

AMURACT™: FAST ELECTRICALLY ACTUATED INDUSTRIAL VALVES (patent pending)

SERIES: **AMA** SIZES 1/2 to 2 INCHES
Heavy Globe Control Valves

PRODUCT SPECIFICATION
April 2008

WARREN CONTROLS

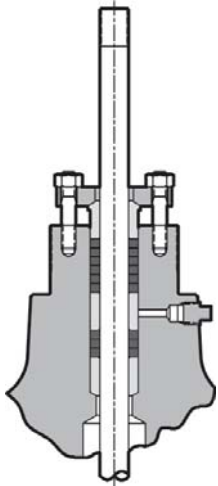
Three-Way, Linear, Steel,
or Stainless Steel Body Valves for
Process and Utility Applications



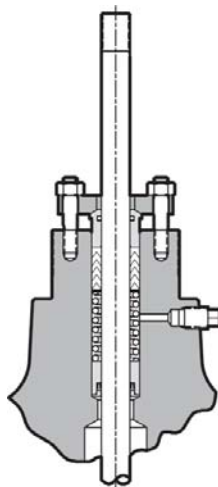
Table of Contents

- Body Style Versus Application 3
- Flow Coefficients (Cv) Versus Travel 4
- Sizing Reference and Load Sizing Calculations 5
- Shut-Off ΔP Ratings..... 5
- Factory Default Settings..... 6
- Dimensions and Weights..... 6
- AmurAct Actuator 7-8
- Configurations 9-10

