



**MAGNETROL**<sup>®</sup>

**AMETEK**<sup>®</sup>

**LEVEL MEASUREMENT  
SOLUTIONS**

# Modulelevel<sup>®</sup> Pneumatic and APM Liquid Level Control

## STEEL FABRICATED MODELS

Pneumatic Modulelevel<sup>®</sup> controls are displacement actuated level sensors. They provide output signals in direct proportion to changes in liquid level.

Simple, modular design and proven magnetic coupling make Modulelevel controls versatile, highly stable, vibration resistant and adaptable to extremes of temperature and pressure.

## FEATURES

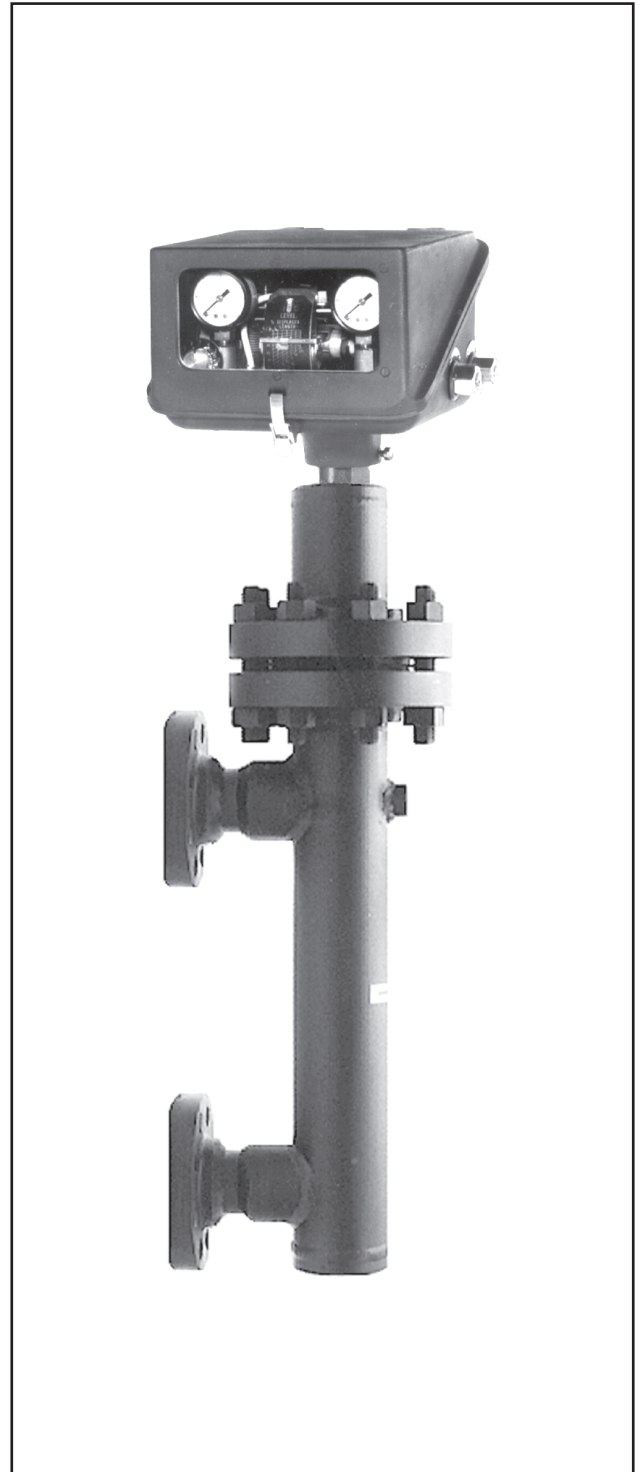
- \* Standard models handle service temperatures from -100°C to +370°C (-150°F to +700°F) and pressure to 294 bar (4265 PSIG).
- \* Stable output signal is unaffected by surface turbulence. Prevents control valve "hunting" and extends valve life.
- \* Controller head may be removed and bench calibrated without dismantling or even depressurizing the tank.
- \* Accurate output signal provided over a wide specific gravity range.
- \* 316 SS displacer and trim.
- \* Easily field calibrated without moving tank liquid level, for reduced installation time and cost.
- \* Controller head rotates 360°, simplifies pneumatic piping hookup.
- \* Pilot relay provides a 4 to 1 amplification of pilot pressure signal to speed valve response.
- \* Built-in visual level indicator is independent of air supply.
- \* Optional pneumatic to current interface transducer for use in electronic control applications.
- \* Optional proportional plus integral control.
- \* Optional differential gap (on-off) control.
- \* Optional Hi-Lo electronic alarm signal provides inexpensive backup alarm.

