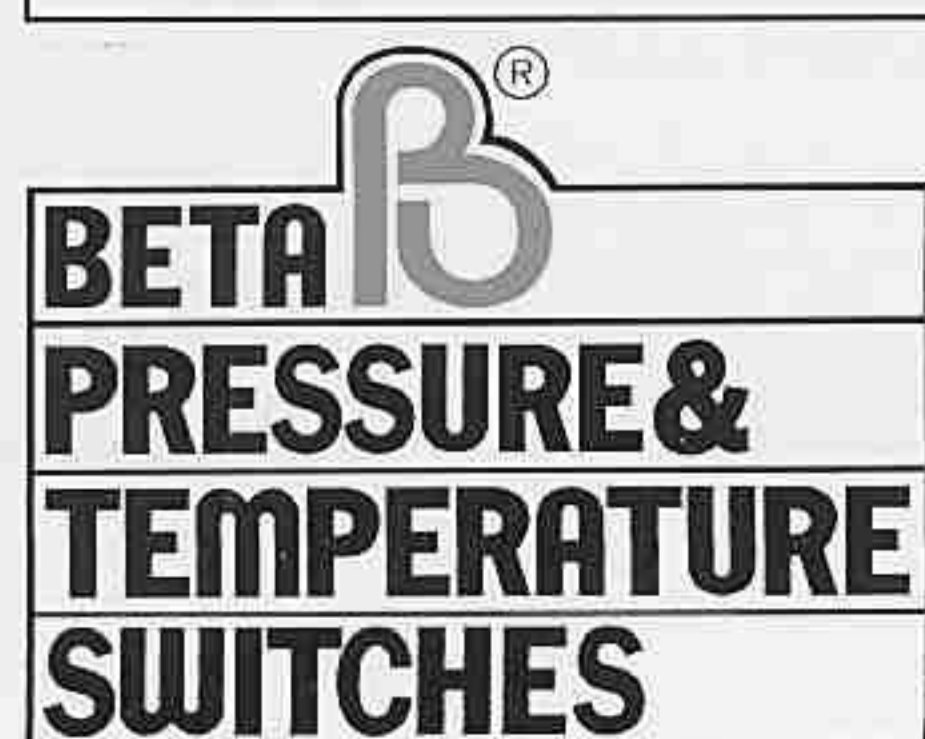
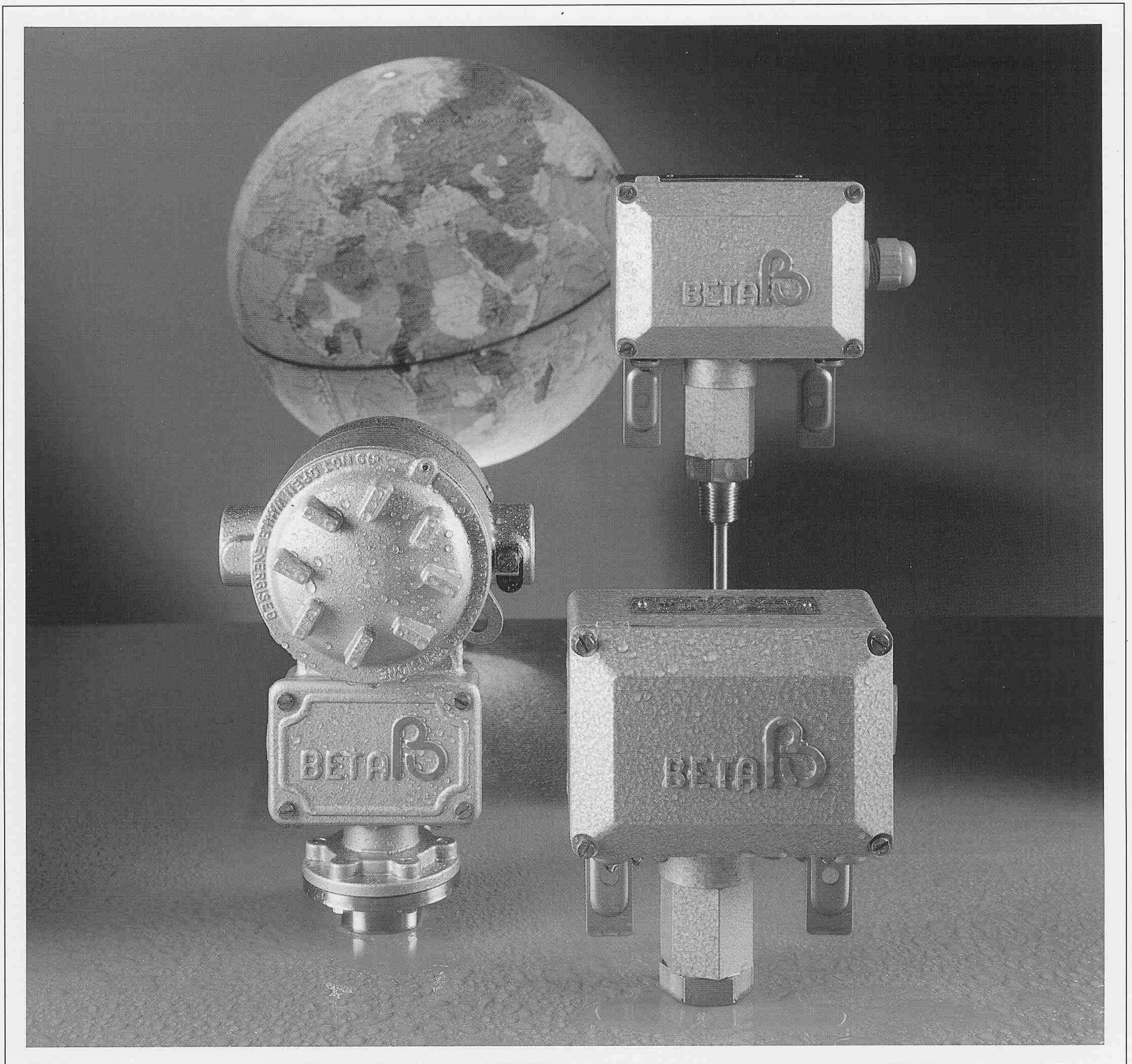


