



Pressure and Temperature Switches

C, W and Z series switches

The 'user-friendly generation' of BETA Pressure and Temperature Switches



Safety:

- Safe, secure electrical hookup by clamp terminals
- Standard earth terminal
- IP 66 enclosure (NEMA 4X)
- 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 to avoid pipe strains on the instrument to cause shift of setpoint

Product Approvals:

- EXIDA: SIL2 Certified
- ATEX: W - Z - Series and C-Series Intrinsically Safe
- IECEx: W-Series and C-Series Intrinsically Safe
- CSA: W-Series, C-Series and C-Series Intrinsically Safe
- FM: W-Series, C-Series Intrinsically Safe

Quality and Factory approvals:

- SGS certified Quality Assurance according to ISO 9001 – 2015 and ISO 14001 - 2015, covers all switch manufacturing, engineering and design.
- TÜV: PED certificate CE 0035
- DEKRA: ATEX certificate CE 0344

Economy:

- A wide range of wetted process materials enable proper selection for any application.

Service:

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

Benefits:

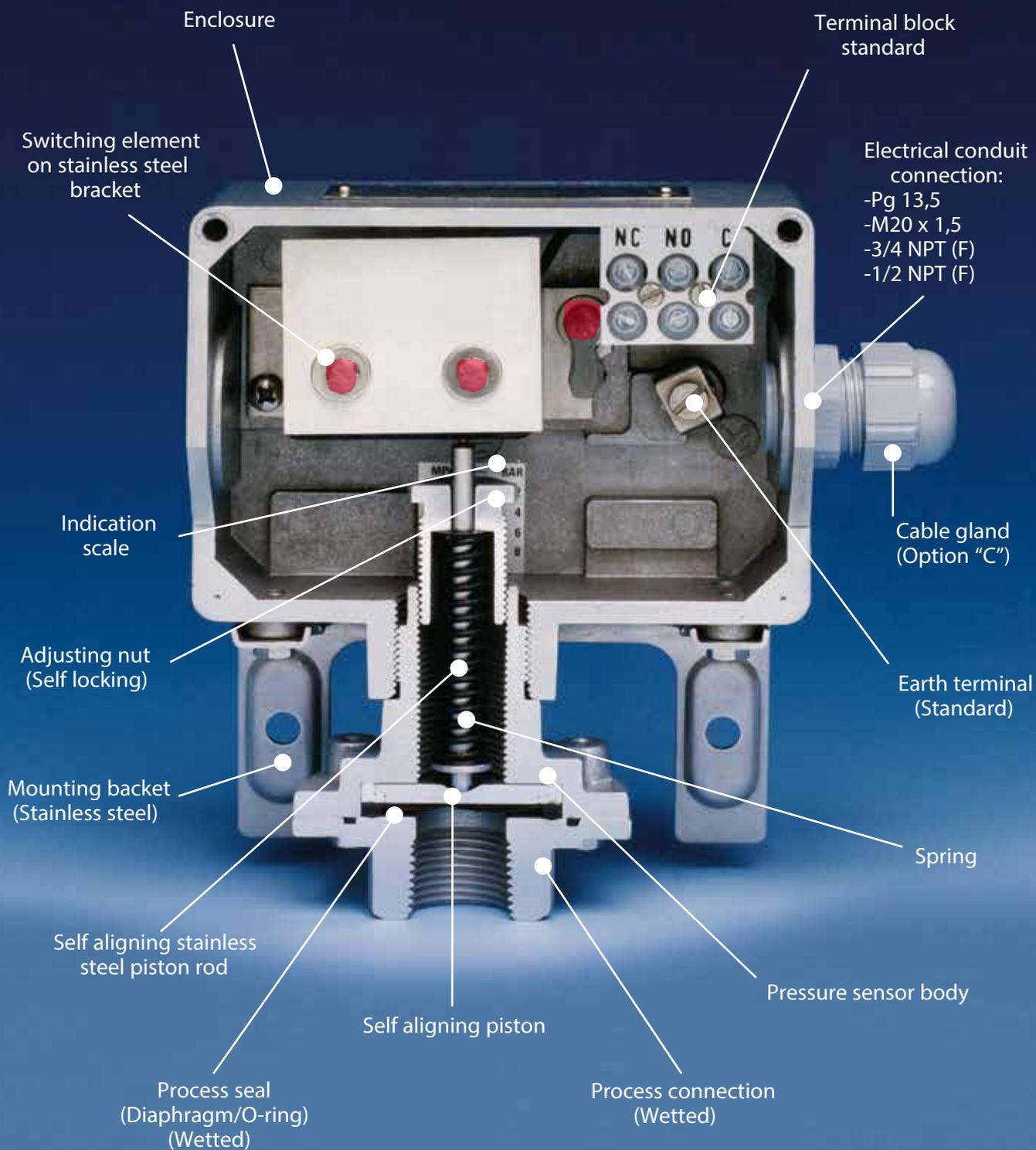
- Our products are distinguished by highest reliability and are used in virtually any sector of industry. Highest quality and worldwide certification of our products for safety-critical applications ensure reliable monitoring of your plant, equipment or installation.
- *BETA safety switches are assembled according to your requirements and are available in more than 10 million versions. Your special request might be a standard for us. Please contact us to discuss your requirements*

- "we will be pleased to advise you" -



BETA SWITCH PRINCIPLE

Stainless steel screws throughout



The BETA principle:

“A high quality, self-aligning springloaded/- piston sensor is the heart of each BETA switch. The limited piston travel transmits pressure at the process 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.”()*

(*) A BETA vacuum switch contains also a vacuum piston and spring (SS 316) on the wetted parts side

The BETA SWITCH has “DESIGNED-IN” reliability.

- 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.
- Major users all over the world, in all areas of industry, already enjoy the benefits of **BETA’s “User Friendly” Switches.**

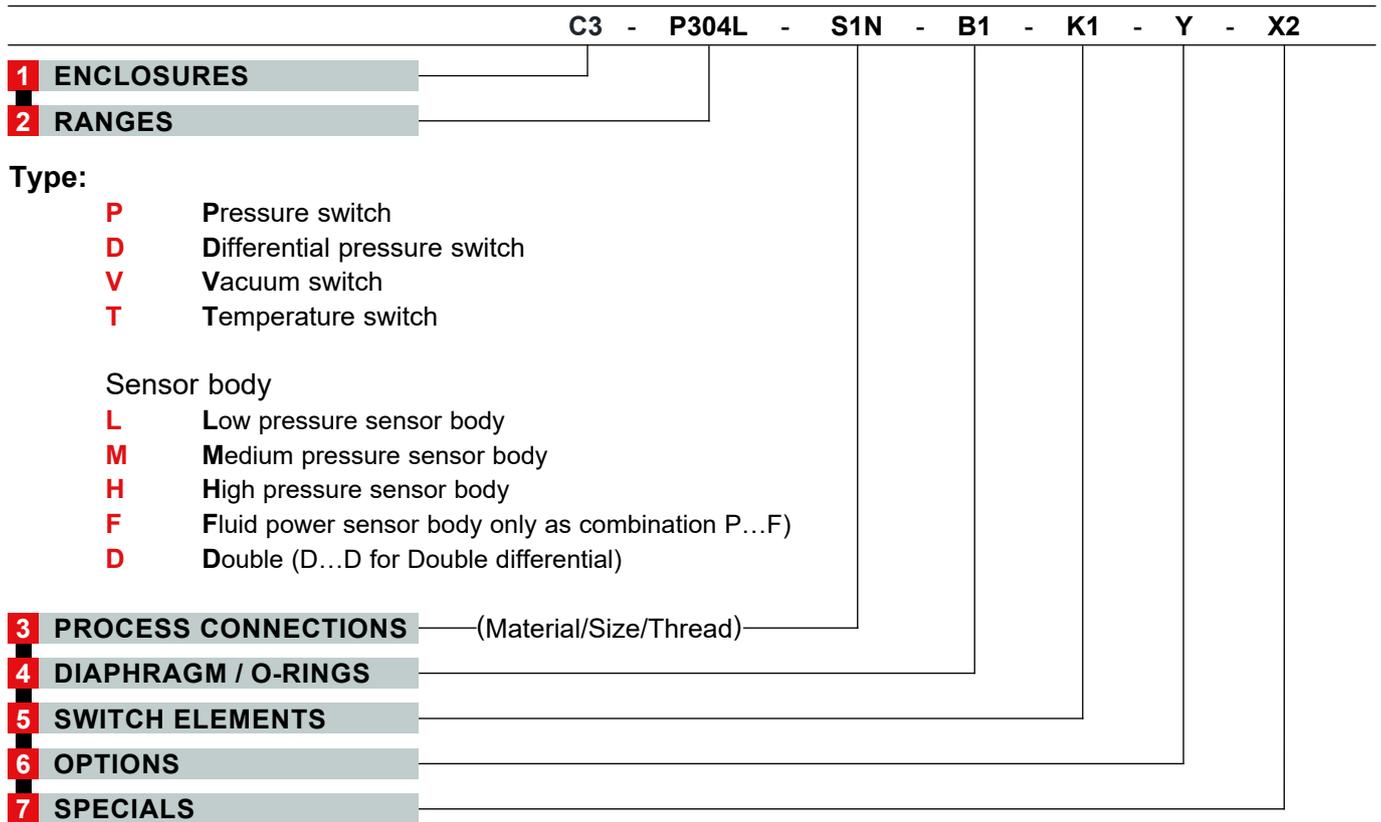
*** BETA manufactures high quality instruments to meet all of your requirements.**

