PT303 Strain Gage Pressure Transmitter

Explosion proof pressure transmitter with integrated amplifier for use in hazardous environments

Operating Manual
## Table of Contents

<table>
<thead>
<tr>
<th>Content</th>
<th>Page</th>
<th>Icon</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>3</td>
<td><img src="image" alt="info" /></td>
</tr>
<tr>
<td>Notes on safety</td>
<td>5</td>
<td><img src="image" alt="warning" /></td>
</tr>
<tr>
<td>Technical data</td>
<td>6</td>
<td><img src="image" alt="data" /></td>
</tr>
<tr>
<td>Function</td>
<td>11</td>
<td><img src="image" alt="head" /></td>
</tr>
<tr>
<td>Transport/delivery</td>
<td>11</td>
<td><img src="image" alt="truck" /></td>
</tr>
<tr>
<td>Assembly</td>
<td>12</td>
<td><img src="image" alt="wrench" /></td>
</tr>
<tr>
<td>Commissioning</td>
<td>14</td>
<td><img src="image" alt="start" /></td>
</tr>
<tr>
<td>Maintenance</td>
<td>16</td>
<td><img src="image" alt="globe" /></td>
</tr>
<tr>
<td>Troubleshooting</td>
<td>17</td>
<td><img src="image" alt="eye" /></td>
</tr>
</tbody>
</table>
1. General

1.1 Important information 3
1.2 Copyright 4
1.3 Explanation of icons 4
1.4 Abbreviations 4
1.5 Correct use 5
1.6 User’s obligations 5

1.1 Important information

This manual applies to the PT303 only. It must be kept near the equipment in a readily and immediately accessible location at all times.

The content of this manual must be read, understood and followed in all points by all relevant people. This applies in particular to the notes on safety. Following the safety instructions will help to prevent accidents, defects and malfunctions.

DYNISCO will not be held liable for any injury, loss or damage resulting from failure to follow the instructions in this manual. If malfunctions occur in spite of having followed the operating instructions, please contact the DYNISCO customer service department (see chapter 8, Maintenance).

This applies in particular during the warranty period.
1.2 Copyright

Copyright law requires that this manual be used for inhouse purposes only.

All reproduction, even partially and for in-house purposes, requires the approval of DYNISCO. This manual may not be forwarded to third parties.

1.3 Explanation of icons

The manual uses icons to indicate information pertaining to safety:

- **ATTENTION**: Risk of destruction or damage to equipment, machines or installations

- **!**: General danger to life or limb

- **! !**: Specific danger to life or limb

- **!**: You MUST do this

The safety instructions are provided again in the individual chapters of the manual.

1.4 Abbreviations

The following abbreviations are used:

- **OM**: Operating manual
- **PT**: Pressure transmitter
- **f.s.**: Of full scale
1.5 Correct use

The PT303 is designed for measuring pressure in explosive atmospheres (Class I, Division 1, Groups A, B, C & D) as part of a larger overall system. It contains an integrated signal amplifier. The PT303 pressure transmitter can be used in media temperatures up to 170°F. If the pressure transmitter is used in other applications, the safety and accident prevention regulations specific to that application must be followed.

1.6 User’s obligations

The operator or owner of the larger overall system, e.g. a machine, is responsible for following the safety and accident prevention regulations that apply to the specific application.

2. Notes on safety

The operator or owner of the larger overall system is responsible for following the safety and accident prevention regulations that apply to the specific application.

Mounting and electrical connection of the PT must be done by specialists with EMC training, following all applicable regulations, and in pressureless, voltage-free condition with the machine switched off. **The machine must be secured against being switched back on!** Ambient temperature for the electronics housing **max. +170°F**. Higher temperatures can result in damage and malfunction. Do not install the pressure transmitter in places where this temperature is exceeded.
Explosion hazard!
Deviation of the supply voltage from the value given in the technical specifications, or false polarity, can damage the pressure transmitter and cause malfunctions that can pose a risk of explosion. Operate with a power supply with the following specifications when employing the pressure 0 - 5 Vdc output:
Do not lay connecting cables in the direct vicinity of cables carrying higher voltage or used to switch inductive or capacitive loads.

