
User's Manual

Hygienic & Sanitary Pressure Transmitter EJA564E

IM-P-20200626-01

Hygienic & Sanitary Pressure Transmitter

EJA564E

IM-P-20200626-01 1st Edition

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1. Introduction

The EJA564E solid-state pressure and level transmitters are based on a piezoresistive silicon sensor, with a very high burst pressure. The sensor element is mounted in a stainless steel "foot". A temperature sensor is mounted inside the foot to and is used for active temperature compensation. A strong stainless steel "flush" diaphragm protects the sensor from the process medium. A minimal amount of special oil fills the chamber surrounding the sensor and transfers pressure from the flush mounted diaphragm to the sensor hydraulically.

Pressure on the sensor element creates a small deflection of the silicon substrate and bridge network. The resulting strain in the silicon resistors causes a change in the bridge resistance that is proportional to the pressure being applied. The transmitter electronics detect this change in the bridge resistance and converts it into the measured value. The amplifier system is based on a single Integrated Circuit, which ensures perfect linearity in the output, all within an accuracy of 0.2 %.

1.1 Description

The EJA564E transmitter is specially designed with a flush mounted diaphragm so it fully meet the needs of the food, pharmaceutical, chemical and other industries. Standard wetted parts are made of 316L SST, other materials are also available, like Hastelloy C. Various process connections can be adapted and available for manufacture; (1.5", 2" and 3" tri-clamp), SMS (1.5" and 2"), dairy milk couplings (DN 25, 40 and 50), flanges (DIN and ANSI) and sanitary weld-on nipples (ø 48, 62 and 85 mm.), among others.

Certain variants of the EJA564E are designed to be non-clogging and are capable of being cleaned inside. Various process connection types are manufactured according to 3-A (74-06) requirements such as Tri-Clamp and others.

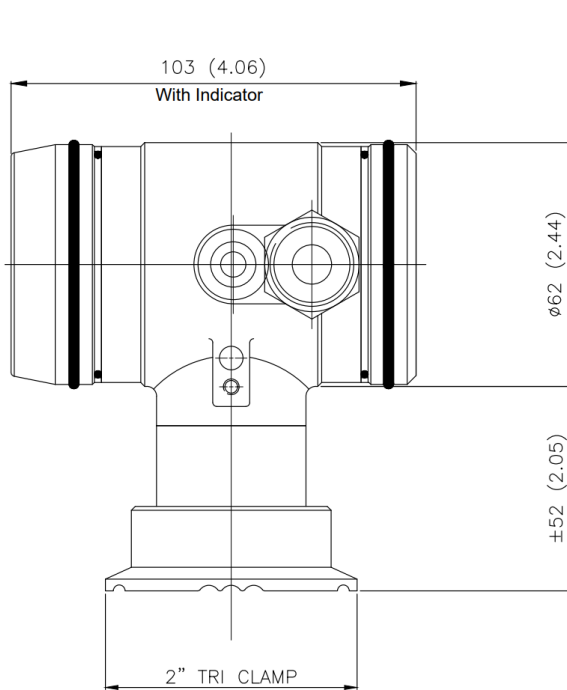
1.2 Barometric Reference

The EJA564E is a "relative transmitter" which means that barometric changes will not affect the zero. The venting is placed in the cover of the electronics housing next to the cable entry and is the filter for the barometric reference to atmospheric pressure.