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



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.



TO SELECT YOUR SWITCH

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

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

Ambient temperature:

Standard: -30 to +80°C
ATEX: -60 to +70°C : **W-Series for T6**
 -60 to +80°C : **W-Series for T5**
 -55 to +65°C : **Z-Series for T6**
Ex i: -60 to +80°C : **C-Series**

Repeatability:

± 0.2% of Full Range* (measured at 20°C ambient temperature
acc. to ANSI/I.S.A.-S51.1-1979).

Tagging & Setting:

BETA will free of charge, add your tag no. (Max. 14 digits) 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.

Limited Factory Warranty:

36 months from Ex-Works date Rijswijk/ - The Netherlands.
(excl. "wetted parts").

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

1 ENCLOSURES

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



ENCLOSURE CODE	CLASSIFICATION	ELECTRICAL COND. CONN.	MATERIAL	EARTH TERMINAL	TERM. BLOCK	TYPE OF SENSOR					
						PRESS	FLUID P.	VACUUM	DIFF.	TEMP.	
B2 ¹⁾	Weathertight ⁴⁾ Miniature (IP65)	Hirschmann ⁴⁾ Plug conn. (DIN 43650-A)	Aluminium	Standard (Via plug)	Not applicable	√	√	√	-	√	
C1 ⁵⁾	Weathertight (IP66) Intrinsically safe (with Option "I")	PG 13,5	Aluminium	Standard (Internal)	Standard	√	√	√	√	√	
C2 ⁵⁾		M20 x 1,5									
C3 ⁵⁾		3/4" NPT (F)									
C4 ⁵⁾		1/2" NPT (F)									
C8		M20 x 1,5									
C9	3/4" NPT (F)	316 SS ²⁾									
W3 ⁵⁾	Explosion-proof ATEX & IECEx: Ex d II C T6...T5 Ex tD A21 T100°C IP66	3/4" NPT (F)	Aluminium	Standard (In- & External)	Standard	√	√	√	√	√	
W8		M20 x 1,5	316 SS ²⁾								
W9		3/4" NPT (F)	316 SS ²⁾								
Z1 ⁵⁾	Explosion-proof Ex de IIC T6 (IP 66) 02 ATEX 2187X	PG 13,5	Aluminium	Standard (In- & external)	Standard EEx e	√	√	√	√	√	
Z2 ⁵⁾		M20 x 1,5									
Z4 ⁵⁾		3/4" NPT (F)									
Z3 ⁵⁾		1/2" NPT (F)									
Z8		M20 x 1,5									316 SS ²⁾
Z9		3/4" NPT (F)									316 SS ²⁾

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

2) Includes SS 316 sensor body and adjusting nut.

3) All differentials except D..D - type

4) EN 175301-803/ ISO4400

5) Are powder coated acc. SP025, dry film thickness approx. 70 microns finish hamertone silver/grey high gloss. Due to the nature of hamertone finish some color difference might be visible, and cannot be avoided. - This has no effect on the integrity of the enclosure protection. -

2" Pipe mount bracket sets available, see page 31.

2 RANGES for Pressure switches

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

"Ranges" given here are valid for setpoints at **increasing pressures** (also vacuum) of the **high end** of the range and **decreasing** for the **low end** of the range.

The "Deadband" values are the max. possible values for a standard micro switch & diaphragm/ O-ring combination 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 switch may influence the lower end of range.

RANGE CODE	ADJUSTABLE RANGE		MAX. DEADBAND		MAX. OVERRANGE-PRESSURE	PROOF PRESSURE
		bar [mbar]		bar [mbar]	bar	bar
P 301 L 1)	[2 - 15]	[mbar]	[1.1 - 1.9]	[mbar]	10	15
P 302 L 1)	[10 - 100]	[mbar]	[2.5 - 3.5]	[mbar]	30	35
P 304 L	[20 - 240]	[mbar]	[6 - 9]	[mbar]		
P 306 L	[20 - 560]	[mbar]	[6 - 12]	[mbar]		
P 308 L	[25 - 1300]	[mbar]	[7 - 15]	[mbar]	125	140
P 402 M	[100 - 400]	[mbar]	[15 - 20]	[mbar]		
P 404 M	[100 - 950]	[mbar]	[15 - 30]	[mbar]		
P 406 M	[120 - 2300]	[mbar]	[16 - 50]	[mbar]		
P 408 M	[150 - 5400]	[mbar]	[16 - 90]	[mbar]	200	600
P 502 H	0.3 - 1.6	bar	[65 - 95]	[mbar]		
P 504 H	0.4 - 3.5	bar	[65 - 160]	[mbar]		
P 506 H	0.5 - 9.0	bar	[65 - 330]	[mbar]		
P 508 H	0.7 - 21.5	bar	[70 - 810]	[mbar]		
P 706 H	2.5 - 32	bar	0.3 - 1.65	bar		
P 708 H	3.0 - 76	bar	0.3 - 3.75	bar		
P 808 H	4.0 - 170	bar	0.8 - 9.5	bar	300	
P 908 H	10 - 300	bar	2.0 - 19.5	bar	400	
P 909 H	10 - 350	bar	2.0 - 25	bar		

1) Only available with L1 -microswitch element. For K1 possible consult factory.

RANGES for Fluid power switches

RANGE CODE	ADJUSTABLE RANGE		MAX. DEADBAND		MAX. OVERRANGE PRESSURE	PROOF PRESSURE
		bar		bar	bar	bar
P 904 F	12 - 55	bar	3.5 - 6.0	bar	650	700
P 906 F	16 - 130	bar	4.0 - 8.5	bar		
P 908 F	20 - 300	bar	6 - 12	bar		
P 918 F	30 - 540	bar	15 - 31	bar		

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

RANGES for Vacuum switches

RANGE CODE	ADJUSTABLE RANGE ¹⁾	MAX. DEADBAND		MAX. VACUUM		MAX. OVERRANGE PRESSURE		PROOF PRESSURE		
	(INCR. VAC. TO PRESS.)	bar [mbar]		[mbar]	bar [mbar]		bar	bar	bar	
V 301 L 2)	[-10 to -3]	[mbar]	[1]	[mbar]	[-500]	[mbar]	+10	bar	+15	bar
V 304 L	[-60/0/+150]	[mbar]	[4/4/6.5]	[mbar]	[-500]	[mbar]	+30	bar	+35	bar
V 404 M	[-400/0/+400]	[mbar]	[16/16/25]	[mbar]	-1	bar	+125	bar	+140	bar
V 406 M	[-980/0/+1000]	[mbar]	[30/30/40]	[mbar]						
V 506 H	-1/0/+6	bar	[80/80/25]	[mbar]	-1	bar	+200	bar	+600	bar

1) For setpoint around zero bar gauge, consult factory.

We cannot guarantee stability of setpoint around zero bar gauge.

