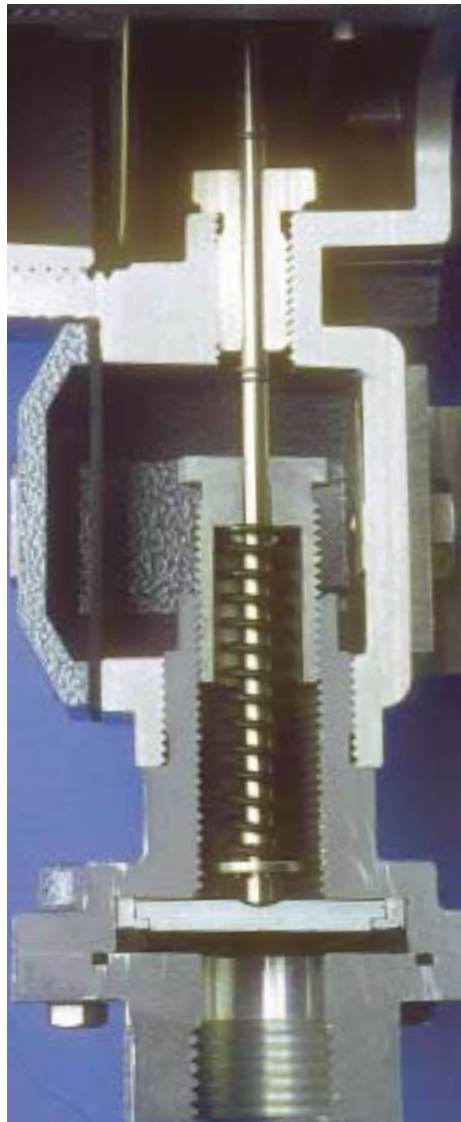
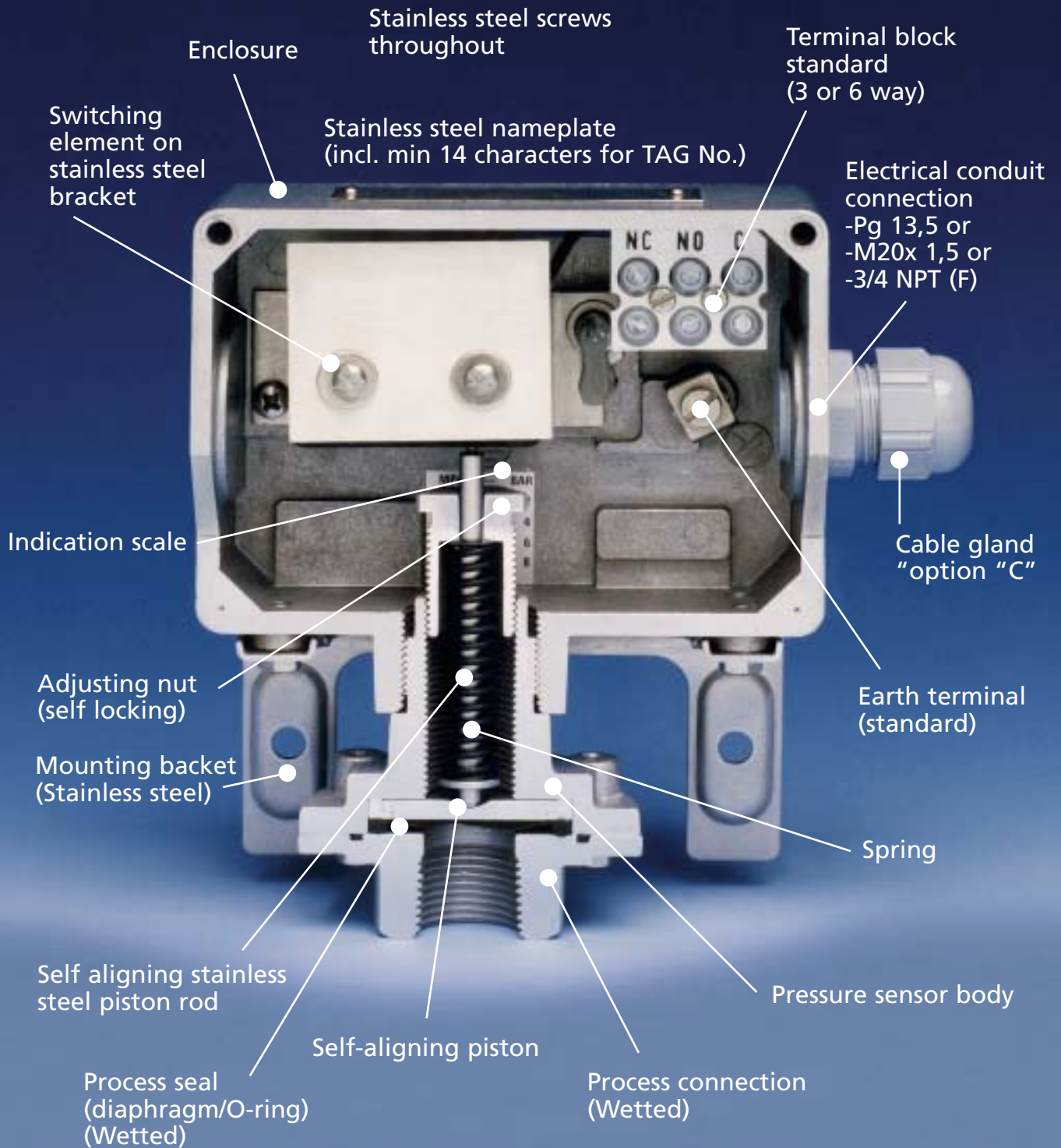


## Pressure & Temperature Switches

The „user friendly“ generation  
General Bulletin



# BETA SWITCH PRINCIPLE



# 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 has resulted in a vast experience of -virtually all known switch applications.
- Benefiting from this experience and using our expertise, you will find all of this in our “user friendly” generation.

## YOUR „SPECIAL“ IS PROBABLY BETA’S „STANDARD“

Major users of switches all over the world, 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 translates pressure at the diaphragm directly to actuation of the microswitch, with no intervening linkages or mechanisms and with full protection against very high overrange pressure.

The piston sensor is isolated from the process fluid by a diaphragm and static O-ring seal, retained by a process connection port. These three 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 resistant against shock and vibration.
- No pipe strains on the instrument to cause shift of setpoint, due to separate flexible stainless steel mounting bracket.

### APPROVED BY

ATEX: KEMA CE 0344 and PED: CE-0035. (For more; see also page 16,17 and 18)

