MONITROL
PRODUCT SPECIFICATION

SERIES
MON-DP

FMCV

Flow Metering Control Valve

...offers improved functionality as a PICV but without the drawbacks

SIZES: 2 ½" – 10"
(65 MM – 250 MM)

MON-DP PS RevE_0723

MON-DP PRODUCT SPEC

WARREN CONTROLS

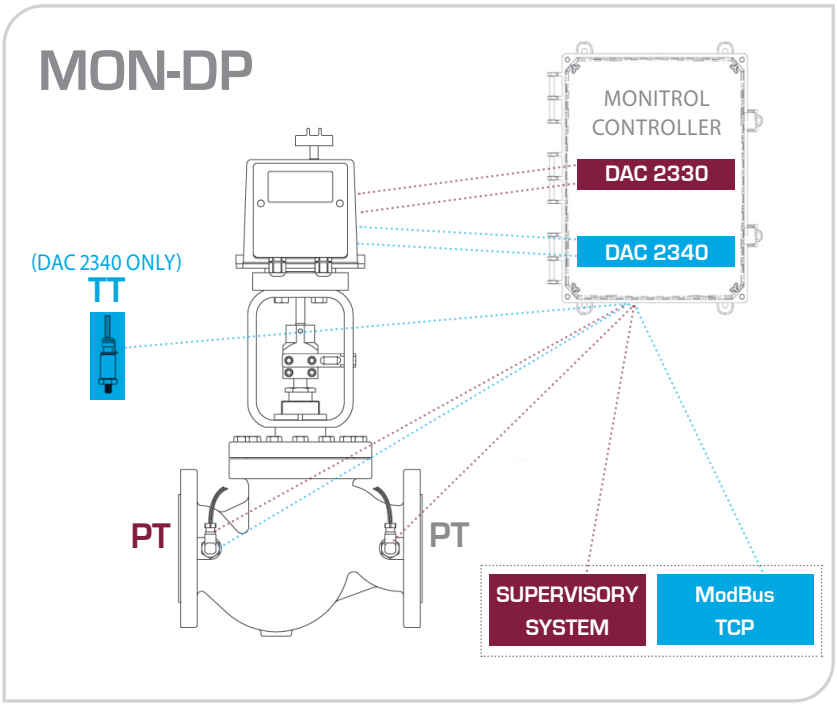
2600 EMRICK BLVD • BETHLEHEM, PA 18020 • USA • 610-317-0800 • WWW.WARRENCONTROLS.COM

DEPENDABLE, RUGGED, PRECISION CONTROL VALVES AND ACCESSORIES

APPLICATION OVERVIEW

The primary application purpose of the Monitrol® Series MON-DP, **FMCV** – Flow Metering Control Valve is to act as the final control element in common Heat Exchanger and Coil Control applications popular throughout HVAC and District / Campus Energy installations for the control of chilled or hot water or water/glycol for energy transfer purposes.

Several other application purposes for this unique final control element prevail for industrial users as well for the robust industrial construction, unique control features and accuracy.



The MON-DP Series Flow Metering Control Valves from Warren Controls are comprised of a Globe Control valve with two integral, industrial grade pressure transducers and a modulating electric actuator.

Using a differential pressure, variable orifice flow equation, the MON-DP Series of FMCV operates in conjunction with the DAC-2330 / 2340 Series Flow Controller providing precisely metered Flow Control of water and water/glycol service using a desired set point from a BMS (building management system) or PLC (programmable logic controller) as would be common in many HVAC and District Energy applications.

Optional temperature control as the primary variable is also available in a cascade control algorithm with the PICV flow control and in addition, a Feedforward signal can contribute for anticipating loads changes downstream so their influence can be corrected for instantaneously (DAC 2340).

The DAC Series 2330 / 2340 Controllers are sold separately

Refer to Product Specification: *DAC CONTROLLERS: 2330 / 2340*

The FMCV - Monitrol® MON-DP Series

I. Measure and monitor the Differential Pressure of the Control Valve

II. Replace the DPRV element of the PICV with a controller that monitors this differential pressure running an algorithm which measures and controls precise flow – very accurately.

III. Continuously Monitor Flow Rates adjusting to whatever deadband is desired.

IV. Ensures that Changes in Flow Rates are driven by temperature changes (requested by BMS or PLC when not local)– hence, Pressure Independence.

V. Limit the Max Flow Rate to a preset value , also precisely.

• Hence the FMCV (Monitrol® MON-DP Series) is a PICV… and more

TABLE OF CONTENTS

INTELLIGENT CONTROL VALVES

The Warren Controls MONITROL is a new series of electronic / intelligent control valves that incorporate integrated flow, pressure and/or temperature transducers in a variety of dedicated control schemes via different Monitrol series.

MON-DP MODEL

The MON-DP Series is a 2½" – 10" flanged end valve assembly with two integral pressure sensors, one at valve inlet and one at valve outlet. Using a variable orifice flow equation the MON-DP can accurately monitor and control all flows withing the range of the valve assembly, as well as be programmed for ANY MAX flow desired for a given circuit.

IMPROVED FLOW ACCURACY

From an application perspective it takes over the role as an improved version of a Pressure Independent Control Valve (PICV) typically used in circuits with air handlers (AHU's) and heat exchangers (HEX).

The MON-DP has a better flow accuracy than a traditional PICV as flow is actually measured and the valve is modulated to that measurement. Traditional PICV's have interpolated flows based on valve position and presumed differential pressure, therefore having a wider range of errors that stack up. Further, they cannot easily set and reset max flow. The MON-DP can precisely set Max Flow.

ONE CONTROL ELEMENT = ENERGY SAVINGS

By virtue of having a single control element the MON-DP uses far less system head pressure than a PICV (which contain two control elements). In a large, distributed system this will be realized as a significant energy savings in pumping costs.

A NEW CLASS OF PICV

This is a new class of PICV known by consulting engineers as a Flow Metering Control Valve (FMCV), for which these are rapidly replacing traditional Pressure Independent Control Valves as the preferred application solution for HVAC coil and heat exchanger control.

FLOW METERING
FLOW CONTROL VALVE (FMCV)

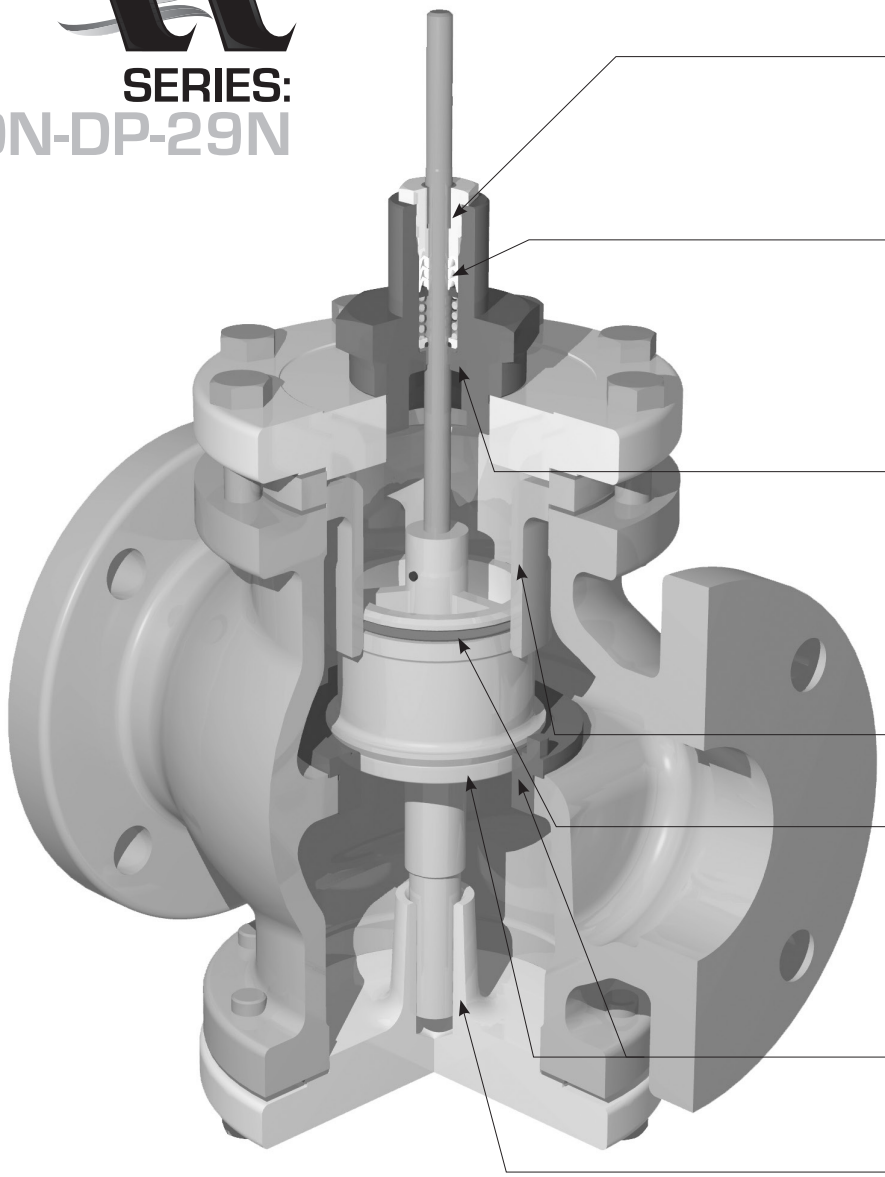
Using precision industrial pressure sensors on inlet and outlet ports, differential pressure is used with a variable orifice flow equation for reasonably accurate and highly repeatable flow measurements, allowing precision flow control.

The highly intuitive touchscreen control interface of the Monitrol control module is easy to setup, tune and operate. The real-time local display for all relevant variables is commonly welcome but can be dimmed when required. All relevant information is available via common communications protocols for management and control from a BMS, DDC, DCS or PLC.

IN APPLICATION PRACTICE THIS IS THE HIGHER PERFORMING EVOLUTIONARY PRODUCT THAT REPLACES PICV'S FOR ALL THEIR PITFALLS AND OPENS NEW APPLICATION OPPORTUNITIES FOR STAND-ALONE FLOW CONTROL LOOPS.

- SIZES 2 ½" – 10" (65 MM – 250 MM)
- ANSI 125 LB., ANSI 150 LB., ANSI 250 LB., OR PN16 FLANGES
- CAST IRON, DUCTILE IRON OR CARBON STEEL VALVE BODIES W/SS TRIM
- SYSTEM PRESSURES TO 300 PSI (20 BAR) BODY MATERIAL AND RATING DEPENDENT

SERIES:
MON-DP-29N



Peek Bearing
for low friction provides stem guiding and protects packing box from external debris.

Robust Spring-Loaded PTFE V-Ring Packing
has low friction and is self adjusting for zero maintenance. EPDM Lip Packing is available for water service.

Peek Bearing in Lower Bonnet Assembly
provides stem guiding and protects packing box from entrained solids for longer packing life.

Thick Balancing Chamber
in bronze or 300 SS

EPDM O-Ring or Fluoraz O-Ring
(for higher temperatures) maintains pressure balance seal.

Plug and Seat
in choice of Bronze or 300 SS provide Class IV leakage rating.

Bottom Post Guide
for additional stability, allowing higher pressure drop.