2 RANGES for Differential switches

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

RANGE CODE	ADJUSTABLE RANGE ¹⁾ DIFF. RANGE		TYPICAL DEADBAND ¹⁾		MAX. STATIC PRESSURE		MAX. OVERRANGE PRESSURE		PROOF PRESSURE			
	[mbar]	bar	[mbar]	bar	bar		bar		bar			
P 301 L...D ⁶⁾	[2 - 15]	²⁾	[mbar]	[1,1-1,97]	[mbar]	10	bar	10	⁴⁾	bar	15	bar
D 302 L	[12 - 75]	²⁾	[mbar]	[7]	[mbar]	30	bar	30	³⁾	bar	35	bar
D 304 L	[22 - 180]		[mbar]	[8]	[mbar]							
D 306 L	[25 - 450]		[mbar]	[11]	[mbar]							
D 309 L	[35 - 1250]		[mbar]	[15]	[mbar]							
D 402 M	0.3 - 1.0		bar	0.15	bar	10	bar	140	⁵⁾	bar	140	bar
D 404 M	0.5 - 2.5		bar	0.2	bar	50	bar					
D 406 M	1.0 - 6.0		bar		bar							
D 408 M	1.0 - 14.5		bar	0.8	bar	100	bar					
D 506 M	5 - 20		bar		bar							
D 508 M	10 - 50		bar	bar	140	bar						
D 608 M	10 - 70		bar	1.5	bar	140	bar					
D 352 H	[80 - 160]		[mbar]	[25]	[mbar]	200	bar	200	⁵⁾	bar	200	bar
D 354 H	[100 - 500]		[mbar]	[35]	[mbar]							
D 356 H	[120 - 1450]		[mbar]	[50]	[mbar]							
D 359 H	[150 - 3450]		[mbar]	[75]	[mbar]							

RANGES for Bi-Directional

D 356 D	[100 - 1500]	[mbar]	[35 - 65]	[mbar]	200	bar	200	⁵⁾	bar	200	bar
D 358 D	[100 - 3500]	[mbar]	[45 - 115]	[mbar]							

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) D...L can withstand a differential pressure P-Low max. 1 bar above P-High.
- 4) P 301L...D can withstand a differential pressure P-Low max. 100 mbar above P-High.
- 5) D...M, D...H and D...D can sustain full High and Low-side reversal.
- 6) Only available with **G3**-enclosure.
- For more details, page 15.

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

SENSOR	SETPOINT	DEADBAND
P301L...D	= + 0.1 mbar/bar	= + 0.1 mbar/bar
D...L	- 0.7 mbar/bar	= - 0.1 mbar/bar
D...M	= + 3 mbar/bar	+ 10 mbar/bar
D...H	- 2 mbar/bar	= - 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 differential application outside above ranges consult your BETA Switch Representative.

3 PROCESS CONNECTIONS

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

PROCESS CONNECT SIZE/ CODE	AVAILABLE ON SENSOR ¹⁾	ALUMINIUM		SS 316		MONEL		BRASS	
		NPT	BSP	NPT	BSP	NPT	BSP	NPT	BSP
1/4" F	F								
	L								
	D...L (Low side)	A1N	A1B	S1N	S1B	M1N	M1B	B1N	B1B
	D...L (High Side)								
	H / M / D...M								
1/2" F	D...H / D								
	F								
	L D...L (High Side)			S2N	S2B	M2N	M2B	B2N	B2B
1/2" M	H / M / D...M								
	L, M & H D...L / M (High Side)			S7N	S7B	M7N	M7B		
1/2" Gauge Connection	H L & M				S7G				
Not for 2) vacuum	1" F			S4N	S4B				
	2" F	L & D...L (High Side)			S6N	S6B		B6N	B6B
	1" M	M & H D...M			S8N	S8B			

- 1) (Standard) process connection** for "L"ow pressure sensor body : S1N or S1B
 "M"edium & "H"igh pressure sensor body : S1N or S1B
 "F"luid power pressure sensor body : B1N or B1B
 Differential switches: D...H, D...D, D...M : S1N or S1B only
 D...L : A1N or A1B; For Low side only
 High side: Only "L"-sensor connections

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

NOTES:

- NPT connections are tapered; BSP are parallel threaded.
- Process connection according to NACE standards are available, consult your BETA Switch Representative.

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



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 (-30°C to +80°C).	1.0
E6	EPDM	EPDM 2)	Some hydraulic fluids, steam condensate.	1.0
K5	Kalrez	Kalrez 2)	Highly corrosive fluids.	1.5
M1	Monel	Buna-N 5)	Seawater.	2.0
M2		Viton-A 4)	High temperature NOT below -10°C. 7)	
M4		PTFE	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 -10°C. 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 -10°C 7)	
S3		Neoprene	Permeative refrigerant gases.	
S4		PTFE 4)	Corrosive acids.	
S5		Kalrez	Highly corrosive and permeative acids.	
S6		EPDM	Steam. (Not for steam condensate)	
T1	Tantalum	Buna-N	Highly corrosive and permeative gases and non-acid liquids. Select O-ring as required.	2.0
T2		Viton-A 5)		
T3		Neoprene		
T4		PTFE 4)		
T5	Kalrez 2) 5)			
V2	Viton-A	Viton-A	High temperature NOT below -10°C. 2)	1.5
S0	SS 316	Welded diaphragm	Highly permeative gases. (NOT below -10°C.)	3.0
M0	Monel	None 3)		

1) Wetted parts are suggested for use on the service indicated. However they do not constitute a guarantee too be suitable for a given process 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 -30°C to +80°C, 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 surge conditions. (Wetted internal spring of Co-Cr-Ni alloy, comparable with Elgiloy).
- 5)** For process temperature > 100 °C, consult your BETA Switch Representative.
- 6)** Other diaphragm materials like Hastelloy available, consult your BETA Switch Representative.
- 7)** High temperature refers to **max. 130 °C 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

W3 - D...L

W8 - D...L



* Cut-a-away model

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
P301L/ D...L	B1	All except with PTFE O-Ring and Welded diaphragm.
D...M	B1	All diaphragm and O-Ring combinations.
D...H	P1	Metal + TCP.
D...D	P1	Metal + TCP.

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



5 SWITCHING ELEMENTS

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

SWITCHING ELEMENT CODE ¹⁾	USE		MAX. RATINGS (RES.)		DEADBAND MULTIPL.	
			VAC.	VDC ⁸⁾	S.P.D.T.	D.P.D.T.
H1 (SL)	Herm. sealed	(Inert gas filled) Dusty, corrosive environment.	125/ 1A	28/ 15A	5.0	6.5
K1 ^{4) 9)}	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 ¹⁰⁾		Standard DPDT configuration on W-series when required.	250/ 5A	30/ 5A	1.5	3.5
U1 ⁹⁾		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
Y1 ¹⁰⁾	125/ 0.1A			30/ 0.1A	3.0	4.5
O1 ¹⁰⁾	Gold contacts	Environmental proof (IP 67). ²⁾	250/ 0.1A	30/ 0.1A	3.0	4.5
N1 ¹⁰⁾	Silver contacts	Environmental proof (IP 67).	250/ 2A	30/ 2A	3.0	4.5
Z1 ¹⁰⁾	For higher (amb.) temp.	Nickel Alloy spring. For corrosive environment.	250/ 5A	125/ 0.3A	3.0	4.5
R1	Ex. Proof.	ATEX approved. (Std. on Z-series)	250/ 5A	250/ 0.25A	2.5	4.5
SP	Adjustable deadband	Small adjustable deadband.	250/ 15A	-	1 to 3	S.P.D.T. only
SR ³⁾⁵⁾⁶⁾⁹⁾	deadband	Wide adjustable deadband.	480/ 20A	-	2 to 6	
SE ³⁾	Manual reset	Actuates automatic on increasing pressure.	480/ 15A	125/ 0.5A	1.5	
SG ³⁾	Manual reset	Actuates automatic on decreasing pressure.	480/ 15A	125/ 0.5A	1.5	
SV ³⁾	DC-service	High DC cap. magnetic blow out.	125/ 10A	125/ 10A	5.0	
SA	Pneumatic ⁷⁾	Normally closed (NC).	For use in explosive atm. Ex II 2G c T6 KEMA 04ATEX4060		Consult BETA Switch Rep.	Single Only
SB ³⁾		Normally open (NO).				

- 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) Actual capacitive or inductive load under VDC 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 "H1"-micro may influence the low end of range.
- 6) "SR"-micro in combination with metal diaphragm: standard with option "P".
- 7) For pneumatic element (select **C1** or **C8** enclosure) or ask for our separate Air Relay documentation.
- 8) For DC rating resistive loads are stated.
- 9) In "W..." Enclosure max 10A current rating allowed, will be stated on the nameplate.
- 10) Subminiature, only possible selection for D.P.D.T. configuration for W-enclosure.