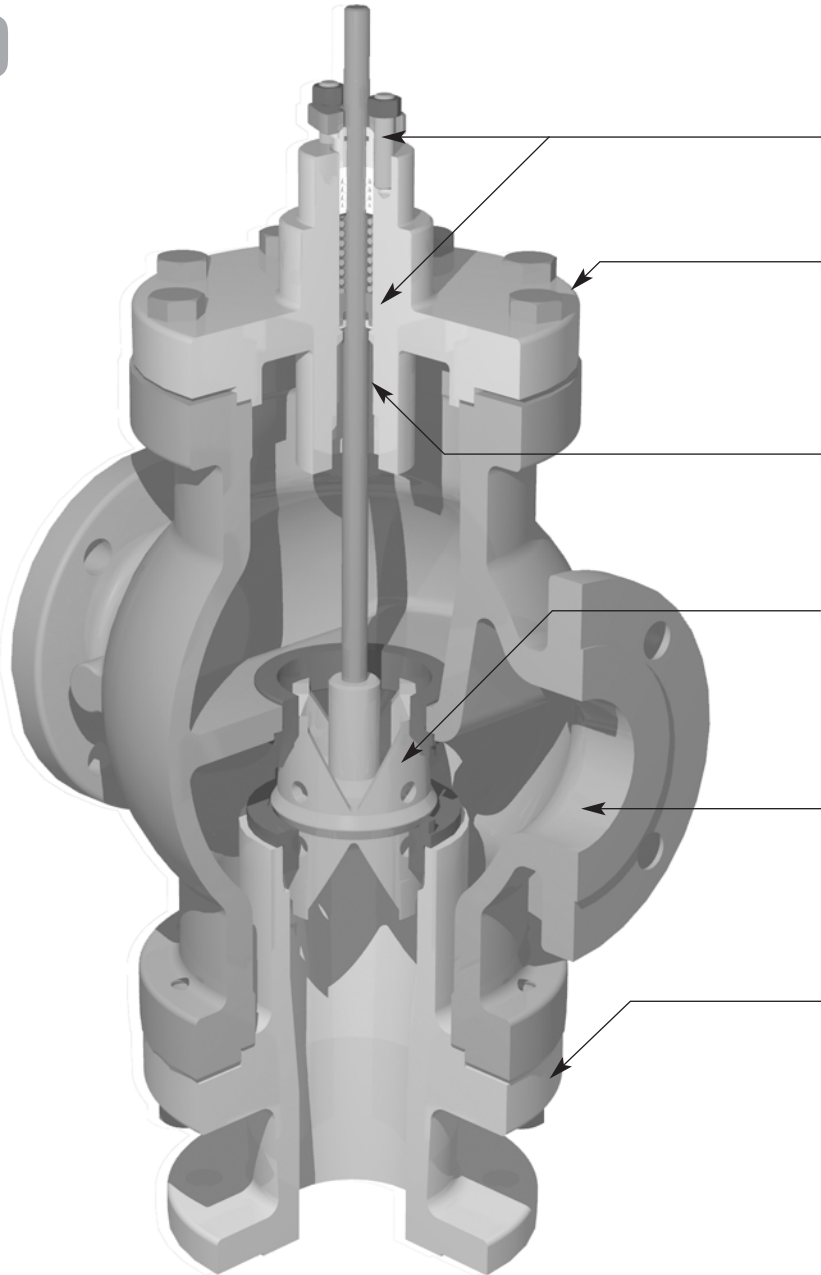
Type 50 Three-Way Mixing Valve



Adjustable
Graphite Packing



TFE V-Ring Packing
Spring-Loaded



Stem Wipers
provide outstanding packing protection.

Heavy Bolted Bonnet Construction
provides added durability and easy maintenance.

Large Guiding Surfaces
ensure smooth operation and stem stability.

Skirt Guided Plug Assembly
provides stability and precision linear flow characteristic.

Large Internal Flow Patterns
maximize CV capacities. Greater flow with smaller sizes reduces cost.

Lower Unit
disassembles for easy trim replacement or debris removal.

Description: Warren Controls AMA Heavy Globe Control Valves feature rugged high capacity bodies of steel, or stainless steel with a variety of trim materials and port sizes. The linear plugs in the 3-way valves provide excellent modulating control of a wide variety of fluids. The AMA Series is ideally suited where value and long life are important objectives for applications including but not limited to the Chemical, District Energy, Food & Beverage, General Service, Marine, Power, and Refining industries with temperatures from -20 to 800°F, severe service, high pressure drops, and corrosive fluids.

Stem lubricator is available as an option, but is not required for standard packing sets.

AmurAct™ Overview

The AmurAct™ Actuator is a revolutionary product in both function and design with best-in-class performance at a price point previously ignored by other manufacturers. While when configured the valve can fully open from closed in about 8 seconds, the actual response time to a required heavy load change from a 'normal' flow condition is only 2 – 3 seconds, on par with pneumatically actuated products. The AmurAct™ linkage (patent pending) uniquely accelerates the stroke through the last 50% of travel providing required speed where it is needed, yet has tremendous torque as it approaches closure allowing for increased close off pressure even on larger valves. Under close off, the AmurAct™ linkage is in **FULL LOCK-UP** mode that allows removal of the motor for service or replacement quite easily with limited disassembly.** Fail-Safe is of course included with Enerdrive*. The patented Enerdrive System™. The modern, electronic replacement for antiquated spring return actuator is a "super capacitive" fail-safe return system.

** Enerdrive or the Enerdrive System is both a patent and trademark of National Environmental Products, Ltd. Since its introduction, Enerdrive™ has proven its versatility and dependability. As a system that is fully incorporated into the PC board for both low and line voltage service, the power generated and stored in its capacitors will drive the control valve at full rated torque to its safety position. It is 100% operational with the resumption of power. Each unit may be manually positioned with the clutch override that is standard on each actuator. Most importantly, the final fail position, either normally open or normally closed may be chosen at any time either before or after installation with the flick of a dip switch.*

*** Two-way Valves Only.*

“ ...THE ACTUAL RESPONSE TIME TO A REQUIRED HEAVY LOAD CHANGE FROM A 'NORMAL' FLOW CONDITION IS **ONLY 2 – 3 SECONDS!** ”

Corrosion-resistant stainless steel safety enclosure.

