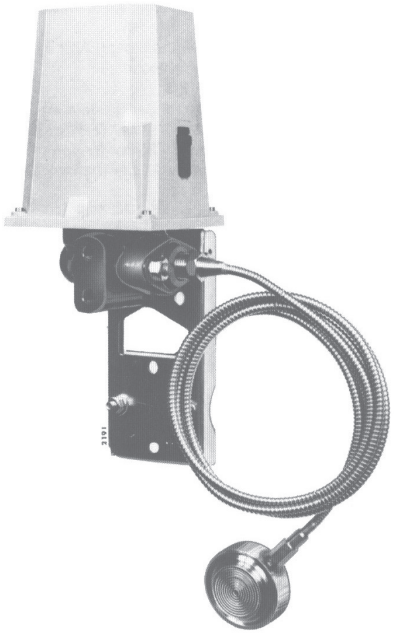
Data Sheet DS/NDD-EN Rev. J

Model NDD
Gauge pressure transmitter with remote diaphragm seal

Deltapi N Series
A complete range of pneumatic pressure transmitters



Introduction

The blind type pressure transmitter mod. NDD is used to measure a gauge pressure and convert it into a proportional pneumatic signal.

Power and productivity for a better world™

DESCRIPTION
The instrument works on the force-balance principle and consists of two main units.

The measuring unit comprises a main body which houses a bellows unit, connected via a capillary pipe through the positive connection port to a separator forming one all-welded system filled with a separating liquid. The negative connection port is open to atmosphere. The bellows unit is clamped in the main body forging by means of a flange and it can withstand the maximum overrange on positive side without damage.

The transmission unit converts the differential force applied to the measuring element into a proportional output pneumatic signal.
The output pressure, generated by a flapper nozzle relay, is fed to a feedback bellows with a rising pressure until the bellows force balances that of the measuring element.

Span value continuously adjustable by an internal micrometric screw.

Zero value adjustable by an external screw.

Mounting in a vertical position on 2in diameter pipe by a special bracket.

OPTIONAL EXTRA FEATURES
A zero elevation or suppression device allows to set as a zero of the transmitter a measured variable value different from zero.
Zero suppression value (S) added to the calibrated span must never exceed the upper range limit of measuring element : S + span ≤ M (see table).

Air filter regulator can be directly mounted on the transmitter, with or without pressure gauge, and connected with piping and fittings either in stainless steel or copper.
Special versions of air filter regulator and gauges, in stainless steel, are available on request.

SPECIFICATIONS

The data were obtained from laboratory tests on standard instruments with: carbon steel or AISI 316L body and flange; AISI 316L bellows unit; silicone oil (DC200) filling; gasket: PTFE; calibration span: 800 kPa - 8 bar (bellows A), 1700 kPa - 17 bar (bellows B), 3500 kPa - 35 bar (bellows C), 7000 kPa - 70 bar (bellows D).

MEASURING BELLOWS	DIAPHRAGM DIAMETER	SPAN LIMITS min. and max.	RANGE LIMITS upper and lower (M)	MAXIMUM ZERO SUPPRESSION (S)	MAXIMUM ZERO ELEVATION	OVERRANGE LIMIT
A	3in	170 and 1700 kPa 1.7 and 17 bar	-100 and 2500 kPa -1 and 25 bar	2330 kPa 23.3 bar	100 kPa 1 bar	3.5 MPa 35 bar
B	2in	350 and 3500 kPa 3.5 and 35 bar	-100 and 5000 kPa -1 and 50 bar	4650 kPa 46.5 bar	100 kPa 1 bar	7 MPa 70 bar
C	2in	700 and 7000 kPa 7 and 70 bar	-100 and 10000 kPa -1 and 100 bar	9300 kPa 93 bar	100 kPa 1 bar	14 MPa 140 bar
D	2in	1400 and 14000 kPa 14 and 140 bar	-100 and 20000 kPa -1 and 200 bar	18600 kPa 186 bar	100 kPa 1 bar	28 MPa 280 bar

Air supply
nom. 140 kPa (1.4 bar, 20 psi); min. 125 kPa (1.25 bar, 18 psi); max. 175 kPa (1.75 bar, 25 psi)

Output signal
20 to 100 kPa/0.2 to 1 bar, 3 to 15 psi or 0.2 to 1 kg/cm^2

Static air consumption
350 Nl/h

Maximum output flow:
- with rising output pressure: 30 Nl/min.
- with falling output pressure: 40 Nl/min.

