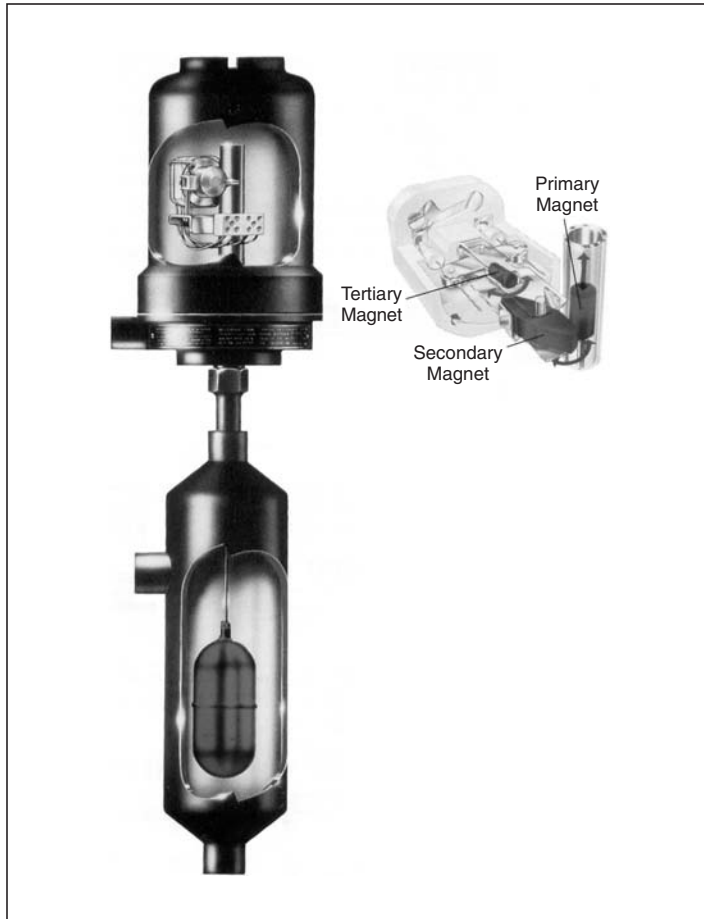


EXTERNAL CAGE FLOAT OPERATED MAGNETIC LEVEL SWITCH



- Unique 3 magnet latching switch mechanism.
- No springs.
- No problem.

FEATURES

- Tri-Magnet Switching
- Vibration Resistant
- Sealed Cage
- Flanged Cage
- T316 SST Trim
- ANSI B31.3 Design

OPERATION

The float or displacer drives a stainless steel sheathed permanent magnet attached to the float rod in the glandless pressure tube. As the float rises and falls with a changing liquid level the float assembly moves upwards inside the pressure tube.

A switch mechanism is mounted inside the enclosure adjacent to the pressure tube, and is activated by the rising or falling magnet.

The vertical movement of the float magnet in the pressure tube simultaneously actuates the secondary and switch magnets within the switch mechanism, to operate the contacts. The 'three-magnet' system enables the float magnet to pass the switch and actuate switch mechanisms at other levels. Switch mechanisms which are actuated will not re-set until the float magnet actuates the switch mechanism on a falling level.

Switching is achieved with the unique CLARK-RELIANCE 'three-magnet' system, providing positive snap-action 'latch-on' switching.

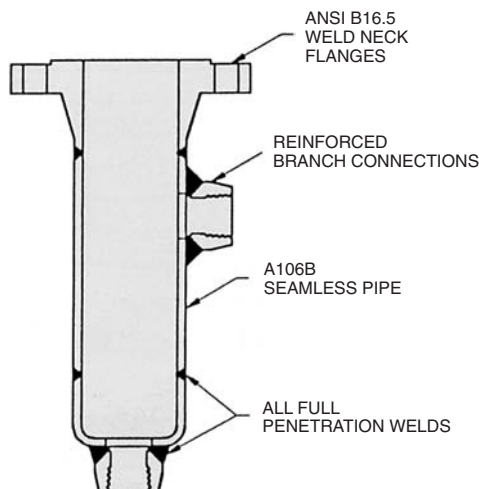
THE FLOAT CHAMBER

Applications

The flanged chamber construction of this X series range of vertical controls makes them a very serviceable level control solution for petrochemical, power generation and OEM applications.