Base and linkage also constructed from corrosion-resistant stainless steel.

Strong, long-life sintered bronze pre-lubricated bearings at pivot points.

Articulated stem connection to extend valve packing life.

Geometric locking for fail-safe closure without sustained actuator force, allowing for safe, in-line motor replacement.**

Strong and compact ... a single actuation package fits and operates a wide selection of valves.

Laboratory & field tested for strength and durability.

Optional configuration for higher-temperature applications



AmurAct™
Fast Electric Actuator

Body Style Versus Application

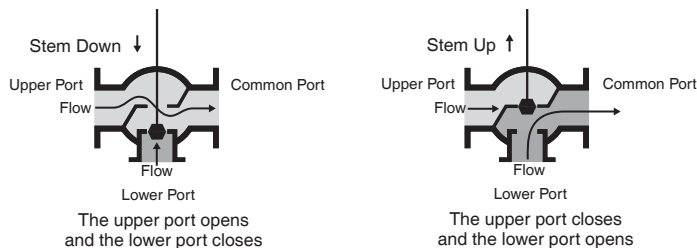
3-Way Valves (Control of Liquids)

Type 50 Three-Way Mixing/Bypass Valve

This valve has two inlets and one outlet, and is the simplest solution for mixing or bypass applications with ANSI Class IV shut-off. In normal applications the inlet pressures are near equal and control is possible from 5% to 95% of travel with inlet pressures up to 300 PSI. In the 1/2 through 2 inch sizes, the flow can be reversed for diverting if this port configuration is desirable.

Sizes:	1/2, 3/4, 1, 1-1/2, 2 inch
Body:	WCB Steel or CF8M Stainless Steel 150LB Flange or 300LB Flange (1/2 thru 2)
Trim:	Linear, 316 Stainless Steel
Packing:	TFE V-Ring, Spring Loaded (+32 to 450°F) Adjustable Graphite (+32 to 500°F) Adjustable Graphite w/Extension Bonnet (+32 to 800°F)
Temperature:	+32 to 350°F (125 FLG) +32 to 400°F (250 FLG) +32 to 800°F (150 or 300 FLG)
Rangeability:	30:1 (sizes 1/2 thru 2)

AMA Three-Way Mixing Valve



Body Pressure-Temperature Ratings:

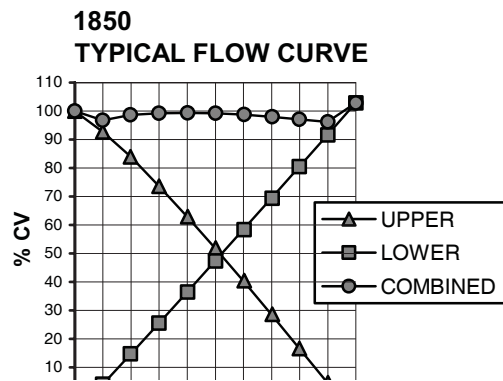
Temperature (F)	125 FLG Iron	250 FLG Iron	150 FLG Steel	300 FLG Steel	150 FLG St Steel	300 FLG St Steel
+32° To 100°	175	400	285	740	275	720
150°	175	400	272	710	255	670
175°	170	385	266	695	245	645
200°	165	370	260	680	235	620
225°	155	355	252	673	230	605
250°	150	340	245	667	225	590
275°	145	325	237	661	220	575
300°	140	310	230	655	215	560
325°	130	295	222	650	210	548
350°	125	280	215	645	205	537
375°	-	265	207	640	200	526
400°	-	250	200	635	195	515
450°	-	-	185	620	182	497
500°	-	-	170	605	170	480
550°	-	-	155	587	155	465
600°	-	-	140	570	140	450
650°	-	-	125	550	125	440
700°	-	-	110	530	110	435
750°	-	-	95	505	95	425
800°	-	-	80	410	80	420

