240 and 290 Series
Melt Pressure Transmitters

Intrinsically safe and explosion proof pressure transmitters with integrated amplifier for use in hazardous environments
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1.1 **IMPORTANT INFORMATION**

This manual applies to the 240 and 290 series 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 its entirety. 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 the product malfunctions, in spite of having followed the operating instructions, please contact the **DYNISCO** customer service department (see the back of the manual for contact information).

1.2 **COPYRIGHT**

Copyright law requires that this manual be used for in-house 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
- **f.s.** of full scale
- **PT** pressure transmitter

1.5 **CORRECT USE**

The 240 and 290 series of pressure transmitters is specially designed for measuring pressure in explosive atmospheres (safety class, EEx ia IIC T4, Ta=-20°C to +80°C) as part of a larger overall system. It contains an integrated signal amplifier. The 240 and 290 series of pressure transmitters can be used in media temperatures up to 400°C. If the pressure transmitter is used in other applications, the safety and accident prevention regulations specific to that application must be followed.

*When using the PT as a safety component in accordance with the EC Machine Directive, Annex IIc, the equipment manufacturer must take any necessary precautions to ensure that malfunctions of the PT cannot cause damage or injury.*

The 240 and 290 series of pressure transmitters are also designed for explosion proof areas approved by factory mutual for Class I, Division 1, Groups A, B, C & D. Explosion proof models are also approved for intrinsic safety by factory mutual for Class I, Division 1, Groups A, B, C, & D.

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.

Toxic hazard!
The PT contains a small amount of mercury (Hg) as its transmission medium. If the diaphragm is damaged, mercury may escape.

Never transport or store the PT without the protective cap. Remove the cap shortly before installation.

If mercury is inhaled or swallowed, seek medical attention immediately!

Mercury is hazardous waste and must be disposed of in accordance with applicable laws. DYNISCO will accept defective PTs.

If mercury escapes, use airtight packaging!

When planning machinery and using the PT, follow the safety and accident prevention regulations that apply to your application, e.g.:

- EN 60204, Electrical equipment in machines.
- EN 292, Machine safety, general design guidelines.
- DIN 57 100 Part 410, Protection against electric shock.
- EN 50 014:1997, General Requirements
- EN 50 020:1994, Intrinsically safe apparatus
- EN 50284:1999, Special requirements for Group II Category 1G

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.

The machine must be secured against being switched back on!

Ambient temperature for the electronics housing max. +80°C (safety class T4 max.).

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 only with an intrinsically safe, EMC compliant power supply with the following specifications when employing the pressure 4-20mA output:

- Supply voltage max. 40 V DC
- Current output max. 100 mA
- Inductivity max. 0
- Capacity max. 0.017 μF

For PT's that are explosion proof Class I, Division 1, Groups A, B, C & D, the power supply rating is 16-40 Vdc.

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**

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3.1 Ordering guides

The exact meanings of the letter/digit combinations are given in the corresponding sections of chapter 3.
3.1.1 Ordering Guide for X242 and X243

\[x \ 2 \ xxx - xxx - xxxxxx - xx/xx - xxx - xxx @ xxx\]

- Approval
- Process Connection
- Diaphragm Material
- Mounting Configuration
- Pressure Range
- Rigid/Flexible Stem
- Electrical Termination
- Option
- Turndown

3.1.2 Ordering Guide for PT241X, PT244X, PT290X, PT291X, and PT292X

\[PT \ 2 \ xxx x - xxxxx - xx/xx - xxx - xxx - xxx @ xxx\]

- Process Connection
- Mounting Configuration
- Diaphragm Material
- Approval
- Pressure Range
- Rigid/Flexible Stem
- Electrical Termination
- Option
- Turndown

3.2 Ordering Example

\[S \ 2 \ 4 \ 2 - 5 \ M - 6/30 - TC - C \ 6 \ H @ 4 \ M\]

- Intrinsically Safe
- ±0.25% Full Scale
- Thread: 1/2"-20 UNF
- Pressure Range: 0-5000 psi
- Rigid Stem Length: 6 = 6 inch
- Flexible Stem Length: 30 = 30 inch
- Option: TC Output
- Connector: PT1H-10-6P
- Set Range: 0-4000 psi

3.3 Safety Related Specifications

- ATEX certificate No.: SIRA 03ATEX2422
- EX-Safety class EEx ia IIC T4 (Ta = -20°C to +80°C)
- FM approvals Class I, Division 1 Groups A, B, C & D

Certified maximum values for EEx ia IIC T4
Associated electrical equipment must satisfy the following conditions:

Supplied voltage max. 40 V DC
Current output max. 100 mA
Inductivity max. 0
Capacity max. 0.017 µF

3.4 PERFORMANCE CHARACTERISTICS

x2xxx - xxx - xxxxx - xx / xx - xxx - xxx@xxx

3.4.1 ACCURACY

(Linearity, hysteresis and repeatability)

3.4.1A X242, X243

±0.25% of full scale
(0-1500 psi and above)

±0.50% of full scale
(0-1000 psi and below)

3.4.1B PT241X

±0.50% of full scale
(0-1500 psi and above)

±1.0 of full scale
(10-1000 psi and below)

3.4.1C PT244X

±0.25% of full scale
(0-500 psi and above)

±0.50% of full scale
(0-250 psi)

3.4.1D PT290X, PT291X, PT292X

±0.50% of full scale
3.4.2 **Resolution**

Infinite

3.4.3 **Repeatability**

±0.10% of full scale

3.5 **Pressure Side Connection**

2 = 1/2" 20 UNF 2A (x242x . . .)