The unique three-magnet memory latching system provides reliable switching for applications such as level alarm, safety shutdown and pump control, and high pressure steam generators.


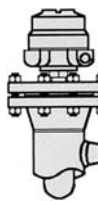
Single or multi-switch models are available. Chambers are designed to ANSI B31.1 Power Piping Code.



Options:

- Stainless steel chamber
- Certified to B31.1
- Non-destructive testing – radiographic, ultrasonic, magnetic particle, dye penetrant
- Epoxy paint finish
- Extended NEMA 4 switch enclosure housing up to 6 SPDT switch mechanisms or 3 DPDT switch mechanisms
- Vent connection

CHAMBER TYPE & MATERIAL OF CONSTRUCTION

Carbon Steel	Stainless Steel	Carbon Steel	Stainless Steel
BC	BS	XC	XS
			
Float is sealed inside chamber during manufacturing. Not removable.		Float may be removed from chamber for routine maintenance, cleaning or inspection.	

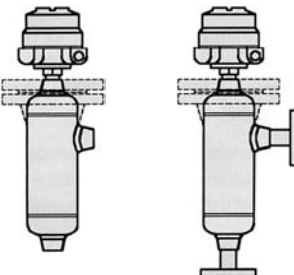
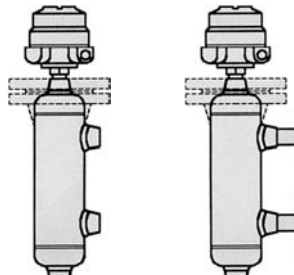
ORDERING INFORMATION TYPICAL MODEL

BC 4F C 1 0 SA7 U 1 X4

WELDING SPECIFICATION

C
Code design and construction standard on all chambers unless otherwise specified.
Code radiography is available on request.
Circumferential and process connection welds are full penetration single-V butt welds. All body flanges are weld neck. Process flanges are slip on type, 1" NPS nipples as standard.
Welders qualified to A.S.M.E. IX. P.W.H.T. available on request.

PROCESS CONNECTION CONFIGURATION & RATING

Side & Bottom	1	Side & Side with drain	2
			

0	1"	N.P.T. (Socket Weld Connection Use Code "s")
1	1"	Class 150 R.F. A.N.S.I. B 16.5
2	1"	Class 300 R.F. A.N.S.I. B 16.5
3	1"	Class 600 R.F. A.N.S.I. B 16.5
4	1 1/2"	Class 150 R.F. A.N.S.I. B 16.5
5	1 1/2"	Class 300 R.F. A.N.S.I. B 16.5
6	1 1/2"	Class 600 R.F. A.N.S.I. B 16.5
7	2"	Class 150 R.F. A.N.S.I. B 16.5
8	2"	Class 300 R.F. A.N.S.I. B 16.5
9	2"	Class 600 R.F. A.N.S.I. B 16.5

Flange faces are raised face with serrated concentric or serrated spiral groove finish.

EXTERNAL CAGE SPECIFICATIONS

Model	BC				XC				STEAM	
	Minimum S.G.	Pressure Rating	SPDT	DPDT	Minimum S.G.	Pressure Rating	SPDT	DPDT	PSI	Temp
BC1F	.70	.74	350	275	XC1F	.70	.74	285	95	
BC2F	.55	.57	300	235	XC2F	.55	.57	285	95	
BC3F	.60	.62	600	465	XC3F	.60	.62	600	465	
BC4F	.70	.72	1440	935	XC4F	.70	.72	740	505	
BC5F	.65	.67	1000	780	XC5F	.70	.72	1400	935	