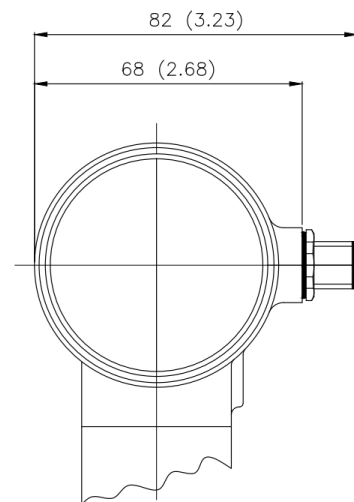
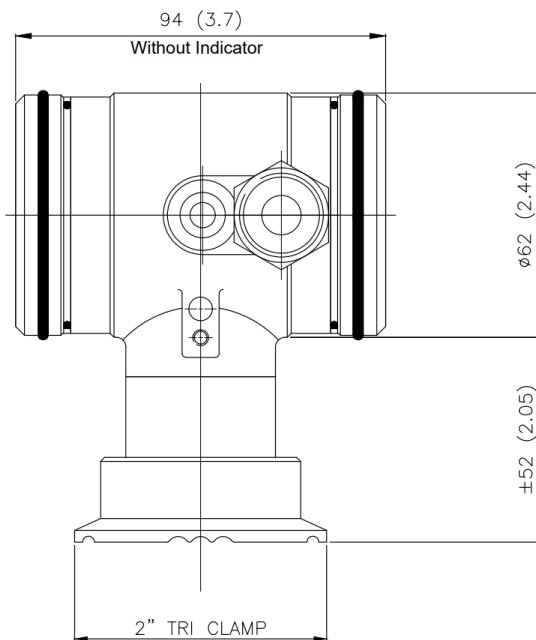
The vent mechanism must be kept clean.

2. Dimensional Drawings

■ EJA564E- "T20" PROCESS CONNECTION



1/2" NPT Electrical Connection



M12 Electrical Connection

Note. Standard Drawings for all other connection types are available on request.

3. Installing the Transmitter

The diaphragm of the transmitter is protected with a special protection cap. Protect the diaphragm until installation takes place. **Take special care with the fragile diaphragm.**

3.1 Installing Weld-On Nipple

A certified welder should perform the installation of the weld-on nipple. Weld with Argon, MIG or TIG, with the smallest welding pin possible.

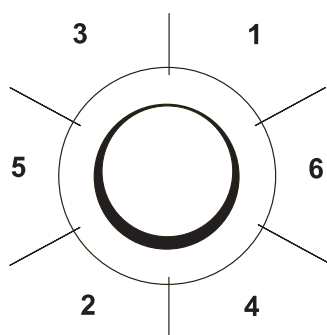
1. Cut a hole in the process vessel or pipe for a precise fit of the weld-on nipple. The hole should be a tight fit when coupled with the weld-on nipple.
2. Prepare the hole by bevelling the edge to accept filler material.
3. Remove the weld-on nipple from the transmitter.

Remove the gasket and O-Ring out of the weld-on nipple!



WARNING

Improper installation may result in distortion of the weld-on nipple. Excessive heat will distort the weld-on nipple. Weld in sections as shown in the figure below and allow adequate cooling between passes. To reduce the chances of distortion to the weld-on nipple, use a mandrel.



Determine (before welding) the position of the electronics housing so that the cable entry and the venting are in the right position. These positions are fixed after welding.

4. Position the weld-on nipple in the vessel hole and tack six places. The weld sequence is shown in the figure above.
5. Weld the weld-on nipple in place using 0.03 to 0.045 in. (0.762 to 1.143 mm) stainless rod as filler material in the bevelled area. Adjust amperage for penetration.
6. Remove the mandrel after the welding operation.

3.2 Installing Transmitter (Code W33)

1. After welding, clean up edges, and take care of the inside nipple wall.
2. Make sure the O-ring (10) is properly located.
3. Improper installation of the O-ring can cause a process leak.
4. Apply silicone grease to the O-ring (10), diaphragm ring and the hole inside wall of the weld-on nipple, this prevents galvanic cell corrosion between transmitter and the nipple inside.
5. Install the transmitter and fix it with the SS M8 bolt.

3.3 Mounting Position

When the transmitter is mounted horizontally, the cable gland must be pointed downwards. Furthermore, 3-A certified units with leakage detection holes in weld-on nipples should be on the lowest point and pointing down 90 degrees from the horizontal.

