting	N/A
		Dev var zero trim	Sensor and CJC ZeroTrimming	N/A
		Lower Trim Point Value/ Upper Trim Point Value	Lower and Upper trimming point	N/A
		Trim Point Support	Lower and upper trim point supported	N/A

Item		Parameter name	Descriptions	Initial setting
Setup	Trim Setup	Minimum Lower Trim Point Value /Maximum Lower Trim Point Value /Minimum Upper Trim Point Value /Maximum Upper Trim Point Value	Maximum/minimum values for trimming point	N/A
		Minimum Differential Trim	Minimum value of the difference of lower and upper trimming point	N/A
	Signal Condition	Upper Sensor Limit/Lower Sensor Limit	Maximum/minimum values for device variables range	Depend on sensor setup
		Units	Device variables unit	degC
		Damping Value	Damping time constant in seconds: 0.4 to 60.0s	*1
	Output Condition → Analog output	Loop current <PV AO>	Output value in mA	N/A
		Loop current mode	Loop current setting at multidrop	Off
		Loop test	Change the output manually for testing the loop. 4mA, 20mA, or value within 3.5 to 23mA	N/A
		D/A trim	Allows the calibration of a selected analog output with an external reference at the operating endpoint	N/A
		Override D/A trim <Clear D/A trim>	Overrides any previous D/A trimming by restoring factory calibration values	N/A
	Output Condition → Analog output → Output range	AO 0%(100%)	Output value for 0% (100%) in mA.	4mA (20mA)
		AO lower(upper) Limit	Output lower (upper) limit in mA. NAMUR, or 3.8 to 23mA	3.8mA (20.5mA)

Item		Parameter name	Descriptions	Initial setting
Setup	Output Condition → Analog output → Output range	Set limit = NAMUR	Setting for loop cur lower limit = 3.8mA, loop cur upper limit = 20.5mA	N/A
	Output Condition → Analog output → Sensor Error Values	Error detection	Type of sensor errors to be detected for burnout operation. (1)No test performed, (2)broken sensor, (3)shorted sensor, or (4)broken & shorted.	broken and shorted sensor
		Broken Sensor value	Setting for analog output value when sensor broken	*1
		Shorted Sensor value	Setting for analog output value when sensor shorted	3.6mA
		NAMUR down	Set analog output value to 3.5mA when sensor broken or shorted	N/A
		NAMUR up	Set analog output value to 23mA when sensor broken or shorted	N/A
	Output Condition → HART output	Loop current mode	Loop current setting at multidrop	Off
		Poll addr	Display and setting for multidrop (0 to 63)	0
		Num req preams	Number of requested preambles	N/A
		Num resp preams	Number of response preambles	5
Review	Input Information		List of input variables	N/A
	Output Information		List of output variables	N/A
	Device Information review		List of device information	N/A

*1: As specified in the order. If not specified, refer to Table 7.2.

Appendix1. ATEX Installation drawing YTA70PQA01

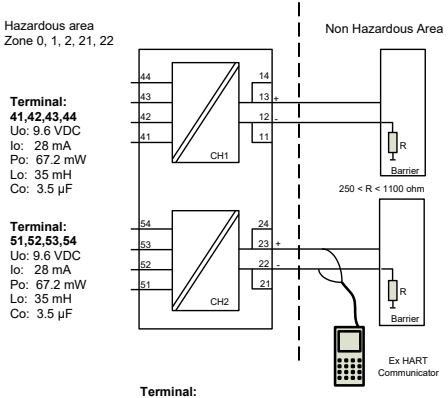
ATEX
Installation drawing YTA70PQA01

For safe installation of theYTA70P-JA/V2S and YTA70P-JB/V2S the following must be observed.
The module shall only be Installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area.

