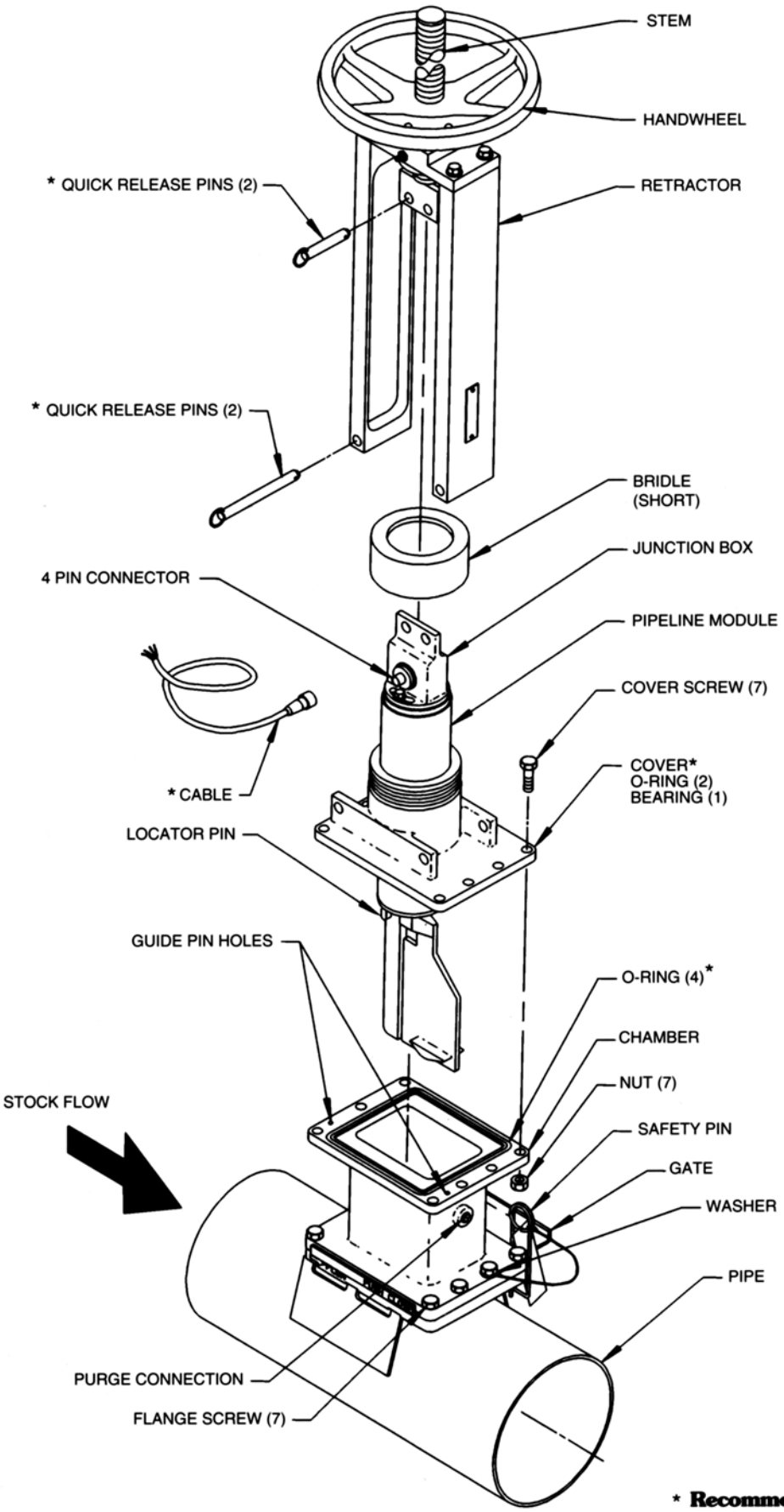
BULLETIN 90.00-2
MARCH 2009

DeZURIK

CONSISTENCY TRANSMITTERS TECHNICAL SPECIFICATIONS

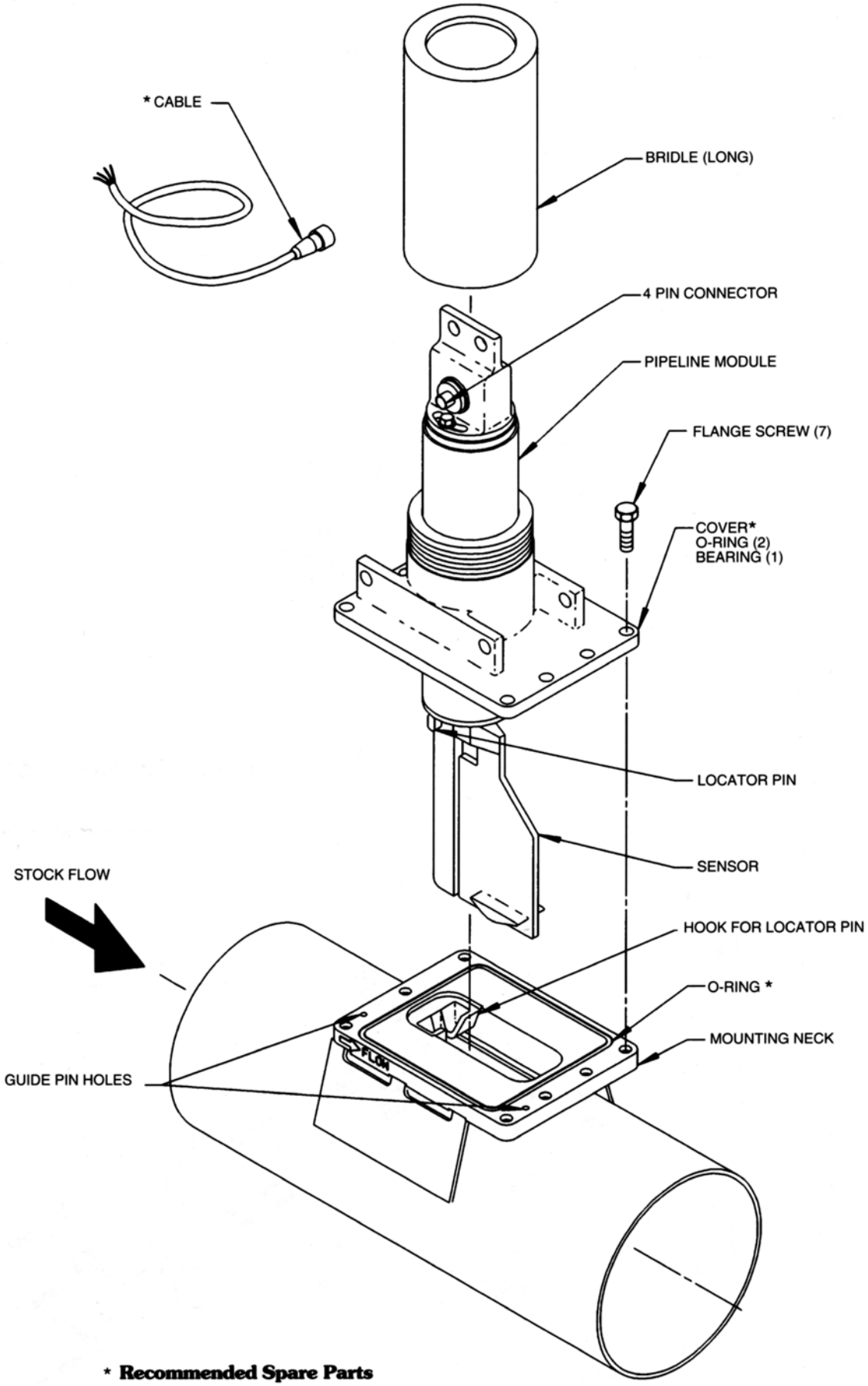
AccuTrax™
Electronic Blade Consistency Transmitter