Pressure ratings are PSIG

For applications below 32° consult factory

Trim Materials	Flowing Differential Pressure Limit
316 Stainless Steel	100 PSID

Flow Coefficients (Cv) Versus Travel



Valve	Type 50 Flow Coefficients (Cv)			
	Three-Way Mixing/Diverting Valve			
				Travel
1/2	Linear	0.876	Full	4.90
		0.876	1SR	3.20
		0.626	2SR	2.00
3/4	Linear	0.876	Full	7.20
		0.876	1SR	4.90
		0.876	2SR	3.20
		0.626	3SR	2.00
1	Linear	1.126	Full	12.0
		0.876	1SR	7.20
		0.876	2SR	4.90
		0.876	3SR	3.20
1-1/2	Linear	1.676	Full	20.0
2	Linear	2.126	Full	40.0

3-Way Valves
(Control of Liquids)

In the 1/2 through 2 inch sizes, the flow can be reversed for diverting if this port configuration is desirable.



Sizing Reference

Rectangular Tank Capacity in Gallons

$$\text{Gallons} = \frac{\text{Height} \times \text{Width} \times \text{Length (inches)}}{230}$$

or

$$\text{Gallons} = H \times W \times L (\text{Ft.}) \times 7.5$$

Circular Tank Storage Capacity in Gallons

$$\text{Storage} = 6D^2 \times L (\text{Gallons})$$

Where:

D = Tank Diameter in Feet
L = Length in Feet

Steam Table

Steam Pressure PSIG	Temp. °F	Temp. °C	Sensible Heat BTU/Lb.	Latent Heat BTU/Lb.	Total Heat BTU/Lb.
0	212	100	180	971	1151
10	239	115	207	952	1159
25	266	130	236	934	1170
50	297	147	267	912	1179
75	320	160	290	896	1186
100	338	170	309	881	1190
125	353	178	325	868	1193
150	365	185	339	858	1197
200	387	197	362	838	1200
250	406	208	381	821	1202
300	422	217	399	805	1204
400	448	231	438	778	1216
500	470	243	453	752	1205
600	489	254	475	729	1204

Load Sizing Calculations

Glossary of Terms

t = Time in Hours
Cp = Specific Heat of Liquid
S = Specific Gravity of Fluid
W = Weight in Lbs.
ΔT = Temperature Rise or Fall in °F
h_{fg} = Latent Heat of Steam

Conversion Factors

1 Lb. Steam / Hr. = 1000 BTU / Hr.
1 Cubic Meter = 264 U.S. Gallons
1 Cubic Foot Water = 62.4 Lbs.
1 PSI = 2.04 Inches of Mercury
1 PSI = 2.3 Feet of Water
1 PSI = 27.7 Inches of Water
1 U.S. Gallon Water = 231 Cubic Inches
1 U.S. Gallon Water = 8.33 Lbs.

Heating Water with Steam

Quick Method

$$\text{Lbs./Hr.} = \frac{\text{GPM}}{2} \times \Delta T$$

Accurate Method

$$\text{Lbs./Hr.} = \frac{\text{GPM} \times 500 \times \Delta T}{h_{fg}}$$

Heating or Cooling Water with Water

$$\text{GPM}_1 = \text{GPM}_2 \times \frac{\text{°F water}_2 \text{ temp. rise or drop}}{\text{°F water}_1 \text{ temp. rise or drop}}$$

Heating or Cooling Water

$$\text{GPM} = \frac{\text{BTU / Hr.}}{(\text{°F water temp. rise or drop}) \times 500}$$

Heating Oil with Steam

$$\text{Lbs./Hr.} = \frac{\text{GPM}}{4} \times (\text{°F oil temp. rise})$$

Heating Air with Water

$$\text{GPM} = 2.16 \times \frac{\text{CFM} \times (\text{°F air temp. rise})}{1000 \times (\text{°F water temp. drop})}$$

Heating Liquids with Steam

$$\text{Lbs./Hr.} = \frac{\text{GPM} \times 60 \times \text{Cp} \times \text{W}}{h_{fg}} \times \Delta T$$

