PT46XDN Series
DeviceNet Melt Pressure Transmitters

OPERATING MANUAL

ODVA™
Networks Built on a
Common Industrial Protocol

Dynisco

P/N 974131
05/05 Rev. B
ECO # 29918

Table of Contents

1. GENERAL

1.1 IMPORTANT INFORMATION

This manual applies to the PT46XDN 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.

Models covered by this manual include the PT460DN, PT462DN and the TPT463DN.

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). This applies in particular during the warranty period.

1.2 COPYRIGHT

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

It is strictly forbidden to allow reproduction of any kind “in whole or in part” to persons outside of Dynisco, without approval from Dynisco.

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
BFSL	Best Fit Straight Line

1.5 OVERVIEW

The Dynisco PT46xDN is a full-featured, smart digital melt pressure transmitter, combining the reliability of this industry-standard Dynisco pressure transducer with the added flexibility of DeviceNet digital communications. The pressure sensing technology is the same as other Dynisco products, proven in such rugged applications such as Polymer Melt Processing applications. The rugged construction is ideal for harsh industrial environments.

The PT46xDN is easily integrated into any digital control system with a DeviceNet scanner. Continuous pressure data is available in real-time at a minimum digital resolution of 0.01% of full scale (14 bits). Monitoring and configuration of the PT46xDN is accomplished via the DeviceNet network using commercially-available DeviceNet programming software.

The PT46xDN effectively combines the features of a melt pressure transducer, power regulator, alarm monitor, and DeviceNet digital signal conditioner into a single, cost-effective package. Wiring the PT46xDN transmitter is simple and fast by virtue of a standard DeviceNet 5 pin Micro-connector. The PT46xDN is powered directly by the DeviceNet bus eliminating the need for a separate power supply. Multiple DeviceNet Pressure Transmitters can be added to a network using a single DeviceNet Master scanner, making this approach very attractive when an application calls for multiple pressure transmitters.

1.6 TRANSMITTER PRINCIPLE OF OPERATION

The mechanical system (filled assembly) consists of a lower diaphragm, a filled capillary tube, and an upper diaphragm with a strain gage. The filled assembly transmits pressure from the process to the strain gage diaphragm where it is converted to a digital signal. The filled assembly isolates the electronics from

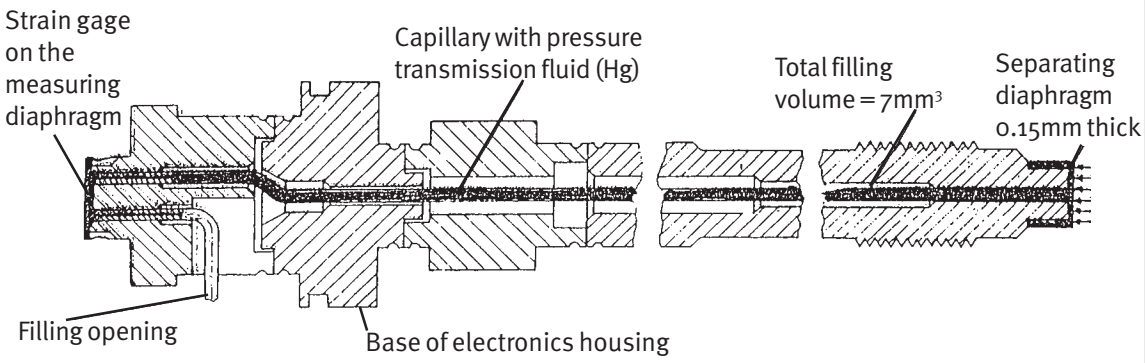
the high process temperatures.

The lower diaphragm is the surface in contact with the media being measured. This diaphragm can be made from a choice of materials. The standard material is heat-treated 15-5 stainless steel with DyMaxTM coating. This has average corrosion and excellent abrasion resistance and is similar to 17-4 stainless steel. Other materials are also available such as Hastelloy C-276 which has excellent corrosion resistant properties (but is not good for abrasion). For other materials please consult the factory.

Behind the lower diaphragm is a capillary tube filled to the upper diaphragm. As the process pressure deflects the lower diaphragm, the fill is displaced through the capillary tube to deflect the upper diaphragm.

The upper diaphragm has a strain gage element in the configuration of a Wheatstone Bridge. The deflection of the upper diaphragm causes a change in the resistance of the strain gage and hence a change in the balance of the bridge. The amount of imbalance is directly proportional to the applied pressure. This completes the translation of pressure applied to the lower diaphragm into a usable electrical signal.

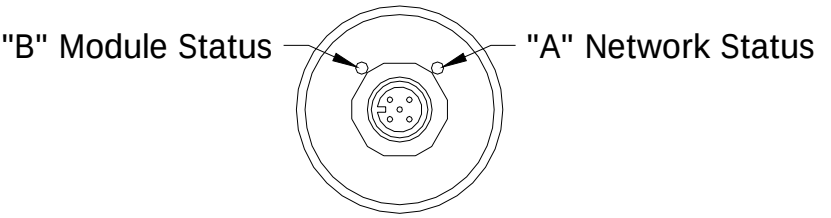
Fig. 1-1 Functioning Principle of the Dynisco Filled Assembly



The low level output signal from the bridge is amplified via an instrumentation amp circuit. The amplified signal then goes to the input of the analog-to-digital (A/D) converter.

1.7 DEVICENET FEATURES

The PT4xxDN utilizes the DeviceNet Predefined Master Slave Connection Set operating as a Group 2 Only Server. The PT4xxDN supports baud rates of 125K, 250k, and 500k. The node address can be set to any address between 0 and 63. The default baud rate and node address are 125k and 63, respectively. Pressure, alarm, and status data are available via polled I/O messages. Alarm, Warning and Scaling parameters are configured using Explicit messages.



1.7.1 INDICATORS

The PT46xDN utilizes 2 bi-color status indicators (i.e. LED's) to report Network and Module/Device status.

1.7.1A NETWORK STATUS INDICATOR ("A")

Off: Transmitter is not on-line. Duplicate MAC ID check has not been completed.

Green: Transmitter is on-line and is allocated to a Master.

Flashing Green: Transmitter is on-line and has passed Duplicate MAC ID check, but is not allocated to a Master.

Red: Communications Failure. Check for Duplicate MAC ID or incompatible baud rate.

Flashing Red: Connection timed-out.

1.7.1B DEVICE STATUS INDICATOR ("B")

Off: Power is off.

