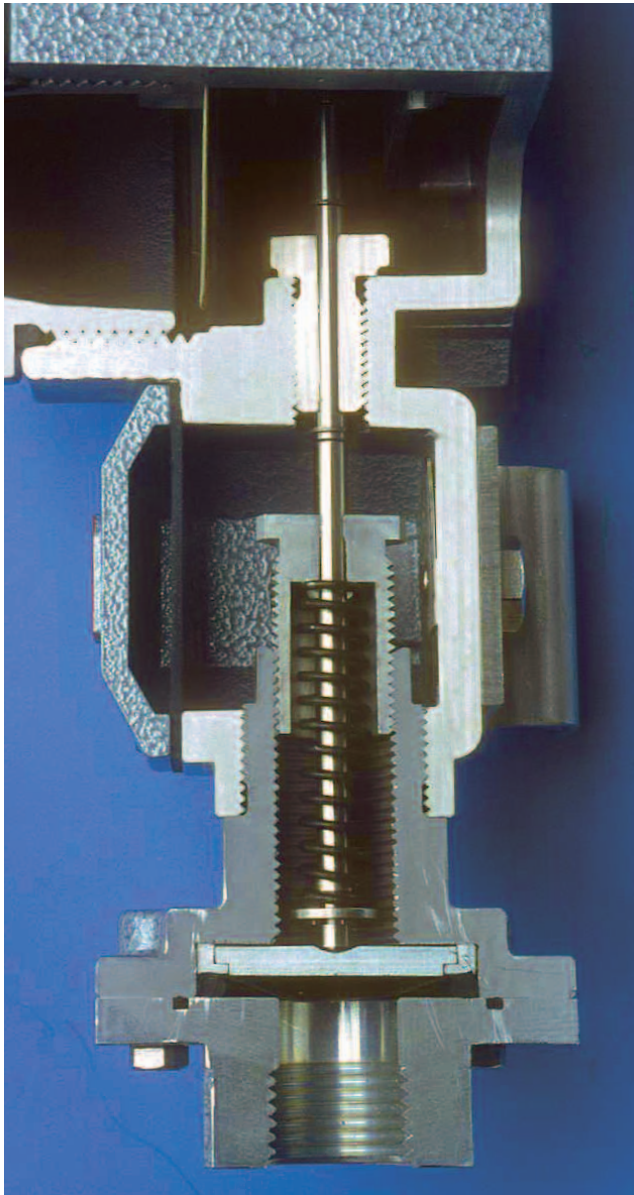


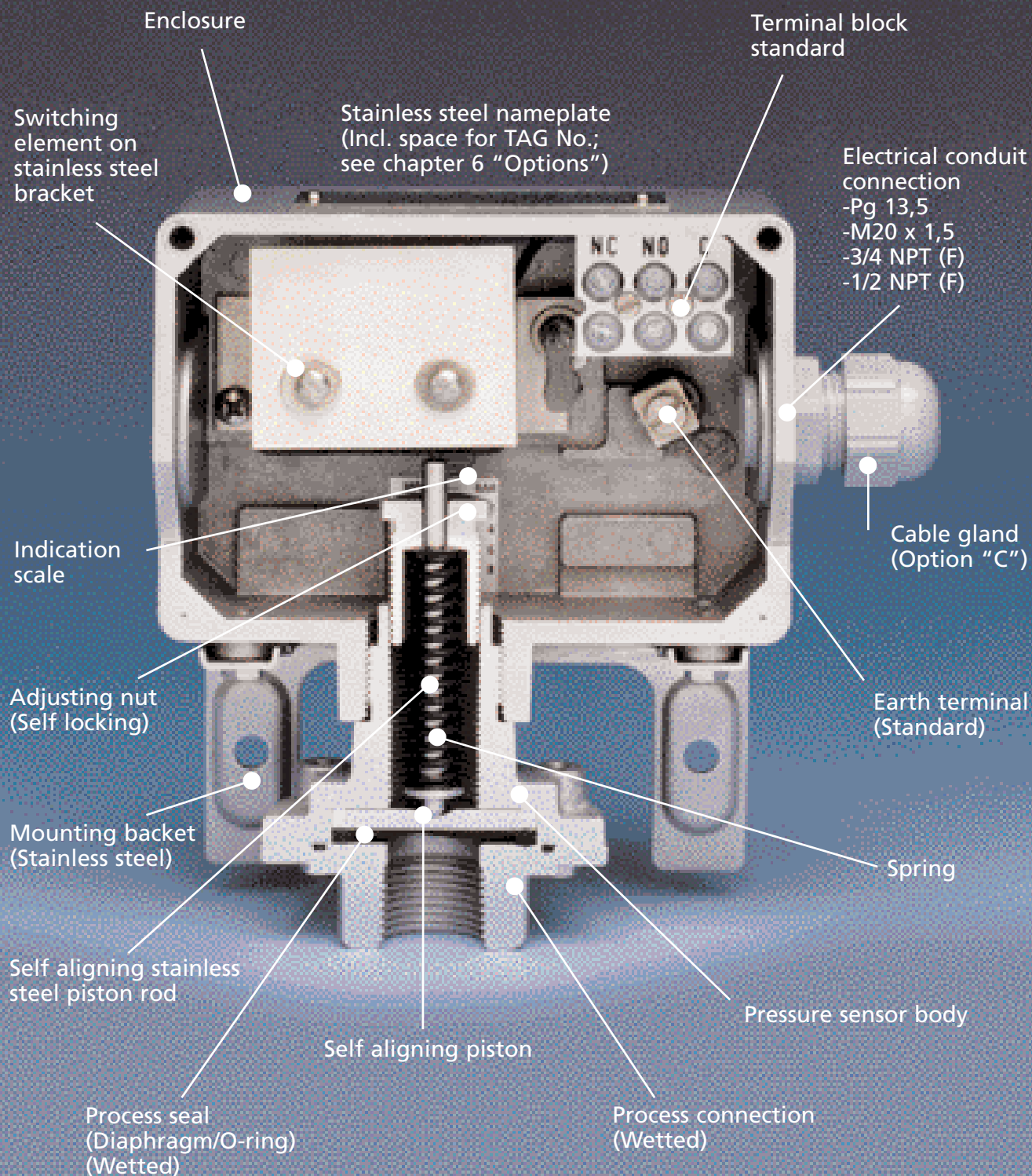
Pressure & Temperature Switches



The "User Friendly Generation"
General Bulletin

BETA SWITCH PRINCIPLE

Stainless steel screws throughout



THE “USER FRIENDLY GENERATION”

- The “User Friendly Generation” is no idle boast. BETA can – and always will – supply the best - instrumentation for the given conditions.
- Many years of close attention to our customer’s requirements have resulted in a vast experience of virtually all known switch applications.

YOUR “SPECIAL” IS PROBABLY BETA’S “STANDARD”

Major users all over the world, in all areas of industry, already enjoy the benefits of BETA’s “user friendly” switches. BETA manufactures high quality instruments to meet all of your requirements.

THE BETA PRINCIPLE

A high quality, self-aligning diaphragm/piston sensor is the heart of a BETA switch. The limited piston travel transmits pressure at the diaphragm directly to the microswitch, with no intervening linkages or mechanisms while providing full protection against high overrange pressure.

The piston sensor is isolated from the process fluid by a diaphragm and static O-Ring seal and retained by a process connection port. These (3) are the only process wetted parts and are available in an extensive range of materials.

THE BETA SWITCH HAS “DESIGNED-IN” RELIABILITY.

THE FEATURES

SAFETY

- Safe, secure electrical hookup by clamp terminals.
- Standard earth terminal.
- IP 66 enclosure.
- Solid cover with gasket and captive screws.

RELIABILITY

- Highest Overrange protection.
- Spring loaded piston, excellent resistance against shock and vibration.
- Flexible stainless steel mounting bracket:
No pipe strains on the instrument to cause shift of setpoint.

APPROVED BY

CSA: W-Series, C-Series and C-Series Intrinsically safe,
FM: W-Series,
ATEX: W-Series, M-Series and C-Series Intrinsically safe,
IECEx: W-Series and C-Series Intrinsically safe,
PED: TÜV certificate CE 0035.
(For more; see also page 16, 20, 21, 22, 23 and 26).

QUALITY SGS

SGS certified Quality Assurance according to ISO 9001 - 2000 covers all switch manufacturing, Engineering & Design.

ECONOMY

A wide range of wetted process materials virtually eliminates the need for costly chemical seals.

SERVICE

The international BETA sales network backs up this high quality product with equally high quality service.



GUIDE OF HOW TO SELECT YOUR BETA SWITCH

BETA uses a simple and logical model code system for easy, accurate product specification, project coordination, efficient document handling and after sales service.

		C3	-	P304L	-	S1N	-	B1	-	K1	-	Y	-	X2
1	ENCLOSURES													
2	RANGES													
	Type													
	P	Pressure switch												
	D	Differential pressure switch												
	V	Vacuum switch												
	T	Temperature switch												
	Sensor body													
	L	Low pressure sensor body												
	M	Medium pressure sensor body												
	H	High pressure sensor body												
	F	Fluid power sensor body (only as combination P...F)												
	D	Double (D...D for Double differential)												
3	PROCESS CONNECTIONS	(Material/Size/Thread)												
4	DIAPHRAGM / O-RINGS													
5	SWITCH ELEMENTS													
6	OPTIONS													
7	SPECIALS													

TO SELECT YOUR SWITCH

Follow section **1** through **5**

If required: For "Optional" and "Special" accessories
Follow section **6** or **7**.

Ambient temperature:

Standard: -22 to +176°F
Ex. proof: - 4 to +104°F : M-Series for T6 - CSA/FM-Pending
ATEX: -40 to +104°F : W-Series for T6 - CSA/FM: -40 to +158°F
-40 to +176°F : W-Series for T5 - CSA/FM: -40 to +176°F
Ex i : -22 to +176°F : C-Series - CSA : -40 to +185°F
FM-Pending

Repeatability:

± 0.2% of Full Range* (measured at 68°F ambient
temperature acc. to ANSI/I.S.A.-S51.1-1979).