Accuracy
± 0.5% F.S.D. (typical)

Degree of protection in accordance with IEC 529
IP55

Ambient temperature limits
-40 and + 120°C

Process temperature limits
Same as fill fluid limits. Refer to table A.
204°C (400°F) with Teflon antistick (N6W, N6F, N6E) and silicone rubber O-ring (N6U)
260°C (500°F) with Teflon TFE O-ring (N6U)

Thermal drift (for ambient temperature variation between -20° C and + 65° C)
Bellows A
- span 170 to 340 kPa (1.7 to 3.4 bar): 1%/10°C
- span 340 to 1700 kPa (3.4 to 17 bar): 0.5%/10°C

Bellows B
- span 350 to 700 kPa (3.5 to 7 bar): 0.8%/10°C
- span 700 to 3500 kPa (7 to 35 bar): 0.4%/10°C

Bellows C
- span 700 to 1400 kPa (7 to 14 bar): 0.6%/10°C
- span 1400 to 7000 kPa (14 to 70 bar): 0.3%/10°C

Bellows D
- span 1400 to 2800 kPa (14 to 28 bar): 0.5%/10°C
- span 2800 to 14000 kPa (28 to 140 bar): 0.2%/10°C

Body and flange material
Carbon steel, AISI 316

Seal diaphragm material
AISI 316L

Seal filling / working temperature range
See table "A"

Cover material
thermoplastic resin

Surface protections
- carbon steel body and flange: zinc plating and chrome passivation
- AISI 316 body and flange: none

Process connections
- Wafer remote seal:
  1 1/2in, 2in, 3in ASME150 to 900;
  DN40, DN50, DN80 DIN ND 10 to 160
- flush diaphragm flanged seal:
  3in ASME 150 to 900; DN80 DIN ND 16 to 160
- extended diaphragm flanged seal:
  3in ASME 150-300; DN80 DIN ND 16-40
- Union remote seal:
  1 1/2in with or without weld bushing or with chemical tee flange

Pneumatic connections
- Air supply (in figure ref. A): 1/4 in NPT-F
- Output (in figure ref. B): 1/4 in NPT-F

Pressure gauge
Brass with stainless steel case (all stainless steel on request) external diameter 51 mm; 0-200 kPa, 0-2 bar and 0-30 psi indication on 82 mm/260° scale.

Air filter regulator
with copper or stainless steel piping, as specified.
Die cast aluminium alloy with light grey epoxy finish.