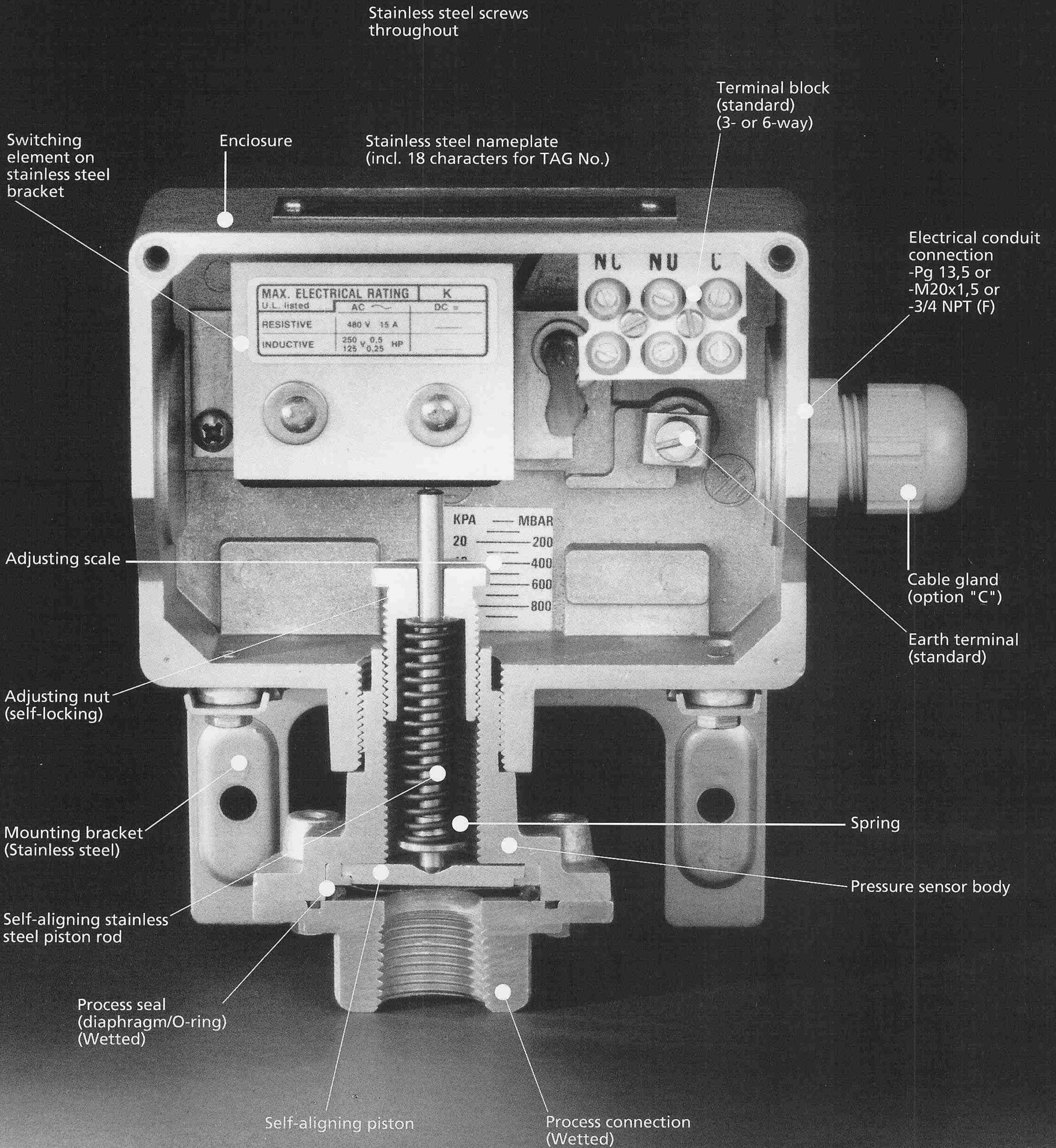


BETA PRESSURE & TEMPERATURE SWITCHES

General Bulletin



The "user friendly generation"



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.
- Born from this experience and using all our expertise, we have developed a new improved range which we call the "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 "user friendly" switches.

BETA has a high quality instrument that meets 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 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 for the "user friendly" process switch.

- **SAFETY**
 - Safe, secure electrical hookup by clamp terminals.
 - Standard earth terminal.
 - IP 66 enclosure.
 - Solid cover with 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.
 - Separate stainless steel mounting bracket.
- **QUALITY**

Quality Assurance according to ISO 9001 covers all switch manufacturing.
- **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.



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.

HOW TO SELECT YOUR BETA SWITCH?

C1 - P304L - S1N - B1 - K1 - Y - X2						
Enclosure	Range (Typ/ Range/ Sensor)	Process Conn. (Mat./Size/ Thread)	Diaph./ O-ring	Switch- ing Element	Option	Special
1	2	3	4	5	6	7

"P" = TYPE

"L" = SENSOR BODY

P	Pressure switch
D	Differential pressure switch
V	Vacuum switch
T	Temperature switch

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)

To select your switch follow section 1 through 5.

If required: For "Optional" and "Special" accessories follow section 6 and 7.

