Non-Clogging Pressure Transmitter

Differential Pressure Model DP-20T
Static Pressure Model SP-20T

(Ceramic Element)

INSTALLATION & OPERATING MANUAL

Auburn FilterSense
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Technical Support & Return Procedure

Auburn FilterSense provides industry leading technical support for all product lines. The technical support department is staffed with a team of engineering professionals.

Areas of assistance provided by the Technical Support department include:

- Pre-Installation Site Analysis
- Product Installation
- General Operation
- Application Specific
- Routine Calibration
- EPA Compliance
- Performance Upgrades and Add-On Features

To ensure the best and most efficient technical support please be prepared with the following information prior to contacting FilterSense. If it is determined that the component must be returned for evaluation/repair, a Return Material Authorization number will be issued. You must include the RMA number on the packing slip and mark the outside of the shipping container.

- Company Name _____
- Product Model Number _____
- Product Serial Number _____
- Date of Installation _____
- Reason for Return _____

FilterSense Technical Support may be reached by:

Phone: (978) 927-4304

Fax: (978) 927-4329

E-Mail: **info@Auburnfiltersense.com**

Hours of Operation: 8AM – 5PM Eastern Standard Time

- Any control unit or particulate sensor that was exposed to hazardous materials in a process must be properly cleaned in accordance with OSHA standards and a Material Safety Data Sheet (MSDS) completed before it is returned to the factory.
- All shipments returned to the factory must be sent by prepaid transportation.
- All shipments will be returned F.O.B. factory.
- Returns will not be accepted without a Return Material Authorization number.

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2 Notifications

2.1 Disclaimer

This document contains important information necessary for proper operation of the product. It is strongly urged that all users of the product read this manual in its entirety. All instructions should be followed properly and any questions that arise should be discussed with Auburn FilterSense (A Nederman Company).

Any use or distribution of this document without the express consent of Auburn FilterSense (A Nederman Company) is strictly prohibited. Any reproduction is prohibited without written permission.

In no event will Auburn FilterSense (A Nederman Company) be liable for any mistake, including lost profits, lost savings, environmental compliance costs or other incidental or consequential damages or injury arising out of the use or inability to use this manual, even if advised of the possibility of such damages, or any claim by any other party. Terms and conditions supplied with each order contain additional liability limitations related to this product.

2.2 Symbols and Conventions

WARNING 	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Warning statements help you to: • Identify a hazard. • Avoid a hazard. • Recognize the consequences.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.
	Identifies information, sections or statements in this manual that apply to approved hazardous area systems, regulations, or installation.

2.3 Safety

WARNING

DEVICE SUITABILITY

Area Classification

Before installing any device confirm area classification requirements. Do not install any device that is not tagged as suitable for the required area classification.

Environment

Before installing any device, confirm ambient temperature, process temperature and process pressure requirements. Do not install any device that is not tagged as suitable for the required temperatures and pressures.

WARNING

NOT A SAFETY RATED DEVICE

This model must not be used independently for safety or as a critical input signal to a safety system. This model is designed for general process control, diagnostics, and environmental monitoring. Safety must be addressed with detailed engineering, redundancy, and safety certified components where applicable. Consult factory for critical safety applications.

WARNING

GROUNDING

Before turning on the instrument, you must connect the protective earth wire of the instrument to a proper earth ground. Grounding to the neutral conductor of a single-phase circuit is not sufficient protection.

2.4 Installation Personnel

WARNING

INSTALLATION PERSONNEL

Only appropriately licensed professionals should install this product.

Always disconnect power before servicing.

2.5 Approvals and Certifications

Factory Mutual Hazardous Location Approval

Labeled products are certified to Factory Mutual and CSA Standard for use in hazardous locations.

APPROVED for use in

- Class I, II & III Division 1, All Groups
- Refer to equipment labeling for T-code ratings.