### QUALITY SGS

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

### ECONOMY

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

### SERVICE

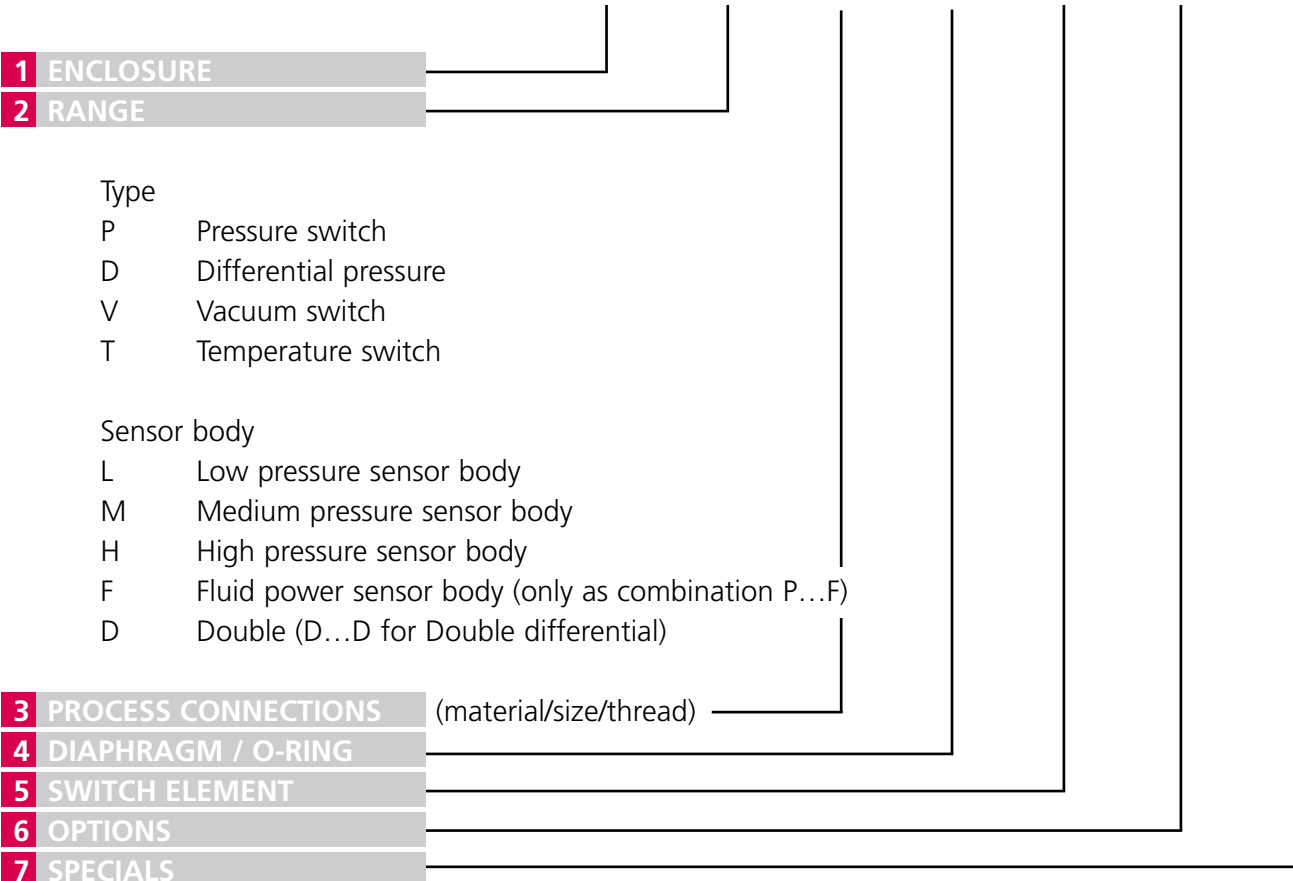
The international BETA sales network backs up this high quality product with an equally high quality service.



# GUIDE OF HOW TO SELECT YOUR BETA SWITCH

From a simple and logical model code system for easy, accurate product specification, through project coordination, efficient document handling and after sales service BETA aims to make life easier for its valued customers and users.

C1 - P304L - S1N - B1 - K1 - Y - X2



## 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  
 Ex. proof: -20 to +40°C : M-, V-, W- and Z-series for T6  
 -20 to +80°C : V- and W-series for T5

**Repeatability:**

± 0.2% of Full Range\* (measured at 20°C 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 setting against additional charge)

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

## ENCLOSURE



ENCLOSURE CODE	CLASSIFICATION	ELECTRICAL COND. CONN.	MATERIAL	EARTH TERMINAL	TERM. BLOCK	TYPE OF SENSOR				
						PRESS	FLUID P.	VACUUM	DIFF.	TEMP.
<b>B2</b> <sup>1)</sup>	Weathertight Miniature (IP65)	Hirschmann Plug conn. DIN 43650-A	Aluminium	Standard (via plug)	Not applicable	√	√	√	-	√
<b>C1</b>	Weathertight (IP66)	PG 13,5	Aluminium	Standard (Internal)	Standard	√	√	√	√	√
<b>C2</b>		M20 x 1,5								
<b>C3</b>		3/4" NPT (F)								
<b>C8</b>		M20 x 1,5	SS 316 <sup>2)</sup>							
<b>G3</b>	Weathertight (IP66)	sealed wire Leads	Aluminium	No	Not applicable				√	
<b>M0</b>	Miniature Explosion-proof EEx d IIC T6 (IP66) 02 ATEX 2189X	Wire Leads (0,5m)	SS 316 <sup>2)</sup>	Standard (wire lead (0,5m))	Not applicable	√	√	√	√ <sup>3)</sup>	√
<b>W3</b>	Explosion-proof EEx d IIC T6 (IP65) 02 ATEX 2186X	3/4" NPT (F)	Aluminium	Standard In- & external	Standard	√	√	√	√	√
<b>V5</b>		M20 x 1,5	Cast Iron <sup>2)</sup>			√	√	√	√	√
<b>Z1</b>	Explosion-proof EEx d IIC T6 (IP65) 02 ATEX 2187	PG 13,5	Aluminium	Standard In- & external	Standard EEx e	√	√	√	√ <sup>4)</sup>	√
<b>Z2</b>		M20 x 1,5								
<b>Z3</b>		3/4" NPT (F)								
<b>Z8</b>		M20 x 1,5	SS 316 <sup>2)</sup>							

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 SS 316 sensor body and adjusting nut.

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

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

C1 - P304L - S1N - B1 - K1 - Y - X2

## RANGES for Pressure switches

"Ranges" given here are valid for setpoints at increasing pressures (vacuum) in barg (mbar). 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.

RANGE CODE	ADJUSTABLE RANGE	MAX. DEADBAND	MAX. OVERRANGE PRESSURE	PROOF PRESSURE
P 301 L <sup>1)</sup>	2 - 15 mbar	1,1 - 1,9 mbar	30 bar	35 bar
P 302 L <sup>1)</sup>	10 - 100 mbar	2,5 - 3,5 mbar		
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		
P 402 M	100 - 400 mbar	15 - 20 mbar	125 bar	140 bar
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		
P 502 H	0,3 - 1,6 bar	65 - 95 mbar	200 bar	600 bar
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	400 bar	
P 908 H	10 - 300 bar	2,0 - 19,5 bar		
P 909 H	10 - 350 bar	2,0 - 25 bar		

<sup>1)</sup> Only available with L1 – microswitch element. (K1/G1 possible consult factory)  
Not available on M- and Z-series switches.

## RANGES for Fluid power pressure switches <sup>1)</sup>

RANGE CODE	ADJUSTABLE RANGE	MAX. DEADBAND	MAX. OVERRANGE PRESSURE	PROOF PRESSURE
P 904 F	12 - 55 bar	3,5 - 6,0 bar	650 bar	700 bar
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		

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

## RANGES for Vacuum switches

RANGE CODE	ADJUSTABLE RANGE (INCR. VAC. TO PRESS.) <sup>1)</sup>	MAX. DEADBAND (VAC./PRESS.)	MAX. VACUUM	MAX. OVERRANGE PRESSURE	PROOF PRESSURE
V 304 L	- 60 / +150 mbar	4 / 6,5 mbar	- 500 mbar	+ 30 bar	+ 35 bar
V 404 M	- 400 / +400 mbar	16 / 25 mbar	- 1 bar	+ 125 bar	+ 140 bar
V 406 M	- 980 / +1000 mbar	30 / 40 mbar	- 1 bar	+ 125 bar	+ 140 bar
V 506 H	-1 / +6 bar	80 / 300 mbar	- 1 bar	+ 200 bar	+ 600 bar

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

## RANGES for Differential switches

RANGE CODE	ADJUSTABLE DIFF. RANGE <sup>1)</sup>	TYPICAL DEADBAND <sup>1)</sup>	MAX.STATIC PRESSURE	MAX.OVERRANGE PRESSURE	PROOF PRESSURE
<b>P301L - ... - D</b> <sup>5)</sup>	2 - 15 mbar <sup>2)</sup>	1,1 - 1,9 mbar	10 bar	10 bar <sup>3)</sup>	15 bar
<b>D 302 L</b>	12 - 75 mbar <sup>2)</sup>	7 mbar	30 bar	30 bar <sup>3)</sup>	35 bar
<b>D 304 L</b>	22 - 180 mbar	8 mbar			
<b>D 306 L</b>	25 - 450 mbar	11 mbar			
<b>D 309 L</b>	35 - 1250 mbar	15 mbar			
<b>D 402 M</b>	0,3 - 1,0 bar	0,15 bar	10 bar	140 bar <sup>4)</sup>	140 bar
<b>D 404 M</b>	0,5 - 2,5 bar	0,2 bar	50 bar		
<b>D 406 M</b>	1,0 - 6,0 bar	0,2 bar			
<b>D 408 M</b>	1,0 - 14,5 bar	0,2 bar			
<b>D 506 M</b>	5 - 20 bar	0,8 bar	100 bar		
<b>D 508 M</b>	10 - 50 bar	0,8 bar	140 bar		
<b>D 608 M</b>	10 - 70 bar	1,5 bar			
<b>D 352 H</b>	80 - 160 mbar	25 mbar	200 bar		
<b>D 354 H</b>	100 - 500 mbar	35 mbar			
<b>D 356 H</b>	120 - 1450 mbar	50 mbar			
<b>D 359 H</b>	150 - 3450 mbar	75 mbar			

## BI-DIRECTIONAL DIFFERENTIAL PRESSURE SWITCHES

<b>D 356 D</b>	0,1 - 1,5 bar	35 - 65 mbar	200 bar	200 bar <sup>4)</sup>	200 bar
<b>D 358 D</b>	0,1 - 3,5 bar	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) 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.
- 5) Only available with G3-enclosure. For more details see page 19 and drawing page 24.