Ambient temperature: -30 to + 80°C.

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

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

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.

1

Enclosure

C1 - 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 Miniature (IP65)	Hirschmann Plug conn. DIN 43650-A	Aluminium	Standard (via plug)	Not applicable	√	√	√	-	√
C1	Weathertight (IP66)	PG 13,5	Aluminium	Standard (Internal)	Standard	√	√	√	√	√
C2		M20 x 1,5								
C3		3/4" NPT (F)								
C8		M20 x 1,5								
M0	Explosion-proof Miniature EEx ed IIC T6 (IP66) ²⁾	Wire leads (0,5m)	316 SS ³⁾	Standard (wire lead (0,5m))	Not applicable	√	√	√	-	√
V3	Explosion-proof EEx d IIC T6 (IP65) ²⁾	3/4" (NPT (F))	Aluminium	Standard in- & external	Standard	√	√	√	√	√
V5		M20 x 1,5	Cast Iron ³⁾							
Z1	Explosion-proof EEx ed IIC T6 (IP66) ²⁾	PG13,5	Aluminium	Standard in- & external	Standard EEx e II	√	√	√	√	√
Z2		M20x1,5								
Z3		3/4" NPT (F)								
Z8		M20x1,5								

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) BASEEFA approved (CENELEC standards EN 50 014/50 018).

3) Includes 316 SS sensor body and adjusting nut.

2

Range

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

Ranges for pressure switches

Ranges given here are valid for setpoints at increasing pressures (vacuum) in barg (mbarg). Deadband values are the max. possible values for a standard switch 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).