ATEX Certificate DEKRA 14 ATEX0106X

Marking II 1 G Ex ia IIC T6…T4 Ga
II 2 D Ex ia IIIC Db

Standards EN IEC 60079-0:2018, EN60079-11:2012



ATEX
Installation drawing YTA70PQA01

Temperature Class	Ambient temperature range	
	Pi: 0.84W	Pi: 0.75W
T6	-40 °C to +40 °C	-40 °C to +45°C
T5	-40 °C to +55 °C	-40 °C to +60 °C
T4	-40 °C to +85 °C	-40 °C to +85 °C

Installation notes.

If the enclosure is made of non-metallic plastic materials, electrostatic charges on the transmitter enclosure shall be avoided.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Ga, the transmitter shall be mounted in a separately certified enclosure that provides a degree of protection of at least IP20 according to EN 60529, and that is suitable for the application and correctly installed.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Ga, and if the enclosure is made of aluminum, it must be installed such, that ignition sources due to impact and friction sparks are excluded.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Db, the transmitter shall be mounted in a separately certified enclosure that provides a degree of protection of at least IP5X according to EN IEC 60079-0, and that is suitable for the application and correctly installed. The surface temperature of the outer enclosure is +20 K above the ambient temperature, determined without a dust layer.
Ambient temperature range: -40 °C to +85 °C

Cable entries and blanking elements shall be used that are suitable for the application and correctly installed.

For an ambient temperature ≥ 60ºC, heat resistant cables shall be used with a rating of at least 20 K above the ambient temperature.

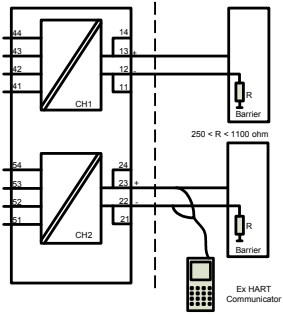
The sensor circuit is not infallibly galvanic isolated from the input circuit. However, the galvanic isolation between the circuits is capable of withstanding a test voltage of 500Vac for 1 minute.

Appendix2. FM Installation drawing YTA70PQF01

FM
Installation drawing YTA70PQF01

Hazardous (Classified) Location
Class I, Division 1, Group A,B,C,D T6 T6: -40 ≤ Ta ≤ 60ºC
Class I, Zone 0, AEX ia IIC T6

Non Hazardous Location



Terminal:
41,42,43,44
Uo: 9.6 VDC
Io: 28 mA
Po: 67.2 mW
Lo: 35 mH
Co: 3.5µF

Terminal:
51,52,53,54
Uo: 9.6 VDC
Io: 28 mA
Po: 67.2 mW
Lo: 35 mH
Co: 3.5µF

Terminal:
11,12,13,14 and
21,22,23,24
Ui: 30 VDC
Ii: 120 mA
Pi: 0.84 W
Li: 10 µH
Ci: 1.0 nF

Installation notes.
For installation in Class I the Transmitter must be installed in a suitable enclosure to meet installation codes stipulated in The National Electrical Code (ANSI-NFPA 70).
Equipment that is FM-approved for intrinsic safety may be connected to barriers based on the Entity Concept. This concept permits interconnection of approved transmitters, meters and other devices in combinations, which have not been specifically examined by FM, provided that the agency's criteria are met. The combination is then intrinsically safe, if the entity concept is acceptable to the authority having jurisdiction over the installation.
The entity concept criteria are as follows: The intrinsically safe devices, other than barriers, must not be a source of power. The maximum voltage Ui(VMAX) and current Ii(IMAX), and maximum power Pi(Pmax), which the device can receive and remain intrinsically safe, must be equal to or greater than the voltage (Uo or VOC or Vt) and current (Io or ISC or It) and the power Po which can be delivered by the barrier. The sum of the maximum unprotected capacitance (Ci) for each intrinsically device and the interconnecting wiring must be less than the capacitance (Ca) which can be safely connected to the barrier. The sum of the maximum unprotected inductance (Li) for each intrinsically device and the interconnecting wiring must be less than the inductance (La) which can be safely connected to the barrier. The entity parameters Uo, VOC or Vt and Io, ISC or It, and Ca and La for barriers are provided by the barrier manufacturer.

