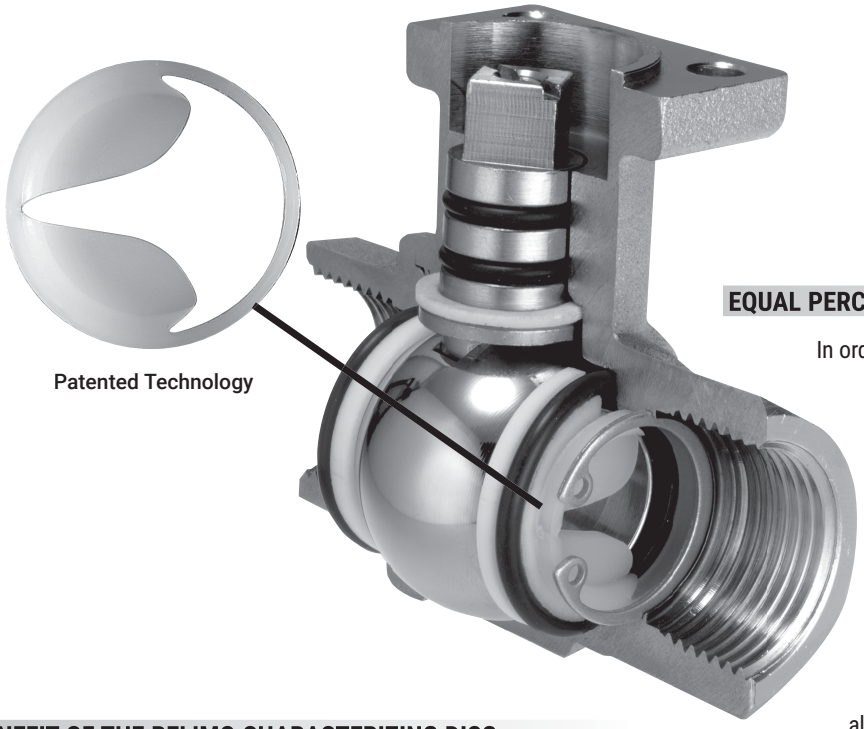
Features and Benefits



Patented Technology

EQUAL PERCENTAGE VALVE CHARACTERISTIC

In order to ensure good stability of control, it is essential for a control valve to have an equal percentage characteristic. This type of characteristic produces a linear variation in thermal output according to the amount of opening of the valve (also known as the system characteristic). Under normal testing conditions a conventional ball valve exhibits an S-shaped characteristic. When it is installed in a real system, however, this characteristic is seriously deformed because, compared with its nominal size, a ball valve possesses an extremely high flow coefficient. Whether used with or without pipe reducers or a reduced bore, they do not normally allow stable regulation of the thermal capacity.

Belimo's unique Characterized Control Valve™ (CCV) is very different. A special characterizing disc inside the valve gives it an equal percentage characteristic which is comparable with that of a globe valve of the same nominal size. The flow (the C_V value) is reduced to the required value by a combination of the hole in the ball and the shaped aperture in the disc. The increase in flow as the valve is opened is very slow and controlled.

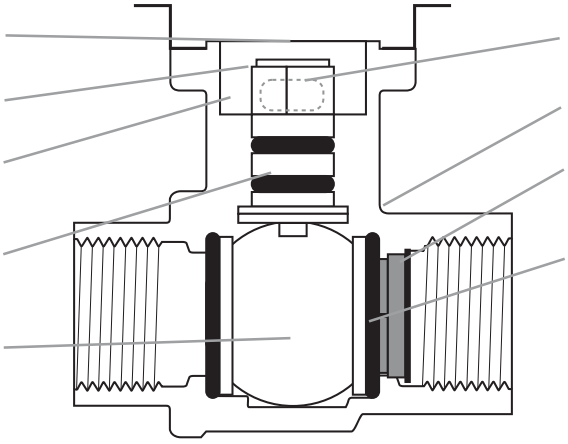
This produces better part-load behavior and improved stability of control while also optimizing energy consumption.

BENEFIT OF THE BELIMO CHARACTERIZING DISC

- Equal percentage flow characteristic.
- Excellent control stability assured with the characterizing disc.
- C_V values equal to C_V values of globe valves the same size.
- The need for multiple pipe reduction is usually eliminated.
- Better control prevents "hunting" of the control loop, increasing life span of actuator and valve.

FEATURES

- Thermal isolating adapter between flange and actuator.
- Easy direct coupling of actuator with a single screw.
- Perpendicular mounting flange and square drive head eliminate lateral forces on the stem.
- Blow-out proof stem with thrust-bearing Teflon® disc and double O-ring design for long service life.*
- Non-corroding chrome-plated brass or stainless ball.



- Vent holes reduce condensation build-up.
- Forged brass valve body — no pin-hole leaks.
- Characterizing disc — made of Tefzel® known for excellent strength and chemical resistance.
- Teflon® seats with O-rings provide constant seating force against the ball and reduce torque requirement.
- Actuator can be mounted in four different positions.

* Designed for service life of over 100,000 full cycles.
Teflon® and Tefzel® are both registered trademarks of Dupont.

Characterized Control Valves™ (CCV)

COORDINATED MOTORIZED OPERATION

The optimum functionality of the Belimo CCV is assured by properly coordinating its actuation with MFT. Specially developed rotary actuators provide the necessary precision for modulating, floating-point, and on/off methods of control.

All CCVs are supplied with the appropriate rotary actuator to provide the close-off and operation desired.

OPTIMIZED FOR CONTROL

The Belimo CCV marries known technology with an innovative development – the unique characterizing disc.

The marriage of CCV and MFT technologies has produced a range of valuable features which surpass the capabilities of globe valves at a very attractive price level:

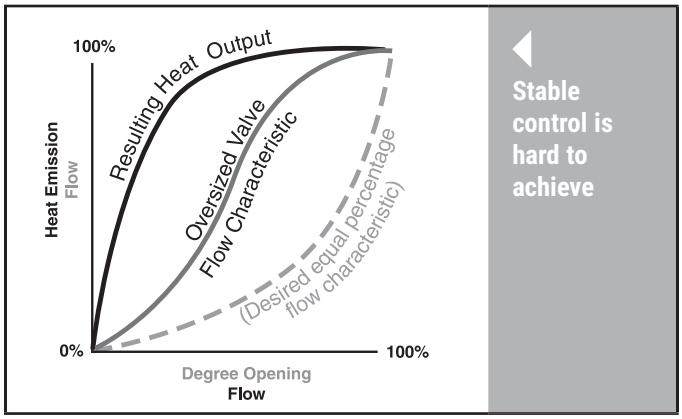
- An equal-percentage valve characteristic
- Unlike a globe valve, no sudden change in inlet flow upon opening
- Excellent stability of control
- C_v values comparable with those of globe valves of the same size or larger
- Higher close-off ratings than standard globe valves
- 100% tight shut-off on two-way valves means NO leak-by unlike globe valves that have ANSI IV shutoff (leakage rate of 0.01% of the C_v rating)
- Three-way valve can be piped in mixing or diverting application

B2 Series	**Two-way ½" to 3"**
B3 Series	**Three-way ½" to 2" Mixing*/Diverting**
B6 Series	**Two-way Flanged 2½" to 6"**

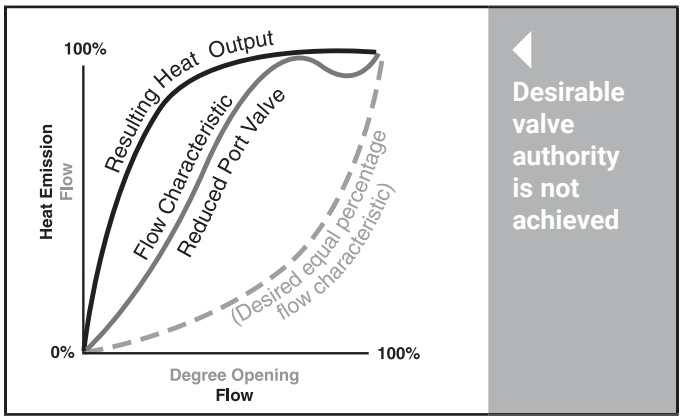
Service:	**Chilled/hot water, 60% glycol**
C_v Range	**0.3-240**
Material:	**Stainless trim or Brass trim**
Control:	**On/Off, Floating, 2-10 VDC**
	Multi-Function Technology®
	Spring Return or Non-Spring Return

Mixing* (Not for use in change over applications)

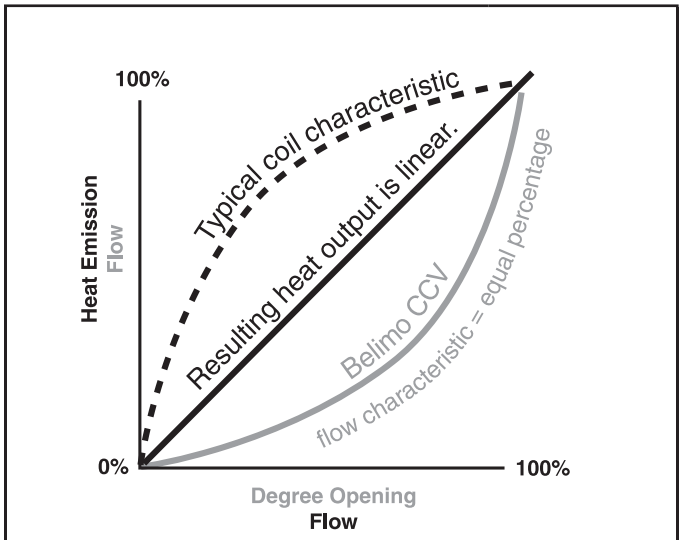
Flow Characteristics of Conventional Ball Valves versus BELIMO CHARACTERIZED CONTROL VALVES



Stable control is hard to achieve



Desirable valve authority is not achieved



Desirable Equal Percent Flow and resulting heat output is achieved with linear results

2-Way Valve Flow Rate for Water Applications (Gallons Per Minute, GPM)

C_v Maximum Rating	Inches	DN mm	2-Way CCV	Pressure Drop Across the Valve									
				1 psi	2 psi	3 psi	4 psi	5 psi	6 psi	7 psi	8 psi	9 psi	10 psi
0.3	½"	15	B207(B)	0.3	0.4	0.5	0.6	0.7	0.7	0.8	0.8	0.9	0.9
0.46	½"	15	B208(B)	0.5	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
0.8	½"	15	B209(B)	0.8	1.1	1.4	1.6	1.8	2.0	2.1	2.3	2.4	2.5
1.2	½"	15	B210(B)	1.2	1.7	2.1	2.4	2.8	2.9	3.2	3.4	3.6	3.8
1.9	½"	15	B211(B)	1.9	2.7	3.3	3.8	4.2	4.7	5.0	5.4	5.7	6.0
3	½"	15	B212(B)	3.0	4.2	5.2	6.0	6.8	7.3	7.9	8.5	9.0	9.5
4.7	½"	15	B213(B)	4.7	6.6	8.1	9.4	11	12	12	13	14	15
7.4	½"	15	B214(B)	7.4	10	13	15	17	18	20	21	22	23
10	½"	15	B215(B)*	10	14	17	20	22	24	26	28	30	32
16	½"	15	B216(B)*	14	20	24	28	31	34	37	40	42	44
4.7	¾"	20	B217(B)	4.7	6.6	8.1	9.4	11	12	12	13	14	15
7.4	¾"	20	B218(B)	7.4	10	13	15	17	18	20	21	22	23
10	¾"	20	B219(B)	10	14	17	20	22	24	26	28	30	32
14	¾"	20	B220(B)*	14	20	24	28	31	34	37	40	42	44
24	¾"	20	B221(B)*	24	34	42	48	54	59	63	68	72	76
7.4	1"	25	B222	7.4	10	13	15	17	18	20	21	22	23
10	1"	25	B223	10	14	17	20	22	24	26	28	30	32
19	1"	25	B224	19	27	33	38	42	47	50	54	57	60
30	1"	25	B225*	30	42	52	60	67	73	79	85	90	95
10	1¼"	32	B229	10	14	17	20	22	24	26	28	30	32
19	1¼"	32	B230*	19	27	33	38	42	47	50	54	57	60
25	1¼"	32	B231	25	35	43	50	56	61	66	71	75	79
37	1¼"	32	B232*	37	52	64	74	83	91	98	105	111	117
19	1½""	40	B238	19	27	33	38	42	47	50	54	57	60
29	1½"	40	B239	29	41	50	58	65	71	77	82	87	92
37	1½"	40	B240*	37	52	64	74	83	91	98	105	111	117
29	2"	50	B248	29	41	50	58	65	71	77	82	87	92
46	2"	50	B249	46	65	80	92	103	113	122	130	138	145
57	2"	50	B250*	57	81	99	114	127	140	151	161	171	180
65	2"	50	B251	65	92	113	130	145	159	170	194	195	206
85	2"	50	B252	85	120	147	170	190	208	225	240	255	269
120	2"	50	B253	120	170	208	240	268	294	318	339	360	380
240	2"	50	B254*	240	339	416	480	537	588	635	679	720	759
60	2½"	65	B261	60	85	104	120	134	147	159	170	180	190
75	2½"	65	B262	75	106	130	150	168	194	198	212	225	237
110	2½"	65	B263	110	156	191	220	246	269	291	311	330	348
150	2½"	65	B264	150	212	260	300	335	367	397	424	450	474
210	2½"	65	B265*	210	297	364	420	470	514	556	594	630	664
70	3"	80	B277	70	99	121	140	157	172	185	198	210	221
130	3"	80	B278	130	194	225	260	290	318	344	368	390	411
170	3"	80	B280*	170	240	294	340	380	416	450	481	510	538
70	2½"	65	B6250S-070	70	99	121	140	157	171	185	198	210	221
110	2½"	65	B6250S-110	110	156	191	220	244	266	282	296	312	320
110	3"	80	B6300S-110	110	156	191	220	244	266	282	296	312	320
186	4"	100	B6400S-186	186	263	322	372	416	456	492	526	558	588
290	5"	125	B6500S-290	290	410	502	580	648	710	767	820	870	917
400	6"	150	B6600S-400	400	566	693	800	894	980	1058	1131	1200	1265

$GPM = C_v \times \sqrt{\Delta p}$

*Models with no characterizing disc.

The influence of the pipe geometry due to reduced flow is negligible for all valves 57 C_v and below with characterizing discs.

Characterized Control Valves™ (CCV)

BELIMO

3-Way Valve Flow Rate for Water Applications (Gallons Per Minute, GPM)

C_v Maximum Rating	Inches	DN mm	3-Way CCV	Pressure Drop Across the Valve									
				1 psi	2 psi	3 psi	4 psi	5 psi	6 psi	7 psi	8 psi	9 psi	10 psi
0.3	½"	15	B307(B)	0.3	0.4	0.5	0.6	0.7	0.7	0.8	0.8	0.9	0.9
0.46	½"	15	B308(B)	0.5	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
0.8	½"	15	B309(B)	0.8	1.1	1.4	1.6	1.8	2.0	2.1	2.3	2.4	2.5
1.2	½"	15	B310(B)	1.2	1.7	2.1	2.4	2.8	2.9	3.2	3.4	3.6	3.8
1.9	½"	15	B311(B)	1.9	2.7	3.3	3.8	4.2	4.7	5.0	5.4	5.7	6.0
3	½"	15	B312(B)	3.0	4.2	5.2	6.0	6.8	7.3	7.9	8.5	9.0	9.5
4.7	½"	15	B313(B)	4.7	6.6	8.1	9.4	11	12	12	13	14	15
10	½"	15	B315(B)*	10	14	17	20	22	24	26	28	30	32
16	½"	15	B316(B)*	14	20	24	28	31	34	37	40	42	44
4.7	¾"	20	B317(B)	4.7	6.6	8.1	9.4	11	12	12	13	14	15
7.4	¾"	20	B318(B)	7.4	10	13	15	17	18	20	21	22	23
14	¾"	20	B320(B)*	14	20	24	28	31	34	37	40	42	44
24	¾"	20	B321(B)*	24	34	42	48	54	59	63	68	72	76
7.4	1"	25	B322	7.4	10	13	15	17	18	20	21	22	23
10	1"	25	B323	10	14	17	20	22	24	26	28	30	32
30	1"	25	B325*	30	42	52	60	67	73	79	85	90	95
10	1¼"	32	B329	10	14	17	20	22	25	27	28	30	32
19	1¼"	32	B330	19	27	33	38	43	47	50	54	57	60
25	1¼"	32	B331	25	35	43	50	56	61	66	71	75	79
19	1½"	40	B338	19	27	33	38	43	47	50	54	57	60
29	1½"	40	B339	29	41	50	58	65	71	77	82	87	92
37	1½"	40	B340	37	52	64	74	83	91	98	105	111	117
46	1½"	40	B341	46	65	80	92	103	113	122	130	138	146
29	2"	50	B347	29	41	50	58	65	71	77	82	87	92
37	2"	50	B348	37	52	64	74	83	91	98	105	111	117
46	2"	50	B349	46	65	80	92	103	113	122	130	138	146
57	2"	50	B350	57	81	99	114	128	140	151	161	171	180
68	2"	50	B351	68	96	118	136	152	167	180	192	204	215
83	2"	50	B352	83	117	144	166	186	204	220	235	249	263

$GPM = C_v \times \sqrt{\Delta p}$ * = Models with no characterizing disc.

The influence of the pipe geometry due to reduced flow is negligible for all valves 83 C_v and below with characterizing discs.

SET-UP

		2-WAY VALVE		3-WAY VALVE	
		SPECIFY UPON ORDERING		SPECIFY UPON ORDERING	
NON-SPRING RETURN Stays in Last Position	**TR24-3-T US** **TR24-3 US** **On/Off or** Floating Point Actuators	Power to pin 2 will drive valve CCW. Power to pin 3 will drive valve CW.		Power to pin 2 will drive valve CCW. Power to pin 3 will drive valve CW.	
	TR24-SR-T US **TR24-SR US** Proportional Type Actuators	**NC:** Closed A to AB, will open as voltage increases.	**NO:** Open A to AB, will close as voltage increases. (Can be chosen with switch inside terminal block of actuator.)	**NC:** Closed A to AB, will open as voltage increases.	**NO:** Open A to AB, will close as voltage increases. (Can be chosen with switch inside terminal block of actuator.)
	LRB24 (-3), MFT, SR **LRX24 (-3), MFT, SR** **ARB24 (-3), MFT, SR** **ARX24 (-3), MFT, SR** Floating Point or Proportional Type Actuators	Power to pin 2 will drive valve CW. Power to pin 3 will drive valve CCW. The above will function when the directional switch is in the "1" position, to reverse select the "0" position.	**NO:** Open A to AB, will close as voltage increases or power applied. (Can be chosen with CW/CCW switch.)	Power to pin 2 will drive valve CW. Power to pin 3 will drive valve CCW. The above will function when the directional switch is in the "1" position, to reverse select the "0" position.	**NO:** Open A to AB, will close as voltage increases or power applied. (Can be chosen with CW/CCW switch.)
SPRING RETURN Note Fail Position	**TFRB24** **LF24 US** **AFRB24**	**NO/FO** Valve: Open A to AB will drive closed. Spring Action: Will spring open A to AB upon power loss.	**NC/FC** Valve: Closed A to AB will drive open. Spring Action: Will spring closed A to AB upon power loss.	**NO/FO** Valve: Open A to AB will drive closed. Spring Action: Will spring open A to AB upon power loss.	**NC/FC** Valve: Closed A to AB will drive open. Spring Action: Will spring closed A to AB upon power loss.
	TF (-3), MFT, SR **LF (-3), MFT, SR** **AF SR** **AFR, MFT** Floating Point or Proportional Type Actuators	**NC/FO** Valve: Closed A to AB will drive open. Spring Action: Will spring open A to AB upon power loss.	**NC/FC** or **NO/FC** Valve: Closed A to AB or Open A to AB. (Can be chosen with CW/CCW switch.) Spring Action: Will spring closed A to AB upon power loss. **NO/FO** Valve: Open A to AB Spring Action: Will spring open A to AB upon power loss. (**NO** action can be chosen with CW/CCW switch.)	**NC/FO** Valve: Closed A to AB will drive open Spring Action: Will spring open A to AB upon power loss.	**NC/FC** or **NO/FC** Valve: Closed A to AB or Open A to AB. (Can be chosen with CW/CCW switch.) Spring Action: Will spring closed A to AB upon power loss. **NO/FO** Valve: Open A to AB Spring Action: Will spring open A to AB upon power loss. (**NO** action can be chosen with CW/CCW switch.)

GENERAL WIRING INSTRUCTIONS

WARNING The wiring technician must be trained and experienced with electronic circuits. Disconnect power supply before attempting any wiring connections or changes. Make all connections in accordance with wiring diagrams and follow all applicable local and national codes. Provide disconnect and overload protection as required. Use copper, twisted pair, conductors only. If using electrical conduit, the attachment to the actuator must be made with flexible conduit.

Always read the controller manufacturer's installation literature carefully before making any connections. Follow all instructions in this literature. If you have any questions, contact the controller manufacturer and/or Belimo.

Transformer(s)

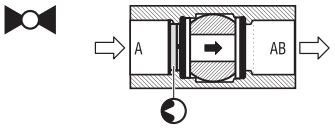
Belimo actuators require a 24 VAC class 2 transformer and draws a maximum of 10 VA per actuator. The actuator enclosure cannot be opened in the field, there are no parts or components to be replaced or repaired.

- EMC directive: 89/336/EEC
- Software class A: Mode of operation type 1
- Low voltage directive: 73/23/EEC

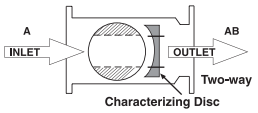
CAUTION It is good practice to power electronic or digital controllers from a separate power transformer than that used for actuators or other end devices. The power supply design in our actuators and other end devices use half wave rectification. Some controllers use full wave rectification. When these two different types of power supplies are connected to the same power transformer and the DC commons are connected together, a short circuit is created across one of the diodes in the full wave power supply, damaging the controller. Only use a single power transformer to power the controller and actuator if you know the controller power supply uses half wave rectification.