Green: Transmitter is operating in a normal condition.

Flashing Green: Transmitter requires baud or address configuration.

Red: Open Gage or electronics fault condition. If possible, check the I/O status message for fault condition.

1.7.2 I/O MESSAGING

The PT46xDN Transmitter supports Polled I/O Messaging to read "real-time" data. It does not support Cyclic I/O, Change of State (COS), or Bit-Strobe connections. The control system Master must be configured first 8-bit word (Byte 0) of the I/O Message Response as shown in Table 1. Note that the most significant 4 bits of the first byte are reserved for future use. The next 8-bit word (Byte 1) supplies transmitter status information, e.g. reading valid, electronics fault, etc. Further information on alarm and status bits is available in Section 7.4. The remaining 2 8-bit words (Bytes 2 & 3) represent the Pressure Value (PV).

Refer to Section 1.7.3 for additional information in interpreting the pressure data reported in the I/O message.

Fig. 1-1 DeviceNet Message Format for I/O Messaging

Byte/Bit	7	6	5	4	3	2	1	0
0	Reserved (0)	Reserved (0)	Reserved (0)	Reserved (0)	Trip Alarm High	Trip Alarm Low	Trip Warn High	Trip Warn Low
1	Reserved (0)	Set Zero Status	Over Tem-perature Fault	Open Gage Fault	Electronics Fault	Under-Range Fault	Over-Range Fault	Reading Valid
2	(LSB) Pressure Input Value							
3	(MSB) Pressure Input Value							

1.7.3 INTERPRETING THE OUTPUT

When reading the PV, it is important to understand how the value is scaled by the Engineering Units parameter and the Unity Gain Reference (UGR) parameter.

The PV can be scaled to a variety of engineering units, e.g. counts, psi, bar, etc., by setting the Data Units parameter to the appropriate value as listed in Attribute #02 of Section 7.4.

When reporting the PV in any engineering unit other than counts, a decimal scale factor called the Unity Gain Reference (UGR) is used to convert PV to "real world" pressure. By employing the UGR, the I/O data is presented in a more efficient integer format rather than a floating point. The UGR is factory-set and cannot be changed.

To compute the actual pressure, the control system must simply divide the PV by the UGR (*Pressure = PV / UGR*).

Example (500-psi PT460DN Transmitter):

A DeviceNet Master reads the PV via an I/O message and the UGR and Data Units via an explicit message as follows:

PV = 3852

UGR = 10

Data Units = 4864 (PSI)

The control system must compute the actual pressure as follows:

Pressure = 3852/10 = 385.2 psi.

1.7.4 EXPLICIT MESSAGING

The PT46xDN Transmitter supports explicit messaging for setup and configuration. Any DeviceNet master that supports explicit messaging can be used in conjunction with the EDS file supplied with the PT46xDN to configure it. Refer to Section 6.4 for a description of configurable parameters.

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.

DYNISCO will not be held liable for any injury, loss or damage resulting from failure to follow the instructions in this manual.

Toxic Hazard!
The PT46XDN may contain a very small amount of mercury (Hg) 0.00322 in^3 typically with a 6/18 configuration, as its transmission medium. If the diaphragm is damaged, mercury may escape. Never transport or store the PT46XDN 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 PT's. If mercury escapes, use airtight packaging!

Temperature

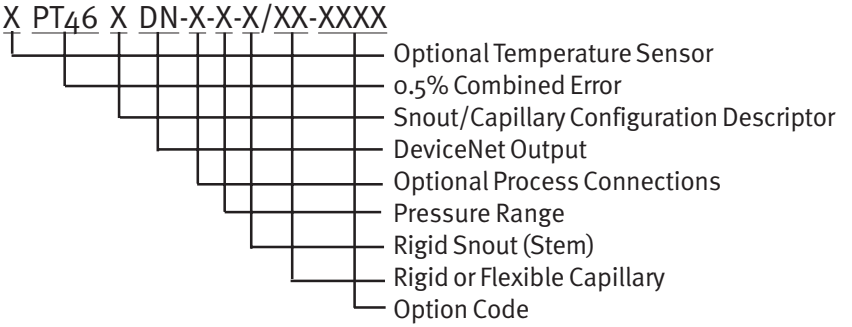
The PT46XDN series of pressure transmitters can be used in media temperatures up to 400°C. If the pressure transmitter is used in other applications, the safety and accident prevention regulations specific to that application must be followed. Maximum ambient temperature for the electronics housing is +85°C (185°F).

Higher temperature can result in damage and malfunction. Do not install the pressure transmitter in places where this temperature is exceeded.

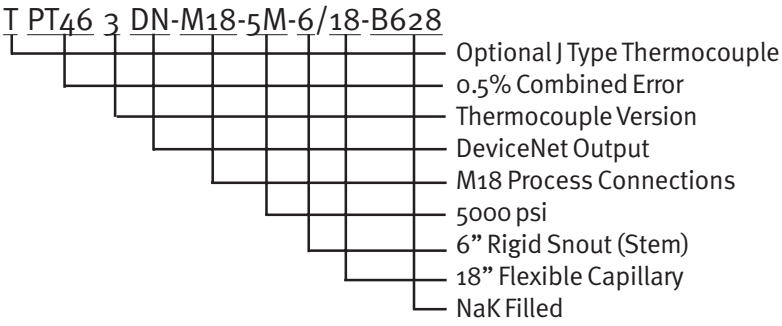
3. TECHNICAL DATA

3.1 ORDERING GUIDE FOR PT46XDN

The exact meanings of the letter/digit combinations are given in the corresponding sections of Chapter 3.



3.2 Ordering Examples



3.3 Ordering Information

XPT46XDN-X-X-X/XX-XXXX

3.4 Configuration and Temperature Option

XPT46**X**DN-X-X-X/XX-XXXX

Blank, 0 = No Temperature Sensor, Rigid Snout with No Capillary
Blank, 2 = No Temperature Sensor, Rigid Snout with Capillary
T, 3 = Temperature Sensor, Rigid Snout with Capillary

3.5 Process Connections

XPT46XDN-**X**-X-X/XX-XXXX

Blank = 1/2-20 UNF
M18 = M18 x 1.5 Thread

Other process connections are available. Please consult factory

3.6 Pressure Range - Full Scale

XPT46XDN-X-**X**-X/XX-XXXX

psi	Order Code	Bar	Order Code	
250	2.5C	17.5	17.5B	(M18 only)
500	5C	35	35B	
750	7.5C	50	50B	
1000	1M	70	70B	
1500	1.5M	100	1CB	
3000	3M	200	2CB	
5000	5M	350	3.5CB	
7500	7.5M	500	5CB	
10000	10M	700	7CB	
15000	15M	1000	1MB	
20000	20M	1400	1.4MB	
30000	30M	2000	2MB	

Other ranges and pressure configurations are available, please consult factory.