Range Code	Adjustable Range	Max. Deadband	Max. Overrange Pressure	Proof Pressure
P 301 L ¹⁾	2 – 15 mbar	1,1 – 1,9 mbar	30 bar	35 bar
P 302 L ¹⁾	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	125 bar	140 bar
P 308 L	25 – 1300 mbar	7 – 15 mbar		
P 402 M	100 – 400 mbar	15 – 20 mbar		
P 404 M	100 – 950 mbar	15 – 30 mbar	200 bar	600 bar
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	400 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	400 bar	600 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		
P 908 H	10 – 300 bar	2,0 – 19,5 bar	400 bar	600 bar
P 909 H	10 – 350 bar	2,0 – 25 bar		

¹⁾ Only available with L1 - microswitch element. Not available on "M"- and "Z"-series switches.

Ranges for fluid power pressure switches ¹⁾

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	6,0 – 12,0 bar		
P 918 F	30 – 540 bar	15,0 – 31,0 bar		

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
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	– 1,0 / 6,0 bar	80 / 300 mbar	– 1 bar	+ 200 bar	+ 600 bar

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

PRESSURE SWITCHES

2 Ranges for differential pressure switches*

Range Code	Adjustable Range Differential Press. 1)	Max. Deadband at 50% of Max. Static Press.	Max. Static Press.	Max. Overrange Press.	Proof Press.
D 404 M	0,5 – 2,5 bar	0,25 bar 2)	50 bar	140 bar	140 bar
D 406 M	1,0 – 6,0 bar				
D 408 M	1,0 – 14,5 bar				
D 506 M	5 – 20 bar	1,0 bar 3)	100 bar		
D 508 M	10 – 50 bar				
D 608 M	10 – 70 bar	1,6 bar 4)	140 bar		

1) Min. Adj. Range is influenced by microswitch element, diaphragm material and Static pressure. Consult your BETA switch Representative.

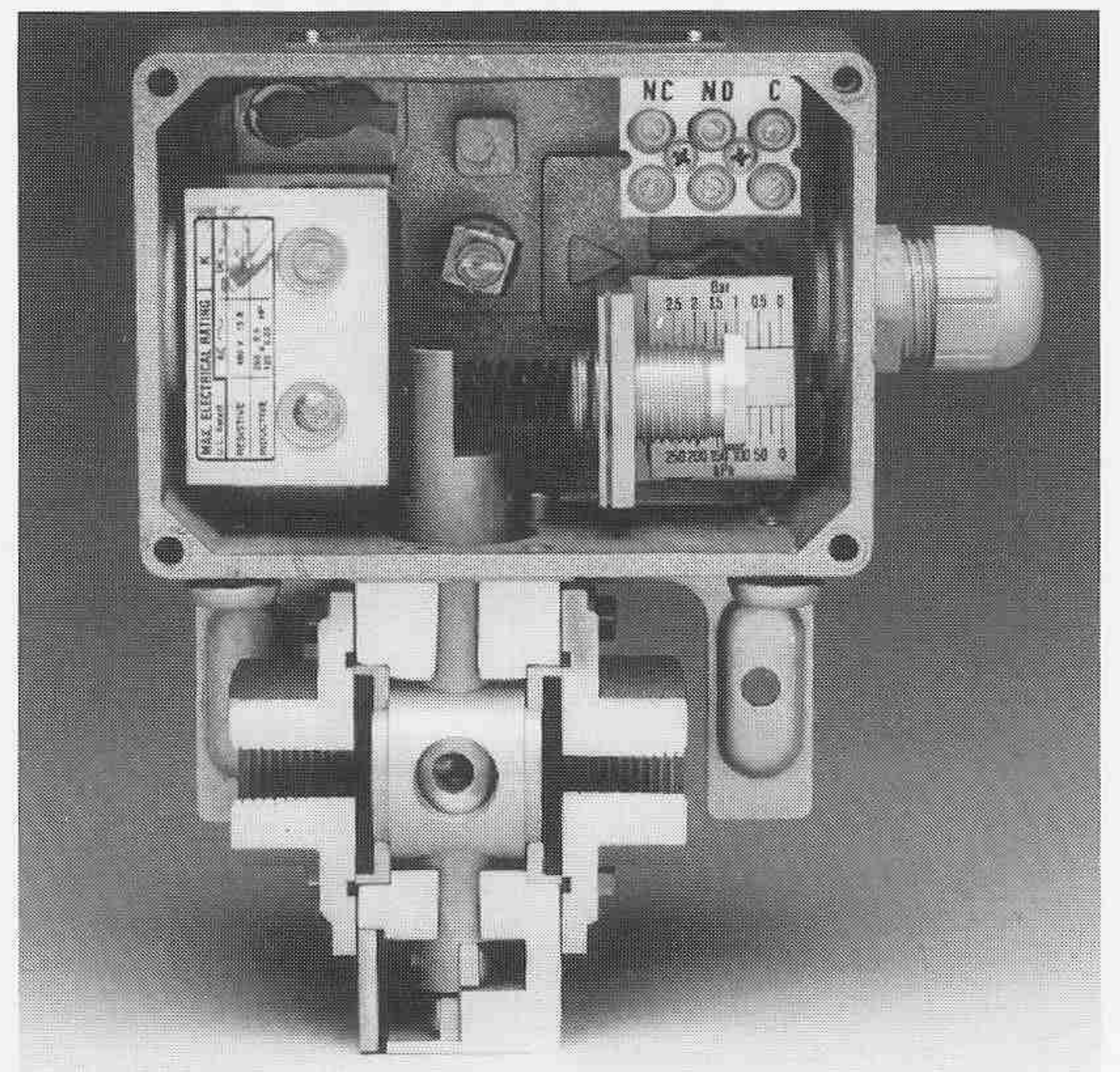
2) Deadband figure given for 25 bar static pressure. Add 0,006 bar for each bar above or subtract 0,006 bar for each bar below 25 bar static pressure.