Retractable Model RHC & RS2



*** Recommended Spare Parts**

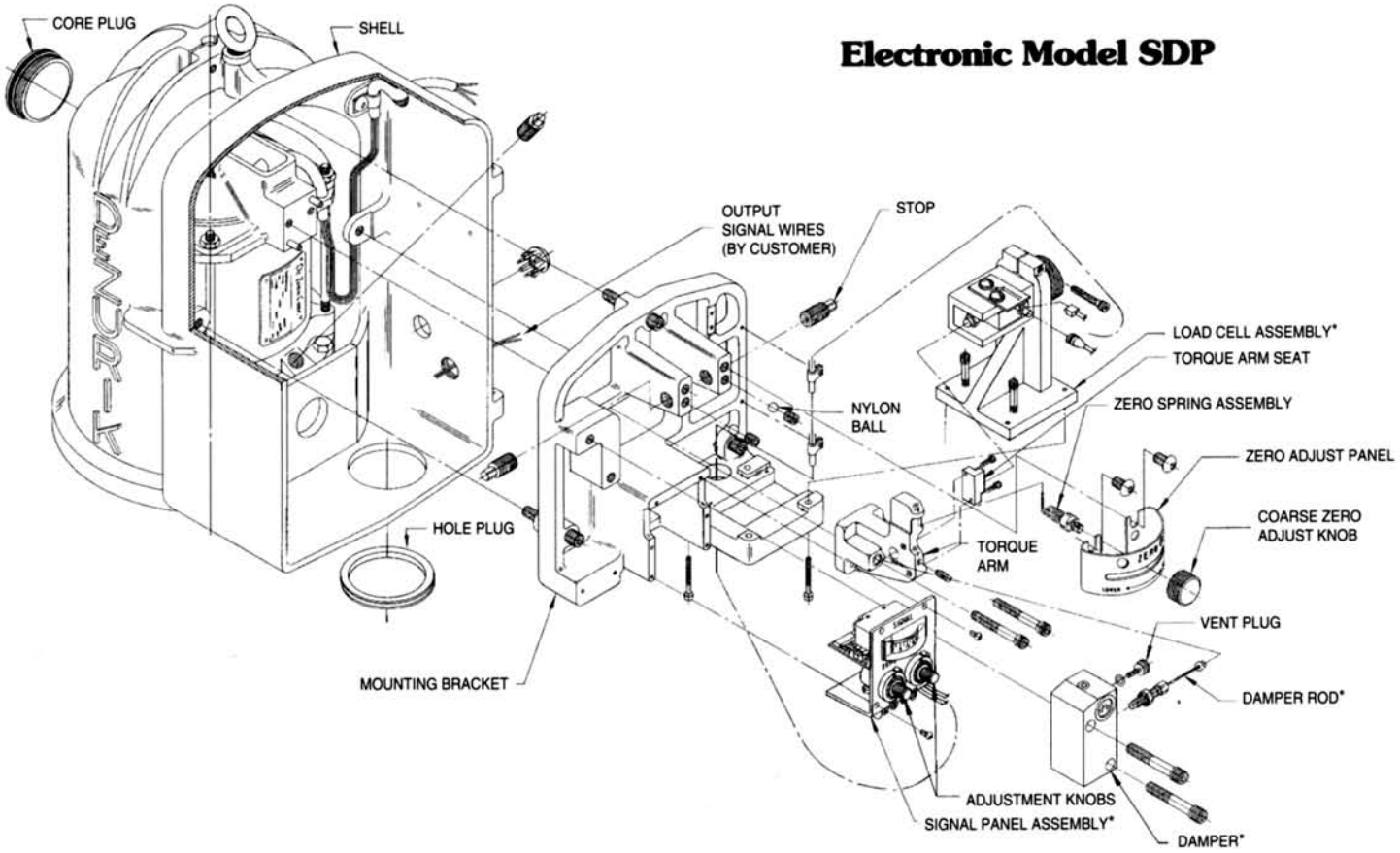
Non-Retractable Model NHC & NS2



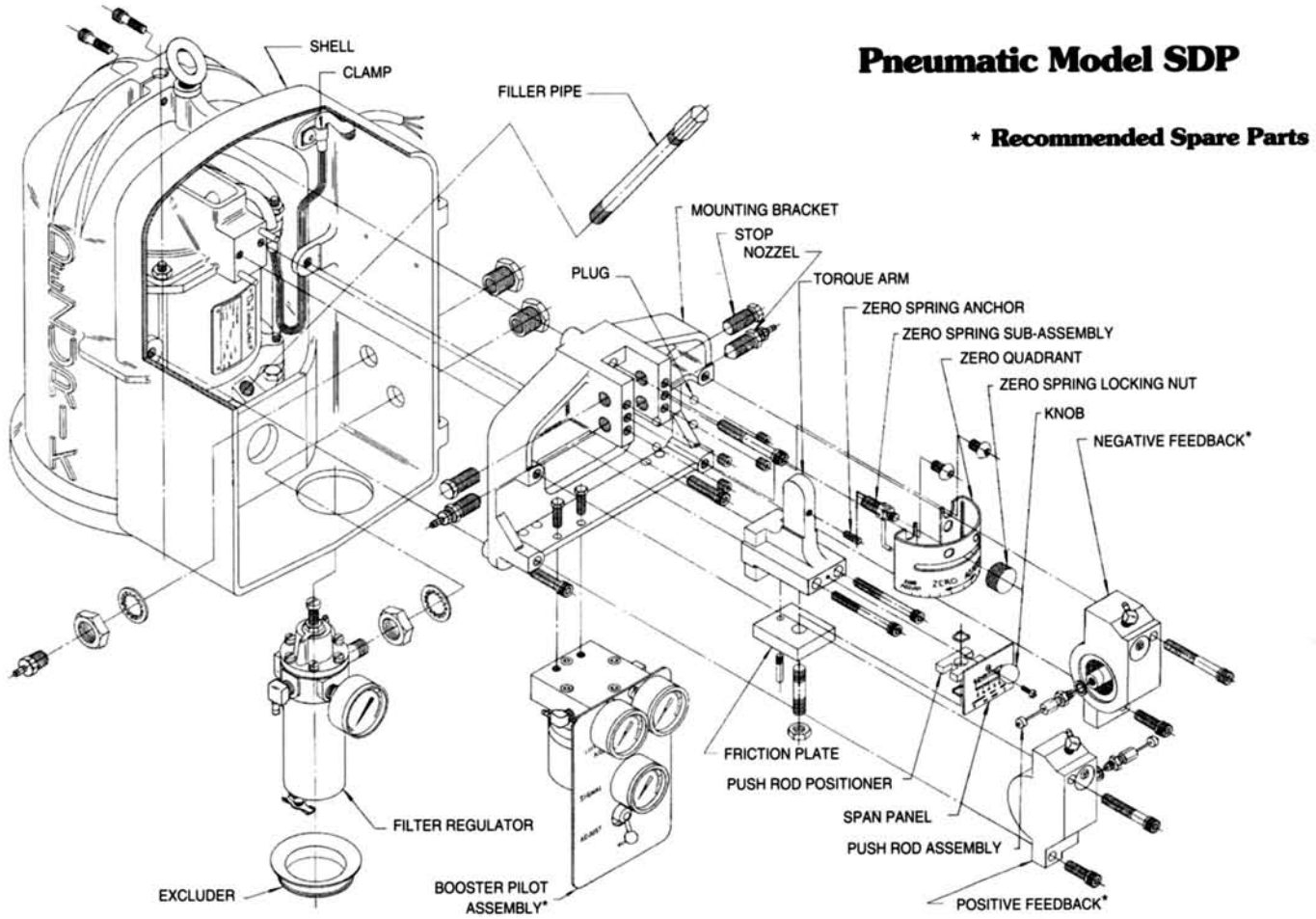
*** Recommended Spare Parts**

Rotating Consistency Transmitter

Electronic Model SDP

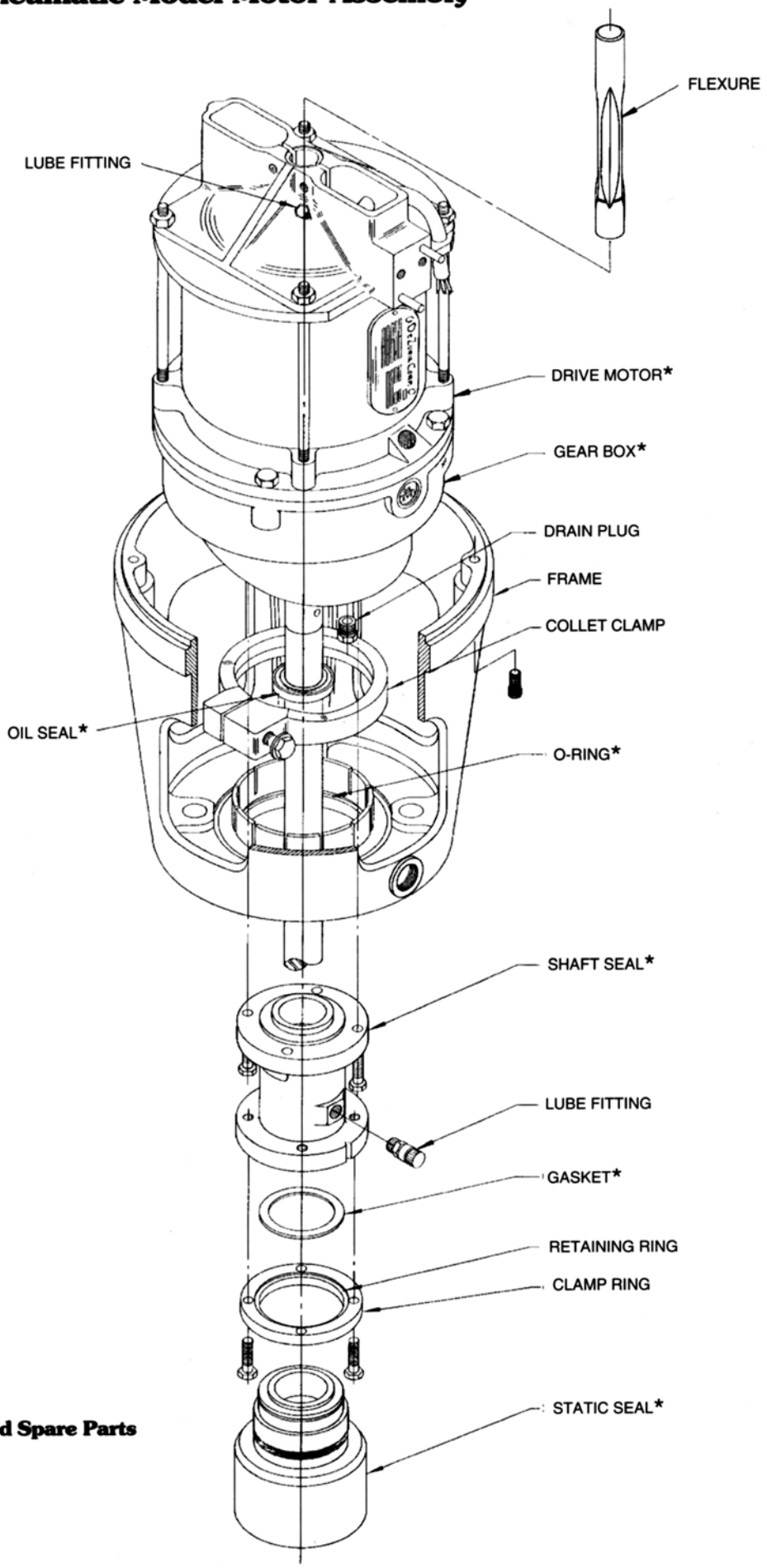


Pneumatic Model SDP



*** Recommended Spare Parts**

Electronic & Pneumatic Model Motor Assembly

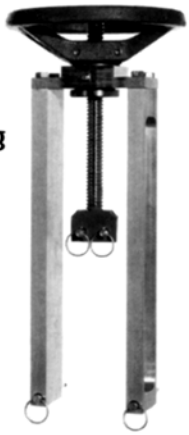


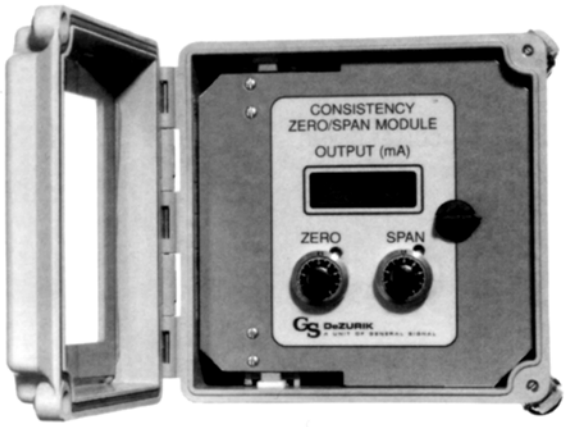
*** Recommended Spare Parts**

Accessories

Electronic Blade Transmitter Retractor Module

An optional feature of the AccuTrax Consistency Transmitter is the ability to retract the unit without shutting down the process. The retractor module is a multiple turn jackscrew that is attached to the mounting module. It can be removed and stored when not needed. One retractor module can serve many installations.





Zero/Span Module

A zero/span module is recommended for applications where the transmitter is typically applied for setpoint control. The zero/span module is a loop powered amplifier that includes a zero offset, span and damping controls. A digital meter displays the 4-20 mA output signal. The zero/span module is located at a remote site away from the pipeline module.

Ranging Module

The ranging module provides an enhanced capability over the zero/span module. It operates from 115/230 VAC and includes separate displays for consistency and signal loop current. The ranging module also controls:

- Linearizing output signal with consistency changes
- Calibrating the transmitter to the specific furnish
- Setting the 4-20 mA output signal to the desired consistency range
- Signal damping

The DeZURIK ranging module is recommended for applications where accuracy over a wide range of consistency is required. Processes that frequently change setpoint are one example. Another example is an AccuTrax transmitter placed along with a flow meter in the stock transfer line to aid in totalizing mill production.

Calibration Kit

A dead weight calibration kit is available with AccuTrax Consistency Transmitters. It allows faster and more accurate calibration than on-line. It also can be used when repair or replacement of epuipment is required.

To order with weights, specify ACC*CALW.
To order without weight, specify ACC*CAL.
Order Example: ACC*CAL.

Rotating Transmitter Power Supply

The DeZURIK PSL power supply supplies power to DeZURIK Electronic Consistency Transmitters.

This power supply converts 115 or 230 volt, 50 or 60 Hz power to 24 VDC. Convenient terminals simplify installation and wiring procedures for either new or existing systems.