## APPLICATIONS

Pneumatic Modulelevel<sup>®</sup> liquid level controls are widely used in utility power generation, chemical and petroleum processing operations, such as:

- Steam generator feedwater heater regulation
- Fractionating column level transmitter
- Ethanolamine level transmitter
- Vent gas scrubber level control
- Drip pot condensate level control
- Flash tank level transmitter

## Modulelevel series P-60 control

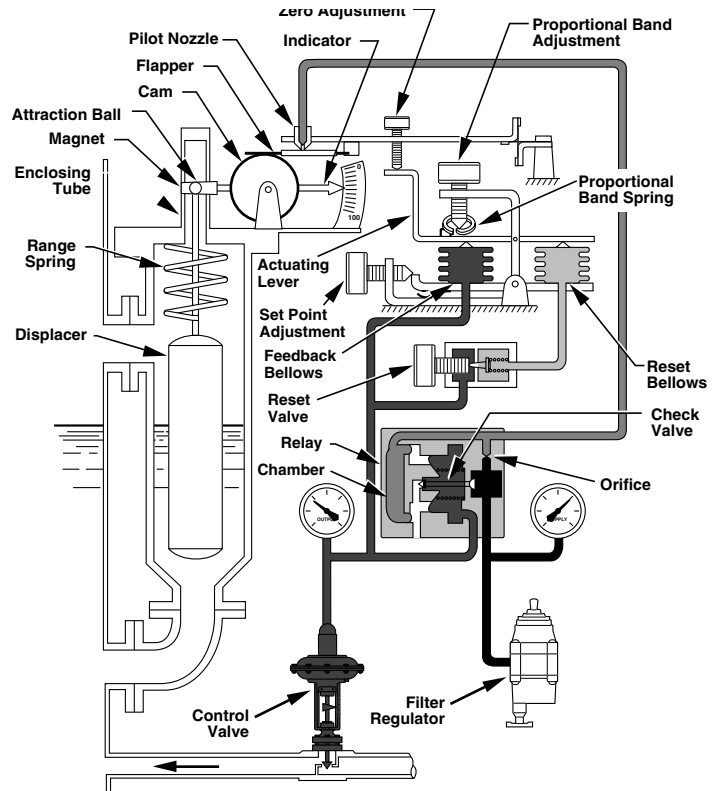


## PRINCIPLE OF OPERATION

The key elements of the Modulelevel pneumatic control are the magnetic coupling, which allows the controller to be mechanically isolated from the sealed sensing unit; the range spring, which dampens the action of the displacer, and the control head, which provides a modulated pneumatic signal in direct proportion to the input from the vertical motion of the displacer.

As the liquid level in the vessel increases or decreases, the buoyant displacer rises or falls. This motion, dampened by the action of the range spring to prevent response to the rapid fluctuations of turbulence, is mechanically coupled to an attractor ball, within an enclosed tube.

A magnet encircling the tube follows the attractor ball, transferring the motion to a rotating cam, which in turn operates a flapper against a nozzle which increases or decreases the pressure within the pneumatic relay. The output pressure signal can be used in a variety of ways to operate a control valve or signal to alarms, indicators, process controls or other devices. With optional integral control, the pilot nozzle proportional signal is conditioned through an additional metering valve system, which will eliminate offset from the desired control point.