1, 3, 4, 90, 91 or 92 = flange (PT241xx-x), (x243x-x), (PT244xx-x), (PT290xx-x), (PT291xx-x), or (PT292xx-x)

3.6 **Pressure Ranges**

3.6.1 **Pressure Ranges in PSI**

3.6.1A

<table>
<thead>
<tr>
<th>Model number</th>
<th>Permitted pressure range in PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>x24xx-2.5C-x/xx</td>
<td>0-250</td>
</tr>
<tr>
<td>x24xx-5C-x/xx</td>
<td>0-500</td>
</tr>
<tr>
<td>x24xx-7.5C-x/xx</td>
<td>0-750</td>
</tr>
<tr>
<td>x24xx-1M-x/xx</td>
<td>0-1,000</td>
</tr>
<tr>
<td>x24xx-1.5M-x/xx</td>
<td>0-1,500</td>
</tr>
<tr>
<td>x24xx-3M-x/xx</td>
<td>0-3,000</td>
</tr>
<tr>
<td>x24xx-5M-x/xx</td>
<td>0-5,000</td>
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<tr>
<td>x24xx-7.5M-x/xx</td>
<td>0-7,500</td>
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<td>x24xx-10M-x/xx</td>
<td>0-10,000</td>
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<td>x24xx-15M-x/xx</td>
<td>0-15,000</td>
</tr>
<tr>
<td>x24xx-20M-x/xx</td>
<td>0-20,000</td>
</tr>
<tr>
<td>x24xx-30M-x/xx</td>
<td>0-30,000</td>
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</table>

3.6.1B

<table>
<thead>
<tr>
<th>Model number</th>
<th>Permitted pressure range in PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT24xx-2.5C-x/xx</td>
<td>0-250</td>
</tr>
<tr>
<td>PT24xx-5C-x/xx</td>
<td>0-500</td>
</tr>
<tr>
<td>PT24xx-7.5C-x/xx</td>
<td>0-750</td>
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<tr>
<td>PT24xx-1M-x/xx</td>
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<tr>
<td>PT24xx-1.5M-x/xx</td>
<td>0-1,500</td>
</tr>
<tr>
<td>PT24xx-3M-x/xx</td>
<td>0-3,000</td>
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</table>
PT24xx-5M-x/xx 0-5,000
PT24xx-7.5M-x/xx 0-7,500

3.6.1c

<table>
<thead>
<tr>
<th>Model number</th>
<th>Permitted pressure range in PSI</th>
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<tr>
<td>PT29xx-25-x/xx</td>
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<td>PT29xx-50-x/xx</td>
<td>0-50</td>
</tr>
<tr>
<td>PT29xx-1C-x/xx</td>
<td>0-100</td>
</tr>
<tr>
<td>PT29xx-2.5C-x/xx</td>
<td>0-250</td>
</tr>
<tr>
<td>PT29xx-5C-x/xx</td>
<td>0-500</td>
</tr>
<tr>
<td>PT29xx-7.5C-x/xx</td>
<td>0-750</td>
</tr>
<tr>
<td>PT29xx-1M-x/xx</td>
<td>0-1,000</td>
</tr>
<tr>
<td>PT29xx-1.5M-x/xx</td>
<td>0-1,500</td>
</tr>
<tr>
<td>PT29xx-3M-x/xx</td>
<td>0-3,000</td>
</tr>
<tr>
<td>PT29xx-5M-x/xx</td>
<td>0-5,000</td>
</tr>
<tr>
<td>PT29xx-7.5M-x/xx</td>
<td>0-7,500</td>
</tr>
<tr>
<td>PT29xx-10M-x/xx</td>
<td>0-10,000</td>
</tr>
</tbody>
</table>

3.6.2 Max. Overload (Without influencing operating data)

x24xx 2 x full scale pressure or 35,000 psi, whichever is less.
PT29x 2 x full scale pressure or 15,000 psi, whichever is less.
PT24x 2 x full scale pressure

3.6.3 Burst pressure

6 x nominal value, max. 45,000 psi

3.6.4 Natural frequency

50 Hz [-3db]

3.7 Rigid stem/flexible stem

3.7.1 X242x, X243x

6 = 152 mm standard length for rigid version
6/18 = 152 mm stem length / 457 mm flexible stem