FLOW PATTERNS

2-way Characterized Control Valves™ **(Belimo B2 Series)**

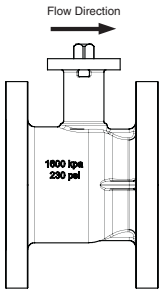


Two-way valves should be installed with the disc upstream.



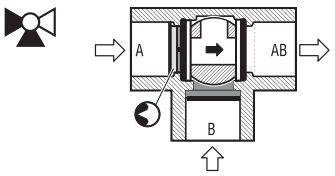
(Belimo B6 Series)

Upstream A
Downstream AB



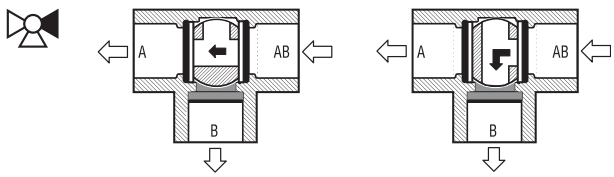
3-way Characterized Control Valves™ **(Belimo B3 Series)**

MIXING (Not for use in change over applications



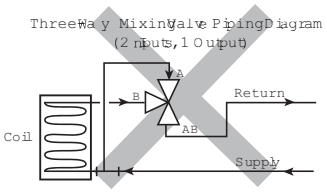
The A-port must be piped to the coil to maintain proper control.

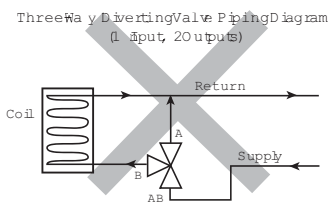
DIVERTING



INCORRECT PIPING

The A-port must be piped to the coil to maintain proper control.





WARNING! Do Not Pipe in this manner!
Note Valve Porting!
The A-port must be piped to the coil! Not the B-port!

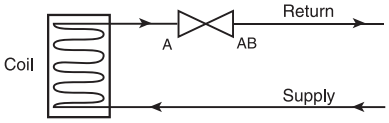
Flow is not possible from A to B. If AB-port is not piped as the common port, the valve must be re-piped. It is good practice to install a balancing valve in the bypass line. These valves are intended for closed loop systems. Do not install in an open loop system or in an application that is open to atmospheric pressure.

OPERATION/INSTALLATION – CORRECT PIPING

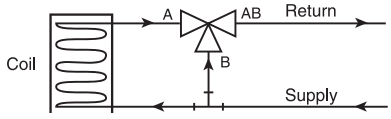
2-way valves should be installed with the characterizing discs upstream. No damage to the valve will result if installed incorrectly with the characterizing discs downstream.

3-WAY VALVES MUST BE PIPED CORRECTLY. **They can be mixing or diverting. Mixing is the preferred piping arrangement.**

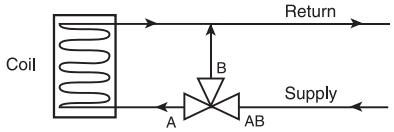
2-way Valve Piping Diagram
(1 Input, 1 Output)



3-way Mixing Valve Piping Diagram
(2 Inputs, 1 Output)



3-way Diverting Valve Piping Diagram
(1 Input, 2 Outputs)



Diverting* (Not for use in change over applications)

The BELIMO Characterized Control Valve is a CONTROL valve, not a manual valve adapted for actuation. The control port is the A-port. It is similar to the globe valve in that the middle port is the B or bypass port. The common port AB is on the main opposite the A-port. These diagrams are for typical applications only. Consult engineering specification and drawings for particular circumstances.

REDUCED B-PORT FLOW

Note: The B-port flow of the 3-way CCV is lower than that of the A-port. In most applications this is beneficial since the reduced flow compensates for the inexistent pressure drop across the coil in the bypass mode. Therefore, proper sizing is important to avoid flow noise in particular when the system is designed with constant speed pumps. Please refer to our valve sizing and selection guidelines.

The flow velocity in the pipe upstream and downstream of the valve should be considered as well. The typical HVAC design maximum flow is 4 to 8 ft/s to avoid noise issues.

Also, the pipe reduction factor must be considered and can be found on pages 3 and 4. Pipe reducers decrease the C_V value of a valve and consequently increase the pressure drop across the valve, a situation that could lead to noise or a lower than designed flow.

Diverting* (Not for use in change over applications)

B2	09		+LRX	24	-MFT	
Valve B2 = 2-way B3 = 3-way	**Valve Size** 07-80 = ½" to 3"	**Trim Material** B = Chrome Plated Brass Ball, Nickel Plated Stem Blank = Stainless Steel Ball and Stem	**Actuator Type** Non Fail-Safe TR LRB, LRX LRQX NRB, NRX NRQX ARB, ARX ARQX Fail-Safe Spring Return TFR, TFRX LF AFR, AFRX Electronic GKR	**Power Supply** 24 = 24 VAC/DC 120 = 120 VAC* 230 = 230 VAC UP = 24 to 240 VAC	**Control** Blank = On/Off -3 = On/Off, Floating Point -SR = 2-10 VDC -MFT = Multi-Function Technology -MFT95 = 0-135 Ω -IP = Internet Protocol	-S = Built-in Auxiliary Switch -T = Terminal Strip N4 = NEMA 4/4X

*LR and AR include 120-240 VAC

Ordering Example

1 Choose the valve actuator combination.

B209+LRX24-MFT

2 Specify preference or configuration.

3 **For MFT Orders Only - Select Programming Code**

NO

Tagging (if needed)

4 Does order require tagging?

Set-Up

Non Fail-Safe Models
NO = Normally Open
NC = Normally Closed

Fail-Safe Models
NO/FO = Normally Open/Fail Open
NO/FC = Normally Open/Fail Closed

NC/FO = Normally Closed/Fail Open
NC/FC = Normally Closed/Fail Closed

See settings
Refers to valve ports A to AB.

P-10001 (A01)

P-100xx (Axx)	Control voltage applications
P-200xx (Wxx)	Pulse width modulation applications
P-300xx (Fxx)	Floating Point applications
P-400xx (Jxx)	On/Off applications
X-XXXXX	Create custom MFT configuration code
X-XXXXX	Create custom MFT configuration in the field with MFT-actuator PC-Tool software

Tagging:
Valves may be tagged per customer specification. ($10.00 charge per tag)

Example:
AHU-1
FCU-2

Part number for tagging: 99981-00101

5 Complete Ordering Example: B209+LRX24-MFT
Configuration: +NO
Programming: +A01

Characterized Control Valve™ (CCV)

B6	250	S	-070	+GRX	24	-MFT	
Valve B6 = 2-way Flanged	**Valve Size** 250-600 = 2½" to 6"	**Trim Material** S = Stainless Steel Ball and Stem	**Cv** 070 = 70 Cv 110 = 110 Cv 186 = 186 Cv 290 = 290 Cv 400 = 400 Cv	**Actuator Type** Non Fail-Safe ARB, ARX GRB, GRX Fail-Safe Spring Return AFRB, AFRX Electronic GKRB, GKRX	**Power Supply** 24 = 24 VAC/DC 120 = 120 VAC* 230 = 230 VAC UP = 24 to 240 VAC	**Control** Blank = On/Off -3 = On/Off, Floating Point -SR = 2-10 VDC -MFT = Multi-Function Technology -MFT95 = 0-135 Ω -IP = Internet Protocol	N4 = NEMA 4/4X

*AR includes 120-240 VAC

Ordering Example

1 Choose the valve actuator combination.

B6250S-070+GRX24-MFT

2 Specify preference or configuration.

3 **For MFT Orders Only - Select Programming Code**

NO | **Tagging (if needed)**

4 Does order require tagging?

Set-Up

Non Fail-Safe Models
NO = Normally Open
NC = Normally Closed

Fail-Safe Models
NO/FO = Normally Open/Fail Open
NO/FC = Normally Open/Fail Closed

NC/FO = Normally Closed/Fail Open
NC/FC = Normally Closed/Fail Closed

See settings
Refers to valve ports A to AB.

P-10001 (A01)

P-100xx (Axx)	Control voltage applications
P-200xx (Wxx)	Pulse width modulation applications
P-300xx (Fxx)	Floating Point applications
P-400xx (Jxx)	On/Off applications
X-XXXXX	Create custom MFT configuration code
X-XXXXX	Create custom MFT configuration in the field with MFT-actuator PC-Tool software

Tagging:
Valves may be tagged per customer specification. ($10.00 charge per tag)

Example:
AHU-1
FCU-2

Part number for tagging: 99981-00101

5 Complete Ordering Example: B6250S-070+GRX24-MFT
Configuration: +NO
Programming: +A01

B2 Series, 2-Way, Characterized Control Valve
Chrome Plated Brass Ball and Brass Stem

Application

This valve is typically used in air handling units on heating or cooling coils, and fan coil unit heating or cooling coils. Some other common applications include Unit Ventilators, VAV box re-heat coils and bypass loops. This valve is suitable for use in a hydronic system with variable flow.

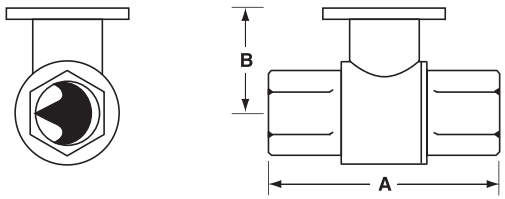
Technical Data	
Service	chilled or hot water, 60% glycol
Flow characteristic	A-port equal percentage
Controllable Flow Range	75°
Sizes	½", ¾"
Type of end fitting	NPT female ends
Materials:	
Body	forged brass, nickel plated
Ball	chrome plated brass
Stem	nickel plated brass
Seats	PTFE
Characterizing disc	Tefzel®
Packing	2 EPDM O-rings, lubricated
Body pressure rating	600 psi
Media temp. range	0°F to 250°F [-18°C to 120°C]
Close off pressure	200 psi
Maximum differential pressure (ΔP)	50 psi for typical applications
Leakage	0% for A to AB
External leakage	according to EN 12266-1:2003
C_V rating	A-port: see product chart for values

Tefzel® is a registered trademark of DuPont

	Valve Nominal Size		Type	Suitable Actuators			
C_V	Inches	DN [mm]	2-way NPT	Non-Spring		Spring	
0.3	½	15	B207B	TR Series	LR Series	TF Series	LF Series
0.46	½	15	B208B				
0.8	½	15	B209B				
1.2	½	15	B210B				
1.9	½	15	B211B				
3	½	15	B212B				
4.7	½	15	B213B				
7.4	½	15	B214B				
10	½	15	B215B				
16	½	15	B216B				
4.7	¾	20	B217B				
7.4	¾	20	B218B				
10	¾	20	B219B				
14	¾	20	B220B				
24	¾	20	B221B*				

*Models without characterizing disc

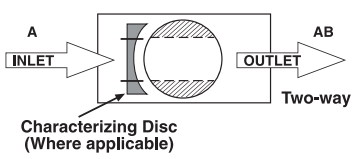
Dimensions

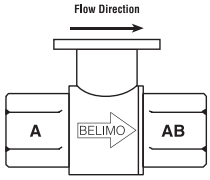


2WayValve-B207-B220

	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207B-B211B	½"	15	2.38" [60.8]	1.39" [35.2]
B212B-B216B	½"	15	2.38" [60.8]	1.78" [45.2]
B217B-B221B	¾"	20	2.73" [69.3]	1.87" [47.4]

Flow Patterns





B3 Series, 3-Way, Characterized Control Valve
Chrome Plated Brass Ball and Brass Stem

Application

This valve is typically used in air handling units on heating or cooling coils, and fan coil unit heating or cooling coils. Some other common applications include Unit Ventilators, VAV box re-heat coils and bypass loops. This valve is suitable for use in a hydronic system with variable or constant flow.

*** (Not for use in change over applications)**

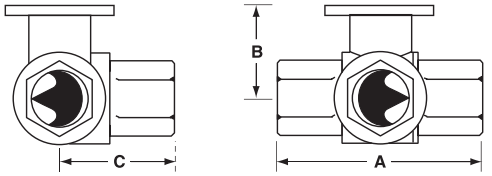
Technical Data	
Service	chilled or hot water, 60% glycol
Flow characteristic	A-port equal percentage B-port modified for constant common port flow
Controllable Flow Range	75°
Sizes	½", ¾"
Type of end fitting	NPT female ends
Materials:	
Body	forged brass, nickel plated
Ball	chrome plated brass
Stem	nickel plated brass
Seats	PTFE
Characterizing disc	Tefzel®
Packing	2 EPDM O-rings, lubricated
Body pressure rating	600 psi
Media temp. range	0°F to 250°F [-18°C to 120°C]
Close off pressure	200 psi
Maximum differential pressure (ΔP)	50 psi for typical applications
Leakage	0% for A to AB <2.0% for B to AB
External leakage	according to EN 12266-1:2003
C_V rating	A-port: see product chart for values B-port: 70% of A to AB C_V

Tefzel® is a registered trademark of DuPont

	Valve Nominal Size		Type	Suitable Actuators			
C_V	Inches	DN [mm]	3-way NPT	Non-Spring		Spring	
0.3	½	15	B307B	TR Series	LR Series	TF Series	LF Series
0.46	½	15	B308B				
0.8	½	15	B309B				
1.2	½	15	B310B				
1.9	½	15	B311B				
3	½	15	B312B				
4.7	½	15	B313B				
10	½	15	B315B				
16	½	15	B316B				
4.7	¾	20	B317B				
7.4	¾	20	B318B				
14	¾	20	B320B				
24	¾	20	B321B				

*Models without characterizing disc

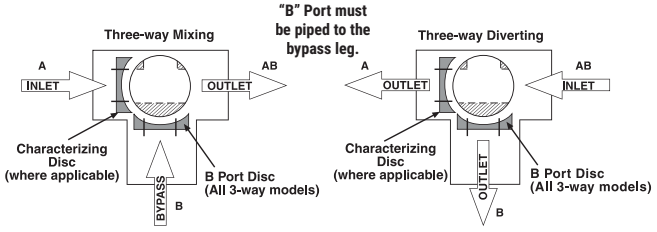
Dimensions



3WayValve-B307-B320

	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307B-B311B	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312B-B316B	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317B-B321B	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]

Flow Patterns



5 YEAR WARRANTY

Application

This valve is typically used in air handling units on heating or cooling coils, and fan coil unit heating or cooling coils. Some other common applications include Unit Ventilators, VAV box re-heat coils and bypass loops. This valve is suitable for use in a hydronic system with variable flow.

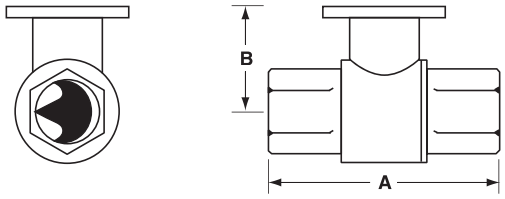
Technical Data	
Service	chilled or hot water, 60% glycol
Flow characteristic	A-port equal percentage
Controllable Flow Range	75°
Sizes	½", ¾", 1", 1¼", 1½", 2", 2½", 3"
Type of end fitting	NPT female ends
Materials:	
Body	forged brass, nickel plated
Ball	stainless steel
Stem	stainless steel
Seats	PTFE
Characterizing disc	Tefzel®
Packing	2 EPDM O-rings, lubricated
Body pressure rating	
600 psi	½" - 1¼" (B230)
400 psi	1¼" (B231) - 3"
Media temp. range	0°F to 250°F [-18°C to 120°C]
Close off pressure	
200 psi	½" - 2" (B254)
100 psi	2½" (B261) - 3"
Maximum differential pressure (ΔP)	50 psi for typical applications
Leakage	0% for A to AB
External leakage	according to EN 12266-1:2003
C_V rating	A-port: see product chart for values

Tefzel® is a registered trademark of DuPont

	Valve Nominal Size		Type	Suitable Actuators				
C_V	Inches	DN [mm]	2-Way NPT	Non-Spring			Spring	
0.3	½	15	B207	TR Series	LR Series	NR...N4 Series	TF Series	LF Series
0.46	½	15	B208					
0.8	½	15	B209					
1.2	½	15	B210					
1.9	½	15	B211					
3	½	15	B212					
4.7	½	15	B213					
7.4	½	15	B214					
10	½	15	B215					
16	½	15	B216					
4.7	¾	20	B217					
7.4	¾	20	B218					
10	¾	20	B219					
14	¾	20	B220					
24	¾	20	B221*					
7.4	1	25	B222					
10	1	25	B223					
19	1	25	B224					
30	1	25	B225*					
10	1¼	32	B229					
19	1¼	32	B230*					
25	1¼	32	B231		AR Series	AR...N4 Series		AF Series
37	1¼	32	B232*					
19	1½	40	B238					
29	1½	40	B239					
37	1½	40	B240*					
29	2	50	B248					
46	2	50	B249					
57	2	50	B250*					
65	2	50	B251					
85	2	50	B252					
120	2	50	B253					
240	2	50	B254*					
60	2½	65	B261					
75	2½	65	B262					
110	2½	65	B263					
150	2½	65	B264					
210	2½	65	B265*					
70	3	80	B277					
130	3	80	B278					
170	3	80	B280*					

*Models without characterizing disc

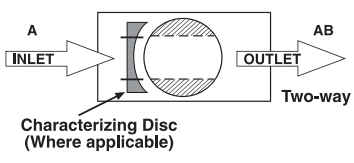
Dimensions

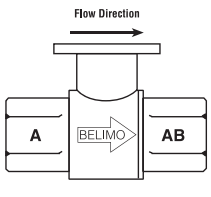


2WayValve-B207-B220

	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207-B211	½"	15	2.41" [61.1]	1.39" [35.2]
B212-B216	½"	15	2.38" [60.4]	1.78" [45.2]
B217-B221	¾"	20	2.73" [69.3]	1.87" [47.4]
B222-B225	1"	25	3.09" [78.4]	1.87" [47.4]
B229-B230	1¼"	32	3.72" [94.6]	1.87" [47.4]
B231-B232	1¼"	32	3.72" [94.6]	2.04" [51.9]
B238-B240	1½"	40	3.88" [98.5]	2.04" [51.9]
B248-B250	2"	50	4.21" [107.0]	2.27" [57.7]
B251-B254	2"	50	4.93" [125.2]	2.73" [69.5]
B261-B265	2½"	65	5.55" [140.9]	2.73" [69.5]
B277-B280	3"	80	5.82" [147.9]	2.73" [69.5]

Flow Patterns





B3 Series, Three Way, Characterized Control Valve
Stainless Steel Ball and Stem

Application

This valve is typically used in air handling units on heating or cooling coils, and fan coil unit heating or cooling coils. Some other common applications include Unit Ventilators, VAV box re-heat coils and bypass loops. This valve is suitable for use in a hydronic system with variable or constant flow.

*** (Not for use in change over applications)**

	Valve Nominal Size		Type	Suitable Actuators				
C_v	Inches	DN [mm]	3-Way NPT	Non-Spring			Spring	
0.3	½	15	B307	TR Series	LR Series	NR...N4 Series	TF Series	LF Series
0.46	½	15	B308					
0.8	½	15	B309					
1.2	½	15	B310					
1.9	½	15	B311					
3	½	15	B312					
4.7	½	15	B313					
10	½	15	B315					
16	½	15	B316					
4.7	¾	20	B317					
7.4	¾	20	B318					
14	¾	20	B320					
24	¾	20	B321					
7.4	1	25	B322					
10	1	25	B323					
30	1	25	B325*					
10	1¼	32	B329		AR Series	AR...N4 Series		AF Series
19	1¼	32	B330					
25	1¼	32	B331					
19	1½	40	B338					
29	1½	40	B339					
37	1½	40	B340					
46	1½	40	B341					
29	2	50	B347					
37	2	50	B348					
46	2	50	B349					
57	2	50	B350					
68	2	50	B351					
83	2	50	B352					

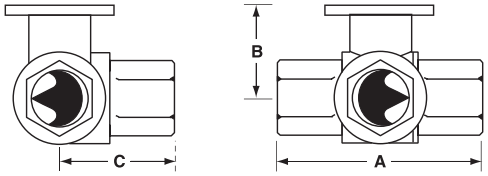
*Models without characterizing disc

Technical Data

Service	chilled or hot water, 60% glycol
Flow characteristic	A-port equal percentage B-port modified for constant common port flow
Controllable Flow Range	75°
Sizes	½", ¾", 1", 1¼", 1½", 2"
Type of end fitting	NPT female ends
Materials:	
Body	forged brass, nickel plated
Ball	stainless steel
Stem	stainless steel
Seats	PTFE
Characterizing disc	Tefzel®
Packing	2 EPDM O-rings, lubricated
Body pressure rating	
600 psi	½" - 1"
400 psi	1¼" - 2"
Media temp. range	0°F to 250°F [-18°C to 120°C]
Close off pressure	
200 psi	½" - 2"
Maximum differential pressure (ΔP)	50 psi for typical applications
Leakage	0% for A to AB <2.0% for B to AB
External leakage	according to EN 12266-1:2003
C_v rating	A-port: see product chart for values B-port: 70% of A to AB C_v

Tefzel® is a registered trademark of DuPont

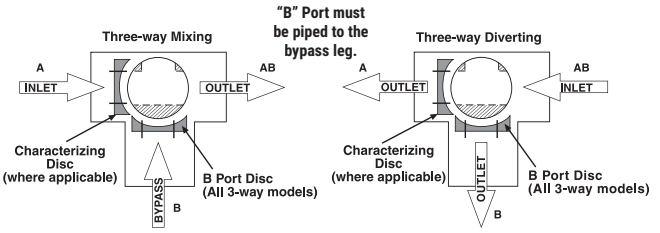
Dimensions



3Way Valve-B307-B320

	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307-B311	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312-B316	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317-B321	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]
B329-B331	1¼"	32	3.96" [100.6]	2.27" [57.7]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.51" [63.7]	2.40" [61.1]
B347-B352	2"	50	4.90" [124.5]	2.73" [69.5]	2.74" [69.7]

Flow Patterns



Characterized Control Valve Product Range Overview
B2.., B3.., 2-way, 3-way, Stainless Steel Ball and Stem

	Valve Nominal Size		Type		Suitable Actuators						
					Non-Spring Return			Spring Return			NEMA 4X
C_V	Inches	DN [mm]	2-way NPT	3-way NPT							
0.3	½	15	B207(B)	B307(B)	TR Series	LR Series		TFR Series	LF Series		NR Series
0.46	½	15	B208(B)	B308(B)							
0.8	½	15	B209(B)	B309(B)							
1.2	½	15	B210(B)	B310(B)							
1.9	½	15	B211(B)	B311(B)							
3	½	15	B212(B)	B312(B)							
4.7	½	15	B213(B)	B313(B)							
7.4	½	15	B214(B)								
10	½	15	B215(B)	B315(B)							
14	½	15	B216(B)*	B316(B)*							
4.7	¾	20	B217(B)	B317(B)							
7.4	¾	20	B218(B)	B318(B)							
10	¾	20	B219(B)								
14	¾	20	B220(B)*								
14	¾	20		B320(B)							
24	¾	20	B221(B)*	B321(B)*							
7.4	1	25	B222	B322							
10	1	25	B223	B323							
19	1	25	B224								
30	1	25	B225*	B325*							
10	1¼	32	B229								
19	1¼	32	B230*								
10	1¼	32		B329			AR Series			AFR Series	AR Series
19	1¼	32		B330							
25	1¼	32	B231	B331							
37	1¼	40	B232*								
19	1½	40	B238	B338							
29	1½	40	B239	B339							
37	1½	40	B240*	B340							
46	1½	40		B341							
29	2	50	B248	B347							
37	2	50		B348							
46	2	50	B249	B349							
57	2	50	B250*	B350							
65	2	50	B251								
68	2	50		B351							
83	2	50		B352							
85	2	50	B252								
120	2	50	B253								
240	2	50	B254*								

* Models without characterizing discs. (B) Models with chrome plated brass ball and brass stem
* 3-Way Valves not for use in change over applications

CCV

Equal Percentage Characteristic

Mode of Operation
The Characterized Control Valve is operated by a rotary actuator. The actuators are controlled by a standard voltage for on/off control or a proportional signal or 3-point control system which move the ball of the valve to the position dictated by the control system.