Order separate item by ACC*PSL.
Order Example: ACC*PSL

Calibration Kit

DeZURIK also provides a calibration kit. The kit is used to determine values for a fixed zero and span adjustment. It can also be used to precalibrate a transmitter to replace an existing unit.

Order as separate item by ACC*CLB.
Order Example: ACC*CLB

Accessories

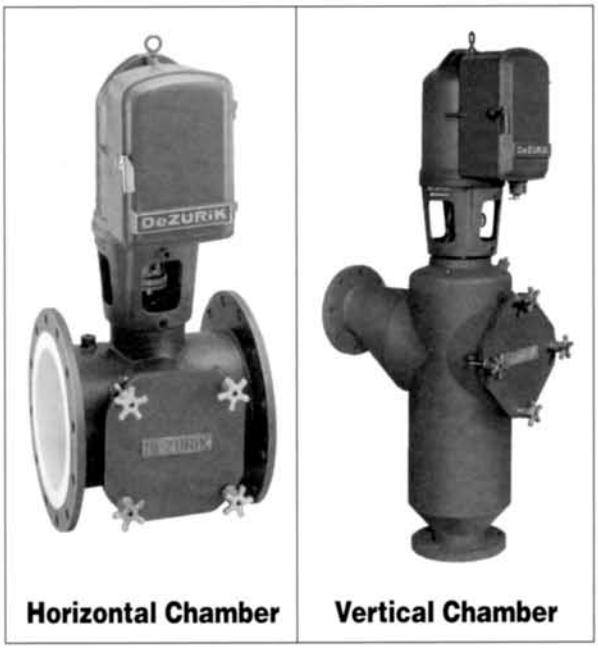
Chamber Styles

DeZURIK offers a variety of pipe chamber sizes and styles for various installation requirements. All chambers are designed to withstand 125 psi non-shock working pressures and are available in type 304, 316, or 317L stainless steel. Flanges are carbon steel with raised face stainless steel gasket surface and are drilled to all popular flange standards.

A convenient access door with quick-opening hand clamps is furnished as standard on all chambers to allow transmitter assembly and convenient clean out. As an added convenience, a 1/4" NPT pressure gauge tap is also provided on every chamber.

Horizontal Chamber

This chamber style is designed for use in horizontal pipelines. Chamber sizes range from 12"-36" (300-900 mm) in diameter. For pipelines smaller than 12" (300mm), reduced inlets and outlets are available. Eccentric pipe reducers are provided as required on all sizes for one or both ends of the chamber. Contact DeZURIK for chamber sizing and system design recommendations.



Horizontal Chamber | Vertical Chamber

Open & Pan Chambers

DeZURIK also offers open and pan type chambers. Contact DeZURIK for pricing and installation recommendations. Refer to Data Sheet 90.01-1 for additional details.

Vertical Chambers

This chamber is designed for use in vertical pipelines with a bottom inlet and side discharge. Chamber sizes range from 12"-36" (300-900mm) in diameter. For pipelines smaller than 12" (300mm), reduced inlets and outlets are available. Any size combination of inlet and outlet reducers may be ordered. Inlet reducers are concentric. Outlet reducers are eccentric. Contact DeZURIK for chamber sizing and system design recommendations.

Optional Mounting Hardware

DeZURIK also offers an optional mounting kit for horizontal pneumatic or electronic transmitters which adapts the transmitter powerhead to an existing pipeline. Use of the existing pipeline reduces both equipment and installation costs. In larger pipeline sizes, this option provides a substantial cost savings.

The mounting kit includes a mounting neck to be welded into the existing pipeline, a welding guide to be bolted to the neck and the door assembly which is to be mounted in the pipeline. Material for all parts is 316 stainless steel. Complete instructions for cutting the holes are included with the kit.

Mounting kits are available for 12"- 30" pipelines. Order as a separate item.

Pipeline Size Inches	Order Code
12	ACC*MKS2-12
14	ACC*MKS2-14
16	ACC*MKS2-16
18	ACC*MKS2-18
20	ACC*MKS2-20
24	ACC*MKS2-24
30	ACC*MKS2-30

Ordering Example: ACC*MKS2-12

General Specifications

Electronic Blade Transmitter Electrical/Mechanical

Output: 4-20 mA, 2 wire system

Voltage: 24 VDC

Consistency Range: 1.5% to 16%

Sensitivity: Senses Consistency changes as small as ± 0.0075%

Span Adjustment: 5 to 1 - Zero/span and ranging modules

Repeatability: ± 0.1% of output span

Velocity: 1.5 - 15 feet (.5 - 5 meters) per second

Dead Band: < 0.2% of output span

Vibration Effect: < 0.1% of output span for 0-30 Hz and 0-3 g's acceleration

Time Constant: 1 second

Temperature Effect on Pipeline Module: < 0.05% of output span per 10°F (6°C)

Pressure Effect: < 0.5% of full output span per 25 psi (2 bar)

Flow Effect: Flow compensated up to 15 feet (5 meters) per second

Ambient Temperature: 15 to 180°F (-10 to 80°C)

Process Temperature: 32 to 212°F (0 to 100°C)

Pressure Rating: 200 psi (14 bar)

Electrical Wiring: 18 AWG shielded

Remote Length: 1000 feet (305 meters) to controller or ranging module.
300 feet (90 meters) to zero/span module

Minimum Pipe Diameter: 6 inch (150mm)

Materials

Mounting Module: Hastelloy C or 316 stainless steel

Blade: Titanium on 1.5 - 6% consistency
Duplex stainless steel above 6% consistency

Rotating Transmitter Electrical/Mechanical

Transmitter Powerhead Size: Vertical 12 - 30" (305 - 760 mm)

Chamber Size: 12 - 36" (305 - 910 mm)

End Style: ANSI Flanged (standard); DIN 10 or BS4504/10 Drilling; DIN 16 or BS4504/16 Drilling; B.S. Table D Drilling; B.S. Table E Drilling

Output Signal: Pneumatic 3-15 psi (0.2 - 1.0 bar); Electronic 4-20 mA (standard)

Consistency Range: 0.75% - 10.0%.
Above 6.0% contact factory for recommendations

Sensitivity: At 1% consistency, sense changes as small as ± 0.01%
At 2.5% consistency, sense changes as small as ± 0.003%
At 4% consistency, sense changes as small as ± 0.002%

Chamber Pressure Rating: Maximum 125 psi (9 bar) non-shock working pressure

Air Supply: 25 psi at 1.5 SCFM minimum.
2 bar at 2.5m³/hour minimum

Electrical Supply: 1/2 HP motor for use with power supply as follows:

Voltages	Cycles	Phase
200	50/60	3
230/460	50/60	3
380	50/60	3
400	50/60	3
415	50/60	3
575	40/50/60	3

(Other electrical supply options available on application)

Materials

Shaft, Transmitter: Type 316 or 317L Stainless Steel

Chamber: Type 304, 316 or 317L Stainless Steel

Motor Housing: High Strength Aluminum

Ordering

Electronic Blade Consistency Transmitter

Style
SBC = Transmitter, Blade Consistency

Consistency Range
A = 1 - 4.5%
B = 2 - 7%
C = 4.5 - 16%

Mounting Module
RHC = Retractable Hastelloy C
RS2 = Retractable 316 Stainless Steel
NHC = Non-retractable Hastelloy C
NS2 = Non-retractable 316 Stainless Steel
N = No Mounting Module Required

Accessories
CMRN = Control Module, Ranging
CMZS = Control Module, Zero/Span
RTR = Retractor (For use with RHC & RS2 only).
To order separately
ACC*CMRN = Control Module, Ranging
ACC*CMZS = Control Module, Zero/Span
ACC*RTR = Retractor

Ordering Example: SBC,B,RS2*CMZS-RTR.