Free of charge:

BETA will add your tag no. on the nameplate and set the
pressure switches at desired setpoint if this is requested
on your order.
(Temperature switches can also be set at an additional charge)

Waranty:

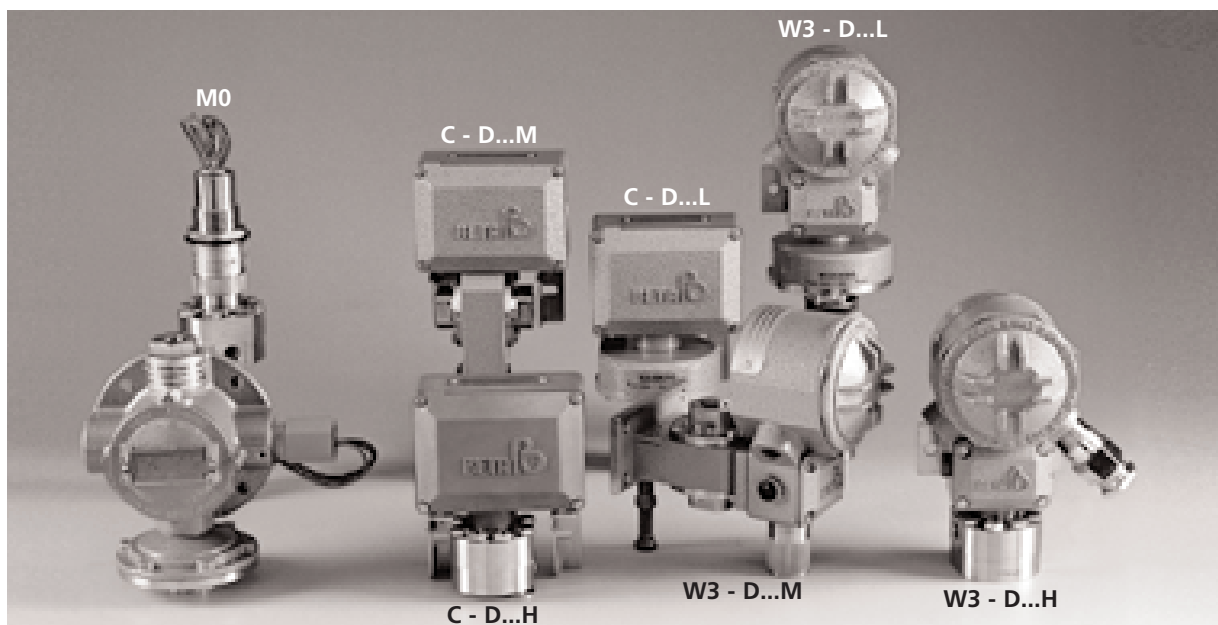
3 years from ex-works date of manufacture (excl. "wetted parts").

* For standard BETA switch (Switch with "K1" switching element and "B1" diaphragm/O-Ring).

PRESSURE SWITCHES

1 ENCLOSURES

C3 - P304L - S1N - B1 - K1 - Y - X2



ENCLOSURE CODE	CLASSIFICATION	ELECTRIAL COND. CONN.	MATERIAL	EARTH TERMINAL	TERM. BLOCK	TYPE OF SENSOR				
						PRESS	FLUID P.	VACUUM	DIFF.	TEMP
B2	1) Weathertight Miniature (IP65)	Hirschmann Plug conn. DIN 43650-A	Aluminium	Standard (Via plug)	Not applicable	✓	✓	✓	–	✓
C1	Weathertight (IP66) CSA & FM Type 4X	PG 13,5	Aluminium	Standard (Internal)	Standard	✓	✓	✓	✓	✓
C2		M20 x 1,5								
C3		3/4" NPT (F)								
C4		1/2" NPT (F)								
C8		Intrinsically safe (with Option "I") Ex ia IIC T6	M20 x 1,5	316 SS 2)						
C9	3/4" NPT (F)									
M0	Miniature Explosion-proof EEx d IIC T6 (IP65) 02 ATEX 2186X CSA & FM Pending	Wire leads (20"Length)	316 SS 2)	Standard (Wire leads 20"Length)	Not applicable	✓	✓	✓	✓ 3)	✓
W3	Explosion-proof ATEX & IECEx: Ex d II C T6..T5 Ex tD A21 T100°C IP66 CSA:Ex d II C T6..T5 FM:AExd II C T6..T5 IP66 NEMA Type 4X	3/4" NPT (F)	Aluminium	Standard In- & External	Standard	✓	✓	✓	✓	✓
W8		M20 x 1,5	316 SS 2)							
W9		3/4" NPT (F)								

1) See separate brochure BETAMINI for Ranges, Process Connections etc.

Enclosure "B2" only available with Range codes P...H, P...F and V...H.

2) Includes 316 SS sensor body and adjusting nut.

3) D...L and D...H type only.

4) All differentials except D...D-type.

PRESSURE SWITCHES

2 RANGES for Pressure switches

C3 - **P304L** - S1N - B1 - K1 - Y - X2

"Ranges" given here are valid for setpoints at increasing pressures (vacuum) in psi (in. wc). The "Deadband" values are the max. possible values for a standard micro & diaphragm/ O-ring and varies nearly linear with setpoint between indicated limits of range and should be multiplied by deadband multipliers as given in section 4 and 5, where appropriate. (For Fluid Power multiplier acc. to section 5 only). Selection of other than standard micro may influence lower end of range. For deadband calculation in combination with "SR"- and "SP"- micro, Consult Factory.

RANGE CODE	ADJUSTABLE RANGE		MAX. DEADBAND		MAX. OVERRANGE PRESSURE		PROOF PRESSURE	
	psi (in. wc)	bar [mbar]	psi (in. wc)	bar [mbar]	psi	bar	psi	bar
P 301 L ¹⁾	(0.8 - 6)	[2 - 15]	(0.4 - 0.8)	[1.1 - 1.9]	145	10	218	15
P 302 L ¹⁾	(0.4 - 40)	[10 - 100]	(1.0 - 1.4)	[2.5 - 3.5]	435	30	500	35
P 304 L	(8.0 - 96)	[20 - 240]	(2.4 - 3.6)	[6 - 9]				
P 306 L	(8.0 - 225)	[20 - 560]	(2.4 - 4.8)	[6 - 12]				
P 308 L	(10.0 - 522)	[25 - 1300]	(2.8 - 6.0)	[7 - 15]				
P 402 M	1.5 - 6	[100 - 400]	0.2 - 0.3	[15 - 20]	1800	125	2030	140
P 404 M	1.5 - 14	[100 - 950]	0.2 - 0.4	[15 - 30]				
P 406 M	1.7 - 33	[120 - 2300]	0.2 - 0.7	[16 - 50]				
P 408 M	2.2 - 78	[150 - 5400]	0.2 - 1.3	[16 - 90]				
P 502 H	4.4 - 23	0.3 - 1.6	0.9 - 1.4	[65 - 95]	2900	200	8700	600
P 504 H	5.8 - 51	0.4 - 3.5	0.9 - 2.3	[65 - 160]				
P 506 H	7.3 - 131	0.5 - 9.0	0.9 - 4.8	[65 - 330]				
P 508 H	10.2 - 312	0.7 - 21.5	1.0 - 11.8	[70 - 810]				
P 706 H	36.3 - 464	2.5 - 32	4.5 - 24.0	0.3 - 1.65	5800	400		
P 708 H	43.5 - 1103	3.0 - 76	4.5 - 54.0	0.3 - 3.75				
P 808 H	58.1 - 2467	4.0 - 170	11.6 - 138.0	0.8 - 9.5				
P 908 H	145.1 - 4354	10 - 300	29.0 - 283.0	2.0 - 19.5				
P 909 H	145.1 - 5080	10 - 350	29.0 - 270.0	2.0 - 25				

¹⁾ Only available with L1 –microswitch element.K1/G1 possible consult factory). Not available on M-series switches.

RANGES for Fluid power switches ¹⁾

RANGE CODE	ADJUSTABLE RANGE		MAX. DEADBAND		MAX. OVERRANGE PRESSURE		PROOF PRESSURE	
	psi	bar	psi	bar	psi	bar	psi	bar
P 904 F	147 - 800	12 - 55	50.8 - 87.0	3.5 - 6.0	9400	650	10160	700
P 906 F	232 - 1880	16 - 130	58.0 - 123.5	4.0 - 8.5				
P 908 F	290 - 4350	20 - 300	87.0 - 174.0	6 - 12				
P 918 F	435 - 7840	30 - 540	218.0 - 450.0	15 - 31				

¹⁾ Fluid Power switches are to be used on clean, lubricating fluids only.

RANGES for Vacuum switches

RANGE CODE	ADJUSTABLE RANGE (INCR. VAC. TO PRESS.) ¹⁾		MAX. DEADBAND (VAC. / PRESS.)		MAX. VACUUM		MAX. OVERRANGE PRESSURE		PROOF PRESSURE	
	psi (in. wc)	bar [mbar]	psi (in. wc)	bar [mbar]	psi	bar [mbar]	psi (in. wc)	bar	psi	bar
V 301 L	(-4 to -1.2)	[-10 to -3]	(0.4)	[1]	-7	[-500]	(145)	+10	218	+15
V 304 L	(-24/0/60)	[-60/0/+150]	(1.6/1.6/2.6)	[4/4/6.5]	-7	[-500]	(435)	+30	508	+35
	psi (in. hg)	bar [mbar]	psi (in. hg)	bar [mbar]	psi	bar [mbar]	psi (in. hg)	bar	psi	bar
V 404 M	(-12/0/12)	[-400/0/+400]	(0.5/0.5/0.7)	[16/16/25]	-14.5	-1	(1810)	+125	2030	+140
V 406 M	(-29/0/29)	[-980/0/+1000]	(0.9/0.9/1.2)	[30/30/40]						
V 506 H	-14/0/87	-1/0/+6	2.4/2.4/0.7	[80/80/25]	-14.5	-1	2900	+200	8700	+600

¹⁾ For setpoint around zero bar gauge, consult factory. (Note: Setpoint stability around zero bar cannot be guaranteed)

PRESSURE SWITCHES

2 RANGES for Differential switches

C3 - **D352H** - S1N - B1 - K1 - Y - X2

RANGE CODE	ADJUSTABLE RANGE DIFF. RANGE ¹⁾		TYPICAL DEADBAND ¹⁾		MAX. STATIC PRESSURE		MAX. OVERRANGE PRESSURE		PROOF PRESSURE	
	psi (in. wc)	bar [mbar]	psi (in. wc)	bar [mbar]	psi	bar	psi	bar	psi	bar
D 302 L	(5 - 30)	[12 - 75] ²⁾	(2.8)	[7]	435	30	435	30 ³⁾	500	35
D 304 L	(9 - 72)	[22 - 180]	(3.2)	[8]						
D 306 L	(10 - 180)	[25 - 450]	(4.4)	[11]						
D 309 L	(14 - 502)	[35 - 1250]	(6.0)	[15]						
D 402 M	4.4 - 14.5	0.3 - 1.0	2.2	0.15	145	10	2030	140 ⁴⁾	2030	140
D 404 M	7.3 - 36	0.5 - 2.5	2.9	0.2	725	50				
D 406 M	14.5 - 87	1.0 - 6.0								
D 408 M	14.5 - 210	1.0 - 14.5								
D 506 M	72.6 - 290	5 - 20	11.6	0.8	1450	100				
D 508 M	145 - 725	10 - 50								
D 608 M	145 - 1016	10 - 70	22.0	1.5	2030	140				
D 352 H	(32 - 64)	[80 - 160]	(10.0)	[25]	2900	200	2900	200 ⁴⁾	2900	200
D 354 H	(40 - 200)	[100 - 500]	(14.0)	[35]						
D 356 H	(48 - 582)	[120 - 1450]	(20.1)	[50]						
D 359 H	(60 - 1386)	[150 - 3450]	(30.1)	[75]						

RANGES for Bi-Directional

D 356 D	(40 - 602)	[100 - 1500]	(14.1 - 26.1)	[35 - 65]	2900	200	2900	200 ⁴⁾	2900	200
D 358 D	(40 - 1406)	[100 - 3500]	(18.1 - 46.2)	[45 - 115]						

NOTES:

- ¹⁾ Ranges and deadbands are given at 50% of Max. Static pressure. All differential pressure sensors are sensitive to static pressure, both for setpoint and deadband.
- ²⁾ Range only with L1 micro switch.
- ³⁾ P301L-D and D...L can withstand a differential pressure P-low max. 1 bar above P-High.
- ⁴⁾ D...M, D...H and D...D can sustain full High and Low-side reversal.