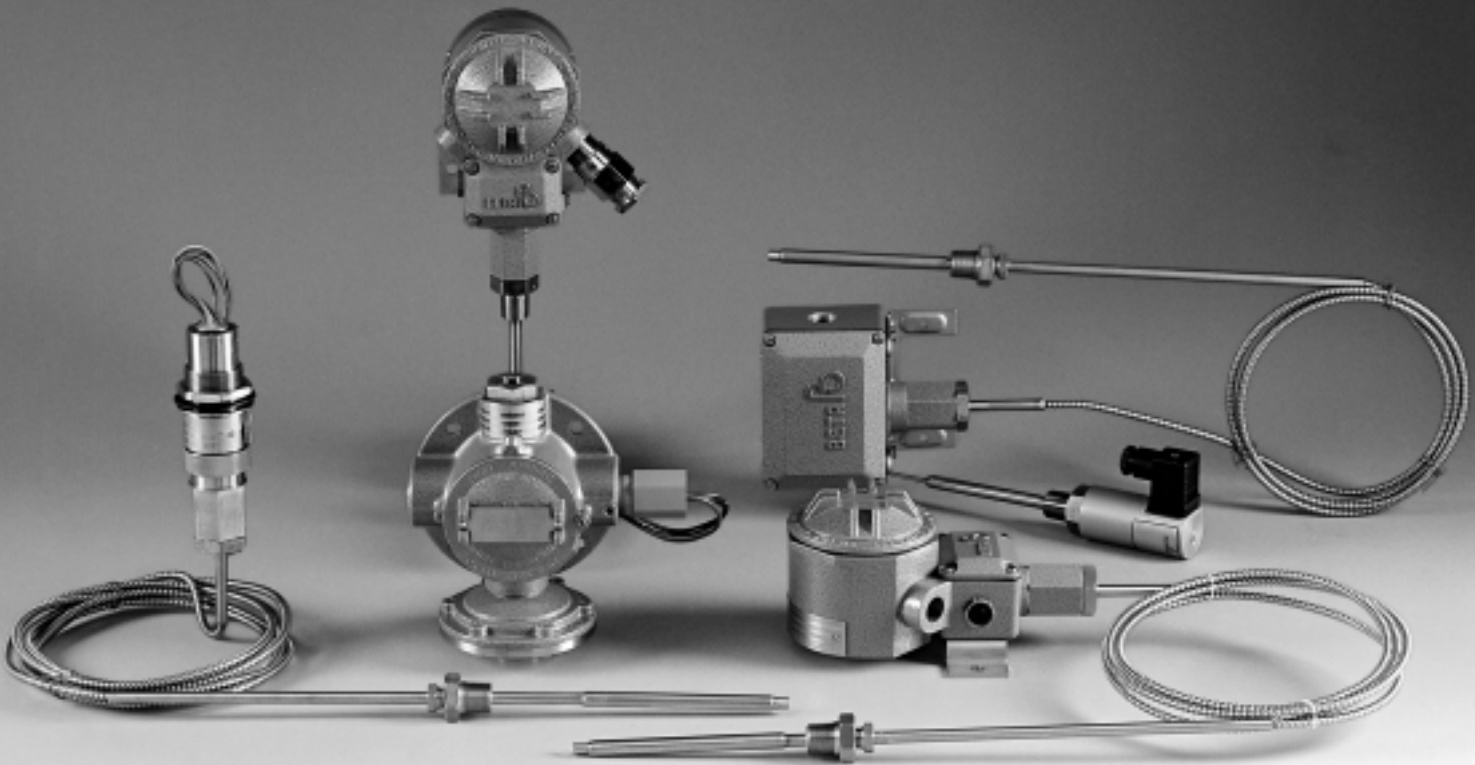
## IN THE FOLLOWING TABLE THE ESTIMATED INFLUENCE FOR INCREASING STATIC PRESSURE IS GIVEN.

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 vacuum differential application consult your BETA Switch Representative.

## RANGES for Temperature switches



RANGE CODE	ADJUSTABLE RANGE	MAX. DEADBAND	MAX. TEMPERATURE	PROOF TEMPERATURE	MAX. PROCESS PRESSURE
T 528 H	-40/+40 °C	3 °C	+125 °C	+200 °C	175 bar
T 548 H	0/+95 °C		+180 °C	+200 °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.

## PROCESS CONNECTIONS / sensor type

### Pressure Switches

PROCESS CONNECT SIZE / CODE	AVAILABLE ON SENSOR <sup>2)</sup>	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" F	L & D...L			S4N	S4B				
	2" F	L & D...L						B6N	B6N
1/2" M	L & M D...L / M			S7N	S7B	M7N	M7B		
	H								
1/2" Gauge Connection	H L & M				S7G				
1" M	M & H D...M			S8N	S8B				

1) Not for vacuum

Other materials such as P.V.C., Hastelloy, SS 316 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 SS 316.

2) Standard process connection for

"L"ow & "M"edium pressure sensor body	: A1N or A1B
"H"igh pressure sensor body	: S1N or S1B
"F"luid power pressure sensor body	: B1N or B1B
Differential switches: D...H, D...D	: S1N or S1B only
D...L	: A1N or A1B; Only for Low side

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

### Temperature Switches

PROCESS CONNECT	SENSOR CODE	TYPE OF TEMPERATURE SENSING BULB.	
1/2"NPT(M)	D00	Direct mount. <sup>1)</sup>	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. <sup>2)</sup>

All SS 316 stainless steel sensor, capillary (SS 304 armoured) 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.

# 4 DIAPHRAGM / O-RING

C1 - P304L - S1N - **B1** - K1 - Y - X2

## DIAPHRAGM / O-RING

### Pressure Switches

DIAPHR./ O-RING CODE	DIAPHRAGM <sup>6)</sup>	O-RING	USE <sup>1)</sup>	DEADBAND MULTIPLIER
<b>B1</b>	Buna-N	Buna-N <sup>2)</sup>	Standard water/oil.	1.0
<b>E6</b>	EPDM	EPDM <sup>2)</sup>	Some hydraulic fluids.	1.0
<b>K5</b>	Kalrez	Kalrez <sup>2)</sup>	Highly corrosive fluids.	1.5
<b>M1</b>	Monel	Buna-N	Seawater.	2.0
<b>M2</b>		Viton-A <sup>5)</sup>	High temperature Not below 0 °C.	
<b>M4</b>		PTFE <sup>4)</sup>	Corrosive acids.	
<b>M5</b>		Kalrez	Highly corrosive and permeative acids.	
<b>N3</b>	Neoprene	Neoprene <sup>2)</sup>	When required.	1.0
<b>P1</b>	PTFE (Polyimide coated with PTFE)	Buna-N	Oil/air/water.	1.5
<b>P2</b>		Viton-A <sup>5)</sup>	High temperature Not below 0 °C.	
<b>P4</b>		PTFE <sup>4)</sup>	Corrosive acids.	
<b>P5</b>		Kalrez	Corrosive acids.	
<b>S1</b>	SS 316	Buna-N	Permeative gases	2.0
<b>S2</b>		Viton-A <sup>5)</sup>	High temperature Not below 0 °C.	
<b>S3</b>		Neoprene	Permeative refrigerant gases.	
<b>S4</b>		PTFE <sup>4)</sup>	Corrosive acids.	
<b>S5</b>		Kalrez	Highly corrosive and permeative acids.	
<b>S6</b>		EPDM	Steam	
<b>T1</b>	Tantalum	Buna-N	Highly corrosive and permeative gases and non-acid liquids. Select O-ring as required.	2.0
<b>T2</b>		Viton-A <sup>5)</sup>		
<b>T3</b>		Neoprene		
<b>T4</b>		PTFE <sup>4)</sup>		
<b>T5</b>		Kalrez		
<b>V2</b>	Viton-A	Viton-A <sup>2) 5)</sup>	High temperature Not below 0 °C.	1.5
<b>S0</b>	SS 316	welded diaphragm	Highly permeative gases.	3.0
<b>M0</b>	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 varies 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).