3.4 Mounting Position Effect

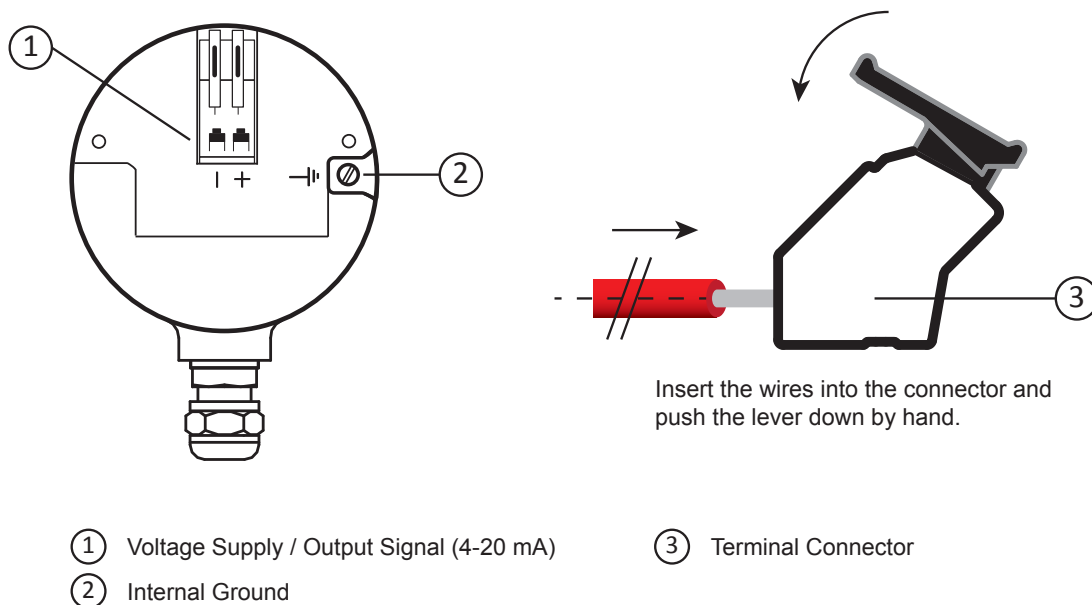
All transmitters are calibrated in a vertical position (diaphragm points downwards). If the transmitter is mounted in another position, there can be a slight zero shift. (example 4.02 mA instead of 4.00 mA). After installation of the transmitter, the zero must be set to 4.00 mA with P103 (cancels mounting position effect). This will not affect the span.

3.5 Calibration

All transmitters are calibrated at the factory to the customer specified range. If the calibration is not specified, the transmitter will be calibrated to the maximum span.

3.6 Connection Terminal

The figure below shows the wiring connection of the transmitter. The 2-wires must be connected to the terminal board. The wiring terminals can be connected without a screwdriver. The opening levers of the terminal can be lifted and pressed down by hand. Lift the opening levers of the terminals and insert the corresponding wires. Press down the levers by hand. The terminal spring will close and the wire is clamped.



3.7 Wiring

The transmitter must always be connected to ground. The transmitter must be connected with standard two-wire shielded cable. **Do not** run signal wiring in open trays with power wiring or near heavy electrical equipment (Frequency controller or heavy pumps). Shielding must always be connected at the side of the power supply. In case the process connection is already connected to ground (e.g. via the tank or pipe line) **do not** connect the instrument to ground. Please ensure that the instrument is not connected to ground twice to prevent an 'earth loop'. In applications with synthetic process connections, the enclosure (internal or external) must be connected to ground.

Reversing the polarity will not damage the transmitter, but the transmitter will not function until the + and – are properly connected.



CAUTION

- Please ensure that the transmitter is not connected to ground twice to prevent an earth loop.

4. Remaining

4.1 External Load

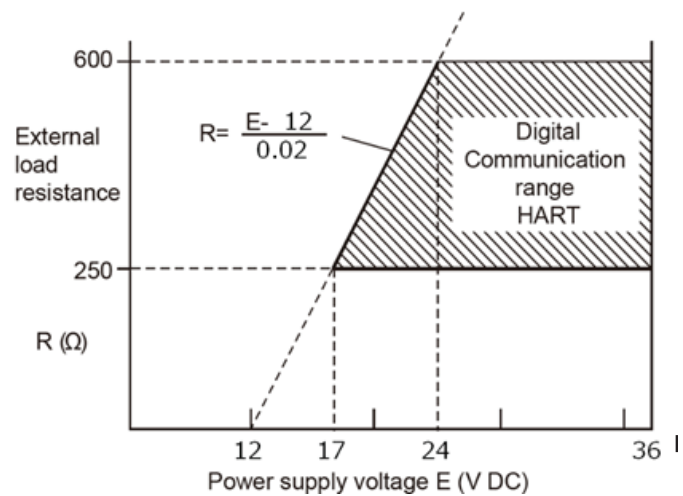
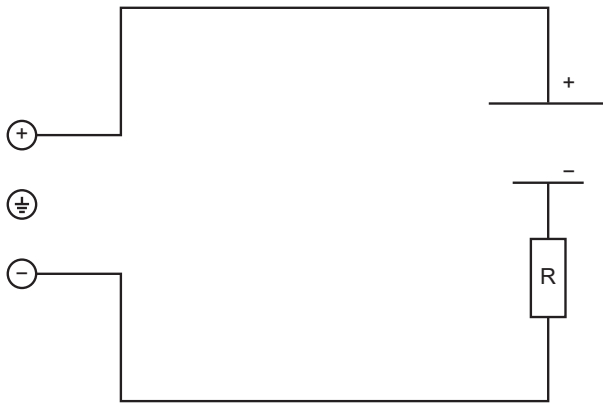
External loads must be placed in the negative side of the 2-wire loop. The minimum power supply is based on the total circuit resistance. The maximum external load ($R_{I \text{ max.}}$) for 24 Vdc will be 600 Ω (Ohm).



