JERGUSON®
A PRODUCT OF CLARK-RELIANCE

Top Mount Displacer Operated
Magnetic Level Switch

Section:	JS100
Bulletin:	JS100.05
Date:	4/2017
Supercedes:	10/2004

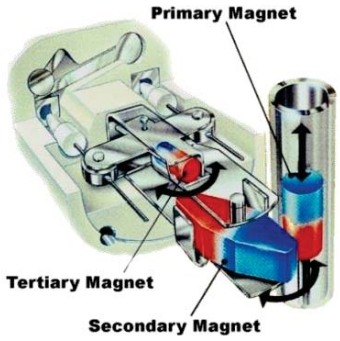
Jerguson's Tri-Magnet Level Switches deliver failure-free performance.

(Series JD)

The innovative use of repelling magnetic fields eliminates mechanical elements that are prone to failure in high temperatures, extreme vibration, or simply fatigue over time.

FEATURES

- **Tri-Magnet Switching for Unparalleled Reliability**
- **Vibration Resistant**
- **Pump Control**
- **316 Stainless Steel Trim**
- **Multi-Point Alarm**



Unique 3 magnet latching.
No springs...No problem.

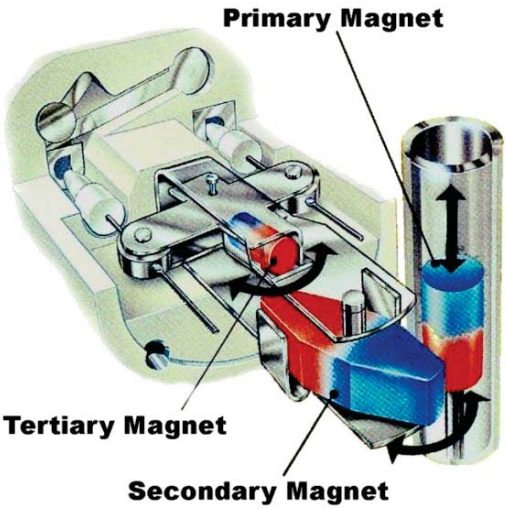
"The new switches are very rugged and dependable, and most importantly, they are mercury-free and safe for the environment. Dealing with spilled mercury is an extremely difficult task, but it is one we don't have to worry about with these new switches. The Jerguson Tri-Magnet Level Switches have been in operation in our facility since May 2007."

-Maintenance Superintendent,
Major Utility Power Generation Plant

The Tri-Magnet Level Switch was endurance tested to over 850,000 cycles without failure.

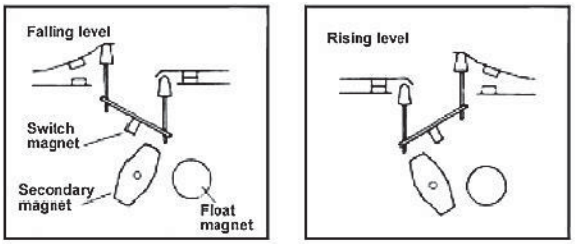
16633 Foltz Parkway ● Strongsville, OH 44149 USA Telephone: (440) 572-1500 ● Fax: (440) 238-8828
www.jerguson.com ● sales@clark-reliance.com

JERGUSON® LEVEL SWITCHES
THE SWITCH MECHANISM



Principle of Operation: Switch Mechanism

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

Type	Choice of Switch Mechanisms Application
X4, X8	**General purpose** - 10 amp mechanisms for general purpose duties up to 480ºF
D4, D8	**High temperature** - 5 amp mechanisms for high temperature applications up to 750ºF
H4, H8	**Hermetically sealed** - 5 amp mechanisms suitable for temperatures up to 480°F, 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** - 0.25 amp gold-plated contact switch mechanism for use in intrinsically safe or low power circuits up to 750ºF
E4, E8	**Encapsulated** - 5 amp switch mechanism is sealed / encapsulated inside alluminum housing, suitable for temperatures to 850°F