Other lengths available
3.7.2 PT241XX

2.031/18 = 2.031” stem length / 18” flexible stem

3.7.3 PT244XX

2.406/18 - 2.406” stem length / 18” flexible stem

Other lengths available

3.7.4 PT290x, PT291x, PT292x

5/30 = 5” stem length / 30” flexible stem

Other lengths available

3.8 ELECTRICAL DATA

Configuration 4-arm Wheatstone bridge strain gauge with int. amplifier

Output signal 2-wire 4 - 20 mA

Supply voltage 16-40 VDC for EEx ia IIC T4 and FM approved explosion proof models

Power consumption ≤20 mA

Zero balance adjustment range (x24x and PT24x)
-40% to +10% > 500 psi
-80% to +20% < 500 psi

(PT29x)
-40% to +10% > 100 psi
-80% to +20% < 100 psi

3.9 TEMPERATURE INFLUENCE

Electronics housing

Max. housing temperatures
Safety class T4 -20°C to +80°C

Compenstated temperature range
240 Series -18°C to +65°C
Compensated temperature range
PT29x Series

Zero shift due to temperature change on electronics housing
x24x, PT24x, PT29x 0.01% full scale/°F maximum (0.02% f.s./°C maximum)

**Diaphragm (in contact with media)**

Maximum temperature at the diaphragm
x2xxx 400°C (750°F)

Zero shift due to temperature change on the diaphragm
x2xxx 15 psi/100°F typical (27 psi/100°C)
PT29x, PT24x 1 psi/100°F typical (from 75°F to 450°F)
2 psi/100°F typical (from 450°F to 600°F)
0.07 bar/38°C typical (from 24°C to 232°C)
0.14 bar/38°C typical (from 233°C to 315°C)

### 3.10 EMC REQUIREMENTS

Conforming to CE in accordance with EMC directive.

<table>
<thead>
<tr>
<th>Electromagnetic Interference</th>
<th>DIN EN 550223 1995</th>
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<tbody>
<tr>
<td>Immunity</td>
<td>DIN EN 61000-4-2 1995</td>
</tr>
<tr>
<td>Conducted Disturbances</td>
<td>DIN EN 61000-4-6 1996 + A1:2000</td>
</tr>
<tr>
<td>Power Frequency Magnetic Field</td>
<td>DIN EN 61000-4-8 1993 + A1:2001</td>
</tr>
</tbody>
</table>

### 3.11 MATERIALS

<table>
<thead>
<tr>
<th>Diaphragm</th>
<th>15-5PH Mat. No. 1.4545 DyMax™ coated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stem</td>
<td>17-4PH Mat. No. 517400</td>
</tr>
</tbody>
</table>

### 3.12 TORQUE

<table>
<thead>
<tr>
<th>x242x</th>
<th>x243x</th>
<th>PT292</th>
<th>PT24x, PT290 and PT291</th>
</tr>
</thead>
<tbody>
<tr>
<td>max. 56.5 Nm</td>
<td>max. 5.6 Nm</td>
<td>max. 14.1 Nm</td>
<td>max. 14.1 Nm</td>
</tr>
<tr>
<td>(500 inch-lbs.)</td>
<td>(50 inch-lbs.)</td>
<td>(125 inch-lbs.)</td>
<td>(125 inch-lbs.)</td>
</tr>
<tr>
<td>min. 11.3 Nm</td>
<td>min. 4.5 Nm</td>
<td>min. 11.3 Nm</td>
<td>min. 11.3 Nm</td>
</tr>
<tr>
<td>(100 inch-lbs.)</td>
<td>(40 inch-lbs.)</td>
<td>(100 inch-lbs.)</td>
<td>(100 inch-lbs.)</td>
</tr>
</tbody>
</table>
3.13 **ENVIRONMENTAL PROTECTION TO IEC 529**

PT housing with conduit  
PT02A-10-6P 1P66 nema 4x
PT02H-10-6P 1P66 nema 4x (Using Dynisco P/N 711610)
PT1H-10-6P 1P66 nema 4x (Using Dynisco P/N 711610)

3.14 **WEIGHT**

1-5 lbs.

3.15 **DIMENSIONS**
Fig. 3-1 x242 Models

TECHNICAL DATA

CONDUIT FITTING SHOWN REFER TO ELECTRICAL CONNECTION IN MODEL NUMBER FOR APPROVED CONNECTOR TERMINATIONS.

GROUND WIRE (NO. 18 AWG)

STRANDED WIRES (NO. 18 AWG) SEE WIRING CHART

GROUNDED SHELL (GREEN WIRE) TO SHELL

ZERO AND SPAN ADJUSTS ARE PROTECTED BY SEAL SCREWS

All dimensions are in inches (millimeters) unless otherwise specified.
Fig. 3-3 PT241 Models
Fig. 3-4, PT244x Models

ZERO AND SPAN ADJUSTS ARE PROTECTED BY SEAL SCREWS
(1/4-20 X 3/8 LONG)

ALL DIMENSIONS ARE IN INCHES (MILLIMETERS)
Fig. 3-6  PT291x Models
Fig. 3-7 PT292x Models
4. FUNCTION

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4.1 CONSTRUCTION

The PTs of series 240’s and 290’s are industry standard.