CAUTION

- With a loop resistance of 250 Ω a power supply of at least 17 Vdc must be used.

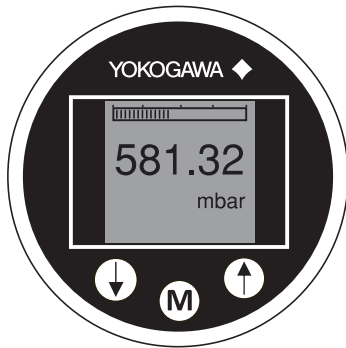
$$R_{I \text{ max.}} = \frac{\text{Voltage} - 12 \text{ V (min.)}}{20 \text{ mA}}$$






5. Display and Push Buttons

The EJA564E has a high contrast display for optimal readout. The menu is controlled by 3 push buttons. Navigate with the up and down through menus and measuring values.

Enter a menu and confirm selections with the menu button.



Display EJA564E

-  Push the up button to browse through various menus and adjusting values.
-  Push the down button to browse through various menus and adjusting values.
-  Push the menu button to enter menus or confirm a selection.

5.1 Display Readout

When the transmitter is powered, a startup screen with the software version and the pressure range appears for a few seconds. After the startup screen the transmitter will automatically continue to the main screen with the actual measurement reading.

5.2 Summary Programming Points

PROGRAM POINT	NAME	FUNCTION
P100	Menu-Exit menu	Start and exit
P101	ZERO value	Zero adjustment (ZERO 4 mA) with or without test pressure
P102	SPAN value	Span adjustment (SPAN 20 mA) with or without test pressure
P103	MOUNT correction	Cancel mounting position effect
P104	UNITS	Selection of engineering units
P105	REVERSE mA	Output selection: 4-20 mA or 20-4 mA
P106	DAMPING	Adjustable damping: 0.00 to 25.00 seconds
P107	TEMP UNITS	Temperature unit selection: Celsius or Fahrenheit
P108	DEVICE SETUP	Configuration: Protection, HART, Display mode, Display update
P109	READOUT	Readout options on display: Current, Unit, percentage and temperature
P110	BURST MODE	Continuously broadcast a standard HART reply message

6. Explanation of Programming Points

P101



Zero value

6.1 Zero Adjustment (ZERO)


The transmitter is set to 0 mbar at atmospheric pressure.

The **ZERO** can be adjusted at a lower or higher point. This will be explained step by step by an example.

Example: Increase ZERO to 100 mBar.

1. The measuring unit of the transmitter is set to mBar. If not, this can be selected by choosing the right measuring unit in program point **P104**.
2. Navigate to program point **P101**, and push the menu button to enter the menu.
3. The actual measured value appears on the display.
4. Increase this value with the arrow  button to 100 mBar, and push the  button until save appears on the display.
5. The transmitter will return to the home screen. The measurement value at atmospheric pressure is now -100 mBar. At an applied pressure of 100 mbar the transmitter will display 0 mbar.

The transmitter can be adjusted to zero in a real process situation. The transmitter will measure the pressure in an actual process. This measurement will be used as the zero value (4 mA).