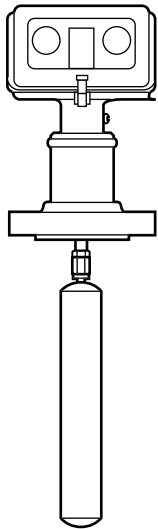


## SPECIFICATIONS

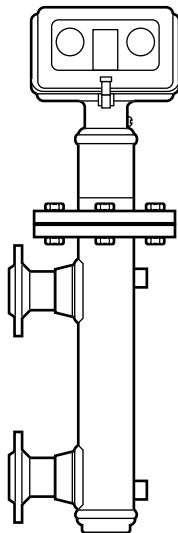
Description		Specification
Process pressure		Up to 294 bar at 40° C
Process temperature		-100°C to +370°C (-150°F to +700°F)
Specific gravity		Min.: 0.11, max.:2.20
Interface detection		Min. difference of 0.10, specific gravity between liquids
Process connections		NPT, socket weld or flanged
Supply pressure ①		17 bar (250 PSIG) max. to regulator. Instrument quality air (clean and dry). Regulator set to 0.3 bar (5 PSIG) above max. output.
Output signal pressure	proportional & transmitter	0.2 - 1.0 bar, 0.4 - 2.0 bar (3 - 15 PSIG, 6 - 30 PSIG)
	differential gap	0 - 1.4 bar or 0 - 2.4 bar (0 - 20 PSIG or 0 - 35 PSIG)
Level range & proportional band adjustment		Limited only to displaced length. From fractional cm to 3 m (inches to 10 ft)
Air consumption		85 l/h at 0.6 bar output (3 SCFH at 9 PSIG output) 170 l/h at 1.0 bar output (6 SCFH at 15 PSIG output)
Response speed		1639 cm <sup>3</sup> (100 ci <sup>3</sup> ) output volume in 3.2 sec upon an output pressure increase from 0.2 - 1.0 bar (3 - 15 PSIG)
Wetted parts		Trim: 304 or 316 SS Spring: 316 SS or inconel Chamber: Carbon steel or 316 (L) SS
Control action		Direct or reverse
Modes of operation		Proportional control, differential gap, transmitter
Housing		NEMA 1, 2, 3 and 3R / IP53 (optional IP55)
Limit switch ratings		Max. voltage: 120 V AC/V DC Max. resistive load: 10 V AC/V DC Max. current: 1/4 A switching 1 A holding

① Max. supply pressures with customer supplied regulator is 7 bar (100 PSIG).

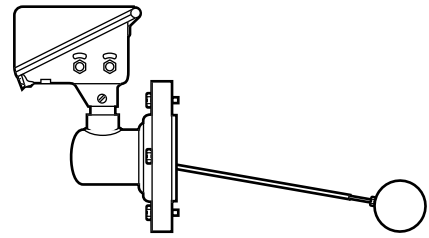
## MOUNTING



Top Mounted Model: P61



Flanged External Cage Models:  
P63, P64, P65 and P66



Side Mounted  
(for narrow differential)  
Model P68

## PNEUMATIC CONTROLLER HEADS

Pneumatic Modulevel® controllers are available in a variety of functions and styles to handle different application requirements.

### Single function heads

Single function heads fulfill one of the functions as described below. Single function heads are available with electric limit switches. Limit switches allow separate high/low level alarms separate from the normal function of the unit.

### Transmitter/receiver heads

Transmitter/receiver heads combine the transmitter function with one of the controller functions as described below.

### Action

All controller heads can be set in *direct* or *reverse action*.

*Direct action*: level increases-output increases (eg. from 0,2 to 1 bar).

*Reverse action*: level increases-output decreases (eg. from 1 to 0,2 bar)

### Functions:

**Proportional**: the unit keeps the level within a calibrated band (wide differential).

**Proportional with reset**: the unit keeps the level at a specific level (narrow differential).

**Transmitter**: continuous measurement, different field instruments can be actuated/deactuated from the output signal transmitter heads can be factory calibrated to detect an INTERFACE under following conditions:

1. Minimum difference of 0.10 specific gravity between both liquids.
2. The interface band does not exceeds the length of the displacer.
3. The displacer is at all times immersed in liquid.

Consult factory when consulting units for interface applications. Both specific gravities must be supplied at the time the order is placed.

**Differential gap**: the unit shows an output that remains stable once the level exceeds the highest switching point until the level drops under the lowest switch point. The unit shows another output until the highest switch point is exceeded again.