IN THE FOLLOWING TABLE THE ESTIMATED INFLUENCE FOR INCREASING STATIC PRESSURE IS GIVEN.

SENSOR	SETPOINT		DEADBAND	
	psi	bar	psi	bar
P 301 L - ... D	≈ + 0.04 InchWC/Psi	≈ + 0.1 mbar/bar	≈ + 0.04 InchWC/Psi	≈ + 0.1 mbar/bar
D...L	- 0.3 InchWC/Psi	- 0.7 mbar/bar	≈ - 0.04 InchWC/Psi	≈ - 0.1 mbar/bar
D...M	≈ + 1.2 InchWC/Psi	≈ + 3 mbar/bar	4 InchWC/Psi	+ 10 mbar/bar
D...H	-0.8 InchWC/Psi	- 2 mbar/bar	≈ -0.2 InchWC/Psi	≈ - 0.4 mbar/bar

Example: D...H-type Diff. setpoint: 1 bar (1000 mbar).

If static pressure increases 10 bar Diff.setpoint will be (10 x - 2 mbar) = - 20 mbar less = 980 mbar.

NOTE: For vacuum differential application consult your BETA Switch Representative.

PRESSURE SWITCHES

3 PROCESS CONNECTIONS

C3 - P304L - **S1N** - B1 - K1 - Y - X2

PROCESS CONNECT SIZE / CODE	AVAILABLE ON SENSOR ²⁾	ALUMINIUM		SS 316		MONEL		BRASS	
		NPT	BSP	NPT	BSP	NPT	BSP	NPT	BSP
1/4" F	F			S1N	S1B			B1N	B1B
	L & M D...L / M	A1N	A1B			M1N	M1B		
	H								
	D...H / D								
1/2" F	F			S2N	S2B			B2N	B2B
	L & M D...L / M	A2N	A2B			M2N	M2B		
	H								
1/2" M	L, M & H D...L / M			S7N	S7B	M7N	M7B		
Not for vacuum ¹⁾	1" F			S4N	S4B				
	2" F			S6N	S6B			B6N	B6N
	1" M			S8N	S8B				

Other materials such as P.V.C., Hastelloy, 316 SS Ti, Titanium etc. and other sizes and (Teflon lined) flanged connections are available.

1) Vacuum switches: Process conn. size max. 1/2". Vacuum piston & spring (both wetted) standard in 316 SS.

2) Standard process connection for

"Low & "Medium pressure sensor body	: A1N or A1B
"High pressure sensor body	: S1N or S1B
"Fluid power pressure sensor body	: B1N or B1B
Differential switches: D...H, D...D	: S1N or S1B only
D...L	: A1N or A1B; For Low side only
	High side; Only "L"-sensor connection

NOTES: Process connection according to NACE standards are available, consult your BETA Switch Representative.

NPT connections are tapered; BSP are parallel threaded.

PRESSURE SWITCHES

4 DIAPHRAGM / O-RINGS

C3 - P304L - S1N - **B1** - K1 - Y - X2

DIAPHRAGM/ O-RING CODE	DIAPHRAGM 6)		O-RING	USE 1)	DEADBAND MULTIPLIER
B1	Buna-N		Buna-N 2)	Standard water / oil (-22 °F to +176 °F).	1.0
E6	EPDM		EPDM 2)	Some hydraulic fluids.	1.0
K5	Kalrez		Kalrez 2)	Highly corrosive fluids.	1.5
M1	Monel		Buna-N	Seawater.	2.0
M2			Viton-A 5)	High temperature NOT below 32°F. 7)	
M4			PTFE 4)	Corrosive acids.	
M5			Kalrez	Highly corrosive and permeative acids.	
N3	Neoprene		Neoprene 2)	When required.	1.0
P1	PTFE (Polyimide coated with PTFE)		Buna-N	Oil / air / water.	1.5
P2			Viton-A 5)	High temperature NOT below 32°F. 7)	
P4			PTFE 4)	Corrosive acids.	
P5			Kalrez	Corrosive acids.	
S1	SS 316		Buna-N	Permeative gases.	2.0
S2			Viton-A 5)	High temperature NOT below 32°F. 7)	
S3			Neoprene	Permeative refrigerant gases.	
S4			PTFE 4)	Corrosive acids.	
S5			Kalrez	Highly corrosive and permeative acids.	
S6			EPDM	Steam.	
T1	Tantalum		Buna-N	Highly corrosive and permeativr gases and non-acid liquids. Select O-ring as required.	2.0
T2			Viton-A 5)		
T3			Neoprene		
T4			PTFE 4)		
T5			Kalrez		
V2	Viton-A		Viton-A 2) 5)	High temperature NOT below 32°F. 7)	1.5
S0	SS 316	Welded diaphragm	None 3)	Highly permeative gases.	3.0
M0	Monel				

¹⁾ Wetted parts are suggested for use on the service indicated. However they do not constitute a guarantee against corrosive or permeation since processes vary from plant to plant. Empirical experience by users should be the final guide. The diaphragm / O-Ring combinations are for process temperatures of -22 °F to +176 °F, unless otherwise indicated. For process temperatures beyond these limits please contact your BETA Switch Representative.

²⁾ Switches for fluid power applications are limited to these options (O-Ring only with 316 SS piston).

³⁾ Only for 1/4" & 1/2" process connections. Not available on vacuum switches. For other sizes and materials, consult your BETA Switch Representative.

⁴⁾ PTFE O-Ring not suitable for vacuum switches or vacuum conditions. (Wetted internal spring of Co-Cr-Ni alloy, comparable with Elgiloy).

⁵⁾ For process temperature > 212 °F, consult your BETA Switch Representative.

⁶⁾ Other diaphragm materials like Hastelloy available, consult your BETA Switch Representative.

⁷⁾ High temperature refers to max. 284°F at process connection.

Note:

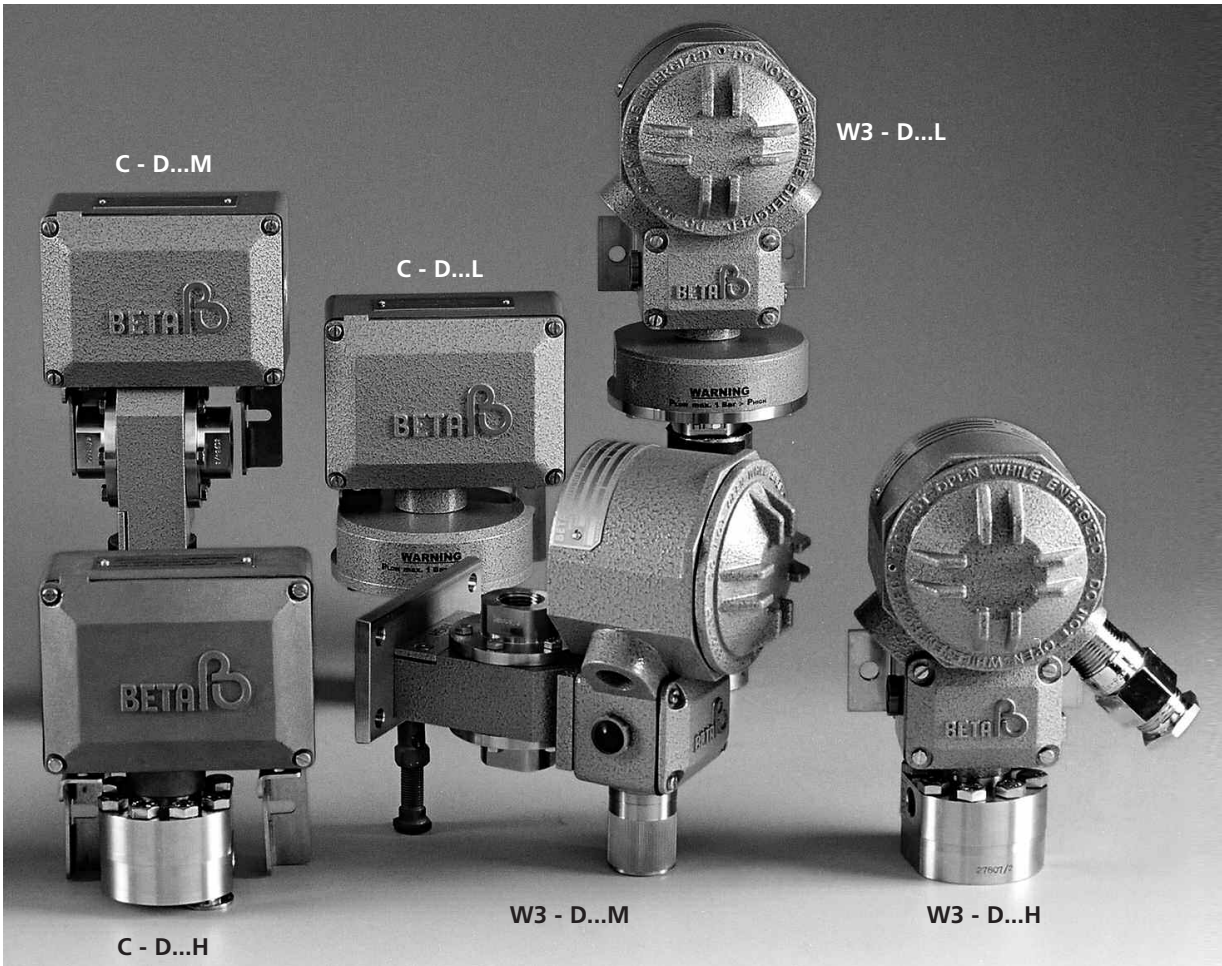
Wetted parts are not guaranteed against corrosion or permeation since processes vary from plant and concentration of harmful fluids, gasses or solids vary from time to time in a given process.

Empirical experience by users should be the final guide and alternate materials based on this are generally available.

DIFFERENTIAL PRESSURE SWITCHES

4 DIAPHRAGM / O-RINGS

C3 - D352H - S1N - **P1** - K1 - Y - X2



Differential Pressure Switches can use the same Diaphragm/O-ring combinations as Pressure Switches but we have to consider following:

TYPE	STANDARD	FOLLOWING COMBINATIONS ARE POSSIBLE
P 301 L-D	B1	All except welded diaphragm.
D...L	B1	All except with PTFE O-Ring and Welded diaphragm.
D...M	B1	All diaphragm and O-Ring combinations.
D...H	P1	All except B1, E6, K5, N3, V2, PTFE O-Ring and Welded diaphragm (M4, P4, S4, T4, S0, M0).
D...D	P1	

Note: Deadband Multiplier for Diaphragm/O-Ring and microswitch element is the same as for pressure switch.