Two-Way Cylinder Balanced Valve

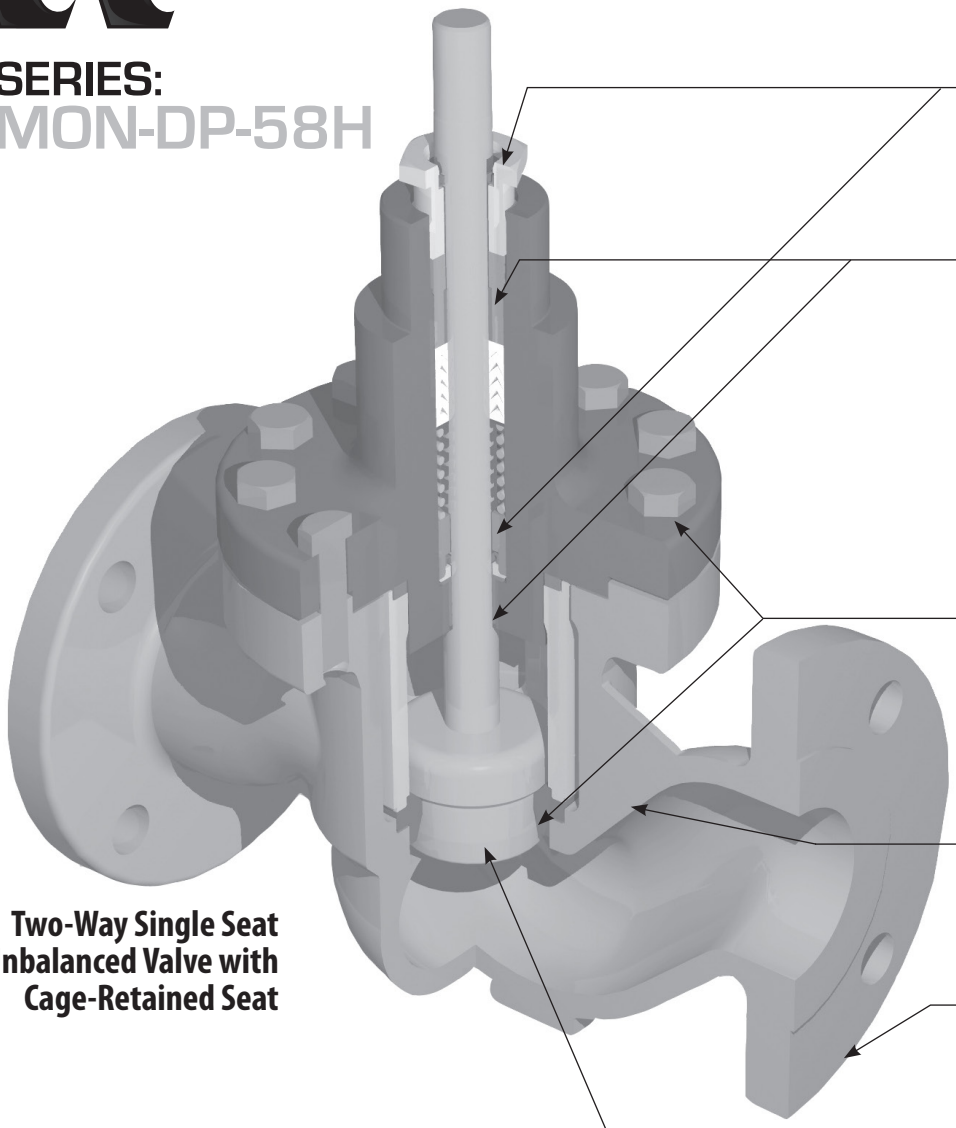
Other options in this series included

- **Two-Way Single Seat Unbalanced Valve**
- **Two-Way Double Seat Balanced Valve**

– See Page 6 for Details.

Description: Warren Controls MON-DP-29N High Capacity General Purpose Globe Control Valves feature rugged iron bodies with a variety of trim materials. The equal percentage plugs in the 2-way valves provide excellent modulating control of a wide variety of fluids. The MON-DP-29N is ideally suited where value and long life are important objectives.

SERIES:
MON-DP-58H



Two-Way Single Seat Unbalanced Valve with Cage-Retained Seat

Stem Wipers
provide outstanding packing protection and stem stability.

Dual Point PEEK Bearing Plug Guiding
provides both stability and low friction, resulting in lowest hysteresis and precision control. Graphalloy Bearings are available for added durability in high temperature applications.

Bolted Bonnet and Cage-Retained Seat
make the 5800 ideal for easy access, maintenance, and trim inspection.

Rugged Body
with a selection of port reductions.

Low Profile Design
offers footprint minimizing valuable space consumption, yet conforms to ANSI/ISA standards for Flanged ends.

Trim Choices Available
include 316SS or 400SS
(Only in Type 43)

Other options in this series included

• Two-Way Cage – Balanced

– See Page 7 for Details.

Description

Warren Controls MON-DP-58H Compact Globe Control Valves feature rugged high efficiency bodies of steel or stainless steel, with cage-retained seats for ease of maintenance, and a variety of trim materials and port sizes. The equal percentage, linear and modified linear plugs provide excellent modulating control of a wide variety of fluids. The MON-DP-58H ideally suited where value and long life are important objectives.

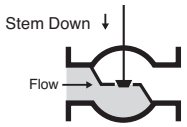
VALVE BODY SPECIFICATIONS

2-Way Valves (Control of Liquids, Gases, and Steam)

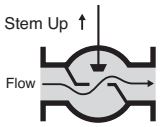
29N20 2-Way Single Seat Unbalanced Valve

The most commonly applied solution for sizes 3" and under with ANSI Class IV leakage rating. ***See Table on page 8 for Fluid Temperature Limits.***

Sizes:	2-1/2 & 3 inch (DN 65 & 80)
Body:	ANSI B16.1 Iron 125LB Flange or 250LB Flange
Trim:	EQ%, Bronze or 300 Series Stainless Steel
Packing:	Long-Life Multi-Stack, EPDM Lip Packing (EPDM Lip Packing is not suitable for use with oils, hydrocarbons, or acids.) Guided Low-Friction TFE V-Ring, Spring Loaded Packing.
Rangeability:	50:1



The valve closes

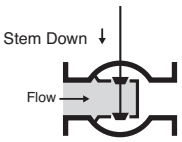


The valve opens

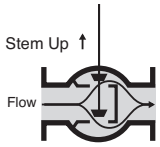
29N22 2-Way Double Seat Balanced Valve

A balanced valve that is an effective solution for sizes over 3" and for higher pressures. Its double seat design allows for dirtier fluids and requires less force to operate than unbalanced valves so smaller actuators can be used. It is limited to ANSI Class III leakage rating. ***See Table on page 8 for Fluid Temperature Limits***

Sizes:	8, 10 & 12 inch (DN 200, 250 & 300)
Body:	ANSI B16.1 Iron 125LB Flange or 250LB Flange
Trim:	EQ%, Bronze or 300 Series Stainless Steel
Packing:	Long-Life Multi-Stack, EPDM Lip Packing (EPDM lip packing is not suitable for use with oils, hydrocarbons, or acids) Guided Low-Friction TFE V-Ring, Spring Loaded Packing
Rangeability:	50:1



The valve closes

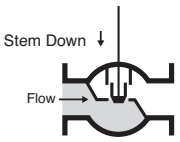


The valve opens

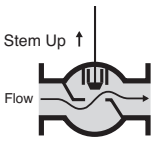
29N23 2-Way Cylinder Balanced Valve

A balanced valve that is an effective solution for sizes over 3" and for higher pressures. It requires less force to operate than unbalanced valves so smaller actuators can be used. Its single seat o-ring seal design facilitates ANSI Class IV leakage rating. It is limited to cleaner fluids. ***See Table on page 8 for Fluid Temperature Limits.***

Sizes:	2-1/2, 3, 4, 5, 6 & 8 inch (DN 65, 80, 100, 125, 150 & 200)
Body:	ANSI B16.1 Iron 125LB Flange or 250LB Flange Ductile Iron ANSI B16.42 Class 150 FLG or EN1092-2 PN16 400-18 FLG (5 thru 8, DN125 thru 200)
Trim:	EQ% [Bronze, (2-1/2 thru 6, DN 65 thru 150); 300 Series Stainless Steel (2-1/2 thru 8, DN 65 thru 200)], Linear [300 Series Stainless Steel, (2-1/2 thru 8, DN 65 thru 200)]
Packing:	Long-Life Multi-Stack, EPDM Lip Packing (EPDM lip packing is not suitable for use with oils, hydrocarbons, or acids.) Guided Low-Friction TFE V-Ring, Spring Loaded Packing
O-Ring:	EPDM (BRZ Trim) *Fluoraz 797 (300 SSTrim)
Rangeability:	50:1



The valve closes



The valve opens

Note: Fluoraz o-ring in Type 2923 is not compatible with the following solvents: acetates, acetone, benzene, carbon tetrachloride, ethers, Freons, ketones, lacquers, methyl ethyl ketone, and toluene - Consult Factory with service conditions for alternate o-ring selection.

BODY PRESSURE-TEMPERATURE RATINGS (PSIG) ANSI B16.1 IRON		
TEMP (°F)	125 FLG & PN16	250 FLG
-20 to 150	175	400
200	165	370
250	150	340
300	140	310
350	125	280
400	--	250

BODY PRESSURE-TEMPERATURE RATINGS (PSIG) WCB STEEL	
TEMP (°F)	150 FLG
-20 to 100	285
150	272
200	260
250	245
300	230
350	215
400	200
450	185

BODY PRESSURE-TEMPERATURE RATINGS (PSIG) ANSI B16.42 DUCTILE IRON	
TEMP (°F)	150 FLG
-20 to 100	250
150	242
200	235
250	225
300	215
350	207
400	200
450	185

BODY PRESSURE-TEMPERATURE RATINGS (BAR) EN 1092-2 DUCTILE IRON	
Temp (°C)	PN16 400-18 FLG
-10 to 120	16
150	15.5
200	14.7
232	14.1

Body Pressure — Temperature Ratings conform to ANSI or EN based on body/flange rating and body material. As the fluid temperature increases, the maximum allowable internal pressure decreases. Verify maximum pressures and temperatures prior to selecting body material and body/flange rating.

58H40 2-Way Single Seat Unbalanced Valve with Cage Retained Seat

The 5840 Valve is particularly effective for the control of liquids, gases, and steam. It is a suitable solution for applications with dirty fluids and high pressure drops. ANSI Class IV leakage rating standard. ***See Table on page 8 for Fluid Temperature Limits***

Sizes:	2-1/2 & 3 inch (DN 65 & 80)
Body:	WCB Steel 150LB Flange
Trim:	EQ% or Linear: 316 Stainless Steel
Leakage Ratings:	ANSI Class IV (Stainless Steel Trim)
Packing Type & Bonnet Construction:	EPDM Lip w/ PEEK Bearings TFE V-Ring, Spring Loaded, w/ PEEK Bearings
Rangeability:	50:1

58H43 2-Way Single Seat Caged Balanced Valve with Cage Retained Seat

The 5843 is a balanced valve that is an effective solution for the control of liquids, gases, and steam at higher pressures. It requires less force to operate than unbalanced valves so smaller actuators can be used. Its single seat o-ring seal design facilitates ANSI Class IV leakage rating standard. It is limited to cleaner fluids. ***See Table on page 8 for Fluid Temperature Limits***

Sizes:	4 inch (DN 100)
Body:	WCB Steel 150LB Flange
Trim:	EQ% or Linear: 400 Stainless Steel
Leakage Ratings:	ANSI Class IV (Fluoraz Seal)
Packing Type & Bonnet Construction:	EPDM Lip w/ PEEK Bearings and Fluoraz Seal TFE V-Ring, Spring Loaded, w/ PEEK Bearings and Fluoraz Seal
Rangeability:	50:1

Note: Fluoraz Seal in Type 5843 is not compatible with the following solvents: acetates, acetone, benzene, carbon tetrachloride, ethers, Freons, ketones, lacquers, methyl ethyl ketone, and toluene - Consult Factory with service conditions for alternate seal selection.