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

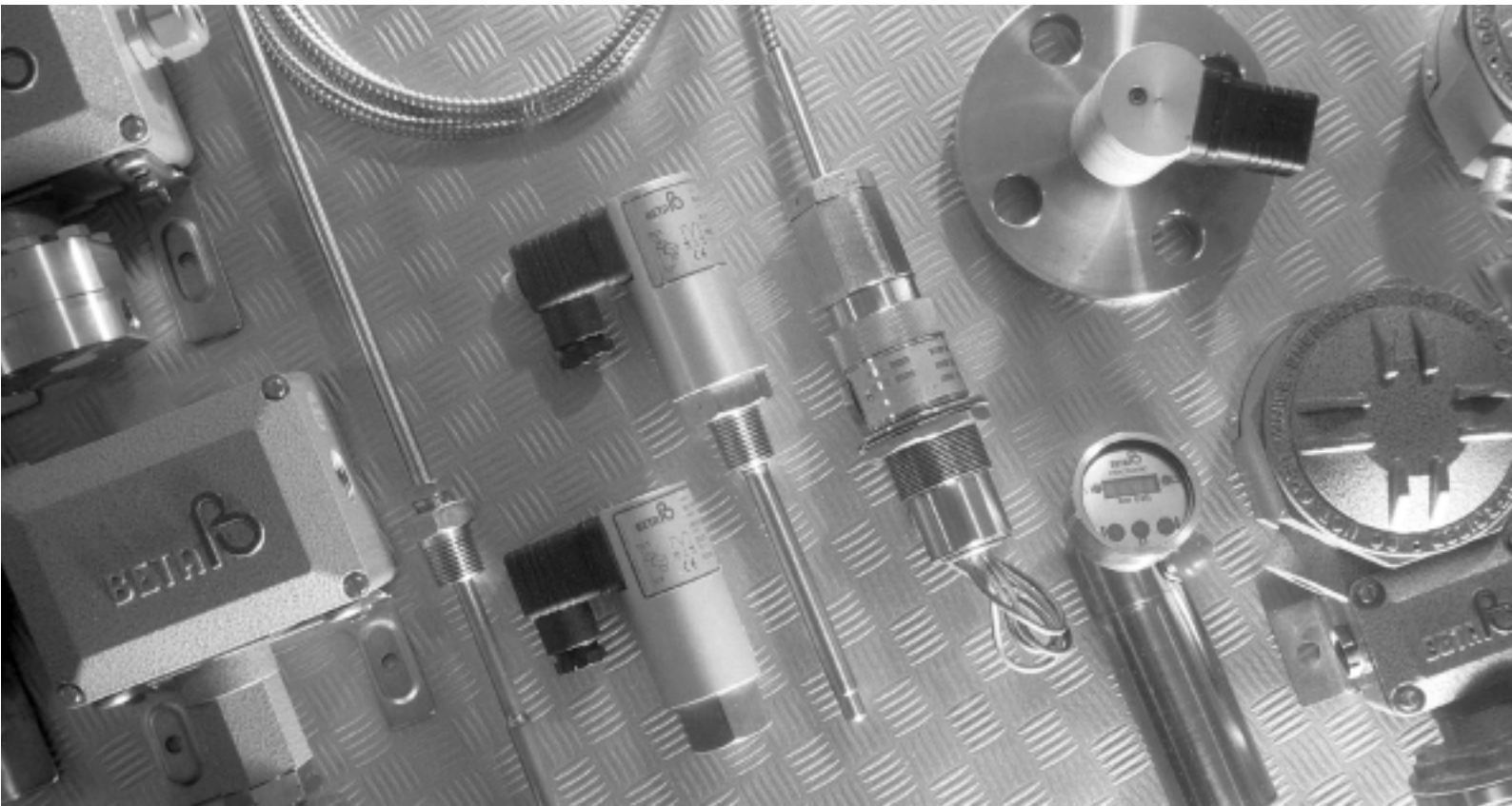
4) PTFE O-ring not suitable for vacuum switches or conditions. (Wetted internal spring of Co-Cr-Ni alloy, comparable with Elgiloy).

5) For process temperature > 100 °C, consult your BETA Switch Representative.

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

## DIAPHRAGM / O-RING

## Differential Pressure Switches



For the Differential Pressure Switches basically the same Diaphragm/O-ring combinations can be used as for the Pressure Switches but we have to consider following.

TYPE	STANDARD	FOLLOWING COMBINATIONS ARE NOT POSSIBLE
P301L-D	<b>B1</b>	S0, M0
D...L	<b>B1</b>	M4, P4, S4, T4, S0, M0
D...M	<b>B1</b>	No Limitation
D...H	<b>P1</b>	B1, E6, K5, N3, V2,
D...D	<b>P1</b>	M4, P4, S4, T4, S0, M0

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

## Temperature Switches

All temperature switches have "S0" welded diaphragm.  
Deadband Multiplier microswitch element same as for pressure switch.

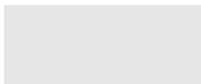
C1 - P304L - S1N - B1 - **K1** - Y - X2

## SWITCHING ELEMENTS VS. ENCLOSURE

SWITCHING ELEMENT		ENCLOSURE						
		G3*, C1, C2, C3, C8	M0	W3, V5	Z1, Z2, Z3, Z8			
		Internal Earth Terminal	Earth via wired lead	In- & External Earth Terminal				
S. P. D. T. (SINGLE SWITCHING ELEMENT)	SE	3-WAY TERMINAL BLOCK						
	SG							
	SL					4-WAY TERM. BL.		
	SP							
	SR					SCREW.TERM.BL.		
	G1					4-WAY TERMINAL BLOCK		
	K1							
	L1							
	U1							
	V1							
	O1							
	N1							
R1			3-WAY TERM. BL.					
M1	3-WAY TERMINAL BLOCK	4-WIRE LEADS	4-WAY TERMINAL BLOCK					
Y1								
Z1								
D. P. D. T. (DOUBLE SWITCHING ELEMENT)	M2	6-WAY TERMINAL BLOCK	7-WIRE LEADS	7-WAY TERMINAL BLOCK				
	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

The standard switching elements are:

"K1" for C-, V- and W- enclosures

"M1" for M- enclosures

"R1" for Z- enclosures

\* "G3" enclosure : Only with L1-, K1- or G1-microswitch.  
: Wire Leads  
: No Internal Earth Terminal

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

## SWITCHING ELEMENTS

### Pressure & Temperature Switches

SWITCHING ELEMENT CODE	1)	USE	MAX. RATINGS (RES.)		DEADBAND MULTIPL.		
			VAC.	VDC	S.P.D.T.	D.P.D.T.	
<b>K1</b>	4)	Standard	480/ 15A	28/ 0,5 A**	1.0	1.5	
<b>L1</b>	4)	General-service Standard on P/D301L & P/D302L ranges	480/ 10A	28/ 0,5A	1.0	-	
<b>M1</b>	*	Standard on M-series	250/5A	30/ 0,1A**	1.5	3.5	
<b>U1</b>		Normal DC-service	480/ 15A	125/0,5A	2.5	4.0	
<b>V1</b>		DC-service High DC cap. Magnetic blow out	125/ 10A	125/ 10A	4.0	-	
<b>G1</b>	4)	Low voltage circuit (Gold contacts) For use in H2S environment and/or for (Ex) applications	125/1A	28/ 0,5A**	1.5	2.0	
<b>Y1</b>	*		125/0,1A	30/ 0,1A	3.0	4.5	
<b>O1</b>	*	Gold contacts Environmental proof (IP 67)	250/0,1A	30/0,1A	1.5	3.0	
<b>N1</b>	*	Silver contacts Environmental proof (IP 67)	250/2A	30/2A	1.5	3.0	
<b>Z1</b>	*	For higher (amb.) temp. Elgiloy spring. For corrosive environment	250/5A	125/ 0,3A	3.0	4.5	
<b>R1</b>		Ex. Proof ATEX approved Only in Z-series	250/7A	30/7A	3.0	S.P.D.T. only	
<b>SP</b>		Adjustable Deadband	Small adjustable deadband	250/ 15A	-		1 to 3
<b>SR</b>	3) 5) 6)		Wide adjustable deadband	480/ 20A	-		2 to 6
<b>SE</b>	3)	Manual Reset	Actuates automatic on increasing pressure	480/ 15A	125/0,5A		1.5
<b>SG</b>	3)	Manual Reset	Actuates automatic on decreasing pressure	480/ 15A	125/0,5A		1.5
<b>SL</b>	5)	Herm.sealed	(inert gas filled) Dusty, corrosive environment	125/1A	28/15A		5.0
<b>SA</b>	3)	Pneumatic 7)	Normally closed (NC)			Consult BETA Switch Rep.	Single only
<b>SB</b>	3)		Normally open (NO)				

1) For D.P.D.T. action second code figure to 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 "V"- and 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. From tests and/or experience is known that microswitches have DC capacity. Consult your BETA Switch Representative.