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

Note:

Micro switches, in single (S.P.D.T. : example "**K1**") or double (D.P.D.T. action : example "**K2**") selection, are only intended to be set for one (1) set point in one (1) direction. Either **Increasing** (rising) or **Decreasing** (falling). In case of differential switches the static pressure needs to be added.

The deadband / reset value is a result of the complete model code selection, and actual assembly, so except for the **SR / SP** micro , the reset value is a given value and cannot be controlled by us.

Please note that in connection with this, that even within a quantity of similar model codes the reset value can vary. Proper application of **SR** and **SP** micro switches requires accurate statement of values to set point and required reset point.

If you have any specific question or requirement contact us at: 2sales@beta-b.nl

5 SWITCHING ELEMENTS VS. ENCLOSURES

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

SWITCHING ELEMENT		ENCLOSURE		
		C1, C2, C3, C4, C8, C9	W3, W8, W9	Z1, Z2, Z3, Z4, Z8, Z9
		Internal Earth Ground Terminal	Internal & External Earth Ground Terminal	Internal & External Earth Ground Terminal
S. P. D. T. (SINGLE SWITCHING ELEMENT)	SE	3-WAY TERMINAL BLOCK	4-WAY TERMINAL BLOCK	NOT POSSIBLE
	SG			
	SP			
	SR			
	SV			
	G1			
	H1 (SL)			
	K1			
	L1			
	U1			
	O1			
N1				
R1	NOT POSSIBLE	NOT POSSIBLE	3-WAY TERMINAL BLOCK	
M1	3-WAY TERMINAL BLOCK	4-WAY TERMINAL BLOCK	NOT POSSIBLE	
Y1				
Z1				
D. P. D. T. (DOUBLE SWITCHING ELEMENT)	R2	NOT POSSIBLE	NOT POSSIBLE	2X3-WAY TERMINAL BLOCK
	M2	2X3-WAY TERMINAL BLOCK	7-WAY TERMINAL BLOCK	NOT POSSIBLE
	Y2			
	Z2			
	G2	2X3-WAY TERMINAL BLOCK	NOT POSSIBLE	NOT POSSIBLE
	H2			
	K2			
U2				
O2		7-WAY TERMINAL BLOCK		
N2				
SA *	1/4 NPT. (F) CONNECTIONS	NOT POSSIBLE	NOT POSSIBLE	
SB *				



POSSIBLE

* "SA" / "SB" only with C1- / C8-enclosure. (connection Brass/ SS316)

The standard switching elements are:

"K1" for C- and W- enclosures. ("L1" for P301L/P302L/D302L range).

"R1" for Z- enclosures.



NOT POSSIBLE

6 OPTIONS

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

OPTION CODE	DESCRIPTION
B	Industrial cleaning of "wetted" parts for oxygen services.
C	Cable gland (weather proof IP66, EExe, EExi or EExd in acc. with classification of enclosure).
I	Intrinsically safe application (EEx)i. Only on "C"-Series (90V/ - 3.3A).
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 ¹⁾	Stainless steel Tag key ringed to enclosure. Tag has 2 lines (16 characters per line).
V	Fungicidal varnish coating (internal).
Y ²⁾	Epoxy coating of switch (external). Only in combination SS 316 process connection. SS Parts are not coated.

Tag no. space on nameplates added free of charge

- 1)** Standard nameplate **C-Series** : 2 lines with 16 characters or spaces + 1 line with 14 characters or spaces.
W-Series : 1 line with 16 characters or spaces.
Z-Series : 1 line with 12 characters or spaces.

- 2)** Air dried system acc. SP026, dry film thickness approx. 200 microns, finish pearl grey gloss.

7 SPECIALS

C3 - P304L - S1N - B1 - 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 the model reference means **two** specials have been incorporated.

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

Example for 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 (Only for C-enclosure).
- Hirschmann or Harting Connector.
- Moisture inhibitor.
- Chemical seals, send us complete specifications if required.

1 ENCLOSURES

C3	-	P304L	-	S1B	-	S2	-	K1	-	Y	-	X2
----	---	-------	---	-----	---	----	---	----	---	---	---	----

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

2 RANGES

C3	-	P304L	-	S1B	-	S2	-	K1	-	Y	-	X2
----	---	-------	---	-----	---	----	---	----	---	---	---	----

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

3 PROCESS CONNECTIONS (Material / Size / Thread)

C3	-	P304L	-	S1B	-	S2	-	K1	-	Y	-	X2
----	---	-------	---	-----	---	----	---	----	---	---	---	----

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

4 DIAPHRAGM / O-RINGS

C3	-	P304L	-	S1B	-	S2	-	K1	-	Y	-	X2
----	---	-------	---	-----	---	----	---	----	---	---	---	----

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

5 SWITCHING ELEMENTS

C3	-	P304L	-	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

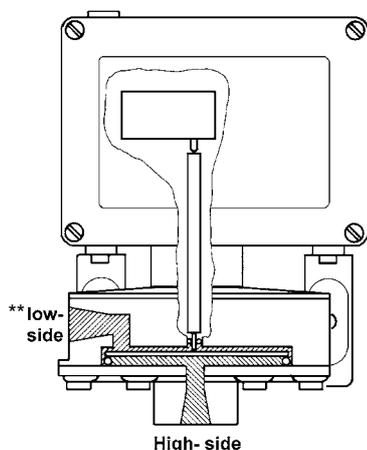
Options : See section **6. Options**” on page 13.

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

The “**User Friendly**” generation of BETA switches offers you a complete range of - **Differential Pressure Switches** -.

LOW RANGE

“D... L”- SERIES



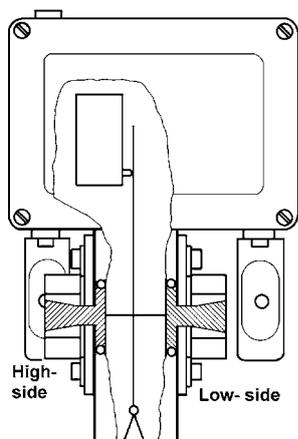
- Principle:** As pressure switch, with sealed Aluminium sensorbody (optional in 316 SS).
- Range:** 12 - 1250 mbar.
Max. Static Pressure: 30 bar.
- Application:** Dry clean air, inert gases and clean non-corr. fluids and gases.
- Execution:** Weathertight IP 66 (C-enclosure),
 Ex i a/b (C-enclosure + option I),
 Ex d (W-enclosure).
 Ex de (Z-enclosure).

** Low side only available in 1/4 NPT/ BSP F aluminium or SS 316.

* “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.

GENERAL PURPOSE

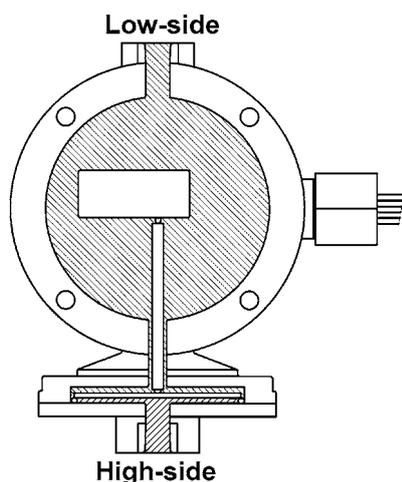
“D...M”- SERIES



- Principle:** 2 x piston/diaphragm type with separate sealing for High and Low.
- Range:** 0.3 - 70 bar.
Max. Static Pressure: 140 bar.
- Application:** Fluid & gas applications which are chemically compatible and are within the switch range.
- Execution:** Weathertight IP 66 (C-enclosure),
 Ex i a/b (C-enclosure + option I),
 Ex d (W-enclosure).
 Ex de (Z-enclosure)

VERY LOW RANGE

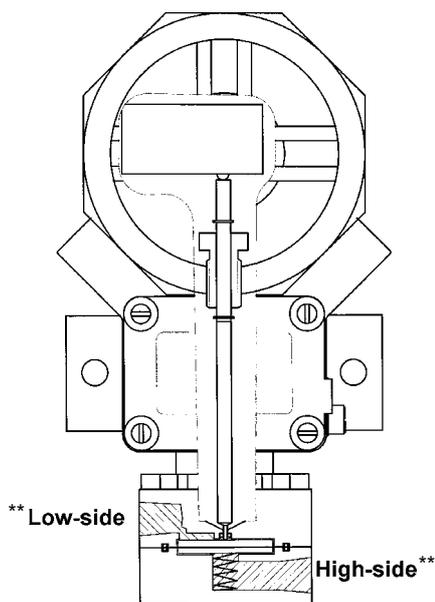
“P301L- .. - D”- SERIES



- Principle:** As pressure switch in sealed Aluminium enclosure.
- Range:** 2 - 15 mbar. (With “L1” micro only).
Max. Static Pressure: 10 bar.
- Application:** Dry clean air inert gases (Low side only).
- Execution:** Weathertight IP 66, (G3 enclosure only) with potted wire leads.