Rotating Consistency Transmitter Powerhead

Style
SDP = Rotating Consistency Transmitter Powerhead

Size
0 = Horizontal Powerhead
12 = 12" Vertical Powerhead
14 = 14" Vertical Powerhead
16 = 16" Vertical Powerhead
18 = 18" Vertical Powerhead
20 = 20" Vertical Powerhead
24 = 24" Vertical Powerhead
30 = 30" Vertical Powerhead

Type
VPH = Vertical Powerhead
HPH = Horizontal Powerhead

Signal
P = Pneumatic
E = Electronic

Materials (Wetted Parts)
S2 = 316 Stainless Steel
S3L = 317L Stainless Steel
Wetted parts include shaft extension, transmitter, collet and static seal (with FKM Fluoro Rubber).

Voltage

Voltage	Cycle	Phase
200	50/60	3
230/460	50/60	3
380	50/60	3
400	50/60	3
415	50/60	3
575	40/50/60	3

Ordering Example: SDP,12,VPH,E,S2,460-60-3*

Rotating Consistency Transmitter Chamber

Style
SDC = Rotating Consistency Transmitter Chamber

Size

12 = 12"	14 = 14"	16 = 16"	18 = 18"
20 = 20"	24 = 24"	30 = 30"	36 = 36"

Type
VCH = Vertical Chamber
HCH = Horizontal Chamber

End Connection
F = Flanged ANSI Drilling
F110 = DIN 10 Flange Drilling
F116 = DIN 16 Flange Drilling
F1D = B.S.D. Flange Drilling
F1E = B.S.E. Flange Drilling

Inlet/Outlet Size

Inlet		Outlet	
A4 = 4"	A16 = 16"	B4 = 4"	B16 = 16"
A5 = 5"	A18 = 18"	B5 = 5"	B18 = 18"
A6 = 6"	A20 = 20"	B6 = 6"	B20 = 20"
A8 = 8"	A24 = 24"	B8 = 8"	B24 = 24"
A10 = 10"	A30 = 30"	B10 = 10"	B30 = 30"
A12 = 12"	A36 = 36"	B12 = 12"	B36 = 36"
A14 = 14"		B14 = 14"	

Material
S1 = 304 Stainless
S2 = 316 Stainless
S3L = 317L Stainless

Ordering Example: SDC,12,VCH,F,A12-B12,S2*

Velocity Range & Flow Capacity

Electronic Blade Consistency Transmitter

1 to 15 Feet/Second (0.5 to 5 Meters/Second)

Pipe Diameter	Minimum Flow		Maximum Flow	
	GPM	M^3/Hour	GPM	M^3/Hour
6" (150mm)	90	20	1,300	295
8" (200mm)	160	25	2,300	520
10" (250mm)	250	60	3,700	840
12" (300mm)	350	75	5,300	1,200
14" (350mm)	500	115	7.100	1,610
16" (400mm)	600	135	9,300	2,100
18" (450mm)	800	180	11,900	2,700
20" (500mm)	1,000	230	14,700	3,340
24" (600mm)	1,400	320	21,000	4,770

Rotating Consistency Transmitter

0.1 to 4.5 Feet/Second (.03 to 1.5) Meters/Second)

Chamber Size*	Inlet & Outlet Size	Minimum Flow				Maximum Flow	
		0.75 to 1.75% Consistency		1.75 to 6% Consistency		0.75 to 6% Consistency	
		GPM	M^3/Hour	GPM	M^3/Hour	GPM	M^3/Hour
12" (300mm)	4" (100mm)	15	3	40	9	180	41
	6" (150mm)	25	6	50	11	400	91
	8" (200mm)	40	9	60	14	700	159
	10" (250mm)	60	14	70	16	1,100	250
	12" (300mm)	80	18	80	18	1,600	363
14" (350mm)	14" (350mm)	100	12	100	23	2,000	454
16" (400mm)	16" (400mm)	140	32	140	32	2,800	636
18" (450mm)	18" (450mm)	165	37	165	37	3,600	818
20" (500mm)	20" (500mm)	220	50	220	50	4,400	1,000
24" (600mm)	24" (600mm)	320	73	320	73	6,400	1,450
30" (750mm)	30" (750mm)	400	114	500	114	10,000	2,270
36" (900mm)	36" (900mm)	660	148	660	148	14,400	3,272

* Horizontal and vertical styles only. For open style, consult factory.

System Design

Close compliance with the following recommendations will enable a flow system to take full advantage of the accuracy and dependability of DeZURIK Electronic Blade and Rotating Consistency Transmitters.

Figure 1 shows a typical electronic blade transmitter installation. Figure 2 (page 12) shows an installation of a rotating consistency transmitter in a vertical pipeline and Figure 3 (page 12) shows a rotating transmitter in a horizontal installation. The numbers in the figures correspond with the following numbered statements.

1. The stock should be well agitated in the stock chest for uniform discharge.
2. The dilution water supply pressure should remain constant for accurate dilution.
3. A DeZURIK control valve with positioner should be used to control dilution water addition.
4. The piping between the dilution valve and the stock line must be sized to limit velocity to no more than four feet per second. The length of the pipeline must be at least four times its diameter.
5. Dilution water should be added immediately ahead of the stock pump.
6. A centrifugal pump must be used for thorough mixing of the dilution water and stock.
7. The piping between the pump and transmitter should be sized for proper process lag time. Lag time should not exceed ten seconds.
8. Do not use long sweep elbows ahead of the transmitter, as they can act as centrifugal separators and change the stock consistency, thus causing an error in consistency measurement.
9. Table A shows the minimum length of stilling section required upstream and downstream for AccuTrax Consistency Transmitters. Table B lists the minimum upstream length for Rotating Transmitters. Pipeline flow for the AccuTrax Consistency Transmitters should be 15 feet (5 meters) per second or less. If velocities on Rotating Transmitters exceed 4.5 feet (1.4 meters) per second contact a DeZURIK Sales Engineer for assistance in optimizing system performance.
10. In horizontal pipelines, if a reducer is used upstream from the transmitter or stilling section, it must be an eccentric reducer to allow stock drainage at shutdown.
11. In horizontal pipelines, if a reducer is used downstream from the transmitter, it must be an eccentric reducer to prevent an air pocket at the transmitter.
12. If a throttling valve is used, it should be located downstream from the transmitter to eliminate a source of turbulence ahead of the transmitter.
13. Piping downstream from the transmitter should rise to prevent an air pocket at the transmitter.

Required Length of Stilling Section

Electronic Blade Consistency Transmitter

Consistency %	Velocity Feet (Meters) /Second	Pipe Diameters	
		Upstream Length L1	Downstream Length L2
2-3	2-6 (.6-1.8)	10	3
	6-12 (1.8-3.6)	15	3
3.1-4.5	2-8 (.6-2.4	8	3
	8-15 (2.4-5)	12	3
4.6-6	2-8 (.6-2.4)	6	3
	8-15 (2.4-5)	10	3
6.1-15	2-8 (.6-2.4)	4	3
	8-15 (2.4-5)	10	3

Example: Stock with a consistency of 3% at a velocity of 7 FPS would require a stilling section upstream 15 times the pipe diameter and 3 downstream.