Product Features
The equal-percentage characteristic of the flow is ensured by the integral characterizing disc. This characteristic provides linear heating or cooling output from the coil improving energy efficiency and comfort.

Actuator Specifications

Control type	on/off, floating point, 2-10 VDC, multi-function technology (MFT)
Manual override	TR, LR, AR, NR, AFR series
Electrical connection	3 ft [1m] cable with ½" conduit fitting or covered screw terminal strip

Valve Specifications

Service	chilled or hot water, 60% glycol
Flow characteristic	A-port equal percentage B-port modified for constant common port flow
Controllable flow range	75°
Sizes	½" - 2"
Type of end fitting	NPT female ends
Materials	
Body	forged brass, nickel plated
Ball	stainless steel or chrome
Stem	stainless steel or chrome
Seats	Teflon® PTFE
Characterizing disc	
½"- 1 ½" (2-way)	Tefzel®
½"-1" (3-way)	Tefzel®
2" (2-way)	stainless steel
1¼"- 2" (3-way)	stainless steel
Packing	2 EPDM O-rings, lubricated
Media temp range	0°F to 250°F [-18°C to 120°C]
Body pressure rating	
½" - 1¼" (B230)	600 psi
1¼"(B231) - 2"(B251)	400 psi
Close-off pressure	200 psi
Maximum differential pressure (ΔP)	50 psi
Leakage	0% for A to AB < 2.0% for B to AB
C_V rating/GPM	A port: see product chart above for values B port: 70% of A to AB C_V

Tefzel® and Teflon® are registered trademarks of DuPont

Characterized Control Valve Product Range Overview
B6.., 2-way, Stainless Steel Ball and Stem

	Valve Nominal Size		2-way Flanged		Suitable Actuators						
C_V	Inches	DN [mm]	ANSI 125	ANSI 250	Non Fail-Safe	NEMA 4X	Fail-Safe	NEMA 4X	Internet Protocol		
70	2½	65	B6250S-070	B6250S-070-250	AR	AR	AFR	AFR	AR..-IP	AFR..-IP	AKR..-IP
110	2½	65	B6250S-110	B6250S-110-250							
110	3	80	B6300S-110	B6300S-110-250							
186	4	100	B6400S-186	B6400S-186-250	GR		GKR	GR / GKR			
290	5	125	B6500S-290	B6500S-290-250							
400	6	150	B6600S-400	B6600S-400-250							

5-year warranty

CCV

Equal Percentage Characteristic

Mode of Operation
The Characterized Control Valve is operated by a rotary actuator. The actuators are controlled by a standard voltage for on/off control, a modulating signal, or floating point control system which move the ball of the valve to the position dictated by the control system.

Product Features
The equal-percentage characteristic of the flow is ensured by the integral characterizing disc. This characteristic provides linear heating or cooling output from the coil improving energy efficiency and comfort.

Actuator Specifications

Control type	on/off, floating point, 2...10 V, multi-function technology (MFT)
Manual override	AR, GR, AFR and GKR series
Electrical connection	3 ft. [1 m] cable with ½" conduit fitting or covered screw terminal strip

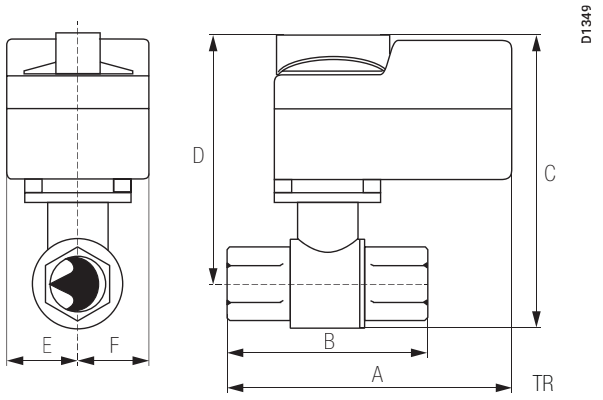
Valve Specifications

Fluid	chilled or hot water, up to 60% glycol max.
Flow characteristic	A-port equal percentage
Controllable flow range	75°
Sizes	2½", 3", 4", 5", 6"
End fitting	ANSI Class 125 flange, flat face*, ANSI 250
Materials	
Body	cast iron GG25
Ball	stainless steel
Stem	stainless steel
Seats	Teflon® PTFE
Seat o-rings	EPDM rubber
Characterizing disc	stainless steel
Stem o-rings	EPDM
Fluid temp. range	0...250°F [-18...+120°C]
Body pressure rating	ANSI 125, Class B, ANSI 250
Close-off pressure	175 psid, 310 psid (-250)
Maximum differential pressure (ΔP)	50 psid
Leakage	0% for A to AB

*125 psi flanges have a plain flat face and should not be bolted to a raised face flange.
Tefzel® and Teflon® are registered trademarks of DuPont™.

5 YEAR WARRANTY

CE LISTED 94 D5 TEMP.IND. & REG.EQUIP. c UL us BRUSHLESS DC motor



Models

TR24-3-T US

TR24-3 US	TR24-3-T US with 3 ft plenum rated cable
TR24-3/300 US	TR24-3-T US with 10 ft plenum rated cable
TR24-3/500 US	TR24-3-T US with 16 ft plenum rated cable

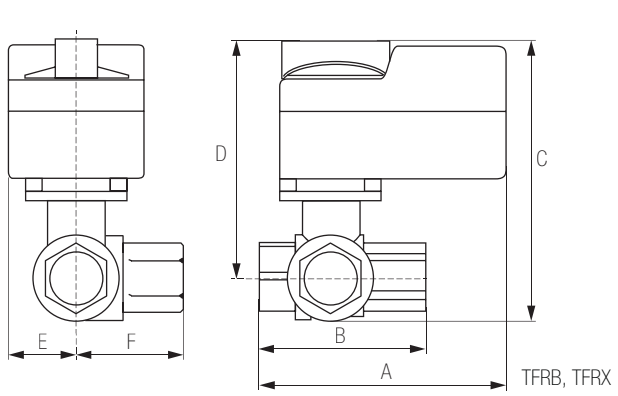
Technical Data	
Control	on/off, floating point
Nominal voltage	24 VAC 50/60 Hz
Nominal voltage range	19.2…28.8 VAC
Power consumption	1 W
Transformer sizing	1VA (class 2 power source)
Electrical connection	screw terminals accessible after removal of small cover (3 ft, 10 ft, 16 ft cables optional)
Input impedance	0.36 kΩ
Angle of rotation	90°
Position indication	integrated into handle
Manual override	push down handle
Running time	90 seconds @ 60 hz, 108 seconds @ 50 hz
Humidity	5 to 95% non-condensing
Ambient temperature	-22°F to 122°F (-30°C to 50°C)
Storage temperature	-40°F to 176°F (-40°C to 80°C)
Housing	NEMA 1/IP40
Housing rating	UL94-5V(B)
Agency listing†	cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level	max. 35 db (A)
Quality standard	ISO 9001

† Rated impulse voltage 330V, Control pollution degree 2, Type of action 1

Dimensions with 2-Way Valve

	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207(B)-B211(B)	½"	15	2.41" [61.1]	1.39" [35.2]
B212(B)-B215(B)	½"	15	2.38" [60.4]	1.78" [45.2]
B217(B)-B221(B)	¾"	20	2.73" [69.3]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307(B)-B311(B)	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312(B)-B315(B)	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317(B)-B321(B)	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]

Wiring Diagrams

INSTALLATION NOTES

2 The common connection from the actuator must be connected to the Hot connection of the controller.

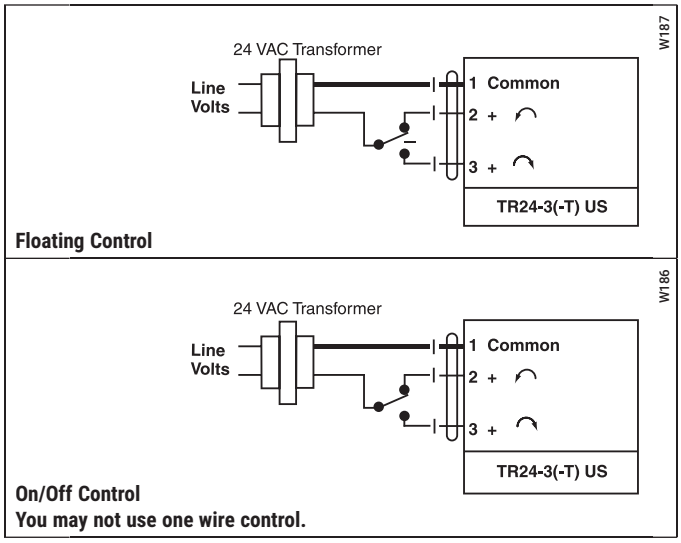
3 Actuators with plenum rated cable do not have numbers on wires; use color codes instead.

4 The actuator Hot must be connected to the control board Hot.

WARNING *Live Electrical Components!*

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

NOTE: TR24-3(-T) US cannot be wired in parallel with themselves or any other actuator.



5 YEAR WARRANTY

CE LISTED 94 D5 TEMP.IND. & REG.EQUIP. c UL us BRUSHLESS DC motor

Models

TR24-SR-T US

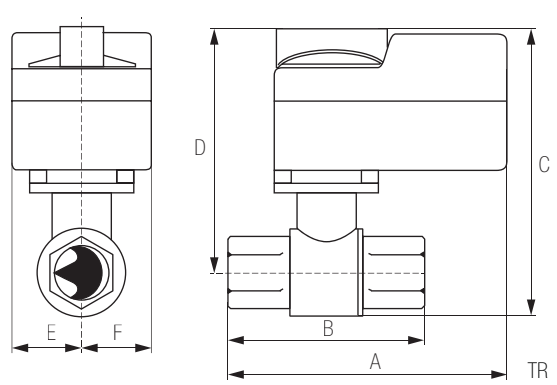
TR24-SR US	TR24-SR-T US with 3 ft plenum rated cable
TR24-SR/300 US	TR24-SR-T US with 10 ft plenum rated cable
TR24-SR/500 US	TR24-SR-T US with 16 ft plenum rated cable

Technical Data	
Control	proportional
Nominal voltage	24 VAC 50/60 Hz, 24 VDC
Nominal voltage range	19.2…28.8 VAC, 21.6…28.8 VDC
Power consumption	0.5 W
Transformer sizing	1VA (class 2 power source)
Electrical connection	screw terminals accessible after removal of small cover (3 ft, 10 ft, 16 ft cables optional)
Input impedance	100 kΩ
Angle of rotation	90°
Direction of rotation	reversible with switch under cover
Position indication	integrated into handle
Manual override	push down handle
Running time	90 seconds
Humidity	5 to 95% non-condensing
Ambient temperature	-22°F to 122°F (-30°C to 50°C)
Storage temperature	-40°F to 176°F (-40°C to 80°C)
Housing	NEMA 1/IP40
Housing rating	UL94-5V(B)
Agency listing†	cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level	max. 35 db (A)
Quality standard	ISO 9001

† Rated impulse voltage 500V, Control pollution degree 2, Type of action 1

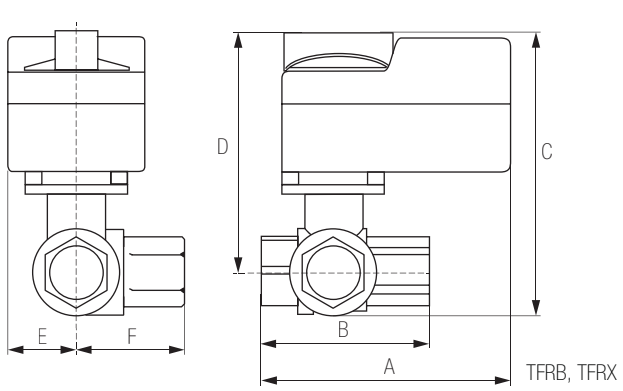
NOTE: Response sensitivity is 75mV

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207(B)-B211(B)	½"	15	2.41" [61.1]	1.39" [35.2]
B212(B)-B215(B)	½"	15	2.38" [60.4]	1.78" [45.2]
B217(B)-B221(B)	¾"	20	2.73" [69.3]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307(B)-B311(B)	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312(B)-B315(B)	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317(B)-B321(B)	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]

Wiring Diagrams

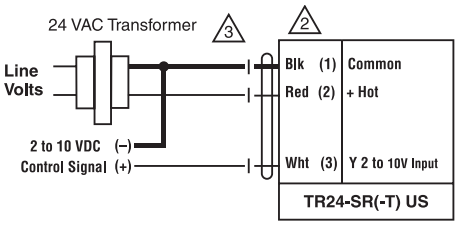
INSTALLATION NOTES

2 Actuators with color coded wires are optional.
Wire numbers are provided for reference.

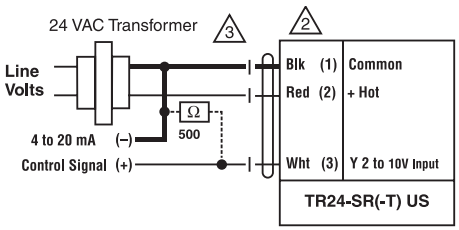
***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

3 Actuators may also be powered by 24 VDC.

***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

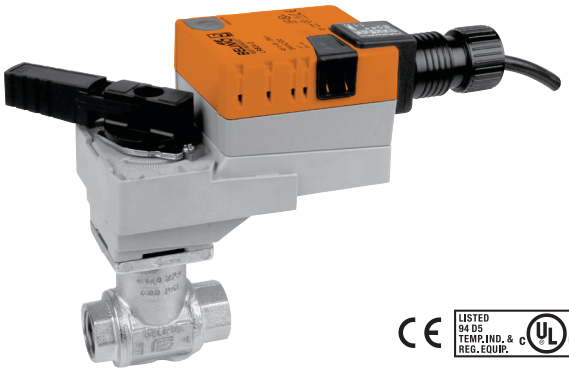


2 to 10 VDC Control of TR24-SR(-T) US



4 to 20 mA Control of TR24-SR(-T) US

Direct/Reverse acting switch is under wiring cover.
R = CW with decrease in signal
L = CCW with decrease in signal
No feedback



Models

LRB24-3-T	LRX24-3-T	w/Terminal Block
LRB24-3	LRX24-3	w/3 ft. cable
LRB24-3-S	LRX24-3-S	w/built-in Aux. Switch

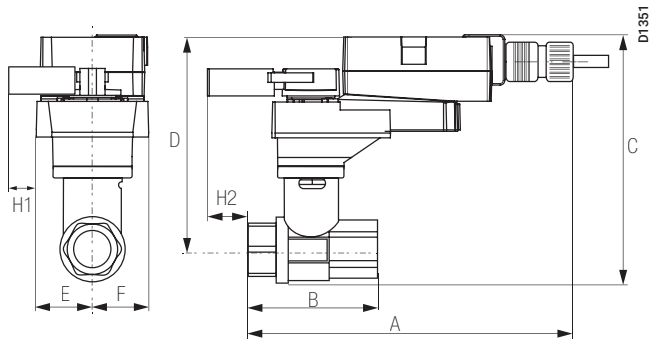
Technical Data	
Control	on/off, floating point
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	1.5 W
holding	0.2 W
Transformer sizing	2 VA (class 2 power source)
Electrical connection	½" conduit connector 18 GA, plenum rated cable
LRB24-3	3 ft [1m]
LRX24-3	3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection	electronic throughout 0° to 95° rotation
Input impedance	600 Ω
Angle of rotation	90°, adjustable with mechanical stop
Direction of rotation	reversible with protected ↷/↶ switch
Position indication	handle
Manual override	external push button
Running time LRB24-3 LRX24-3	 90 seconds, constant independent of load 150, 95, 60, 45, 35 seconds, constant independent of load
Humidity	5 to 95% RH, non-condensing (EN 60730-1)
Ambient temperature	-22°F to 122°F [-30°C to 50°C]
Storage temperature	-40°F to 176°F [-40°C to 80°C]
Housing type	NEMA 2/IP54
Housing material	UL94-5VA
Agency listings†	cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level	less than 35 dB (A)
Quality standard	ISO 9001

LR...24-3-T	
Electrical connection	screw terminal (for 26 to 14 GA wire) protected (NEMA 2, IP20)

LR...24-3-S	
Auxiliary switch	1 SPDT, 3A (0.5A) @ 250 VAC, UL Listed, adjustable 0° to 100°

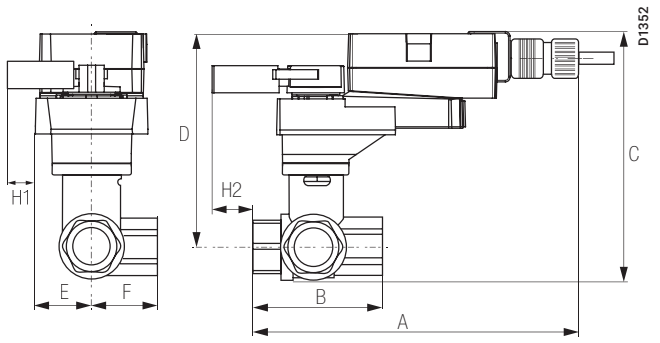
† Rated impulse voltage 800V, Control pollution degree 3, Type of action 1
(1.B for -S models)

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207(B)-B211(B)	½"	15	1.39" [35.2]	1.39" [35.2]
B212(B)-B215(B)	½"	15	1.78" [45.2]	1.78" [45.2]
B217(B)-B221(B)	¾"	20	1.87" [47.4]	1.87" [47.4]
B222-B225	1"	25	1.87" [47.4]	1.87" [47.4]
B229-B231	1¼"	32	1.87" [47.4]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307(B)-B311(B)	½"	15	2.06" [52.2]	1.39" [35.2]	1.20" [30.6]
B312(B)-B315(B)	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317(B)-B321(B)	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]

Wiring Diagrams

INSTALLATION NOTES

△2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

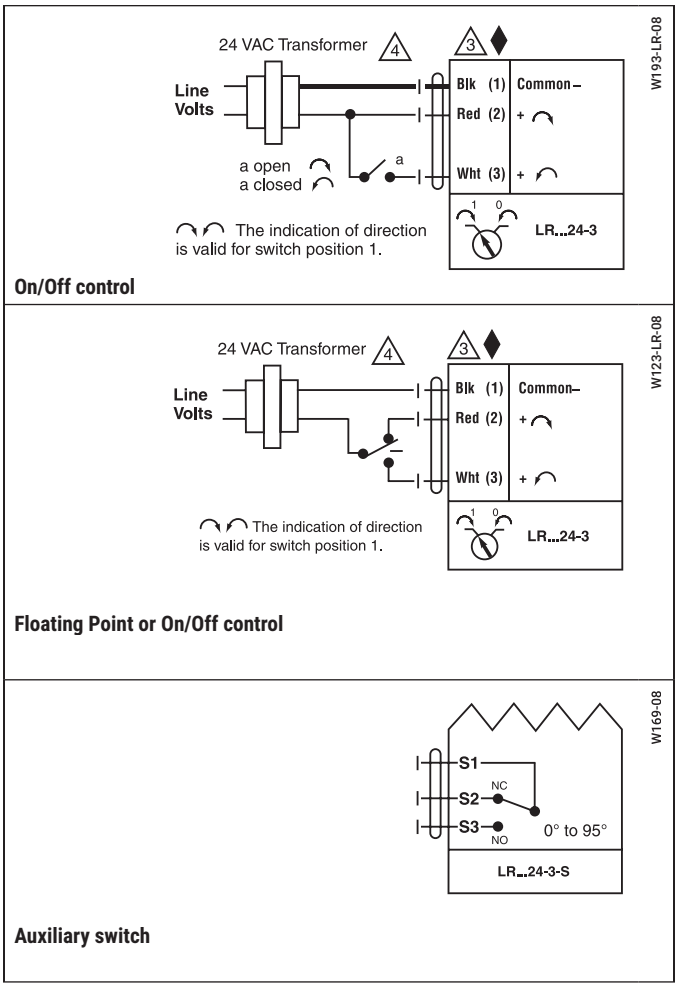
△3 Actuators are provided with color coded wires.
Wire numbers are provided for reference.