Heating Liquids in Steam Jacketed Kettles

$$\text{Lbs./Hr.} = \frac{\text{Gallons} \times \text{Cp} \times \text{S} \times 8.33}{h_{fg} \times t} \times \Delta T$$

General Liquid Heating

$$\text{Lbs./Hr.} = \frac{\text{W} \times \text{Cp}}{h_{fg} \times t} \times \Delta T$$

Heating Air with Steam

$$\text{Lbs./Hr.} = \frac{\text{CFM}}{900} \times \Delta T$$

Shut-Off ΔP Ratings

AMA Shut-Off ΔP Rating			Lower Seat Shutoff		Upper Seat Shutoff	
			Motor Choices		Motor Choices	
SERIES	SIZES	Seat Diameter	F1	F2	F1	F2
AMA Type 50	1/2" - 3/4"	0.626	720	720	291	720
	1/2" - 1"	0.876	720	720	122	399
	1"	1.126	426	499	58	226
	1 1/2"	1.676	177	210	11	86
	2"	2.126	—	122	—	46

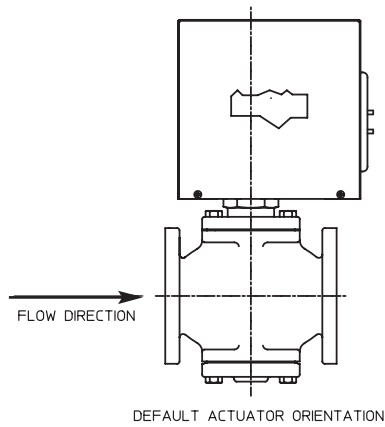
NOTE:

1. For maximum trim life observe maximum sustained flowing differential pressure trim limits. See page 3
2. Under power fail conditions the valve leakage rate is at the next highest ANSI leakage class.

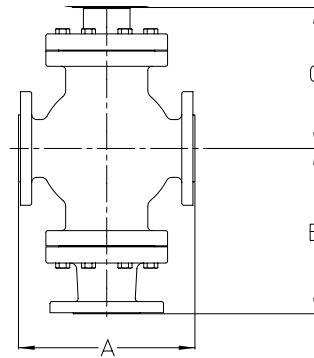
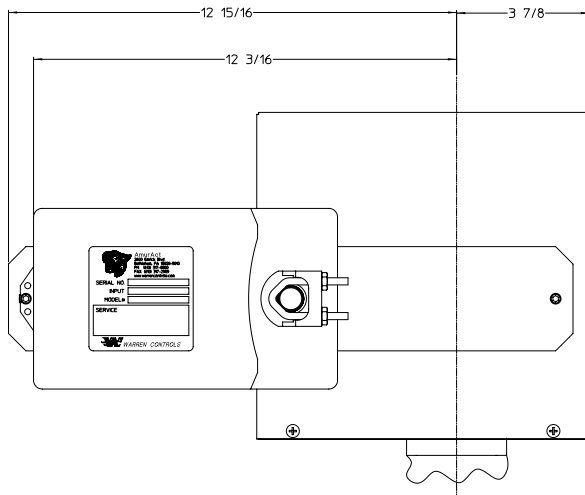
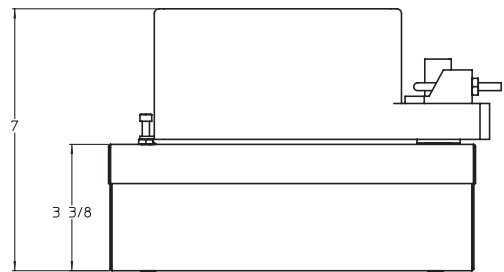
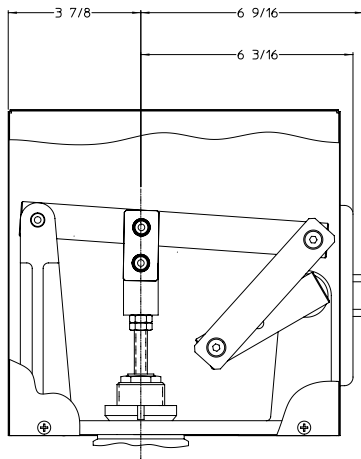
Factory Default Settings

AMURACT FACTORY DEFAULT SETTINGS

Unless a purchase order specifically requests it to be configured differently, an AmurAct™ control valve will accept a 4-20 mAdc input signal and will fail shut upon loss of either operating power or input signal, or both.