PRESSURE AND TEMPERATURE SWITCHES

5 SWITCHING ELEMENTS

C3 - D352H - S1N - P1 - **K1** - Y - X2

SWITCHING ELEMENT CODE ¹⁾		USE	MAX. RATINGS (RES.)		DEADBAND MULTIPL.	
			VAC.	VDC	S.P.D.T.	D.P.D.T.
F1	DC-service	Environmental sealed (IP 66).	250 / 5A	28 / 5A	3.0	5.0
H1 ⁵⁾	Herm. sealed	(Inert gas filled) Dusty, corrosive environment.	125 / 1A	28 / 15A	5.0	6.5
K1 ⁴⁾	General-service	Standard.	480 / 15A	28 / 0.5A **	1.0	1.5
L1 ⁴⁾		Standard for P/D301L & P/D302L ranges.	480 / 10A	28 / 0.5A	1.0	-
M1 *		Standard on M-Series.	250 / 5A	30 / 0.1A	1.5	3.5
U1		Normal DC-service.	480 / 15A	125 / 0.5A	2.5	4.0
G1 ⁴⁾	Low voltage circuit (Gold contacts)	For use in H ₂ S environment and/or for (EEx)i applications. ²⁾	125 / 1A	28 / 0.5A **	1.5	2.0
Y1 *			125 / 0.1A	30 / 0.1A	3.0	4.5
O1 *	Gold contacts	Environmental proof (IP 66).	250 / 0.1A	30 / 0.1A	1.5	3.0
N1 *	Silver contacts	Environmental proof (IP 66).	250 / 2A	30 / 2A	1.5	3.0
Z1 *	For higher (amb.) temp.	Elgiloy spring. For corrosive environment.	250 / 5A	125 / 0.3A	3.0	4.5
SP	Adjustable deadband	Small adjustable deadband.	250 / 15A	-	1 to 3	S.P.D.T. only
SR ^{3) 5) 6)}		Wide adjustable deadband.	480 / 20A	-	2 to 6	
SE ³⁾	Manuel reset	Actuates automatic on increasing pressure.	480 / 15A	125 / 0.5A	1.5	
SG ³⁾	Manuel reset	Actuates automatic on decreasing pressure.	480 / 15A	125 / 0.5A	1.5	
SV	DC-service	High DC cap. magnetic blow out.	125 / 10A	125 / 10A	4.0	Single only
SA ³⁾	Pneumatic ⁷⁾	Normally closed (NC).	For use in explosive atm. Ex II 2G c T6 KEMA 04ATEX4060		Consult BETA	
SB ³⁾		Normally open (NO).			Switch Rep.	

¹⁾ For D.P.D.T. action second code figure should be specified as "2" (Example: K1 = S.P.D.T. / K2 = D.P.D.T.).

²⁾ Capacitive and / or inductive load may influence the setpoint repeatability.

³⁾ Not on Differential pressure switches (except for "SR"-micro in "W"-enclosure).

⁴⁾ VDE certified acc. to. DIN EN 61 058-1:1992+A1:1993.

⁵⁾ "SR"-and "SL"-micro may influence the low end of range.

⁶⁾ "SR"-micro in combination with metal diaphragm: standard with option "P".

⁷⁾ For pneumatic element ask for our separate Air Relay documentation.

* Subminiature.

** DC rating not U.L. listed, although experience and third party testing confirm the DC voltage ratings.
Consult your BETA Switch Representative.

PRESSURE AND TEMPERATURE SWITCHES

5 SWITCHING ELEMENTS VS. ENCLOSURES

C3 - P304L - S1N - B1 - **K1** - Y - X2

SWITCHING ELEMENT		ENCLOSURE		
		C1, C2, C3, C4, C8, C9	M0	W3, W8, W9
		Internal Earth Ground Terminal	Earth Ground via wired lead	Internal & External Earth Ground Terminal
S. P. D. T. (SINGLE SWITCHING ELEMENT)	SE	3-WAY TERMINAL BLOCK		
	SG			
	SP			
	SR			SCREW.TERM.BL.
	SV			4-WAY TERM. BL.
	G1			4-WAY TERMINAL BLOCK
	H1			
	K1			
	L1			
	U1			
	O1			
	N1			
	F1	3-WAY TERMINAL BLOCK	4-WIRE LEADS	4-WAY TERMINAL BLOCK
	M1			
	Y1			
	Z1			
D. P. D. T. (DOUBLE SWITCHING ELEMENT)	F2	6-WAY TERMINAL BLOCK	7-WIRE LEADS	7-WAY TERMINAL BLOCK
	M2			
	Y2			
	Z2			
	G2	6-WAY TERMINAL BLOCK		
	H2			
	K2			
	U2			
	O2			7-WAY TERMINAL BLOCK
	N2			
AIR RELAY	SA *	1/4 NPT. (F) CONNECTIONS		
	SB *			

	POSSIBLE
	NOT PRACTICAL
	NOT POSSIBLE

* "SA" / "SB" only with C1- / C8-enclosure.

The standard switching elements are:
 "K1" for C-, V- and W- enclosures.
 "M1" for M-enclosures.

PRESSURE SWITCHES

6 OPTIONS

C3 - D352H - S1N - P1 - K1 - **Y** - X2

OPTION CODE	DESCRIPTION
B	Industrial cleaning of "wetted" parts for oxygen services.
C	Cable gland (weather proof IP65, EExe, EExi or EExd in acc. with classification of enclosure).
I	Intrinsically safe application (EEx)i. Only on "C"-Series.
M	Vacuum protector plate (Not on Vacuum-, Fluid Power-, D...H- and D...D Switch) (Standard on D...L).
P	Recommended on strong process pulsations. Only on "H"-Sensors. Not in combination with EPDM, Neoprene, Viton-A and Kalrez diaphragms.
S	Stainless steel Tag-clipped to enclosure. Tag has 3 lines (20 characters per line).
V	Fungicidal varnish coating (internal).
Y	Epoxy coating of switch (external). Only in combination SS 316 process connection.

Tag no. space on nameplates — **added free of charge**

Standard nameplate C-Series : 2 lines with 18 characters or spaces + 1 line
with 14 characters or spaces
W-Series : 1 line with 18 characters or spaces

7 SPECIALS

C3 - D352H - S1N - P1 - K1 - Y - **X2**

We can incorporate numerous specials to meet your requirements. These special requirements are indicated by the letter "X" in the model code or at the end of the model number, followed by a figure showing the number of specials.

Example:

"X1" at the end of model reference means one special.

"X2" at the end of model reference means two specials have been incorporated.

Details of each special must always be specified completely on enquiries and orders.

Example of specials for BETA switches are:

- Flanged connection 3 /4" to 3" (ANSI or DIN).
- Range indication in Pa, Kg/cm², mm H₂O or mm Hg.
- Breakwire resistor acc E12 range for line monitoring.
- Hirschmann or Harting Connector.
- Moisture inhibitor.
- Chemical seal.

SELECT YOUR BETA SWITCH

1 ENCLOSURES

C3	-	P506H	-	S1B	-	S2	-	K1	-	Y	-	X2
----	---	-------	---	-----	---	----	---	----	---	---	---	----

See section **1. Enclosure** on page 5.

2 RANGES

C3	-	P506H	-	S1B	-	S2	-	K1	-	Y	-	X2
----	---	-------	---	-----	---	----	---	----	---	---	---	----

See section **2. Range** on page 6, and 7.

3 PROCESS CONNECTIONS (Material / Size / Thread)

C3	-	P506H	-	S1B	-	S2	-	K1	-	Y	-	X2
----	---	-------	---	-----	---	----	---	----	---	---	---	----

See section **3. Process connections** on page 8.

4 DIAPHRAGM / O-RINGS

C3	-	P506H	-	S1B	-	S2	-	K1	-	Y	-	X2
----	---	-------	---	-----	---	----	---	----	---	---	---	----

See section **4. Diaphragm / O-ring** on page 9 and 10.

5 SWITCHING ELEMENTS

C3	-	P506H	-	S1B	-	S2	-	K1	-	Y	-	X2
----	---	-------	---	-----	---	----	---	----	---	---	---	----

See section **5. Switching Elements** on page 11 and 12.

Selection of your switch is now completed.

If required: For "Optional" and "Special" accessories

Options: See section "**6. Options**" on page 13.

Specials: See section "**7. Specials**" on page 13.

TEMPERATURE SWITCHES

BETA TEMPERATURE SWITCH



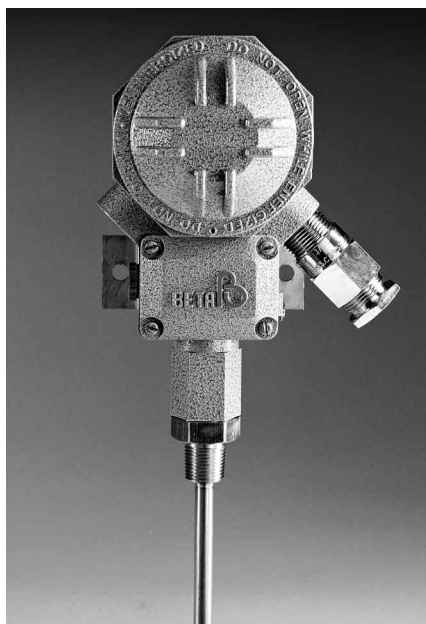
The BETA Temperature Switch is a pressure switch enclosure incorporating a sealed 2-phase (vapor/liquid) temperature sensor.

When the temperature of the process increases, the vapor pressure of the liquid also increases. If this vapor pressure exceeds the pre-adjusted setpoint of the "pressure" switch, it will actuate the switching element.

- Available as direct- or capillary mount sensor.
- In weathertight and explosion proof models (ATEX approved).
- Fits into most standard thermowells (10mm bore).
- No need for ambient temperature compensation (no setpoint shift).
- Excellent repeatability/small dead-band.
- All 316 stainless steel sensor and capillary (SS armored).
- Filling system of gas/liquid acc. to SAMA-Class II C.

"C"-Series with Capillary type sensor.

EXPLOSION-PROOF TEMPERATURE SWITCH



ATEX, IECEx, CSA & FM, approved up to the highest classification (see page 20).