**SELECTION DATA**

**A complete measuring system consists of:**

1. Order code for Pneumatic Modulelevel® control
2. Options:
  - Filter regulator** to filter air and adapt pressure: order code **006-9501-002**.
  - Gauge:** order code **006-9501-003**.
  - Adjustable displacer hanger:** order code **032-3110-004** (std. length 2,5 m (8')), is required when distance between top displacer and mounting flange is > 236 mm (9.30").
  - Special process connections:** consult factory.
  - Gauge glass tappings** for caged models only: Specify location and distance between the tappings at the time the order is placed.
  - P/I converters:** transform pneumatic output to 4-20 mA or 10-50 mA (2 wire system).

**Order code for top mounted and flanged cage models**

**MOUNTING AND MATERIALS OF CONSTRUCTION**

flanged top		cage side/bottom		cage side/side		<i>tank connection</i>
fabricated		fabricated		fabricated		<i>materials of construction</i>
steel	316SS	steel	316SS	steel	316SS	
1	2	3	4	5	6	

**SPECIFIC GRAVITY AND TEMPERATURE**

205° C (400°F)	370° C (700°F)	<i>mounting max. temp.</i>
1	4	0.11 - 0.54 specific gravity
2	5	0.55 - 1.09 specific gravity
3	6	1.10 - 2.20 specific gravity

TANK CONNECTION (for DIN flanges consult factory)  
 a. For flanged connection type (P61, P62) - head flange rating

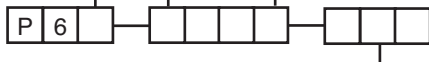
RF 150 lb	RF 300 lb	RF 600 lb	<i>RF = raised face RJ = ring joint</i>
G3	G4	G5	3" size
H3	H4	H5	4" size
K3	K4	K5	6" size

b. For external cage models (P63, P64, P65, P66) - ANSI rating

RF 150lb	RF 300lb	RF 600lb	<i>connection</i>
C5	C7	C9	1 1/2" NPT connector
C6	C8	C0	1 1/2" socket weld
P3	P4	P5	1 1/2" ANSI flanges
D5	D7	D9	2" NPT
D6	D8	D0	2" socket weld
Q3	Q4	Q5	2" ANSI flanges

**LEVEL RANGE**

356 14	813 32	1219 48	1524 60	1829 72	2134 84	2438 96	2743 108	3048 120	<i>mm inches</i>
A	B	C	D	E	F	G	H	I	



complete order code for Pneumatic Modulelevel® Control

**PNEUMATIC CONTROLLER HEAD**

Function	Pressure bar (PSIG)	Single Function Models				Transmitter/Receiver Controllers			
		Direct Acting		Reverse Acting		Integral Mount		Remote Mount	
		Standard Head	w/Limit Switches	Standard Head	w/Limit Switches	Standard Head	Standard Head	Standard Head	Standard Head
Proportional	0.2-1.0 (3-15)	PAA	PIA	PEA	PMA	RAA	REA	TAA	TEA
	0.4-2.0 (6-30)	PAB	PIB	PEB	PMB	RAB	REB	TAB	TEB
Proportional w/Reset	0.2-1.0 (3-15)	PBA	PJA	PFA	PNA	RBA	RFA	TBA	TFA
	0.4-2.0 (6-30)	PBB	PJB	PFB	PNB	RBB	RFB	TBB	TFB
Transmitter	0.2-1.0 (3-15)	PCA	PKA	PGA	POA	-	-	-	-
	0.4-2.0 (6-30)	PCB	PKB	PGB	POB	-	-	-	-
Differential Gap	0-1.4 (0-20)	PDA	PLA	PHA	PPA	-	-	-	-
	0-2.4 (0-35)	PDB	PLB	PHB	PPB	-	-	-	-

**Order code for side mounted models**

P 6 8	Standard side mounted float controller - carbon steel construction with 316 SST float
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2	0.60 minimum specific gravity, max temperature 205°C (400°F)
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**TANK CONNECTION**

F 2 A	Threaded 3" NPT
H 3 A	Flanged 4" - 150 lbs RF
H 4 A	Flanged 4" - 300 lbs RF
H 5 A	Flanged 4" - 600 lbs RF

P 6 8	2			A	P		
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complete order code for Pneumatic Modulevel® Control