3. Technical Data

3.1 Ordering guide 6
3.1.1 Ordering guide for PT303 7
3.2 Ordering example 7
3.3 Safety related specifications 7
3.4 Performance characteristics 7
3.4.1 Accuracy 7
3.5 Wiring/Electrical Termination 8
3.6 Pressure ranges 9
3.6.1 Max. Overload 9
3.6.2 Natural frequency 9
3.7 Electrical Data 9
3.8 Weight 9
3.9 Dimensions 10

3.1 Ordering guide
The exact meanings of the letter/digit combinations are given in the corresponding sections of chapter 3.
3.1.1 Ordering guide for pt303

\[
\begin{array}{c}
X \\
\text{PT303-X} \\
\text{Pressure Type} \\
\text{Model} \\
\text{Pressure Range}
\end{array}
\]

3.2 Example for Ordering

\[
\begin{array}{c}
A \\
\text{PT303-2.5C} \\
\text{Absolute Pressure} \\
\text{Model} \\
\text{Set Range: 250 psi}
\end{array}
\]

3.3 Safety Related Specifications

FM approvals  
Class I, Division 1 Groups A, B, C & D

3.4 Performance Characteristics

PT303-X

3.4.1 Accuracy

±0.25% of full scale (Including Linearity, hysteresis and repeatability)
3.5 Wiring/Electrical Termination

The electrical termination of the PT303 is 72” of four conductor sheilded cable, #22 AWG conductors, with 1/2-14 NPT conduit fitting.

<table>
<thead>
<tr>
<th>Color</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Signal +</td>
</tr>
<tr>
<td>Black</td>
<td>Signal -</td>
</tr>
<tr>
<td>White</td>
<td>Excitation +</td>
</tr>
<tr>
<td>Green</td>
<td>Excitation -</td>
</tr>
</tbody>
</table>

Fig. 3-1 Typical Wiring Diagram

![Typical Wiring Diagram](image-url)
3.6 Pressure Ranges

(A) PT303-15   0-15
(A) PT303-30   0-30
(A) PT303-50   0-50
(A) PT303-75   0-75
(A) PT303-1C   0-100
(A) PT303-1.1C 0-110
(A) PT303-1.75C 0-175
(A) PT303-2C   0-200
(A) PT303-2.5C 0-250
(A) PT303-3C   0-300
(A) PT303-4C   0-400
(A) PT303-5C   0-500
(A) PT303-7.5C 0-750
(A) PT303-1M   0-1,000
(A) PT303-1.5M 0-1,500
(A) PT303-2M   0-2,000
(A) PT303-2.5M 0-2,500
(A) PT303-3M   0-3,000
(A) PT303-5M   0-5,000
(A) PT303-7.5M 0-7,500
(A) PT303-10M  0-10,000

3.6.1 Max Overload (Without influencing Operation Data)

PT303 2x rated pressure

3.6.2 Frequency Response

> 2000 Hz

3.7 Electrical Data

Configuration 4-arm Wheatstone bridge strain gauge with int. amplifier
Output signal 4-wire 0-5 Vdc
Supply voltage +/- 12 Vdc for FM approved explosion proof models

3.8 Weight

-3.5 pounds
3.9 Dimensions

Fig. 3-2 PT303 Mechanical Drawing
4. Function

4.1 Construction

The PT303 are General Electric standards.
The main advantages are:
- thermal stability
- resistance to aggressive media

4.2 Description of Functions

Through a closed, direct contact measurement system, the PT furnishes an electrical signal that is proportional to the pressure of the media. The pressure is applied by the medium on the measuring diaphragm. The deflection of the measuring diaphragm changes the resistance of the strain gauge bonded to the measuring diaphragm. The strain gauge is a Wheatstone bridge. Depending on the model, the integrated amplifier generates an electrical signal (Vdc) proportional to the pressure.

5. Transport / delivery

5.1 Transport / packing / transport damage

5.2 Storage

5.3 Scope of delivery

ESD sensitive component. Electrostatic discharge may damage the PT.
Take ESD precautions.
5.1 Transport/packing/transport damage
- Do not let the PT be damaged by other items during transit.
- Use only the original packaging.
- Report transport damage to DYNISCO immediately in writing.

5.2 Storage
- Store the PT in original packaging only.
- Protect against dust and moisture.

5.3 Scope of delivery
- Pressure Transmitter
- Calibration Sheet
- Operating manual with declaration of conformity

6. Assembly

6.1 Mounting the Pressure Transmitter 13
6.2 Electrical connection 13
6.3 Connection assignments 14

Ambient temperature for the electronics housing max. +170°F.
Higher temperatures can result in damage and malfunction.
Do not install the pressure transmitter in places where this temperature is exceeded.
6.1 Mounting the Pressure Transmitter

Mounting and electrical connection of the PT must be done by specialists with EMC training, following all applicable regulations, and in **pressureless, voltage-free, intrinsically safe** condition with the **machine switched off**.

- **EX**
  - The machine must be secured against being switched back on!

- **ATTENTION**
  - ESD sensitive component. Electrostatic discharge may damage the PT. Take ESD precautions.
  - Before mounting the PT, check the process connection carefully.
  - Before mounting the PT, ensure that the process connection is free from media.