3) Deadband figure given for 50 bar static pressure. Add 0,01 bar for each bar above or subtract 0,01 bar for each bar below 50 bar static pressure.

4) Deadband figure given for 70 bar static pressure. Add 0,011 bar for each bar above or subtract 0,011 bar for each bar below 70 bar static pressure.

* BETA offers more types & ranges differential pressure switches. Ask for separate bulletin SP 230.

Cut-away of Differential pressure switch with "C"-enclosure



3 C1 - P304 L - S1N - B1 - K1 - Y - X2

		Process Connection Material/Size/Thread Code 1)							
Process Connect. Size	Available on Sensor 3)	Aluminium		316 SS		Monel		Brass	
		NPT	BSP	NPT	BSP	NPT	BSP	NPT	BSP
1/4" F	F								
	L&M	A1N	A1B	S1N	S1B	M1N	M1B	B1N	B1B
	H								
1/2" F	F								
	L&M	A2N	A2B	S2N	S2B	M2N	M2B	B2N	B2B
	H								
1" F	L			S4N	S4B				
	L			S6N	S6B			B6N	B6B
1/2" M	L&M			S7N	S7B	M7N	M7B		
	H								
1" M	M&H			S8N	S8B				

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

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

3) 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

Notes: Process connections according to NACE standards are available: Consult your BETA switch representative.
 NPT connections are tapered; BSP are parallel threaded.

4

Diaphragm/
O-Ring

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

Diaphr./ O-ring Code	Diaphragm	O-ring	Use ¹⁾	Deadband Multiplier
B1	Buna-N	Buna-N ²⁾	Standard water/oil (-30 to +80°C.).	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 0°C.	
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 0°C.	
P4		PTFE ⁴⁾	Corrosive acids.	
P5		Kalrez	Corrosive acids.	
S1	316 SS	Buna-N	Permeative gases.	2.0
S2		Viton-A ⁵⁾	High temperature Not below 0°C.	
S3		Neoprene	Permeative refrigerant gases.	
S4		PTFE ⁴⁾	Corrosive gases.	
S5		Kalrez	Highly corrosive and permeative acids/Steam.	
S6		EPDM	Steam.	
T1	Tantalum	Buna-N	Highly corrosive and permeative gases and non-acid liquids. Select O-ring as required.	2.0
T2		Viton-A		
T3		Neoprene		
T4		PTFE ⁴⁾		
T5		Kalrez		
V2	Viton-A	Viton-A ²⁾⁵⁾	High temperature Not below 0°C.	1.5
S0	316 SS	welded diaphragm	None ³⁾	Highly permeative gases.
M0	MONEL			

- 1) Wetted parts are recommended for use on the service indicated. However they do not constitute a guarantee against corrosion 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 processtemperatures of - 30° to + 80°C, unless otherwise indicated. For processtemperatures beyond these limits please contact your BETA switch Representative.
- 2) Switches for fluid power applications are limited to these options (O-Rings only).
- 3) Only in combination with option "W" and 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 C0-Cr-Ni alloy, comparabel to Elgiloy).
- 5) For processtemperature > 100°C, please consult your BETA switch Representative.