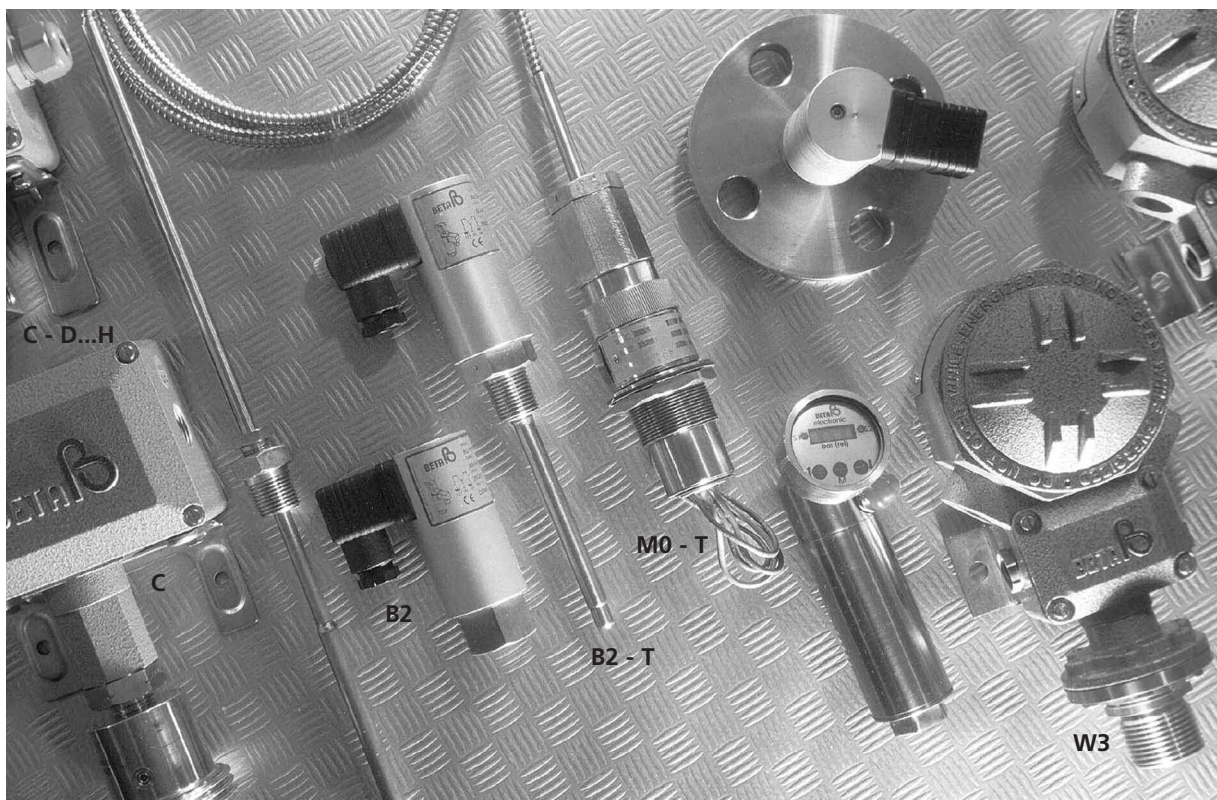
With the "C"-, "M"- and "W"-enclosures the BETA Temperature Switch is approved by ATEX, IECEx, CSA & FM according to IEC, CSA and FM Standards.

"W"-Series with Direct mount type sensor.

TEMPERATURE SWITCHES

1 ENCLOSURES

C3 - T548H - D00 - S0 - K1 - Y - X2



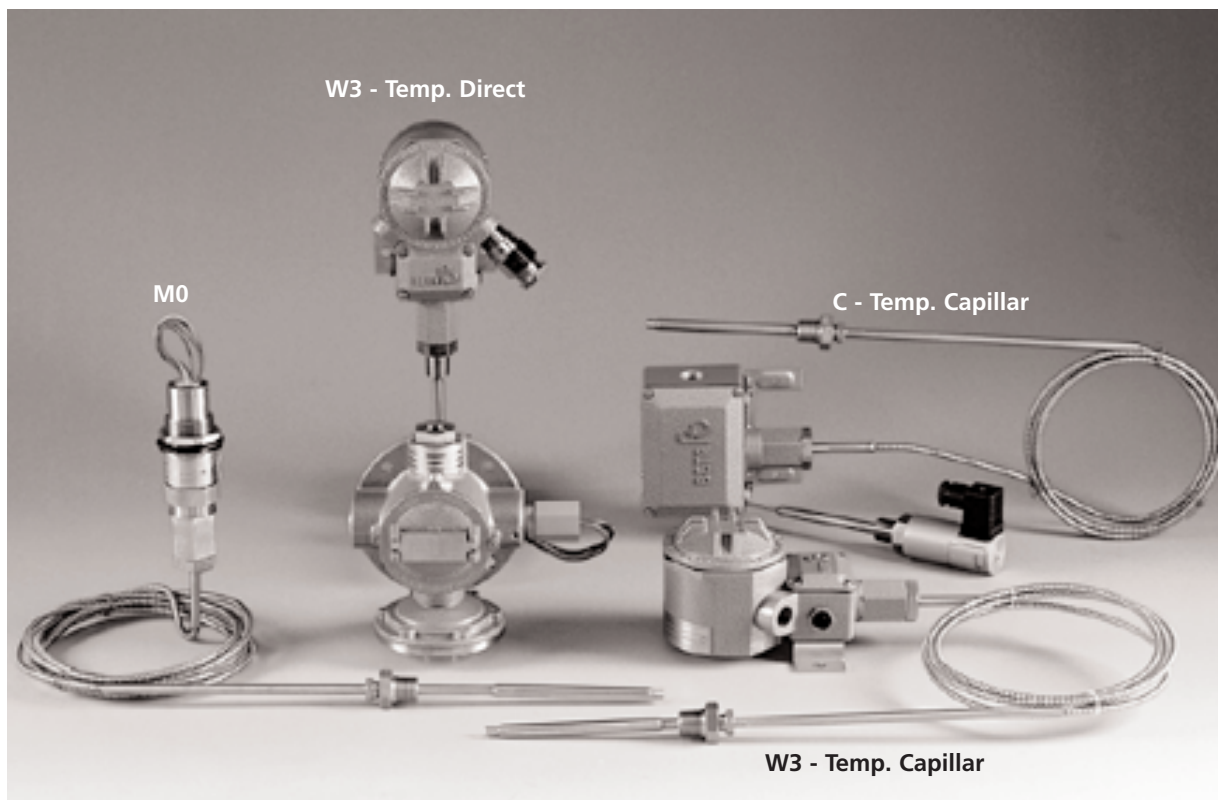
ENCLOSURE CODE	CLASSIFICATION	ELECTRIAL COND. CONN.	MATERIAL	EARTH TERMINAL	TERM. BLOCK
B2	Weathertight Miniature (IP65)	Hirschmann Plug conn. DIN 43650-A	Aluminium	Standard (Via plug)	Not applicable
C1	Weathertight (IP66) CSA & FM Type 4X Intrinsically safe (with Option "I") Ex ia IIC T6	PG 13.5	Aluminium	Standard (Internal)	Standard
C2		M20 x 1.5			
C3		3/4" NPT (F)			
C4		1/2" NPT (F)			
C8		M20 x 1.5	316 SS 1)		
C9		3/4" NPT (F)			
M0	Miniature Explosion-proof EEx d IIC T6 (IP65) 02 ATEX 2189X CSA & FM Pending	Wire leads (20"Length)	316 SS 1)	Standard (Wire leads 20"Length)	Not applicable
W3	Explosion-proof ATEX & IECEx: Ex d II C T6...T5 Ex tD A21 T100°C, IP66 CSA: Ex d II C T6..T5 FM: AExd II C T6..T5 IP66 NEMA Type 4X	3/4" NPT (F)	Aluminium	Standard In- & External	Standard
W8		M20 x 1.5	316 SS 1)		
W9		3/4" NPT (F)			

1) Includes 316 SS sensor body and adjusting nut.

TEMPERATURE SWITCHES

2 RANGES

C3 - **T548H** - D00 - S0 - K1 - Y - X2



RANGE CODE	ADJUSTABLE RANGE		MAX. DEADBAND ³⁾		MAX. TEMPERATURE		PROOF TEMPERATURE		MAX. PROCESS PRESSURE	
	°F	°C	°F	°C	°F	°C	°F	°C	psi	bar
T 528 H	-40 / +104	-40 / +40	37	3	+257	+125	+392	+200	2,540	175
T 548 H	+32 / +203	0 / +95			+356	+180	+392	+200		
T 568 H ¹⁾	+140 / +356	+60 / +180			+572	+300	+662	+350		
T 588 H ²⁾	+320 / +572	+160 / +300	38	3.5	+752	+400	+842	+450		

¹⁾ In case process temperature > 285 °F, Direct mount sensing bulb is not recommended.

²⁾ Not in combination with Direct mount sensing bulb.

³⁾ For deadband calculation in combination with "SR"- and "SP"- micro, Consult Factory.

TEMPERATURE SWITCHES

3 SENSOR BULBS

C3 - T548H - **D00** - S0 - K1 - Y - X2

PROCESS CONNECTION	SENSOR CODE	TYPE OF TEMPERATURE SENSING BULB	
1/2" NPT (M)	D00	Direct mount.	128 mm lenght.
	D02		225 mm lenght.
	C02	Capillary mount.	2 m. capillary lenght.
	C03		3 m. capillary lenght.
	C05		5 m. capillary lenght.
	C10		10 m. capillary lenght.
	CXX		Special capillary lenght.
			¹⁾

All 316 SS stainless steel sensor, capillary (304 SS armored) and compression fitting.

¹⁾ Not in combination with range T588H (+320/+572 °F), not recommended with T568H in case of process temperature >284 °F.

²⁾ Length of capillary should be specified, consult your BETA Switch Representative.

4 DIAPHRAGM / O-RINGS

C3 - T548H - D00 - **S0** - K1 - Y - X2

All temperature switches have "S0" welded diaphragm.

5 SWITCHING ELEMENTS

C3 - T548H - D00 - S0 - **K1** - Y - X2

The standard Switching elements are: "K1" for C -, V - and W - enclosures
"M1" for M - enclosures

Deadband Multiplier microswitch element same as for pressure switch.

For other available switching elements / and more technical information see **5** on pages 11 and 12.

TEMPERATURE SWITCHES

6 OPTIONS

C3 - T548H - D00 - S0 - K1 - **Y** - X2

OPTION CODE	DESCRIPTION
C	Cable gland (weather proof IP65, EExe, EExi or EExd in acc. with classification of enclosure).
I	Intrinsically safe application (EExi). Only on "C"-Series.
S	Stainless steel Tag-clipped to enclosure. Tag has 3 lines (20 characters per line).
V	Fungicidal varnish coating (internal).
Y	Epoxy coating of enclosure and sensorbody (external).

Tag no. space on nameplates — **added free of charge**

Standard nameplate C-Series : 2 lines with 18 characters or spaces
+ 1 line with 14 characters or spaces
M- and W-Series : 1 line with 18 characters or spaces

7 SPECIALS

C3 - T548H - D00 - S0 - K1 - Y - **X2**

We can incorporate numerous specials to meet your requirements.
These special requirements are indicated by the letter "X" in the model code or at the end of the model number, followed by a figure showing the number of specials.

Example:

"X1" at the end of model reference means one special.