4 Contact Type D4, X4, P4, H4, E4

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, E8

D.P.D.T.
4 x S.P.S.T.
AA Make on Rise
BB Make on Fall

Link for DPDT/DPCO

Note: Max temperature of top mount displacer operated level switch = 400°F

Principle of Operation: Displacer & Spring

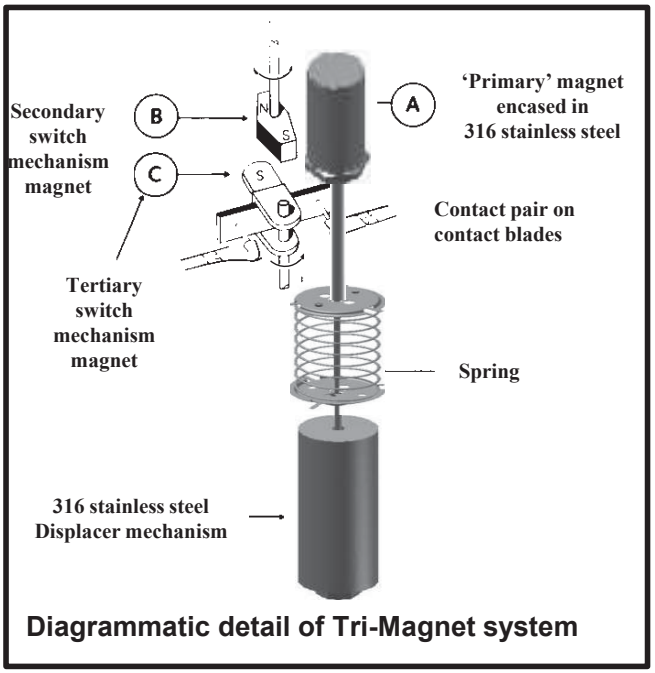
The displacer element made of stainless steel is suspended on a stainless steel cable from a spring. The displacer element is always heavier than its equivalent volume of the liquid in which it is to operate, and therefore will extend the tension spring at all times. Hanging freely, the spring will extend to a known length, controlled by a mechanical stop to prevent overstressing. Attached to the spring is the rod and magnet assembly, which is free to move up and down within the pressure tube as the spring extends or contracts, actuating the switch mechanism.

As rising liquid submerges the displacer, a buoyancy force is created equal to the weight of the displaced liquid volume. This force reduces the apparent weight of the displacer, contracting the spring and moving the magnet upwards inside the pressure tube, actuating the switch mechanism. On a falling liquid level, the displacer element is uncovered and the spring senses an increasing effective weight, extending the spring. The increased effective weight moves the magnet downward to re-set the switch mechanism.

This simple principle can be refined to operate a single switch over a very wide differential by providing the buoyancy force from two displacer elements instead of a single one.

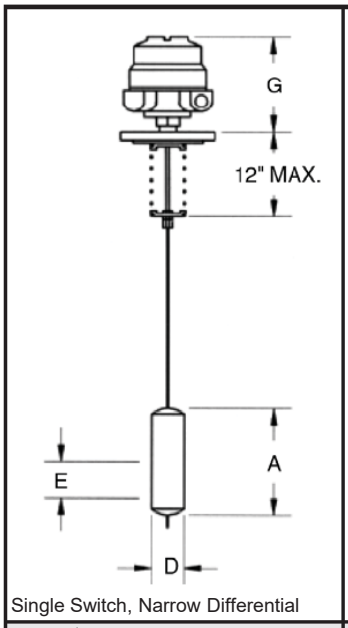
Two switch models are available for applications with narrow differentials for pump control or with appropriate wide differentials.

In all cases, because the element(s) are suspended on a cable, switching or control levels may be many feet below the mounting flange, and are fully field adjustable to re-setting the displacer element(s) on the cable.



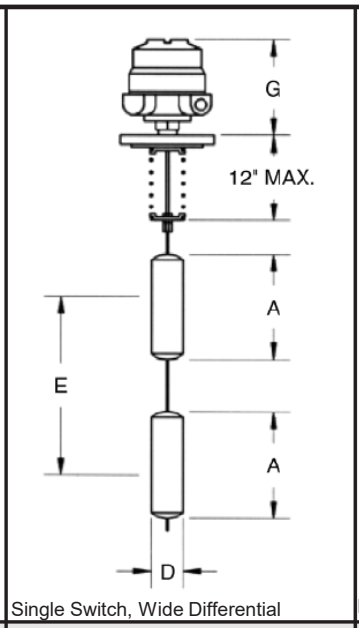
Diagrammatic detail of Tri-Magnet system