2.6 North American Hazardous Areas

Equipment that is marked "CLI, II, III DIV 1, GP A, B, C, D, E, F, G" is suitable for use in Class I, II, III Division 1, Division 2, Groups A, B, C, D, E, F, G, or non-hazardous areas only. Temperature codes listed on each component must be followed. The following WARNING statement applies to use in hazardous areas.

EXPLOSION HAZARD

Substitution of components may impair intrinsic safety.

Do not replace components or disconnect equipment unless power has been removed and the area is known to be nonhazardous.

Use of this product in a hazardous area requires an intrinsic safety barrier. Refer to the Hazardous Area Control Drawing for further requirements.

A dust tight seal must be used at the conduit entry when the transmitter is used in a Class II location.

Resistance between intrinsically safe ground and earth ground must be less than 1 ohm.

Installation must be in accordance with ANSI/NFPA-70 and ANSI/ISA RP12.06.01.

3 Introduction

General

The model DP 20T / SP 20T pressure transmitters are non-clogging diaphragm sensors designed for use in particulate laden applications. The flush/ported design enables configuration for either differential (DP 20T) or static (SP 20T) measurement. The ability to transmit accurate measurements below 10”WC (2.49kPa), over a broad temperature range, makes them the ideal replacement for mechanical gauges and electronics transmitters with a tubing connection to a particulate laden process.

For differential measurements, the flush diaphragm is mounted to the dirty or wet side of the process, such as the inlet of a dust collector, wet scrubber, or mist eliminator. The port is used to route tubing to the cleaner side of the process such as the clean side of a dust collector or mist eliminator.

Principle of Operation

The DP 20T / SP 20T use a rugged sensing element packaged in a heavy duty stainless steel body. Changes in process pressure or vacuum applied to the diaphragm cause deflection in the sensing element. A linear 4-20mA signal proportional to the pressure or vacuum is produced as an output.

4 Installation

Installation of all components should be performed by properly licensed professionals.

Orientation

Ideally the transmitter should be mounted so that the diaphragm is vertical (body of the transmitter is horizontal). This is ideal due to the very low pressures being measured by the device. Gravity may cause slight errors in pressure readings if the transmitter is mounted with the diaphragm horizontally. For very high particulate laden applications, the transmitter can be supplied and calibrated with a 45 degree mount for angled installation on a vertical surface such as the side of a baghouse or dust collector.

Mechanical

The transmitter is mounted to the process with a 2” tri-clamp fitting. A matching 2” ferrule is welded or bolted to the dirty side of the process at the desired sensing point. The transmitter is then clamped to the mount with a clamp and gasket.

For DP 20T models, tubing runs to the clean side port of the dust collector and should make a loop at least 1 foot below the level of the transmitter to form a condensation “trap”. This “trap” will prevent condensation in the clean side tube from entering the transmitter body. The transmitter is rated for operation in humid applications; however standing water inside the transmitter body can freeze at low temperatures, possibly damaging the sensing element. Optionally, a small drain valve may be installed in this loop for easy condensation removal.

Clean side differential process connections are made by installing a ¼” od male tube fitting to the clean side of the process. Rigid tubing is then run between the tube fitting and the transmitter port. For processes with high moisture, it is recommended to install clean side tubing at an upward angle directly out of the clean side process

connection. This will allow humidity in the process to condense within the upward run of the clean side tubing and drain directly back down into the process.

The maximum allowable temperature at the sensing diaphragm is 250F. For process temperatures that exceed 250F a thermal isolation mount should be used. Refer to Auburn Filtersense sales department for ordering information.

Electrical

HAZARDOUS AREA WIRING

Hazardous area control drawing must be followed in hazardous area applications.

All electrical connections should be performed by an appropriately licensed electrician. Wiring connections are supplied as flying leads. The point at which the cable enters the transmitter body is a watertight seal. Cable details are listed below.

