

LEVEL CONTROLLER PNEUMATIC

ISO 9001-2000
COMPANY

Automat
... the level temperature & gas people

Bulletin No.: 401-1

Effective : March 2004

DESCRIPTION

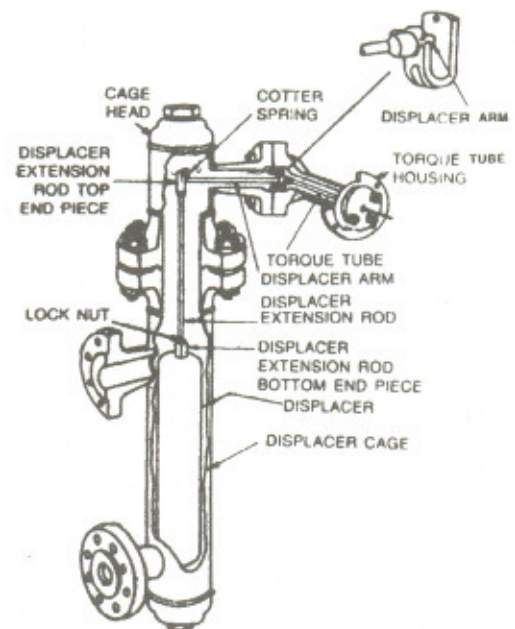
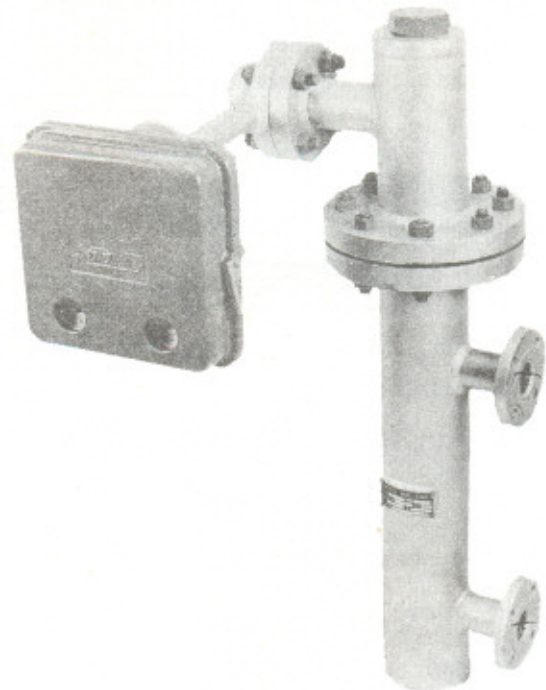
AUTOMAT Level Controller is, designed to sense liquid level, interface and specific gravity. The output of the instrument is linear to level change. This linear Characteristic makes the controller ideal for use as a level transmitter as well a level controller.

PRINCIPAL OF OPERATION

The operation of Automat Level Controller is based on Archimedes Principal. In the Level controller the body immersed is called a displacer which is suspended from a torsional measuring spring called torque tube. The displacement for full level range varies from zero (displacer hanging free) to 100% at the top range. The displacer always weighs more than the upward buoyant force which may be developed by the liquid in which it is submerged. Although the displacer rises and falls with level changes, its movement is substantially less than actual level movement. The difference in movement between displacer and liquid level is dependent on the cross sectional area of the displacer, the specific gravity of the liquid and the stiffness of the torque tube. Displacers are usually of cylindrical shape, having constant cross sectional area so that for each equal increment of submersion depth, an equal increment of buoyancy change will result, yielding the desired linear or proportional relationship. The torque tube is designed to twist a specific amount for each increment of buoyancy change and to be insensitive to pressure changes on the vessel. The degree of rotation of inner end of torque tube will be in linear relation to the degree of buoyancy. The rotation of shift is converted to proportional pneumatic output.

TECHNICAL SPECIFICATIONS

Input Signal	: Liquid Level or Liquid-to-Liquid Interface Level from 0 to 100percent of displacer length. Standard lengths for all sensors in mm. Refer Displacer length in table 6.
Liquid Density	: From 30% to 100 percent of displacement force change obtained with given displacer volume. Standard volume is 1620 cm ³ .
Output Signal	: 0.2-1 kg/cm ² . DIRECT : Increase in level increases output. REVERSE: Increase in level decreases output.