**CONTROLLER HEAD**

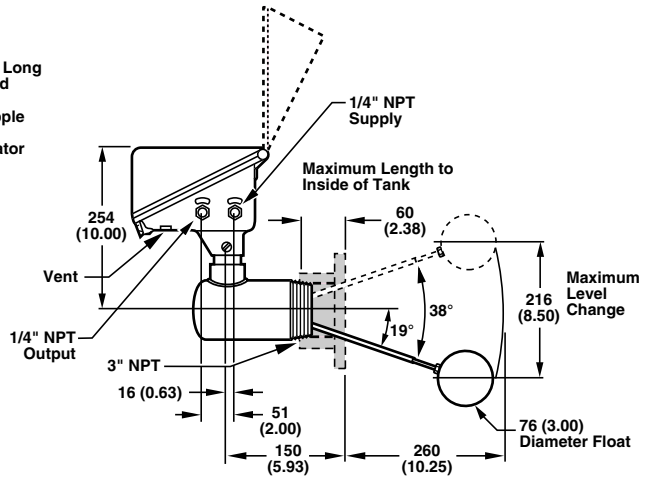
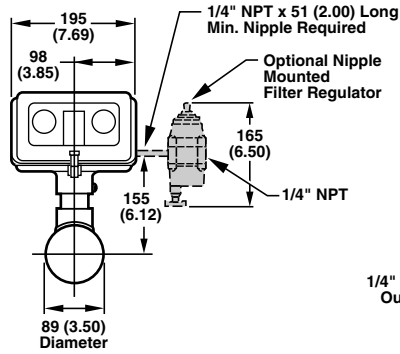
<i>Proportional</i>		<i>Proportional with reset</i>		<i>Transmitter</i>		<i>Differential gap</i>		
0.2 - 1.0 (3 - 15)	0.4 - 2.0 (6 - 30)	0.2 - 1.0 (3 - 15)	0.4 - 2.0 (6 - 30)	0.2 - 1.0 (3 - 15)	0.4 - 2.0 (6 - 30)	0 - 1.4 (0 - 20)	0 - 2.4 (0-35)	Pressure bar (PSIG)
PAJ	PAK	PBJ	PBK	PCJ	PCK	PDJ	PDK	direct
PEJ	PEK	PFJ	PFK	PGJ	PGK	PHJ	PHK	reverse

**DIMENSIONS IN mm (inches)**

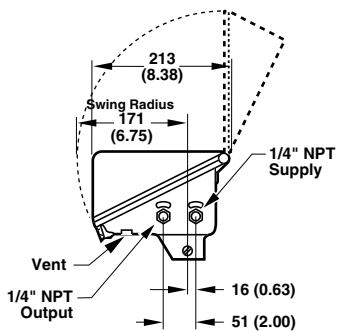
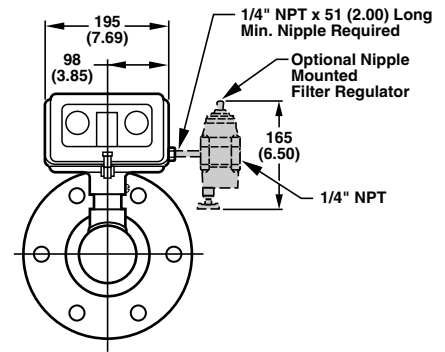
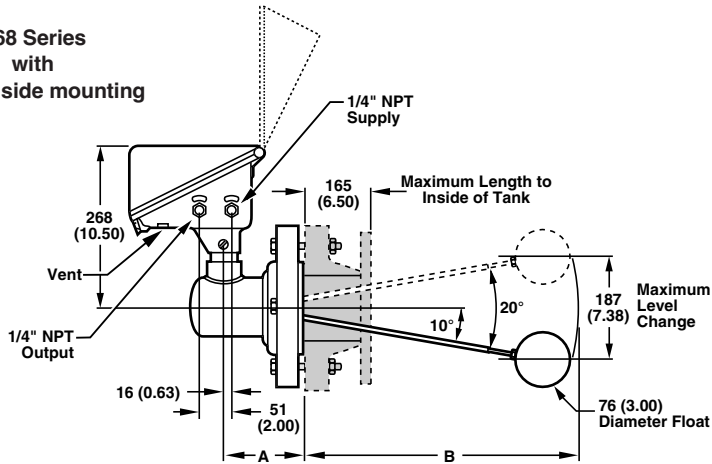
**Standard side mount model P68**