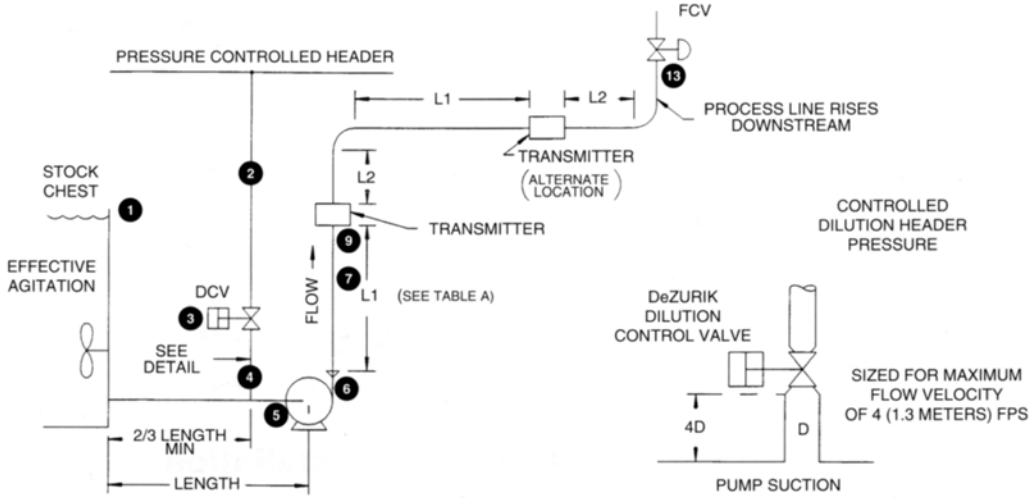


Figure 1

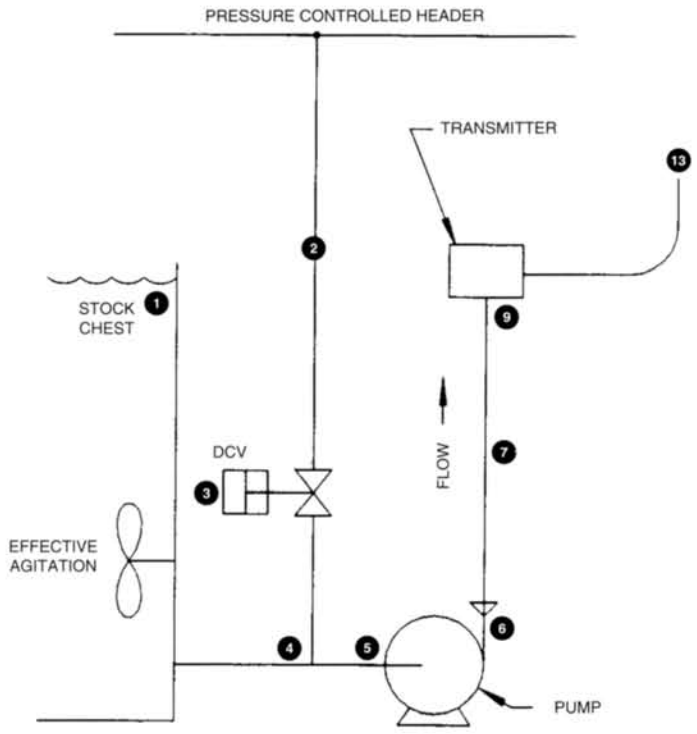
Required Length of Stilling Section

Rotating Consistency Transmitter

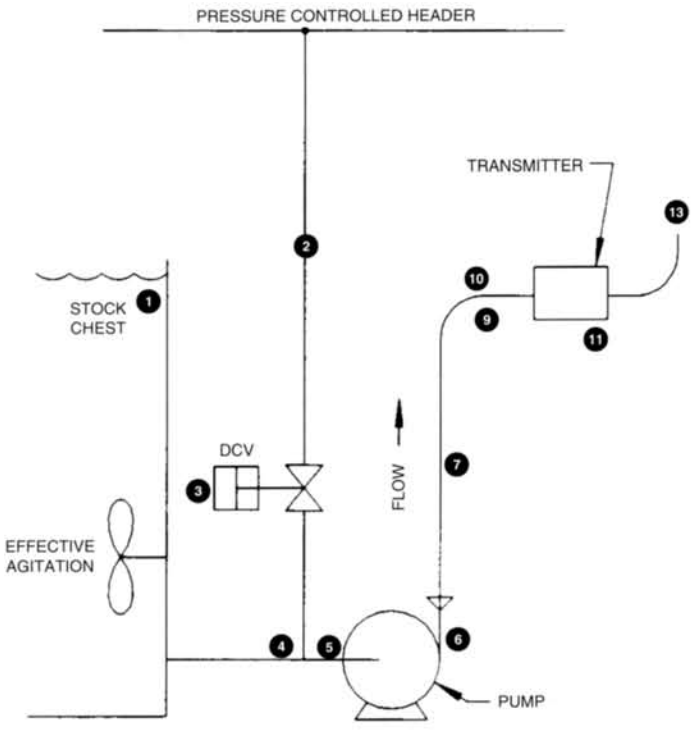
Consistency %	Velocity in Feet (Meters) Per Second								
	.5 (.2)	1 (.3)	1.5 (.5)	2 (.6)	2.5 (.8)	3* (.9)	3.5 (1.1)	4 (1.2)	4.5 (1.4)
	Pipe Diameters - Upstream Length								
1.0	3.5	4.0	5.0	6.0	7.0	7.5	8.5	9.5	10.0
1.5	2.0	3.0	4.0	5.0	5.5	6.5	7.5	8.5	9.0
2.0	1.5	2.0	3.0	3.5	4.5	5.5	6.5	7.0	8.0
*2.5	1.5	1.5	2.0	2.5	3.5	*4.5	5.5	6.5	7.0
3.0	1.5	1.5	1.5	1.5	2.5	3.5	4.5	5.0	6.0
3.5	1.5	1.5	1.5	1.5	1.5	2.5	3.5	4.5	5.0
4.0	1.5	1.5	1.5	1.5	1.5	1.5	2.5	3.5	4.5
4.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	3.0	3.5
5.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	3.0
5.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5
6.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0

***Example:** Stock with a consistency of 2.5% at a velocity of 3.00 FPS would require a stilling section 4.5 times the pipeline diameter in which the transmitter is mounted.

Table B



Vertical Installation



Horizontal Installation

Consistency Control Considerations

Since the measurement of consistency is an inferred measurement and not direct, careful consideration must be given to flow variations, temperature variations, changes in the fiber itself and the addition of mineral fillers. The performance data provided will assist in developing the greatest degree of accuracy in consistency measurement.

Flow

To obtain optimum performance the consistency transmitter selected must be designed to operate over the flow rates required and also maximize consistency control when flow rates change. DeZURIK Rotating and Blade Consistency Transmitters are designed with flow compensating sensors. Figures 1 and 2 graphically illustrate that substantial flow rate changes have a minimal effect on the control provided by DeZURIK Consistency Transmitters.