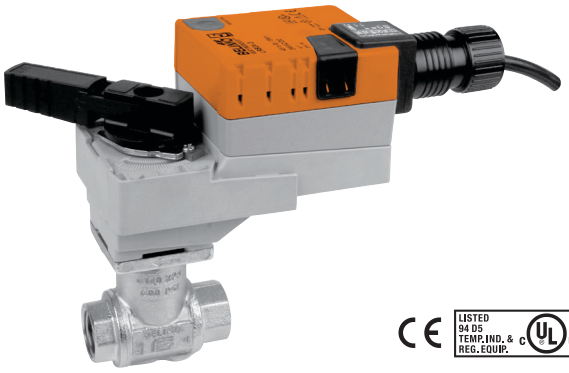
△4 Actuators may also be powered by 24 VDC.

APPLICATION NOTES

♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

⚠ ***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.





Models

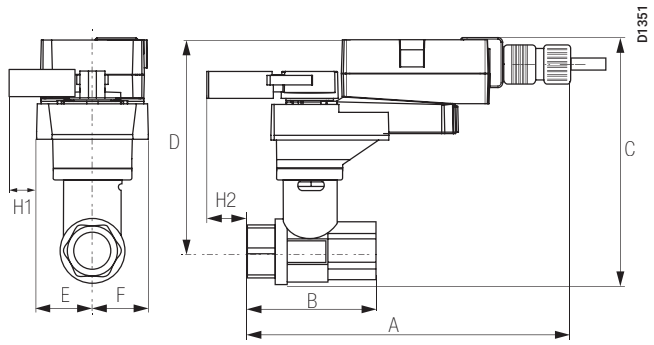
LRB24-SR-T	LRX24-SR-T	w/Terminal Block
LRB24-SR	LRX24-SR	w/3ft. cable

Technical Data		
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	1.5 W
	holding	0.4 W
Transformer sizing		3 VA (class 2 power source)
Electrical connection		½" conduit connector 18 GA, plenum rated cable
LRB24-SR		3 ft [1m]
LRX24-SR		3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection		electronic throughout 0° to 95° rotation
Operating range Y		2 to 10 VDC, 4 to 20 mA
Feedback output U		1 to 10 VDC, max 0.5 mA
Input impedance		100 kΩ (0.1 mA), 500 Ω
Angle of rotation		90°, adjustable with mechanical stop
Direction of rotation		reversible with protected ↷/↶ switch
Position indication		handle
Manual override		external push button
Running time		constant independent of load
LRB24-SR		90 seconds
LRX24-SR		150, 95, 60, 45, 35 seconds
Humidity		5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA 2/IP54
Housing material		UL94-5VA
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level		<35 dB(A)
Quality standard		ISO 9001

LR...24-SR-T	
Electrical connection	screw terminal (for 26 to 14 GA wire) protected (NEMA 2/IP20)

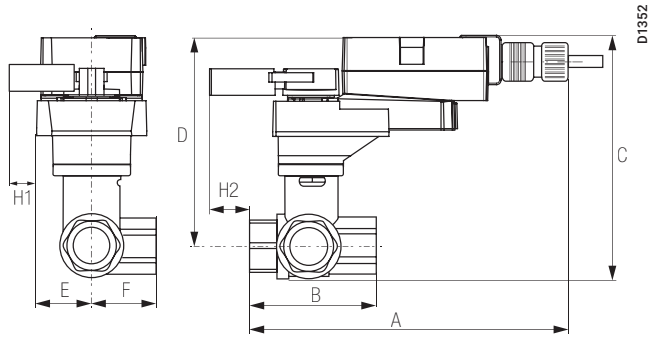
† Rated impulse voltage 800V, Control pollution degree 3, Type of action 1 (1.B for -S models)

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207(B)-B211(B)	½"	15	2.41" [61.1]	1.39" [35.2]
B212(B)-B215(B)	½"	15	2.38" [60.4]	1.78" [45.2]
B217(B)-B221(B)	¾"	20	2.73" [69.3]	1.87" [47.4]
B222-B225	1"	25	3.09" [78.4]	1.87" [47.4]
B229-B231	1¼"	32	3.72" [94.6]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307(B)-B311(B)	½"	15	2.06" [52.2]	1.39" [35.2]	1.20" [30.6]
B312(B)-B315(B)	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317(B)-B321(B)	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]

Wiring Diagrams

INSTALLATION NOTES

△2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

△3 Actuators may also be powered by 24 VDC.

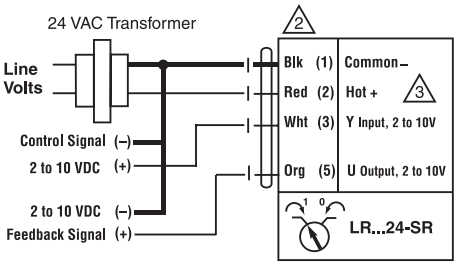
△5 Only connect common to neg. (–) leg of control circuits.

APPLICATION NOTES

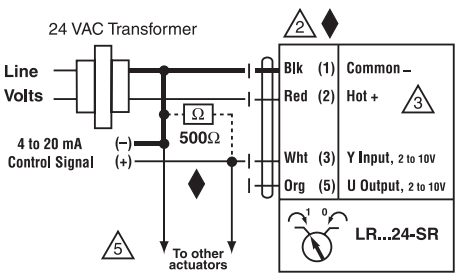
♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

♦ The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

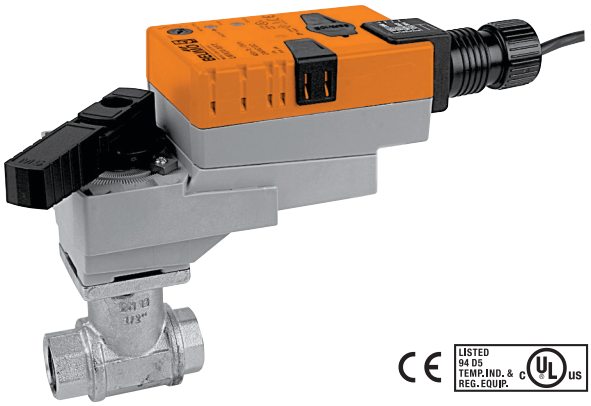
***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



2 to 10 VDC control



4 to 20 mA control



5 YEAR WARRANTY

CE LISTED 94 D5 TEMP.IND. & REG.EQUIP. c UL us

BRUSHLESS DC motor

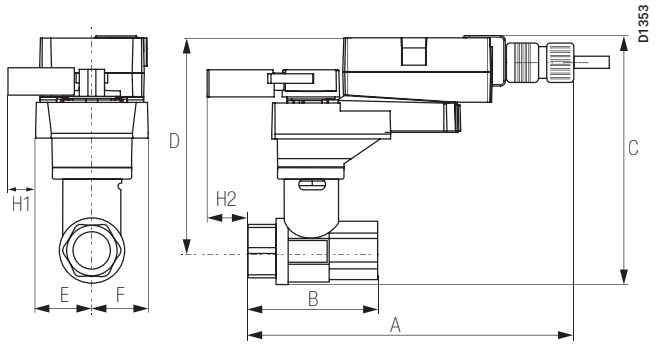
Models

LRB120-3
LRX120-3

Technical Data		
Control		On/Off, Floating Point
Power supply		100 to 240 VAC, 50/60 Hz (nominal) 85 to 265 VAC, 50/60 Hz (tolerance)
Power consumption	running	2 W
	holding	0.5 W
Transformer sizing		4 VA (class 2 power source)
Electrical connection		½" conduit connector 18 GA, plenum rated cable
LRB120-3		3 ft [1m]
LRX120-3		3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection		electronic throughout 0° to 95° rotation
Input impedance		600 Ω
Angle of rotation		90°, adjustable with mechanical stop
Direction of rotation		reversible with protected ↷/↶ switch
Position indication		handle
Manual override		external push button
Running time LRB120-3 LRX120-3		90 seconds, constant independent of load 150, 95, 60, 45, 35 seconds, constant independent of load
Humidity		5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA 2/IP54
Housing material		UL94-5VA
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level		<35 dB(A)
Quality standard		ISO 9001

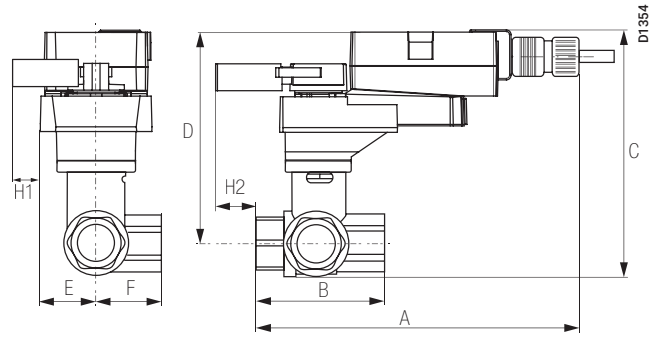
† Rated impulse voltage 4kV, Control pollution degree 3, Type of action 1

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207(B)-B211(B)	½"	15	2.41" [61.1]	1.39" [35.2]
B212(B)-B215(B)	½"	15	2.38" [60.4]	1.78" [45.2]
B217(B)-B221(B)	¾"	20	2.73" [69.3]	1.87" [47.4]
B222-B225	1"	25	3.09" [78.4]	1.87" [47.4]
B229-B230	1¼"	32	3.72" [94.6]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307(B)-B311(B)	½"	15	2.06" [52.2]	1.39" [35.2]	1.20" [30.6]
B312(B)-B315(B)	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317(B)-B321(B)	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]

Wiring Diagrams

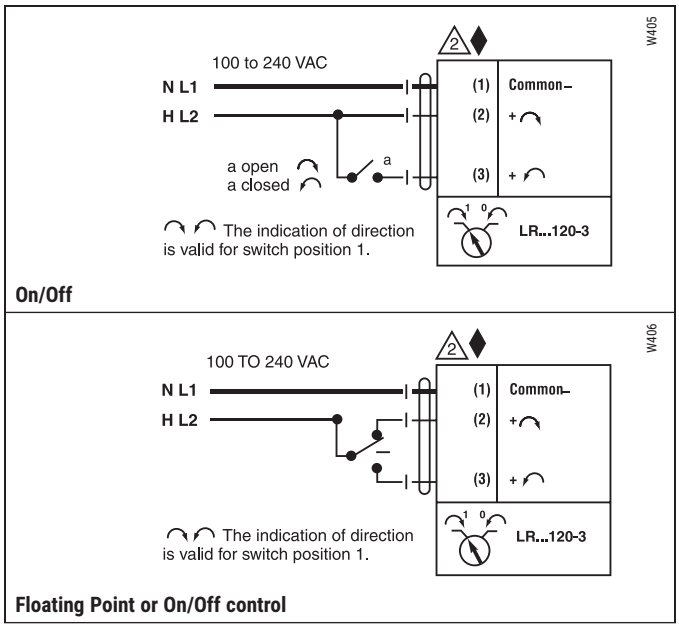
INSTALLATION NOTES

2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

APPLICATION NOTES

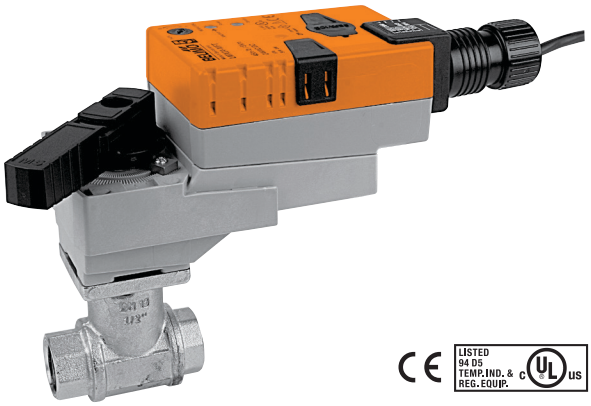
Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



On/Off

Floating Point or On/Off control



5 YEAR WARRANTY

CE LISTED 94 D5 TEMP.IND. & REG.EQUIP. c UL us

BRUSHLESS DC motor

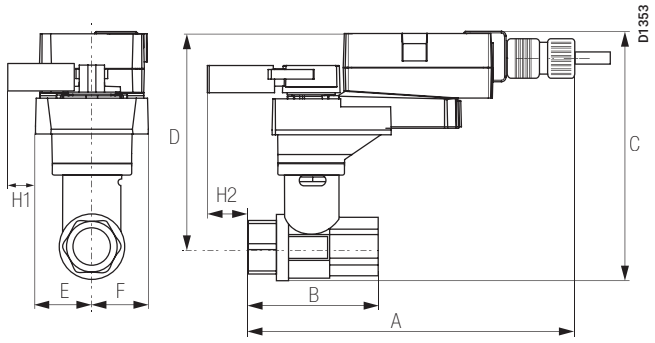
Models

LRB120-SR
LRX120-SR

Technical Data		
Power supply		100 to 240 VAC, 50/60 Hz (nominal) 85 to 265 VAC, 50/60 Hz (tolerance)
Power consumption	running	2.5 W
	holding	1 W
Transformer sizing		4.5 VA (class 2 power source)
Electrical connection		½" conduit connector 18 GA, plenum rated cable
LRB120-SR		3 ft [1m]
LRX120-SR		3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection		electronic throughout 0° to 95° rotation
Operating range Y		2 to 10 VDC, 4 to 20 mA
Feedback output U		1 to 10 VDC, max 0.5 mA
Input impedance		100 kΩ (0.1 mA), 500 Ω
Angle of rotation		90°, adjustable with mechanical stop
Direction of rotation		reversible with protected ↷/↶ switch
Position indication		handle
Manual override		external push button
Running time		constant independent of load
LRB120-SR		90 seconds
LRX120-SR		150, 95, 60, 45, 35 seconds
Humidity		5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA 2/IP54
Housing material		UL94-5VA
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level		<35 dB(A)
Quality standard		ISO 9001

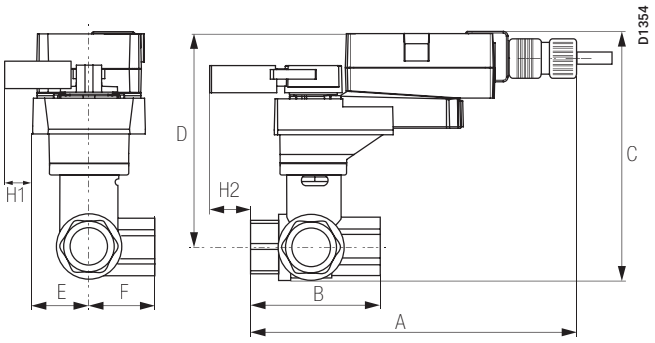
† Rated impulse voltage 4kV, Control pollution degree 3, Type of action 1

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207(B)-B211(B)	½"	15	2.41" [61.1]	1.39" [35.2]
B212(B)-B215(B)	½"	15	2.38" [60.4]	1.78" [45.2]
B217(B)-B221(B)	¾"	20	2.73" [69.3]	1.87" [47.4]
B222-B225	1"	25	3.09" [78.4]	1.87" [47.4]
B229-B230	1¼"	32	3.72" [94.6]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307(B)-B311(B)	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312(B)-B315(B)	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317(B)-B321(B)	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]

Wiring Diagrams

INSTALLATION NOTES

△2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

△6 Only connect common to neg. (–) leg of control circuits.

△7 A 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC.

△15 LRB(X) can be supplied with both 120 VAC and 230 VAC.

△19 All 120 VAC and 230 VAC actuators use appliance rated cables.

APPLICATION NOTES

♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

⚠ ***WARNING** Live Electrical Components!*
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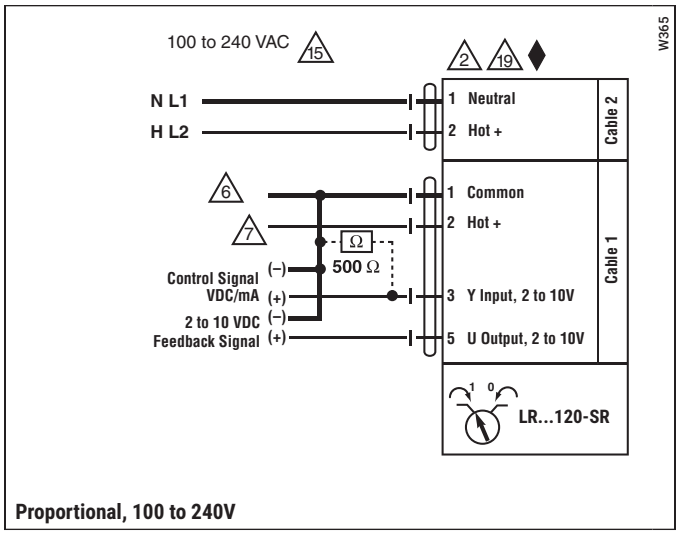
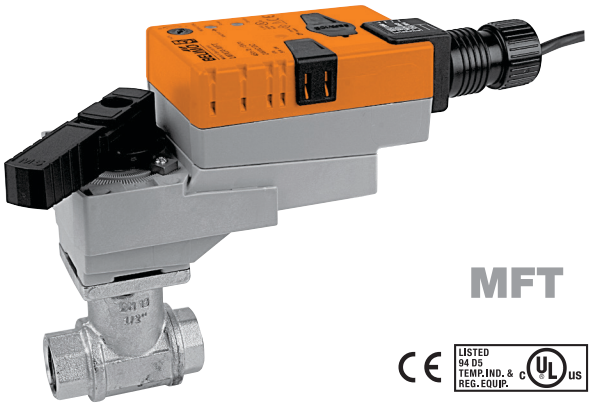


Proportional, 100 to 240V



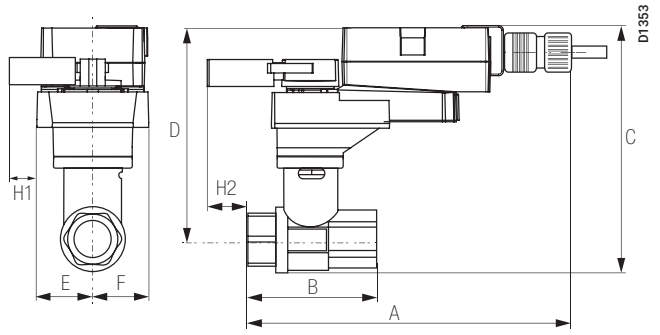
Models

LRX24-MFT Flexible Version

Technical Data	
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	2 W
holding	1.2 W
Transformer sizing	6 VA (class 2 power source)
Electrical connection	½" conduit connector 18 GA, plenum rated cable
LRX24-MFT	3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection	electronic throughout 0° to 95° rotation
Operating range Y	2 to 10 VDC (default) 4 to 20 mA variable (VDC, PWM, floating point, on/off)
Feedback output U	2 to 10 VDC, 0.5mA max VDC variable
Input impedance	100 kΩ (0.1 mA), 500 Ω 1500 Ω (PWM, floating point, on/off)
Angle of rotation	90° electronically variable adjustable with mechanical stop
Direction of rotation	reversible with protected ↷/↶ switch
Position indication	handle
Manual override	external push button
Running time	150 seconds (default) Variable (35 to 150 secs)
Humidity	5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature	-22°F to 122°F [-30°C to 50°C]
Storage temperature	-40°F to 176°F [-40°C to 80°C]
Housing	NEMA 2/IP54
Housing material	UL94-5VA
Agency listings†	cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level	<35 dB(A)
Quality standard	ISO 9001

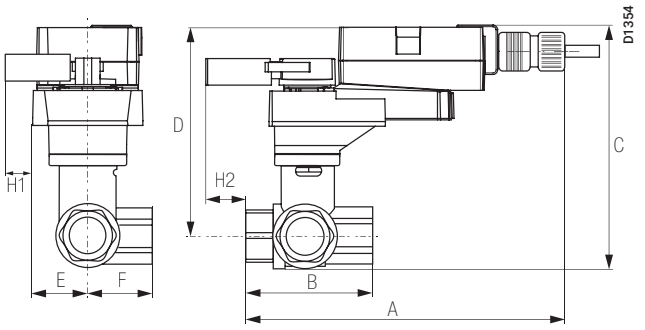
† Rated impulse voltage 800V, Control pollution degree 3, Type of action 1 (1.B for -S models)

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207-B211	½"	15	2.41" [61.1]	1.39" [35.2]
B212-B215	½"	15	2.38" [60.4]	1.78" [45.2]
B217-B221	¾"	20	2.73" [69.3]	1.87" [47.4]
B222-B225	1"	25	3.09" [78.4]	1.87" [47.4]
B229-B230	1¼"	32	3.72" [94.6]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307-B311	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312-B315	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317-B321	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]

Wiring Diagrams

INSTALLATION NOTES

△2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

△3 Actuators may also be powered by 24 VDC.

△4 Position feedback cannot be used with Triac sink controller.
The actuator internal common reference is not compatible.

△6 Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.

△8 Contact closures A & B also can be triacs.
A& B should both be closed for triac source and open for triac sink.

△9 For triac sink the common connection from the actuator must be connected to the hot connection.