"X2" at the end of model reference means two specials have been incorporated.

Details of each special must always be specified completely on enquiries and orders.

BETA SWITCHES FOR HAZARDOUS AREA

BETA offers complete line of switches for (classified) hazardous locations!

The "BETA Switch", well known as a safety instrument, adds an extra dimension to industrial safety by having area approval up to the highest classification by ATEX, IECEx, CSA and FM.

- Worldwide agency approvals.
- "User Friendly" Modifications – Standard features incorporated for your safety.
- Very wide rangeability with 100% accuracy over the full range – Fewer switches required to meet customers specifications / requirements / needs.
- Only 3 process wetted parts – Check with us before considering expensive Chemical Seals.
- Very high overrange pressures – No setpoint shift or damage to sensor.
- No maintenance.
- Wetted parts to NACE standard available.

For W-Series

ATEX: Cert.: KEMA 02 ATEX 2186

Ex II 2G Ex d II C T6 (-40 to +158 °F)...T5 (-40 to +176 °F)

Ex II 2D Ex tD A21 IP66 T100 °C

IECEx: Cert.: KEM 07.0034

Ex d II C T6...T5

Ex tD A21 T100 °C IP66

CSA: Cert.:1873316

Class I, Div. 1, Groups B, C, D T6...T5 (T6: 158 °F/ T5: 176 °F)

Class II, III, Div.1, Groups E, F and G

Ex d II C T6...T5

FM: Cert.:3028962

Class I, Div. 1, Groups A, B, C and D

Class II, Div. 1, Groups E, F and G

Class III, T6...T5

AExd IIC T6...T5, IP66 NEMA Type 4X

For C-Series Intrinsically safe

ATEX: Cert.: KEMA 02 ATEX 1190X

Ex II 1G EEx ia IIC T4...T6

Ex II 2G EEx ib IIC T4...T6

II 1 D T85 °C (185 °F)

II 2 D T85 °C (185 °F)

IECEx: Cert.: KEM 07.0024X

Type of protection: ia and iaD

Zone O Ex ia IIC T6

Ex iaD 20 IP66 T85 °C (185 °F)

CSA: Cert.:1891054

Acc. to Class 2258 04

IS Class I, II, III, Div.1, Groups A, B, C, D, E, F and G

Ex ia IIC T6 T85 °C (185 °F)

Enclosure Type 4X

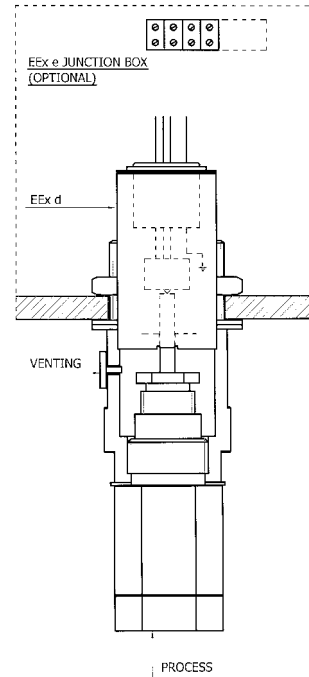
FM: Pending

BETA SWITCHES FOR HAZARDOUS AREA

M-Series (Ex II 2G EEx ed IIC T6) (CSA & FM Pending)



"MINEX"-Series



"M"-Series (Ex II 2G EEx ed IIC T6)

The "M"-series stainless steel Mini Explosion-proof switch is specially designed for Offshore applications.

ATEX approved: KEMA 02 ATEX 2189 X (EN 50 014 / 018 / 019)
(-4 °C to +104 °F / T6)

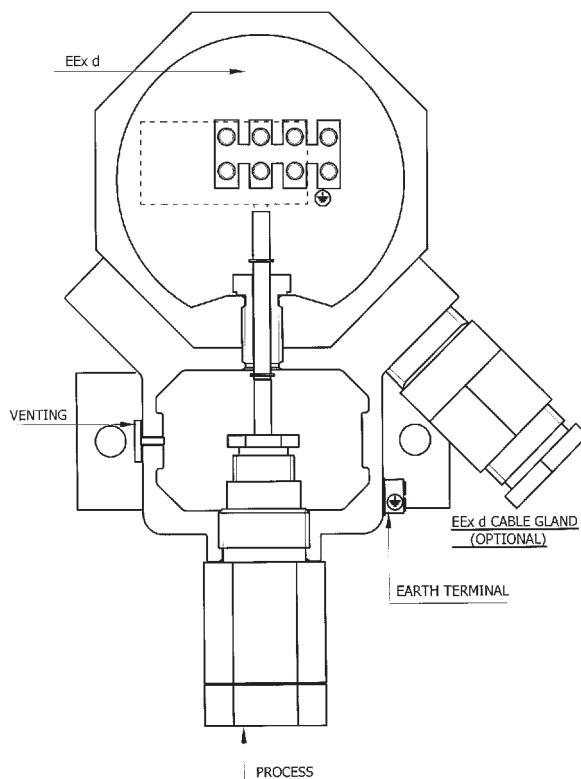
- Available as Pressure-, Hydraulic-, Vacuum-, Differential Pressure (only "D...L" and "D...H"-series) and Temperature switch.
- All ranges (except for P301L and P302L) available.
- S.P.D.T. and D.P.D.T. execution available.
- Highest overrange protection.
- Easy installation of multiple switches in (optional) EExe box (Min. installation space).
- Easy field adjustment.

BETA SWITCHES FOR HAZARDOUS AREA

W-Series -ATEX, IECEx, CSA and FM approved (see also page 20)



"W"-Series



"W"-Series

The "W"-series is a worldwide best seller.

Separate adjustment compartment allows easy field calibration.

Due to the wide selection of materials and components parts, virtually all applications can be covered.

ATEX approved: KEMA 02 ATEX 2186

* For Gas : Ex II 2G Ex d IIC T6
For Dust : Ex II 2D Ex tD A21 IP 66 T100°C

CSA No.: 1873316

Ex d IIC T6...T5

FM No.: 3028962

AEx d IIC T6...T5

IECEx No.: KEM07.0034

Ex II 2D Ex tD A21 T100°C IP66

(For more information see also page 20)

- Aluminium or 316 SS enclosure.
- Separate adjustment compartment.
- Available as Pressure-, Hydraulic-, Vacuum-, Differential pressure- and Temperature switch.
- All ranges available.
- Highest overrange protection.
- Excellent for field mounting. (2" Pipe mounting bracket available)
- Extremely rugged powder coated enclosure which is suitable for tough offshore applications. (1000 hrs. Salt spray test acc. to DIN 50021, IEC 60068-2-11 or ASTM B117-90)

BETA SWITCHES FOR HAZARDOUS AREA

C-Series (Intrinsically safe) -ATEX, IECEx, CSA approved (FM pending) (see also page 20)



"C"-Series

BETA "C" - Series with option "I" for intrinsically safe systems

BETA has its "C"-Series switches with option "I" certified by KEMA

acc. to NEN EN IEC 60079-0 / EN 50 020 for **Ex II 1G/D EEx ia IIC T4...T6 T 85 °C** or

Ex II 2G/D EEx ib IIC T4...T6 T 85 °C.

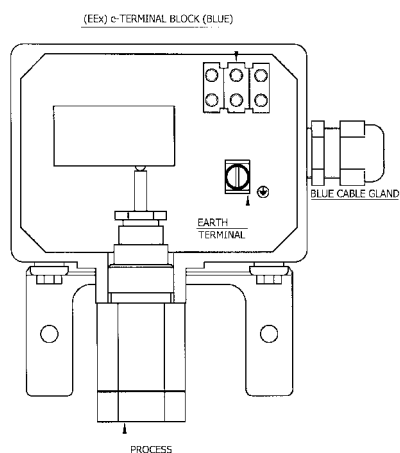
ATEX approved: KEMA 02 ATEX 1190X (-40 to +176°F)

IECEx approved: KEM 07.0024X (-40 to +185°F)

CSA approved: Cert.No.: 1891054 (-40 to +185°F)

FM Pending

(For more information see also page 20)



"C"-Series (Intrinsically safe application EEx i).

This option includes all required installation materials including a blue colored EEx e approved terminal block and the - (standard) earth - terminal.

Option "I" in accordance with art. 9 of the ATEX Directive 94/9/EC (EEx ia/ib IIC) which are related to insulation, clearance, creepage distances and enclosure type whereby a max. peak voltage of 90 V / 3,3A is allowed.

Please note following:

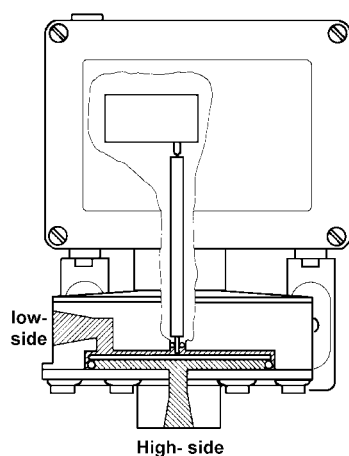
When switch is ordered with cable gland (option "C") we will automatically install the EEx i blue cable gland (see drawing). Due to low current used in I.S. systems we recommend the use of switching elements with gold contacts (code "G1", "O1" or "Y1"). It is not mandatory.

BETA DIFFERENTIAL PRESSURE SWITCHES

The "USER FRIENDLY" generation of BETA switches offers you a complete range of Differential Pressure Switches.

LOW RANGE

"D... L"-SERIES

**Principle:**

As pressure switch, with sealed Aluminium sensorbody (optional in 316 SS).

Range:

12 - 1250 mbar. (4.8 - 500 in. wc)

Max. Static Pressure:

30 bar. (435 psi)

Application:

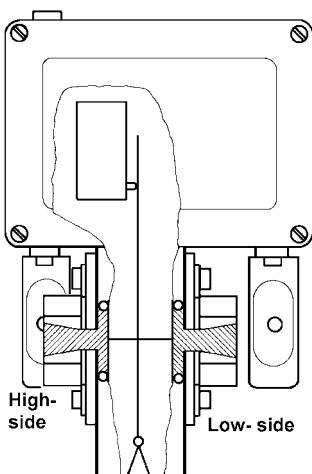
Dry clean air, inert gases and clean non-corr. fluids and gases.

Execution:

Weathertight IP 66 (C-enclosure),
EEx i a/b (C-enclosure + option I),
EEx ed (M-enclosure),
EEx d (W-enclosure).

GENERAL PURPOSE

"D... M"-SERIES

**Principle:**

2 x piston/diaphragm type with separate sealing for High and Low.

Range:

0,3 – 70 bar. (4.4 - 1400 psi)

Max. Static Pressure:

140 bar. (2030 psi)

Application:

Fluid & gas applications which are chemically compatible and are within the switch range.