Appendix3. IECEx Installation drawing YTA70PQI01

IECEx
Installation drawing YTA70PQI01

For safe installation of theYTA70P-JA/V2S and YTA70P-JB/V2S the following must be observed.
The module shall only be Installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area.

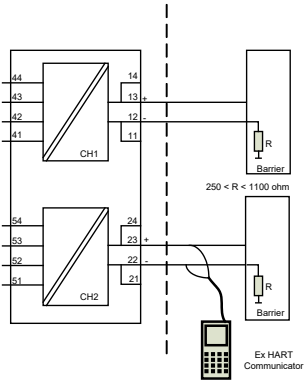
IECEx Certificate	IECEx DEK 14.0058X
Marking	Ex ia IIC T6…T4 Ga Ex ia IIIC Db
Standards:	IEC60079-11:2011, IEC60079-0: 2017

Hazardous area
Zone 0, 1, 2, 21, 22

Non Hazardous Area

Terminal:
41,42,43,44
Uo: 9.6 VDC
Io: 28 mA
Po: 67.2 mW
Lo: 35 mH
Co: 3.5 µF

Terminal:
51,52,53,54
Uo: 9.6 VDC
Io: 28 mA
Po: 67.2 mW
Lo: 35 mH
Co: 3.5 µF



Terminal:
11,12,13,14 and
21,22,23,24
Ui: 30 VDC
Ii: 120 mA
Pi: 0.84 W or Pi: 0.75 W
Li: 0 µH
Ci: 1.0 nF

IECEx
Installation drawing YTA70PQI01

Temperature Class	Ambient temperature range	
	Pi: 0.84W	Pi: 0.75W
T6	-40 °C to +40 °C	-40 °C to +45 °C
T5	-40 °C to +55 °C	-40 °C to +60 °C
T4	-40 °C to +85 °C	-40 °C to +85 °C

Installation notes.

If the enclosure is made of non-metallic plastic materials, electrostatic charges on the transmitter enclosure shall be avoided.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Ga, the transmitter shall be mounted in a separately certified enclosure that provides a degree of protection of at least IP20 according to IEC 60529, and that is suitable for the application and correctly installed.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Ga, and if the enclosure is made of aluminum, it must be installed such, that ignition sources due to impact and friction sparks are excluded.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Db, the transmitter shall be mounted in a separately certified enclosure that provides a degree of protection of at least IP5X according to IEC 60079-0, and that is suitable for the application and correctly installed. The surface temperature of the outer enclosure is +20 K above the ambient temperature, determined without a dust layer.
Ambient temperature range: -40 °C to +85 °C

Cable entries and blanking elements shall be used that are suitable for the application and correctly installed.

For an ambient temperature ≥ 60ºC, heat resistant cables shall be used with a rating of at least 20 K above the ambient temperature.

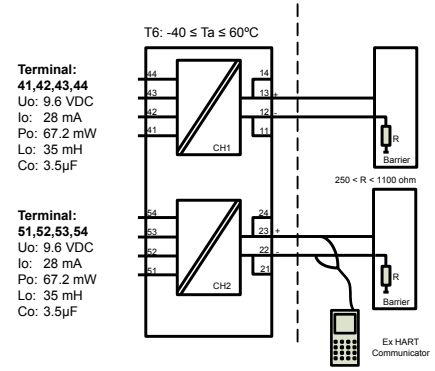
The sensor circuit is not infallibly galvanic isolated from the input circuit. However, the galvanic isolation between the circuits is capable of withstanding a test voltage of 500Vac for 1 minute.

Appendix4. CSA Installation drawing YTA70PQC01

CSA
Installation drawing YTA70PQC01

Hazardous (Classified) Location
IS, Class I, Division 1, Group A,B,C,D T6 or
Ex ia IIC Ga T6 or
Class I, Zone 0, AEx ia IIC Ga T6

Non Hazardous Location



Installation notes.
The Transmitter must be installed in a suitable enclosure to meet installation codes stipulated in The Canadian Electrical Code (CEC) or for US in the National Electrical Code (NEC).