APPLICATION NOTES

◆ The ZG-R01 500 Ω resistor converts the 4 to 10 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

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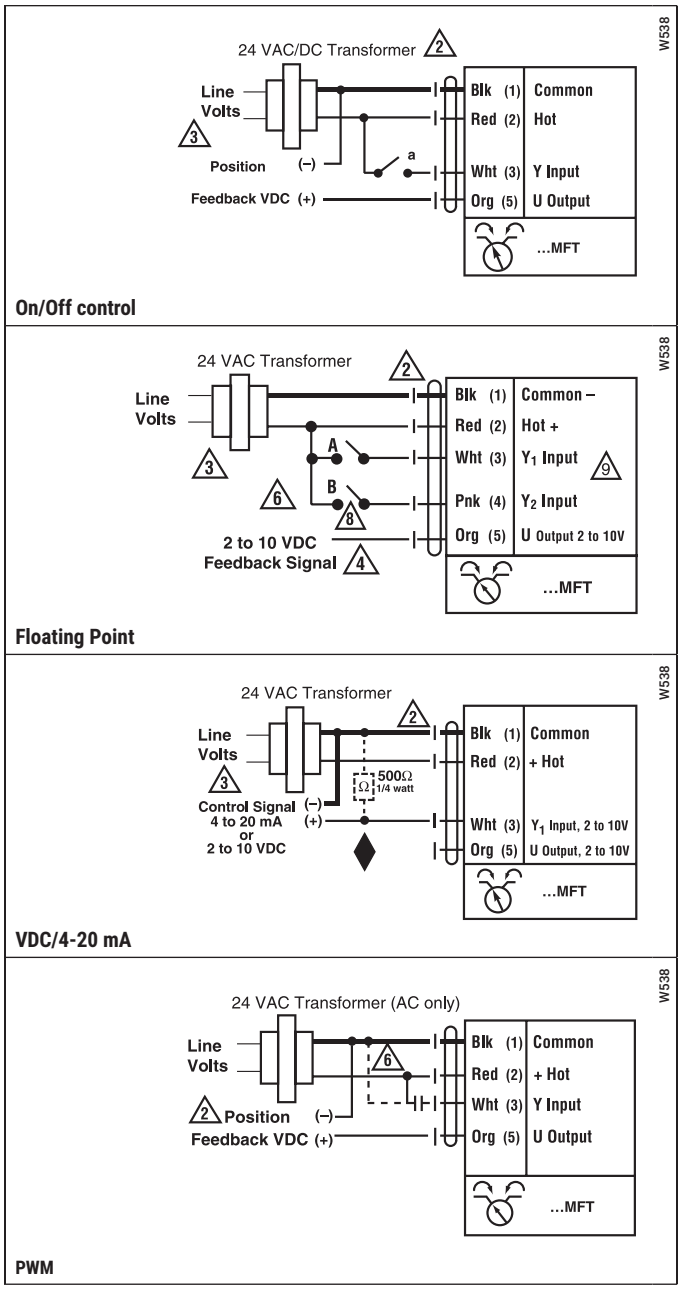
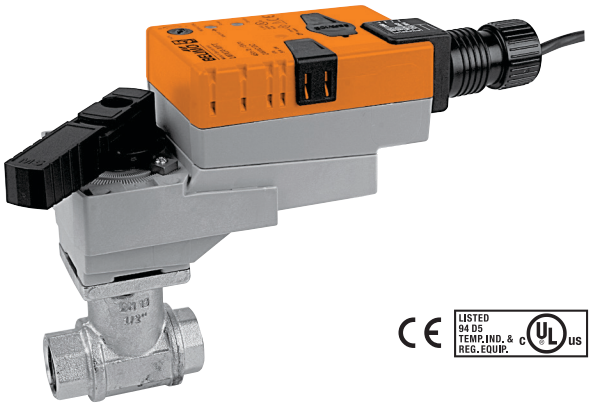


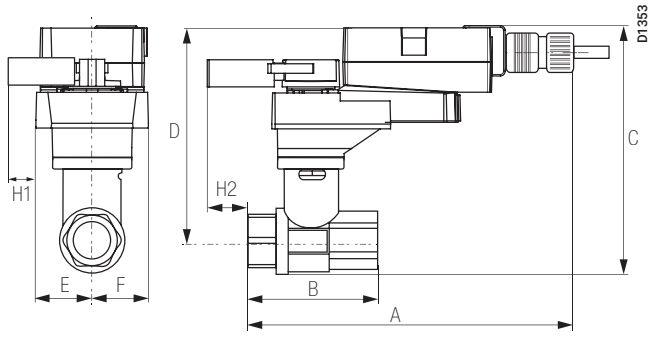


Models

LRX24-PC

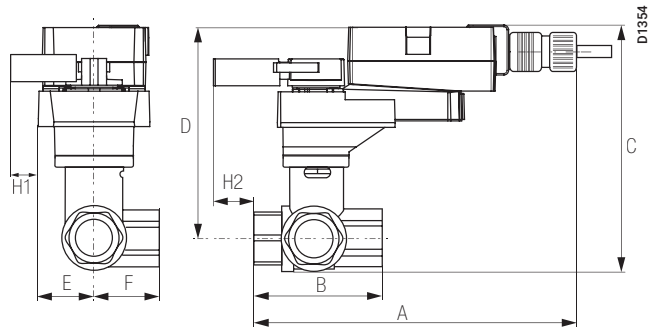
Technical Data		
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	2 W
	holding	1.2 W
Transformer sizing		5 VA (Class 2 power source)
Electrical connection		½" conduit connector 18 GA plenum rated cable 3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection		electronic throughout 0 to 95° rotation
Operating range Y		0 to 20V phasecut
Feedback output U		2 to 10 VDC, 0.5mA max
Input impedance		8 kΩ (50 mW)
Angle of rotation		90°, adjustable with mechanical stop electronically variable
Direction of rotation		reversible with ↷/↶ switch
Position indication		handle
Manual override		external push button
Running time		150 seconds (default)
Humidity		5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA 2/IP54
Housing material		UL94-5VA
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level		<35 dB(A)
Quality standard		ISO 9001

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207-B211	½"	15	2.41" [61.1]	1.39" [35.2]
B212-B215	½"	15	2.38" [60.4]	1.78" [45.2]
B217-B221	¾"	20	2.73" [69.3]	1.87" [47.4]
B222-B225	1"	25	3.09" [78.4]	1.87" [47.4]
B229-B230	1¼"	32	3.72" [94.6]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307-B311	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312-B315	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317-B321	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]

Wiring Diagrams

INSTALLATION NOTES

1. Provide overload protection and disconnect as required.
2. ***CAUTION** Equipment damage!*
   Actuators may be connected in parallel.
   Power consumption and input impedance must be observed.
3. Actuators may also be powered by 24 VDC.

***WARNING** Live Electrical Components!*

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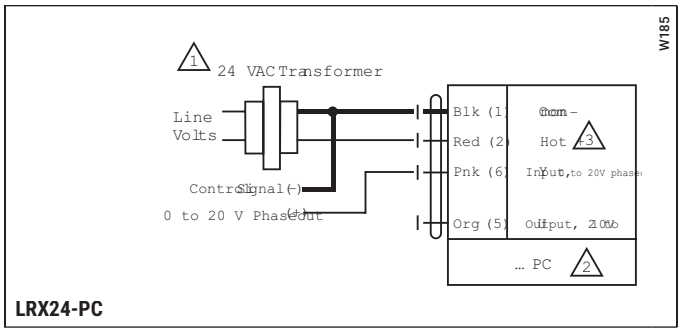
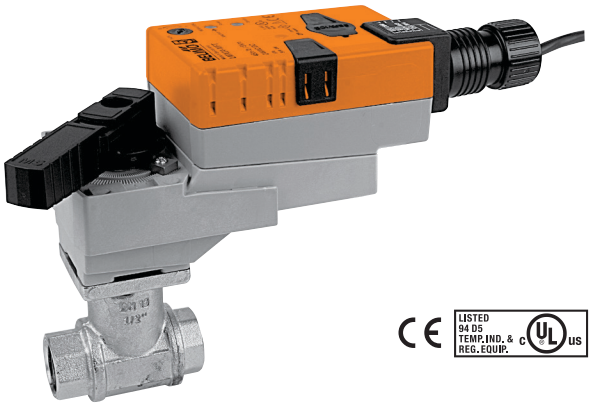


LRX24-PC



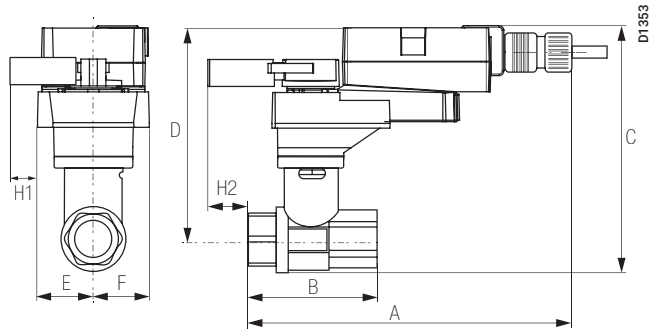
Models

LRX24-MFT95

Technical Data		
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	2 W
	holding	1.2 W
Transformer sizing		5 VA (Class 2 power source)
Electrical connection		½" conduit connector 18 GA plenum rated cable 3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection		electronic throughout 0 to 95° rotation
Operating range WRB		0 to 135 Ω Honeywell Electronic Series 90, 0 to 135 Ω input
Feedback output U		2 to 10 VDC, 0.5mA max
Input impedance		100 kΩ (0.1 mW)
Angle of rotation		90°, adjustable with mechanical stop electronically variable
Direction of rotation		reversible with ↷/↶ switch
Position indication		handle
Manual override		external push button
Running time		150 seconds (default) variable (35 to 150 seconds)
Humidity		5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA 2/IP54
Housing material		UL94-5VA
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level		<35 dB(A)
Quality standard		ISO 9001

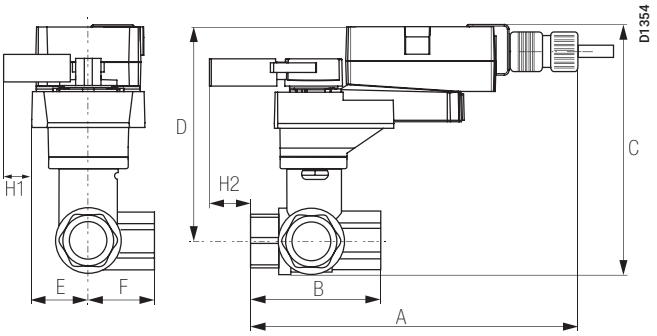
†Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3.

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207-B211	½"	15	2.41" [61.1]	1.39" [35.2]
B212-B215	½"	15	2.38" [60.4]	1.78" [45.2]
B217-B221	¾"	20	2.73" [69.3]	1.87" [47.4]
B222-B225	1"	25	3.09" [78.4]	1.87" [47.4]
B229-B230	1¼"	32	3.72" [94.6]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307-B311	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312-B315	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317-B321	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]

Wiring Diagrams

INSTALLATION NOTES

21 Provide overload protection and disconnect as required.

22 Actuators and controller must have separate transformers.

23 Consult controller instruction data for more detailed information.

24 Resistor value depends on the type of controller and the number of actuators. No resistor is used for one actuator. Honeywell® resistor kits may also be used.

25 To reverse control rotation, use the reversing switch.2524232221

***WARNING** Live Electrical Components!*

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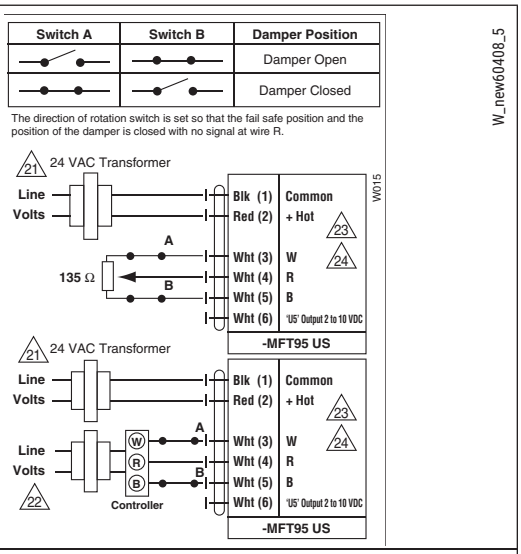
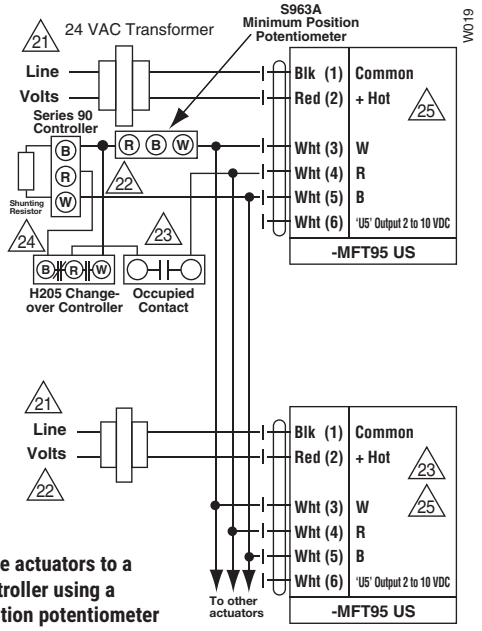
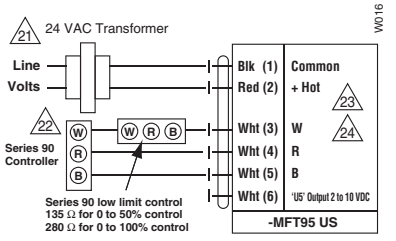


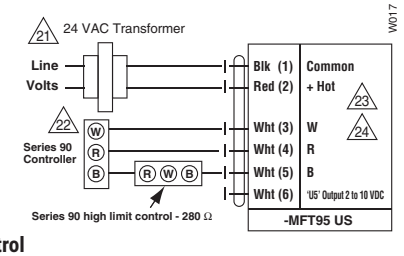
Override



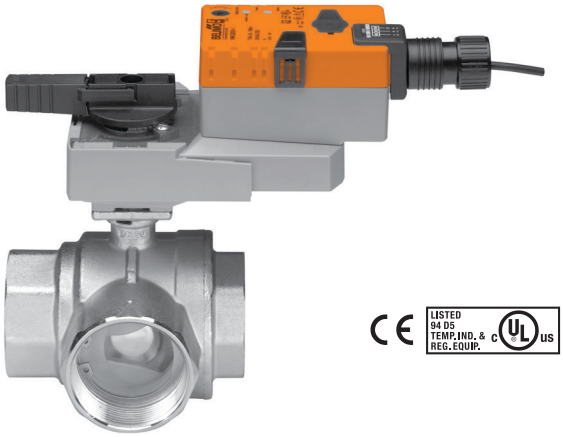
Wiring multiple actuators to a Series 90 controller using a minimum position potentiometer



Low Limit Control



High Limit Control

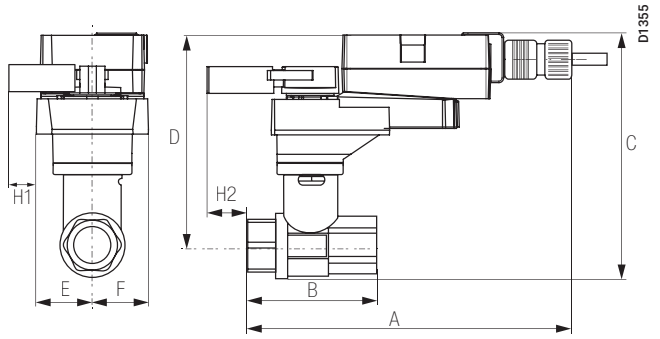


Models

LRQB24-1	Basic Version
LRQX24-1	Flexible Version

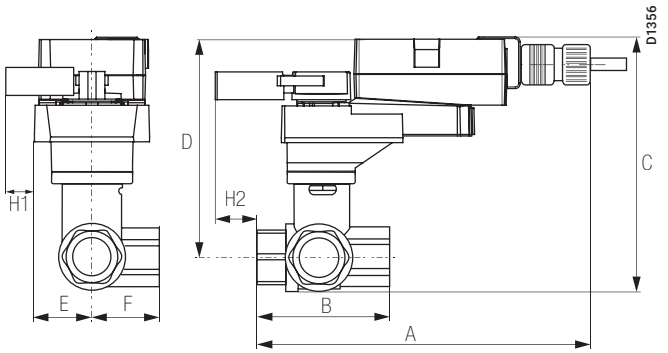
Technical Data		
Control		on/off
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	12 W
	holding	1.5 W
Transformer sizing		18 VA (Class 2 power source) 20A @ 5ms max
Electrical connection		½" conduit connector 18 GA plenum rated cable
LRQB24-1		3 ft [1m]
LRQX24-1		3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection		electronic throughout 0 to 95° rotation
Input impedance		600 Ω
Angle of rotation		max 95°, adjustable with mechanical stop
Direction of rotation		reversible with ↷/↶ switch
Position indication		handle
Manual override		external push button
Running time		
LRQB24-1		5 seconds constant of independent load
LRQX24-1		5 or 10 seconds constant of independent load
Humidity		5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA 2/IP54
Housing material		UL94-5VA
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level		<52 dB(A)
Quality standard		ISO 9001

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207-B211	½"	15	2.41" [61.1]	1.39" [35.2]
B212-B215	½"	15	2.38" [60.4]	1.78" [45.2]
B217-B221	¾"	20	2.73" [69.3]	1.87" [47.4]
B222-B225	1"	25	3.09" [78.4]	1.87" [47.4]
B229-B230	1¼"	32	3.72" [94.6]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307-B311	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312-B315	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317-B321	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

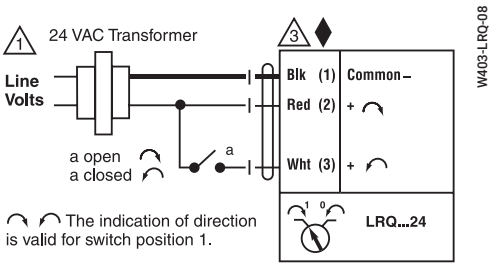
3 Actuators may also be powered by 24 VDC.

APPLICATION NOTES

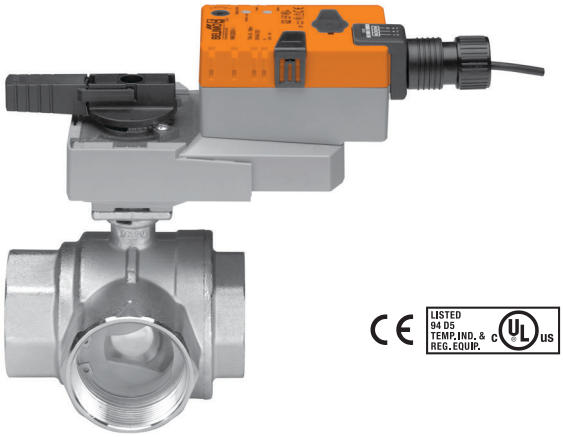
Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

WARNING *Live Electrical Components!*

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



LRQ...24-1



5 YEAR WARRANTY

CE LISTED 94 05 TEMP.IND. & REG.EQUIP. c UL us

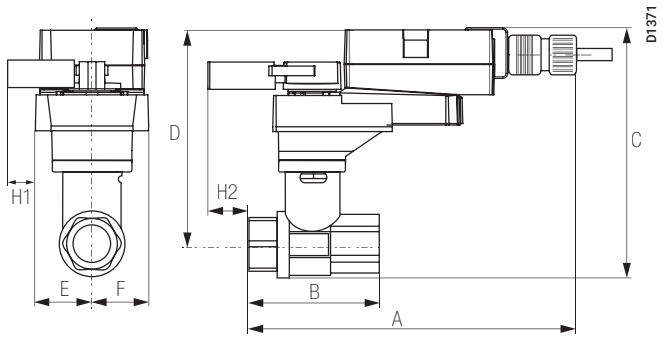
BRUSHLESS DC motor

Models

LRQB24-MFT	Basic Version
LRQX24-MFT	Flexible Version

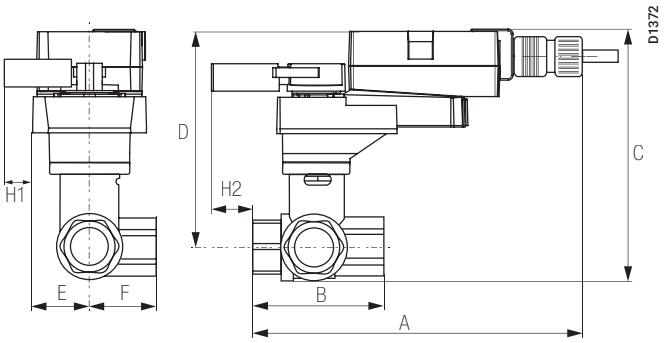
Technical Data		
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	12 W
	holding	1.5 W
Transformer sizing		18 VA (Class 2 power source) 20A @ 5ms max
Electrical connection		½" conduit connector 18 GA plenum rated cable
LRQB24-MFT		3 ft [1m]
LRQX24-MFT		3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection		electronic throughout 0 to 95° rotation
Operating range Y		2 to 10 VDC, 4 to 20 mA (default) variable (VDC, on/off)
Feedback output U		2 to 10 VDC, 0.5mA max VDC variable
Input impedance		100 kΩ (0.1 mA), 500 Ω 1500 Ω (on/off)
Angle of rotation		max 95°, adjustable with mechanical stop
Direction of rotation		reversible with ↷/↶ switch
Position indication		reflective visual indicator (snap-on)
Manual override		external push button
Running time		
LRQB24-MFT		5 seconds constant of independent load
LRQX24-MFT		5 or 10 seconds constant of independent load
Humidity		5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA 2/IP54
Housing material		UL94-5VA
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level		<52 dB(A)
Quality standard		ISO 9001

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207-B211	½"	15	2.41" [61.1]	1.39" [35.2]
B212-B215	½"	15	2.38" [60.4]	1.78" [45.2]
B217-B221	¾"	20	2.73" [69.3]	1.87" [47.4]
B222-B225	1"	25	3.09" [78.4]	1.87" [47.4]
B229-B230	1¼"	32	3.72" [94.6]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307-B311	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312-B315	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317-B321	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

3 Actuators may also be powered by 24 VDC.

5 Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.

APPLICATION NOTES

♦ The ZG-R01 500 Ω resistor may be used.