1. Go to the home screen, the transmitter will display the actual measured value.
2. Push the  button until the actual measured zero and the message **ZERO PUSHED** appears on the display.
3. The transmitter will return to home screen.


P102

Span value


6.2 Span Adjustment (SPAN)

This setting can be used to adjust the range (SPAN) according to an entered value or adjusted with or without an applied pressure. The maximum pressure value that can be measured: The measurement at **ZERO (P101)** + the entered value **SPAN (P102)**. If the **ZERO (P101)** is increased, the maximum measured value will automatically be set higher by the same amount as the zero. This will be explained step by step by an example.

Example: Measurement range 0 – 2000 mbar.

1. The **span** must be set to 2000 mbar
2. Navigate to program point **P102**, and push the menu button to enter the menu.
3. Adjust the **SPAN** with the push buttons to 2000 mbar and push the  button until save appears on the display.
4. The transmitter will return to the home screen.

The span can also be adjusted to a real process situation. The transmitter will measure the pressure in an actual process. This measurement will be used as the span value (20 mA).

1. Go to the home screen, the transmitter will display the actual measured value.
2. Push the  button until the actual measured span and the message **SPAN PUSHED** appears on the display.
3. The transmitter will return to home screen.

TIP

P102 is the adjustment of the total span.

When a compound range must be adjusted (for example -1 till +3 bar), a span of 4 bar must be programmed.

The Zero (P101) must be set at -1 bar. The transmitter is adjusted at - 1 bar = Zero and +3 bar = Span.

P103

Mount corr.

6.3 Cancel Mounting Position Effect

All transmitters are calibrated vertically. If the transmitter is installed horizontally, the transmitter has a small "mounting position" effect on the zero. For example, the pressure value displayed may be 0.002 mbar instead of 0.000 mbar.

1. Navigate to program point **P103**, and push the menu button to enter the menu.
2. Two choices appear on the screen: **Set** and **Reset**.

Choosing **Set** will adjust the zero to 0.000 mbar in the mounting position when applicable.

- Select **Set**, and push the menu button to confirm.
- The corrected is value is shown on the display.
- Push the menu button to save.

Choosing **Reset** will put the transmitter back to the factory setting. (vertical adjustment)

- Select **Reset**, and push the menu button to confirm to reset back to factory setting.
- The transmitter will return to the home screen.



CAUTION

- Do not apply pressure when executing "Cancel mounting position effect"

P104

Units

6.4 Display Setting of Units

Various engineering units can be displayed on the display.

1. Navigate to program point **P104**, and push the menu button to enter the menu.
2. Several engineering units can be selected. Each selected engineering unit is automatically converted to the correct value of the corresponding unit.
3. Navigate through this menu and choose the required unit, push the menu button to confirm.
4. The transmitter will return to the home screen. The measured reading will be displayed in the selected unit in the home screen.



CAUTION

- The selected pressure unit is only visible on the display when UNITS is chosen in program point P109.

P105

Reverse mA

6.5 Output Selection 4-20 mA or 20-4 mA

Factory setting = 4 - 20 mA

1. Navigate to program point P105, and push the menu button to enter the menu.
2. Two choices appear on the screen: 4-20 and 20-4
3. Make an output choice and push the menu button to confirm.
4. The transmitter will return to the home screen.

P106

Damping

6.6 Damping Adjustment

The transmitter has an adjustable damping between 0.00 to 25.00 seconds.

Factory setting = 0.00 seconds

- Navigate to program point **P106**, and push the menu button to enter the menu.
- Two choices appear on the screen: **Set** and **Reset**

Choosing **Set** allows a value to be set between 0.00 and 25.00 seconds.

- Select **Set**, and push the menu button to confirm.
- Adjust the damping with the push buttons and push the menu button to confirm.
- The transmitter will return to the home screen.

Choosing **Reset** will put the transmitter back to factory setting (0.00 seconds)

- Select **Reset**, and push the menu button to confirm to reset back to factory setting.
- The transmitter will return to the home screen.

P107**Temp Units****6.7 Temperature Units**

In this menu, the preferred temperature unit can be selected.

1. Navigate to program point P107, and push the menu button to enter the menu.
2. Two choices appear on the screen: Celsius and Fahrenheit.
3. Make a choice and push the menu button to confirm.
4. The transmitter will return to the home screen.