Wire	Function
Red	Positive 15-32Vdc
Black	4-20mA output
Green	Earth Ground
Shield Drain	Earth Ground
Vent Tube	Ambient pressure reference tube for static gauge pressure sensors. Does not apply for differential sensors.

Static pressure sensors measure gauge pressure. The ambient pressure reference is obtained through a small capillary tube integrated into the electrical cable. It is important to keep this tube unobstructed and prevent water or debris from clogging the tube. For best reliability locate electrical connection junction boxes below the level of the connected transmitter to prevent moisture from entering the capillary tube. Cables should enter the junction box from the top or sides. Differential pressure sensors may contain a capillary tube in the cable however it is not connected to the transmitter internally and is not used.

5 Setup

Zero check

After applying power to the transmitter, check the transmitter output with no pressure applied. Stop the process flow or disconnect the diaphragm and reference port from the process to ensure no pressure is applied across the sensing element. The transmitter should read 4.00mA with zero pressure applied. A zero adjustment potentiometer is located inside the body, see the calibration procedure in this manual for further detail. When adjusting the zero, ensure that the diaphragm is being held steady in the same orientation as when mounted.

Operation

The transmitter's output is linear and proportional to the pressure applied across the sensing element.

DP 20T Polarity

Standard polarity for model DP 20T is for positive pressure at the diaphragm and negative pressure at the reference port (differential models). In typical negative pressure fabric filter or baghouse applications (blower downstream of filter) the diaphragm side (positive) is connected to the upstream side (dirty) of the filter and the reference port is connected to the downstream side (clean) of the filter.

Reverse polarity model DP 20T-R is for negative pressure at the diaphragm and positive pressure at the reference port (differential models). This configuration is typically used for static vacuum measurements where the reference port is vented to atmosphere.

SP 20T Polarity

Standard polarity model SP 20T is for positive pressure at the diaphragm.

Reverse polarity model SP 20T-R is for negative pressure at the diaphragm.

Output Range

The standard output range is 0 to 10"WC (0 to 2.49kPa) corresponding to 4.0 to 20.0mA. The sensor measures gauge pressure, not absolute. Custom output ranges (0 to 20"WC, -10 to +10"wc, etc..), and units of measure are available, consult factory for pricing and lead times.

6 Maintenance

Periodic Maintenance

Periodic maintenance consists of simply keeping the sensing element free of large particulate buildups.

Check the diaphragm to ensure no clumps of particulate are adhering to the diaphragm. The diaphragm may be cleaned with alcohol or other mild solvents which do not attack ceramic surfaces. **Apply the slightest pressure possible when cleaning the diaphragm**. Excessive pressure may cause a zero shift or damage the diaphragm itself. For differential transmitter, check the clean side reference port tubing to ensure it has not become plugged with particulate and is free of condensate.

Periodic Calibration

The transmitter's calibration (both zero and span) should be verified approximately every six months. With proper pressure reference equipment this can be easily performed by the end user. Transmitters may be returned to the factory for routine calibration as well.

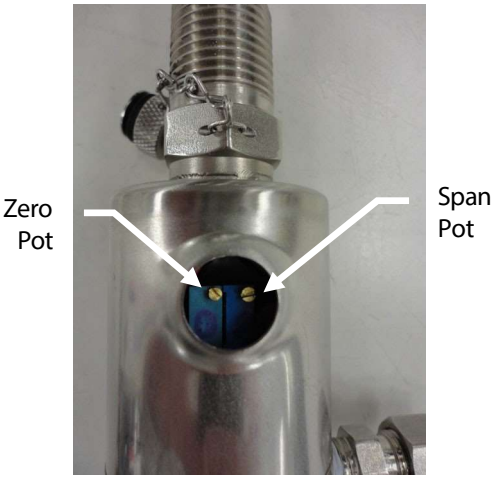
Calibration Procedure

- Loosen and remove the zero/span access port cover with an allen wrench, do not turn the main barrel.
- Apply zero pressure reference to the transmitter and adjust the Zero potentiometer to achieve 4.00mA output.