- **ATTENTION**
  - To prevent the PT from sticking permanently in the process connection, coat the thread section of the transmitter with high temperature resistant grease or a suitable parting agent.

- **ATTENTION**
  - Always use a torque wrench when screwing the PT in and out. Do not apply the tool to the housing or housing / electrical connection!
  - • Screw the PT into the process connection and tighten.

6.2 Electrical Connection

Mounting and electrical connection of the PT must be done by specialists with EMC training, following all applicable regulations, and in **pressureless, voltage-free**, condition with the **machine switched off**.

- **ATTENTION**
  - The machine must be secured against being switched back on!
Do not lay connecting cables in the direct vicinity of cables carrying higher voltage or used to switch inductive or capacitive loads.

ESD sensitive component. Electrostatic discharge may damage the PT. Take ESD precautions.

### 6.3 Connection Assignments

**Conduit / Leads**

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Signal +</td>
</tr>
<tr>
<td>Black</td>
<td>Signal -</td>
</tr>
<tr>
<td>White</td>
<td>Excitation +</td>
</tr>
<tr>
<td>Green</td>
<td>Excitation -</td>
</tr>
</tbody>
</table>

### 7. Commissioning

**7.1 Supply Voltage**

Please read the entire manual prior to installation and use. Maximum excitation is 28 Vdc. Rated excitation is +/- 12 Vdc. Recommended warmup is 15 minutes.

**Explosion hazard!**

Deviation of the supply voltage from the value given in the technical specifications, or false polarity, can damage the pressure transmitter and cause malfunctions that can pose a risk of explosion.
7.2 Calibration

Calibrate in pressureless state and at room temperature. Other ambient temperatures will corrupt the signal. Use an adjustment screwdriver!

The adjustment is made at two potentiometer screws in the cover section of the electronic housing.

- Remove the cap screws from the potentiometers.

ATTENTION

- Connect a meter or suitable instrument to the signal output to verify the settings.
- Adjust zero at potentiometer adjusting zero screw and verify on meter.

7.3 Zero Adjustment

For PT303, adjust zero at operating temperature!

- Wait until a steady operating temperature is reached at the pressure sensor.
- Adjust zero at potentiometer adjusting zero screw and verify on the meter.
- Replace the cover screws on the potentiometers.

7.4 Operation

ATTENTION

Operating temperature at the PT diaphragm max. 170°F. Higher temperatures will damage the PT.

Ambient temperature for the electronics housing max. 170°F. Higher temperatures can result in damage and malfunction.

Do not install the pressure transmitter in places where this temperature is exceeded.
8. Maintenance

8.1 Maintenance

Mounting and electrical connection of the PT must be done by specialists with EMC training, following all applicable regulations, and in **pressureless, voltage-free** condition with the **machine switched off**.

**The machine must be secured against being switched back on!**

**Burn hazard!**
The PT can be very hot when removed.

**Wear protective gloves!**

ESD sensitive component. Electrostatic discharge may damage the PT. Take ESD precautions.

Always remove the PT before cleaning the machine with abrasives or steel wire brushes or suchlike.

**Removing the transmitter if the medium is in solidified condition can damage the diaphragm of the PT.**

**Do not clean the screw-in section of the PT with hard objects. This will damage the PT!**

**Always use a torque wrench applied to the designated hexagon collar when screwing the PT in and out. Do not apply the tool to the housing or housing/electrical connection!**
• Remove the PT.
• Carefully clean the PT/process connection of the transmitter with a soft cloth, while the medium is still malleable.

8.2 Repair/Disposal

Please send defective PTs to your DYNISCO representative. For addresses, see the back cover of the operating manual.

8.3 Warranty

This DYNISCO product is warranted under terms and conditions set forth in the DYNISCO web pages. Go to www.dynisco.com and click “warranty” at the bottom of any page for complete details.

9. Troubleshooting

<table>
<thead>
<tr>
<th>Fault</th>
<th>Possible Cause</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>No signal</td>
<td>Cable breakage or poor contact</td>
<td>Check cable and contact, or replace</td>
</tr>
<tr>
<td></td>
<td>No supply voltage</td>
<td>Check supply voltage</td>
</tr>
<tr>
<td>Strong zero shift when screwing in</td>
<td>Process connection incorrectly produced (alignment error)</td>
<td>Check process connection with test bolt, rework if necessary</td>
</tr>
<tr>
<td></td>
<td>Mounting torque too high</td>
<td>Adjust to recommended mounting torque</td>
</tr>
<tr>
<td>No signal change despite pressure rise</td>
<td>Plug forming in front of diaphragm</td>
<td>Check process connection</td>
</tr>
<tr>
<td></td>
<td>Diaphragm damaged</td>
<td>Send pressure transmitter to DYNISCO for repair</td>
</tr>
</tbody>
</table>