Span : Adjustment over 30 to 100% of standard displacer length. Set Point (Controller) : Continuously adjustable to position set point less than 100 percent on controllers or span of less than 100% on transmitter anywhere within the displacer length (Liquid or interface level) or displacer force change (density). Zero (Transmitter) : Accuracy transmitter only ±1 percent of output pressure change at 100 percent span (100% P.B.)	Ambient Temperatures : 55°C (For Controller/Transmitter) Process Temperatures : Upto 150°C without Cooling fins upto 375°C with Cooling fins (For higher temp. contact factory).
	COMPONENT MOC
	Case and Cover - Aluminium Alloy Nozzle - Stainless Steel Primary Orifice - Stainless Steel Relay valve plug and seats - Brass Relay valve Diaphragm - Buna N with Nylon insert Proportional valve Plug and seat - Brass Proportional valve body - Brass Bourden Tube - Phosphorous Bronze Cover Gasket - Sponge Rubber

Sensor Specification

Available Matl. of Construction External: Carbon Steel, 304SS, 316SS & 316L.

Internal: 316SS

Torque Tube 316SS, Inconel

Process Connections..... Flanged. Standard Flanges are of ASA rating. (Flanges of other standards also available).

Max. Working Pres...... 10, 20, 40, 60 & 100 Kg/cm² (150, 300, 600, 900 & 1500 class ANSI).

Rated Process Temp...... 375°C max. (Cooling Fins are provided for Process Temperatures above 150°C).

Model Number Description

1 DESCRIPTION LEVEL & TRANSMITTER/CONTROLLER (SERIES 410)

- i) **A** : Transmitter Direct with Proportional output ii) **C** : Transmitter Reverse with Proportional output
iii) **B** : Controller Direct with Proportional output iv) **D** : Controller Reverse with Proportional output

2 CAGE DESCRIPTION

For Style 1, 2, 3, & 4 (External Mounted)

F Type 449 C Class 150, 300, 600, 900, & 1500 ANSI Carbon Steel Cage and Cage head with Flanged Process Connection.

G Type 449 C Class 150, 300, 600, 900, & 1500 ANSI SS Cage and Cage head (304SS/316SS/316L) with Flanged Process Connections.

For Style 5 (Top Internal Mounted)

H Type 449 BP Class 150, 300 & 600 ANSI Carbon Steel Cage head Top Mounted Sensor

J Type 449 CP Class 150, 300 & 600 ANSI SS Cage head (304SS/316SS/316L) Top Mounted Sensor.

For Style 6 (Side Internal Mounted)

M Type 449 V Class 150, 300 & 600 ANSI Carbon Steel/SS Side Mounted Sensor with extended Torque Tube Housing.

3**Style Description**

Process Connection Orientation		
Upper Connection	Lower Connection	Style No.
Top	Bottom	1
Top	Side	2
Side	Side	3
Side	Bottom	4
Top Internal Mounted		5
Side Internal Mounted		6

Example of 2+3

CH5: Reverse Transmitter with Type 449BP Carbon Steel Cage Head with Top Mounted Flanged Connection.

5**Size and Type of Process Connections**

Connections	Rating of Process Connection				
	Style 1, 2, 3 & 4 Only				
	150 lbs	300 lbs	600 lbs	900 lbs	1500 lbs
¾" Flanged	E1	E3	E6	E9	E15
1" Flanged	G1	G3	G6	G9	G15
1½" Flanged	H1	H3	H6	H9	H15
2" Flanged	K1	K3	K6	K9	K15
Style 5 only					
3" Flanged	M1	M3	M6	X	
4" Flanged	P1	P3	P6		
6" Flanged	T1	T3	T6		
Style 6 only					
4" Flanged	U1	U3	U6	X	
6" Flanged	W1	W3	W6		

Order Code

4**5****6****4****Material of Construction**

CAGE, CAGE HEAD AND PROCESS CONNECTION	Carbon Steel	B
	304 SS	C
	316 SS	E
TORQUE TUBE HOUSING	Carbon Steel	F
	304 SS	G
	316 SS	H
TORQUE TUBE	316 SS	I
	Inconel	K
DISPLACER & DISPLACERSTEM	316 SS	L