Trim Materials	Flowing Differential Pressure Limit
Bronze	50 PSID
300 Series Stainless Steel	100 PSID
316 Stainless Steel	100 PSID
400 Stainless Steel	200 PSID

- Under Constant Modulating, Full Flowing Conditions

FLUID TEMPERATURE LIMITS

FLUID TEMPERATURE LIMITS						
VALVE TYPE	BODY MATERIAL	END CONNECTION	TRIM MATERIAL	PACKING TYPE	T MAX	T MIN
20 2-Way Single Seat	Cast Iron	125FLG, PN16 FLG	Bronze, 300 Stainless Steel	EPDM	350ºF	-20ºF
	Cast Iron	125FLG, PN16 FLG	Bronze, 300 Stainless Steel	Teflon	350ºF	60ºF
	Cast Iron	250FLG	Bronze, 300 Stainless Steel	EPDM	400ºF	-20ºF
	Cast Iron	250FLG	Bronze, 300 Stainless Steel	Teflon	400ºF	60ºF
22 2-Way Double Seat	Cast Iron	125FLG, PN16 FLG	Bronze, 300 Stainless Steel	EPDM	350ºF	-20ºF
	Cast Iron	125FLG, PN16 FLG	Bronze, 300 Stainless Steel	Teflon	350ºF	60ºF
	Cast Iron	250FLG	Bronze, 300 Stainless Steel	EPDM	400ºF	-20ºF
	Cast Iron	250FLG	Bronze, 300 Stainless Steel	Teflon	400ºF	60ºF
23 2-Way Cylinder Balanced	Cast Iron	125FLG, PN16 FLG	Bronze	EPDM	300ºF	-20ºF
	Cast Iron	125FLG, PN16 FLG	Bronze	Teflon	300ºF	60ºF
	Cast Iron	125FLG, PN16 FLG	300 Stainless Steel	EPDM	350ºF	23ºF
	Cast Iron	125FLG, PN16 FLG	300 Stainless Steel	Teflon	350ºF	60ºF
	Cast Iron	250FLG	Bronze	EPDM	300ºF	-20ºF
	Cast Iron	250FLG	Bronze	Teflon	300ºF	60ºF
	Cast Iron	250FLG	300 Stainless Steel	EPDM	400ºF	23ºF
	Cast Iron	250FLG	300 Stainless Steel	Teflon	400ºF	60ºF
	Ductile Iron	150FLG	Bronze	EPDM	300ºF	-20ºF
	Ductile Iron	150FLG	Bronze	Teflon	300ºF	60ºF
	Ductile Iron	150FLG	300 Stainless Steel	EPDM	400ºF	23ºF
	Ductile Iron	150FLG	300 Stainless Steel	Teflon	450ºF	60ºF
	Ductile Iron	PN16 FLG	Bronze	EPDM	300ºF	14ºF
	Ductile Iron	PN16 FLG	Bronze	Teflon	300ºF	60ºF
	Ductile Iron	PN16 FLG	300 Stainless Steel	EPDM	400ºF	23ºF
	Ductile Iron	PN16 FLG	300 Stainless Steel	Teflon	450ºF	60ºF
40 2-Way Single Seat	Steel	150FLG	316 Stainless Steel	EPDM	400ºF	-20ºF
	Steel	150FLG	316 Stainless Steel	Teflon	450ºF	60ºF
43 2-Way Cage Balanced	Steel	150FLG	316 Stainless Steel, 400 Stainless Steel	EPDM	400ºF	23ºF
	Steel	150FLG	316 Stainless Steel, 400 Stainless Steel	Teflon	450ºF	60ºF

NOTE: -20 ºF T MIN temperature limit is for indoor applications with low humidity where ice will not form on the valve stem.

Proper Selection of control valves involves matching the valve's rated Cv with the required pressure drop. This ensures the proper authority ratio for the application. However, in keeping up with the PICV marketing practices and in order to facilitate the valve selection process, the table below gives the reader an easy selection guide per size over given design ranges of flow rates.

MON-DP-29N MODEL VALVES

SUGGESTED SELECTION FLOW RANGE PER VALVE SIZE

VALVE SIZE		VALVE CHARACTERISTICS			DESIGN FLOW RANGE (GPM) @ 5 PSI ΔP		DESIGN FLOW RANGE (GPM) @ 10 PSI ΔP		DESIGN FLOW RANGE (GPM) @ 15 PSI ΔP	
ANSI	DIN	Valve Type	Port Size	Cv	MIN flow range	MAX flow range	MIN flow range	MAX flow range	MIN flow range	MAX flow range
2.5 in	65 mm	20/23	Full	65	3	145	4	206	5	252
3.0 in	80 mm	20/23	1 Size Reduced	75	3	168	5	237	6	290
		20	Full	90	4	201	6	285	7	349
4.0 in	100 mm	23	2 Sizes Reduced	116	5	259	7	367	9	449
			1 Size Reduced	144	6	322	9	455	11	558
			Full	170	8	380	11	538	13	658
5.0 in	125 mm	23	2 Sizes Reduced	203	9	454	13	642	16	786
			1 Size Reduced	237	11	530	15	749	18	918
			Full	280	13	626	18	885	22	1084
6.0 in	150 mm	23	2 Sizes Reduced	275	12	615	17	870	21	1065
			1 Size Reduced	315	14	704	20	996	24	1220
			Full	360	16	805	23	1138	28	1394
			Extended	420	19	939	27	1328	33	1627
8.0 in	200 mm	23	Full	680	30	1520	43	2150	53	2634
8.0 in	200 mm	22	2 Sizes Reduced	520	23	1163	33	1644	40	2014
			1 Size Reduced	595	27	1330	38	1881	46	2304
			Full	680	30	1520	43	2150	53	2634
10.0 in	250 mm	22	2 Sizes Reduced	735	33	1643	46	2324	57	2847
			1 Size Reduced	840	38	1878	53	2656	65	3253
			Full	960	43	2147	61	3036	74	3718
			Extended	1100	49	2460	70	3479	85	4260

MON-DP-58H MODEL VALVES

SUGGESTED SELECTION FLOW RANGE PER VALVE SIZE

VALVE SIZE		VALVE CHARACTERISTICS			DESIGN FLOW RANGE (GPM) @ 5 PSI ΔP		DESIGN FLOW RANGE (GPM) @ 10 PSI ΔP		DESIGN FLOW RANGE (GPM) @ 15 PSI ΔP	
ANSI	DIN	Valve Type	Port Size	Cv	MIN flow range	MAX flow range	MIN flow range	MAX flow range	MIN flow range	MAX flow range
2.5 in	65 mm	40	Full	65	3	145	4	206	5	252
3.0 in	80 mm	40	1 Size Reduced	65	3	145	4	206	5	252
			Full	100	4	224	6	316	8	387
4.0 in	100 mm	43	1 Size Reduced	100	4	224	6	316	8	387
			Full	170	8	380	11	538	13	658

Remarks:

1- The above ranges are based on a minimum pressure drop of 5 psig (0.34 barg) to 15 psig (1.03 barg) respectively across the control valve element of the Monitrol assembly.

2- The Above Figures are based on water (SG = 1).

3 -The Above figures do not account for reducers if and when used.

4- For the most economical selection, always select the smallest size that meets a design flow rate.

GENERAL SPECIFICATIONS:

CONTROL VALVE

Body Sizes: 2.5″ – 10″
End Connections: Flanged, ANSI 125 LB., PN16, ANSI 150 LB. or 250 LB.
Body Materials: Cast Iron, Ductile Iron, WCB Carbon Steel
Body Ratings: ANSI 125 LB., ANSI 250 LB for Cast Iron / ANSI 150 Lb. for Ductile Iron & WCB
Valve Trim: Bronze or Stainless Steel, Balanced or Unbalanced

ACTUATOR

Voltage: 24 Vac/Vdc, 115Vac, 230Vac (Typically varies by selection) - Additional Actuator Available
Control: 4-20 mA or 2-10 Vdc
Feedback: 2-10 Vdc – Some models also offer 4-20 mA
Linear Force: Varies based on Actuator
Fail Modes: Fail-In-Place or Fail-Safe on loss of power, depending on model.

CONTROLLER (sold separately)

Universal Power Supply: 110 – 240 Vac, 50/60 Hz.
Up to four process inputs for sensors and command signals
Up to two process outputs – one for actuator control, one for selectable feedback
Dedicated Control Algorithms and Display Interface
TCP/IP communications with Modbus (Future BACNet Model)
NEMA 4X Enclosure

MONITROL MON-DP CLOSE OFFS

ACTUATOR SERIES			E024		E025		E026		E029/E031		E035...E046	E147...E154
ANSI LEAKAGE CLASS			III	IV	III	IV	III	IV	III	IV	IV	IV
VALVE SERIES	SIZE	PORT SIZE										
29N20	2 1/2"	Full	-	-	-	-	71	55	186	170	43	157
	3"	All	-	-	-	-	47	34	127	113	25	104
29N23	2 1/2"	All	358	226	358	226	400	400	-	-	378	400
	3"	All	275	140	275	140	400	300	-	-	272	400
	4"	All	-	-	-	-	281	141	400	400	127	400
	5"	All	-	-	-	-	187	46	400	400	41	400
	6"	All	-	-	-	-	-	-	400	400	-	372
29N22	8"	All	-	-	-	-	-	-	400	-	-	400
	10"	All	-	-	-	-	-	-	392	-	-	400
58H40	2 1/2″	1 Size Reduced	-	-	-	-	-	-	-	-	-	323
	2 1/2"	Full	-	-	-	-	-	-	-	-	-	157
	3"	1 Size Reduced	-	-	-	-	-	-	-	-	-	157
	3″	Full	-	-	-	-	-	-	-	-	-	106
58H43	4"	All	-	-	-	-	-	-	-	-	-	455

Valve			29N20 Flow Coefficients (Cv) • 2-Way Single Seat Unbalanced Valve									
Valve Size (IN)	Trim Style	Port Size	%Travel									
			100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
2 - 1/2	EQ%	Full	65	55.6	43.8	29.8	15.4	8.07	5.67	4.11	2.81	1.49
	Linear	Full	65	58.5	52.0	45.5	39.0	32.5	26.0	19.5	13.0	6.50
3	EQ%	Full	90	83.6	75.1	63.8	49.2	31.6	12.9	4.75	3.37	1.99
	EQ%	1SR	75	64.4	50.4	34.0	18.0	11.3	7.42	3.51	2.32	1.32
	Linear	Full	90	81.0	72.0	63.0	54.0	45.0	36.0	27.0	18.0	9.00