DIFFERENTIAL PRESSURE SWITCHES

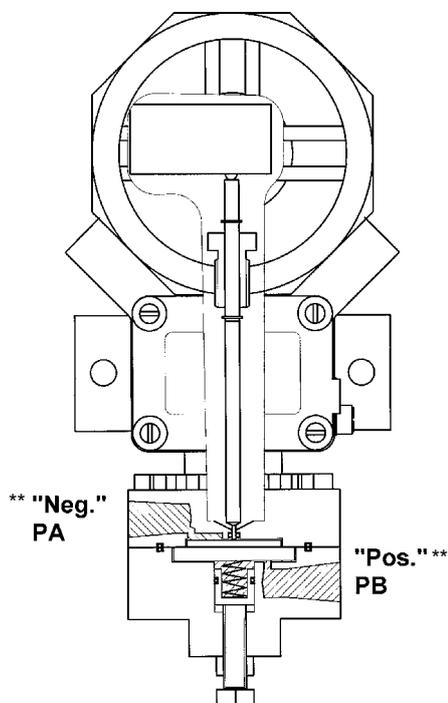
LOW RANGE / HIGH STATIC "D... H"- SERIES



- Principle:** Piston type with single diaphragm, sealed in 316 SS sensorbody.
- Range:** 80 – 3450 mbar.
- Max. Static Pressure:** 200 bar.
- 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 d (W-enclosure).
EX de (Z-enclosure)

** Low and High side, only available in 1/4 NPT/ BSP F, SS 316.

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
- Max. Static Pressure:** 200 bar
- 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).
Ex de (Z-enclosure).

** Neg./ Pos. side only available in 1/4 NPT/ BSP F, SS 316.

* "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.

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 (10,5 mm 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 Direct mount type sensor

EXPLOSION-PROOF TEMPERATURE SWITCH



ATEX, IECEx, CSA & FM, approved up to the highest classification (see page 22).

With the “C”- and “W”-enclosures the BETA Temperature Switch is approved by ATEX, IECEx, according to NEN EN IEC 60079 Standards.

“W” - Series with Capillary type sensor

TEMPERATURE SWITCHES

1 ENCLOSURES

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

W3 - T...H-D00



C3 - T...H-D00

W3 - T...H-C03



W8 - T...H-C03



W8 - T...H-D00



C8 - T...H-D00

ENCLOSURE CODE	CLASSIFICATION	ELECTRICAL COND. CONN.	MATERIAL	EARTH TERMINAL	TERM. BLOCK
B2	Weathertight Miniature (IP65)	Hirschmann Plug conn. DIN 43650-A ²⁾	Aluminium	Standard (Via plug)	Not applicable
C1	Weathertight (IP66) Intrinsically safe (with Option "I")	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	SS 316 ¹⁾		
C9	3/4" NPT (F)	Aluminium	Standard In- & External	Standard	
W3	3/4" NPT (F)	SS 316 ¹⁾			
W8	M20 x 1.5				
W9	3/4" NPT (F)	Aluminium	Standard In- & External	Standard EEx e	
Z1	PG 13.5	Aluminium			
Z2	M20 x 1.5				
Z3	3/4" NPT (F)				
Z4	1/2" NPT (F)				
Z8	M20 x 1.5	SS 316 ¹⁾			
Z9	3/4" NPT (F)				

1) Includes SS 316 sensor body and adjusting nut.

2) EN175301-803/ ISO 4400.

2 RANGES

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

W8 - T...H - D00



W3 - T...H - D00



W3 - T...H - C03



C3 - T...H - D00



C8 - T...H - D00

RANGE CODE	ADJUSTABLE RANGE		MAX TYPICAL DEADBAND ³⁾		MAX. TEMPERATURE		PROOF TEMPERATURE		MAX. PROCESS PRESSURE	
		°C		°C		°C		°C		bar
T 528 H	-40 / +40	°C	3	°C	+125	°C	+200	°C	175	bar
T 548 H	0 / +95	°C			+200	°C	+250	°C		
T 568 H ¹⁾	+60 / +180	°C			+300	°C	+350	°C		
T 588 H ²⁾	+160 / +300	°C	3.5	°C	+400	°C	+450	°C		

1) In case process temperature > 140 °C, 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. ¹⁾	128 mm length
	D02		225 mm length
	C02	Capillary mount.	2 m. capillary length
	C03		3 m capillary length
	C05		5 m. capillary length
	C10		10 m. capillary length
	CXX		Special capillary length ²⁾

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

¹⁾ Not in combination with range T588H (+160/+300 °C), not recommended with T568H in case of process temperature >140 °C.

²⁾ Length of capillary should be specified, consult your BETA Switch Representative. (Max 15 m.)

** Thermowells available, see page 30.

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 - and W - enclosures
"R1" for Z - 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.

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,**

- 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.
- Very high overrange pressures – No setpoint shift or damage to sensor.
- No maintenance.
- Wetted parts to NACE standard available.

For **W-Series**

ATEX: ITS 17ATEX 101854 X
Ex II 2 G Ex db IIC T6 Gb -60°C ≤ Tamb ≤ +70 °C
Ex db IIC T5 Gb -60°C ≤ Tamb ≤ +80 °C
Ex II 2 D Ex tb IIIC T 100 °C Db -60°C ≤ Tamb ≤ +80 °C

IECEx IECEx ITS 17.0019 X
Ex db IIC T6 Gb - 60°C ≤ Tamb ≤ +70 °C
Ex db IIC T5 Gb - 60°C ≤ Tamb ≤ +80 °C
Ex tb IIIC T 100 °C Db -60°C ≤ Tamb ≤ +80 °C

CSA: CERT.:1873316 acc. to Class 2258-02
Class I, Div. 1, Groups B, C, D T6/ -40 to +70 °C, T5/-40 to +80 °C
Class II, III, Div.1, Groups E, F and G
Ex d IIC T6...T5
Enclosure Type 4X, IP66

FM: CERT.:3028962
Class I, Div. I, Groups A, B, C and D, T6 Ta = -40 to +70 °C, T5 T1 = -40 to +80 °C
Class I, Zone I, AEx d IIC, T6 Ta = +70 °C, T5 Ta = +80 °C
DIP, Class II/III, Div.1, Groups E, F and G, T6 Ta = +70 °C, T5 Ta = +80 °C
Enclosure Type 4X, IP66

For **C-Series** Intrinsically safe

ATEX: CERT.: KIWA 15 ATEX 0023X
Ex II 1 G Ex ia IIC T4...T6 Ga or
Ex II 2 G Ex ib IIC T4...T6 Gb
Ex II 1 D Ex ia IIIC T 85°C Da or
EX II 2 D Ex ib IIIC T 85°C Db
Amb. Temp.: -60 °C to +80 °C

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
Amb. Temp.: -40 to +80 °C
Enclosure Type 4X

IECEx: CERT.: KIWA 15.0011X
Type of protection: Exia
Ex ia IIC T6 Ga
Ex ia IIIC T 85°C Da

FM: Cert. No. 3031247
IS Class I, II and III, Div. 1, Groups A, B, C, D, E, F, G
Class I, Zone 0, AEx ia IICT6, -40 °C <Ta < +80 °C
Type 4x