3.7 Rigid stem & Rigid or Capillary

XPT46XDN-X-X-**X/XX**-XXXX

6 = 6” Rigid Stem/0” Flexible Capillary
6/18 = 6” Rigid Stem/18” Flexible Capillary
6/30 = 6” Rigid Stem/30” Flexible Capillary
12/18 = 12” Rigid Stem/18” Flexible Capillary
12/30 = 12” Rigid Stem/30” Flexible Capillary

Other lengths and configurations are available, please consult factory.

3.8 Option Codes

XPT46XDN-X-X-X/XX-**XXXX**

Please consult factory for list of approved options.

3.9 Output

DeviceNet

3.10 DeviceNet Conformance

Conformance-Tested by ODVA Independent Test Lab (CIP protocol test, EDS test, physical layer test & system interpretability test).

3.11 Digital Resolution

Pressure Operating Range Resolution	14 bits minimum (±0.01% FS or 16 ppm) typically, full scale = ~20,000 counts

3.12 DeviceNet Specifications

Digital Communication Protocol	DeviceNet Version 2.0, ~Errata 5
ODVA Vendor ID	852 (Dynisco Instruments)
Device Profile	Generic Device 00_{hex} (Refer to $1C_{hex}$ Vacuum/ Pressure Gauge Device in DN spec. Vol. 2, 3-26 as a guideline)
Network Power Consumption	Maximum 30 mA @ 24 Vdc
Connector Style	Sealed 5-pin Micro (IEC-60947-5-2)
Isolated Physical Later	Non-isolated per DN spec 9-2
LED Support	2 bi-color LED's (module and network status per Device Net spec 8-2.)
MAC ID Setting	Software selectable only. Default id = 63.
Communication Rate Setting	Software selectable
Communication Rates Supported	125k (default), 250k and 500k bits/sec
Predefined Master/Slave Connection Set	Group only 2 server (Slave)
Message Types Supported	Polled/Explicit
Dynamic Connections Supported (UCMM)	No
Fragmented Explicit Messaging Implemented	Yes

Alarm Setpoints	2 High and 2 Low user-setable alarm points. Configured and transmitted via DeviceNet protocol. Include user-defined hysteresis band.

3.13 Engineering Units

Counts	Analog to Digital Counts	0 to 20000 typical
PSI	pounds-force per square inch	14.503774*bar
BAR	bar	(Full Scale Bar)/(Full Scale Counts)*Counts
kgf/cm^2	kilogram-force per square centimeter	1.0197162*bar
MPa	MegaPascal	0.1*bar
% Full Scale	Percent full scale	0 to 100

3.14 Sensor Diagnostics

Overrange Notification	Yes
CPU Watchdog Error	Yes
EEPROM Failure	Yes
Open Gauge Detection	Yes
Electronics Temperature Detection	Yes

3.15 Performance Characteristics

3.15.1 Combined Error (Accuracy)

Combined error is also known as accuracy which includes linearity, hysteresis and repeatability, and is determined by BFSL (Best Fit Straight Line).

±0.5% of full scale
±0.75% of full scale for transmitters with ranges of 1000 psi and less with lengths greater than 36”.

3.15.2 Repeatability

±0.20% of full scale

3.15.3 Max. Pressure (without influencing operating data)

2 x full scale pressure or 35,000 psi, which ever is less.

3.15.4 Burst pressure

6 x nominal value, max. 45,000 psi

3.15.5 Humidity

0 - 90% relative humidity (non-condensing)

3.16 Electrical Termination

DeviceNet Micro (5 pin)

3.17 Temperature influence

Electronics Housing

Housing Temperature Range	-20°C to +85°C (-5°F to +185°F)

Zero shift due to temperature change on electronics housing

PT46XDN	0.01% full scale/°F max. (0.02% f.s./°C max.)

Diaphragm (in contact with media) span shift due to temperature change on electronics housing.

PT46XDN	0.01% full scale /°F max.(0.02% f.s./°C max.)

Zero shift due to temperature change on the diaphragm.

PT46XDN	15 psi/100°F typical (27 psi/100°C)

3.18 Materials

Standard Diaphragm	15-5PH Mat. No. 1.4545 Various proprietary coatings
Standard Stem(Snout)	17-4PH Mat. No. 517400

Please note other diaphragm and stem materials may be substituted.