DIMENSIONAL AND OPERATING LEVEL DATA



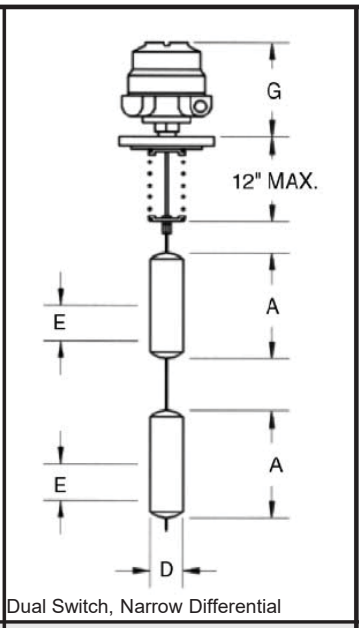
Single Switch, Narrow Differential

1D SST: A = 7 1/2 D = 2 1/2				
S.G.	0.50	0.60	0.80	1.00
E min.	3 1/2"	3"	2 1/2"	2"



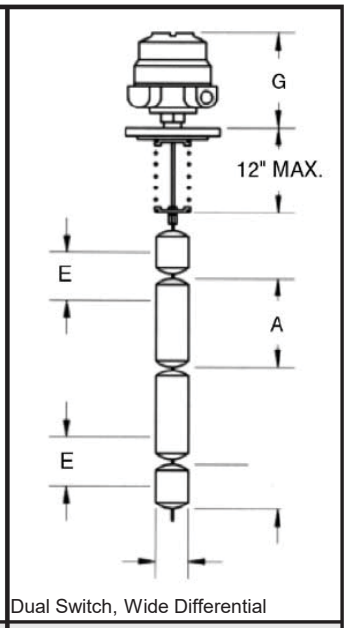
Single Switch, Wide Differential

2D SST: A = 7 1/2 D = 2 1/2				
S.G.	0.50	0.60	0.80	1.00
E min.	7 1/4"	6 1/4"	5 1/4"	4 5/8"



Dual Switch, Narrow Differential

8D SST: A = 7 1/2 D = 2 1/2				
S.G.	0.80	0.90	1.00	1.10
E min.	2 1/2"	2 1/4"	2"	1 7/8"



Dual Switch, Wide Differential

3D SST: A = 7 12 B = 4 D = 2 1/2				
S.G.	0.80	0.90	1.00	1.10
E min.	5"	4 3/4"	4 1/2"	4 1/4"

E min. = Differential

ENCLOSURE DIMENSIONAL DATA

Type	Duty	Height G	Conduit Thread	Switch Adjustment	Weatherproof Rating
SA7, SI7	Explosion-proof	13 1/4"	1" NPT	3 3/8"	NEMA 4 & 7
SA4	Weather-proof	12"	1" NPT	3 3/8"	NEMA 4

MATERIALS OF CONSTRUCTION

Technical Specifications	Designed in accordance with the requirements of B31.1 & B31.3. Pressure tested to 1.5 x maximum working pressures.	
Materials of Construction	Carbon Steel Mounting Flange	Stainless Steel Mounting Flange
Flanges/Fittings	ASTM A105	ASTM A182F316
Displacer & Trim	316 SS	316 SS
Spring	Inconel 600	Inconel 600
Options: ● Low temperature carbon steel chambers ● Controls to meet NACE requirements ● A comprehensive NDT package		

5 YEAR MECHANICAL WARRANTY

OUR WARRANTY

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

If returned within the stated warranty period, and upon factory inspection the cause of the claim is determined to be covered under the warranty, at option, the device will be repaired or replaced without cost to the purchaser (or owner), other than transportation.

Jerguson® 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.

ORDERING INFORMATION

TYPICAL MODEL

JDC 2D SA4 1 X4 D71

MATERIAL OF CONSTRUCTION

MODEL JDC - CARBON STEEL	MODEL JDS - 316 SST

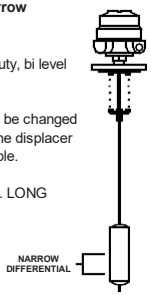
DISPLACER FUNCTIONS

Single switch, narrow differntial: 1D

Specify for alarm duty, bi level or lo level.

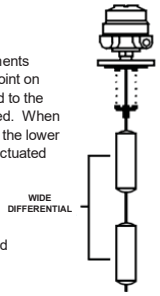
Switching level can be changed by simply moving the displacer up or down the cable.

SST CABLE 10 FT. LONG



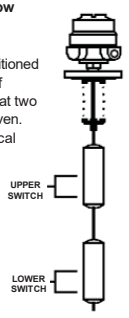
Single switch, wide differential: 2D

The two displacer elements are positioned at any point on the cable to correspond to the switching levels required. When the liquid level drops to the lower displacer, a switch is actuated and starts (or stops) a pump, when the liquid rises to the upper displacer, the switch is again actuated to stop (or start) the pump.