For **Z-Series**

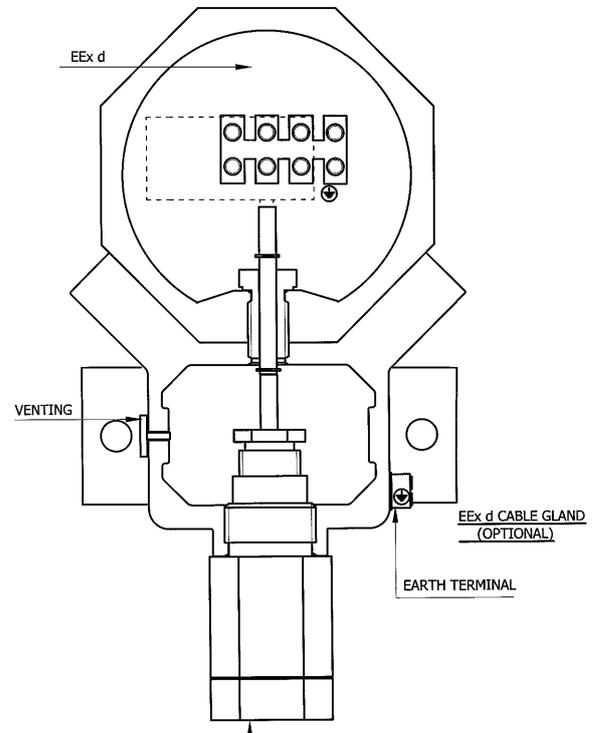
ATEX: CERT.: KEMA 02ATEX 2187
Ex II 2 G Ex de IIC T6 (-55 to +65 °C).

W-Series -ATEX, IECEx, CSA and FM approved.

The “W”-series is a worldwide best seller.



“W” - Series



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: ITS 17ATEX 101854 X

- * For Gas : Ex II 2 G Ex db IIC T6...T5 Gb
- * For Dust : Ex II 2 D Ex tb IIIC T100°C Db

IECEX IECEx ITS 17.0019 X

- Ex db IIC T6...T5 Gb
- Ex tb IIIC T 100 °C Db

(For more information see also page 22)

- Aluminium with -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)
- 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 SS mounting bracket available), see page 30.
- Epoxy coating optional.

BETA SWITCHES FOR HAZARDOUS AREA

C-Series (Intrinsically safe) - ATEX, IECEx, CSA and FM approved.

(See also page 22)

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



"C" - Series

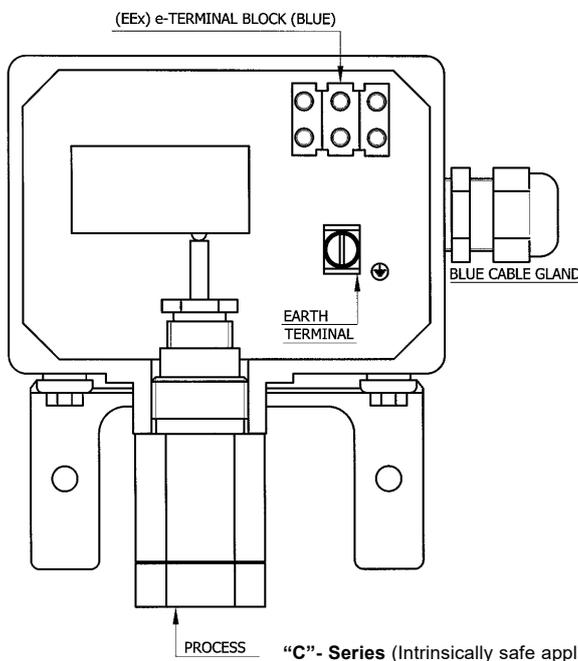


BETA has its "C"-Series switches with option "I" certified by KIWA acc. to NEN EN 60079-0 / EN 60079-11 for,

**II 1 G Ex ia IIC-T4...T6 Ga or
II 2 G Ex ib IIC-T4...T6 Gb or
II 1 D Ex ia IIIC T85°C Da or
II 2 D Ex ib IIIC T85°C Db**

ATEX approved	: KIWA 15 ATEX 0023X	(-60 to +80°C)
IECEx approved	: KIWA 15.00IIX	(-60 to +80°C)
CSA approved	: Cert.No.: 1891054	(-40 to +80°C)
FM Approved	: Cert. No.: 3031247	(-40 to +80°C)

(For more information see also page 22)



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

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

Please note the 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 how ever not mandatory.

Z-Series - ATEX, IECEx, CSA and FM approved.

(See also page 22)

BETA “Z” - Series, - The Economical Explosion-Proof Switch - .

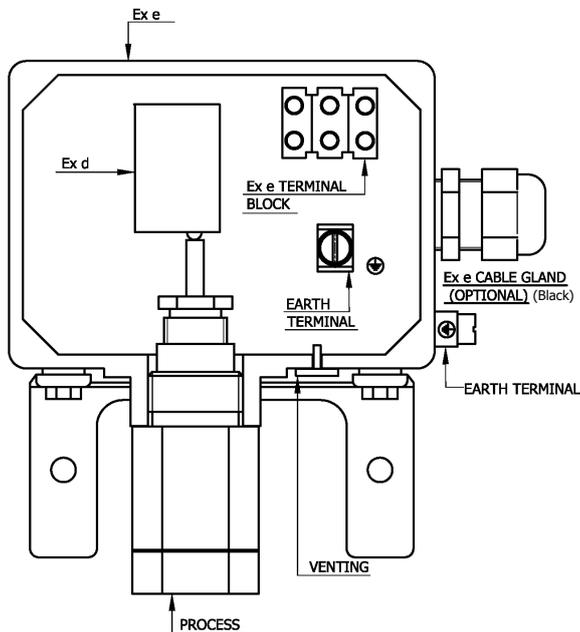


“Z” - Series

BETA has its “Z”- Series switches, **ATEX approved: KEMA 02ATEX 2187**

(-55 °C to + 65 °C/ T6)

Acc. to NEN EN 60079-0 / NEN EN 60079-1/
NEN EN 60079-7 for **II 2 G Ex de IIC T6**.



“Z”- Series (II 2 G Ex d e IIC T6)

- Available in Aluminium or SS 316 (for offshore applications).
- Available as Pressure-,Hydraulic-, Vacuum-, Differential pressure
(not on “D..D”- serie) and temperature switch.
- All ranges available (except for P301L and P302L).
- Limited to “R1/ R2” switching element.
- High overrange.
- Simple and quick electrical connection.

BETA PRESSURE & TEMP. SWITCH - CERTIFICATIONS

EXPLOSIONPROOF CERTIFICATIONS

ATEX – Ex II 2 G Ex d IIC T6...T5 Gb Ex II 2 D Ex tb IIIC T 100 °C Db	for W-Series .
ATEX – Ex II 1 G Ex ia IIC T4...T6 Ga Ex II 2 G Ex ib IIC T4...T6 Gb II 1D Ex ia IIIC T85°C Da II 2D Ex ib IIIC T85°C Db	for C-Series (intrinsically safe).
ATEX – Ex II 2 G Ex de IIC T6	for Z-Series .
ATEX – Ex II 2 G c T6	for Air Relay SA/SB .
FM – AEx d IIC T6...T5	for W-Series .
CSA – Ex d IIC T6...T5	for W-Series .
CSA – Ex ia IIC T6 T85 °C	for C-Series (intrinsically safe).
FM – A Ex ia IIC T6	for C-Series (intrinsically safe).
IECEX – Ex db IIC T6...T5 Gb Ex tb IIIC T 100 °C Db	for W-Series .
IECEX – Zone 0 Ex ia IIC T6 Ga Ex ia IIIC T85 °C Da	for C-Series intrinsically safe.

And more available for different countries like Japan, Korea, South-Africa, Russia etc..
Safety SIL2 capable.

SIL 2 certification:

The BETA UF generation carries the SIL2 approval, however in order to state SIL2 compliance, the standard IEC 61508, requires the following :

- Each and every unit to be explicitly SIL2 compliant needs to be factory ordered **with a setting**, preferably with a Final Test Certificate A.
- An **Xn** needs to be added to the modelcode : SIL2 compliance and a sticker will be added to the enclosure.
- The setting will then be BETA factory executed and recorded with the original sales order
- The adjusting nut will be **BETA factory sealed with red-paint**
- Should the setting be altered (red seal broken) after Ex Works BETA : **the SIL2 compliance** will be **obsoleted / non valid**.
- Only way to maintain compliance is to return the unit to BETA for re-adjustment as that will be recorded into our records and again the adjusting nut will be sealed.
- Third party adjustment is not acceptable unless that third party **is acknowledged by BETA BV** after an in-factory training at BETA, **carries a valid ISO 9001** certification has a **calibration records of the used and applicable calibration equipment**.
- The third party will **inform BETA on any adjustment**, requiring **SIL2 compliance**, by e-mail stating **each model code / serial number / set point setting / date of setting** to enable BETA to enter that data in our records, only after that entry the respective unit is **re-validated as SIL2 compliant**. It will be confirmed to the respective third party.
- Above procedure is subjected to any change according IEC 61508 without prior notice

MARINE APPROVALS

RINA for **B-** and **C-Series** (**Limited Ranges**).