The main advantages are:
• Intrinsically safe EEx ia IIC T4
• thermal stability
• resistance to aggressive media
• insensitivity to electromagnetic radiation (EMC)
• liquid-filled transmission system (mercury)
• pressure measurements in plastic melt up to a temperature of 400°C

4.2 DESCRIPTION OF FUNCTIONS

Through a closed, liquid-filled pressure transmission system, the PT furnishes an electrical signal that is proportional to the pressure of the melt.

The pressure applied by the medium is forwarded to the measuring diaphragm and the mercury in the capillary. 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 and electrical signal (mA or Volts) proportional to the pressure.

Fig. 4-1 Functioning Principle of the PT of the X242 Series
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**Toxic hazard!**

The PT contains a small amount of mercury (Hg) as its transmission medium. If the diaphragm is damaged, mercury may escape.

Never transport or store the PT without the protective shell bolted in place. Remove the shell shortly before installation.

**If mercury is inhaled or swallowed, seek medical attention immediately.**

Mercury is hazardous waste and must be disposed of in accordance with applicable laws. **DYNISCO** will accept defective PTs.

If mercury escapes, use airtight packaging!

**ATTENTION** 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**

- PT with diaphragm protection cap  
- Fastening clip (transmitter with flexible stem only)  
- Calibration sheet  
- Operating manual with declaration of conformity
6. **ASSEMBLY**

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Ambient temperature for the electronics housing max. +80°C (safety class T4 max.).

Higher temperatures can result in damage and malfunction.

**EX**

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

### 6.1 MOUNTING HOLE

**ATTENTION**

To produce the mounting hole, use only DYNISCO machining tool kit (DYNISCO P/N 200925).

- Drill the mounting hole as shown in fig. 6-1, 6-2, 6-3, 6-4, 6-5, 6-6.

**Fig. 6-1 Mounting Hole x242**

DIMENSIONS ARE IN (MM)
**Fig. 6-2 Mounting hole x243**

DIMENSIONS ARE IN (MM)

**Fig. 6-3 Mounting hole PT241x**
**Fig. 6-4 Mounting hole PT244x**

4X Ø.422 (Ø10.72) ± 1.25 (31.75)
1/2-13 UNC-2B TAP ± .75 (19.05)
EQUALLY SPACED ON Ø 2.500 (Ø63.51) BC

DIMENSIONS ARE IN (MM)

**Fig. 6-5 Mounting hole PT290 & PT291**

2.125 (54) MAX
1/2-13 UNC-2B TAP (19.1)
EQUALLY SPACED ON Ø 2.125 (54) BC

SNOUT LENGTH: 10 (254)
MOUNTING HOLE CONFIGURATION REQUIRES USE OF SEALING GASKET
When reworking the mounting hole, pay particular attention to the centricity of:
- the hole,
- the thread, if present, and
- the sealing surface.

Pressure sealing takes place on the 45° beveled sealing surface and on the front cylindrical section of the PT (see figures 6-1, 6-2, 6-3, 6-4, 6-5, 6-6).

The sealing surface must be:
- correctly machined
- free from marks and rough edges
- free from solidified plastic residue.

### 6.2 Checking the Mounting Hole (Not Flanged Models)

- Paint the test bolt DYNISCO on the marked area (figure 6-7, item 1) with marking ink up to the thread.
Insert the test bolt in the mounting hole. Twist it in by hand until the two sealing surfaces make contact. Remove and examine the test bolt.

The only acceptable abrasion of marking ink is at the sealing edge (45°), evenly over the entire circumference.

If the ink has been rubbed off in other places too:

- rework the mounting hole.

### 6.3 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.

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

**Toxic hazard!**
The PT contains a small amount of mercury (Hg) as its transmission medium. If the diaphragm is damaged, mercury may escape.

Never transport or store the PT without the protective cap bolted in place. Remove the cap shortly before installation.

**If mercury is inhaled or swallowed, seek medical attention immediately!**

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

**ATTENTION** Before mounting the PT, check the mounting hole carefully. The PT must only be mounted in holes that satisfy the requirements stipulated in chapter 6.1. A hole that does not satisfy these requirements can damage the PT.

**ATTENTION** Before mounting the PT, ensure that the mounting hole is free from plastic residue.
Remove plastic residue with the DYNISCO cleaning tool kit. A test bolt is included with this cleaning set.

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

- Check the mounting hole with the test bolt, and clean with cleaning set if necessary.
- Coat the thread section of the transmitter with high temperature resistant grease or a suitable parting agent.

**ATTENTION** 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 / sensor connection!

**ATTENTION** Maximum mounting torque 500 inch-pounds for 1/2-20 UNF transmitters. If the mounting torque is too high, the PT may be damaged or its zero point may shift.

- Screw the PT into the mounting hole and tighten.

### 6.4 Mounting PTs with Flexible Stem

Mounting a PT with a flexible stem to the pressure sensor is done analogously to the procedure in 6.3.