Valve			29N23 Flow Coefficients (Cv) • 2-Way Cylinder Balanced Valve									
Valve Size (IN)	Trim Style	Port Size	%Travel									
			100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
2 - 1/2	EQ%	Full	65	55.6	43.8	29.8	15.4	8.07	5.67	4.11	2.81	1.49
	Linear	Full	65	58.5	52.0	45.5	39.0	32.5	26.0	19.5	13.0	6.50
3	EQ%	Full	90	83.6	75.1	63.8	49.2	31.6	12.9	4.75	3.37	1.99
	EQ%	1SR	75	64.4	50.4	34.0	18.0	11.3	7.42	3.51	2.32	1.32
	Linear	Full	90	81.0	72.0	63.0	54.0	45.0	36.0	27.0	18.0	9.00
4	EQ%	Full	170	159	143	122	95.1	62.9	31.3	15.6	9.89	4.11
	EQ%	1SR	144	124	96.5	65.2	35.7	21.8	14.4	7.01	4.20	2.61
	EQ%	2SR	117	90.8	60.5	35.2	25.0	16.6	8.00	5.79	4.20	2.61
	Linear	Full	170	153	136	119	102	85.0	68.0	51.0	34.0	17.0
5	EQ%	Full	280	258	230	194	150	102	54.7	23.1	14.0	6.40
	EQ%	1SR	237	206	170	128	83.0	42.2	23.8	11.2	6.66	4.17
	EQ%	2SR	203	168	127	83.2	45.6	29.9	17.9	9.13	6.66	4.17
	Linear	Full	280	252	224	196	168	140	112	84.0	56.0	28.0
6	EQ%	XTEND	420	399	370	330	276	206	123	45.9	21.4	7.64
	EQ%	Full	360	333	298	255	203	144	83.6	34.1	14.6	7.10
	EQ%	1SR	315	280	238	190	138	84.4	42.0	23.7	10.4	6.86
	EQ%	2SR	275	236	189	138	87.6	50.8	36.0	22.0	10.4	6.86
	Linear	Full	360	324	288	252	216	180	144	108	72.0	36.0
8	EQ%	Full	680	643	590	513	407	267	115	50.3	31.1	17.1

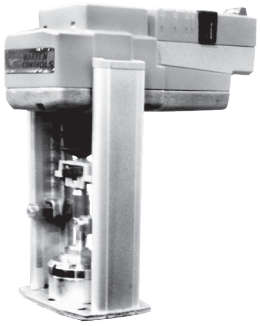
Valve			29N22 Flow Coefficients (Cv) • 2-Way Double Seat Balanced Valve									
Valve Size (IN)	Trim Style	Port Size	%Travel									
			100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
8	EQ%	Full	680	619	557	475	370	246	118	43.9	29.0	14.2
	EQ%	1SR	595	522	424	304	179	108	75.3	42.2	21.3	12.1
	EQ%	2SR	520	434	320	202	133	97.7	61.1	34.0	24.8	15.6
10	EQ%	XTEND	1125	1060	979	865	742	590	425	225	72	24
	EQ%	Full	960	886	796	689	574	474	383	285	181	72.3
	EQ%	1SR	840	733	594	440	287	166	109	57.8	27.3	16.1
	EQ%	2SR	735	605	449	291	173	129	89.3	48.8	24.2	14.9

Valve				58H40 Flow Coefficients (Cv) • 2-Way Single Seat Unbalanced Valve with Cage-Retained Seat									
Valve Size (IN)	Trim Size(N)	Trim Style	Port Size	%Travel									
				100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
2.5	2.126	EQ%	FULL	65.0	58.2	48.1	33.6	17.2	10.3	7.09	5.07	3.51	1.89
		LINEAR	FULL	65.0	58.5	52.0	45.5	39.0	32.5	26.0	19.5	13.0	6.50
	1.688	EQ%	1SR	43.0	38.5	31.8	22.2	11.4	6.84	4.69	3.35	2.32	1.25
		LINEAR	1SR	43.0	38.7	34.4	30.1	25.8	21.5	17.2	12.9	8.60	4.30
3	2.501	EQ%	FULL	100	89.6	74.0	51.7	26.5	15.9	10.9	7.80	5.40	2.90
		LINEAR	FULL	100	90.0	80.0	70.0	60.0	50.0	40.0	30.0	20.0	10.0
	2.126	EQ%	1SR	65.0	58.2	48.1	33.6	17.2	10.3	7.09	5.07	3.51	1.89
		LINEAR	1SR	65.0	58.5	52.0	45.5	39.0	32.5	26.0	19.5	13.0	6.50

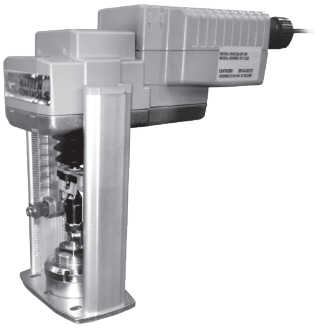
Valve				58H43 Flow Coefficients (Cv) • 2-Way Single Seat Caged Balanced Valve with Cage-Retained Seat									
Valve Size (IN)	Trim Size(N)	Trim Style	Port Size	%Travel									
				100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
4	3.376	EQ%	FULL	170	152	126	87.9	45.1	27.0	18.5	13.3	9.18	4.93
		LINEAR	FULL	170	153	136	119	102	85.0	68.0	51.0	34.0	17.0
		EQ%	1SR	100	89.6	74.0	51.7	26.5	15.9	10.9	7.80	5.40	2.90

ACTUATOR SPECIFICATIONS

E024



E025



E026

E029

E031

E024, E025, E026, E029 & E031: (Not Available for 58H40 and 58H43 Valve Series)

Control Signal:	2-10 Vdc (4-20 mAdc with 500 ohm resistor Kit KR500-supplied with motor)
Control Action, Loss of Signal:	Increasing Signal Opens Valve, Loss of Signal Closes Valve (Default Setting) Reversible with Switch. Can be specified when ordering.
Feedback Signal:	2-10 Vdc
Power Supply:	24 VAC/DC
Loss of Power:	**E024 & E029** (FAIL LAST POSITION) **E031** (E029 w/ VMS-50 BCM, FAIL SAFE TO LOSS OF SIGNAL POSITION) **E025 & E026** (ELECTRONIC FAIL SAFE) Fail Closed (Default Setting) Reversible with Switch. Can be specified when ordering.
Power Consumption	
Running:	**E024** 4W; **E025** 8.5W; **E026** 12W; **E029/E031** 6W
Holding:	**E024** 2.5W; **E025** 2.5W; **E026** 3W; **E029/E031** 3.5W
Timing:	See Configuration Tables
Manual Override:	Hex crank (supplied with actuator)
Construction:	Aluminum Die Cast and Plastic Housing
Locations:	NEMA Type 2 / IP54, UL enclosure type 2
Temperature Limits:	+32ºF to 122ºF Ambient
Mounting:	Vertical above centerline of valve
Safety Agency Listing:	CE , cUL

ILEA-F SERIES: small frame actuators

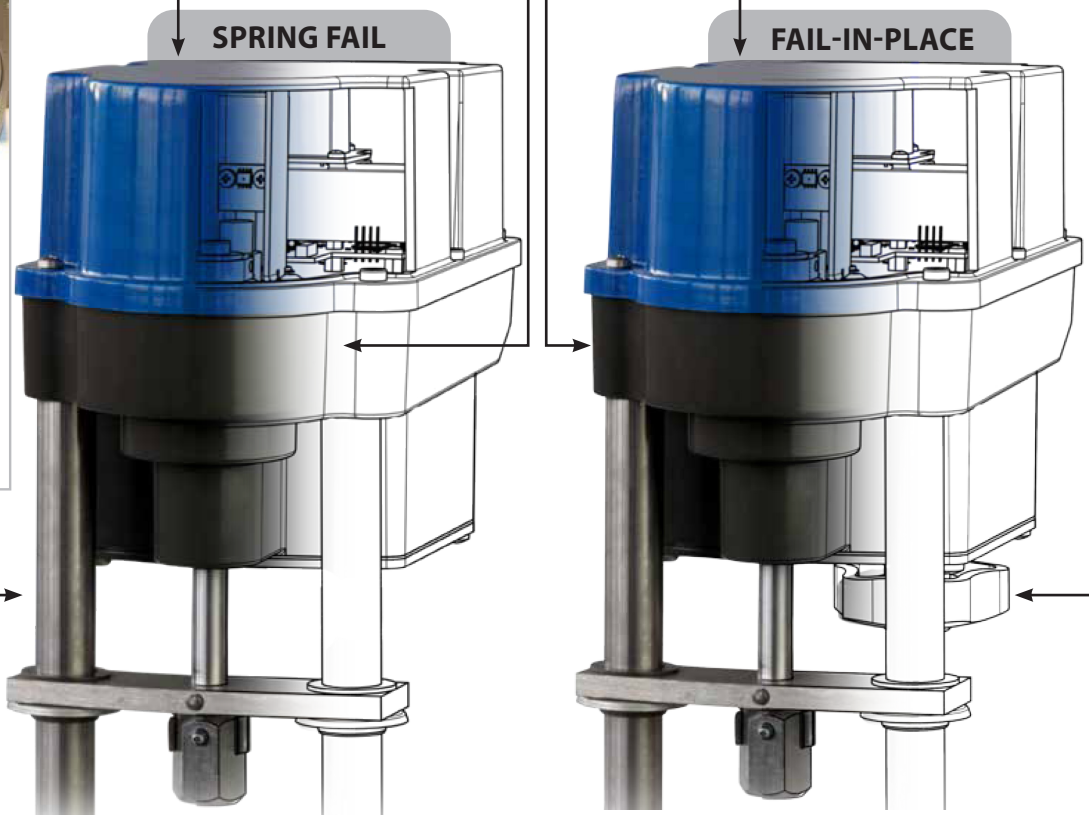
High Quality, Modulating, Linear, Industrial Electric Valve Actuator

For smaller sized control valves, this compact design packs a nice set of features at an economical price point. The Brushless DC motor ensures long life.

Robust industrial design with polycarbonate cover, enclosure IP65

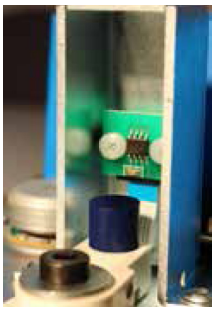
Compact design with low installation height, durable aluminium gearbox

Integrated power spring for fail safe function in case of loss of power supply, either extending or retracting actuator stem



Manual operation with handwheel or push buttons. Parameter setting via DIP switches

FOR SPRING FAIL & FAIL-IN-PLACE



Contactless, non-wearing travel detection with Hall sensor for exact positioning

Brushless DC motor (BLDC). Controller with integrated positioner function. Status display and automatic commissioning

Manual operation with push buttons or handwheel. Parameter setting via DIP switches

ILEA-F SERIES ACTUATORS SPECIFICATIONS

	UNITS	SPRING-FAIL	FAIL-IN-PLACE	
		ILEA-F18-U/D	ILEA-F1A-M	
Thrust / Force	(Lbf)	450	450	
MAX Stroke	(Inches)	1.57	1.57	
Pillar distance, C to C	(Inches)	4	4	
Weight, approx. kg 5.6	(Lbs.)	12.3	11	
Stroke Speed	(Secs / Inch)	28	21	
Approximate Height	(Inches)	11	11	
Approx.clearance above to remove cover	(Inches)	3.25	3.25	
Manual Override		Electrically via 2 push buttons	Electrically via 2 push buttons or Handwheel	
What happens under the condition of Overvoltage/ Undervoltage on the power supply or loss of power.		Actuator engages Spring Fail, to Open or Closed, Depending on model.	Actuator Stops in Position when event occurs.	
What happens under the condition of Loss of Control Signal.		Actuator engages Spring Fail, to Open or Closed, Depending on model.	**4-20mA or 2-10 VDC** Actuator Stops in Position when event occurs.	**0-20mA or 0-10 VDC** Actuator Assumes Lower Control Signal when event occurs.