Two switch, two narrow differentials: 8D

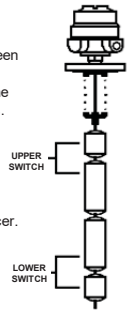
The displacers are positioned to form two elements of similar lengths, such that two alarm points may be given. This arrangment is typical of sump application



Two switch, two wide differentials: 3D

A pump is controlled between the middle and the lower displacers positioned on the cable at the required levels. Should the level rise to the upper displacer, this actuates the upper alarm switch which remains actuated until the level drops to the middle displacer.

Alternatively the upper switch could control a second pump.



INTERNAL MOUNT DISPLACER TYPES

Displacer

CODE	Function-Differential	Displacer	SPDT*	DPDT*	Tolerance
JDC1D	Single Switch-Narrow	316-SST	.50 - 1.2	.50 - 1.2	N/A
JDC2D	Single Switch-Wide	316-SST	.50 - 1.5	.50 - 1.5	±10%
JDC3D	Dual Switch-Wide	316-SST	.60 - 1.2	.80 - 1.2	±5%
JDC8D	Dual Switch-Narrow	316-SST	.60 - 1.2	.80 - 1.2	±10%

NOTE: Max temperature of top mount displacer operated level switch = 400°F

MOUNTING CONNECTION

CODE	SIZE	CARBON STEEL RATING	SST RATING
D71	3" 150# R.F. ASME	285 PSIG @ 100°F	275 PSIG @ 100°F
D73	3" 300# R.F. ASME	740 PSIG @ 100°F	720 PSIG @ 100°F
D76	3" 600# R.F. ASME	1480 PSIG @ 100°F	1400 PSIG @ 100°F
D91	4" 150# R.F. ASME	285 PSIG @ 100°F	275 PSIG @ 100°F
D93	4" 300# R.F. ASME	740 PSIG @ 100°F	720 PSIG @ 100°F
D96	4" 600# R.F. ASME	1480 PSIG @ 100°F	1400 PSIG @ 100°F
DB1	6" 150# R.F. ASME	285 PSIG @ 100°F	275 PSIG @ 100°F
D6M	2 1/2" MNPT	740 PSIG @ 100°F	1000 PSIG @ 100°F
D7M	3" MNPT	1480 PSIG @ 100°F	1000 PSIG @ 100°F

SWITCH MECHANISM TYPES

Switch Mechanism

		Temp Wet-side °F	AC max. values			DC Max. values			
			VA	Volts	Amps	Watts	Volts	Res. Amps	Ind. Amps
X4	4 Contact	480	2000	440	10	50	250	10	0.5
D4	Link for SPDT	750	2000	440	5	50	250	5	0.5
H4	Two independent single pole single throw contact sets	480	2000	440	5	50	250	5	0.5
E4		850	2000	440	5	50	250	5	0.5
P4		750	6	250	0.25	3.6	250	0.25	0.1
X8	8 Contact	480	2000	440	10	50	250	10	0.5
D8	Link for DPDT	750	2000	440	5	50	250	5	0.5
H8	Four independent single pole single throw contact sets	480	2000	440	5	50	250	5	0.5
E8		850	2000	440	5	50	250	5	0.5
P8		750	6	250	0.25	3.6	250	0.25	0.1