**ATTENTION** Avoid kinking or crushing the flexible stem.

Minimum bending radius
- **1” (25 mm)** for protected capillary

The connector must be easily accessible (on connector versions).

- Mount the electronics housing of the PT with the fastening clip. See mounting example in figure 6-8.
- Additionally secure the flexible stem between the electronics housing with a standard cable clip.
6.5 **INSTALLING THE FLANGED PRESSURE TRANSMITTER**

Installation of the flange mounted pressure transmitter is analogous to the procedure described under 6.3, except mounting torque is designed for the mounting bolts and varies depending on specific transmitter. See specification section 3.12 for details.

6.6 **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, intrinsically safe condition with the machine switched off.

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.

Operate only with an intrinsically safe, EMC compliant power supply with the following specifications when employing the pressure 4-20 mA output:

- Supply voltage max. 40 V DC
- Current output max. 100 mA
- Inductivity max. 0
- Capacity max. 0.017 µF
**ATTENTION** ESD sensitive component. Electrostatic discharge may damage the PT. Take ESD precautions.

**ATTENTION** The electrical connection must comply with EMC requirements.

**ATTENTION** If the electrical connection is not made as described in chapter 6.6.1, or if cables / cable connectors / cable glands other than those stipulated by DYNISCO are used, DYNISCO cannot guarantee that EMC requirements will be satisfied.

### 6.6.1 EMC / CE COMPLIANT CONNECTION

- Earth the machine section with the screw-in trunnion / mounting hole for the PT in accordance with regulations. The PT must be connected to earth via the screw-in trunnion / mounting hole.
- Connect the shield of the connecting cable on both sides, making sure it conducts with full and continuous contact.
- When introducing the connecting cable into an EMC compliant switch cabinet, for example, connect the shield correctly (cable gland, conducting, full contact, continuous) to the conductive housing or route it via built-in cable connector that is also connected to the conductive housing.
- Connect unused cable cores or free cable ends correctly to the cable shield on both sides.

### 6.7 CONNECTION ASSIGNMENTS

**Conduit / Leads**

- Red + Signal/Power
- Black - Signal/Power
- Green Ground

**Connector**

- A + Signal/Power
- B - Signal/Power

Transmitter incorporates over-voltage protection and reverse polarity protection and will not operate if inputs are reversed.

### 6.8 FLANGE CONFIGURATIONS
ASSEMBLY

CONTROLLED PRODUCT
ALL CHANGES MUST BE APPROVED BY APPROVALS COORDINATOR BEFORE EXECUTION.

NOTES:
1. ALL DIMENSIONS ARE IN INCHES.
2. UNLESS NOTED OTHERWISE, FLANGE SECURED TO SNOUT VIA SET SCREW.
3. UPDATE 242945 & 242946 WITH ANY CHANGES OR ADDITIONS TO MODEL CODING OR DESCRIPTIONS.

FLANGE MOUNTING CONFIGURATIONS

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<th>CODE</th>
<th>DESCRIPTION</th>
<th>FIG</th>
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<th>Ø'B</th>
<th>Ø'C</th>
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NOTES:
1. ± .008 .005
2. 1.5 PLACE DECIMAL ± .01
3. SIDE VIEW
4. EXCEPT AS MAY BE OTHERWISE PROVIDED BY CONTRACT, THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF DYNISCO, ARE ISSUED IN STRICT CONFIDENCE, AND SHALL NOT BE REPRODUCED OR COPIED, OR USED AS THE BASIS FOR THE MANUFACTURE OR SALE OF APPARATUS WITHOUT PERMISSION.

ITEM PART NO. DESCRIPTION QTY

ASSEMBLY

FIG. 6-9 x243 Flange Configurations

Certification Drawing, Flange Configurations

Dynisco
**NOTES:**

1. **MATERIAL:** UNLESS OTHERWISE SPECIFIED, 17-4 PH SST, COND H1075. RAW MATERIAL P/N PER ABOVE TABLE.

2. **ALL THREADS ARE UN-2B,** UNLESS OTHERWISE SPECIFIED.

3. **S5 IS A 150 LB - 2 1/2" RAISED FACE ANSI FLANGE,** SEE STANDARD ASME B16.5 FOR DIMENSIONS.

4. **S11 IS A 600 LB - 2" RAISED FACE ANSI FLANGE,** SEE STANDARD ASME B16.5 FOR DIMENSIONS.

5. **UPDATE** 242945 & 242946 WITH ANY CHANGES OR ADDITIONS TO MODEL CODING OR DESCRIPTIONS.

---

**CONTROLLED PRODUCT**

ALL CHANGES MUST BE APPROVED BY APPROVALS CO-ORDINATOR BEFORE EXECUTION.
### Notes:
1. Material: 17-4 SST, Condition 1075.
2. Update 242945 & 242946 with any changes or additions to model coding or descriptions.

### Diagram
![Diagram of a split-style flange with dimensions and annotations](image)

### Table

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<tr>
<th>Item</th>
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### Tolerances
- 1.2 Place decimals ± .01
- 2. Fractions ± 1/32
- 3. Angled ± .5
- 4. All dimensions are in inches.