SWITCH MECHANISM TYPES

Model	Temp Wet-side °F	AC max. values			DC max. values			
		VA	Volts	Amps	Watts	Volts	Res. Amps	Ind. Amps
X4	480	2000	440	10	50	250	10	0.5
D4	750	2000	440	5	50	250	5	0.5
H4	480	2000	440	10	50	250	10	0.5
P4	750	6	250	0.25	3.6	250	0.25	0.1
X8	480	2000	440	10	50	250	10	0.5
D8	750	2000	440	5	50	250	5	0.5
H8	480	2000	440	10	50	250	10	0.5
P8	750	6	250	0.25	3.6	250	0.25	0.1

NUMBER OF SWITCH MECHANISMS

Specify No. of Switches Required.

INTERNATIONAL APPROVALS

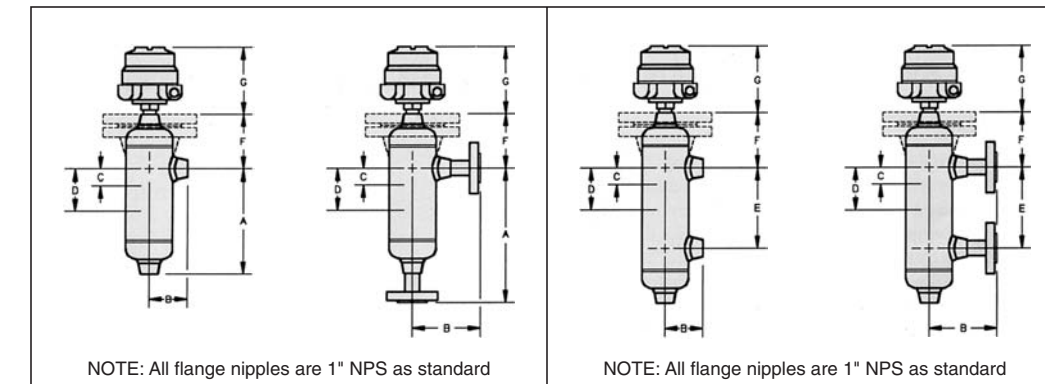
U	Underwriters Laboratories	C1, 1, Div. I, Grp. C & D
* H	Underwriters Laboratories	C1, 1, Div. I, Grp. B, C & D
N	Weatherproof to NEMA 4X/1P66	U.L.

ENCLOSURE TYPES

	Duty	Material of cover	Material of base	Material of pressure tube
SA7	Explosion-proof	Aluminum Alloy		316 Stainless Steel
S17		Cast Iron		
SA4	Weather-proof	Drawn Steel	Aluminum Alloy	

* Apply Code If Required

DIMENSIONAL AND OPERATING LEVEL DATA



NOTE: All flange nipples are 1" NPS as standard

Model	A			B		C	D		E	F	
	Single Switch	Multi-Switch	7 Flanged	NPT or S/W	Flanged		Hi Alarm	Single Alarm		Multi-Switch	Chamber Type B
BC1F & XC1F	8 1/2 ≤	11 1/2 ≤	14 ≤	3 1/4 ≤	6 ≤	2 ≤	2 3/4 ≤	5 3/4 ≤	14 ≤	5 1/2 ≤	5 3/4 ≤
BC2F & XC2F	10 ≤	13 ≤	14 ≤	3 3/4 ≤	6 1/2 ≤	2 ≤	2 3/4 ≤	5 3/4 ≤	14 ≤	6 ≤	6 ≤
BC3F & XC3F	10 ≤	13 ≤	14 ≤	3 3/4 ≤	6 1/2 ≤	2 ≤	2 3/4 ≤	5 3/4 ≤	14 ≤	6 ≤	6 1/16 ≤
BC4F & XC4F	10 ≤	13 ≤	14 ≤	3 3/4 ≤	6 1/2 ≤	2 ≤	2 3/4 ≤	5 3/4 ≤	14 ≤	6 ≤	8 1/16 ≤
XC5F	10 ≤	13 ≤	14 ≤	3 3/4 ≤	6 1/2 ≤	2 ≤	2 3/4 ≤	5 3/4 ≤	14 ≤	6 ≤	8 1/16 ≤
BC5F	9 1/2 ≤	12 1/2 ≤	14 ≤	4 1/4 ≤	7 1/2 ≤	2 ≤	2 3/4 ≤	5 3/4 ≤	14 ≤	6 1/2 ≤	8 1/16 ≤