Net weight (maximum)
8 to 25 kg approx

Packing
expanded polythene box

TABLE 'A' - FILL FLUIDS CHARACTERISTICS

FILL FLUIDS (APPLICATION)	OPERATING CONDITIONS				SPECIFICATIONS @ 25°C (77°F)		
	Tmax °C (°F) @ P >of	Pmin mbar abs (psia)	Tmax °C (°F) @ P min	Tmin °C (°F)	Specific gravity	Viscosity Kinematic (cSt)	Thermal Expansions $x10^{-3}$ /°C
Silicone oil DC 200 (General purpose)	200 (390) @ 35 mbar abs	0.7 (0.1)	160 (320)	-40 (-40)	0.93	10	1.08
Silicone oil DC 702 (High temperature)	315 (600) @ atmosphere	0.7 (0.1)	200 (390)	-7 (+20)	1.07	45	0.78
Silicone oil DC 704 (High temperature)	340 (645) @ atmosphere	0.7 (0.1)	230 (445)	20 (70)	1.07	42	0.95
Neobee M-20 (Food-Sanitary)	200 (390) @ atmosphere	130 (1.9)	150 (300)	-18 (0)	0.92	9.8	1.2
Glycerin Water (70%) (Food-Sanitary)	93 (200) @ atmosphere	atmosphere	93 (200)	-7 (+20)	1.08	2.2	0.36
DC 97-9120 PHARMA B GRADE (Food-Sanitary)	200 (390) @ 35 mbar abs	0.7 (0.1)	160 (320)	-40 (-40)	0.96	50	1.04
Inert (Galden) (Oxygen Service)	160 (320) @ atmosphere	0.7 (0.1)	65 (150)	-18 (0)	1.8	4.5	1.1
KTFILL-1 (Paints and specials)	300 (570) @ 400 mbar abs	0.7 (0.1)	160 (320)	-10 (+14)	1	16	0.92

ORDERING INFORMATION

Select one character or set of characters from each category and specify complete catalog number.
In addition quote the required seal model from one of the enclosed N6 ordering information

PRODUCT CODE

abc de fg hi j k lm

BASE MODEL
VERSION
BODY AND FLANGE
MEASURING ELEMENT
GASKETS
OUTPUT
EXTRAS

abc **BASE MODEL**

	Code
Gauge pressure transmitter with remote diaphragm seal	NDD

de **VERSION**

Standard	W1

fg **BODY AND FLANGE**

Carbon steel	01
AISI 316	11

ef **SPAN LIMITS (Note 1)**

170 and 1700 kPa / 24.6 and 246 psi	05
350 and 3500 kPa / 50.7 and 507 psi	06
700 and 7000 kPa / 101.5 and 1015 psi	07
1400 and 14000 kPa / 203 and 2030 psi	08

Note 1: Multiply by 10 the value in kPa (MPa) to obtain mbar (bar)

j **CONSTRUCTION**

Transmitter with remote diaphragm seal (to be quoted separately as N6W, N6F, N6E or N6U)	2

k **OUTPUT**

3 to 15 psi	According to ANSI/ISA S 51.1-1979 standard terminology	1
3 to 15 psi with zero elevation device		2
3 to 15 psi with zero suppression device		3
0.2 to 1.0 kg/cm²		4
0.2 to 1.0 kg/cm² with zero elevation device		5
0.2 to 1.0 kg/cm² with zero suppression device		6
20 to 100 kPa / 0.2 to 1 bar		7
20 to 100 kPa / 0.2 to 1 bar with zero elevation device		8
20 to 100 kPa / 0.2 to 1 bar with zero suppression device		9

EXTRAS

lm

Identification tag material	Piping material	Air filter regulator	Pressure gauge	
Stainless Steel	- -	- -	- -	02
Stainless Steel	Stainless Steel	with	- -	10
Stainless Steel	Copper	with	- -	11
Stainless Steel	Stainless Steel	with	with	13
Stainless Steel	Copper	with	with	14

N6W WAFER REMOTE SEAL

Select one character or set of characters from each category and specify complete catalog number.

		Code
abc	**BASE MODEL**	
	Wafer remote seal	**N6W**

d	**NUMBER OF REMOTE SEAL**	
	One remote seal	**1**

ef	**MOUNTING CONNECTION**	
	1 - 1/2in ASME	**F1**
	2in ASME	**F2**
	3in ASME	**F3**
	DN40, DIN ND 10-40	**D1**
	DN80, DIN ND 10-40	**D3**
	DN40, DIN ND 64-160	**D7**
	DN80, DIN ND 64-160	**D8**
	DN50, DIN ND 10-40	**21**
	DN50, DIN ND 64-160	**22**

g	**OTHER WETTED MATERIAL (Not diaphragm)**	
	Same as diaphragm	**0**

h	**DIAPHRAGM MATERIAL**		
	AISI 316L serrated seat finish		**2**
	AISI 316L smooth seat finish		**L**
	Hastelloy C 276		**3**
	Tantalum (max temperature 260°C/500°F) - (NOT VACUUM)		**5**
	AISI 316L ss with Teflon anti-stick coating	(only available with code F3 at position "ef")	**7**
	Hastelloy C 276 with Teflon anti-stick coating		**8**
	AISI 316L ss with Teflon coating anti-corrosion and antistick (Note)		**A**