### Additional Details
- All changes must be approved by the coordinator before execution.
- Cylindrical unless otherwise specified.
7. **Commissioning**

7.1 **Supply Voltage**

Please read the entire manual prior to installation and use.

⚠️ **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**

PTs of the x2xxxx and PT2xxx series may have an internal calibration signal. Connecting terminals E and F switches the calibration signal to the signal output. It is 80% of the full scale pressure of the transmitter (B300 option must be specified).

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

**Attention** Do not change the installed position of the PT after calibration. If the position is changed you must re-calibrate the PT.

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

- Remove the cap screws from the potentiometers.

---

**Fig. 7-1 Electronics Housing Cover**
- 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.
- If B300 option is specified, connect terminals E and F. The calibration signal is connected to the output.
- Adjust calibration value (80% of full scale pressure) at potentiometer adjusting span screw and verify on the meter.
- Check the zero setting again.
- Repeat the zero adjustment and calibration value as necessary.

7.3 **ZERO ADJUSTMENT**

For PTs of series x2xxxx and PT2xxx’s, 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** Before starting the machine, wait until the melt medium at the diaphragm of the PT has reached its operating/processing temperature. If the machine is started before the medium reaches its operating temperature, the PT will be damaged. If it is hard to tell when the operating temperature has been reached, use a combined PT with thermocouple.

**ATTENTION** Operating temperature at the PT diaphragm max. 400°C (752°F). Higher temperatures will damage the PT.

Ambient temperature for the electronics housing max. +80°C (safety class T4 max.). Higher temperatures can result in damage and malfunction.

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

7.5 **HAZARDOUS AREA ELECTRICAL CONFIGURATION**
COMMISSIONING

NON-HAZARDOUS AREA

APARATUS UNSPECIFIED EXCEPT THAT IT MUST NOT BE SUPPLIED FROM NOR CONTAIN UNDER NORMAL OR ABNORMAL CONDITIONS A SOURCE OF POTENTIAL WITH RESPECT TO EARTH IN EXCESS OF 250 VOLTS RMS OR 250 VOLTS DC

CONTROL INSTRUMENTATION OPERATING AT OR LESS THAN 250 V RMS 250 VDC

TABLE 1, GROUP IA

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<th>L (µH)</th>
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TABLE 3, GROUP IIC

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NOTES:

1. THE ELECTRICAL CIRCUIT IN THE HAZARDOUS AREA MUST BE CAPABLE OF WITHSTANDING AN AC TEST VOLTAGE OF 500 VOLTS R.M.S. TO EARTH OR FRAME OF THE APPARATUS FOR ONE MINUTE.

2. THE CAPACITANCE AND INDUCTANCE OR INDUCTANCE / RESISTANCE (L/R) RATIO OF THE HAZARDOUS AREA CABLES MUST NOT EXCEED THE VALUES SHOWN ON TABLES 1, 2 & 3.

3. NON-HAZARDOUS AREA EQUIPMENT SHALL COMprise ONE OF THE FOLLOWING DUAL CHANNEL BARRIERS:
   A) PEPPER & FUCHS ZG31 Ex
   B) MTL 2441B
   OR
   TWO OF THE FOLLOWING SINGLE CHANNEL BARRIERS:
   PEPPER & FUCHS ZG31 Ex
   PEPPER & FUCHS KHD2-STC-Ex 1
   PEPPER & FUCHS KHD2-STC-Ex 1 P
   PEPPER & FUCHS KHD2-STC-Ex 1


5. IF TWO OR MORE SEPARATE 1S CIRCUITS ARE TO BE KEPT SEPARATE WITHIN A MULTICORE, THEN TYPE A OR B CABLES MUST BE USED, OR SEPARATE CABLES TO BE USED.

6. CABLE SCREENS ARE TO BE EARTHED AT ONE END ONLY.

7. SYSTEM LABEL TO BE AFFIXED AT THE INTERFACE OF 'IS' OR 'NON-IS' CIRCUITS OR ADJACENT TO THE PRINCIPAL APPARATUS.

SIRA SYST. Ex 98E2139.

HAZARDOUS AREA

DYNISCO 4-20 mA 2-WIRE PRESSURE TRANSMITTER MODELS:
PT241S, PT242S, S242, S243
PT290S, PT291S, PT292S
X90S, X941S, X942S
SCS CERT. NO Ex 9722145

DUAL CHANNEL

SINGLE CHANNEL BARRIER

NON-HAZARDOUS AREA

APARATUS UNSPECIFIED EXCEPT THAT IT MUST NOT BE SUPPLIED FROM NOR CONTAIN UNDER NORMAL OR ABNORMAL CONDITIONS A SOURCE OF POTENTIAL WITH RESPECT TO EARTH IN EXCESS OF 250 VOLTS RMS OR 250 VOLTS DC

CONTROL INSTRUMENTATION OPERATING AT OR LESS THAN 250 V RMS 250 VDC
HAZARDOUS AREA
(C CLASS 1, DIV 1, GROUPS A,B,C,D)