- Apply full scale pressure reference to the transmitter and adjust the Span potentiometer to achieve 20.00mA output.
- Re-check with zero and full scale pressure inputs and make any required fine tuning adjustment, always adjusting the zero first, followed by the span.
- Re-install and tighten the zero/span access port cover, making sure it is fully closed and the button head allen screw is fully tightened.

Zero/Span Access Port Cover

Zero/Span Potentiometer Location



7 Troubleshooting

The most important aspects of troubleshooting are to keep in mind the transmitter is measuring small pressures. Verifying or comparing differential pressure readings should be performed with instruments of equal or superior accuracy and range.

Does not output 4.0mA with no pressure across transmitter.

Transmitter zero needs adjustment or transmitter not being held steady with the diaphragm vertical. See section 4 for transmitter zero check details.

Outputs less than 4.0mA with pressure across transmitter, or readings appear inverted.

Transmitter is wired wrong, or with differential transmitter the reference pressure port is disconnected. Verify wiring and that the transmitter is operating with the proper pressures on the diaphragm and on the reference port.

No output from transmitter

Transmitter requires 15 – 32Vdc loop power. Verify that loop power is being supplied properly by external equipment.

8 Specifications

Parameter	Detail	Specification	Note
Input Voltage	Loop Powered	15-32Vdc	
Measurement Units		"wc (Inches water column)	kPa or other optional
Measurement Ranges	Standard	0-10"wc (0-2.5kPa) 0-20"wc (0-5kPa) 0-30"wc (0-7.5kPa) 0-40"wc (0-10kPa) -10 to +10"wc (-2.5 to +2.5kPa) -20 to +20"wc (-5 to +5 kPa)	Differential or Static (gauge) Other ranges optional
Span Adjustment		+/- 10% of range	
Accuracy		+/- 0.5% of range +/- 1.5% of range +/- 3% of range	Diaphragm temp 75F Diaphragm temp < 200F Diaphragm temp < 280F
Process Temperature	Standard Optional	-13F to 250F (-25C to121C) -13F to 450F (-25C to 232C)	Temperature over 250F is achieved through thermal isolation mount
Ambient Temperature		-13F to 175F (-25C to 80C)	
Max. Loop Impedance		250Ω	
Safe Overpressure		10x range	
Enclosure	Material	316 Stainless Steel	
Diaphragm	Material	Ceramic	

9 Ordering Information

Item	Order Number
DP 20T Differential Pressure Transmitter	DP20T
SP 20T Static Pressure Transmitter	SP20T
Range, Differential or Static (gauge) Pressure Standard polarity is positive pressure at the diaphragm	
0-10”wc (0-2.5kPa) 0-20”wc (0-5kPa) 0-30”wc (0-7.5kPa) 0-40”wc (0-10kPa) -10 to +10”wc (-2.5 to +2.5kPa) differential only -20 to +20”wc (-5 to +5 kPa) differential only	-10 -20 -30 -40 -10B -20B
FM/CSA hazardous area approval Intrinsically safe, Class I, II, III, Division 1, 2, All groups	-CSA
Reverse polarity – negative pressure at the diaphragm	-R
Mount	
2” Quick Clamp, 45 degree weld, 6” length, 250F max. process temperature (standard)	-MA
2” Quick Clamp, 45 degree weld, 24” length, 450F max. process temperature	-MAH
2” Quick Clamp, 45 degree no weld mount plate, 6” length, 250F max. process temperature	-MAB
2” Quick Clamp, 45 degree no weld mount plate, 24” length, 450F max. process temperature	-MABH

Accessories	Order Number
Quick clamp gasket, Viton, 250F, 2”, package of 5	QCG-2VSK
Quick clamp gasket, Teflon, 450F, 2”, package of 5	QCG-2TSK
Quick clamp, 2”, 316 stainless steel	QC-2SK

10 Installation Drawing