Note: not available with 1-1/2in or DN40 connection code F1, D1, D7 at position "ef"

i	**EXTENSION LENGTH**	
	None	**0**

j	**CAPILLARY - Fill fluid**	
	Silicone oil (DC 200)	**A**
	Silicone oil (DC 702)	**C**
	Silicone oil (DC 704)	**D**
	Glycerin/Water	**G**
	Inert Fluid	**P**
	KTFILL-1	**L**
	Neobee M-20	**N**
	DC97 - 9120 PHARMA B-GRADE	**Q**

kl	**SYSTEM LENGTH m(feet)**	
	1 (3)	**03**
	1.5 (5)	**05**
	2 (7)	**07**
	2.5 (8)	**08**
	3 (10)	**10**
	3.5 (12)	**12**
	4 (13)	**13**
	4.5 (15)	**15**
	5 (17)	**17**
	6 (20)	**20**
	7.5 (25)	**25**
	9 (30)	**30**
	10 (35)	**35**

m	**CERTIFICATION**	
	None	**0**

no	**OPTIONS**	
	None	**00**

N6E FLANGED EXTENDED DIAPHRAGM SEAL

Select one character or set of characters from each category and specify complete catalog number.

abc **BASE MODEL**

	Code
Flanged extended diaphragm seal	N6E

d **NUMBER OF REMOTE SEAL**

One remote seal	1

ef **MOUNTING CONNECTION**

	Material	
3in ASME CL150	Carbon steel	K3
3in ASME CL150	AISI 316 ss	S3
3in ASME CL300	Carbon steel	L3
3in ASME CL300	AISI 316 ss	36
DN80, DIN ND 16	Carbon steel	4C
DN80, DIN ND 16	AISI 316 ss	4M
DN80, DIN ND 40	Carbon steel	4D
DN80, DIN ND 40	AISI 316 ss	4N

g **OTHER WETTED MATERIAL (Not diaphragm)**

AISI 316L ss	2
Hastelloy C (only available with diaphragm material code 3, 8 and A at position "h")	3

h **DIAPHRAGM MATERIAL**

AISI 316L ss		2
Hastelloy C 276		3
AISI 316L ss with Teflon anti-stick coating	(only available with 3in ANSI CL 150/300 connection, code K3,S3,L3,36 at position "ef")	7
Hastelloy C 276 with Teflon anti-stick coating		8
AISI 316L ss with Teflon coating anti-corrosion and antistick		A

i **EXTENSION LENGTH**

2in	2
4in	4
6in	6

j **CAPILLARY - Fill fluid**

Silicone oil (DC 200)	A
Silicone oil (DC 702)	C
Silicone oil (DC 704)	D
Glycerin/Water	G
Inert Fluid	P
KTFILL-1	L
Neobee M-20	N

kl **SYSTEM LENGTH m(feet)**

1 (3)	03
1.5 (5)	05
2 (7)	07
2.5 (8)	08
3 (10)	10
3.5 (12)	12
4 (13)	13
4.5 (15)	15
5 (17)	17
6 (20)	20
7.5 (25)	25
9 (30)	30
10 (35)	35

m **CERTIFICATION**

None	0

no **OPTIONS**

None	00

N6F FLANGED FLUSH DIAPHRAGM SEAL

Select one character or set of characters from each category and specify complete catalog number.