Rotating Transmitter

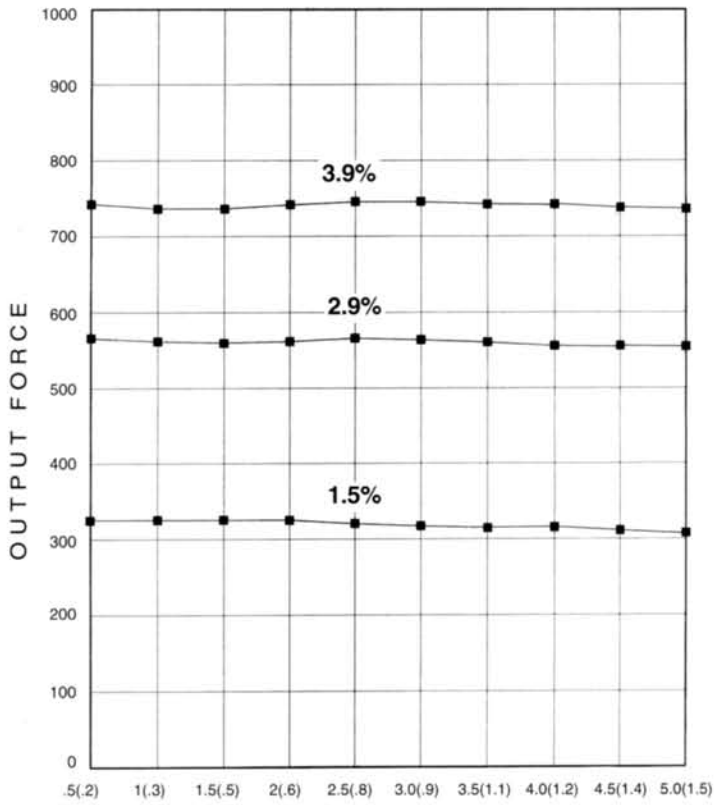


Figure 2

Blade Transmitter

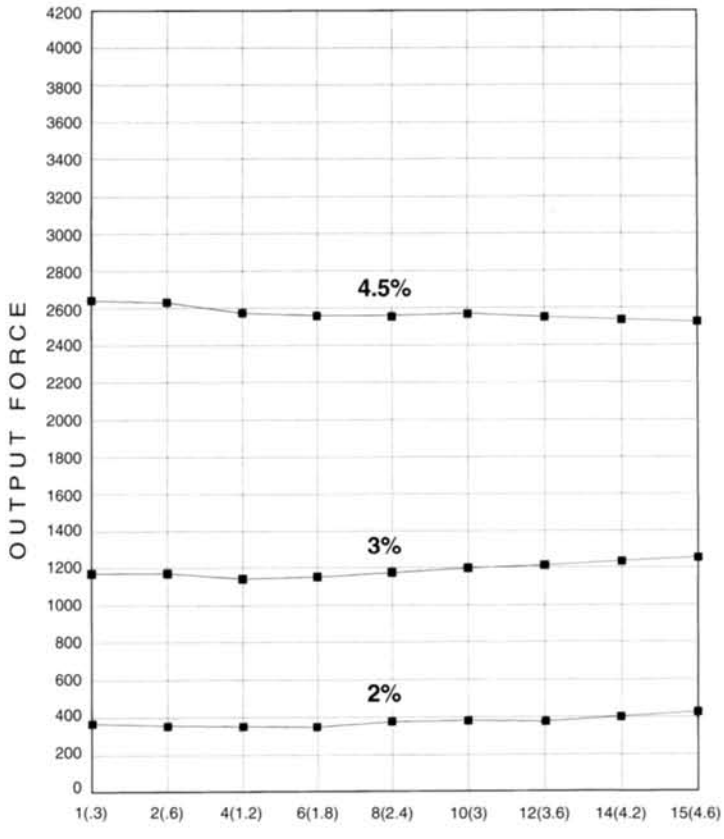


Figure 1

Temperature

Consistency can also be affected by changes in process temperature. As the fiber suspension heats up, the resistance declines and the output signal also declines. As the consistency is reduced, the temperature effect is also diminished. The same is true with fiber suspensions that produce less resistance. Figure 3 illustrates the effect on consistency from a cold start to a fully warmed up condition when the system is on automatic (set-point) control.

Blade and Rotating Transmitters

Long Fiber Chemical Pulp Fiber

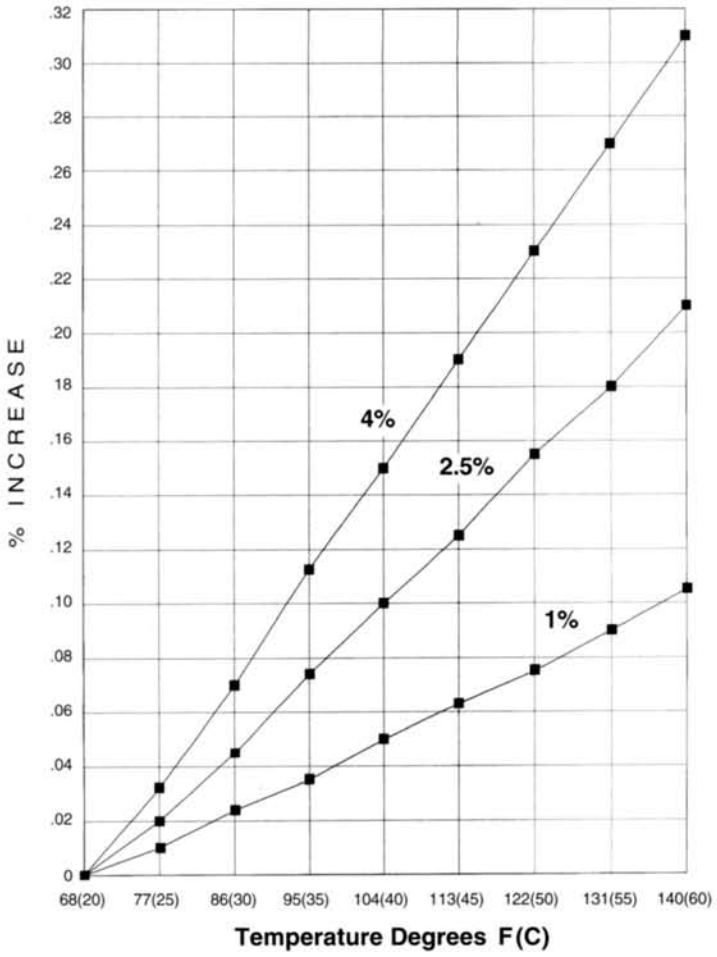


Figure 3

Mineral Fillers

Another factor to consider is the use of mineral fillers and their percentage of the total solids. When measuring total solids, fiber and fillers are considered. DeZURIK Consistency Transmitters respond only to the fiber content. As the percentage of fillers increases, the force or resistance felt at the transmitter decreases. While the example in Figure 4 compares the effects on hardwood fiber, the net effect is similar for any fibrous material.

Blade and Rotating Transmitters

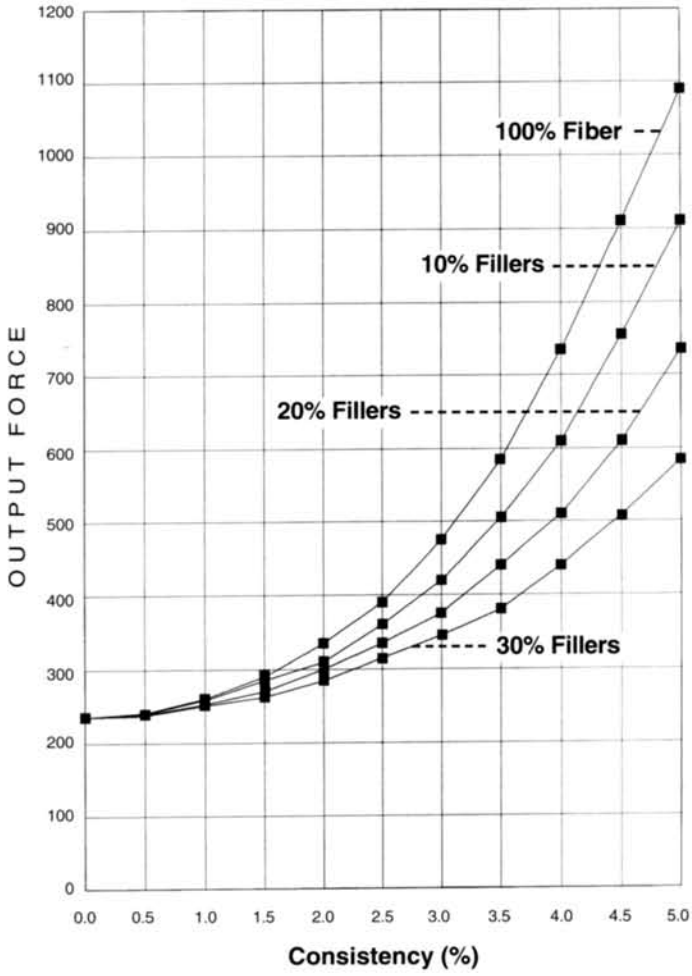


Figure 4

Fiber Types

In those processes where the furnish changes, the amount of resistance felt by the transmitter will vary and along with it consistency measurement. This is most prevalent where recycled paper is used as the raw material. Figures 5-7 indicate the changes in output force for chemical pulp, stone groundwood, old corrugated containers and reclaimed newsprint.