DYNAMCO 4-20 mA 2-WIRE PRESSURE TRANSMITTER MODELS: PT241S, PT244S, S242, S243 P2590S, PT241S, PT292S X840S, X841S, X842S

INPUT +
INPUT -
CAL +
CAL -

NOTE 3
DUAL CHANNEL BARRIER

NOTE 4
SINGLE CHANNEL BARRIER

CONTROL INSTRUMENTATION OPERATING AT OR LESS THAN 250 V RMS OR 250 VOLTS DC

NON-HAZARDOUS AREA
NON-HAZARDOUS AREA APARATUS UNSPECIFIED EXCEPT THAT IT MUST NOT BE SUPPLIED FROM NOR CONTAIN UNDER NORMAL OR ABNORMAL CONDITIONS A SOURCE OF POTENTIAL WITH RESPECT TO EARTH IN EXCESS OF 250 VOLTS RMS OR 250 VOLTS DC

NOTES:
1. INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NFPA 70, ARTICLE 504) AND ANSI/ISA RP 12.6.

2. PROTECTIVE ASSOCIATED APPARATUS MUST BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS INSTALLATION DRAWING.

3. ANY FMRC APPROVED SINGLE OR DUAL CHANNEL BARRIER WITH ENTITY PARAMETERS OF Voc OR Vt ≤ 25 V, Isc ≤ 100 mA, Ca ≥ 0.017 uf, La ≥ 0 mH OR PROTECTIVE BARRIER PEPPERL / FUCHS Z111/Ex.

4. ANY FMRC APPROVED SINGLE OR DUAL CHANNEL BARRIER WITH ENTITY PARAMETERS OF Voc OR Vt ≤ 40V, Isc ≤ 100 mA, Ca ≥ 0.017 uf, La ≥ 0 mH OR ONE OF THE FOLLOWING PROTECTIVE BARRIERS: MTL 5042 OR PEPPERL / FUCHS KFD2-STC4-Ex1.
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, intrinsically safe** condition with the machine switched off.

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

**Burn hazard!**
The PT must be removed with the melt in molten condition. The PT can be very hot when removed.

**Wear protective gloves!**

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

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

**ATTENTION** Before removing the PT, the medium must be in molten condition.

**ATTENTION** Removing the transmitter with the medium in solidified condition can damage the diaphragm of the PT.

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

**ATTENTION** 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/sensor connection!

- Remove the PT.
- Carefully clean the diaphragm of the transmitter with a soft cloth, while the medium is still malleable.

8.2 **THERMOCOUPLE/RTD REPLACEMENT**

A defective thermocouple is easy to replace.
• Loosen the hexagon socket screw at the top end of the sensor stem.

• Remove the defective thermocouple from the probe stem.

**ATTENTION** When fitting the new thermocouple, the pressure transmitting capillary must be located in the slot of the thermocouple.

• Insert the new thermocouple all the way into the probe stem.

• Tighten the hexagon socket screw at the top of the sensor stem to secure the thermocouple.

---

**Fig. 8-1 Thermocouple**
### 8.3 REPAIR/DISPOSAL

**Toxic hazard!**
The PT contains a small amount of mercury (Hg) as its transmission medium. If the diaphragm is damaged, mercury may escape.

Never transport or store the PT without the protective cap bolted in place. Remove the cap shortly before installation.

**If mercury is inhaled or swallowed, seek medical attention immediately!**

Mercury is hazardous waste and must be disposed of in accordance with applicable laws. DYNISCO will accept defective PTs.

If mercury escapes, use airtight packaging!

Please send defective PTs to your DYNISCO representative.

For addresses, see the back cover of the operating manual.

### 8.4 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. **ACCESSORIES**

- Machining tool kit 1/2”-20UNF-2A  P/N 200295
- Cleaning tool kit 1/2”-20UNF-2A  P/N 200100
- Machining tool kit M18 x1.5  P/N 200105
- Cleaning tool kit M18 x1.5  P/N 200100
- Mounting Bracket  P/N 190750
## 10. Troubleshooting

### 10.1 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>Mounting hole incorrectly produced (alignment error)</td>
<td>Check hole with test bolt, rework with tool 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 mounting hole; remove solidified plastic</td>
</tr>
<tr>
<td></td>
<td>Diaphragm damaged</td>
<td>Send pressure transmitter to DYNISCO for repair</td>
</tr>
</tbody>
</table>
11. **CE Declaration of Conformity**

**DECLARATION OF CONFORMITY**

*We*  Dynisco Instruments  
38 Forge Parkway  
Franklin Ma. 02038

Declare in our sole responsibility, that the following product(s):  
S24X, PT24XS, PT29XS, X84XS (X indicating a variable number or letter)

To which this declaration relates is in conformity with the following standard(s): or other normative document(s):  
EN 50082-2 “Electromagnetic Compatibility. Generic immunity standard. Part2”  
when the mating connector is a Bendix EMI Plug.