**NOTE:** Controller head may be rotated thru 360°.

**P68 Series with threaded side mounting**



**P68 Series with flanged side mounting**



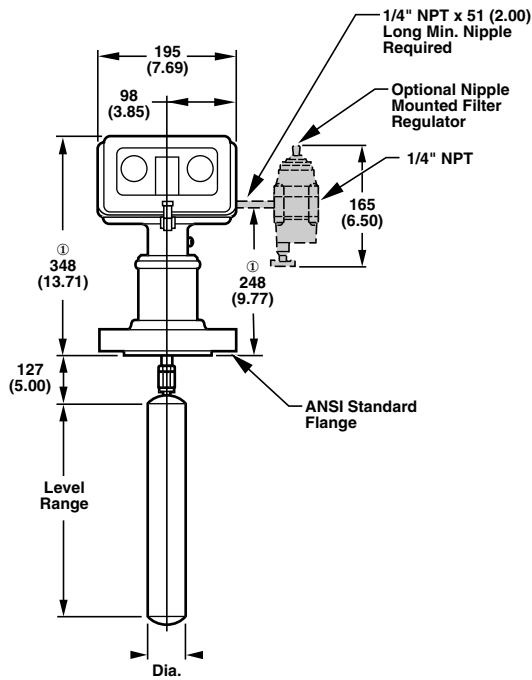
**Controller Head**

Flange size and Class	DIM. A	DIM. B	Number of bolt holes	Dia. of bolt holes
4" - 150 lb	137 (5.38)	511 (20.12)	8	19 (0.75)
4" - 300 lb	137 (5.38)	511 (20.12)	8	22 (0.88)
4" - 600 lb	149 (5.88)	498 (19.62)	8	25 (1.00)