abc **BASE MODEL**

	Code
Flanged flush diaphragm seal	N6F

d **NUMBER OF REMOTE SEAL**

One remote seal	1

ef **MOUNTING CONNECTION**

	Material	
3in ASME CL150	Carbon steel	K3
3in ASME CL150	AISI 316 ss	S3
3in ASME CL300	Carbon steel	L3
3in ASME CL300	AISI 316 ss	36
3in ASME CL600	Carbon steel	37
3in ASME CL600	AISI 316 ss	38
3in ASME CL900	Carbon steel	39
3in ASME CL900	AISI 316 ss	3A
DN80, DIN ND 16	Carbon steel	4C
DN80, DIN ND 16	AISI 316 ss	4M
DN80, DIN ND 40	Carbon steel	4D
DN80, DIN ND 40	AISI 316 ss	4N
DN80, DIN ND 64	Carbon steel	4E
DN80, DIN ND 64	AISI 316 ss	4F
DN80, DIN ND 100	Carbon steel	4H
DN80, DIN ND 100	AISI 316 ss	4G
DN80, DIN ND 160	Carbon steel	4K
DN80, DIN ND 160	AISI 316 ss	4L

g **OTHER WETTED MATERIAL (Not diaphragm)**

Same as diaphragm	0

h **DIAPHRAGM MATERIAL**

AISI 316L serrated seat finish		2
AISI 316L smooth seat finish		L
Hastelloy C 276		3
Tantalum (max temperature 260°C/500°F) - (NOT VACUUM)		5
AISI 316L ss with Teflon anti-stick coating	(only available with 3in connection code K3,S3,L3,36,37,38,39,3A at position "ef")	7
Hastelloy C 276 with Teflon anti-stick coating		8
AISI 316L ss with Teflon coating anti-corrosion and antistick		A

i **EXTENSION LENGTH**

None	0

j **CAPILLARY - Fill fluid**

Silicone oil (DC 200)	A
Silicone oil (DC 702)	C
Silicone oil (DC 704)	D
Glycerin/Water	G
Inert Fluid	P
KTFILL-1	L
Neobee M-20	N
DC97 - 9120 PHARMA B-GRADE	Q

kl **SYSTEM LENGTH m(feet)**

1 (3)	03
1.5 (5)	05
2 (7)	07
2.5 (8)	08
3 (10)	10
3.5 (12)	12
4 (13)	13
4.5 (15)	15
5 (17)	17
6 (20)	20
7.5 (25)	25
9 (30)	30
10 (35)	35

m **CERTIFICATION**

None	0

no **OPTIONS**

None	00

■ Compliance to NACE class II bolting, according to specification MR0175, latest revision