Channel 1 and Channel 2 are separate channels and therefore separate shielded cables shall be used for each channel.

Substitution of components may impair intrinsic safety.

Appendix5. Label of Explosion Protected Type

YOKOGAWA

Yokogawa Electric Corporation
2-9-32, Nakacho, Musashino-shi
Tokyo, 180-8750 JAPAN

TEMPERATURE TRANSMITTER
Model: YTA70P
Suffix: -JA/V2S

READ/Lisez IM 01C50C05-01

Supply: 8.0...30V, Output: 4...20mA

11: out ch1	supply -			
12: out ch1	HART®			
13: out ch1	HART®			
14: out ch1	supply+			
41: in ch1	TC -	mV -	RTD	-3w/ -4w
42: in ch1	CJC		RTD	-2w/ -3w/ -4w
43: in ch1	CJC		RTD	+2w/+3w/+4w
44: in ch1	TC+	mV+	RTD	+4w

IECEx

☐ Ex ia IIC T6...T4 Ga
☐ Ex ia IIIC Db
IECEx DEK 14.0058X
Installation Drawing: YTA70PQI01

Ex CE 0344

II 1 G ☐ Ex ia IIC T6...T4 Ga
II 2 D ☐ Ex ia IIIC Db
DEKRA 14ATEX0106X
Installation Drawing: YTA70PQA01

FM APPROVED

T6: -40°C ≤ Ta ≤ +60°C
IS, CL I, DIV. 1, GP ABCD T6
CL I, ZONE 0, AEx ia IIC T6
FM 3024107 Entity
Installation Drawing: YTA70PQF01

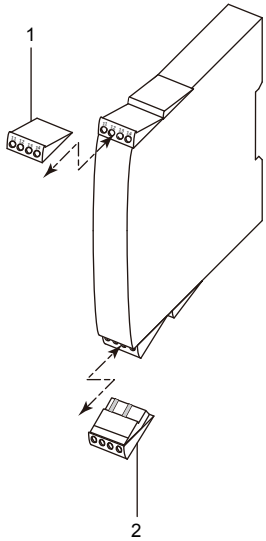
C SP US

T6: -40°C ≤ Ta ≤ +60°C
IS, CL I, DIV. 1, GP ABCD T6
Ex ia IIC T6 ; AEx ia IIC T6
CSA 70009864
Installation Drawing: YTA70PQC01

Made in Denmark - Label No.: YTA70PS102

FA0501.ai

Parts List for Connectors



Item	Part No.	Qty	Description
1	F9168CA	1	Connector for Power supply (For general use type)
	F9168CB		Connector for Power supply (For intrinsically safe type)
2	F9168CC	1	Connector for T/C input (For general use type)
	F9168CD		Connector for RTD, Ohm, mV input (For general use type)
	F9168CE		Connector for T/C input (For intrinsically safe type)
	F9168CF		Connector for RTD, Ohm, mV input (For intrinsically safe type)

Revision Information

- **Manual No. : IM 01C50C05-01EN**
- **Title : YTA70P Temperature Transmitter**

Edition	Date	Page	Revised item
1st	June 2014	—	New Publication
2nd	Feb. 2015	—	Add explosion protected type
		i, ii	Revised
		1-6	Add ATEX Documentation
		2-5	Add 2.7
		5-2	Add Figure 5.2
		7-4	Add ATEX, FM, IECEx, and CSA Intrinsically safe approval specifications
		Appendix	Add Appendix
3rd	June 2017	1-1	Revised 1.Preface
		7-1	Add EU RoHS Directive
4th	July 2021	2-2	Revised Figure2.2 Labels
		7-1 to 7-6	Revised General Specifications
		Appendix	Add EMC Conformity and EU RoHS Directive Change Appendix

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Jan. '20