Dimensions & Weights



3-WAY

Motor	Weight lbs	Dimensions
F1	5 lbs	9.13" x 5.2" x 3.55"
F2	8 lbs	9.13" x 5.2" x 3.55"

Linkage	Weight lbs	Dimensions
LS	11 lbs	9.5" x 9.5" x 3.25"
LE	11.2 lbs	16.81" x 9.5" x 3.25"

Dimension (IN)	Type 50	Valve Size (IN)				
		1/2	3/4	1	1-1/2	2
A	125 or 150FLG	7-1/4	7-1/4	7-1/4	8-3/4	10
	250 or 300FLG	7-1/2	7-5/8	7-3/4	9-1/4	10-1/2
B	125 or 150FLG	6-1/2	6-1/2	6-1/2	6-1/4	10
	250 or 300FLG	6-5/8	6-3/4	6-3/4	6-1/2	10-1/4
C	Standard	5-1/2	5-1/2	5-1/2	6-1/8	8-1/8
	Extension Bonnet	CF	CF	CF	CF	CF
Weight (LB)	Standard	CF	CF	CF	CF	CF
	Extension Bonnet	CF	CF	CF	CF	CF

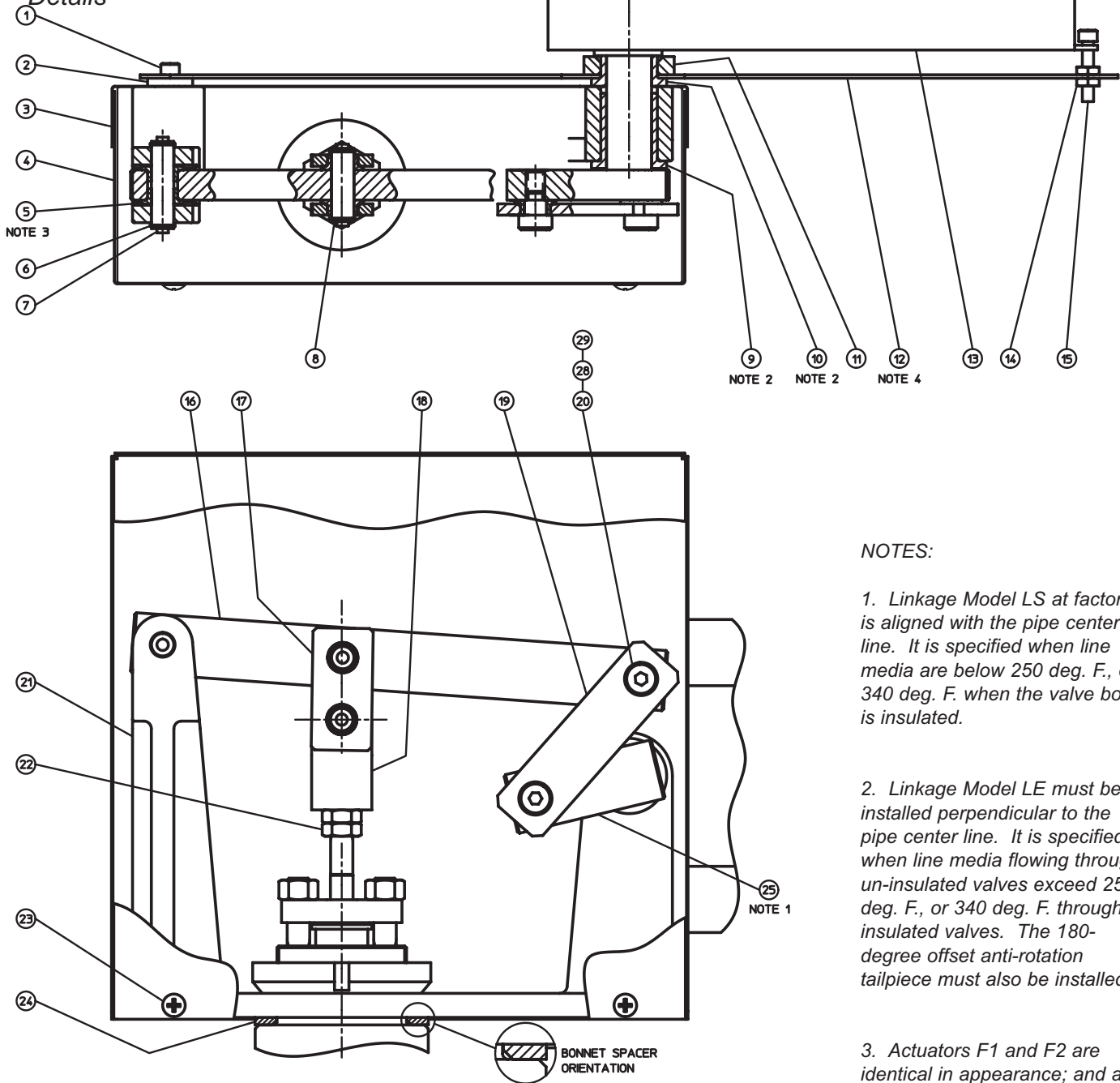
Face to face dimensions conform to ANSI/ISA S75.03