## OPTIONS

C1 - P304L - S1N - B1 - K1 - **Y** - X2

### Pressure & Temperature Switches

OPTION CODE	DESCRIPTION
<b>B</b> *	Industrial cleaning of "wetted" parts for oxygen services.
<b>C</b>	Cable gland (weather proof IP65, EExe, EExi or EExd in acc. with classification of enclosure).
<b>I</b>	Intrinsically safe application (EExi). Only on "C"-series.
<b>M</b> *	Vacuum protector plate (Not on Vacuum- and Fluid Power Switch)
<b>P</b> *	Recommended on strong process pulsations. Only on "H"-sensors. Not in combination with EPDM, Neoprene and Viton-A.
<b>S</b>	Stainless steel Tag-wired to enclose. Tag has 3 lines (18 characters per line)
<b>T</b>	Stainless steel Tag-permanently attached. (Not on "M"- and "V"-and "W"-series switches). Has 3 lines (18 characters/line).
<b>V</b>	Fungicidal varnish coating (internal).
<b>Y</b>	Epoxy coating of switch (external). Only in combination SS 316 process connection.
<b>D</b> *	Differential execution on G3-enclosure. Only for G3-P301L...D

\* Not available on Temperature switches.

### Tag no. space on nameplates \_\_ added free of charge

Standard nameplate C.-serie : 2 lines with 16 characters or spaces + 1 line with 14 characters or spaces  
 M.-, V.- and W.-serie : 1 line with 19 characters or spaces  
 Z.-serie : 1 line with 14 characters or spaces

## SPECIALS

C1 - P304L - S1N - B1 - K1 - Y - **X2**

### Pressure & Temperature Switches

We can incorporate numerous specials to meet your requirements. These special requirements are -indicated by the letter X 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 our switches are:

- Flanged connection 3 /4" to 3" (ANSI or DIN).
- Range indication in Pa, Kg/cm<sup>2</sup>, mm H<sub>2</sub>O or mm Hg.
- Breakwire resistor acc E12 range for line monitoring.
- Hirschmann or Harting Connector.
- Moisture inhibitor
- Chemical seal

## 1 ENCLOSURE

W3 - P506H - S1B - S2 - K1 - Y - X2

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

## 2 RANGE

W3 - P506H - S1B - S2 - K1 - Y - X2

See section **2. Range** on page 6, 7 and 8

## 3 PROCESS CONNECTIONS (material/size/thread)

W3 - P506H - S1B - S2 - K1 - Y - X2

See section **3. Process connections** on page 9

## 4 DIAPHRAGM / O-RING

W3 - P506H - S1B - S2 - K1 - Y - X2

See section **4. Diaphragm / O-ring** on page 10 and 11

## 5 SWITCHING ELEMENTS

W3 - P506H - S1B - S2 - K1 - Y - X2

See section **5. Switch Element** on page 12 and 13

Selection of your switch is now completed.

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

**Options:** See section "**6. Options**" on page 14

**Specials:** See section "**7. Specials**" on page 14

# BETA EXPLOSIONPROOF SWITCHES

## The most complete range of Explosion-proof switches !!

The BETA Pressure & Temperature Switch programme offers you the most complete range of Explosion-proof switches for virtually every industry and application.

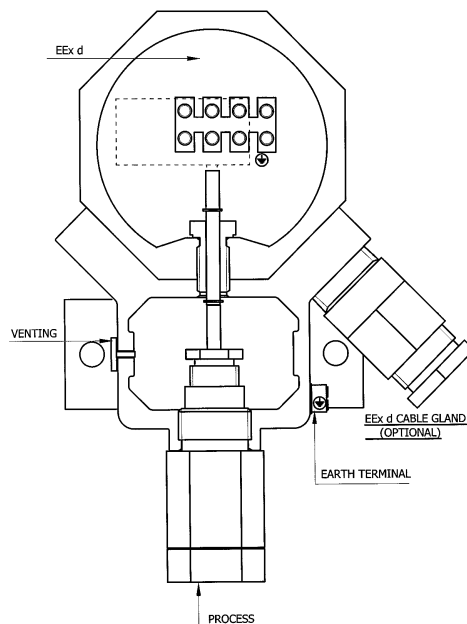
The "BETA Switch", well known as a safety instrument, adds an extra dimension to industrial safety by having the switches approved up to the highest classification EEx d IIC T6/T5 by KEMA 02ATEX.

- Quality product (Q.A. acc. to ISO 9001-2000).
- "User friendly" Modifications – Standard features incorporated for your safety.
- Only 3 process wetted parts – Check with us before considering expensive Chemical Seals.
- Very high overrange pressures – No setpoint shift.
- "Designed-in" reliability – Designed for your application.
- Wetted parts to NACE standard available.

## V- and W-Series (Ex II 2G/D EEx d IIC T6/T5)\*



"W"-series



"W"-series (Ex II 2G/D EEx d IIC T6/T5)\*

### The "V" and "W"-series are a worldwide best seller.

With its separate adjustment compartment enabling easy field calibration.

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

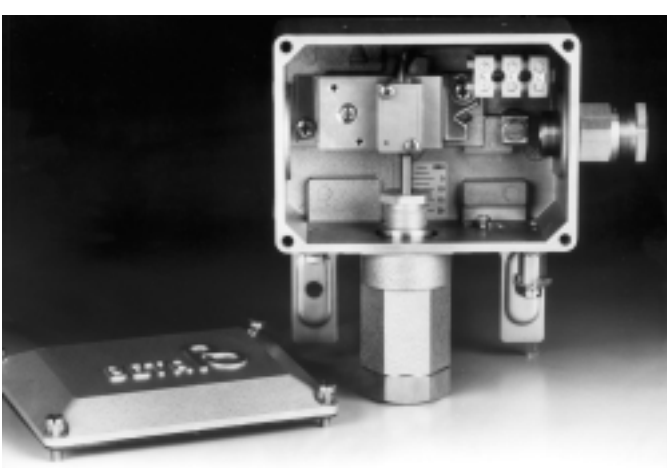
### ATEX approved: KEMA 02ATEX2186 X

- \* For Gas : -20 to +40 °C / T6  
          : -20 to +80 °C / T5
- For Dust : Ex II 2D T 100 °C

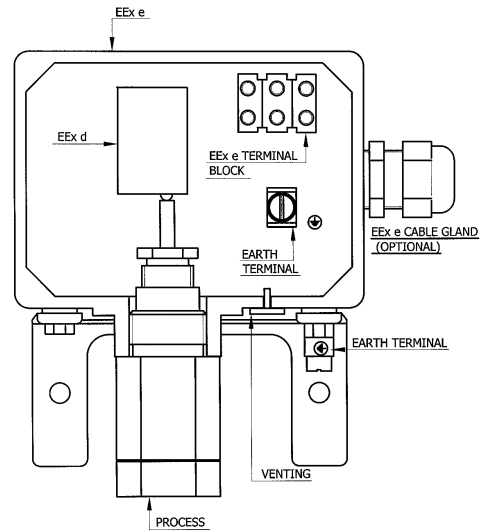
- In aluminium ("W"-type) or cast iron ("V"-type)
- With separate adjustment -compartment.
- Available as Pressure-, Hydraulic-, Vacuum-, Differential pressure- and Temperature switch.
- All ranges available.
- Highest overrange protection.
- Excellent for field mounting. (2" Pipe mounting bracket -as accessories available)
- Heavy duty execution.