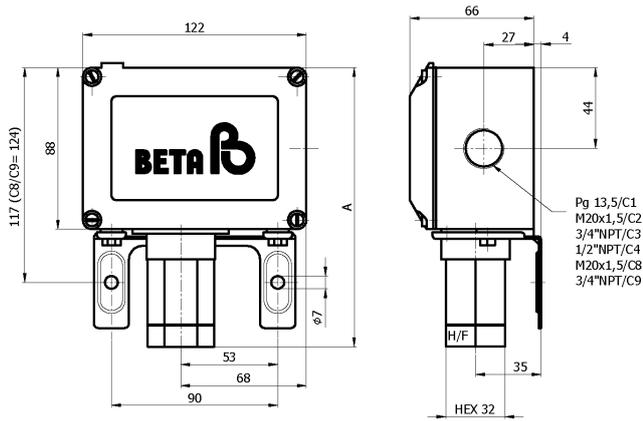
FOR GAS, FUEL, WATER AND STEAM

PED CE 0035 - **C-**and **W-Series** (Only Pressure sensor / - range).

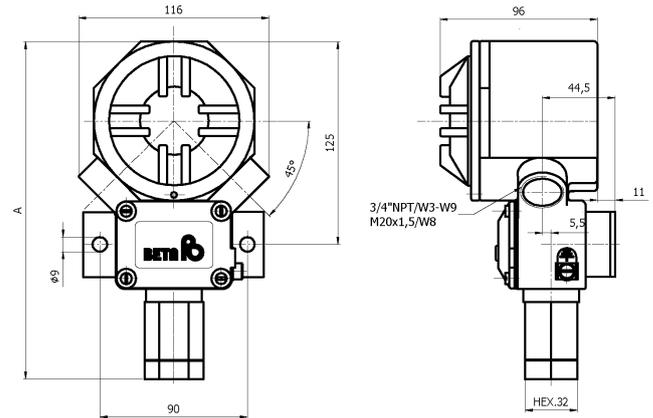
More certificates/ reports are available. Please consult your BETA Switch Representative.



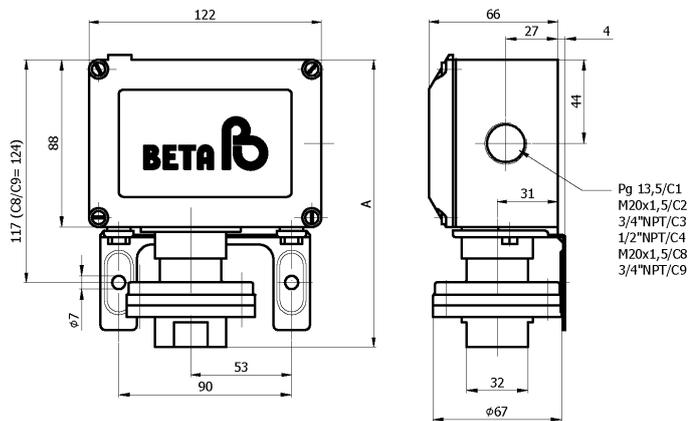
"C - Z"- Series: Pressure & Vacuum "P...H"



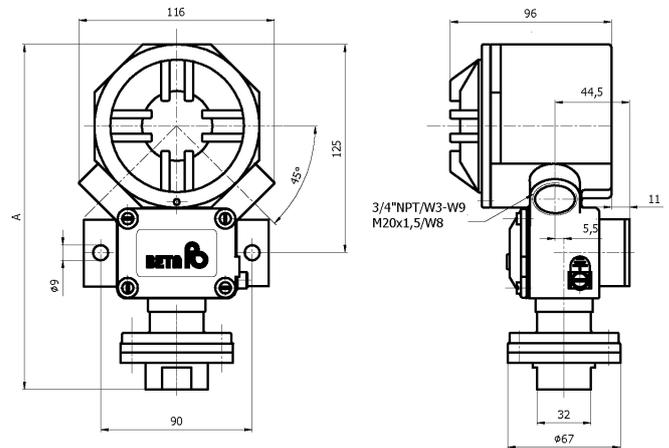
"W."- Series: Pressure & Vacuum "P...H"



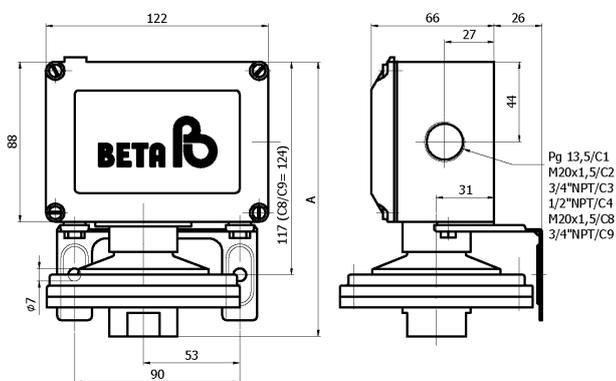
"C - Z"- Series: Pressure & Vacuum "P...M"



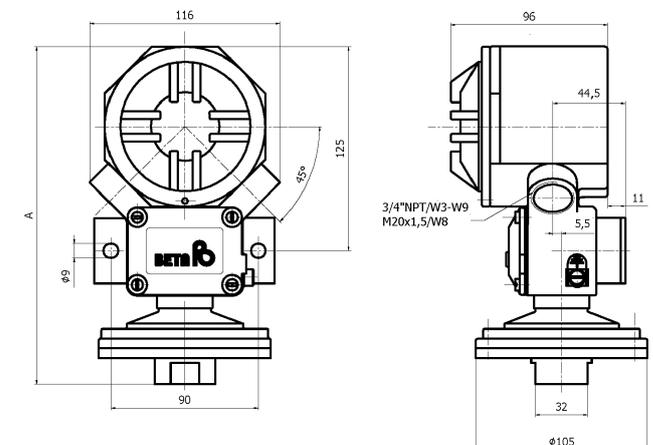
"W."- Series: Pressure & Vacuum "P...M"



"C - Z"- Series: Pressure & Vacuum "P...L"



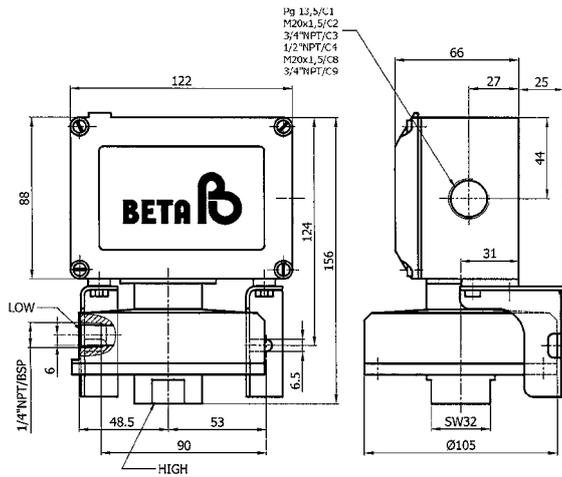
"W."- Series: Pressure & Vacuum "P...L"



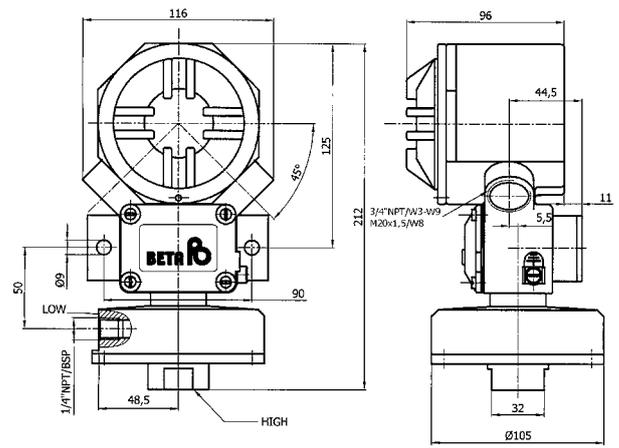
** For specific details about the dimension "A" consult factory.