GLOBAL SPECIFCATIONS for ILEA-F18-U/D and ILEA-F1A-M

Power Supply:	24 VAC/DC, optionally wide range PS (100-240 VAC)
Motor protection:	Electronic motor current monitoring with safety cut-off
Duty cycle as per IEC 60034-1,8:	S2 30 min/ S4 1200c/h-50% ED
Permitted ambient temperature:	-4°F to 140°F (-20°C to +60°C)
Internal fault monitoring:	Thrust, Control Signal, Temperature, Power Supply
Binary control:	24-230 VAC for ON/OFF service
Control Signal and Feedback:	0-20 mA, 4-20 mA, 0-10 V, 2-10 V selectable
Mounting Position:	Any position, except cover pointing downwards
Conduit entries:	2 pcs. M 20 x 1.5 /1 pc. M 16 x15 / Optional 1/2"Female NPT, NEMA4X (as an accessory)
Cover material:	Polycarbonate
Gear case material:	High quality aluminium die casting, powder-coated (60 µm thickness)
Enclosure Rating. to EN 60529:	IP65: Standard, IP67: Optional
Fuse - HV Power Supply:	1 AMP, 5 x 20 mm, 250 VAC, Slow Blow

ENERGY CONSUMPTION

ELECTRIC PARAMETER	UNITS	POWER SUPPLY VOLTAGE			
		115 VAC	*230 VAC*	*24 VAC*	*24 VDC*
Nominal Current	(Amps)	0.12	0.24	1.2	0.6
Max Current	(Amps)	0.12	0.24	1.2	0.6
Power Consumption	(Watts)	16.5	16.5	16.5	14.5

ILEA-A/B SERIES: medium frame actuators

High Quality, Modulating, Linear, Industrial Electric Valve Actuator

Feature rich and proven design with robust construction provides reliable, trouble free service.

All common power supplies: single phase,and d.c. voltage. Suitable for control operations. Protection class IP67 is standard.

No switching-over to manual operation needed. The hand wheel serves as an operation indicator and is always ready for operation

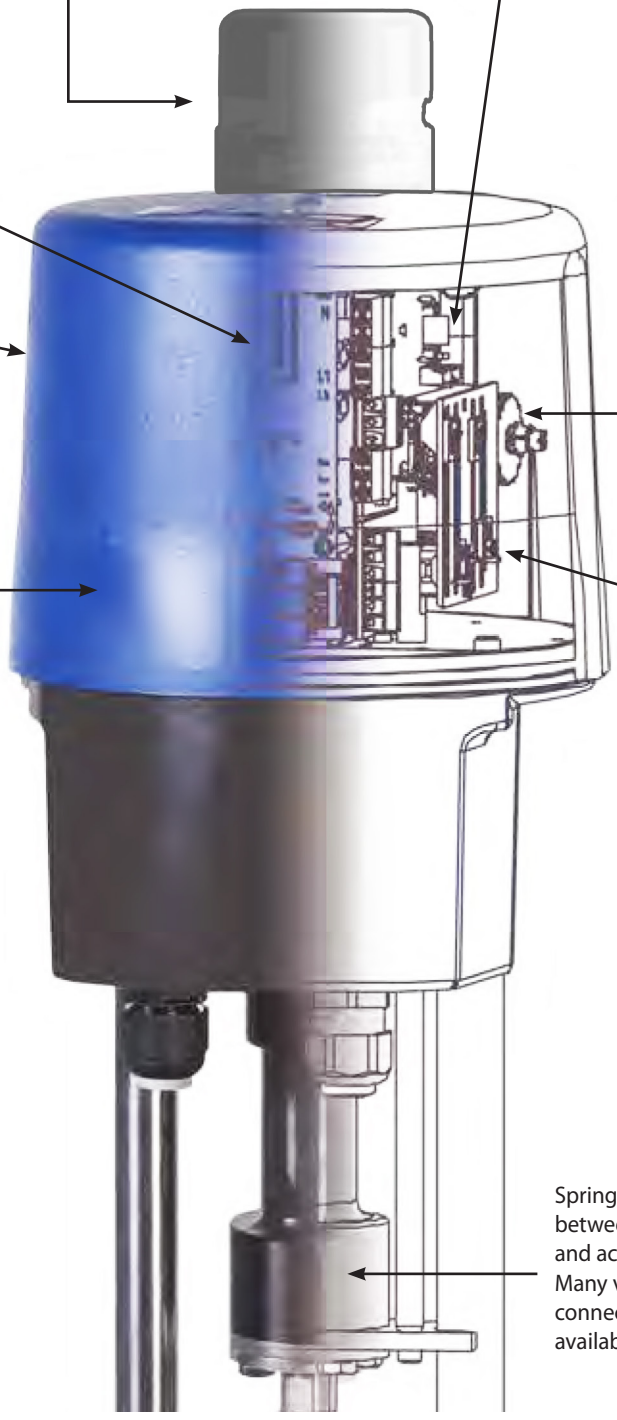
Vibration-proof potentiometer suspension

Efficient motor for precise positioning and controlling with a long duty cycle

Friction clutch prevents damage

Compact, corrosion resistant, sturdy and light-weight due to high-quality aluminum alloys

IP67 ENCLOSURE METAL COVER



IP67 ENCLOSURE POWDER COAT ALUMINUM

Precise valve setting:
- with fine adjustment of cams
- with stroke scale

Spring clutch between valve and actuator. Many valve connections are available

Electronic board

ILEA-A SERIES ACTUATORS SPECIFICATIONS

	UNITS	ILEA-A3D-S			ILEA-A3D-M
Thrust / Force	(Lbf)	1,010			1,010
MAX Stroke	(Inches)	2			2
POWER SUPPLY	***VOLTAGE***	***24 VDC***	***24 VAC***	***115 VAC***	***24 VAC***
Nominal Current	(Amps)	2	3.15	0.66	3.15
MAX Current	(Amps)	2.6	4.1	0.86	4.1
Power Consumption	(Watts)	48	53	57	53
Fail Mode, Loss of Power		Fail-Safe, Capacitive, Selectable			Fail-In-Place
Pillar distance, C to C	(Inches)	4			
Weight, approx. kg 5.6	(Lbs.)	17.6			
Stroke Speed	(Secs / Inch)	6 to 11 (Default is 11)			
Approximate Height	(Inches)	19			
Approx.clearance above to remove cover	(Inches)	4			

GLOBAL SPECIFCATIONS for ILEA-A/B/G	
Manual override	Handwheel (For use when unpowered)
Duty Cycle & Motor Protection: (Per IEC 60034-1,8)	The motor has electronic current monitoring and temperature monitoring with a safety cutoff. Per IEC, the actuator is rated for S2 30 Min / S4 1200 Cycles/Hr. – 50% ED. In lab testing, duty cycle is potentially 100% and a function of motor load. At no inlet pressure to the valve it can run 100% moving for months w/o problem. Even with mild differential pressure on the valve plug it can run near continuously. At some point though, the motor will begin to heat up. The motor has a built in temperature sensor and when motor temperature exceeds 65°C, the motor's speed is reduced by 50%, in theory it should allow the motor temperature to then drop below 65°C, at which time the motor would go back to normal speed. Should the motor keep rising to exceed 70°C. then the motor would stop and the fail-safe circuit would take the valve to the designated FAIL-SAFE position.
Permitted ambient temperature	-4°F to 140°F (-20 to +60°C)
Binary Control	24 V for ON/OFF control (min. duration of pulse 1s)
Internal Fault Monitoring	Torque, set value, temperature, power supply, positioning deviation etc., adjustable
Duty cycle as per IEC 60034-1,8	S2 30 min S4 50% ED @ 25°C
Permitted ambient temperature	-4°F to 140°F (-20 to +60°C)
Automatic Startup	Recognizing the end position(s) and auto-scaling control and feedback values
Internal fault monitoring	Thrust, control signal, temperature, power supply
Diagnostics Function	Stores cumulated operation data (motor and total running time, number of motor starts) and data sets of current values (set value, feedback value, torque, temperature and error messages)
Communication Interface	Optional umbilical cable with USB Connection and software that allows for data reading and parameterization
Control Signal and Feedback	0 (4)..20 mA or 0 (2)..10 V selectable, split range operation
Valve Positioner Function	Integrated, deadband adjustable from 0.5 .. 5%, shut-off MIN
Mounting Position	Any position, except below horizontal
Conduit entries	2 pcs. M 20 x 1.5 / 1 pc. M 16 x 1.5 / Optional 1/2"Female NPT, NEMA4X (as an accessory)
Enclosure Rating	IP 67, according to EN 60529
Cover material	Powder Coated Aluminum
Optional Local Controls	Illuminated display to show the actuator status and lockable selector to switch between modes: automatic, manual process ON/OFF, STOP and parameter menu. Control buttons for manual movement, menu operation
Optional User Limit Switches	Potential-free additional position switches with silver contacts (0.1 A - 5 A switching current)
Fault Indication Relay	Standard, potential-free opening contact provides a freely definable (programmable) collective fault signal and doubles for indication for when optional Local Controls is NOT in remote mode.
Heating Resistor	Optional, primarily to prevent condensation
Additional Special Order Options	Profibus, Foundation Fieldbus

ILEA ACTUATORS SPECIFICATIONS

The Industrial Linear Electric Actuators (ILEA Series) is a best-in-class, robust and proven design with features and options not available elsewhere and now available at an attractive price point.

Depending on model with the ILEA Series, here is a listing of the possible features, attributes and options
(not all available on every model)

- 24Vac/Vdc, 115 Vac, 230 Vac
- Spring Fail Safe, Capacitive Fail Safe and Fail-In-Place
- Handwheel Override
- Fast or Slow, Fixed or Adjustable speed ranges
- Profibus, Foundation Fieldbus, others
- IP65 or IP67 Enclosures
- Heaters
- Limit & Fault Switches
- Integral Local Control Station
- Multiple forces from 450 Lbf to 5620 Lbf.
- Modulating Control or ON/OFF
- Control & Feedback signals mA or Vdc
- Tested for EMC conducted and radiated emissions to EN55014-1, EN55022 and EN61000 specifications
- Software programmable settings with umbilical cord to fine tune operating parameters

ILEA ACTUATOR STOCKED MODELS

Warren Controls has ready stock on 11 popular models and a handful of the most popular configurable options, with dozens of other models available with only a 4-week delay on the order cycle.

Small Frame Size ILEA-F Model

- 450 Lbf with Spring Fail (up or down), speed range up to 85 seconds/inch of travel
- 450 Lbf with Fail-In-Place, speed range up to 21 seconds/inch of travel & handwheel
- IP65 Enclosure Only, 24Vac/Vdc or Universal 115 – 230 Vac Supply

Warren Controls factory stocked options include:
Limit Switches, Heater and High Voltage Power Supply

Model #'s

ILEA-F18-D400-5000
ILEA-F18-D500-5000
ILEA-F18-U400-5000
ILEA-F18-U500-5000
ILEA-F1A-M400-5000
ILEA-F1A-M500-5000

The optional High Voltage (100-240 Vac) Power Supply is Available and stocked.

Medium Frame Size ILEA-A Model

- 1,011 Lbf with Capacitive Fail-Safe, Speed range up to 6 seconds per inch of travel (Factory default: 11 seconds/inch) 24 Vac, IP65
- 1,011 Lbf with Fail-In-Place, Speed range up to 6 seconds per inch of travel (Factory default: 11 seconds/inch) 24 Vac, IP65
- 1,011 Lbf with Capacitive Fail-Safe, Speed range up to 6 seconds per inch of travel (Factory default: 11 seconds/inch) 115 Vac, IP65

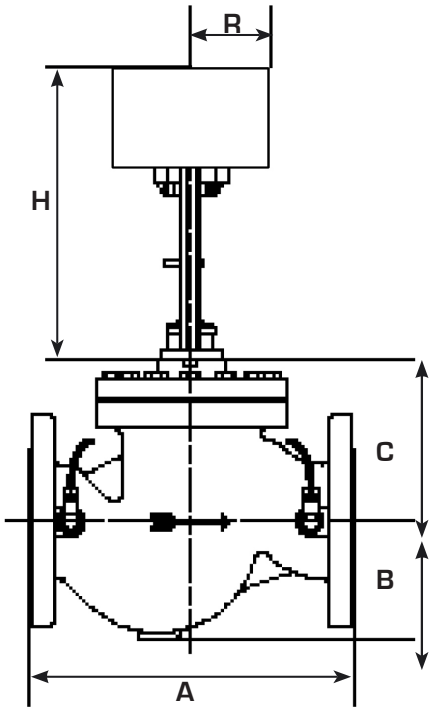
Warren Controls factory stocked options include:
Limit Switches, Heater, IP67 Enclosure, Local Control Station and Software / Programming umbilical cord.