# BETA EXPLOSIONPROOF SWITCHES

## Z-Series (Ex II 2G EEx ed IIC T6)



"Z"-series



"Z"-series (Ex II 2G EEx ed IIC T6)

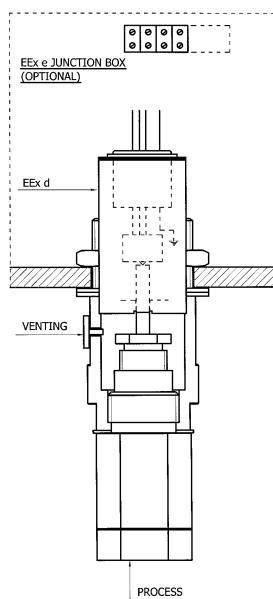
**The "Z"-series, the economical explosion-proof switch. ATEX approved: KEMA 02ATEX2187**

- 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 (except for P301L and P302L) available.
- Limited to "R1" switching element. (S.P.D.T. only).
- High overrange.
- Simple and quick electrical connection.

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



"MINEX"-series



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

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

**ATEX approved: KEMA 02ATEX2189 X**

- Available as Pressure-, Hydraulic-, Vacuum-, Differential Pressure (only "D...L" and "D...H"-serie) 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.
- Combined, easy installation in (optional) EExe box (Min. installation space).
- Easy field adjustment.

# BETA EXPLOSIONPROOF SWITCHES - INTRINSIC SAFE

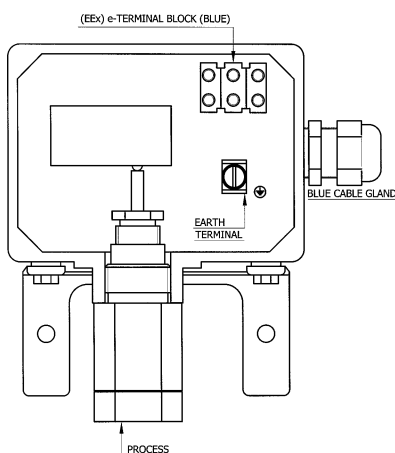
## BETA "C" - Series



"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 EN 50 014/20 for **Ex II 1G/D EEx ia IIC T6 T 85 °C** or **Ex II 2G/D EEx ib IIC T6 T 85 °C**.



### ATEX approved: KEMA 02ATEX1190 X

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

Option "I" in accordance with art. 9 of the Council 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.

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

Please note following:

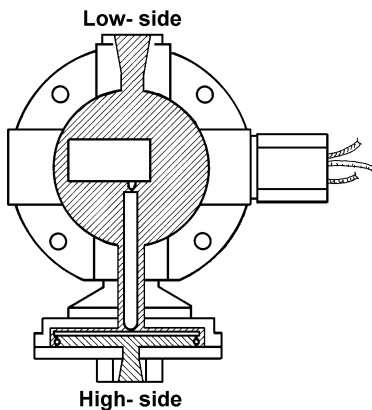
When switch is ordered with cable gland (option "C") we will automatically install the EEx i blue cable gland (see also drawing). Due to low current used in I.S. systems we recommend the use of switching elements with gold contacts (code "G1", "O1" or "Y1"). It is not mandatory.

# BETA DIFFERENTIAL PRESSURE SWITCHES

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

## VERY LOW RANGE

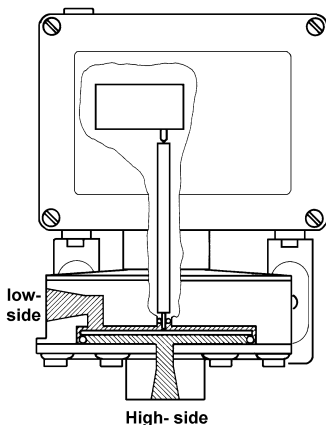
## "P301L - .. - D"-SERIE



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

## LOW RANGE

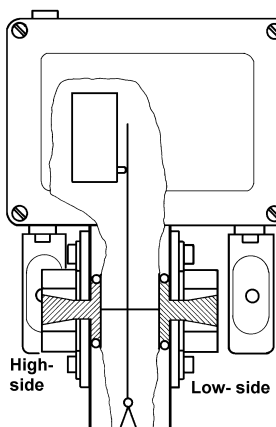
## "D... L"-SERIE



- Principle:** As pressure switch, with sealed Aluminium sensorbody. (optional in SS 316).
- 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)  
EEx i a/b (C-enclosure + option I)  
EEx ed (M-enclosure)  
EEx d (V- and W-enclosure).  
EEx ed (Z-enclosure)

## GENERAL PURPOSE

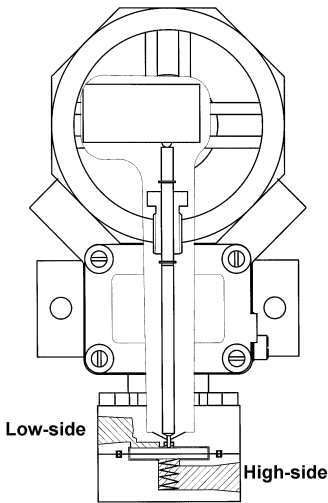
## "D... M"-SERIE



- Principle:** 2 x piston/diaphragm type with separate sealing for High and Low.
- Range:** 0,3 – 70 bar
- Max. Static Pressure:** 140 bar
- Application:** All fluids & gases provided acceptable choice of wetted parts is within our range.
- Execution:** Weathertight IP 66 (C-enclosure)  
EEx i a/b (C-enclosure + option I),  
EEx ed (Z-enclosure),  
EEx d (V- and W-enclosure).

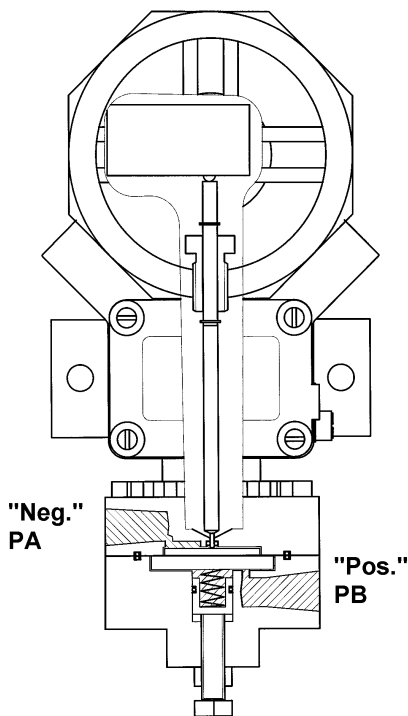
# BETA DIFFERENTIAL PRESSURE SWITCHES

## LOW RANGE / HIGH STATIC "D... H"-SERIE



- Principle:** Piston type with single diaphragm, sealed in SS 316 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)
  - EEx i a/b (C-enclosure + option I)
  - EEx ed (M-enclosure)
  - EEx d (V- and W-enclosure)
  - EEx ed (Z-enclosure)

## LOW RANGE / HIGH STATIC "D... D"-SERIE



### Bi-Directional Pressure Double Differential Switch

- Principle:** Piston type with single diaphragm, sealed in SS 316 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)
  - EEx i a/b (C-enclosure + option I)
  - EEx d (V- and W-enclosure).

\* With "clean fluids and gases", we mean 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 do.

## BETA TEMPERATURE SWITCH



The BETA Temperature Switch is a pressure switch incorporating a sealed 2-phase (vapour/liquid) temperature sensor. When the temperature of the process increases, the vapour pressure of the liquid also increases. If this vapour 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 execution (ATEX approved).
- Fits into most standard thermowells.
- No need for ambient temperature compensation (no setpoint shift).
- Excellent repeatability/small dead-band.
- All 316 stainless steel sensor and capillary (SS armoured).
- Filling system of gas/liquid acc. to SAMA-Class II C.

"C"-series with Capillary type sensor

## EXPLOSION-PROOF TEMPERATURE SWITCH



ATEX approved up to the highest classification  
With the "M"-, "V"-, "W"- and "Z"-enclosures the BETA Temperature Switch is approved by ATEX, standard EN 50.014-50.018-50.019.