3.19 Torque for 1/2-20 UNF Process Connection

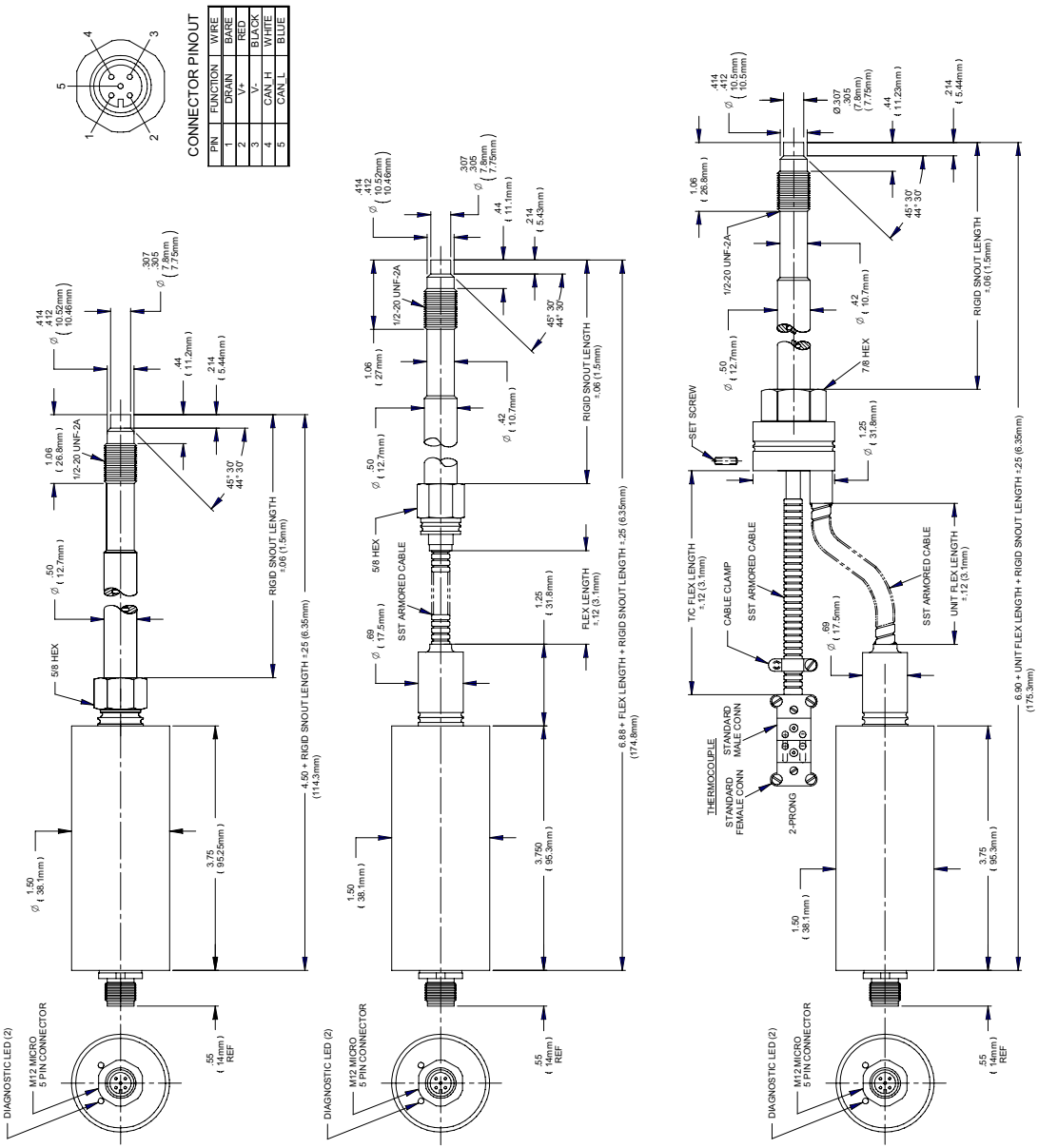
PT46XDN
max. 56.5 Nm
(500 inch-lbs.)
min. 11.3 Nm
(100 inch-lbs.)

3.20 Weight

The weight varies depending on product configuration. Average weight range is 1 to 5 pounds.

3.21 Dimensions

Fig. 3-1 PT46XDN



4. TRANSPORT/DELIVERY

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!

4.1 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.

4.2 STORAGE

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

4.3 SCOPE OF DELIVERY

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

5. INSTALLATION

5.1 GENERAL MOUNTING INFORMATION

Do not remove the protective cap on the PT until ready to install.

Before mounting the PT, check mounting hole carefully. The PT must only be mounted in holes that satisfy the requirements below. A hole that does not satisfy these requirements can damage the Transmitter.

Insure the mounting hole is clear of any frozen polymer or debris and is machined to the proper dimensions.

For threaded PT transmitters coat the threads with a high temperature anti-seize grease or a suitable parting agent, this will help prevent the PT snout from sticking permanently in the mounting hole.

Install unit into the process connection. (Do NOT torque transmitter into the hole at this time!) Allow time for the transmitter snout temperature to equalize to the process temperature. This will help eliminate thread galling and ease removal later. There should be NO pressure applied at this time.

Always use a torque wrench applied to the designated hexagon collar or mounting bolts while screwing the transmitter in and out. Do not apply the tool to the housing or housing/sensor connection.

After temperatures have equalized, apply proper torque as described in Section 3.20 of the Manual and tighten transmitter into mounting hole.

After the correct torque has been applied units with flexible capillary require the electronics to be mounted away from the process heat using mounting hardware, P/N 200941.

Make sure that the medium is in molten condition during transmitter removal. Removing the transmitter while the medium is in solidified condition can damage the sensor diaphragm.

When removing the PT, carefully clean the diaphragm of the transmitter with a soft cloth while the medium is still malleable.

Always remove the PT prior to cleaning the machine with abrasives or steel wire brushes. Also, do not clean the PT with hard objects, such as a screwdriver, a wire brush, etc. this will possibly damage the transmitter.

Before reinstalling the PT, ensure that the mounting hole is free from hardened plastic. A mounting hole cleaning tool kit is available to aid in removing of the material. (Dynisco Part Number 200100 for ½-20, 200101 for M18 and 200102 for M10 ports.) A gauge plug to check the hole is included in this kit.

The most common causes of transducer damage are: installation in improperly machined or plugged mounting holes and cold starts. The tip of the transducer consists of a stainless steel diaphragm that must be protected from severe abrasives, dents and scores.

Burn Hazard! The PT must be removed with the melt in the molten condition. The PT can be very hot when removed. WEAR PROTECTIVE GLOVES!

Careful attention should be paid to correctly machine the mounting port. Failure to use the recommended mounting port may result in erroneous pressure measurement, difficult transducer removal, premature sensor failure, process fluid leaks, and personnel hazard. In applications involving high temperature operation and/or repeated thermal cycling a good high quality anti-seize compound should be applied to the threaded surfaces.

5.2 Mounting Hole Torque

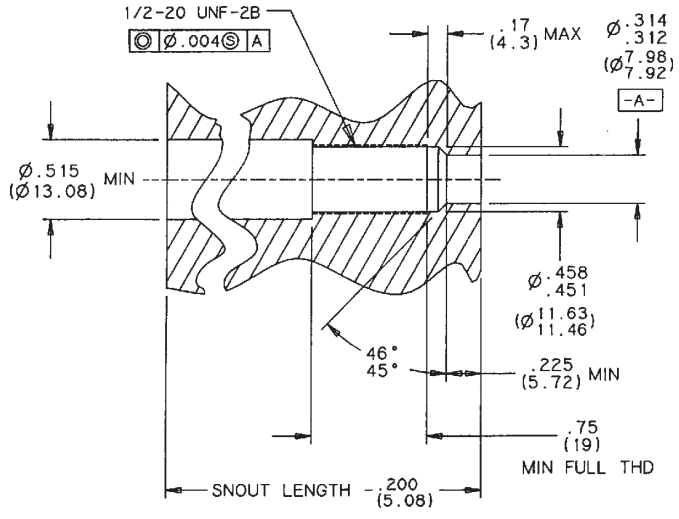
PT46XDN
max. 56.5 Nm
(500 inch-lbs.)
min. 11.3 Nm
(100 inch-lbs.)