6**Displacer Length**

Code	Milimetres Long	Inches Long
R ₁	356mm	14"
R ₂	813mm	32"
R ₃	1219mm	48"
R ₄	1524mm	60"
R ₅	1829mm	72"
R ₆	2134mm	84"
R ₇	2438mm	96"
R ₈	2743mm	108"
R ₉	3048mm	120"
R ₁₀	N.S.: Non Standard (upto 6 metres) 3049 mm to 6000 mm only for Internal Mounted.	

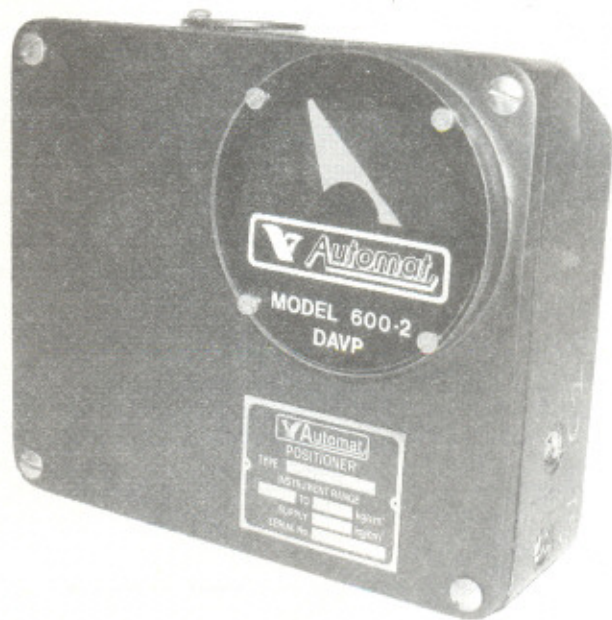
MODEL DESCRIPTION:**BF3/BFKL/K3/R1**

Level Controller with Direct Action, with Carbon Steel Cage, 2" side-side process connection, Torque Tube Housing in Carbon Steel, Torque Tube of Inconel and Displacer of 356 mm length in SS316.

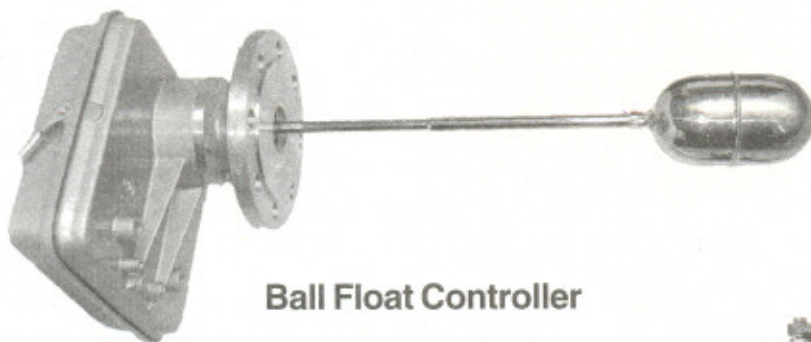
OUR OTHER PNEUMATIC PRODUCTS



Single Acting Valve Positioner

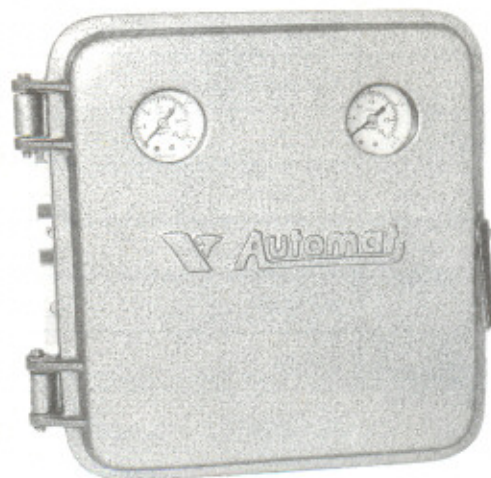


Double Acting Valve Positioner



Ball Float Controller

Pneumatic Controller



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