***WARNING** Live Electrical Components!*
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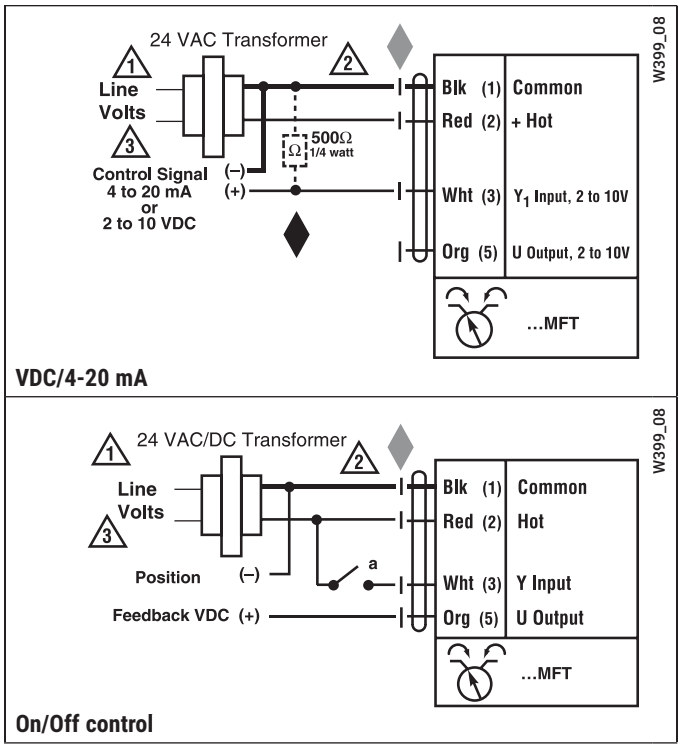
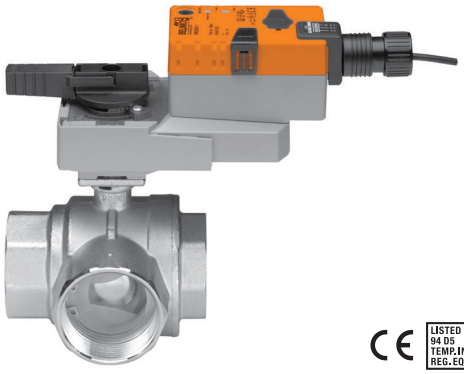




5 YEAR WARRANTY

CE LISTED 94 D5 TEMP.IND. & REG.EQUIP. c UL us

BRUSHLESS DC motor

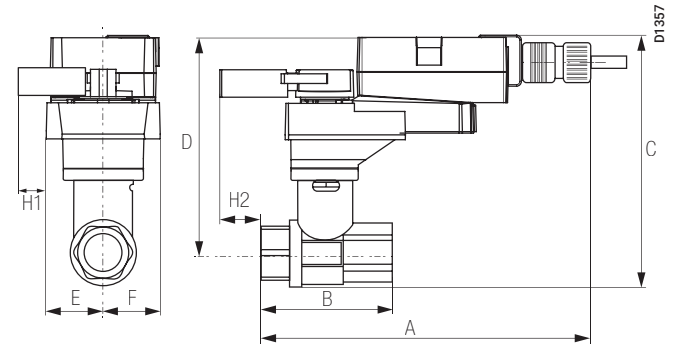
Models

NRQB24-1	Basic Version
NRQX24-1	Flexible Version

Technical Data	
Control	on/off
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	12 W
holding	1.5 W
Transformer sizing	18 VA (Class 2 power source)
Electrical connection	½" conduit connector, 18 GA plenum rated cable
NRQB24-1	3 ft [1m]
NRQX24-1	3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection	electronic throughout 0 to 95° rotation
Input impedance	600 Ω
Angle of rotation	max 95°, adjustable with mechanical stop
Direction of rotation	reversible with ↷/↶ switch
Position indication	reflective visual indicator (snap-on)
Manual override	external push button
Running time	constant of independent load
NRQB24-1	5 seconds
NRQX24-1	5, 10 or 15 seconds
Humidity	5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature	-22°F to 122°F [-30°C to 50°C]
Storage temperature	-40°F to 176°F [-40°C to 80°C]
Housing	NEMA 2/IP54
Housing material	UL94-5VA
Agency listings†	cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level	<52 dB(A)
Quality standard	ISO 9001

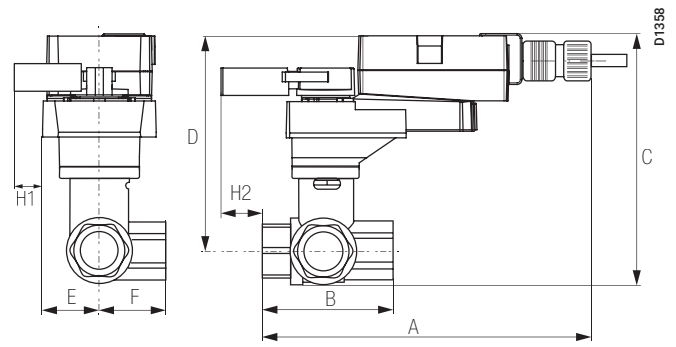
Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3.

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B231-B232	1¼"	32	3.72" [94.6]	2.04" [51.9]
B238-B240	1½"	40	3.88" [98.5]	2.04" [51.9]
B248-B250	2"	50	4.21" [107]	2.27" [57.7]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B329-B331	1¼"	32	3.96" [100.6]	2.27" [57.7]	2.14" [54.3]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

3 Actuators may also be powered by 24 VDC.

APPLICATION NOTES

♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

WARNING *Live Electrical Components!*

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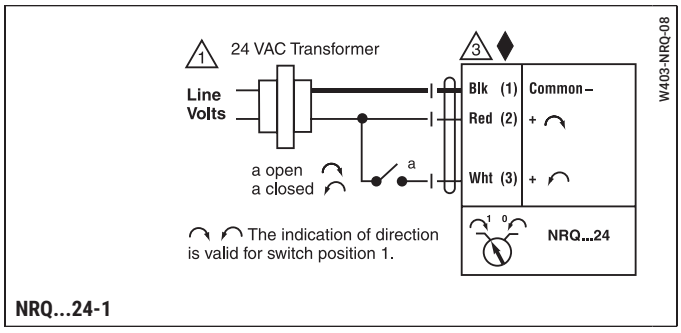


NRQ...24-1

5 YEAR WARRANTY

CE LISTED 94 D5 TEMP.IND. & REG.EQUIP. c UL us

BRUSHLESS DC motor

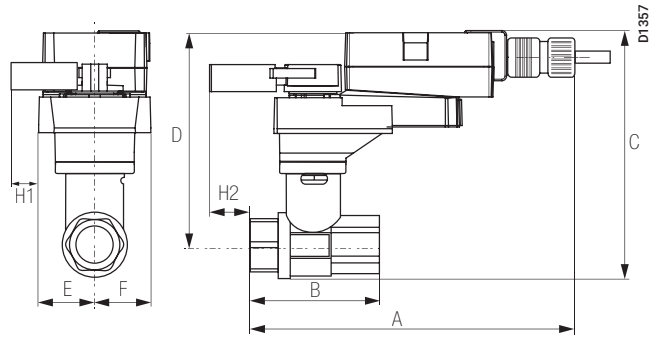
Models

NRQB24-MFT	Basic Version
NRQX24-MFT	Flexible Version

Technical Data		
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	12 W
	holding	1.5 W
Transformer sizing		18 VA (Class 2 power source)
Electrical connection		½" conduit connector, 18 GA plenum rated cable
NRQB24-MFT		3 ft [1m]
NRQX24-MFT		3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection		electronic throughout 0 to 95° rotation
Operating range Y		2 to 10 VDC, 4 to 20 mA (default) variable (VDC, on/off)
Feedback output U		2 to 10 VDC, 0.5mA max VDC variable
Input impedance		100 kΩ (0.1 mA), 500 Ω, 1500 Ω (on/off)
Angle of rotation		max 95°, adjustable with mechanical stop electronically variable
Direction of rotation		reversible with ↷/↶ switch
Position indication		reflective visual indicator (snap-on)
Manual override		external push button
Running time		constant of independent load
NRQB24-MFT		5 seconds
NRQX24-MFT		5, 10 or 15 seconds
Humidity		5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA 2/IP54
Housing material		UL94-5VA
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level		<52 dB(A)
Quality standard		ISO 9001

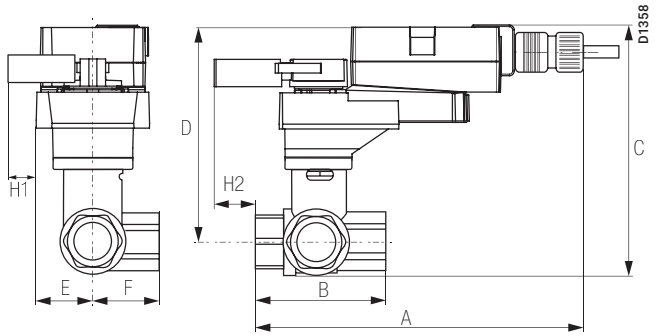
Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3.

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B231-B232	1¼"	32	3.72" [94.6]	2.04" [51.9]
B238-B240	1½"	40	3.88" [98.5]	2.04" [51.9]
B248-B250	2"	50	4.21" [107]	2.27" [57.7]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B329-B331	1¼"	32	3.96" [100.6]	2.27" [57.7]	2.14" [54.3]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

3 Actuators may also be powered by 24 VDC.

5 Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.

APPLICATION NOTES

♦ The ZG-R01 500 Ω resistor may be used.

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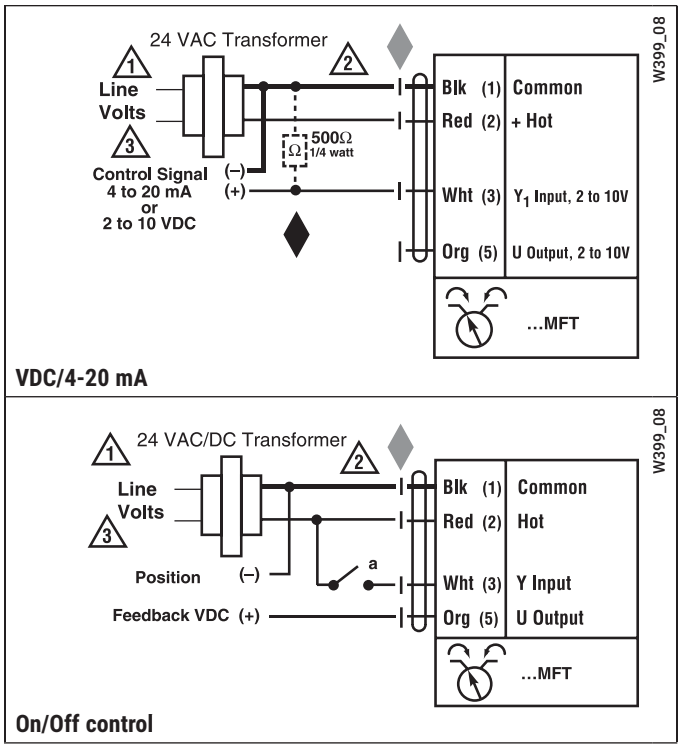


VDC/4-20 mA

On/Off control

5 YEAR WARRANTY

CE LISTED 94 DS TEMP.IND. & REG.EQUIP. c UL us

BRUSHLESS DC motor

Models

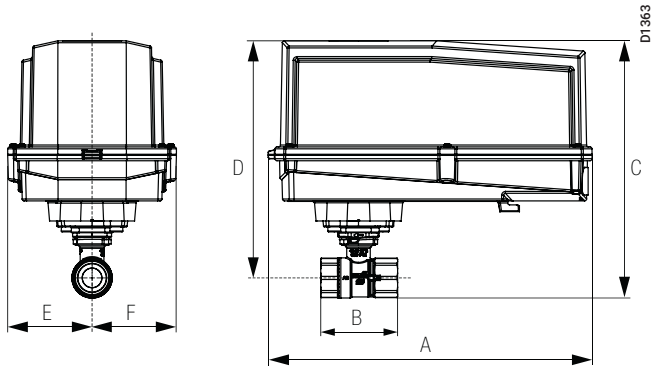
NRB24-3-T N4	
NRB24-3-T N4H	w/built in heater
NRX24-3-T N4	
NRX24-3-T N4H	w/built in heater

Technical Data		
Control		on/off, floating point
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	2.0 W / heater 24 W
	holding	0.2 W
Transformer sizing		4 VA (class 2 power source) / heater 19 VA
Electrical connection		screw terminal (for 26 to 14 GA wire)
Overload protection		electronic throughout 0° to 95° rotation
Input impedance		600 Ω
Angle of rotation		90°, adjustable with mechanical stop
Direction of rotation		reversible with ↷/↶ switch
Position indication		visual pointer
Manual override		external push button
Running time		90 seconds constant independent of load
Humidity		100% RH
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing type		UL Type 4X/NEMA 4X/IP66 & IP67
Housing material		Polypropylene
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE according to 89/336/EEC.
Quality standard		ISO 9001

*Cannot be used with the CCV-EXT-KIT

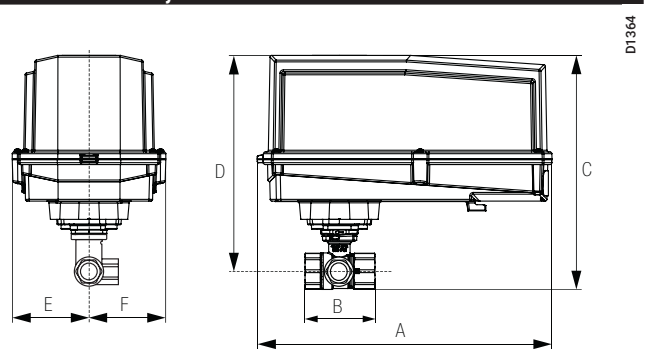
† Rated impulse voltage 800V, Control pollution degree 3, Type of action 1.

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207-B211	½"	15	2.41" [61.1]	1.39" [35.2]
B212-B215	½"	15	2.38" [60.4]	1.78" [45.2]
B217-B221	¾"	20	2.73" [69.3]	1.87" [47.4]
B222-B225	1"	25	3.09" [78.4]	1.87" [47.4]
B229-B230	1¼"	32	3.72" [94.6]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307-B311	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312-B315	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317-B321	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]

Wiring Diagrams

INSTALLATION NOTES

2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

3 Actuators are provided with color coded wires.
Wire numbers are provided for reference.

4 Actuators may also be powered by 24 VDC.

APPLICATION NOTES

♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

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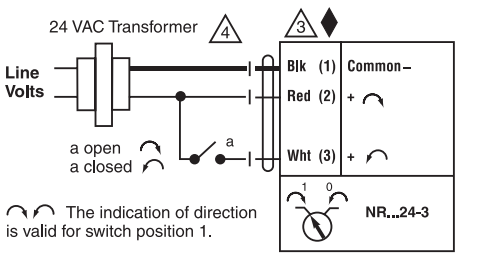
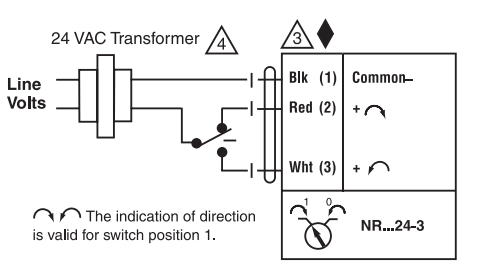
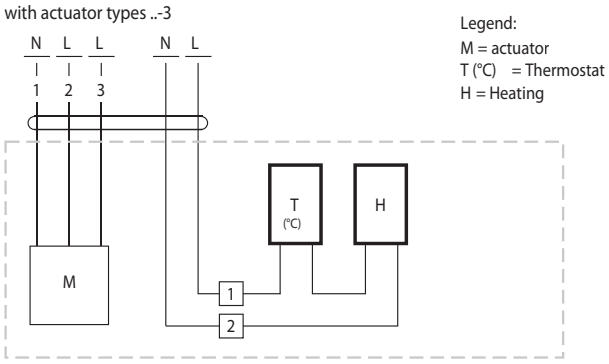


On/Off control



Floating Point control



Note
The following points must be taken into account with independent, external wiring:
- All contact between the cables or wires that are introduced and the heating element is to be avoided.
- Where necessary, use cables with sufficient numbers of wires, e.g. so that the heating and the actuator can be supplied separately with voltage.

Heater wiring

MFT

5 YEAR WARRANTY

CE LISTED 94 DS TEMP.IND. & REG.EQUIP. c UL us

BRUSHLESS DC motor

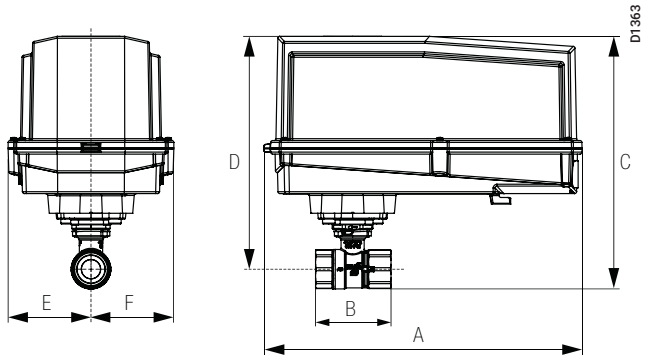
Models

NRB24-SR-T N4	
NRB24-SR-T N4H	w/built in heater
NRX24-SR-T N4	
NRX24-SR-T N4H	w/built in heater

Technical Data		
Control		2 to 10 VDC, 4 to 20 mA
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	2.5 W / heater 24 W
	holding	0.4 W
Transformer sizing		5 VA (class 2 power source) / heater 20 VA
Electrical connection		screw terminal (for 26 to 14 GA wire)
Overload protection		electronic throughout 0° to 95° rotation
Input impedance		100 kΩ (0.1mA), 500Ω
Angle of rotation		90°, adjustable with mechanical stop
Direction of rotation		reversible with ↷/↶ switch
Position indication		visual pointer
Manual override		external push button
Running time		90 seconds constant independent of load
Humidity		100% RH
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing type		UL Type 4X/NEMA 4X/IP66 & IP67
Housing material		Polypropelene
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE according to 89/336/EEC.
Quality standard		ISO 9001

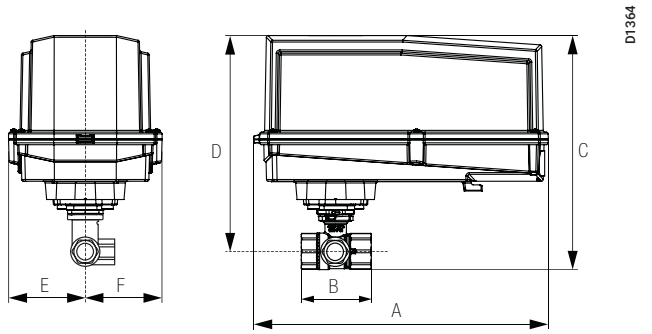
†Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3
*Cannot be used with the CCV-EXT-KIT

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207-B211	½"	15	2.41" [61.1]	1.39" [35.2]
B212-B215	½"	15	2.38" [60.4]	1.78" [45.2]
B217-B221	¾"	20	2.73" [69.3]	1.87" [47.4]
B222-B225	1"	25	3.09" [78.4]	1.87" [47.4]
B229-B230	1¼"	32	3.72" [94.6]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307-B311	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312-B315	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317-B321	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]

Wiring Diagrams

INSTALLATION NOTES

△2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

△3 Actuators may also be powered by 24 VDC.

△5 Only connect common to neg. (–) leg of control circuits.

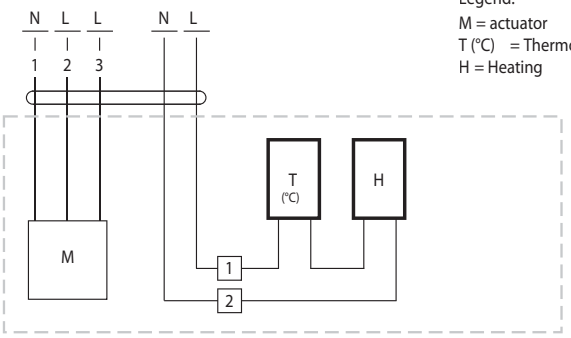
APPLICATION NOTES

♦ The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

⚠ ***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

Wiring Diagrams

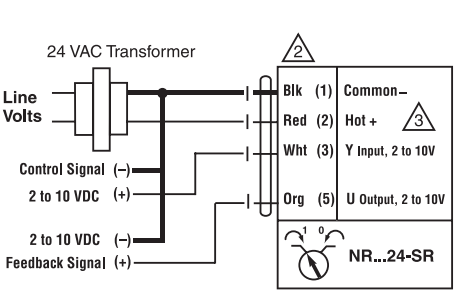
with actuator types ..-3



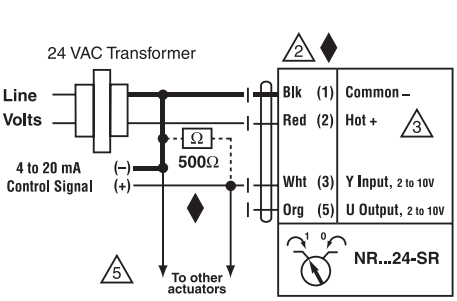
Legend:
M = actuator
T (°C) = Thermostat
H = Heating

Note
The following points must be taken into account with independent, external wiring:
- All contact between the cables or wires that are introduced and the heating element is to be avoided.
- Where necessary, use cables with sufficient numbers of wires, e.g. so that the heating and the actuator can be supplied separately with voltage.