Switching
Element

5

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

The standard switching elements are "K1" for "C" & "V"-enclosures
"M1" for "M"-enclosures
"R1" for "Z"-enclosures

PRESSURE SWITCHES

5 Electrical data and switching element vs. enclosure

Switching Element		Enclosure					
		C1, C2, C3, C8	M0	V3, V5	Z1, Z2, Z3, Z8		
		Internal Earth Terminal	Earth via wire lead	In- & External Earth Terminal			
S.P.D.T. (SINGLE SWITCHING ELEMENT)	SE SG	3-WAY TERMINAL BLOCK		4-WAY TERM. BL.			
	SL						
	SP						
	SR						
	G1 K1 L1 U1 V1			4-WAY TERMINAL BLOCK			
	R1					3-WAY TERM. BL.	
	M1 Y1 Z1			3-WAY TERMINAL BLOCK		4-WIRE LEADS	4-WAY TERMINAL BLOCK
	M2 Y2 Z2			6-WAY TERMINAL BLOCK		7-WIRE LEADS	7-WAY TERMINAL BLOCK
D.P.D.T. (DOUBLE SWITCHING ELEMENT)	G2 H2 K2 U2	6-WAY TERMINAL BLOCK					
	AIR RELAY	SA SB	1/4" NPT. (F) CONNECTIONS				

POSSIBLE
 NOT PRACTICAL
 NOT POSSIBLE

Switching El. Code ¹⁾	Use	Max. Ratings (res.)		Deadband Multipl.		
		VAC.	VDC	S.P.D.T.	D.P.D.T.	
K1 ⁴⁾	General-service	Standard	480/ 15A	28/ 0,5A**	1.0	Add deadb. at min. Range on calculated deadb. of S.P.D.T. version
L1 ⁴⁾		Standard on 301 L & 302 L ranges	480/ 10A	28/ 0,5A	1.0	
M1 *		Standard on "B"- and "M"-series	250/ 5A	30/ 0,1A**	1.5	
U1		Normal DC-service	480/ 15A	125/ 0,5A	2,5	
V1	DC-service	High DC cap. Magnetic blow out	125/ 10A	125/ 10A	5.0	Check above diagram on possibility
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 *			125/0,1A	30/0,1A	3.0	
Z1 *	For higher (amb.) temp.	Elgiloy spring. For corrosive environment	250/ 5A	125/ 0,3A	3.0	
R1	Ex. Proof	P.T.B./CENELEC approved/Only in "Z"-series	250/ 7A	30/ 7A	2.5	S.P.D.T. only
SP	Adjustable Deadband	Small adjustable deadband	250/ 15A	-	1.0 to 3.0	
SR ³⁾⁵⁾		Wide adjustable deadband	480/ 20A	-	2.0 to 6.0	
SE ³⁾	Manual Reset	Actuates automatic on increasing pressure	480/ 15A	125/ 0,5A	1.5	
SG ³⁾		Actuates automatic on decreasing pressure	480/ 15A	125/ 0,5A	1.5	
SL ⁵⁾	Herm. sealed	(Inert gas filled) Dusty, corrosive environment	125/ 1A	28/ 15A	6.0	Consult BETA switch REP.
SA ³⁾	Pneumatic	Normally closed (NC)			Single only	
SB 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 set point repeatability.
- 3) Not on Differential pressure switches except for "SR"-micro in "V"-enclosure "SR" in "C"-enclosure may increase lower end of range
- 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

- * Subminiature.
- ** DC rating not U.L. listed. From tests and/or experience it is known that microswitches have DC capacity. Consult your BETA switch representative.