P108**Device Setup****6.8 Device Setup**

In this menu, several operational settings can be made for the transmitter and the display.

1. Navigate to program point P108, and push the menu button to enter the menu.
2. Five choices appear on the screen:

LocProtect: The transmitter can be protected against local adjustments

ComProtect: The transmitter can be protected against adjustments with HART.

HART: Option for HART 5 and HART 7 communication.

DispMode: Option for turning the display **on** or **off**.

Disp.Upd.: Option to adjust the refresh rate of the measuring value on the display between 0.0 to 5.0 seconds. For example when this value is set to 2.0 seconds, the measuring value on the display will be refreshed every 2 seconds.

- Select Set, and push the menu button to confirm.
- Adjust the setting with the push buttons and confirm with the menu button.
- The transmitter will return to the home screen.
- Choosing Reset will put the transmitter back to factory setting (0.0 seconds).

P109**Readout****6.9 Readout**

In this menu, the type of readout on the display can be adjusted.

Factory Setting = Unit

1. Navigate to program point P109, and push the menu button to enter the menu.
2. Four choices appear on the screen:
Current: Current value (4 - 20 mA)
Unit: Pressure unit (Selected in P104)
Percentage: 0 - 100 %
Temperature: Actual process temperature (°C or °F) *Indication, accuracy depending on sensor position.*
3. Navigate to the desired choice, confirm by pushing the menu button.
4. The transmitter will return to the home screen.

P110**Burst mode****6.10 Burst Mode (HART)**

The transmitter can be configured for Burst mode. This will enable continuously broadcasting standard HART reply messages.

1. Navigate to program point P110, and push the menu button to enter the menu.
2. Five choices appear on the screen: **Mode**, **Cntrl**, **Cmd number**, **Message**, **Period** and **Trigger**
3. Select Mode Cntrl, and push to confirm.
4. Two choices appear on the screen: **On** and **Off**
 - Choose **On** to turn on burst mode.
 - Choose **Off** to turn off burst mode.
5. Select **Message** to select the burst message 0,1,2 or 3 and push the menu button to confirm.
6. Select **Cmd number**, and push the menu button to confirm.

Five choices appear on the screen:

- **Cmd 01** = PRIMARY VARIABLE
- **Cmd 02** = CURRENT AND PERCENT OF RANGE
- **Cmd 03** = DYNAMIC VARIABLES AND CURRENT

- **Cmd 09** = DEVICE VARIABLES WITH STATUS
- **Cmd 48** = ADDITIONAL TRANSMITTER STATUS

Choose the preferable burst mode, and push menu button to confirm.

7. Select **Period**, and push the menu button to confirm.

Two choices appear on the screen: **Max Time** and **Min Time**

- Select **Max Time** to set the maximum amount of time when the message will be sent. This value can be set from 0.5 to 3600 seconds.
- Select **Min Time** to set the minimum amount of time when the message will be sent. This value can be set from 0.5 to 3600 seconds.

Enter the preferred value, and push the menu button to confirm.

8. Select **Trigger**, and push the menu button to confirm.

9. Five choices appear on the screen:

Continuous = The Burst message is send continuously.

Windowed = The Burst message is triggered when the measured value deviates more than the specified trigger value.

Rising = The Burst message is triggered when the measured value rises above the triggered value.

Falling = The Burst message is triggered when the measured value falls below the triggered value.

On-Change = The Burst message is triggered when any value in the measuring changing.

Choose the desired burst mode, and set the preferred parameters.

P111

Information

6.11 Information

This menu summarizes information about the configuration of the transmitter.

Below the contents of the information screen.

V No:	Software Version number
No:	Serial number of the transmitter
Z:	Zero adjustment
S:	Span adjustment
Da:	Out delay on display
O:	Output (4-20 mA or 20-4 mA)
Lpro:	Local protection (on/off)
Tunit:	Temperature unit (°C or °F)
Tph:	Highest measured process temperature
Tpl:	Lowest measured process temperature
Tah:	Highest measured ambient temperature
Tal:	Lowest measured ambient temperature
Tc no:	Tag number