NUMBER OF SWITCH MECHANISMS

No. of Switches

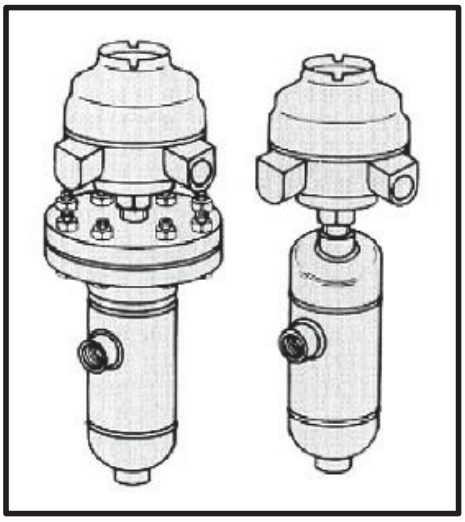
Specify No. of Switches Requried

ENCLOSURE TYPES

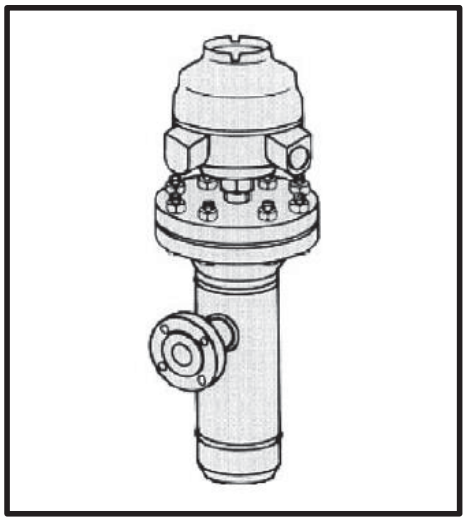
Enclosure

Code	Duty	Material of cover	Material of base	Material of pressure	Material of screwed	Maximum number of switches
SA4N	Weather-proof	Aluminum Alloy		316 Stainless Stee	To match chamber material	1 - 2
LA4N	Weather-proof	Cast Iron				1 - 3
SA7F	Explosion-proof Factory Mutual Cl.I,Div.1,Grps B,C &D	Drawn Steel	Aluminum Alloy			1 - 2

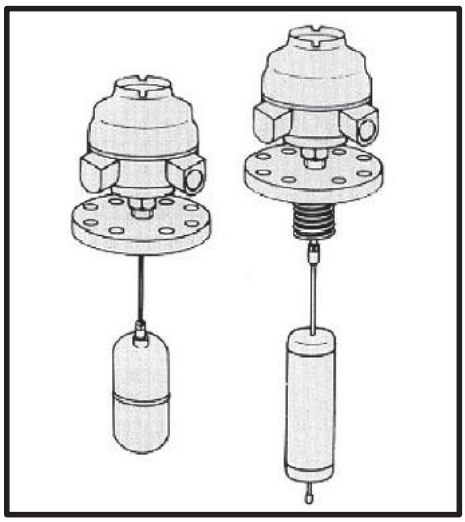
JERGUSON® "FIT & FORGET" PRODUCTS PROVIDE THE SOLUTION TO YOUR LIQUID LEVEL CONTROL PROBLEMS



Medium Pressures
ASME Class 150, 300, 600
SG 0.40



High Pressure
ASME Class 900, 1500, 2500
SG 0.40



Direct Mounting
ASME Class 150, 300, 600
SG 0.40

You can rely on us

The Jerguson range of liquid level controls is designed for operation in a wide variety of applications.

Typical Applications

Separators	Water Sumps
Compressors	Scrubbers
Knock Out Pots	Fractioning Columns
Condensors	Process Vessels
De-actuators	Condensate Tanks
Storage Tanks	Drainpots
Service Tanks	Accumulators
Header Tanks	Flush Vessels
Effluent Sumps & Tanks	Fuel Tanks
Heat Exchanger	Feedwater Heaters
Lube Oil Tanks	Surge Drums

Jerguson level switches are used for the control of liquids by companies all over the world.

Shell	Bechtel
Exxon	Bellili
Amoco	Ontario Hydro
Fluor	Nissaci-Sangyo
Hyundai	Foster Wheeler
Hitachi	Siemens
British Petroleum	Mannesmann-Demag
Mobil	Catalytic
Texaco	Techni
Ingersoll Rand	Technipetrol
Compare	Nuovo Pignone
Honeywell	Dresser

JERGUSON®

16633 Foltz Parkway ● Strongsville, OH 44149 USA Telephone: (440) 572-1500 ● Fax: (440) 238-8828
www.jerguson.com ● sales@clark-reliance.com

Clark·Reliance®

Instrumentation & Control

JERGUSON® JACOBY·TARBOX® Reliance®

Level Gages
Magnetic Level Gages
Switches & Valves

Sight Flow Indicators
Sight Windows
Eductors

Boiler Level Gages
Remote Level Indicators
Boiler Safety Instruments

Filtration & Purification

ANDERSON® Separator

Gas Coalescing & Filtration
Steam Separators & Traps
Liquid Particle Filtration

Enervac™ INTERNATIONAL ULC

Transformer Oil Purification
SF6 Equipment
Air Dryers

OIL FILTRATION SYSTEMS®

Vacuum Dehydrators
Varnish Removal Systems
Hi & Low Flow Filter Skids

Elements, Internals, Parts & More

www.clark-reliance.com / www.clark-reliance.com/parts

16633 Foltz Parkway ● Strongsville, OH 44149 USA Telephone: (440) 572-1500 ● Fax: (440) 238-8828
www.clark-reliance.com ● sales@clark-reliance.com

REPRESENTED BY: YATES & COMPANY, INC. ♦ 1 Hollywood Ave, Unit 22 HoHoKus, NJ 07423
Tel: 201-345-3101 ♦ Email: info@yatesco.net