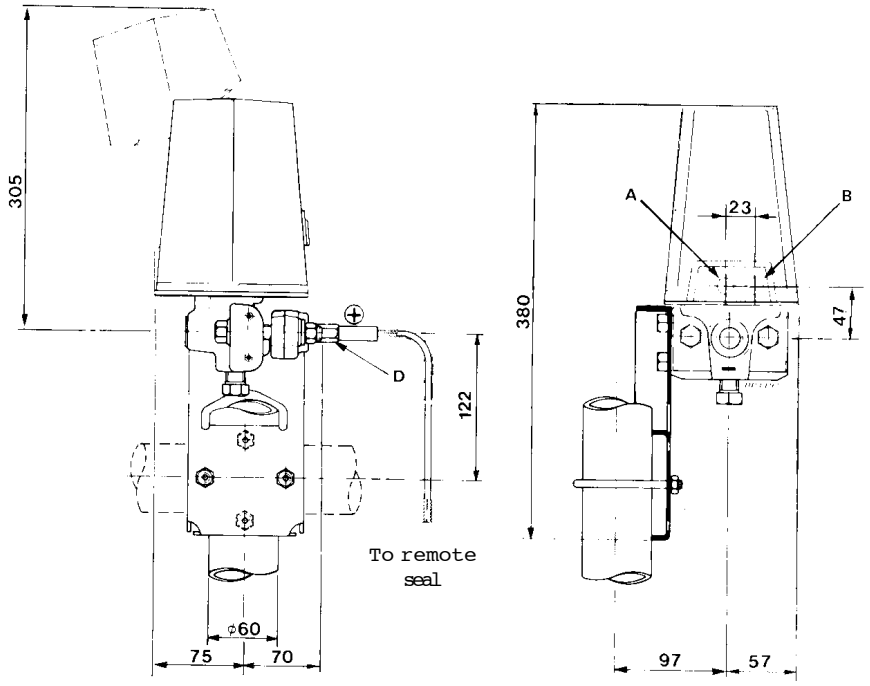
N6U THREADED UNION CONNECTION SEAL

Select one character or set of characters from each category and specify complete catalog number.

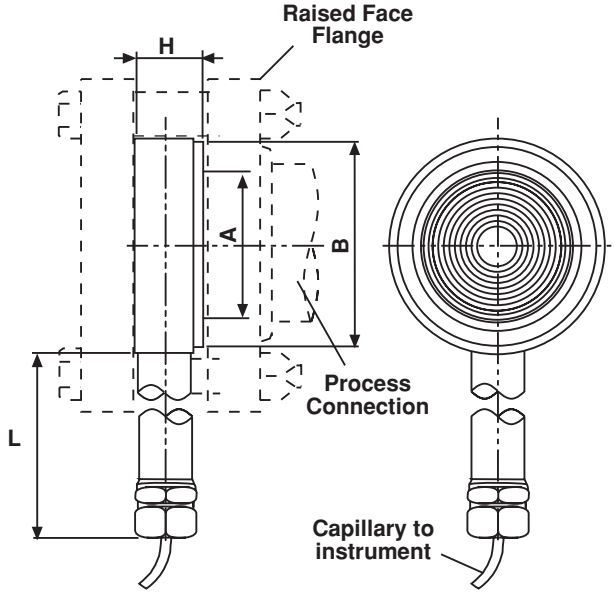
		Code
abc	**BASE MODEL**	
	Threaded union connection seal	**N6U**
d	**NUMBER OF REMOTE SEAL**	
	One remote seal	**1**
ef	**MOUNTING CONNECTION**	
	Union connection	**U1**
g	**OTHER WETTED MATERIAL (Not diaphragm)**	
	Same as diaphragm	**0**
h	**DIAPHRAGM MATERIAL**	
	AISI 316L ss	**2**
	Hastelloy C 276	**3**
i	**EXTENSION LENGTH**	
	None	**0**
j	**CAPILLARY - Fill fluid**	
	Silicone oil (DC 200)	**A**
	Silicone oil (DC 702)	**C**
	Silicone oil (DC 704)	**D**
	Glycerin/Water	**G**
	Inert Fluid	**P**
	KTFILL-1	**L**
	Neobee M-20	**N**
kl	**SYSTEM LENGTH m(feet)**	
	1 (3)	**03**
	1.5 (5)	**05**
	2 (7)	**07**
	2.5 (8)	**08**
	3 (10)	**10**
m	**PROCESS O-RING MATERIAL**	
	Silicone rubber	**3**
	Teflon TFE	**4**
no	**OPTIONS**	
	No options	**00**
	AISI 316 ss weld bushing	**W1**
	Chemical tee flange	**W2**

■ Compliance to NACE class II bolting, according to specification MR0175, latest revision