Model #'s

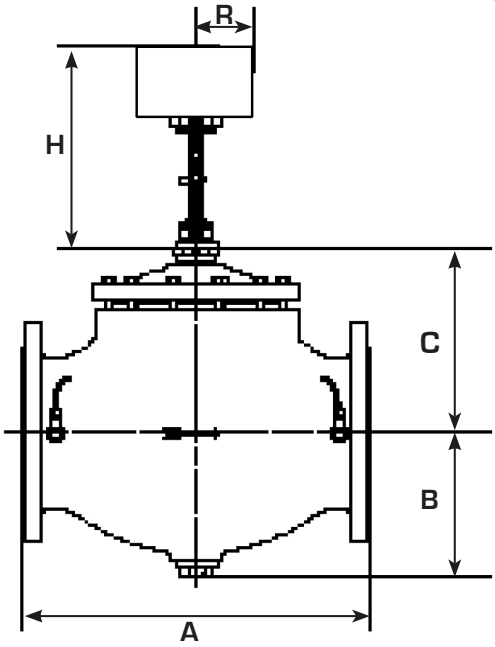
ILEA-A3D-S100-7000
ILEA-A3D-S400-7000
ILEA-A3D-S500-7000
ILEA-A3D-M400-7000
ILEA-A3D-M500-7000

DIMENSIONAL DATA

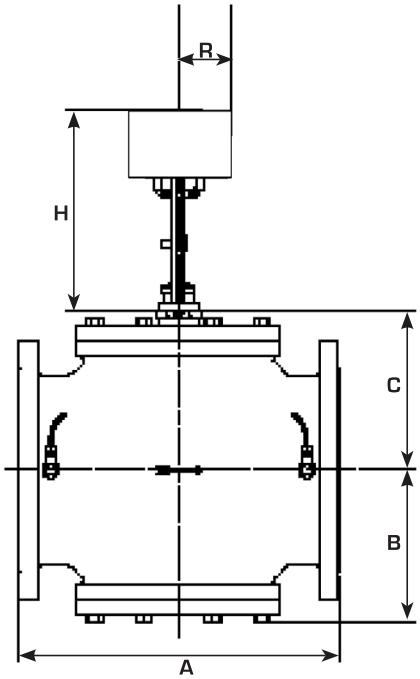
MON-DP 2.5-4 IN



MON-DP 5-8 IN



MON-DP 10 IN



5840 2.5" 3"

MODEL LISTING	SIZE	FLG	A	B	C	H	R
MON-DP-5840250WFxxxx-xxxxxxxx-E147...E154	2.5	150	10.875	4.000	7.000	20.25	3.563
MON-DP-5840300WFxxxx-xxxxxxxx-E147...E154	3	150	11.750	4.375	7.000	20.25	3.563

2920 2.5" 3"

MODEL LISTING	SIZE	FLG	A	B	C	H	R
MON-DP-29N-20250RFxxxx-xxxxxxxx-E026	2.5	125	9.000	4.750	5.500	10.15	7.5
MON-DP-29N-20250RFxxxx-xxxxxxxx-E029/E031	2.5	125	9.000	4.750	5.500	10.9	7.5
MON-DP-29N-20250RFxxxx-xxxxxxxx-E035...E046	2.5	125	9.000	4.750	5.500	13	7.75
MON-DP-29N-20250RFxxxx-xxxxxxxx-E147...E154	2.5	125	9.000	4.750	5.500	20.25	3.563
MON-DP-29N-20300RFxxxx-xxxxxxxx-E026	3	125	10.000	5.375	6.125	10.15	7.5
MON-DP-29N-20300RFxxxx-xxxxxxxx-E029/E031	3	125	10.000	5.375	6.125	10.9	7.5
MON-DP-29N-20300RFxxxx-xxxxxxxx-E035...E046	3	125	10.000	5.375	6.125	13	7.75
MON-DP-29N-20300RFxxxx-xxxxxxxx-E147...E154	3	125	10.000	5.375	6.125	20.25	3.563
MON-DP-29N-20300RGxxxx-xxxxxxxx-E026	2.5	250	9.625	4.75	5.5	10.15	7.5
MON-DP-29N-20300RGxxxx-xxxxxxxx-E029/E031	2.5	250	9.625	4.75	5.5	10.9	7.5
MON-DP-29N-20300RGxxxx-xxxxxxxx-E035...E046	2.5	250	9.625	4.75	5.5	13	7.75
MON-DP-29N-20300RGxxxx-xxxxxxxx-E147...E154	2.5	250	9.625	4.75	5.5	20.25	3.563
MON-DP-29N-20300Rxxxx-xxxxxxxx-E026	3	250	10.75	5.375	6.125	10.15	7.5
MON-DP-29N-20300RGxxxx-xxxxxxxx-E029/E031	3	250	10.75	5.375	6.125	10.9	7.5
MON-DP-29N-20300RGxxxx-xxxxxxxx-E031...E046	3	250	10.75	5.375	6.125	13	7.75
MON-DP-29N-20300RGxxxx-xxxxxxxx-E147...E154	3	250	10.75	5.375	6.125	20.25	3.563

2923 4"

MODEL LISTING	SIZE	FLG	A	B	C	H	R
MON-DP-29N-23400RFxxxx-xxxxxxxx-E026	4	125	13.000	6.375	7.750	10.15	7.5
MON-DP-29N-23400RFxxxx-xxxxxxxx-E029/E031	4	125	13.000	6.375	7.750	10.9	7.5
MON-DP-29N-23400RFxxxx-xxxxxxxx-E035...E046	4	125	13.000	6.375	7.750	13	7.75
MON-DP-29N-23400RFxxxx-xxxxxxxx-E147...E154	4	125	13.000	6.375	7.750	20.25	3.563
MON-DP-29N-23400RGxxxx-xxxxxxxx-E026	4	250	13.625	6.375	7.750	10.15	7.5
MON-DP-29N-23400RGxxxx-xxxxxxxx-E029/E031	4	250	13.625	6.375	7.750	10.9	7.5
MON-DP-29N-23400RGxxxx-xxxxxxxx-E035...E046	4	250	13.625	6.375	7.750	13	7.75
MON-DP-29N-23400RGxxxx-xxxxxxxx-E147...E154	4	250	13.625	6.375	7.750	20.25	3.563

5843 4"

MODEL LISTING	SIZE	FLG	A	B	C	H	R
MON-DP-58H-43400WFxxxx-xxxxxxxx-E147...E154	4	150	13.875	5.250	7.000	20.25	3.563

2923 5", 6",8"

MODEL LISTING	SIZE	FLG	A	B	C	H	R
MON-DP-29N-23500x(F/6)xxxx-xxxxxxxx-E026	5	125	15.750	5.750	8.250	10.15	7.5
MON-DP-29N-23500xGxxxx-xxxxxxxx-E026	5	250	16.625	5.750	8.250	10.15	7.5
MON-DP-29N-23500x(F/6)xxxx-xxxxxxxx-E029/E031	5	125	15.750	5.750	8.250	10.9	7.5
MON-DP-29N-23500xGxxxx-xxxxxxxx-E029/E031	5	250	16.625	5.750	8.250	10.9	7.5
MON-DP-29N-23500x(F/6)xxxx-xxxxxxxx-E035...E046	5	125	15.750	5.750	8.250	13	7.75
MON-DP-29N-23500xGxxxx-xxxxxxxx-E035...E046	5	250	16.625	5.750	8.250	20.25	3.563
MON-DP-29N-23500x(F/6)xxxx-xxxxxxxx-E147...E154	5	125	15.750	5.750	8.250	20.25	3.563
MON-DP-29N-23500xGxxxx-xxxxxxxx-E147...E154	5	250	16.625	5.750	8.250	20.25	3.563
MON-DP-29N-23600x(F/6)xxxx-xxxxxxxx-E029/E031	6	125	17.750	6.500	8.875	10.9	7.5
MON-DP-29N-23600xGxxxx-xxxxxxxx-E029/E031	6	250	18.625	6.500	8.875	10.9	7.5
MON-DP-29N-23600x(F/6)xxxx-xxxxxxxx-E147-E154	6	125	17.750	6.500	8.875	20.25	3.563
MON-DP-29N-23600xGxxxx-xxxxxxxx-E147-E154	6	250	18.625	6.500	8.875	20.25	3.563
MON-DP-29N-23600x(F/G)xxEx-xxxxxxxx-E160-E167	6	125	13.750	6.500	8.875	24.75	3.563
MON-DP-29N-23600xGxxEx-xxxxxxxx-E160-E167	6	250	18.625	6.500	8.875	24.75	3.563
MON-DP-29N-23800x(F/G)xxx-xxxxxxxx-E160-E167	8	125	21.375	9.000	11.500	24.75	3.563
MON-DP-29N-23800xGxxxx-xxxxxxxx-E160-E167	8	250	22.375	9.000	11.500	24.75	3.563

2922 8",10"

MODEL LISTING	SIZE	FLG	A	B	C	H	R
MON-DP-29N-22800RFxxxx-xxxxxxxx-E029/E031	8	125	16.25	8.875	9.625	10.9	7.5
MON-DP-29N-22800RGxxxx-xxxxxxxx-E029/E031	8	250	16.25	8.875	9.625	10.9	7.5
MON-DP-29N-22800RFxxxx-xxxxxxxx-E147...E154	8	125	16.25	8.875	9.625	20.25	3.563
MON-DP-29N-22800RGxxxx-xxxxxxxx-E147...E154	8	250	16.25	8.875	9.625	20.25	3.563
MON-DP-29N-22010RFxxxx-xxxxxxxx-E029/E031	10	125	20.00	10.875	11.250	10.9	7.5
MON-DP-29N-22010RGxxxx-xxxxxxxx-E029/E031	10	250	21.375	10.875	11.250	10.9	7.5
MON-DP-29N-22010RFxxxx-xxxxxxxx-E147...E154	10	125	20.00	10.875	11.250	20.25	3.563
MON-DP-29N-22010RGxxxx-xxxxxxxx-E147...E154	10	250	21.375	10.875	11.250	20.25	3.563
MON-DP-29N-22010RFxxEx-xxxxxxxx-E160-E167	10	125	20.00	10.875	11.250	24.75	3.563
MON-DP-29N-22010RGxxEx-xxxxxxxx-E160-E167	10	250	21.375	10.875	11.250	24.75	3.563

Dimension (IN) 2920		Valve Size (IN)				
		2-1/2	3	4	5	6
Weight (LB)	125FLG	55	72	119	134	175
	250FLG	64	77	131	166	233

Dimension (IN) 2922		Valve Size (IN)						
		2-1/2	3	4	5	6	8	10
Weight (LB)	125FLG	32	42	77	124	169	290	CF
	250FLG	42	54	96	162	220	380	CF

Dimension (IN) 2923		Valve Size (IN)					
		2-1/2	3	4	5	6	8
Weight (LB)	125FLG	57	75	127	149	197	CF
	25FLG	66	80	139	181	256	CF

Dimension (IN) 2930		Valve Size (IN)					
		2-1/2	3	4	5	6	8
Weight (LB)	125FLG	64	83	139	157	202	343
	250FLG	73	94	157	211	283	CF

Dimension (IN) 2932		Valve Size (IN)					
		2-1/2	3	4	5	6	8
Weight (LB)	125FLG	59	78	140	154	203	316
	250FLG	73	94	166	215	284	407

Actuator	WEIGHT
F1 (Fail-In-Place)	11
F1 (Fail-Safe)	12.3
P3	10
A2, A3	17.6
P4, P5	16
A4, A5	22
P6	17.6
A6, B4, B5	26.5

Valve Size (IN) 5840	Weight (LB)							
	Standard				With Extension Bonnet			
	300THD	300SWE	150FLG	300FLG	300THD	300SWE	150FLG	300FLG
1/2	23	23	25	27	27	27	29	31
3/4	23	23	26	30	27	27	30	34
1	24	24	25	29	29	29	29	33
1-1/2	31	31	33	39	35	35	37	43
2	36	36	40	44	40	40	44	48
2-1/2	N/A	N/A	64	74	N/A	N/A	74	84
3	N/A	N/A	77	90	N/A	N/A	87	100
4	N/A	N/A	120	140	N/A	N/A	130	150

Consult factory for drawings, weights, and dimensions of configurations not shown.