5.3 Mounting Hole Dimensions

Drill the mounting hole as shown in Fig. 5-1.

Please consult factory for other mounting configurations.

Fig. 5-1 PT46XDN (1/2-20 UNF) Mounting Hole



5.4 Mounting the Pressure Transmitter

Dynisco offers a set of mounting hole-machining tools with all the necessary drills, taps, and reamers for the Dynisco standard ½-20UNF-2A and M18 and M10 mounting holes used in high temperature and plastics processing applications (Dynisco Part Numbers 200925, 200105 and 901949 respectively). Detailed instructions are sent with the machining kits. Copies of the instructions are available from Dynisco upon request.

When machining the hole pay careful attention to the concentricity between the threads and the 0.312/ 0.314 diameter. Since the pressure seal is on the 45° seating surface, this surface should be examined for good finish, free from burrs, etc.

It is general good practice to check the mounting hole before installing the transducer. One procedure is to coat a gauge plug (Dynisco Part Number 200908 for the 1/2 –20 standard port, 435901 for the short tip 1/2 –20 version, 200960 for the M18), with Dykem machine bluing on surfaces below the thread. Insert the gauge plug into the mounting hole and rotate until surface binding is encountered. Remove and inspect. Bluing should only be scraped off of the 45° sealing chamfer. If bluing has been removed from other surfaces, the mounting hole has not been machined properly.

5.5 DeviceNet Wiring

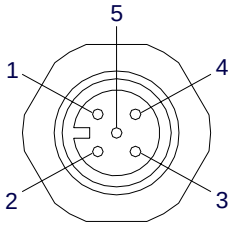
The PT46XDN can be readily connected to the DeviceNet bus using the optional connector and cable assembly or a customer-supplied connector and cable. It is important to adhere to proper DeviceNet wiring practices. The DeviceNet Technical Overview available from the Open DeviceNet Vendors Association (www.odva.org) provides additional information on DeviceNet physical layer topologies including cable types, trunk and drop lengths, and terminating resistors.

It is recommended that all wiring be validated using a media checker to identify potential media problems, e.g. shorts, opens, excessive cable length, and crossed connections.

5.6 DeviceNet Connector Wiring

The DeviceNet Pressure Transmitter uses the standard DeviceNet Micro DIN 5-pin connector. The connections are as follows:

Cable Leads	To	Connector Pin
Black	-V	3
Blue	CAN-L	5
Bare	Drain	1
White	CAN-H	4
Red	+V	2



CONNECTOR PINOUT
(male pins on transmitter)

6. CONFIGURATION

6.1 INITIALIZING DEVICENET COMMUNICATIONS

When the transmitter is connected to the DeviceNet bus, it will perform an initialization sequence to establish communications with the Master.

1. Initially, the Device Status LED will flash red one time, and then will change to a steady green. At this point the Transmitter has passed its internal health check.

2. Simultaneously, the Network Status LED will flash green one time, then after a few seconds will continue to flash green.

3. At this point, the duplicate MAC ID check is complete, and the transmitter is waiting to be allocated to a Master.

4. If the Network status LED stays solid red, remove the connector and then reconnect. If the LED is still solid red, continue to section 6.2 Setting the Node Address and Baud Rate

6.2 SETTING THE NODE ADDRESS AND BAUD RATE

The Node Address and Baud Rate are set via explicit messaging by means of any commercially-available DeviceNet configuration tool.

1. The default node address is **63,** and the default baud rate is **125K**.

2. If the node address is changed, the DeviceNet Pressure Transmitter will reinitialize prior to assuming the new node address.

3. If the baud rate is changed, it is necessary to disconnect the transmitter from the network. The transmitter will assume the new baud rate once it is reconnected to the network and it has reinitialized.

6.3 ELECTRONIC DATA SHEET FILE (EDS)

The EDS or Electronic Data Sheet file for the Dynisco DeviceNet Pressure Transducer is named PT46XDN.EDS and is available online at www.dynisco.com. The EDS file is used to automate the DeviceNet network configuration process by precisely defining vendor-specific and required device parameter information.

The EDS file describes a device's configurable parameters, including its legal and default values and the public interfaces to those parameters. Software configuration tools utilize the EDS files to configure a DeviceNet network.

6.4 Parameter Configuration

After the baud rate and node address have been established, the device parameters are ready to be configured. The following configurable parameters are available (see Section 7.4 for more information):

1. Data Units (Attribute #02 / Default is "counts")

The Pressure Value (PV) can be scaled to a variety of engineering units by configuring the Data units to digital counts, PSI, bar, kg/cm^2, MPa or % full scale.

2. Alarm and Warn Status Enable (Attribute #06 and #07 / Default is "disabled")

The respective parameters must be set (i.e. enabled) if the master will use the alarm or warning bits in the I/O message.

3. Alarm Trip Point High and Low (Attribute #13 and #14)

These values (and the Hysteresis) define under what conditions the Alarm High and Low status bits are set in the I/O message.

4. Alarm Trip Point Hysteresis (Attribute #15)

This value (and the Alarm Trip Point High and Low values) define under what conditions the Alarm High and Low status bits are set in the I/O message.

5. Warning Trip Point High and Low (Attribute #17 and #18)

These values (and the Hysteresis) define under what conditions the Warn High and Low status bits are set in the I/O message.

6. Warning Trip Point Hysteresis (Attribute #19)

This value (and the Warn Trip Point High and Low values) define under what conditions the Warn High and Low status bits are set in the I/O message.

7. Set Zero Service (for zeroing effects of temperatures and mounting position)

Execute this service to zero the PV output. Refer to Section 7.3 for more information.

7. DeviceNet Object Model

7.1 Object Model

Objects Present in the DeviceNet Pressure Transmitter

Object	Optional/Required	# of Instances
Identity (1)	Required	1 Message
Router (2)	Required	1
DeviceNet (3)	Required	1
Assembly (4)	Required	1
Connection (5)	Required	3
Parameter (15)	Required	1
Pressure (100)	Required	22

7.2 Dynisco Pressure Sensor Object

This class covers the entire Pressure Sensor and acts as an interface to the PLC.

Class ID: 100

7.3 Set Zero Service

There is one manufacturer-specific service to start “SetZero” functionality. The service acts as a “tare” function by offsetting the current pressure value by the pressure value at the time the service is invoked. This is typically used to eliminate a zero shift which may occur at elevated temperature. The service code is 100_{dec} (64_{hex}). There are no parameters associated with this service.