7. Programming

7.1 Programming with Hand Held Terminal

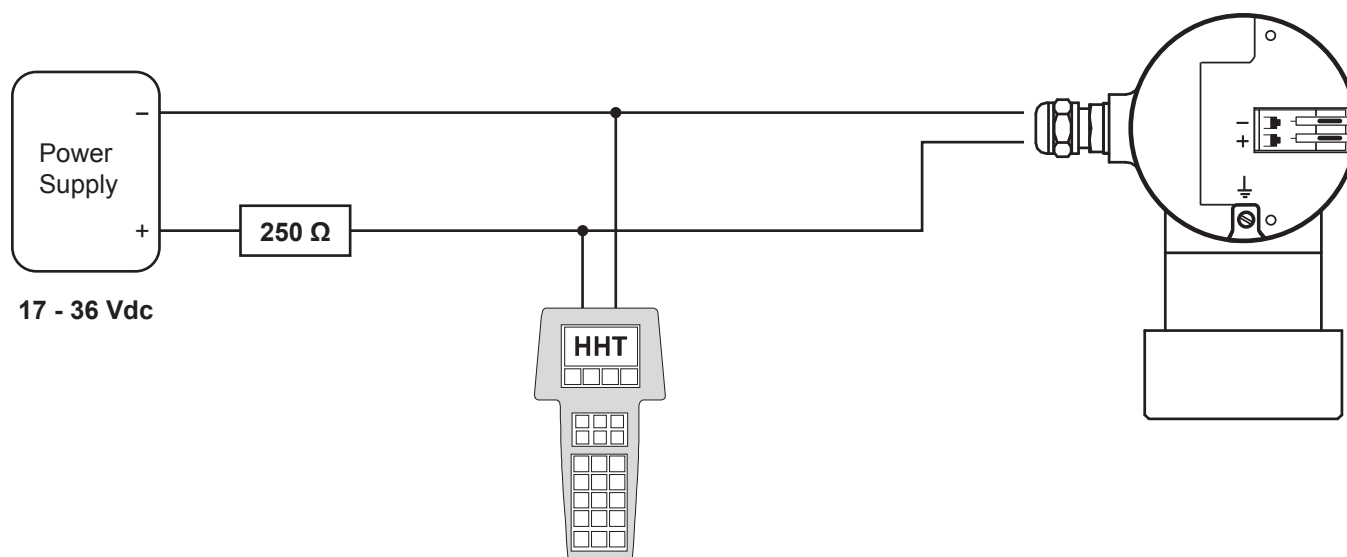


CAUTION

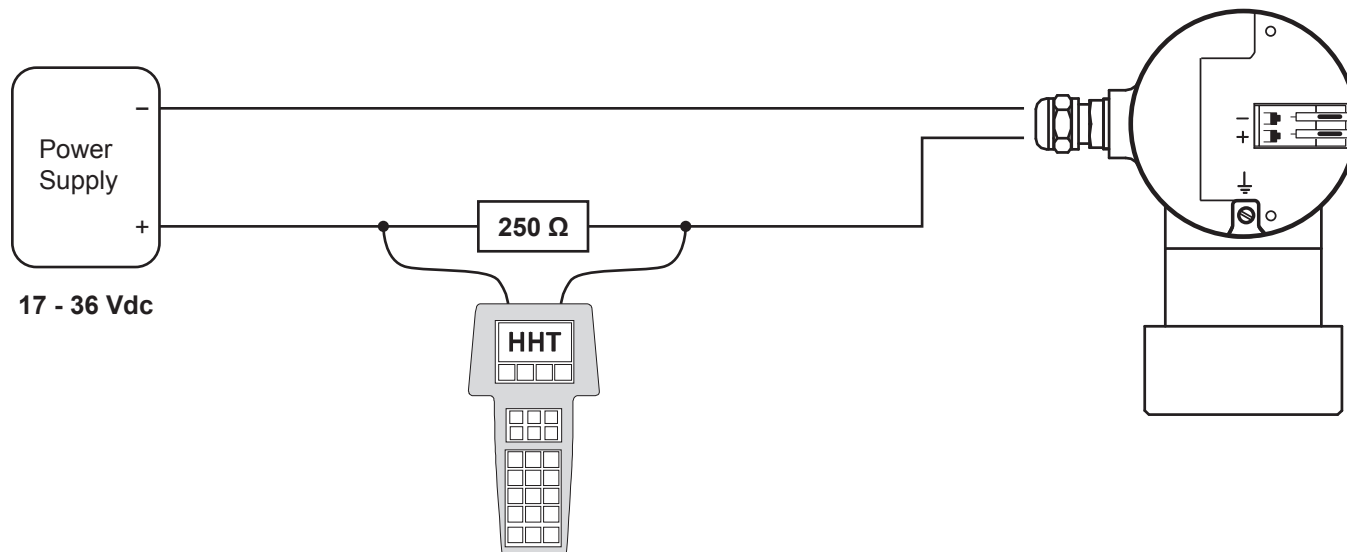
- When using HART or a Hand Held Terminal (HHT), a minimum resistance of **250 Ω** must be present in the loop of the 2-wire system. This is necessary for proper communication (see drawing below). A power supply of at least **17 Vdc** must be used.