DIMENSIONS

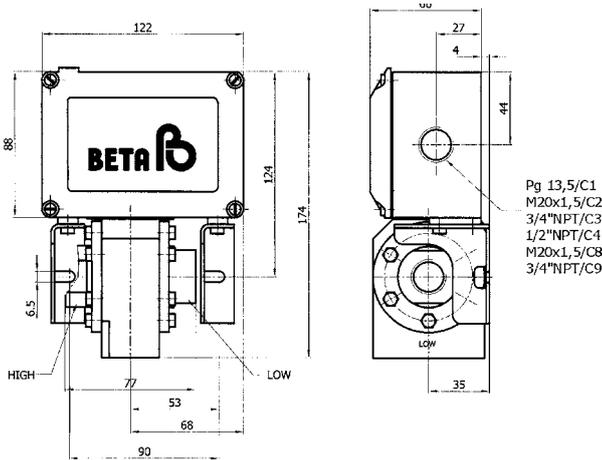
"C - Z"- Series: Differential "D...L"



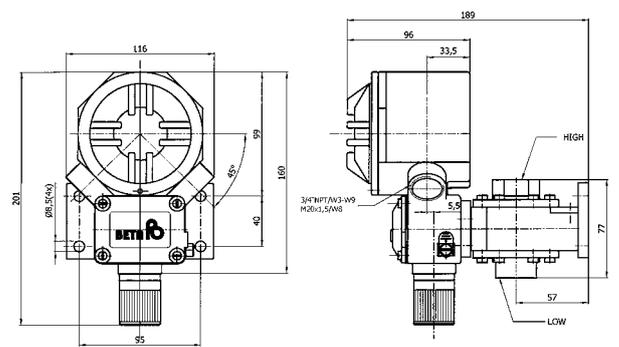
"W"- Series: Differential "D...L"



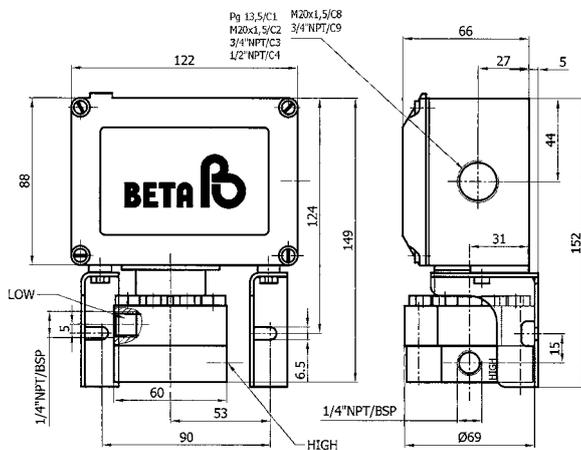
"C - Z"- Series: Differential "D...M"



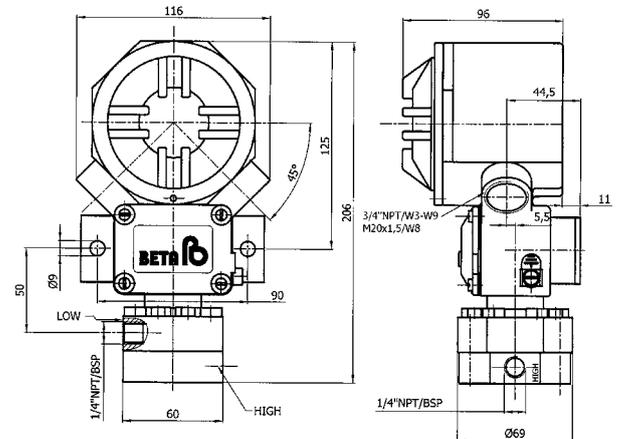
"W"- Series: Differential "D...M"



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

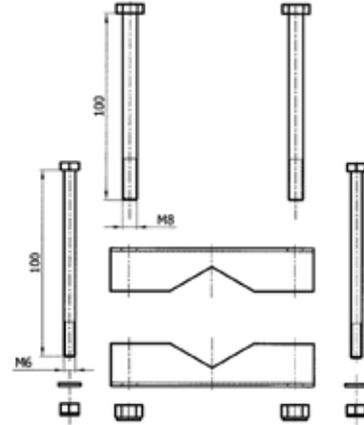


"W"- Series: Differential "D...H"



Contents :

1. 2 x Bracket +
 2. 2 x bolts M8 x 100 mm + nut (W3)
 - OR
 3. 2 x bolts M6 x 100 mm + washer + nut (C/Z)
- Size +/- 1,5 mm / Material SS 304



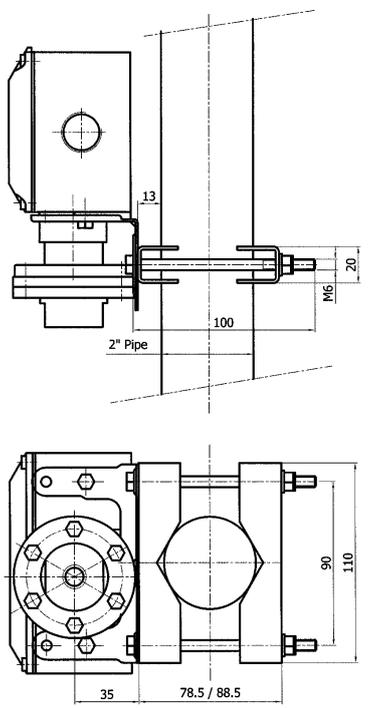
Disclaimer :

This pipe mount bracket is solely intended for use in combination with BETA Pressure & Temperature Switches.

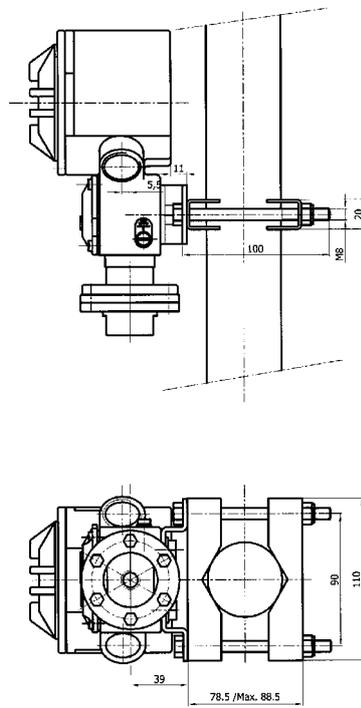
Foundation vibrations, as well as process vibrations, can disturb the proper functioning of the mounted instrument, the use of this bracket does not prevent or diminishes such occurrence.

2" Pipemount Set (SS 304) Configuration Examples

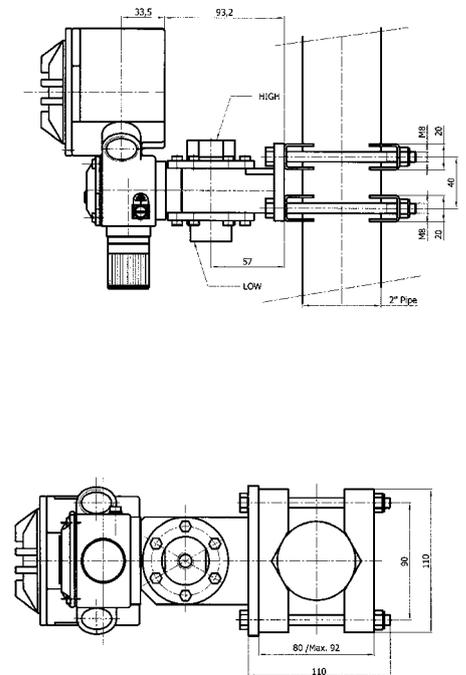
"C."- Series Enclosure on 2" Pipe



"W."- Series Enclosure on 2" Pipe



"W."- Series Enclosure "D...M" on 2" Pipe



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 ± 1,5 mm.

Pressure and Temperature Switches

C, W and Z series switches

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BETA Pressure & Temperature switches
are designed & manufactured in The Netherlands

Note
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