Actual shipping weights may vary.

Valve Size (IN) 5843	Weight (LB)			
	Standard		With Extension Bonnet	
	150FLG	300FLG	150FLG	300FLG
2-1/2	65	75	75	85
3	79	92	89	102
4	123	143	133	153

Valve Size (IN) 5848	Weight (LB)							
	Standard				With Extension Bonnet			
	300THD	300SWE	150FLG	300FLG	300THD	300SWE	150FLG	300FLG
1/2	23	23	25	27	27	27	29	31
3/4	23	23	26	30	27	27	30	34
1	24	24	25	29	29	29	29	33

Actuator	DIMENSIONS		WEIGHT (LBS)
	D (in)	H (in)	
F1	**NOTE 1	13	12.5
P2,P3	7.125	20.25	10
A2, A3	7.125	20.25	17.6
P4, P5	7.125	21.75	16
A4, A5	7.125	21.75	22
P6	7.125	24.75	17.6
A6, B4, B5	7.125	24.75	26.5

**NOTE 1: Please see the diagrams on page 18 for dimensions.

MONITROL TRANSDUCERS

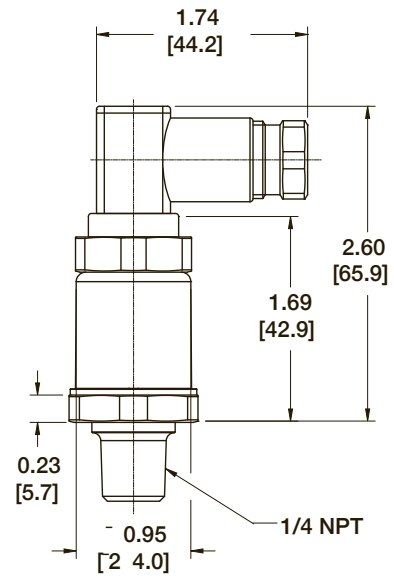
The Monitrol uses industrial grade Pressure and Temperature transducers of a particular form factor and electrical interface. For mounting into the pressure boundary of the control valve or fluid system the transducers interface with male ¼ NPT fittings. These match the fitting plugs in the Monitrol valve assemblies. Electrically they use a 3-wire connection powered from the Monitrol controller via a 5 Vdc power supply whose output is ratiometric from 4.5 Vdc to 0.5 Vdc (pressure) or 4.75 - 0.25 Vdc (temperature).

The pressure transducers come in five different ranges of gauge pressure.
0 – 30 PSIG, 0 – 60 PSIG, 0 – 100 PSIG, 0 – 200 PSIG and 0 – 300 PSIG

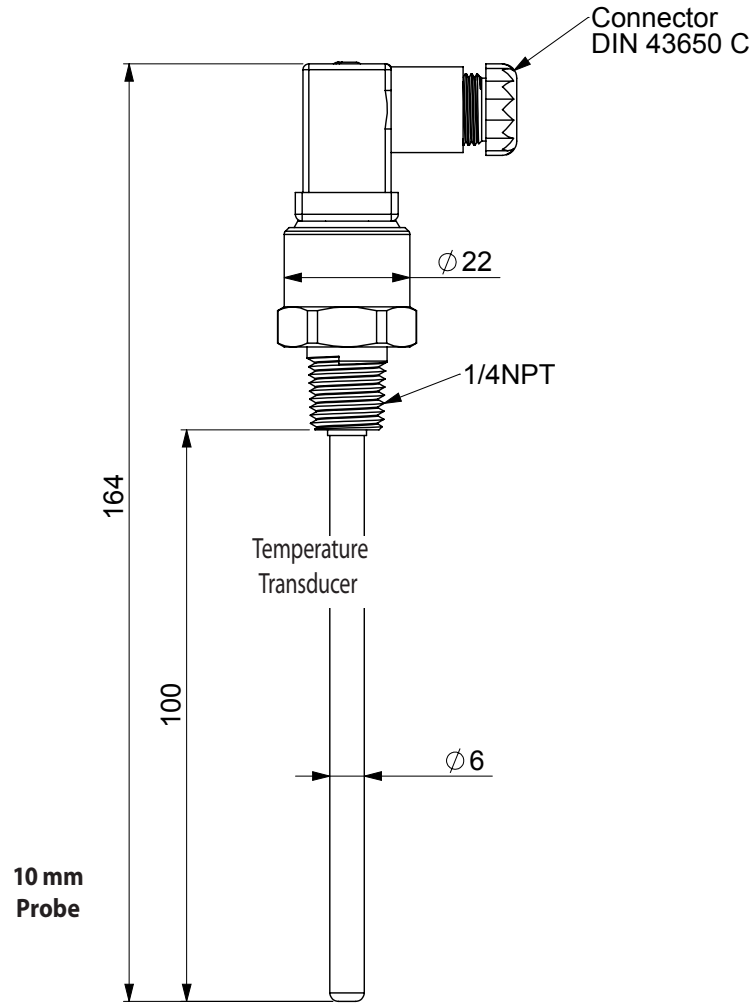
These pressure transducers can accept direct contact with fluid temperatures up to 257°F (125°C). For temperatures above this (as typically might be with saturated steam) pigtail fittings are required. The temperature transducers come in two tip lengths: either 10 mm when installed in a valve or 100 mm when installed in a larger diameter pipe. In either case it is the tip of the transducer that is sensing the temperature. The temperature transducers come in one fixed range of: – 58 to 275°F (– 50°C to 135°C)

For all other temperature requirements outside that range a standard 24 Vdc sourced temperature transmitter can be applied.

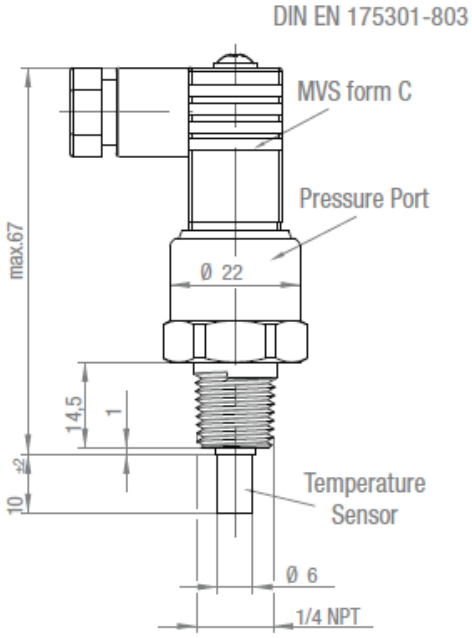
PRESSURE TRANSDUCER



TEMPERATURE TRANSDUCER



10 mm Probe



100 mm Probe

THE CONTROLLER

The Monitrol Controller is ordered as a separate line item. See the Monitrol Controller Product Specification for details.

The Monitrol Controller is designed to work seamlessly with the MON-DP hardware.

Incorporating dedicated algorithms for selection the MON-DP can use its proprietary, predictive control algorithm which requires no tuning for its primary function as a Flow Metering Control Valve (FMCV).

A Multi-Loop / Multi-Variable version of the controller additionally offers temperature control as the primary control variable in a cascade configuration and in addition to that a Feed-forward input variable that would be used to compensate for downstream loads changes.

HOME SCREEN

The home screen of the software displays the actual flow rate, the desired flow rate, the command signal received from the supervisory system and the current valve position.

The valve can also be controlled manually from the main screen. The reset button allows any technician to reset the flow rate set point if required. Error messages are displayed in the message box on the bottom and notify the user of the current status of the system.

Configuration of the application can be accessed by pressing the settings button in the top right corner, which is password protected.

SETTINGS

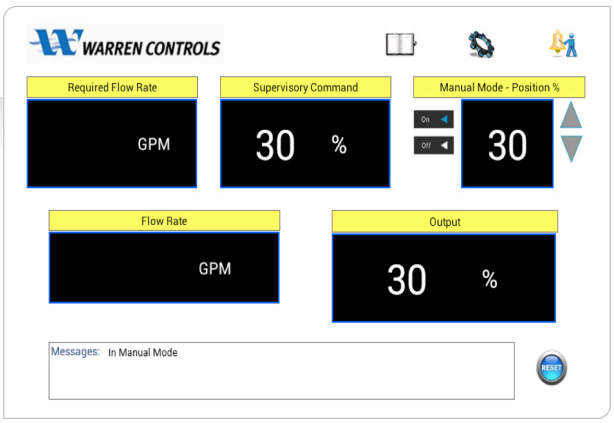
On logging in, the settings screen allows the authorized user to configure the controller as per the requirement. The configuration screen allows user to access the parameters for various parts of the system like the actuator, supervisory system, valve and sensors.

The various options available are elaborately described. While configuring the parameters the user may press the exit button on the top right corner to exit to the home screen at anytime. This would cause the authorization to be removed unless calibration mode is on, which allows user to return to the configuration screen without re-entering the username and password.

ENCLOSURE

The two enclosures offered are polycarbonate (shown and standard) and stainless steel (special). Both are NEMA 4X, include conduit fittings and lockable front covers.

See the Monitrol Controller Product Specification for full details.



CONFIGURATIONS

Selections: Please make a selection from each table of options below to make a complete model number string.

□□□-□□-□□□ □□ | □□□ □ □ □ □ □ | □

MODEL & SERIES

Model & Family		Valve Body
MON-DP-29N	DP Flow Version (Sizes 2-1/2"-10")	**20** Single Seat Valve 2-1/2" & 3"
MON-DP-58H	DP Flow Version (Sizes 2-1/2"-4")	**23** Cylinder Balanced 2-1/2" - 8"
MON-DP-291	(Type 23 Extended Port 6") (Type 23- 8")	**22** Double Seat Valve 8" & 10" Only
		40 Cage Unbalanced 2-1/2" & 3"
		43 Cage Balanced 4" Only

BODY

Body Size	Body Material	Ends	Flow Char.	Trim Material	Port Size	Packing
250 2-1/2"	**R** Cast Iron	**F** ANSI 125/150 lb.	**E** Equal %	**B** Bronze	**F** Full Port	**L** NLP Ethylene Prop. Lip Packing
300 3"	**W** WCB	**6** PN16 Flg. for MON-DP29N Only	**L** Linear	**S** 300 SS	**1** 1st Port Reduction	**T** Teflon V-ring Self Adj.
400 4"	**D** Ductile Iron	**G** ANSI 250 lb. for MON-DP29N Only		**7** 400 SS (4" size 43 only)	**2** 2nd Port Reduction	
500 5"					**E** Extended Port	
600 6"						
800 8"						
010 10"						

BODY

Bonnet Construction
S Standard PEEK Bearings
FIELD ONLY USED FOR MON-DP-58H

NOTE: 450ºF for Teflon; 400ºF for NLP Limited to Temperature Limit of the Pressure Sensors

Port Size: Xtnd Port ONLY available on 6" Type 23 & 10" Type 22.