7.4 DeviceNet Class Attributes

The Table below shows the mapping of the DeviceNet Class Attributes.

The DeviceNet Class is always 100_{dec} (64_{hex}), and the Instance is always 01.

Attribute ID (Decimal)	Access Rule	Description	Data Type	Value
01	Get	Data Type – Constant always returns Hex C7	UINT	$C7_{hex}$
02	Get/Set	Data Unit/Engineering Units	UINT	Hex (Decimal) 4097_{dec} (1001_{hex}) = counts 4864_{dec} (1300_{hex}) = psi 4871_{dec} (1307_{hex}) = bar 2048_{dec} (0800_{hex}) = kg/cm² 2049_{dec} (0801_{hex}) = MPa 4103_{dec} (1007_{hex}) = % FS
03	Get	Device Status	BIT	0=clear; 1 =set
		ReadingValid: 1 = PV (Attr. 04) is valid, 0 = PV is invalid.		Bit 0: Reading Valid
		OverRangeFault: PV › OverRangeValue		Bit 1:OverRangeFault
		UnderRangeFault: PV ‹ UnderRangeValue		Bit 2: UnderRangeFault
		EEPROM/CPUFault: EEPROM or WatchDog Timer failure		Bit 3: EEPROM/CPU Fault
		OpenGageFault: Failure of strain gage bridge		Bit 4: OpenGaugeFault
		OverTemperatureFault: Electronics Temp. exceeds factory limit		Bit 5: OverTemperatureFault
		SetZeroStatus: 1 = Set zero in progress 0 = Set zero not in progress		Bit 6: SetZeroStatus
		Bits 0-7 are also available via Bytes #1 & #2 of the I/O message (see section 1.7.3)		Bit 7: Reserved (0)

Attribute ID (Decimal)	Access Rule	Description	Data Type	Value
04	Get	PressureValue (PV) PV is in Engineering Units as defined by Attribute # 2. PV is affected by Set Zero Service (see Section 7.3). When interpreting the PV, be sure to account for the UnityGainRef (see Attr #12).	UINT	
05	Get	Alarm/Warn Status	BYTE	0=cleared, 1=set
		TripWarnLow is set when PV <= WarnTripPointLow		Bit 0: TripWarnLow
		TripWarnHigh is set when PV >= WarnTripPointHigh		Bit 1: TripWarnHigh
		TripAlarmLow is set when PV <= AlarmTripPointLow		Bit 2: TripAlarmLow
		TripAlarmHigh is set when PV >= AlarmTripPointHigh		Bit 3: TripAlarmHigh
		Note: AlarmEnable or Warning Enable Attributes must be set to enable the Alarm/Warn status bits.		Bit 4 to 7: Reserved
06	Get/Set	AlarmEnable	BIT	0 = Disable (default) 1 = Enable
07	Get/Set	WarnEnable	BIT	0 = Disable (default) 1 = Enable
08	Get	SensorFullScaleValue	UINT	Maximum allowable value $FFFF_{hex}$
09	Get	Offset A	INT	Factory use only
10	Get	Offset B	INT	Factory use only

Attribute ID (Decimal)	Access Rule	Description	Data Type	Value
11	Get	Gain	UINT	Factory use only
12	Get	Unity Gain Reference (UGR) Decimal scale factor used to convert PV to “real world” pressure. Pressure = PV / UGR. Note that the UGR is fixed for each transducer range.	UINT	
13	Get	AlarmTripPointHigh (ATPH) If AlarmEnable is set and PV >= ATPH, TripAlarmHigh is set (see Attr 05). TripAlarmHigh is cleared once PV <= ATPH – AlarmHysteresis (see Attr 15)	UINT	Valid Range: (WTPH - Alarm Hysteresis) <= ATPH <= Overrange
14	Get/Set	AlarmTripPointLow (ATPL) If AlarmEnable is set and PV <= ATPL, TripAlarmLow is set (see Attr 05). TripAlarmLow is cleared once PV >= ATPL + AlarmHysteresis (see Attr 15).	UINT	Valid Range: Underrange <= ATPL <= (WTPL - AlarmHysteresis)
15	Get/Set	AlarmHysteresis The amount by which PV must recover to clear either TripAlarmHigh or TripAlarmLow.	UINT	Valid Range: AlarmHysteresis <= (ATPH - WTPH) or (WTPL - ATPL)
16	Get/Set	AlarmSettlingTime The time that the PV must exceed the trip point before TripAlarmHigh or TripAlarmLow is set.	UINT	Units are in milliseconds

Attribute ID (Decimal)	Access Rule	Description	Data Type	Value
17	Get/Set	WarnTripPointHigh (WTPH) If WarnEnable is set and PV >= WTPH, TripWarnHigh is set (see Attr. 05) TripWarnHigh is cleared once PV <= WTPH – WarnHysteresis (see Attr 19).	UINT	Valid Range: (WTPL + WarmHysteresis) <= WTPH <= (ATPH - AlarmHysteresis)
18	Get/Set	WarnTripPointLow (WTPL)If AlarmEnable is set and PV <= WTPL, TripWarnLow is set (see Attr. 05)TripWarnLow is cleared once PV >= WTPL + WarnHysteresis (see Attr 19).	UINT	Valid Range: (ATPL + AlarmHysteresis) <= WTPH <= WarnHysteresis
19	Get/Set	WarnHysteresis The amount by which PV must recover to clear either TripWarnHigh or TripWarnLow.	UINT	Valid Range: WarnHysteresis < = (WTPH - WTPL)
20	Get/Set	WarnSettlingTime The time that the PV must exceed the trip point before TripWarnHigh or TripWarnLow is set.	UINT	Units are in milliseconds
21	Get	OverRange If PV > OverRange, then OverRangeFault is set (see Attr. 03).	UINT	
22	Get	UnderRange If PV < UnderRange, then UnderRangeFault is set (see Attr. 03).	UINT	
25	Set	Execute Rezero When set tol, unit is rezeroed	SINT	

8. MAINTENANCE

8.1 MAINTENANCE

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

Wear protective gloves!