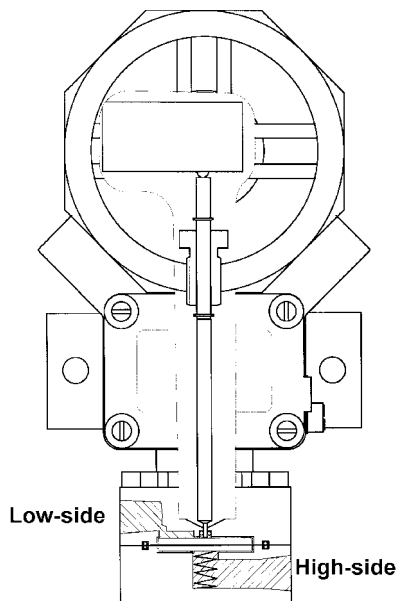
Execution:

Weathertight IP 66 (C-enclosure),
EEx i a/b (C-enclosure + option I),
EEx d (W-enclosure).

BETA DIFFERENTIAL PRESSURE SWITCHES

LOW RANGE / HIGH STATIC

"D... H"-SERIES

**Principle:**

Piston type with single diaphragm, sealed in 316 SS sensorbody.

Range:

80 – 3450 mbar. (32 - 1390 in. wc)

Max. Static Pressure:

200 bar. (2900 psi)

Application:

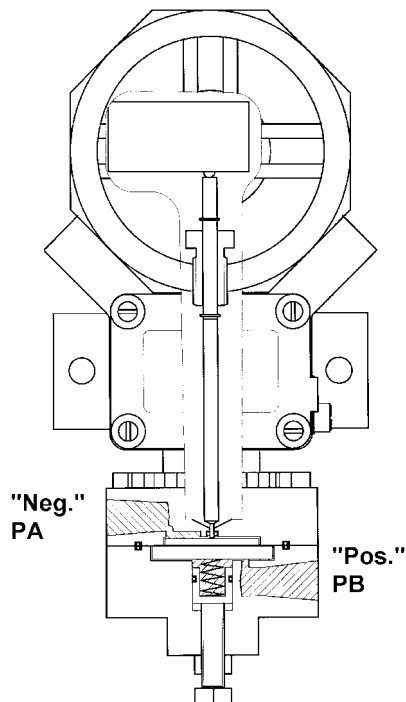
Clean fluids and gases*, provided acceptable choice of wetted parts is within our range.

Execution:

Weathertight IP 66 (C-enclosure),
Ex i a/b (C-enclosure + option I),
Ex ed (M-enclosure),
Ex d (W-enclosure).

LOW RANGE / HIGH STATIC

"D... D"-SERIES

**Bi-Directional Differential Pressure Switch****Principle:**

Piston type with single diaphragm, sealed in 316 SS sensorbody.

Range:

0,1 – 3,5 bar (40 - 600 in. wc)

Max. Static Pressure:

200 bar (2900 psi)

Application:

Clean fluids and gases*, provided acceptable choice of wetted parts is within our range.

Typical application:

Natural gas pipelines, safe guarding high pressure pipeline valves against being opened at too high differential pressure from either side.

Execution:

Weathertight IP 66 (C-enclosure),
Ex i a/b (C-enclosure + option I),
Ex d (W-enclosure).

* "Clean fluids and gases", must be free of particles > 40µm, filters (not included) are recommended in case of contaminated medium.

A differential pressure switch is a "dead end" instrument, so a simple filter with fine mesh will work.

BETA PRESSURE & TEMP. SWITCH - CERTIFICATIONS

EXPLOSIONPROOF CERTIFICATIONS

ATEX – Ex II 2G Ex d IIC T6...T5	for W-Series.
Ex II 2D Ex tD A21 T100°C	
ATEX – EEx ed IIC T6	for M-Series.
ATEX – Ex II 1G EEx ia IIC T4...T6	for C-Series (intrinsically safe).
Ex II 2G EEx ib IIC T4...T6	
II 1D T85 °C (185 °F)	
II 2D T85 °C (185 °F)	
ATEX – EEx II 2 G c T6	for Air Relay SA/SB.
FM – AExd IIC T6...T5	for W-Series.
CSA – Exd IIC T6...T5	for W-Series.
CSA – Ex ia IIC T6 T85 °C (185 °F)	for C-Series (intrinsically safe).
IECEX – Ex d IIC T6...T5	for W-Series.
Ex tD A21 T100 °C	
IECEX – Zone O Ex ia IIC T6	for C-Series intrinsically safe.
Ex ia D 20 IP66 T85 °C	

And more available for different countries like Japan, Korea, South-Africa, Australia etc..

MARINE APPROVALS

RINA	for B- and C-Series.
G.L.	for C-Series.

FOR GAS, FUEL, WATER AND STEAM

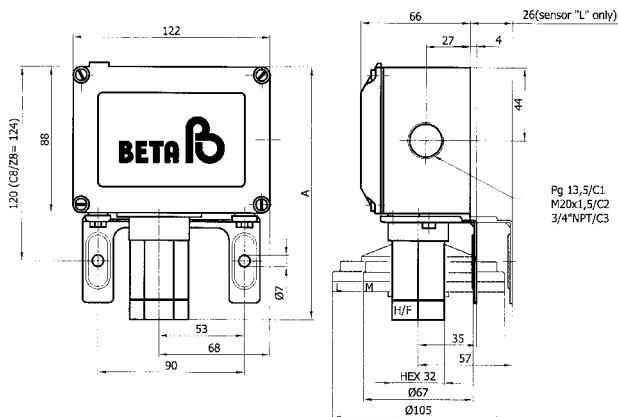
PED CE 0035 - C-and W-Series.

More certificates/reports are available. Please consult your BETA Switch Representative.



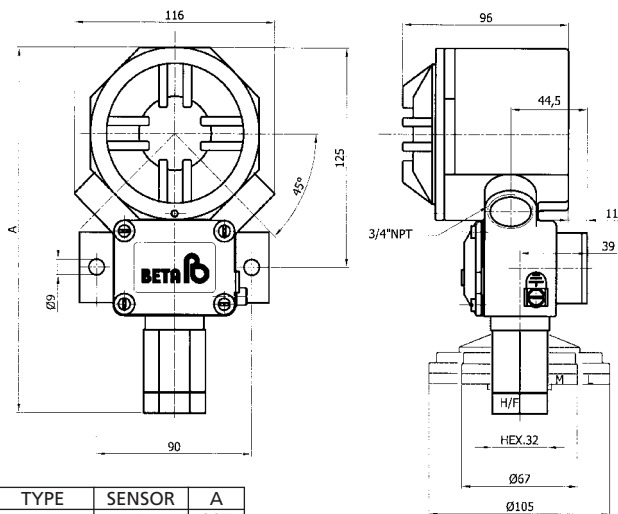
DIMENSIONS

"C."-Series: Pressure & Vacuum



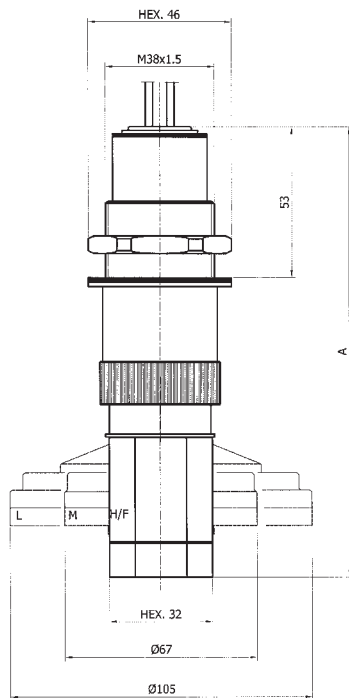
TYPE	SENSOR	A
PRESSURE SWITCH	L	152
	M	152
	H	152
	F	160
VACUUM SWITCH	L	173
	M	173
	H	164

"W."-Series: Pressure & Vacuum



TYPE	SENSOR	A
PRESSURE SWITCH	L	207
	M	207
	H	207
	F	215
VACUUM SWITCH	L	228
	M	228
	H	222

"M0"-Series: Pressure & Vacuum

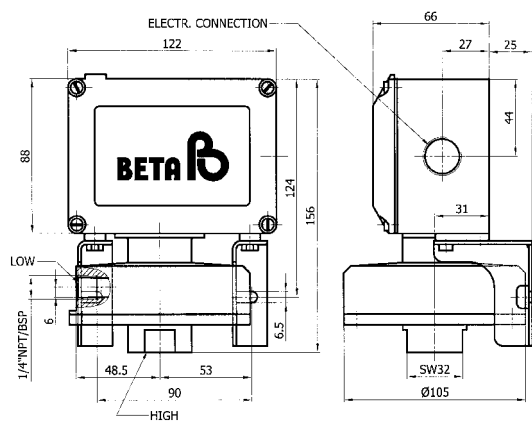


TYPE	SENSOR	A
PRESSURE SWITCH	L	155
	M	155
	H	155
	F	163
VACUUM SWITCH	L	175
	M	175
	H	169

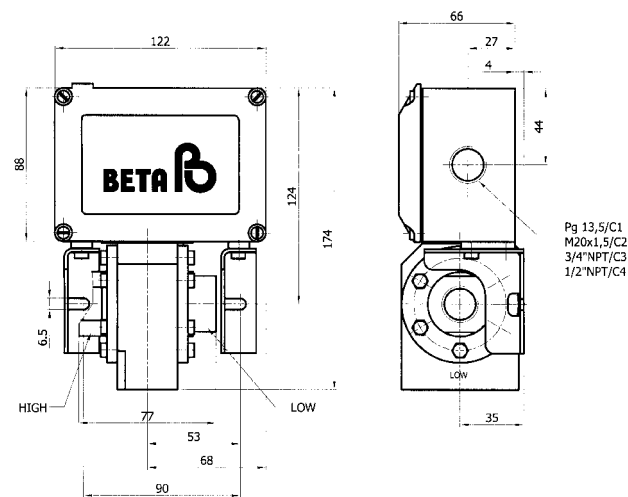
Dimensions given here are for 1/4" and 1/2" (F) process connections: For "H"-sensor with 1/2" (F) add 4 mm on "A" dimension. Sizes in mm, tolerances $\pm 1,5$ mm.