Notes:

- 1) Flanged dimensions apply for R.F. process connections up to 2" - 600#.
- 2) Switch actuation levels are at minimum S.G.
- 3) C = Highest operating liquid level
- 4) D (Single Switch) = Reset level
- 5) D (Multi Switch) = Lowest operating liquid level
- 6) D-C = Switching Differential (Max.)
- 7) Add 2" to "A" Dimension for (2) Switches

All dimensions in inches. Dimensions are for reference only, and must be certified upon order.

ENCLOSURE DIMENSIONAL DATA

Type	Duty	Height G	Conduit Thread	Switch Adjustment	Weatherproof Rating
SA7 S17	Explosionproof	13 3/4 ≤	1 ≤ NPT	3 3/8 ≤	NEMA 4x & 7
SA4	Weatherproof	12 ≤	1 ≤ NPT	3 3/8 ≤	NEMA 4x

MATERIALS OF CONSTRUCTION

Technical Specification	Designed in accordance with the requirements of B31.3 Pressure tested to 1.5 x maximum working pressures.	
Materials of Construction	Carbon Steel Chamber	Stainless Steel Chamber
Chamber Tube	ASTM A106 GrB/BS3602 HFS410	ASTM A312 T316/BS3605-316-514
Top/Bottom Caps	ASTM A234/BS1504-161-430A	ASTM A403 WP-316
Flanges/Fittings	ASTM A105/BS1503-221-430E	ASTM A182F316/BS1503-316-513
Studs	ASTM A193-B7/BS1506-621A-B7	ASTM A193-B7/BS1506-621AB7
Nuts	ASTM A194-2H/BS1506-162-2H	ASTM A194-2H/BS1506-162-2H
Float & Trim	T316	T316 SST

Options: • Low temperature carbon steel chambers • A comprehensive N.D.T. •

WARRANTY STATEMENT

All Clark-Reliance mechanical level devices are warranted free of defects in materials and workmanship for five years from the date of original factory shipment.

Clark-Reliance shall not be liable for mis-application, labor claims, direct or consequential damage or expense arising from the installation or use of the equipment. There are no other warranties expressed or implied.



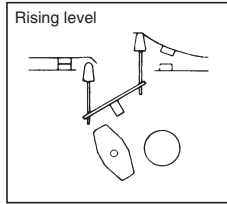
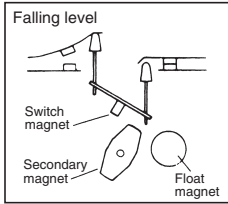
CLARK-RELIANCE LEVEL SWITCHES

THE SWITCH MECHANISM

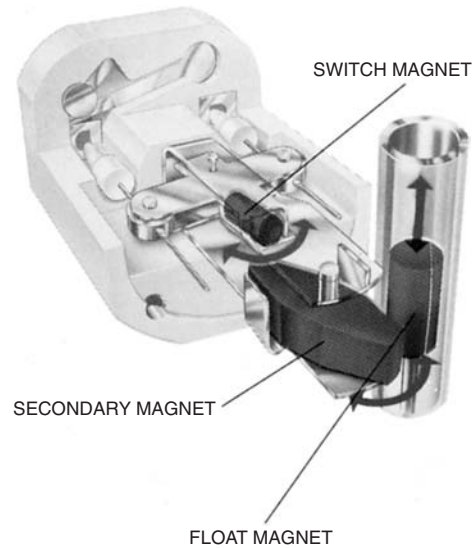
Principial of Operation

The switch mechanism is based on a unique three-dimensional magnet design where the snap action is accomplished by the utilization of magnetic repulsion.