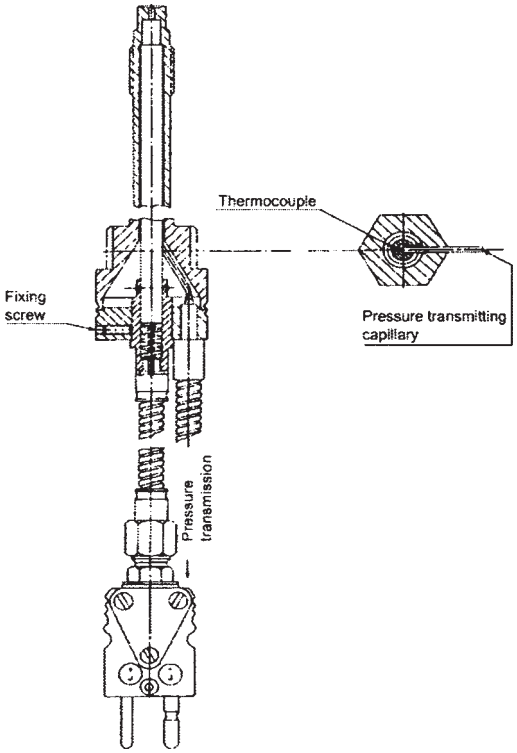
Installation and Removal Instructions

- DO NOT REMOVE PROTECTIVE CAP UNTIL READY TO INSTALL.
- PRIOR TO INITIAL INSTALLATION, VERIFY CORRECT MACHINING OF MOUNTING HOLE.
- WHEN REINSTALLING, MAKE SURE MOUNTING HOLE IS CLEAR OF DEBRIS OR HARDENED PLASTIC.
- THE MEDIUM MUST BE IN MOLTEN CONDITION DURING TRANSDUCER REMOVAL. (Removing the transducer with the medium in a solidified condition can damage the sensor diaphragm.)
- ALWAYS REMOVE THE PT BEFORE CLEANING THE MACHINE WITH ABRASIVES OR STEEL WIRE BRUSHES, ETC.
- DO NOT CLEAN THE “SCREWED-IN” SECTION OF THE PT WITH HARD OBJECTS – THIS WILL DAMAGE THE PT.
- ALWAYS USE A TORQUE WRENCH APPLIED TO THE DESIGNATED HEXAGONAL COLLAR WHEN SCREWING THE PT IN AND OUT. DO NOT APPLY THE TOOL TO THE HOUSING OR HOUSING/ SENSOR CONNECTION.
- ELECTROSTATIC DISCHARGE MAY DAMAGE THE PT – TAKE ESD PRECAUTIONS.

8.2 THERMOCOUPLE/RTD REPLACEMENT

1. To remove, loosen setscrew on side of snout.
2. Without twisting, pull the thermocouple probe or RTD stem carefully out of snout.
3. To install, align slot on probe stem with pressure capillary tube and press into snout carefully until top of probe shoulders against snout.
4. Lock in place with setscrew.

Fig. 7-1 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 PT units back to your DYNISCO representative. For DYNISCO addresses, see the back cover of the operating manual.

8.4 WARRANTY

Dynisco Pressure transmitters will provide excellent service and superior performance if proper care is taken during handling, installation, and use. 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

10. TROUBLESHOOTING

Symptom	Corrective Actions
Output Not at Zero	1) Preform Set Zero Service
Output is Negative at Zero Pressure	1) Process temperature has cooled down since last Set Zero. Wait for process to fully heat up to operating temperature. 2) Transducer has lost its fill due to diaphragm damage or rupture.
Large Zero Shift when screwing in to mounting hole	1) Check mounting hole for frozen polymer. 2) Check transdcuer tip for damage 3) Check mounting hole for concentricity by using gauge plug in transducer cleaning tool kit (p/n 200100) to check for side loading of the transducer tip. Dykem bluing should only be rubbed off at the 45° sealing surface and threads. Rework hole to proper specifications. 4) Check mounting torque is within specifications.
No response to changes in applied pressure	1) Check Port/Piping for blockage or solidified polymer 2) Check Transducer tip for diaphragm damage, rupture or missing 3) Check Flexible Capillary for visible damage like pinched, Crushed, over-extended armor on the capillary
Output not linear	1) Check for dented diaphragm 2) Check for frozen polymer on tip
Erroneous Pressure Reading	1) Check Data Units/Engineering units for correct setting 2) Was Transmitter zeroed at process operating temperature with no pressure applied 3) Check mounting hole for proper depth dimension. Transmitter tip may be recessed too far from polymer flow and pressure sensing may be deadened from polymer buildup in from of tip 4) Check mounting hole for concentricity by using Gauge Plug in transducer cleaning tool kit (P/N 200100) to check for side loading of transducer tip. Dykem bluing should only be rubbed off at the 45° sealing surface and threads 5) Remove and check Transmitter tip for damage. Tip face should be free of dents or tears in the diaphragm material. It should be completely flat and free of frozen polymer

6) Always insure that mounting hole is clear of frozen polymer or any other obstruction before mounting the transmitter
7) Check Flexible Capillary for any visible damage like pinched, crushed, over-extended armor on the capillary

No Communications

1) Check wiring, particularly continuity and polarity of the CAN-H and CAN-L connections to the Scanner. If these are reversed it will not communicate
2)Make sure 24 volts is present on V+ and V+ and that the power supply for the bus is of sufficient ampere rating for the amount of devices on the network
3) Using a DeviceNet configuration tool, check to see if all devices on the network are set to the same baud rate including the Scanner card
4) Using a DeviceNet configuration tool, check to see if there are any duplicate Node Addresses (MAC-ID) on the network, if so assign a new address to one of the conflicting devices
5) Ensure that the network is configured correctly and the Scanlist has downloaded correctly to the DeviceNet Scanner
6) Verify that the EDS file in use is correct and or the latest version (Available on the Dynisco website www.dynisco.com)
7) Verify that the maximum line length for the baud rate selected is not exceeded (See chart below)

Baud Rate	**125K**	**250K**	**500K**
Thick Trunk	500m (1640 ft)	250m (820 ft)	100m (328 ft)
Thin Trunk	100m (328 ft)	100m (328 ft)	100m (328 ft)
Max Drop	6m (20 ft)	6m (20 ft)	6m (20 ft)
Cumulative Drop	156m (512 ft)	78m (256 ft)	39m (128 ft)

8) Ensure that both ends of the DeviceNet network trunk line are correctly terminated with 121 ohm resistors.
9) Ensure that no drop line devices on a trunk network have termination fitted
10) Replace faulty Transmitter with one of a like model and see if problem still exists, if so the problem resides in the network