The EJA564E can easily be programmed with the Hand Held Terminal (YHC HART Communicator).

Option 1: HART Hand Held terminal connected across the transmitter.



Option 2: HART Hand Held terminal connected across the loop resistor.



7.2 HART Commands and Parameters

Dynamic Variables (Command #3)		Note
PV	Pressure	Selected units (psi...mBar)
SV	Sensor Temperature	Selected units (Deg. F or C)
TV	Electronic Temperature	Selected units (Deg. F or C)
FV	(Pressure)	Same as PV

- Dynamic variables (PV,SV,TV,FV) and current can be read using HART Command #3.
- Device variables with Status can be read using HART Command #9.

8. Specifications

Please refer to the General Specifications. Document GS-P-20200626-01 for model, suffix, option codes and all required dimensional and electrical specifications.

The General Specifications listed below can be downloaded from the Yokogawa Corporation of America website: <https://www.yokogawa.com/us/solutions/products-platforms/field-instruments/pressure-transmitters/hygienic-sanitary-transmitters/>

■ General Specification List

Model	Document Title	Document No.
EJA564E, EJA565E	Hygienic & Sanitary Pressure Transmitter	GS-P-20200626-01

9. Precautions and Warnings



CAUTION

- Check if the specifications of the transmitter meet the needs of the process conditions
- When the EJA564E is used as a level transmitter, be aware of the place where the transmitter is mounted. Here are some suggestions:
 - DO NOT mount a level transmitter in- or near filling or discharging pipes.
 - In case of automatic cleaning systems or hand cleaning: never point the water jets on the diaphragm, take necessary steps to avoid this. This will void the warranty.
- When the EJA564E is used as a pressure transmitter, be aware of the following points:
 - Rapid closing valves in combination with high flow velocity will cause water hammer(spikes) and can destroy the transmitter. DO NOT mount a transmitter near such valves, always a few pipe bends away up or down stream (avoid suction).
 - Install a pressure transmitter a few pipe bends away from pumps, as well on the suction or pressure side of the pump.

■ Welding Information



CAUTION

- When using the EJA564E process connectors suffix code “W□□”, the welding information on page 6 must be followed exactly. This is very important to prevent distortion of the weld-on nipples. It also prevents the screw thread from the EJA564E from being deformed.
- The diaphragm of the transmitter is protected with a special protection cap. Protect the diaphragm until installation takes place to prevent damaging of the diaphragm.
- Configuring the transmitter locally and remotely simultaneously will cause transmission errors and must be prevented.
- As soon as the wiring is brought inside through the cable gland and connected to the terminal board, make sure the cable gland is tightly fixed so that moisture cannot enter into the electronics housing.
- Avoid high pressure water-jets pointed at the venting.
- If the ambient conditions are very wet, we advise to use a venting through the cable. A special vented cable can be connected on request. (The normal venting will be removed) In that case the transmitter is IP68 rated.
- The covers must be fully engaged so that moisture cannot ingress into the electronics housing.

Revision Information

- Title : Hygienic & Sanitary Pressure Transmitter
EJA564E
- Manual No. : IM-P-20200626-01

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■ For Questions and More Information

If you have any questions, you can send an E-mail to the following address.

E-mail: support@us.yokogawa.com

- If you want have more information about Yokogawa products, you can visit Yokogawa's homepage at the following web site.

Homepage: <http://www.yokogawa.com/>

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