"W"-series with Direct mount type sensor

# BETA PRESSURE & TEMP. SWITCH - CERTIFICATIONS

## EXPLOSIONPROOF CERTIFICATIONS

- ATEX – EEx d IIC T6 for V- and W-series
- ATEX – EEx ed IIC T6 for M- and Z-series
- ATEX – EEx ia/ib IIC T6 for C-series (intrinsically safe)

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

- DVGW - C-, V- and W-series
- DGWK - C-, V- and W-series
- TÜV 100/1 - C-, V-, W- and Z-series

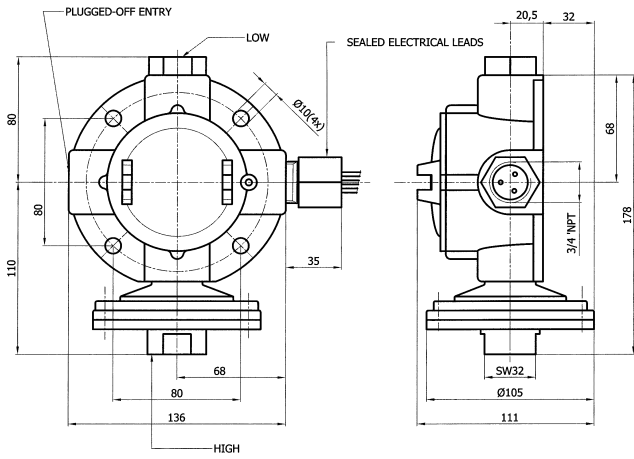
More certificates/reports are available. Please consult your BETA Switch Representative.



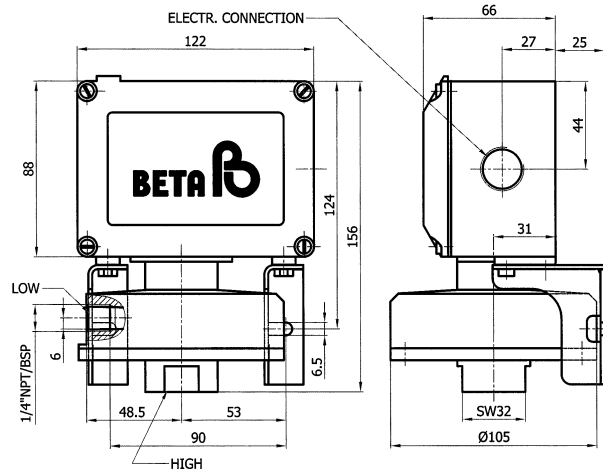


# DIMENSIONS

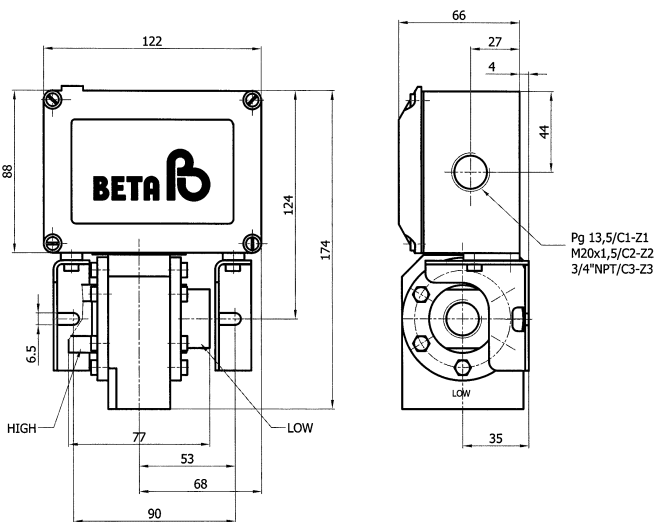
"G3"-Type: Low Differential



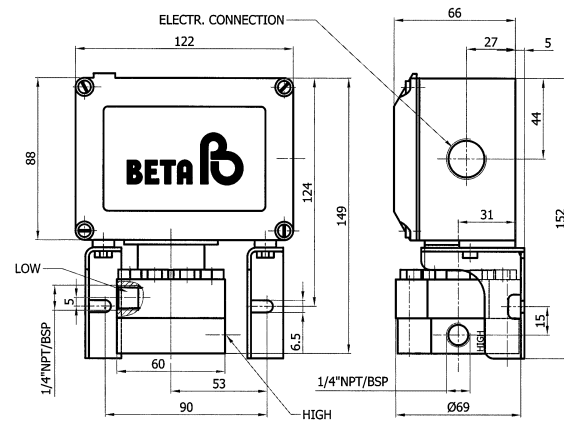
"C."- & "Z."-Serie: Differential "D...L"



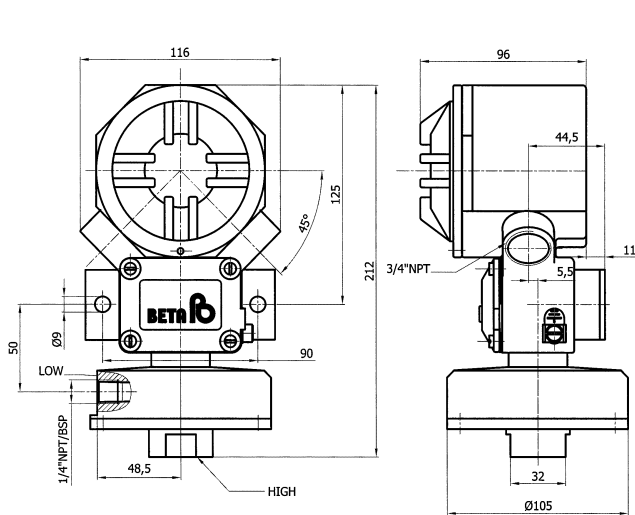
"C."- & "Z."-Serie: Differential "D...M"



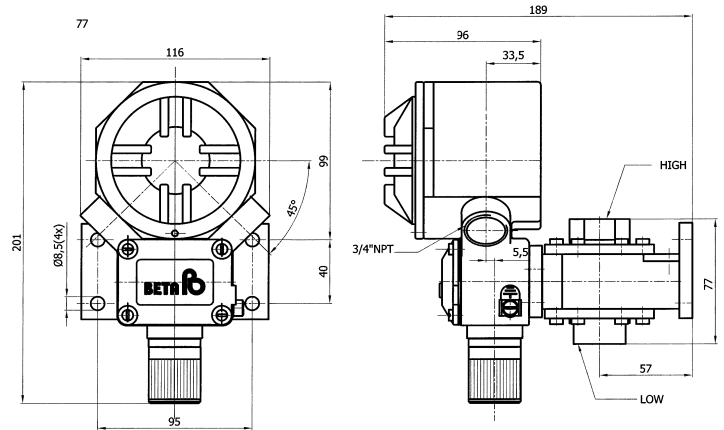
"C."- & "Z."-Serie: Differential "D...H"



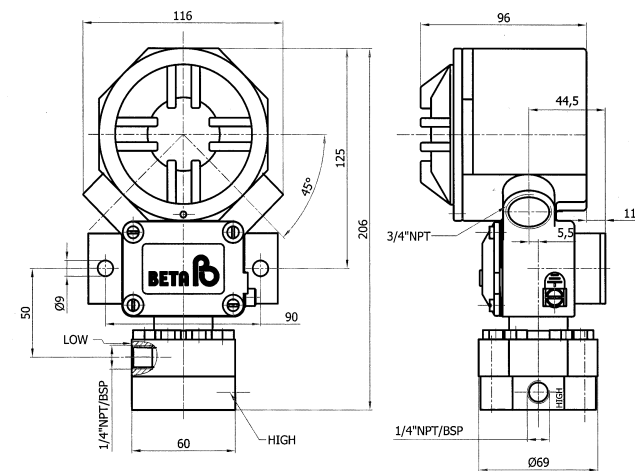
“W.”-Serie: Differential “D...L”



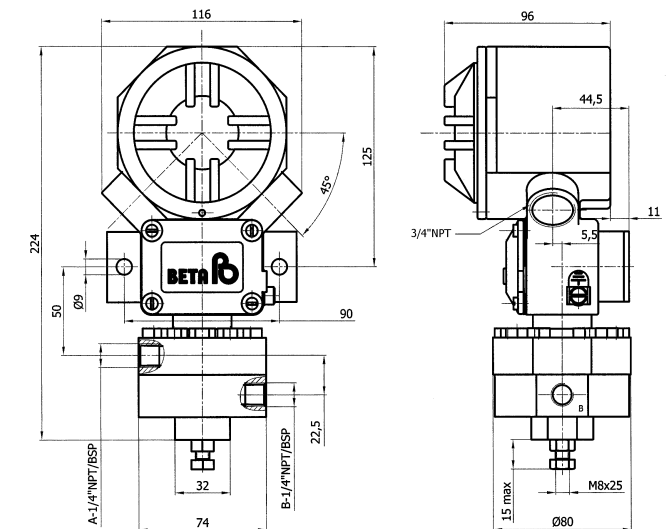
“W.”-Serie: Differential “D...M”



“W.”-Serie: Differential “D...H”



“W.”-Serie: Differential “D...D”