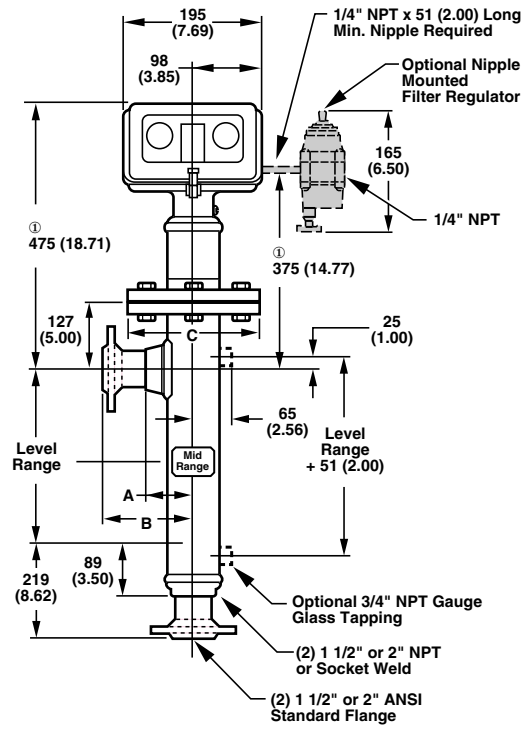
**DIMENSIONS IN mm (inches)**

**NOTE:** Controller head may be rotated thru 360°.

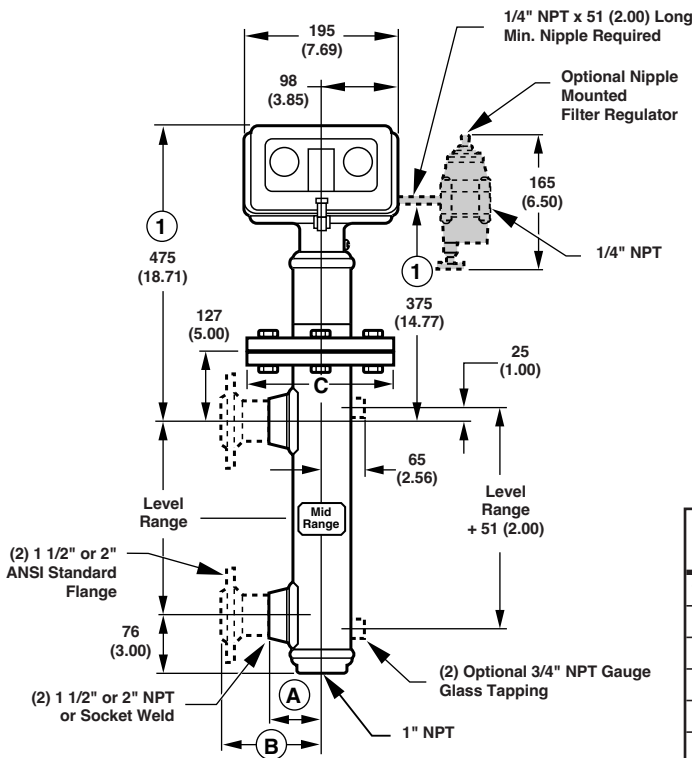
**Top mounted/flanged cage models:  
P61, P62, P63, P64 and P65**



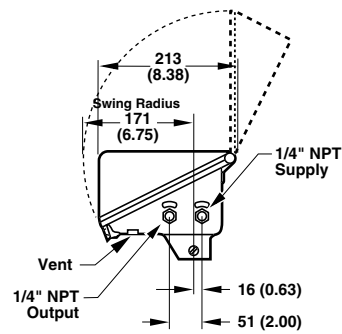
**P61 & P62 series top mounting  
150, 300 & 600 lb. Class.**



**P63 & P64 series with side/bottom connections  
150, 300 & 600 lb. Class.**



**P65 & P66 series with side/side connections  
150, 300 & 600 lb. Class.**



**Controller head – side view**

Outlet Size	Dimensions	
	A	B
1 1/2" S.W.	78 (3.07)	
2" S.W.	82 (3.23)	
1 1/2" NPT	69 (2.72)	
2" NPT	65 (2.56)	
1 1/2" flanged		151 (5.94)
2" flanged		159 (6.25)

Pressure	Dim. C
150	190 (7.50)
300	210 (8.25)
600	210 (8.25)

- ① Add. 51 (2.00) for units that will operate on S.G range 0,11 - 0,54 or interface service.  
Add. 79 (3.12) for units that will operate above 200°C (400°F).
- ② Distance "D" without stem extension is 127 (5.00) standard.  
Can be furnished to min. distance of 76 (3.00).



**DNV**  
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DNV Certification B.V., THE NETHERLANDS

#### QUALITY ASSURANCE - ISO 9001

THE QUALITY ASSURANCE SYSTEM IN PLACE AT MAGNETROL GUARANTEES THE HIGHEST LEVEL OF QUALITY DURING THE DESIGN, THE CONSTRUCTION AND THE SERVICE OF CONTROLS.  
OUR QUALITY ASSURANCE SYSTEM IS APPROVED AND CERTIFIED TO **ISO 9001** AND OUR TOTAL COMPANY IS COMMITTED TO PROVIDING FULL CUSTOMER SATISFACTION BOTH IN QUALITY PRODUCTS AND QUALITY SERVICE.

#### PRODUCT WARRANTY

ALL MAGNETROL MECHANICAL LEVEL CONTROLS ARE WARRANTED FREE OF DEFECTS IN MATERIALS AND WORKMANSHIP FOR FIVE FULL YEARS (ELECTRONICS ONE FULL YEAR) FROM THE DATE OF ORIGINAL FACTORY SHIPMENT. IF RETURNED WITHIN THE WARRANTY PERIOD; AND, UPON FACTORY INSPECTION OF THE CONTROL, THE CAUSE OF THE CLAIM IS DETERMINED TO BE COVERED UNDER THE WARRANTY; THEN, MAGNETROL INTERNATIONAL WILL REPAIR OR REPLACE THE CONTROL AT NO COST TO THE PURCHASER (OR OWNER) OTHER THAN TRANSPORTATION.  
MAGNETROL SHALL NOT BE LIABLE FOR MISAPPLICATION, 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, EXCEPT, SPECIAL WRITTEN WARRANTIES COVERING SOME MAGNETROL PRODUCTS.



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UNDER RESERVE OF MODIFICATIONS

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