Heater wiring



2 to 10 VDC control



4 to 20 mA control

MFT

5 YEAR WARRANTY

CE LISTED 94 D5 TEMP.IND. & REG.EQUIP. c UL us

BRUSHLESS DC motor

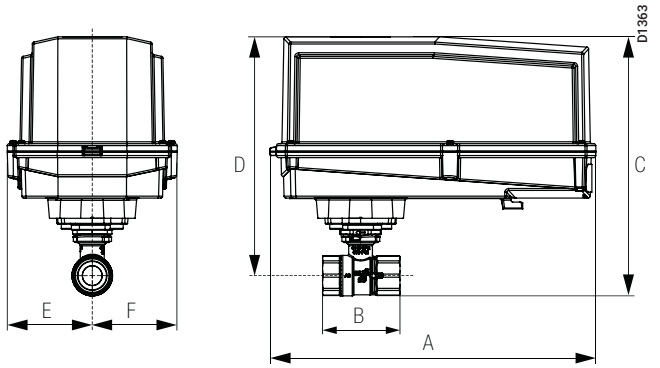
Models

NRX24-MFT-T N4
NRX24-MFT-T N4H w/built in heater

Technical Data	
Control	2 to 10 VDC, 4 to 20 mA (default) variable (VDC, PWM, floating point, on/off)
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	3.5 W (1.25 W) / heater 24 W
holding	1.25 W
Transformer sizing	6 VA (class 2 power source) / heater 21 VA
Electrical connection	screw terminal (for 26 to 14 GA wire)
Overload protection	electronic throughout 0° to 95° rotation
Input impedance	100 kΩ (0.1 mA), 500 Ω 1500 Ω (PWM, floating point, on/off)
Angle of rotation	95°, adjustable with mechanical stop electronically variable
Direction of rotation	reversible with ↷/↶ switch
Position indication	visual pointer
Manual override	external push button
Running time	150 seconds (default) constant independent of load variable (75 to 350 seconds)
Humidity	100% RH
Ambient temperature	-22°F to 122°F [-30°C to 50°C]
Storage temperature	-40°F to 176°F [-40°C to 80°C]
Housing type	UL Type 4X/NEMA 4X/IP66 & IP67
Housing material	Polypropelene
Agency Listings†	cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE according to 89/336/EEC.
Quality standard	ISO 9001

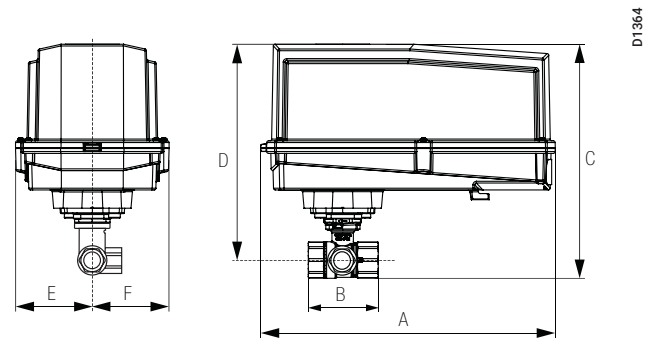
†Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3
*Cannot be used with the CCV-EXT-KIT

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207-B211	½"	15	2.41" [61.1]	1.39" [35.2]
B212-B215	½"	15	2.38" [60.4]	1.78" [45.2]
B217-B221	¾"	20	2.73" [69.3]	1.87" [47.4]
B222-B225	1"	25	3.09" [78.4]	1.87" [47.4]
B229-B230	1¼"	32	3.72" [94.6]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307-B311	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312-B315	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317-B321	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]

Wiring Diagrams

INSTALLATION NOTES

△2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

△3 Actuators may also be powered by 24 VDC.

△4 Position feedback cannot be used with Triac sink controller.
The actuator internal common reference is not compatible.

△6 Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.

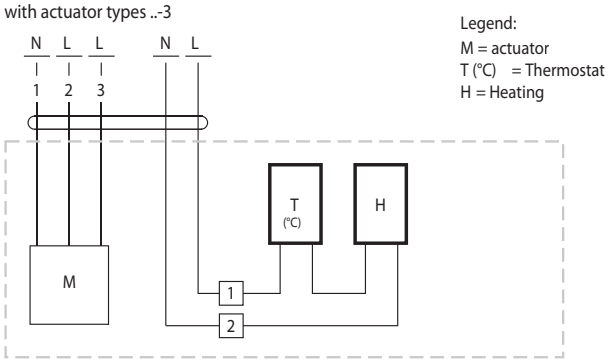
△8 Contact closures A & B also can be triacs.
A& B should both be closed for triac source and open for triac sink.

△9 For triac sink the common connection from the actuator must be connected to the hot connection.

APPLICATION NOTES

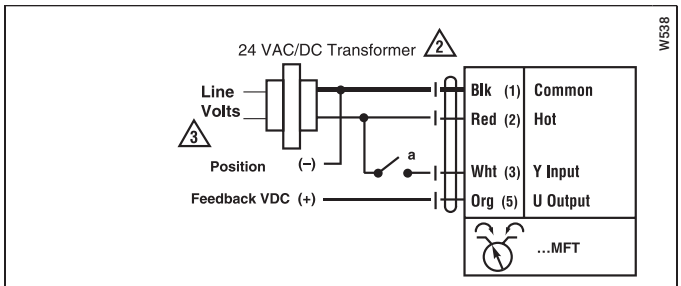
♦ The ZG-R01 500 Ω resistor converts the 4 to 10 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

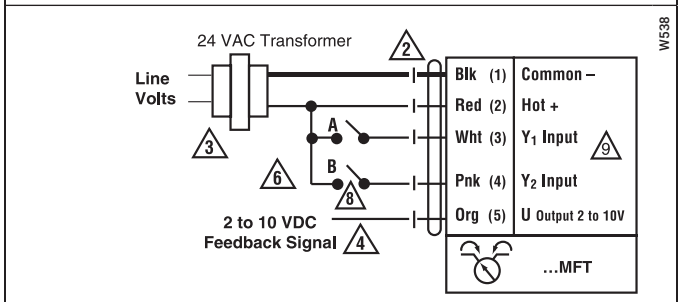


Note
The following points must be taken into account with independent, external wiring:
- All contact between the cables or wires that are introduced and the heating element is to be avoided.
- Where necessary, use cables with sufficient numbers of wires, e.g. so that the heating and the actuator can be supplied separately with voltage.

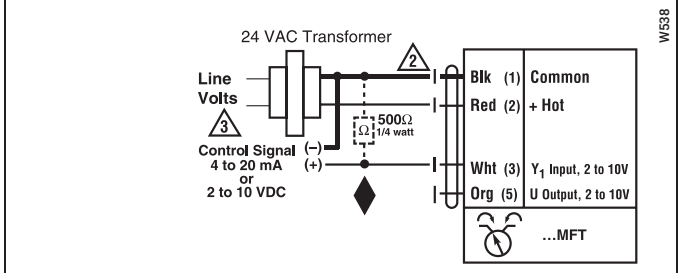
Heater wiring



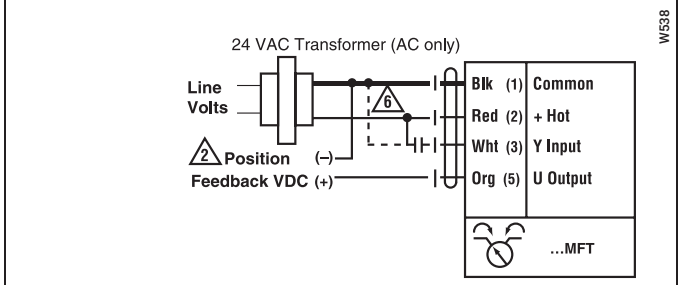
On/Off control



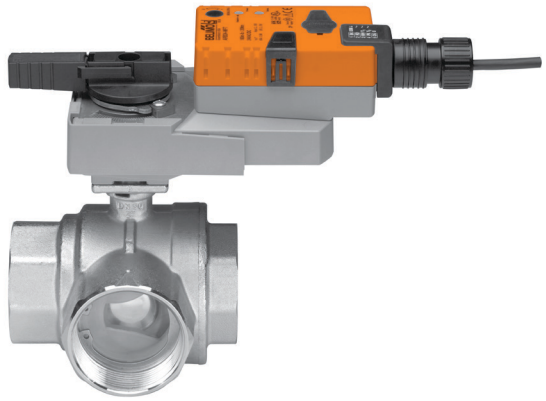
Floating Point



VDC/4-20 mA



PWM



5 YEAR WARRANTY

CE LISTED 94 DS TEMP.IND. & REG.EQUIP. c UL us BRUSHLESS DC motor

Models

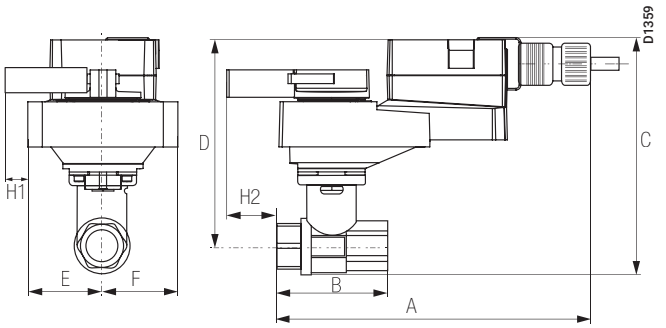
ARB24-3
ARB24-3-S w/built-in Aux. Switch
ARX24-3 Flexible
ARX24-3-S Flexible w/built-in Aux. Switch
ARB24-3-5-14
ARX24-3-5-14

Technical Data	
Control	on/off, floating point
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	2.5 W
holding	0.2 W
Transformer sizing	5.5 VA (class 2 power source)
Electrical connection	½" conduit connector 18 GA plenum rated cable
ARB24-3...	3 ft. [1m]
ARX24-3...	3 ft. [1m] 10 ft. [3m] 16 ft. [5m]
Overload protection	electronic throughout 0° to 95° rotation
Input impedance	600 Ω
Angle of rotation	90°, adjustable with mechanical stop
Direction of rotation	reversible with protected ↷/↶ switch
Position indication	handle
Manual override	external push button
Running time ARB24-3... ARX24-3...	 90 seconds 300, 150, 90 seconds, constant independent of load
Humidity	5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature	-22°F to 122°F [-30°C to 50°C]
Storage temperature	-40°F to 176°F [-40°C to 80°C]
Housing	NEMA 2/IP54
Housing material	UL94-5VA
Agency listings†	cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level	<45 dB(A)
Quality standard	ISO 9001

AR...24-3-S	
Auxiliary switch (-S models)	1 x SPDT, 3A (0.5A) @ 250 VAC, UL Listed, adjustable 0 to 90°

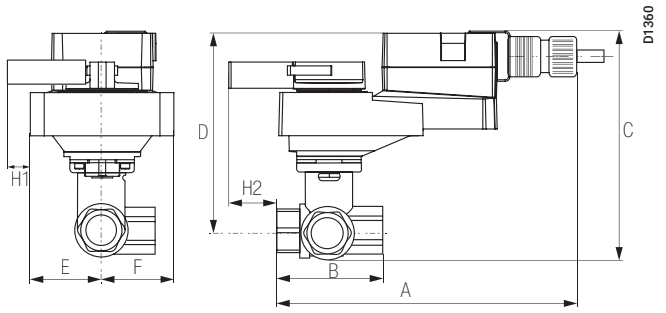
† Rated impulse voltage 800V, Control pollution degree 3, Type of action 1 (1.B for -S models)

Dimensions with 2-Way Valve



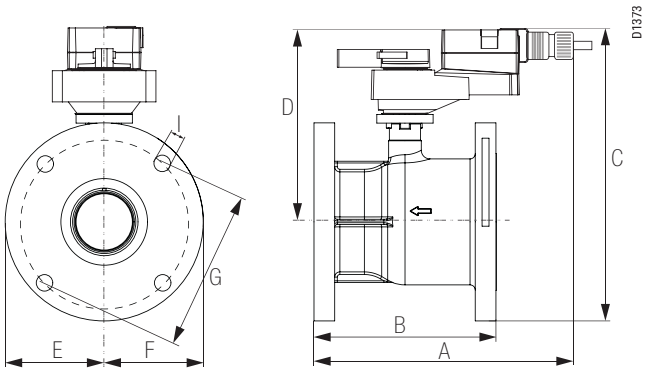
	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B231-B232	1¼"	32	3.72" [94.6]	1.98" [50.4]
B238-B240	1½"	40	3.88" [98.5]	1.98" [50.4]
B248-B250	2"	50	4.21" [107.0]	2.21" [56.2]
B251-B254	2"	50	4.93" [125.2]	2.68" [68.0]
B261-B265	2½"	65	5.55" [140.9]	2.68" [68.0]
B277-B280	3"	80	5.82" [147.9]	2.68" [68.0]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B329-B331	1¼"	32	3.96" [100.6]	2.21" [56.2]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.45" [62.2]	2.33" [59.1]
B347-B352	2"	50	4.90" [124.5]	2.68" [68.0]	2.60" [66.0]

Dimensions



Valve Body	Nominal Pipe Size	Top Flange Design	Flange Diameter	Face-to-Face Length	Height
			A	B	C
B6250	2½" [65]	F05	7.50" [190.5]	5.50" [139.7]	8.10" [205.4]
B6300	3" [80]		8.00" [203.2]	6.60" [167.6]	8.40" [213.1]
B6400	4" [100]		9.00" [228.6]	8.30" [210.8]	9.30" [235.9]

Wiring Diagrams

INSTALLATION NOTES

2 **CAUTION** *Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

3 For end position indication, interlock control, etc.,
ARB24-3-S incorporates one built-in auxiliary switches:
1 x SPDT, 3A (0.5A) @250 VAC, UL listed, adjustable 0° to 95°.

4 Actuators may also be powered by 24 VDC.

APPLICATION NOTES

Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

WARNING *Live Electrical Components!*
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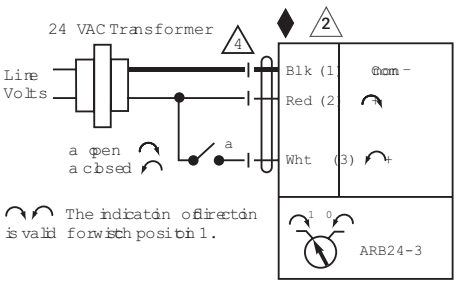
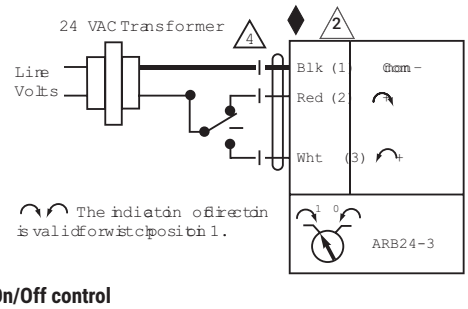
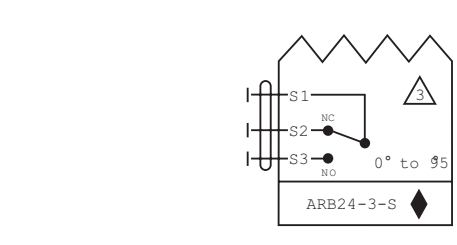


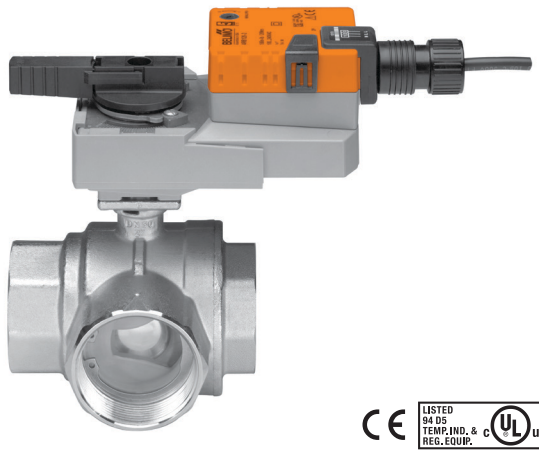
On/Off control



Floating Point or On/Off control



Auxiliary switch



5 YEAR WARRANTY

CE LISTED 94 DS TEMP.IND. & REG.EQUIP. c UL us

BRUSHLESS DC-motor

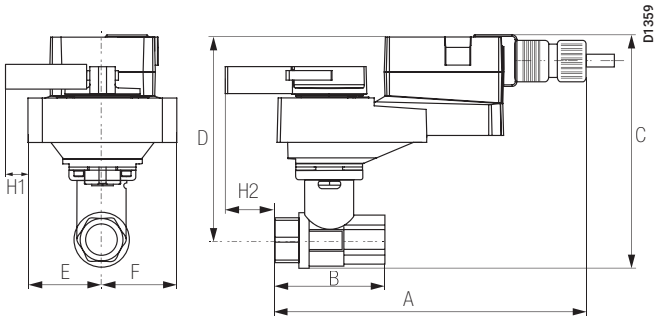
Models

ARB24-SR
ARX24-SR Flexible Version

Technical Data		
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	2.5 W
	holding	0.4 W
Transformer sizing		5 VA (class 2 power source)
Electrical connection		½" conduit connector 18 GA plenum rated cable 3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection		electronic throughout 0° to 95° rotation
Operating range Y		2 to 10 VDC, 4 to 20 mA
Feedback output U		1 to 10 VDC, max 0.5 mA
Input impedance		100 kΩ (0.1 mA), 500 Ω
Angle of rotation		90°, adjustable with mechanical stop
Torque		180 in-lb [20 Nm]
Direction of rotation		reversible with protected ↷/↶ switch
Position indication		handle
Manual override		external push button
Running time ARB24-SR... ARX24-SR...		 90 seconds 300, 150, 90 seconds, constant independent of load
Humidity		5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature		-22°F to +122°F [-30°C to +50°C]
Storage temperature		-40°F to +176°F [-40°C to +80°C]
Housing		NEMA 2/IP54
Housing material		UL94-5VA
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level		<45 dB(A)
Quality standard		ISO 9001

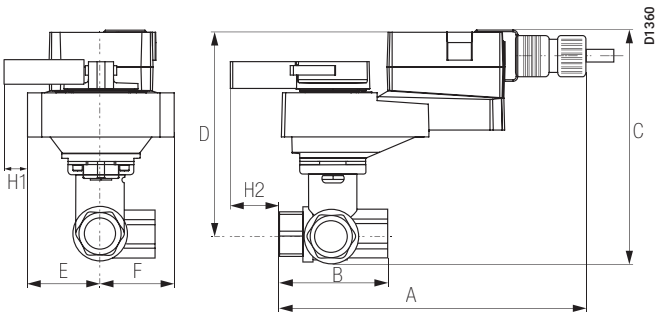
† Rated impulse voltage 800V, Control pollution degree 3, Type of action 1 (1.B for -S models)

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B231-B232	1¼"	32	3.72" [94.6]	2.04" [51.9]
B238-B240	1½"	40	3.88" [98.5]	2.04" [51.9]
B248-B250	2"	50	4.21" [107.0]	2.27" [57.7]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B329-B331	1¼"	32	3.96" [100.6]	2.27" [57.7]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.51" [63.7]	2.40" [61.1]
B347-B352	2"	50	4.90" [124.5]	2.73" [69.5]	2.74" [69.7]

Wiring Diagrams

INSTALLATION NOTES

△2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

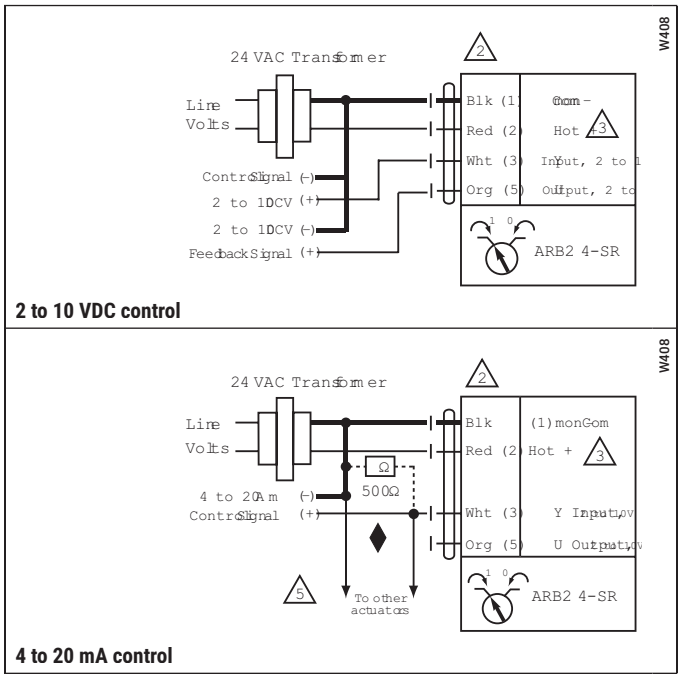
△3 Actuators may also be powered by 24 VDC.

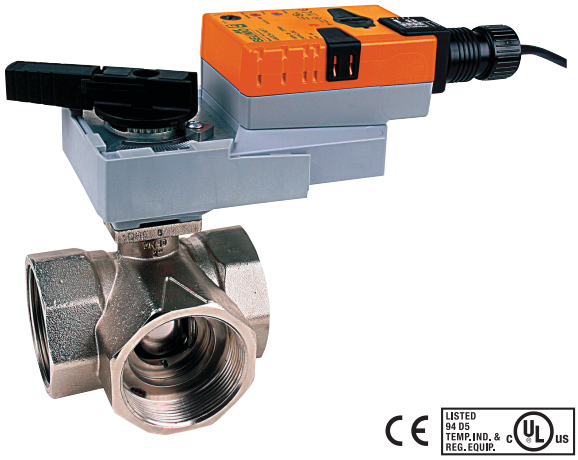
△5 Only connect common to neg. (–) leg of control circuits.

APPLICATION NOTES

◆ The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.