6

C1 - P304L - S1N - B1 - K1

Option

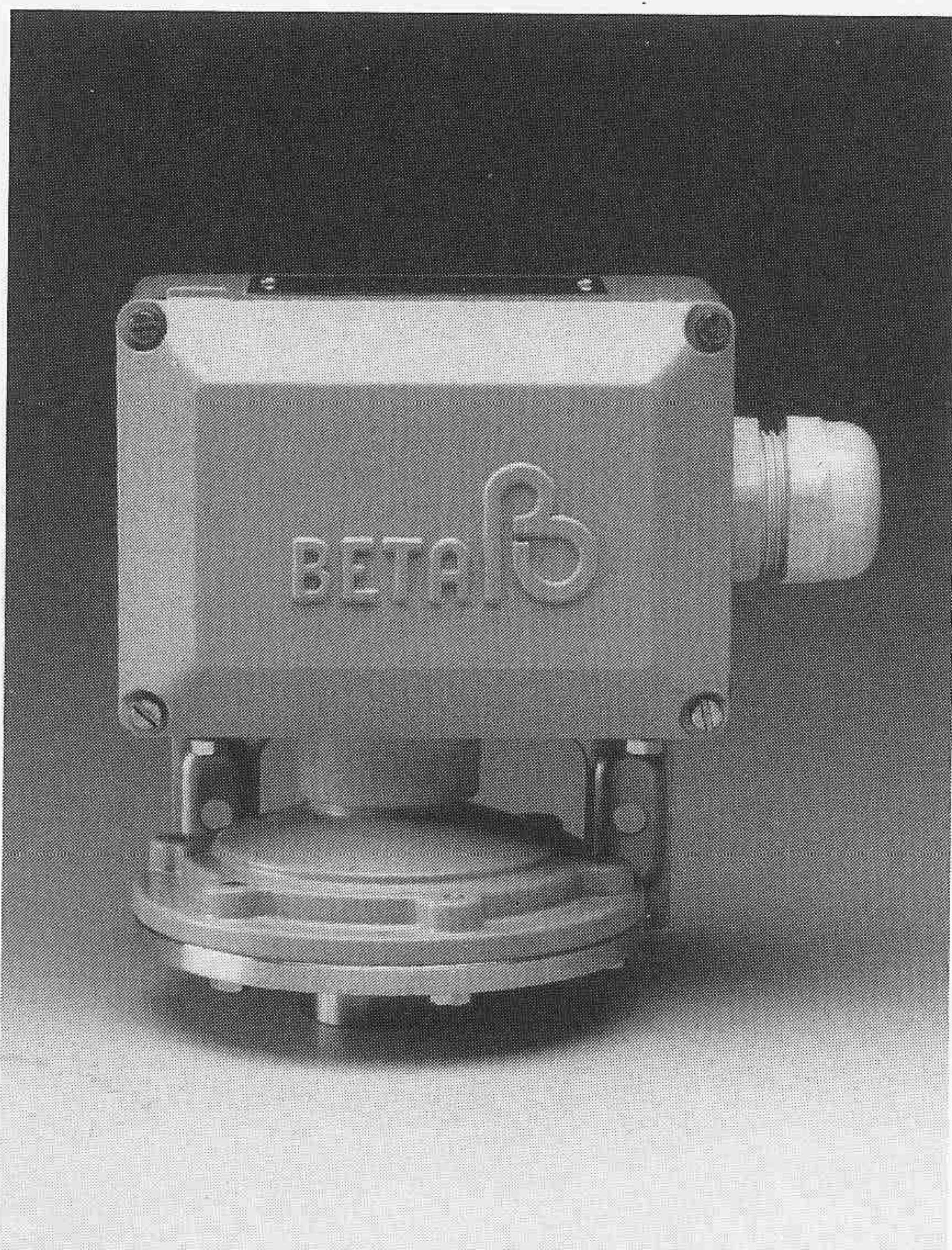
- Y

- X2

Option code	Option code
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- and Fluid Power Switch).
P	Recommended on strong process pulsations. Only on "H"-sensors.
R	Oversized nameplate. (Not on "EEx d"-versions). Extra: electr. rating and 2 lines (14char.) for Tag no.
S	Stainless steel Tag – wired to enclosure. Tag has 3 lines (18 characters per line)
T	Stainless steel Tag – permanently attached. (Not on "M"- and "V"-series switches). Has 3 lines (18 char./line).
V	Fungicidal varnish coating (internal).
Y	Epoxy coating of switch (external). (We strongly advise to use 316 SS process connection)