MOUNTING DIMENSIONS



- **N6W Remote wafer seal**

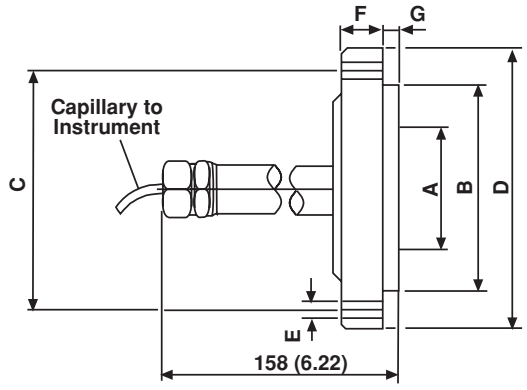


SIZE	DIMENSIONS mm (in)			
	A (dia)	B dia)	H	L
1-1/2 in	47 (1.85)	73.2 (2.87)	23 (0.9)	139.7 (5.5)
2 in	60 (2.36)	92.1 (3.62)	23 (0.9)	139.7 (5.5)
3 in	89 (3.5)	127 (5)	23 (0.9)	139.7 (5.5)
DN 40	47 (1.85)	88 (3.46)	23 (0.9)	139.7 (5.5)
DN 50	60 (2.36)	102 (4.02)	23 (0.9)	139.7 (5.5)
DN 80	89 (3.5)	138 (5.43)	23 (0.9)	139.7 (5.5)