The magnet mounted on the float rod causes the secondary magnet to rotate as it passes up and down. The switch magnet is repelled by the secondary and snaps to the opposite side. This causes the cradle to pivot, moving the push rods which operate the switch contacts. The result is positive snap action interlock switching...no springs...no spring problems.



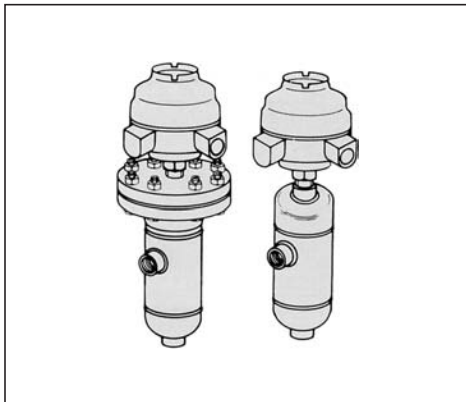
Schematic showing three-magnet system



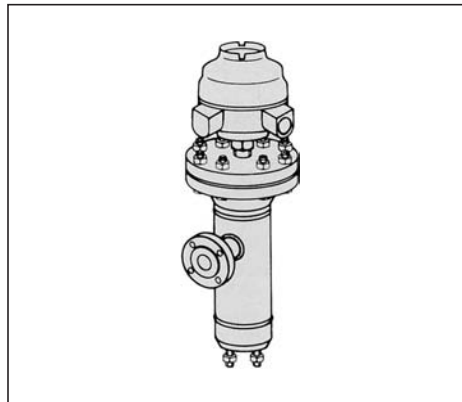
Choice of Switch Mechanisms	
Type	Application
X4, X8	General purpose – 10 amp mechanisms for general purpose duties up to 480°F
D4, D8	High temperature – 750°F mechanisms for high temperature applications up to 5 amps
H4, H8	Hermetically sealed – Suitable for low temperature duties, contaminated atmosphere environments and intrinsically safe circuits. All moving parts and contacts enclosed in an inert gas filled stainless steel enclosure.
P4, P8	Low current – Gold-plated contact switch mechanisms for use in intrinsically safe or low power circuits up to 750°F

4 Contact Type D4, X4, P4, H4	
2 x S.P.S.T. AA Make on Rise BB Make on Fall	 Link for SPDT/SPCO
8 Contact Type D8, X8, P8, H8	
D.P.D.T. 4 x S.P.S.T. AA Make on Rise BB Make on Fall	 Link for DPDT/DPCO

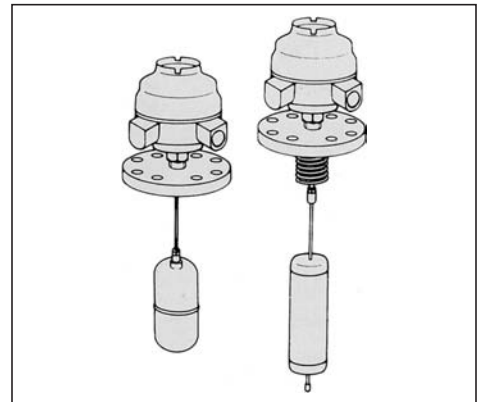
CLARK-RELIANCE “FIT & FORGET” PRODUCTS PROVIDE THE SOLUTIONS TO YOUR LIQUID LEVEL CONTROL PROBLEMS



Medium Pressures
ANSI Class 150, 300, 600
SG 0.4



High Pressures
ANSI Class 900, 1500, 2500
SG 0.40



Direct Mounting Displacer
ANSI Class 150, 300, 600
SG 0.4



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