Following the provisions of the directive:  
VDE 0839 Part 82-2/February 1996

Date: August 10, 2000

[Signature]
Dynisco Instruments  
Vice President of Operations
12. **EX DECLARATION OF CONFORMITY**

---

**1. EC TYPE-EXAMINATION CERTIFICATE**

**2.** Equipment intended for use in Potentially Explosive Atmospheres Directive 94/9/EC

**3. Certificate Number:** Sira 03ATEX2422

**4. Equipment:** X24XX, X84XX, PT24XX and PT29XX Pressure Transducers

**5. Applicant:** Dynisco Instruments

**6. Address:** 38 Forge Parkway
Franklin
Massachusetts
USA

7. This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8. Sira Certification Service, notified body number 0518 in accordance with Article 9 of Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report number RS2A10315A.

9. Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule to this certificate, has been assured by compliance with the following documents:

EN 50014:1997 (A1 and A2)
EN 50020:2002
EN 50284:1999

10. If the sign ‘X’ is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

11. This EC type-examination certificate relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the manufacture and supply of this equipment.

12. The marking of the equipment shall include the following:

- **II 1 G**
- **Ex ia IIIC T4**
- **T_{emb} = -20°C to +60°C**

---

**Project Number:** S2A10315

**Date:** 19 September 2003

**C. Index:** 13

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**M D Sheerman**
Certification Manager

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This certificate and its schedules may only be reproduced in its entirety and without change.

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SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE

13 DESCRIPTION OF EQUIPMENT

Series X24XX, X84XX, PT24XX and PT29XX is a two-wire pressure transmitter designed to output a 4-20 mA signal corresponding to 0-100% of the full-scale pressure range. The circuit is designed to work with a supply voltage range of 16 to 40 V DC. Two additional terminals are provided to calibrate a specific measurement system. By shorting these two terminals, a fixed pre-set output signal at 80% full-scale is impressed on the output. The system is designed such that the calibration circuit is isolated from the amplifier circuit, so that only two barriers need be used when the customer chooses to use the calibration feature in a hazardous area.

The enclosure material is stainless steel.

For the connection of associated apparatus the following entity parameters apply.

Input terminals

- $U_I = 40V$
- $I_I = 100mA$
- $C_I = 17\text{nF}$
- $U_I = 0$

Calibration terminals

- $U_I = 25V$
- $I_I = 100mA$
- $C_I = 17\text{nF}$
- $U_I = 0$

Note: Only linear supplies may be connected to the apparatus.

14 DESCRIPTIVE DOCUMENTS

14.1 Drawing No.       Sheet Rev. Date Title

- 000052  1 of 1 B 06 Aug 97 Certification Dwg Electrical Connections (Connectors)
- 241099  1 to 2 B 06 Sept 02 Certification Dwg PT241, PT244 (E) (S)
- 242098  1 to 2 G 06 Sept 02 Certification Dwg S242 (Intrinsically Safe) Explosionproof (E)
- 242110  1 of 1 E 09 Dec 99 Assembly X24X-XX-XX/XX Intrinsically Safe (S)
- 242927  1 of 1 D 05 Sept 03 Engraving Drawing X24XX, PT24XX, PT29XX, X84XX
- 243098  1 to 2 D 06 Sept 02 Certification Dwg S243 (Intrinsically Safe)
- 290099  1 of 2 D 06 Sept 02 Certification Dwg PT29XX
- 290999  2 of 2 D 06 Sept 02 Certification Dwg PT29XX
- 856278  1 of 1 C 29 Aug 03 Label (Intrinsically Safe)
- 856280  1 of 1 E 05 Sept 03 CE Nameplate 24VDC Input, 4-20mA output
- 870098  1 to 2 E 19 Dec 01 Certification Dwg X84XS (Intrinsically Safe)
- 952195B 1 of 1 A 15 Oct 96 Drill Drawing Amp Board
- 952195D 1 of 4 A 15 Oct 96 Layout Dwg Amp Board Layer 1

Date 19 September 2003

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Sira Certification Service
Rake Lane, Eccleston, Chester, CH4 8JN, England
Tel: +44 (0) 1244 670900  Fax: +44 (0) 1244 881330
Email: ex@nazard@siltec.co.uk
Sira Certification Service is a service of Sira Test & Certification Ltd
## SCHEDULE

### EC TYPE-EXAMINATION CERTIFICATE

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</table>

14.2 Report No. R52A10315A

15 SPECIAL CONDITIONS FOR SAFE USE (denoted by X after the certificate number)

None

16 ESSENTIAL HEALTH AND SAFETY REQUIREMENTS OF ANNEX II (EHSRs)

The relevant EHSRs that are not addressed by the standards listed in this certificate have been identified and individually assessed in Report No. R52A10315A.

17 CONDITIONS OF CERTIFICATION

17.1 The use of this certificate is subject to the Regulations Applicable to Holders of Sira Certificates.

17.2 Holders of EC type-examination certificates are required to comply with the production control requirements defined in Article 8 of directive 94/9/EC.

Date 19 September 2003

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Sira Certification Service
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