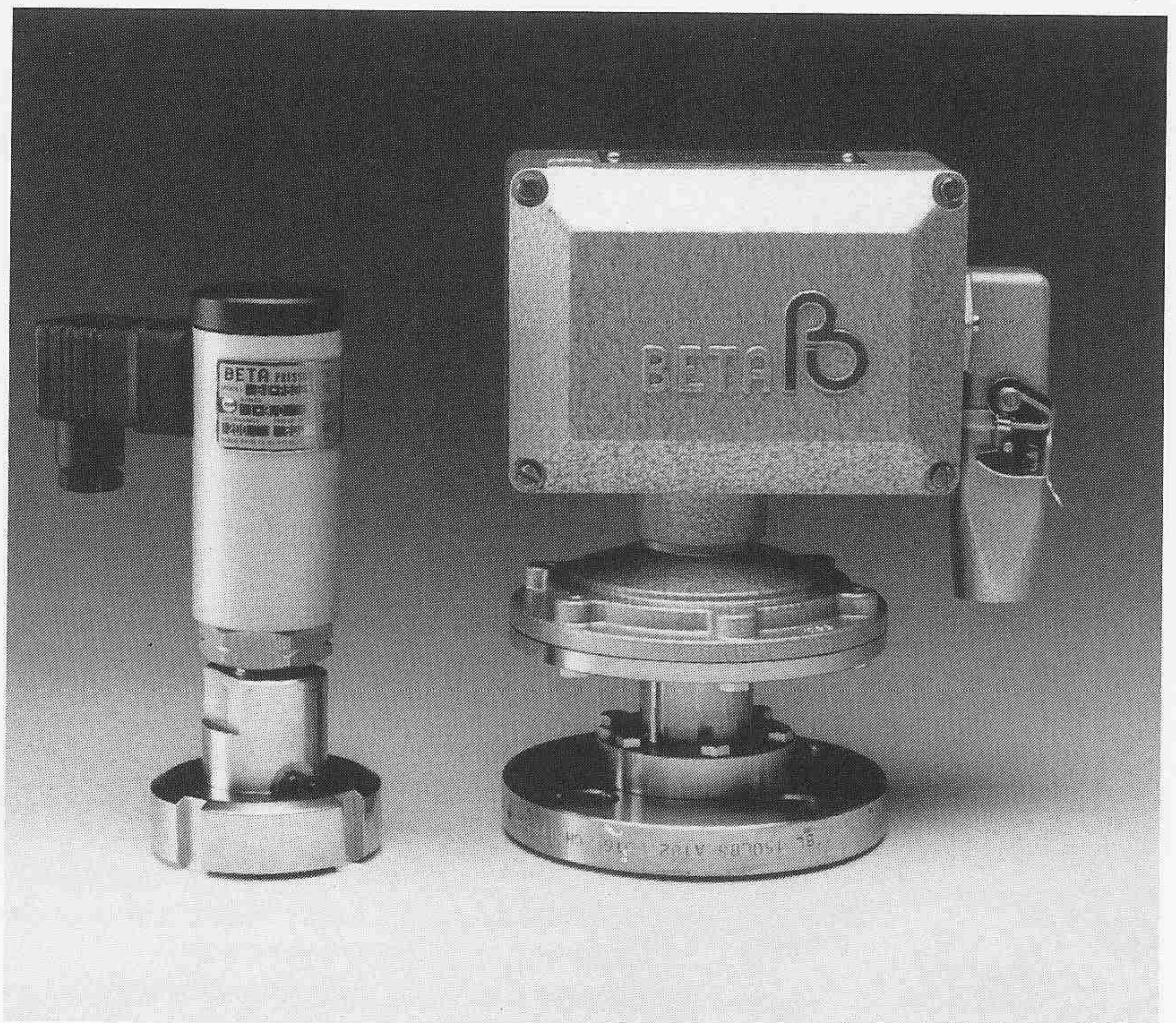
Note: Standard nameplate has 1 line for tag no. with 18 characters or spaces.

On request we add your tag no. on standard nameplate, free of charge, if information is given on your order.



OPTIONS:

"C"-enclosure with "Y" (Epoxy coating) and "C" (Cable gland) options.



SPECIALS:

"BETAMINI" with sanitary connection and "C"-enclosure with 1" flange on "L"-sensor and HAN 7D electrical connection.

7

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

Special

X2

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 in full on enquiries and orders.