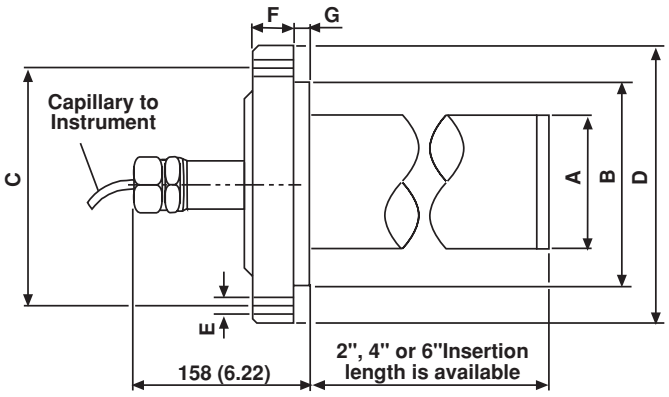
Wafer seal maximum working pressure

16 MPa, 160 bar, 2320 psi but not greater than the backup flange rating (not supplied)

- **N6F Remote flanged flush diaphragm seal**



- **N6E Remote flanged extended diaphragm seal**

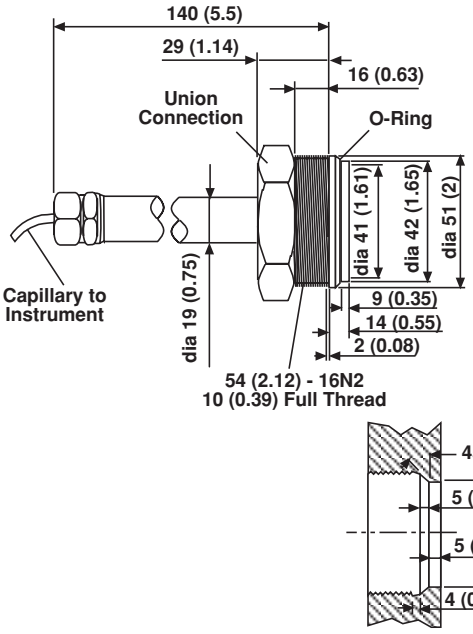


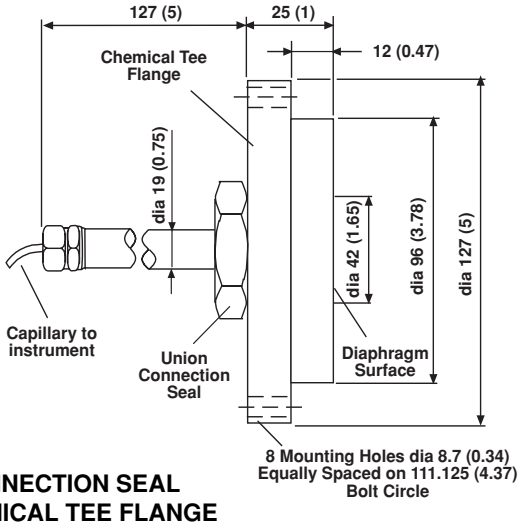
SIZE/RATING	A (dia)		DIMENSIONS mm (in)						N° of holes
	flush	extended	B (dia)	C (dia)	D (dia)	E (dia)	F	G	
3in ASME CL 150	89 (3.5)	72 (2.83)	127 (5)	152.5 (6)	190.5 (7.5)	20 (0.79)	24 (0.94)	9.5 (0.37)	4
3in ASME CL 300	89 (3.5)	72 (2.83)	127 (5)	168.5 (6.63)	210 (8.26)	22 (0.86)	28.5 (1.12)	9.5 (0.37)	8
3in ASME CL 600	89 (3.5)		127 (5)	168.5 (6.63)	210 (8.26)	22 (0.86)	32 (1.26)	9.5 (0.37)	8
3in ASME CL 900	89 (3.5)		127 (5)	190.5 (7.5)	241 (9.48)	26 (1.02)	38.5 (1.51)	9.5 (0.37)	8
DN80 DIN ND16	89 (3.5)	72 (2.83)	138 (5.43)	160 (6.3)	200 (7.87)	18 (0.71)	20 (0.79)	9.5 (0.37)	8
DN80 DIN ND40	89 (3.5)	72 (2.83)	138 (5.43)	160 (6.3)	200 (7.87)	18 (0.71)	24 (0.94)	9.5 (0.37)	8
DN80 DIN ND64	89 (3.5)		138 (5.43)	170 (6.7)	215 (8.46)	22 (0.86)	28 (1.1)	9.5 (0.37)	8
DN80 DIN ND100	89 (3.5)		138 (5.43)	180 (7.08)	230 (9.05)	26 (1.02)	32 (1.26)	9.5 (0.37)	8
DN80 DIN ND160	89 (3.5)		138 (5.43)	180 (7.08)	230 (9.05)	26 (1.02)	36 (1.42)	9.5 (0.37)	8

Flanged seal maximum working pressure:

ASME CL 150: 2 MPa, 20 bar, 290 psi
ASME CL 300: 5 MPa, 50 bar, 725 psi
ASME CL 600: 10 MPa, 100 bar, 1450 psi
ASME CL 900: 16 MPa, 160 bar, 2320 psi
DIN ND 16: 1.6 MPa, 16 bar, 230 psi
DIN ND 40: 4 MPa, 40 bar, 580 psi
DIN ND 64: 6.4 MPa, 64 bar, 930 psi
DIN ND 100: 10 MPa, 100 bar, 1450 psi
DIN ND 160: 16 MPa, 160 bar, 2320 psi

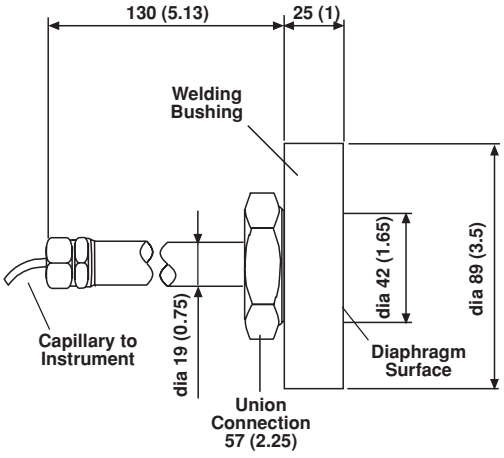
- **N6U Remote union connection seal**





UNION CONNECTION SEAL WITH CHEMICAL TEE FLANGE

UNION CONNECTION SEAL WITH WELD BUSHING



Union seal maximum working pressure

Union connection: 10.3 MPa, 103 bar, 1500 psi;
With chemical tee flange: 2 MPa, 20 bar, 300 psi

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DS/NDD-EN Rev. J 01.2011

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