11. CE Declaration of Conformity

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Dynisco

INNOVATING FOR EFFICIENCY

HERSTELLERERKLÄRUNG
DECLARATION OF MANUFACTURER

im Sinne der EG – Richtlinie Druckgeräte 97/23/EG
conforming to Pressure Equipment Directive (PED) 97/23/EC

Die Drucksensoren der Typenreihen
The pressure transducer series

IDA, MDA, MDT, PT, DYNA4, TDA, TDT TPT, EMT, EIT
LDA, EPR, MRT, X1/2xxx, 8xx, S/E242/243, IPX, SPX

sind entwickelt, konstruiert und gefertigt in Übereinstimmung mit den Vorgaben der EG-Richtlinie 97/23/EG in alleiniger Verantwortung der
are designed and produced in accordance with the requirements of PED 97/23/EC under the sole responsibility of

Firma Dynisco Europe GmbH,
Wannenäckerstr. 24
D-74028 Heilbronn

Die oben angeführten Drucksensoren-Serien mit Druckbereich bis 1000 bar sind nach geltender guter Ingenieurpraxis (GIP) ausgelegt und werden in Übereinstimmung mit derselben hergestellt.
Above mentioned pressure transducers with a range up to 1000 bar/14.505 PSI are designed and produced in accordance with Sound Engineering Practice (SEP).

Das darauf angebrachte CE-Zeichen bestätigt lediglich die Übereinstimmung mit der Richtlinie 89/336/EG, Elektromagnetische Verträglichkeit.
The CE-mark on the transducer declares only the conformity with EC-Directive 89/336/EC, Electromagnetic Compatibility.

Heilbronn, den 29.05.2002

Lorenz Kirberich
Marketing- und Sales Manager

Hans Mayer
Quality Control Manager

12. ODVA Declaration of Conformity

Declaration of Conformity

DeviceNet

ODVA has found the product(s) as described below to be in compliance with the DeviceNet™ Specification, having passed ODVA's conformance testing at one of its authorized conformance test service providers at the Composite Test Level specified. Product(s) that have been issued an official Declaration of Conformity from ODVA have the right to display the ODVA certification marks for DeviceNet conformant products. If a product family approval has been granted in accordance with the ODVA Conformance Policy, tested family members are listed on the first page of this Declaration of Conformity with qualifying untested products listed on the attachment.

The vendor referenced below has signed ODVA's DeviceNet Terms of Usage Agreement (see attached). Therefore agreeing that it is the vendor's ultimate responsibility to assure that its DeviceNet products conform to the Specification, and that the Specifications are provided by ODVA to the vendor on an AS IS basis without warranty. NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE BEING PROVIDED BY ODVA.

Test Date: 07 May 2004 **Composite Test Revision:** 18
Test Suite: M002

ODVA File Number: 10138
Vendor ID: 852
Vendor Name: Dynisco Instruments LLC
Vendor Address: 38 Forge Parkway
Franklin, MA 02038 USA

Product Name(s) (Device actually tested)	Dynisco PTXXXDN (Sample E370) Dynisco PTXXXDN (Sample E371)
Product Code(s)	1 1
Product Revision	4.001
Device Type Code	0
Device Profile Name	Generic Device
Electronic Data Sheet Revision	4.1
Comments:	Passed DeviceNet Composite Test Revision 18

Approved by:

William B. Henry

Katherine Voss

DeviceNet™ is a trademark of Open DeviceNet Vendor Association, Inc.

PUB 00014R0f

Page 1 of 3

Declaration of Conformity

DeviceNet

Product Family List for Dynisco PTXXXDN Family: ODVA File Number 10138

Model	Description
PT420DN	High Accuracy, Rigid Stem DeviceNet Melt Pressure Transmitter
PT422DN	High Accuracy, Flexible Stem DeviceNet Melt Pressure Transmitter
PT460DN *	Standard Duty, Rigid Stem DeviceNet Melt Pressure Transmitter
PT462DN	Standard Duty Flexible Stem DeviceNet Melt Pressure Transmitter
PT432DN	High Accuracy DeviceNet Melt Pressure Transmitter with Thermocouple
PT463DN	Standard Duty DeviceNet Melt Pressure Transmitter with Thermocouple
PT140DN	Hydraulic DeviceNet Pressure Transmitter - 1/8-27 NPT
PT270DN *	Industrial DeviceNet Pressure Transmitter - 1/4-18 NPT

* Indicates samples submitted to ODVA for conformance testing.

13. Appendix 1 - Terms and Definitions

Address – A unique ID assigned to each device on the Network.

Alarm – A software trigger point to where a bit is set to 1 to indicate a pressure level has been reached.

Attribute – A subset of the instance that holds the particular information and status for each Instance.

Class – Defined Objects including Identity, Message Router, DeviceNet, Assembly, Connection, and Acknowledge Handler Objects.

Configuration Tool – Device or Software used in commissioning of the Slave Device to change the MAC-ID and Baud rate.

DeviceNet – A low cost Open Network designed to connect a multitude of industrial sensors to eliminate extensive Hardwiring.

Diaphragm – The actual sensing area of the device in contact with the process.

Drop – The thin Transmission media that connects the device to the Trunk.

EDS – Electronic Data Sheet

Hysteresis – A threshold band to where no change takes place to the alarm

Instance – A subset of the Object class that holds certain parameters.

MAC-ID – Also referred to as Address.

Master – The consuming device on the network that all slaves transmit data to.

Node – A device on the network that is connected to any point in the trunk and is in communication with the master.

Object – A function or program in the device that can be internal to the device or visible to the DeviceNet network and can include Identity, Message Router, Connection and DeviceNet network Management.

Polling I/O – A function to where the slave device transmits data only when requested by a Master.

Scanlist – A database or map stored in the DeviceNet master containing all information used to communicate with all slaves on the network.

Scanner – A Host or Master device that requests and sends information to any node on the network. This device holds a table of all devices on the network.

Slave – The producing device on the network that sends its information to the Master.

Snout – The threaded section of the Transducer that mounts to the process.

Strain Gauge – A device whose electrical resistance varies in proportion to the amount of strain or mechanical surface movement applied to the device.

Trunk – The Thick transmission media used to carry network traffic over long distances.

14. Appendix 2 - Revision History

Revision A (3/22/04) – Initial Release
Revision B (4/4/05) - Added Calibration Coefficients
Revision C (5/11/05) - Changed Parameter to Allow for Lower Ranges
Revision D (6/1/05) - Added Rezero Parameter

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