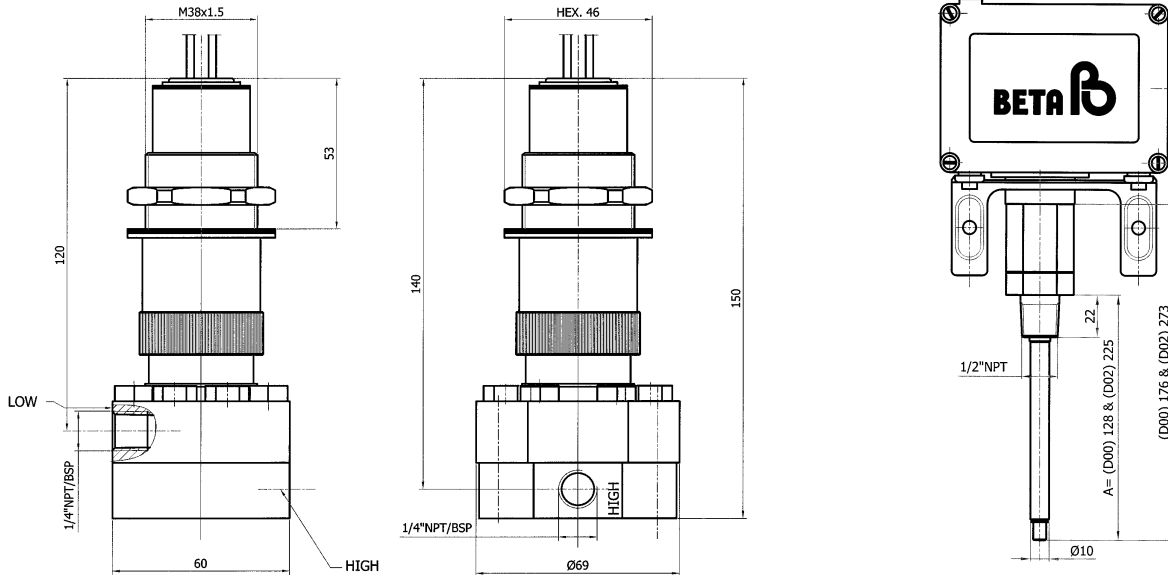


Dimensions given here are for 1/4" and 1/2" (F) process connections: For "H"-sensor with 1/2" (F) add 4 mm on "A" dimension. Sizes in mm, tolerances  $\pm 1,5$  mm

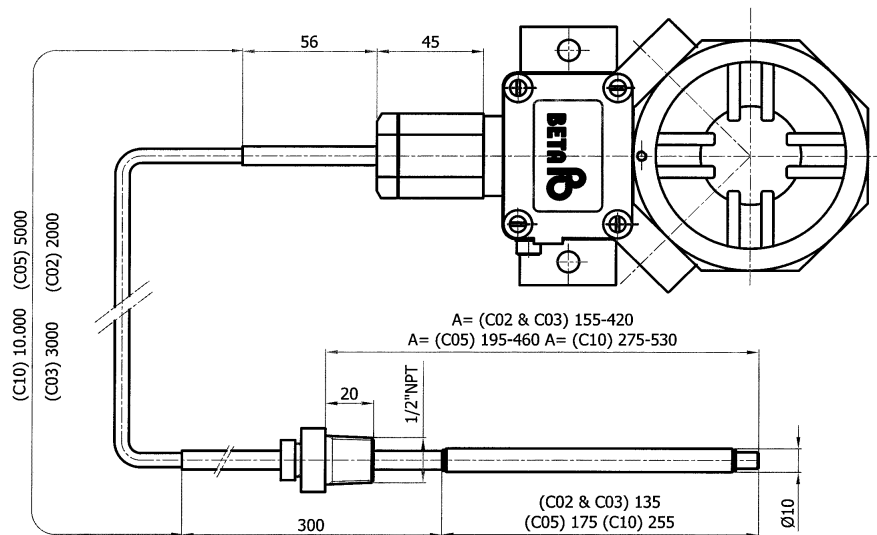
# DIMENSIONS

“MO”-Serie: Differential “D...H”

“C.”- & “Z.”-Serie: Temperature “Direct” mount

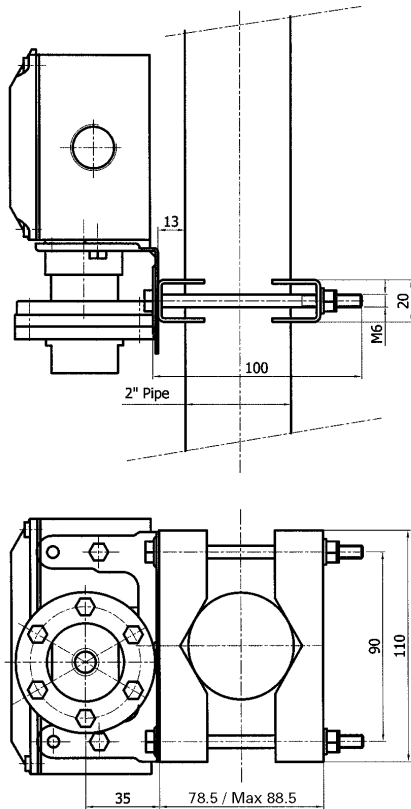


“W.”-Serie: Temperature “Capillary” mount

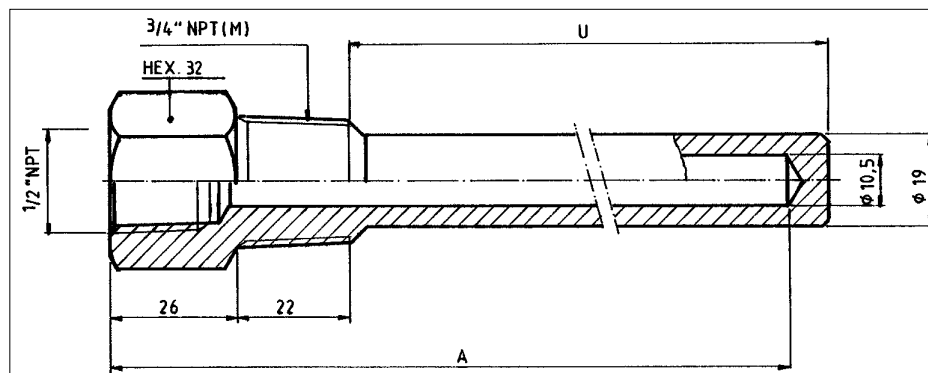
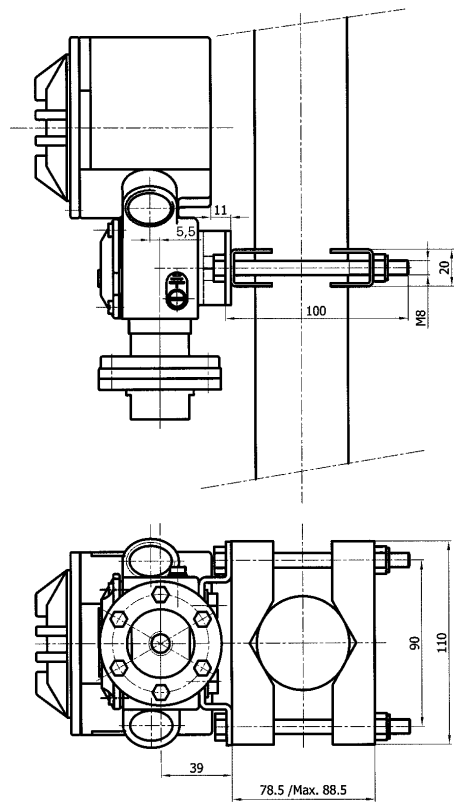


## 2" Pipe mount bracket (SS 316)

"C."- & "Z."-Serie



"W."-Serie



## 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

### 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.

# BETA PRESSURE & TEMPERATURE SWITCHES



"OEM"-switches ("B"-series)



Weathertight switches ("C"-series)



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



Explosion proof switches ("W"-series)



Economical Exproof switches ("Z"-series)



Air relay switch

## PRODUCTION

### THE NETHERLANDS

BETA Pressure & Temperature switches

#### BETA BV

P.O. Box 1227

NL-2280 CE Rijswijk

Tel. +31 70 3199700

Fax +31 70 3199790

E-mail: [info@beta-b.nl](mailto:info@beta-b.nl)

[www.beta-b.nl](http://www.beta-b.nl)