See page 11 for full list of Cv's and Port Reductions available

Bronze Trim not available in the 5800 Series

TRIM TYPE / VALVE SIZE / BODY MATERIAL - COMPATIBILITY	
MON-DP-29N:	Type 20 for 2.5"& 3" (Cast Iron Only)
	Type 23 for 2.5"-4" (Cast Iron Only)
	Type 23 for 5", 6" (Cast Iron & Ductile Iron)
	Type 22 for 8" & 10" (Cast Iron Only)
MON-DP-58N:	Type 40 for 2.5" & 3" only must use type 'S' Trim (Carbon Steel Only)
	Type 43 for 4" only - must use type '7' Trim (Carbon Steel Only)

MON-DP-291:	Type 23, 6" Extended Port (Cast Iron or Ductile)
	Type 23, 8" (Cast Iron or Ductile)

	Remote	Body Tapped for Sensor at: Inlet / Upper Port	Body Tapped for Sensor at: Outlet / Lower Port	Remote			
	SENSORS				ACTUATION	COMM.	SPEC.
	Location 1	Location 2	Location 3	Location 4	Actuator Series	Protocol	Specials
The Standard temperature sensor has a 'stub' tip end. The 100 mm Temperature sensor has a 100 mm tip end. For applications above 125C (257F), where a pressure sensor is used, the optional pigtail is required in the special order code. Fluid & Temperature are required process condtions for accepting an Order!	**00** No Sensor/ Plug	**P0** 30 PSIG	**P0** 30 PSIG	**00** No Sensor/ Plug	**E024** Lin. 337 Lb. / 24 Vac Fail-in-Place (MON-DP-29N 2.5" & 3" Only)	**0** None	**0** None
	P0 30 PSIG	**P1** 60 PSIG	**P1** 60 PSIG	**P0** 30 PSIG	**E025** Lin. 337 Lb./ 24 Vac w/Capacitive Backup (MON-DP-29N 2.5" & 3"Only)	**M** Modbus Ethernet	**S** Described by Line Item
	P1 60 PSIG	**P2** 100 PSIG	**P2** 100 PSIG	**P1** 60 PSIG	**E026** Lin. 450 Lb./ 24 Vac w/Capacitive Backup (MON-DP-29N 2.5" - 5" Only)	**B** BACnet Ethernet	
	P2 100 PSIG	**P3** 200 PSIG	**P3** 200 PSIG	**P2** 100 PSIG	**E029** Lin.1011 Lb./24 Vac Fail-in-Place (MON-DP-29N models Only)		
	P3 200 PSIG	**P4** 300 PSIG	**P4** 300 PSIG	**P3** 200 PSIG	**E031** Lin. 1011 Lb. / 24 Vac w/Battery Backup(MON-DP-29N Only)		
	P4 300 PSIG			**P4** 300 PSIG	**E035** 450 Lbf., 85 Secs/In., Fail Actuator Stem Down, 115 Vac		
	T1 100 mm			**T1** 100 mm	**E036** 450 Lbf., 85 Secs/In., Fail Actuator Stem Down, 220 Vac		
	T2 10 mm			**T2** 10 mm	**E037** 450 Lbf., 85 Secs/In., Fail Actuator Stem Down, 24 Vac		
					E038 450 Lbf., 85 Secs/In., Fail Actuator Stem Down, 24 Vdc		
					E039 450 Lbf., 85 Secs/In., Fail Actuator Stem Up, 115 Vac		
					E040 450 Lbf., 85 Secs/In., Fail Actuator Stem Up, 220 Vac		
					E041 450 Lbf., 85 Secs/In., Fail Actuator Stem Up, 24 Vac		
					E042 450 Lbf., 85 Secs/In., Fail Actuator Stem Up, 24 Vdc		
					E043 450 Lbf., 21 Secs/In., Fail In Place, 115 Vac		
					E044 450 Lbf., 21 Secs/In., Fail In Place, 220 Vac		
					E045 450 Lbf., 21 Secs/In., Fail In Place, 24 Vac		
					E046 450 Lbf., 21 Secs/In., Fail In Place, 24 Vdc		
					E147 1010 Lbf., 5.5 Secs/In., IP-67 Encl, Fail In Place, 115 Vac		
					E148 1010 Lbf., 5.5 Secs/In., IP-67 Encl, Fail In Place, 220 Vac		
					E149 1010 Lbf., 5.5 Secs/In., IP-67 Encl, Fail In Place, 24 Vac		
					E150 1010 Lbf., 5.5 Secs/In., IP-67 Encl, Fail In Place, 24 Vdc		
					E151 1010 Lbf., 5.5 Secs/In., IP-67 Encl, Fail Safe, 115 Vac		
					E152 1010 Lbf., 5.5 Secs/In., IP-67 Encl, Fail Safe, 220 Vac		
					E153 1010 Lbf., 5.5 Secs/In., IP-67 Encl, Fail Safe, 24 Vac		
					E154 1010 Lbf., 5.5 Secs/In., IP-67 Encl, Fail Safe, 24 Vdc		
					E160 1798 Lbf., 36 Secs/In.,2.5" Travel,IP-67 Encl, Fail In Place, 115 Vac		
					E161 1798 Lbf., 36 Secs/In., 2.5" Travel,IP-67 Encl, Fail In Place, 220 Vac		
					E162 1798 Lbf., 36 Secs/In., 2.5" Travel,IP-67 Encl, Fail In Place, 24 Vac		
					E163 1798 Lbf., 36 Secs/In., 2.5" Travel,IP-67 Encl, Fail In Place, 24 Vdc		
					E164 1798 Lbf., 36 Secs/In., 2.5" Travel,IP-67 Encl, Fail Safe, 115 Vac		
					E165 1798 Lbf., 36 Secs/In., 2.5" Travel, IP-67 Encl, Fail Safe, 230 Vac		
					E166 1798 Lbf., 36 Secs/In., 2.5" Travel, IP-67 Encl, Fail Safe, 24 Vac		
					E167 1798 Lbf., 36 Secs/In., 2.5" Travel, IP-67 Encl, Fail Safe, 24 Vdc		

For model MON-DP, Location 2 and Location 3 must be both the same 'P' pressure sensor

NOTE:
E024 - E031 Actuators are excluded from use on MON-DP-58H valves.
The E029/E031 with the 8" 23 will result in reduced MAX Cv for stroke length.
E024 & E025 Actuators are excluded for valves 4" and larger.

ACTUATOR COMPATIBILITY TABLE
All 8" - 10" Type 22 valves compatible for E029, E031 & E147-E154, except extended port
Type 22 10" Extended port Compatible with E160-E167
Type 40 & 43 valves compatible with E147-E154
Type 20 or 2.5" & 3" compatible with all except E024 and E025
Type 23 or 2.5" & 3" compatible with all except E029 and E031
Type 23, 4" and 5" compatible w/all except the E024 and E025 actuators
Type 23, 6" Standard & Reduced Ports compatible with with E029, E031 & E147-E154
Type 23, 6" Extended Port & Type 23, 8" Compatible with E160-E167

ENGINEERED PRODUCT SPECIFICATION OF FMCV FOR 2 ½" (65 MM) AND LARGER

FMCV's (MON-DP) utilizes a dedicated Controller to perform up to three separate functions:

PICV Manager – Continuously monitors the flow rate across the coil and ensures pressure independent performance by continuously maintaining a constant known flow rate for a given control signal, no matter how system pressures may be changing. (optionally deployed)

Delta T Manager - Continuously monitors the return temperature across a coil or HEX and compares this value with the desired set point. If the actual temperature is below the set point, the logic will reduce valve flow to bring the temperature back to the set point. (optionally deployed)

Dynamic Load Balancing – via a Feed Forward input signal that accepts a direct downstream flow input or a load accumulation from a PLC or computer that totals load demand. (optionally deployed)

The FMCV shall be field configurable to allow users to operate the unit in a Delta T Manager mode solely or PICV Manager mode solely or to engage both the Delta T Manager mode and the PICV Manager mode simultaneously in a cascade configuration. The Dynamic Load Balancing may also be optionally deployed in conjunction with the cascade controller.

The Controller shall interface between:

Two Pressure Sensors – if the PICV Manager mode is engaged

One Temperature Sensor – if the Delta T Manager mode is engaged

One unique electrically actuated two way control valve.

Any supervisory system on site.

When the PICV Manager mode is engaged, the Controller algorithm shall sense the delta P around the control valve element and ensure Pressure Independence across the entire range of the control valve.

The FMCV shall accept a user selectable max flow setting for the control valve.

Flow accuracy of the FMCV shall be user selectable.

FMCV shall be easily integrated with supervisory control systems. All major tuning parameters shall be field adjustable to allow maximum flexibility.

FMCV shall accept a command signal range of 4-20 mA or 2-10 VDC or any user defined subset of the specified ranges.

FMCV shall provide a feedback signal of range of 4-20 mA or 2-10 VDC or any user defined subset of the specified ranges. The feedback parameter shall be user selectable to indicate flow rate, valve position, pressure or temperature.

The FMCV shall allow user to run real time diagnostics for flow rate, valve position, pressure and temperature. The FMCV shall display and communicate relevant error messages.

The FMCV shall be equipped to communicate using MODBUS/ TCP protocol.

The two way control valve element of FMCV shall be an industrial grade quality sliding stem . Further they shall be selected and supplied in accordance with the project general specifications.

The two way control valves shall have minimum rangeability of 50:1 with self-lubricating packing to minimize internal friction.

ENGINEERED PRODUCT SPECIFICATION OF FMCV FOR 2 ½" (65 MM) AND LARGER

The two way control valve shall be provided with a high sensitivity actuator electric actuator whose power source is 24 Vac/dc, 110 Vac or 220 Vac single phase, as dictated by requirements of the jobsite.

The actuator of the two way control valve shall have close-off differential pressure of no less than 150 PSIG (10.3 bar).

The two way control valve shall be selected to meet maximum tolerated pressure drops at maximum flow rate. Manufacturer specific specialized selection software shall be used for verification.

Pressure sensors shall be 24VDC operated with three wire configuration. Further they shall be selected in accordance with the project general specifications.

Temperature sensors shall be 24VDC operated with three wire configuration. Further they shall be selected in accordance with the project general specifications.

Electrical Requirement

1. The Controller shall be housed inside an externally dedicated NEMA 4x enclosure.
2. The Controller shall be powered via 100/220 VAC single phase or 24VDC.
3. The Controller shall provide 5 VDC power to the pressure and/or temperature sensors.
4. The actuator shall operate on 24 VAC 50/60 Hz, 24 VDC, 110 VAC 50/60 Hz, or 220 VAC 50/60 Hz.
5. The actuator shall have an override mechanism for manual operation.
6. The actuator shall be specified as 'Fail-in-Place' on loss of power or otherwise, optionally select a version of the actuator that is 'Fail-Safe', whereby loss of power will move the valve fully open or fully closed, preselected by the user.

Approved Vendors

1. Vendors shall supply the entire valve assembly, actuator, sensors and controller as an integrated product solution with integrated application documentation.
2. Approved manufacturers include Warren Controls, Inc. - Monitrol™ Control Valves, Series MON-DP.

MON-DP PS RevE_0723

MON-DP PRODUCT SPECIFICATION

WARREN CONTROLS

2600 EMRICK BLVD • BETHLEHEM, PA 18020 • USA •800-922-0085 • WWW.WARRENCONTROLS.COM

DEPENDABLE, RUGGED, PRECISION CONTROL VALVES AND ACCESSORIES