CF = Consult factory N/A = Not Available

Actual Shipping Weights May Vary

AmurAct™ Actuator

Construction Details



NOTES:

1. Linkage Model LS at factory is aligned with the pipe center line. It is specified when line media are below 250 deg. F., or 340 deg. F. when the valve body is insulated.

2. Linkage Model LE must be installed perpendicular to the pipe center line. It is specified when line media flowing through un-insulated valves exceed 250 deg. F., or 340 deg. F. through insulated valves. The 180-degree offset anti-rotation tailpiece must also be installed.

3. Actuators F1 and F2 are identical in appearance; and are wired and configured identically.

4. To change position feedback from 4-20 mA_{dc} to 2-10 v_{dc}, connect a 500-ohm (min 1/2 w) resistor between terminals ONE (1) and FIVE (5) on JP3.

**SEE PAGE 8 FOR AMURACT PART
NOMENCLATURE AND MATERIALS**

XXX
Model

XXXXXXXXXX
VBA Series

XX
Linkage

XX
Motor

XX
Enclosure
Rating

X
Special
Req

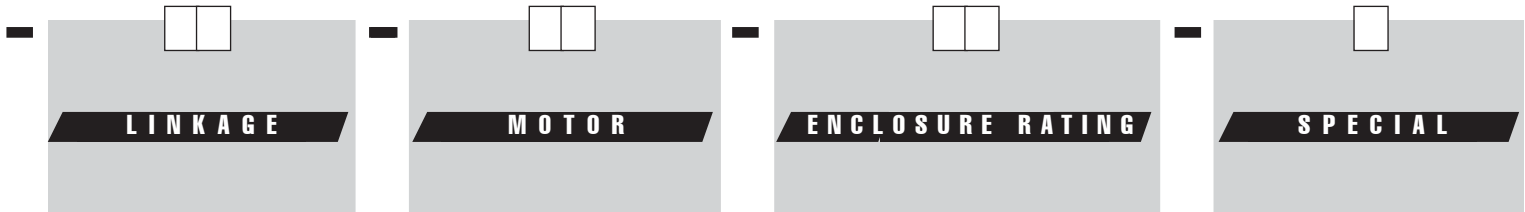
<valve-type><size-code><body-material><end-conn><trim-style><trim-material><Trim-C><packing>