DIMENSIONS

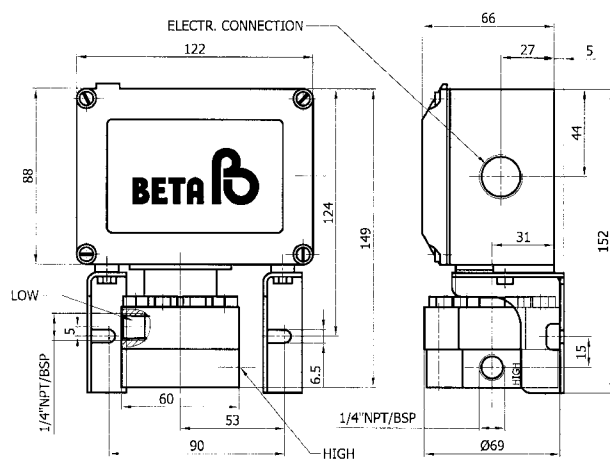
"C."-Series: Differential "D...L"



"C."-Series: Differential "D...M"

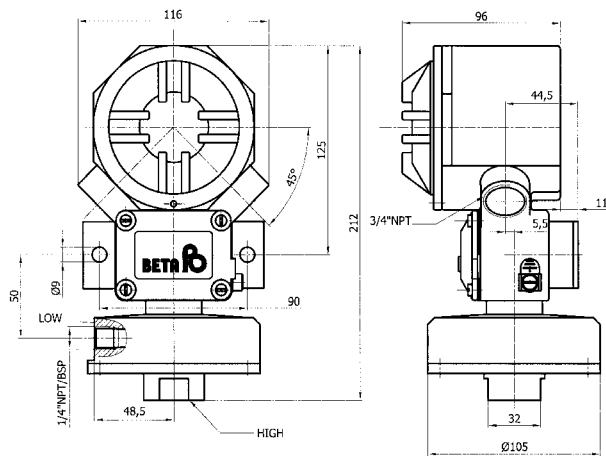


"C."-Series: Differential "D...H"

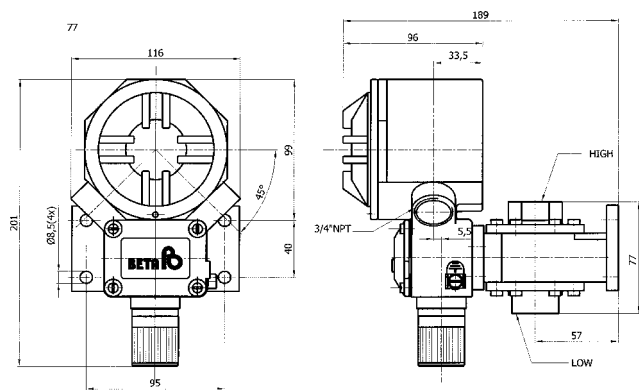


DIMENSIONS

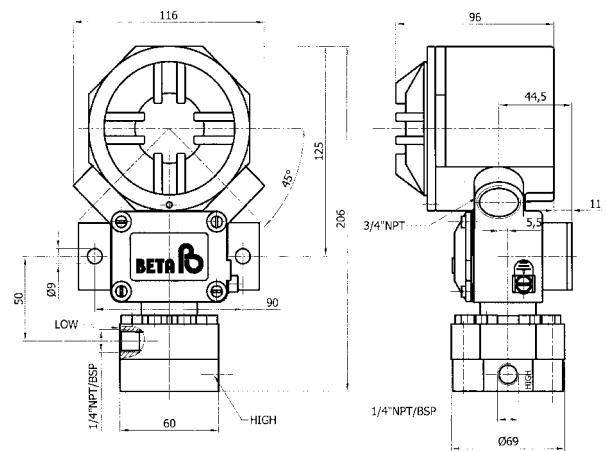
"W."-Series: Differential "D...L"



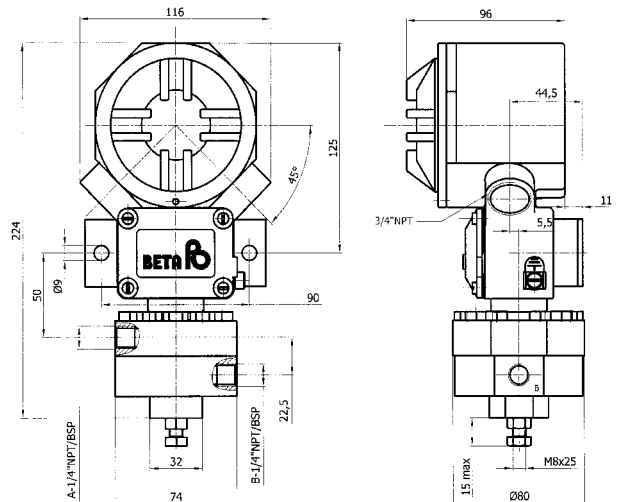
"W."-Series: Differential "D...M"



"W."-Series Differential "D...H"



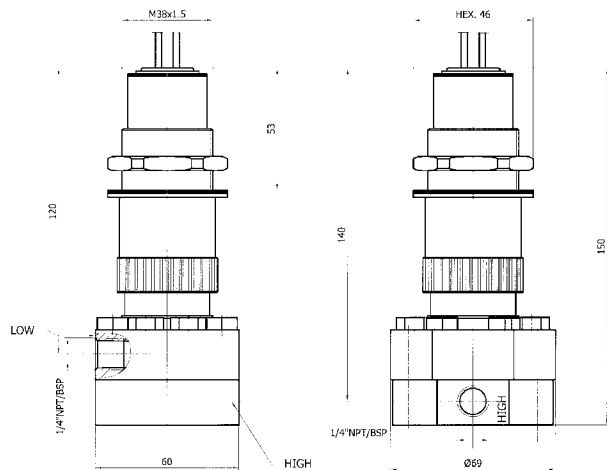
"W."-Series: Differential "D...D"



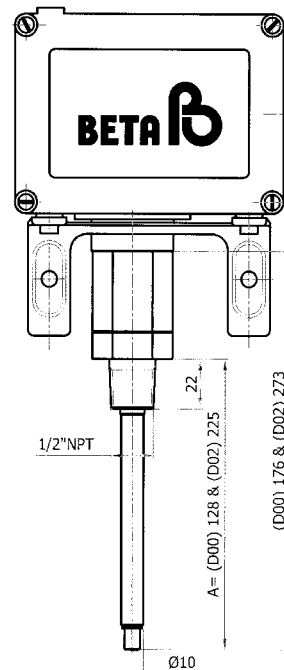
Dimensions given here are for 1/4" and 1/2" (F) process connections: For "H"-sensor with 1/2" (F) add 4 mm on "A" dimension. Sizes in mm, tolerances $\pm 1,5$ mm.

DIMENSIONS

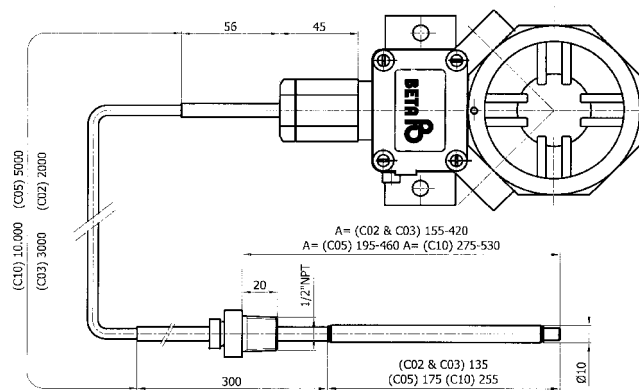
"M0"-Series: Differential "D...H"



"C."-Series: Temperature "Direct" mount



"W."-Series: Temperature "Capillary" mount

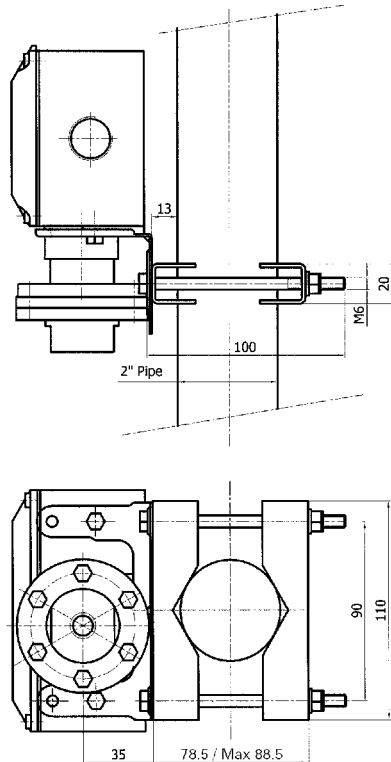


Dimensions given here are for 1/4" and 1/2" (F) process connections: For "H"-sensor with 1/2" (F) add 4 mm on "A" dimension. Sizes in mm, tolerances $\pm 1,5$ mm.

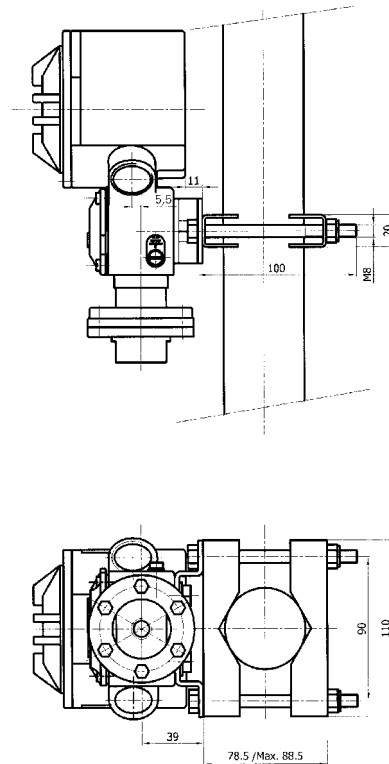
ACCESSORIES

2" Pipe mount bracket (304 SS)

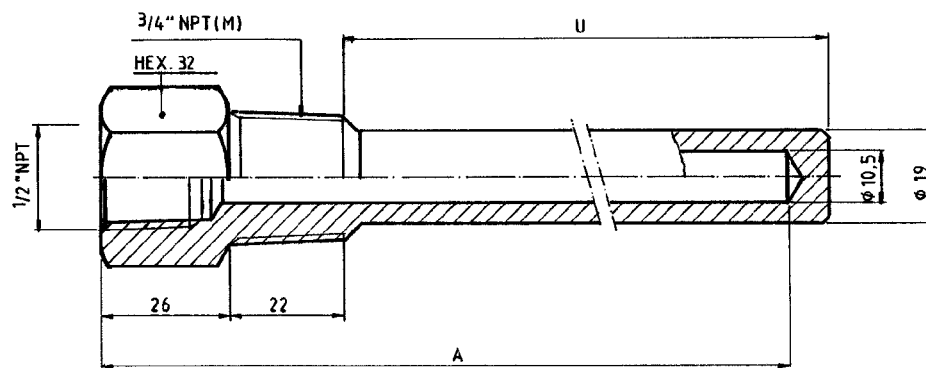
"C"-Series



"W."-Series



Thermowell (316 SS)



Standard BETA Thermowell

CODE	INSERTION LENGTH U (MM)	INSERTION ELEMENT LENGTH A (MM)	FIT TO BETA TEMP. SENSING BULB
TW 11	115	155	D00, C02, C03
TW 15	155	195	C02, C03, C05
TW 19	190	228	D02, C02, C03, C05
TW 22	228	270	C02, C03, C05, C10

NOTES:

- "C10" requires special Thermowell. Consult your BETA Switch Representative.
- BETA Thermowells to be ordered as separate item. Do not include Thermowell code into the switch code.
- Special Thermowell possible. Consult your BETA Switch Representative.

Pressure & Temperature Switches



Weathertight switches ("C"-Series) - Optional: Intrinsically safe



Exproof 316 SS offshore switches ("M"-Series)



"OEM"-switches ("B"-Series)



Explosion proof switches ("W"-Series)

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SP.210.G/US/07/10/1M