Electronic Blade B Sensor

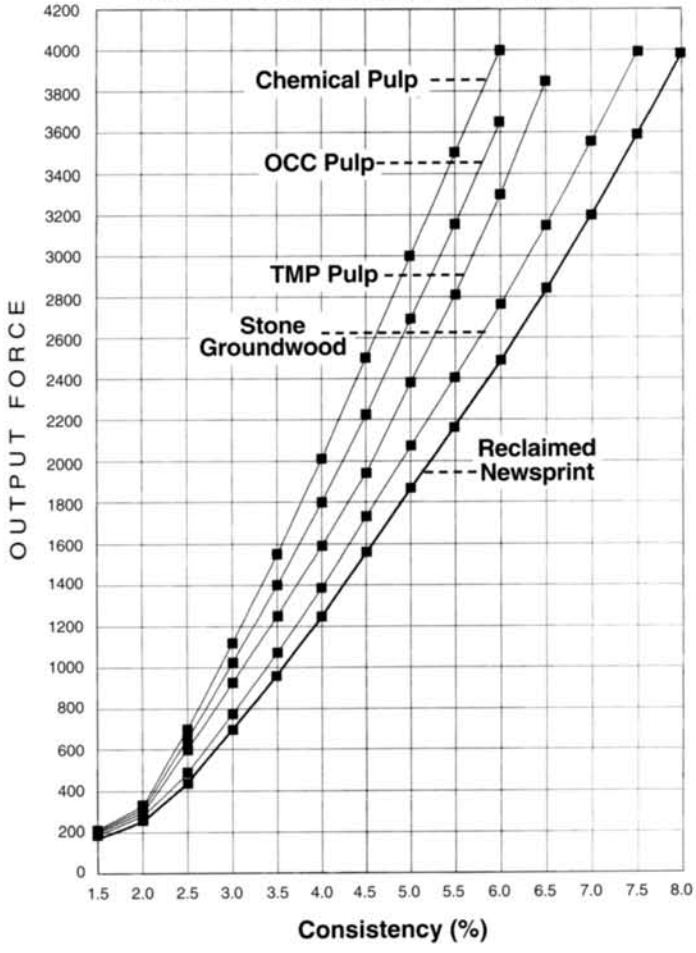


Figure 5

Electronic Blade C Sensor

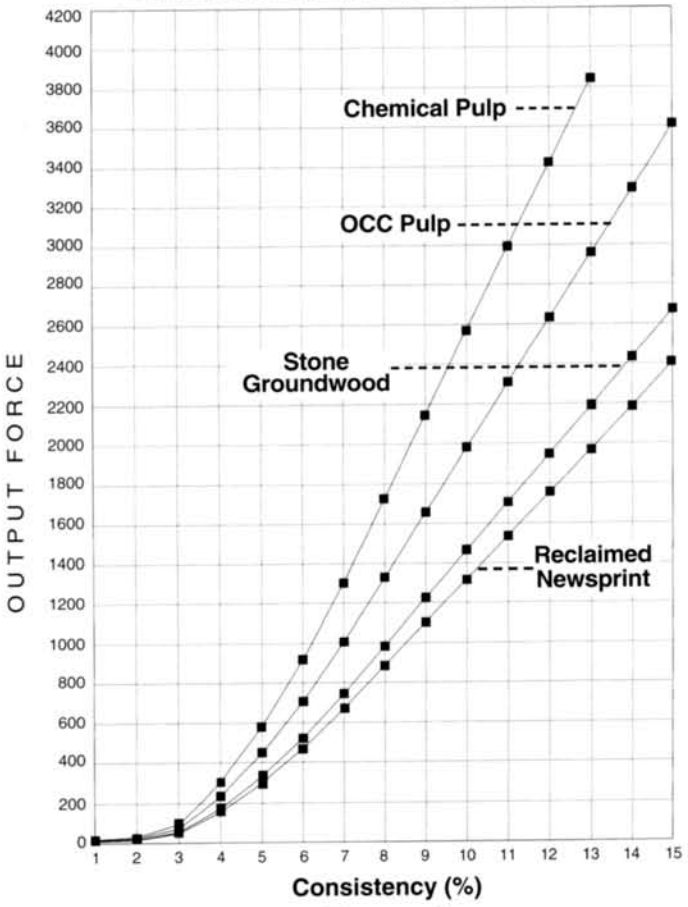


Figure 6

Rotating Transmitter

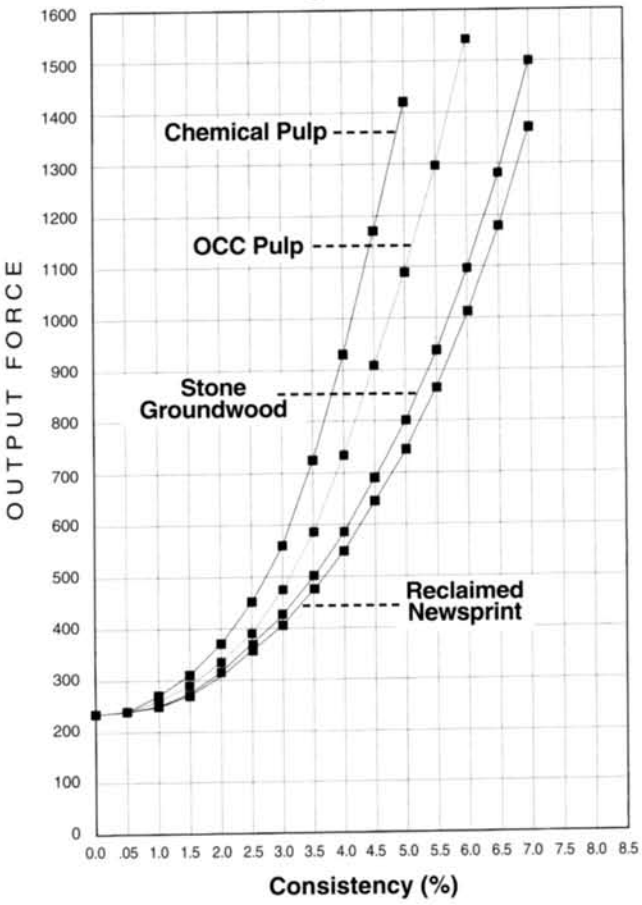


Figure 7

Sales and Service

For information about our worldwide locations, approvals, certifications and local representative:
Web Site: www.dezurik.com E-Mail: info@dezurik.com

250 Riverside Ave. N. Sartell, Minnesota 56377 • Phone: 320-259-2000 • Fax: 320-259-2227

Printed in the U.S.A.