VALVE BODY								
Valve Type	Size	Body Material	End Connection	Trim Style	Trim Material	Trim Cv	Packing Type	Bonnet Construction

<u>1/2" - 1 1/2"</u> <u>2"</u>	050 1/2 inch 075 3/4 inch 100 1 inch 125 1 - 1/4 inch 150 1 - 1/2 inch 200 2 inch	W WCB F CF8M	F 125/150 lb. Flanged G 250/300 lb. Flanged	L Linear	S 316 SS	F Full Port 1 1st Port Reduction 2 2nd Port Reduction 3 3rd Port Reduction Port reductions see page 4	T Teflon G Graphite Graphite packing requires F2 Motor	S 450 Tmax X 800F Tmax w. /Ext.Bonnet 800F requires Graphite packing, only on WCB or CF8M bodies.
-----------------------------------	--	-------------------------------	--	-----------------	-----------------	--	---	---

Extension
bonnet is
legal with LE
linkage



LS Standard Linkage with orientation parallel to the pipe line

LE Extended Temperature Linkage with orientation perpendicular to the pipeline and motor extended beyond linkage box.

F1 Standard Motor with universal power input and Enerdrive Fail Safe Back-up

F2 Extended Torque Motor with universal power input and Enerdrive Fail Safe Back-up

00 No rating, somewhat splash resistant with proper fittings

N4 Future Enclosure Option for NEMA 4X (Check availability)

0 No Special Options

S Special Options verbally described on order, priced separately

Size	MOTOR TO USE	
	F1	F2
TYPE 50		
1/2 inch	YES	YES
3/4 inch	YES	YES
1 inch	YES	YES
1 -1/2 inch	YES	YES
2 inch	NO	YES

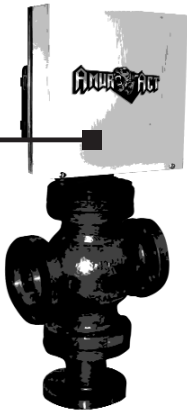
Notes: Please refer to page 5 for Close-off ratings.

WARREN CONTROLS

2600 Emrick Blvd., Bethlehem, PA 18020-8010 www.WarrenControls.com
Tel: 800-922-0085 or 610-317-0800 Fax: 610-317-2989

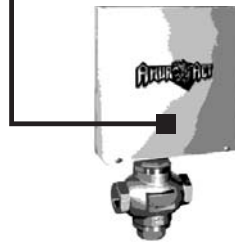


□ **AMA** - is the breed defined for high temperature and robust blending. A 3-Way flanged steel valve with ANSI 150 or 300 Lb. ratings, this rugged design was made to perform where others cannot. Available in multiple port sizes for finely tuned flows in sizes from 1/2" through 2".



AMA

□ **AMB** - is the breed defined for a wide range of compact 2-way and 3-Way applications. Available in bronze or CF8M bodies, this NPT end design is chocked full of design choices, from five different kinds of hard and soft trim to Cv's ranging from 0.25 up to 40...from 1/2" through 2".



□ **AMC** - is the breed defined that excels in higher capacity flows with a wide range of 2-way and 3-Way applications. This cast iron flanged body is available in sizes from 2 1/2" to 4", depending on profile. Various balanced trim designs help achieve incredible close off performance for such a compact actuator.



□ **AMD** - is the breed defined for high temperature flow and pressure control. This 2-Way steel valve with ANSI 150 or 300 Lb. ratings includes a bolted bonnet and cage retained seat for maximum durability and ease of long term maintenance. End connection options are flanged, NPT or socket weld. An optional extension bonnet will accommodate the highest temperature applications possible for electric actuation. A rugged performer, available in multiple port sizes for finely tuned flows in sizes from 1/2" through 2".