5 YEAR WARRANTY

CE LISTED 94 DS TEMP.IND. & REG.EQUIP. c UL us BRUSHLESS DC motor

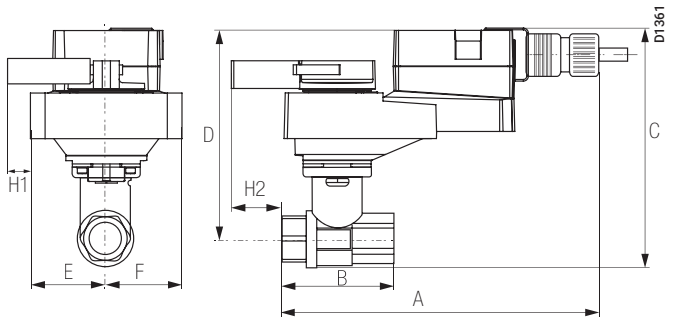
Models

ARB120-3
ARX120-3 Flexible Version

Technical Data	
Control	on/off, floating point
Power supply	100 to 240 VAC, 50/60 Hz (nominal) 85 to 265 VAC, 50/60 Hz (tolerance)
Power consumption running	3 W
holding	0.6 W
Transformer sizing	7 VA (class 2 power source)
Electrical connection	½" conduit connector 18 GA appliance rated cable
ARB120-3	3 ft [1m]
ARX120-3	3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection	electronic throughout 0° to 95° rotation
Input impedance	600 Ω
Angle of rotation	90°, adjustable with mechanical stop
Direction of rotation	reversible with protected ↷/↶ switch
Position indication	handle
Manual override	external push button
Running time	
ARB120-3	90 seconds
ARX120-3	300, 150, 90 seconds, constant independent of load
Humidity	5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature	-22°F to 122°F [-30°C to 50°C]
Storage temperature	-40°F to 176°F [-40°C to 80°C]
Housing	NEMA 2/IP54
Housing material	UL94-5VA
Agency listings†	cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level	<45 dB(A)
Servicing	maintenance free
Quality standard	ISO 9001

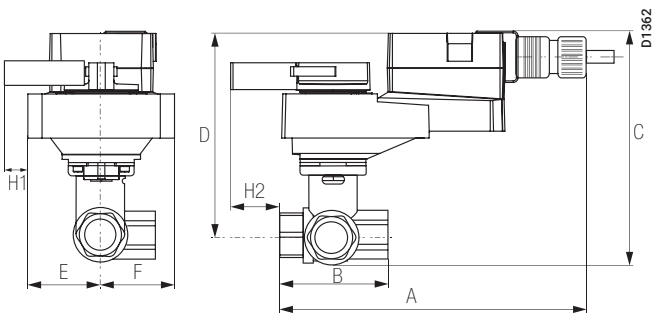
† Rated impulse voltage 4kV, Control pollution degree 3, Type of action 1

Dimensions with 2-Way Valve



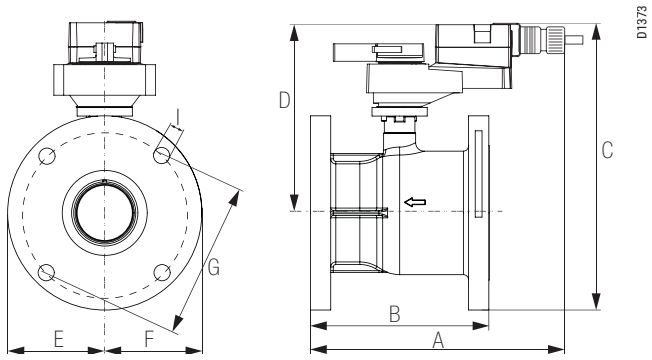
	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B231-B232	1¼"	32	3.72" [94.6]	2.04" [51.9]
B238-B240	1½"	40	3.88" [98.5]	2.04" [51.9]
B248-B250	2"	50	4.21" [107.0]	2.27" [57.7]
B251-B254	2"	50	4.93" [125.2]	2.73" [69.5]
B261-B265	2½"	65	5.55" [140.9]	2.73" [69.5]
B277-B280	3"	80	5.82" [147.9]	2.73" [69.5]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B329-B331	1¼"	32	3.96" [100.6]	2.27" [57.7]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.51" [63.7]	2.40" [61.1]
B347-B352	2"	50	4.90" [124.5]	2.73" [69.5]	2.74" [69.7]

Dimensions



Valve Body	Nominal Pipe Size	Top Flange Design	Flange Diameter	Face-to-Face Length	Height
			A	B	C
B6250	2½" [65]	F05	7.50" [190.5]	5.50" [139.7]	8.10" [205.4]
B6300	3" [80]		8.00" [203.2]	6.60" [167.6]	8.40" [213.1]
B6400	4" [100]		9.00" [228.6]	8.30" [210.8]	9.30" [235.9]

Wiring Diagrams

INSTALLATION NOTES

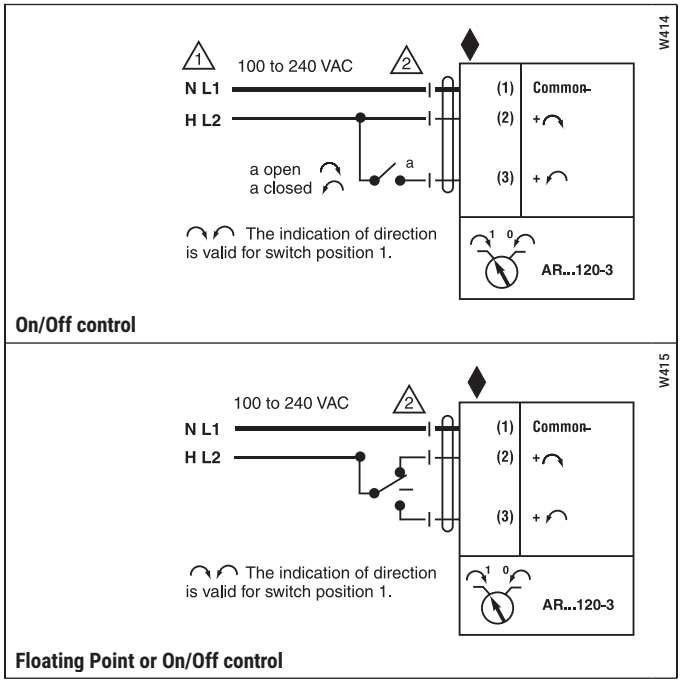
1 Provide overload protection and disconnect as required.

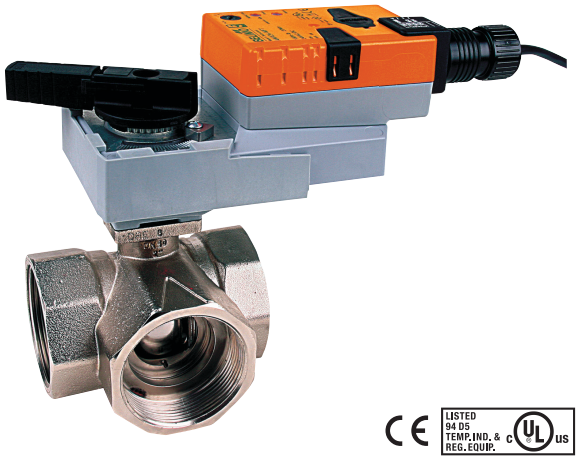
2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

APPLICATION NOTES

Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.





5 YEAR WARRANTY

CE LISTED 94 DS TEMP.IND. & REG.EQUIP. c UL us

BRUSHLESS DC-motor

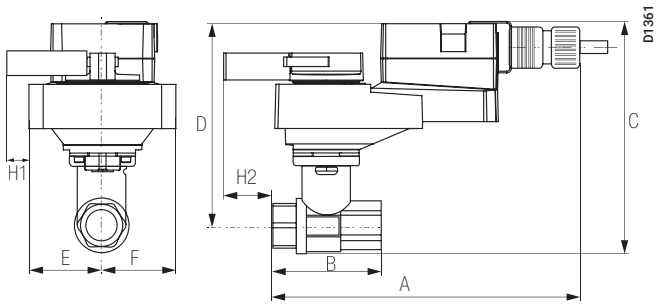
Models

ARB120-SR
ARX120-SR Flexible Version

Technical Data	
Control	on/off, floating point
Power supply	100 to 240 VAC, 50/60 Hz (nominal) 85 to 265 VAC, 50/60 Hz (tolerance)
Power consumption running	3 W
holding	0.6 W
Transformer sizing	7.5 VA (class 2 power source)
Electrical connection	½" conduit connector 18 GA plenum rated cable
ARB120-SR	3 ft [1m]
ARX120-SR	3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection	electronic throughout 0° to 95° rotation
Feedback output U	1 to 10 VDC, max 0.5 mA
Input impedance	600 Ω
Angle of rotation	90°, adjustable with mechanical stop
Direction of rotation	reversible with protected ↷/↶ switch
Position indication	handle
Manual override	external push button
Running time	
ARB120-SR	90 seconds
ARX120-SR	300, 150, 90 seconds, constant independent of load
Humidity	5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature	-22°F to 122°F [-30°C to 50°C]
Storage temperature	-40°F to 176°F [-40°C to 80°C]
Housing	NEMA 2/IP54
Housing material	UL94-5VA
Agency listings†	cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level	<45 dB(A)
Servicing	maintenance free
Quality standard	ISO 9001

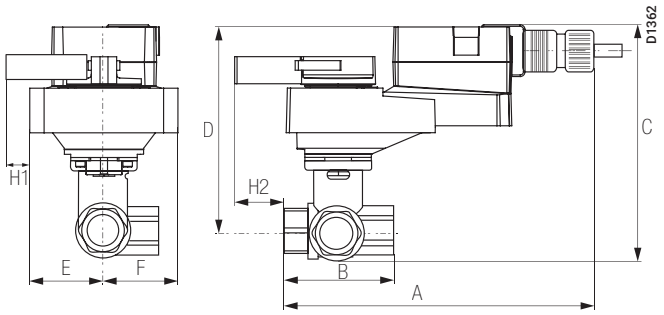
† Rated impulse voltage 4kV, Control pollution degree 3, Type of action 1

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B231-B232	1¼"	32	3.72" [94.6]	2.04" [51.9]
B238-B240	1½"	40	3.88" [98.5]	2.04" [51.9]
B248-B250	2"	50	4.21" [107.0]	2.27" [57.7]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B329-B331	1¼"	32	3.96" [100.6]	2.27" [57.7]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.51" [63.7]	2.40" [61.1]
B347-B352	2"	50	4.90" [124.5]	2.73" [69.5]	2.74" [69.7]

Wiring Diagrams

INSTALLATION NOTES

△2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

△6 Only connect common to neg. (–) leg of control circuits.

△7 A 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC.

△15 ARB(X) can be supplied with both 120 VAC and 230 VAC.

△19 All 120 VAC and 230 VAC actuators use appliance rated cables.

APPLICATION NOTES

♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

⚠ ***WARNING** Live Electrical Components!*
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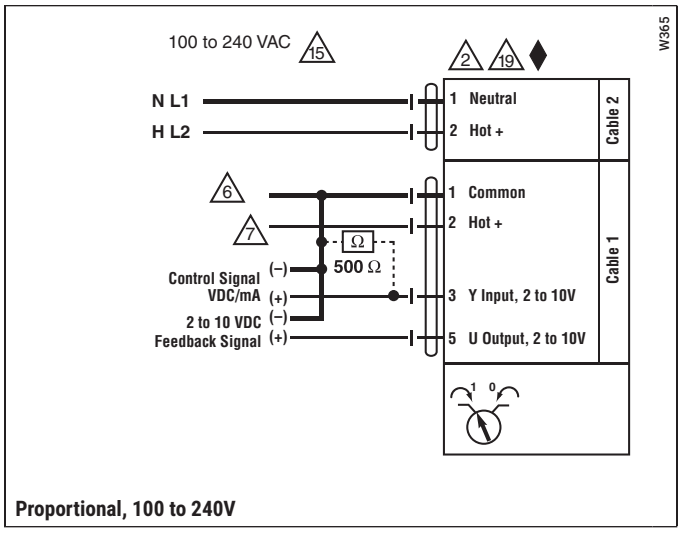
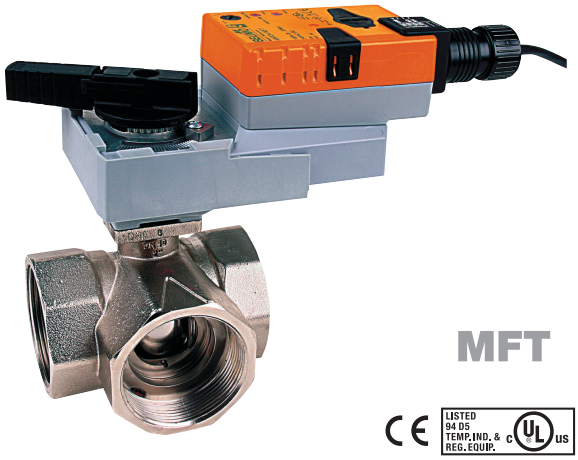


Proportional, 100 to 240V



MFT

5 YEAR WARRANTY

CE LISTED 94 DS TEMP.IND. & REG.EQUIP. c UL us

BRUSHLESS DC motor

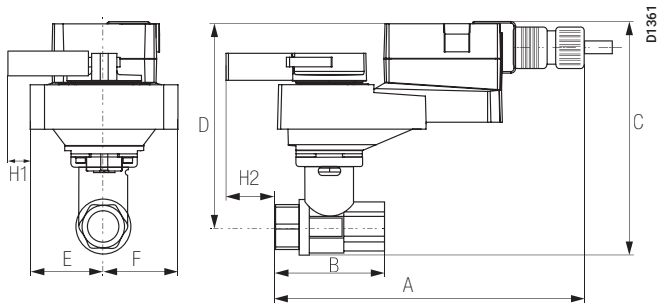
Models

ARX24-MFT
ARX24-MFT-5-14

Technical Data		
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	4 W
	holding	1.25 W
Transformer sizing		6 VA (class 2 power source)
Electrical connection		½" conduit connector 18 GA plenum rated cable
ARX24-MFT		3 ft. [1m], 10 ft. [3m], 16 ft. [5m]
Overload protection		electronic throughout 0° to 95° rotation
Operating range Y		2 to 10 VDC, 4 to 20 mA (default) variable (VDC, PWM, floating point, on/off)
Feedback output U		2 to 10 VDC, 0.5 mA max VDC variable
Input impedance		100 kΩ (0.1 mA), 500 Ω 1500 Ω (PWM, floating point, on/off)
Angle of rotation		95° electronically variable
Direction of rotation		reversible with protected ↷/↶ switch
Position indication		handle
Manual override		external push button
Running time ARB24-MFT ARX24-MFT		 150 seconds variable (90 to 350 seconds)
Humidity		5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA 2/IP54
Housing material		UL94-5VA
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level		<45 dB(A)
Quality standard		ISO 9001

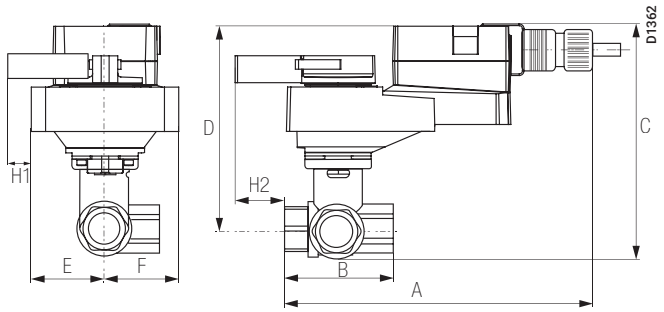
† Rated impulse voltage 4kV, Control pollution degree 3, Type of action 1

Dimensions with 2-Way Valve



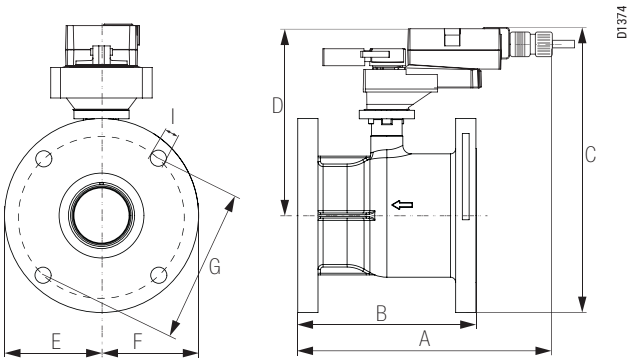
	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B231-B232	1¼"	32	3.72" [94.6]	1.98" [50.4]
B238-B240	1½"	40	3.88" [98.5]	1.98" [50.4]
B248-B250	2"	50	4.21" [107.0]	2.21" [56.2]
B251-B254	2"	50	4.93" [125.2]	2.68" [68.0]
B261-B265	2½"	65	5.55" [140.9]	2.68" [68.0]
B277-B280	3"	80	5.82" [147.9]	2.68" [68.0]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B329-B331	1¼"	32	3.96" [100.6]	2.21" [56.2]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.45" [62.2]	2.33" [59.1]
B347-B352	2"	50	4.90" [124.5]	2.68" [68.0]	2.60" [66.0]

Dimensions



Valve Body	Nominal Pipe Size	Top Flange Design	Flange Diameter	Face-to-Face Length	Height
			A	B	C
B6250	2½" [65]	F05	7.50" [190.5]	5.50" [139.7]	8.10" [205.4]
B6300	3" [80]		8.00" [203.2]	6.60" [167.6]	8.40" [213.1]
B6400	4" [100]		9.00" [228.6]	8.30" [210.8]	9.30" [235.9]

Wiring Diagrams

INSTALLATION NOTES

△2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

△3 Actuators may also be powered by 24 VDC.

△4 Position feedback cannot be used with Triac sink controller.
The actuator internal common reference is not compatible.

△6 Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.

△8 Contact closures A & B also can be triacs.
A& B should both be closed for triac source and open for triac sink.

△9 For triac sink the common connection from the actuator must be connected to the hot connection.

APPLICATION NOTES

♦ The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

WARNING *Live Electrical Components!*
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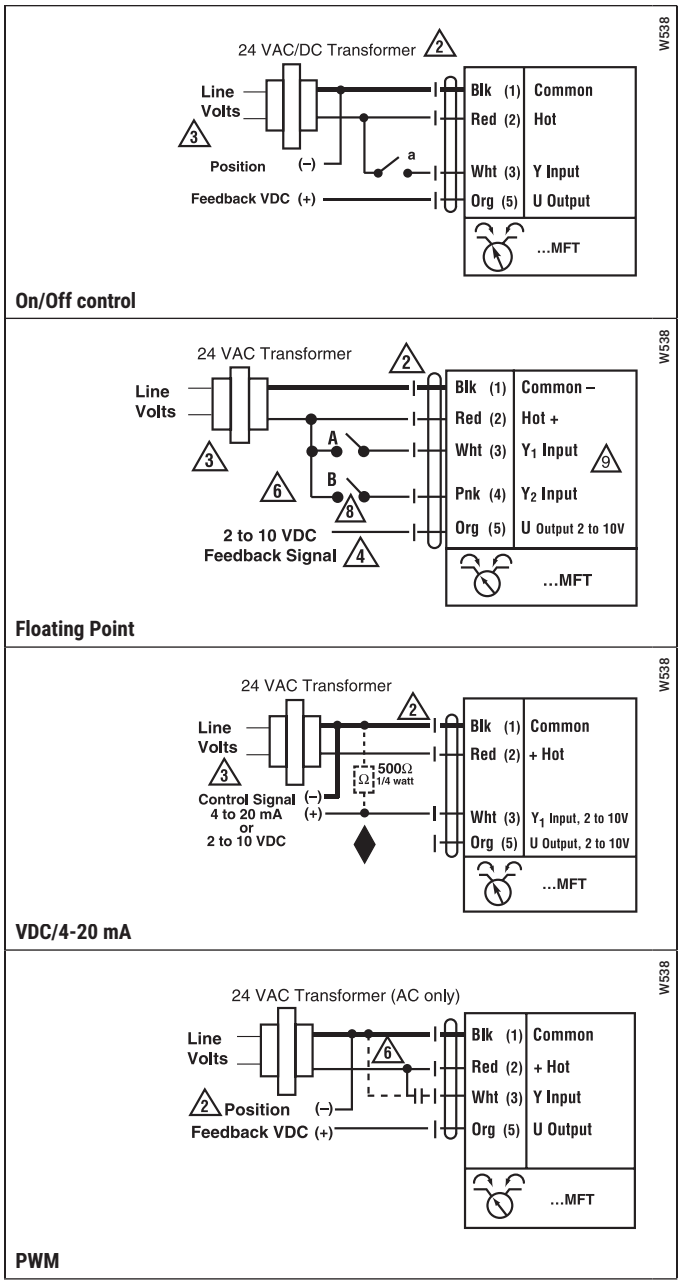
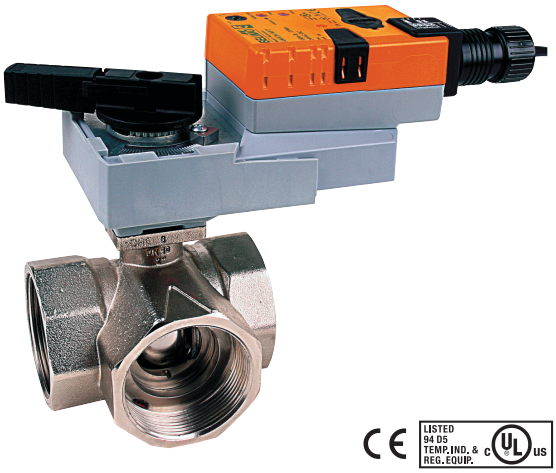




5 YEAR WARRANTY

CE LISTED 94 DS TEMP.IND. & REG.EQUIP. c UL us

BRUSHLESS DC-motor

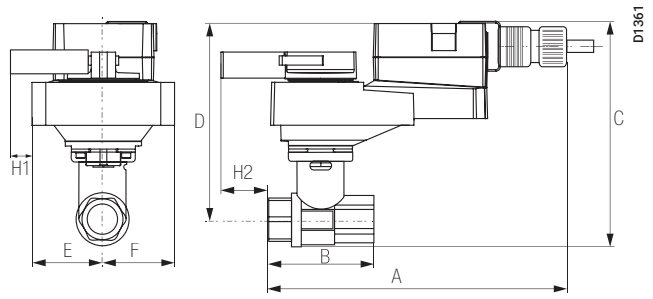
Models

ARX24-PC

Technical Data	
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	4 W
holding	1.25 W
Transformer sizing	5.5 VA (Class 2 power source)
Electrical connection	½" conduit connector 18 GA plenum rated cable 3 ft. [1m], 10 ft. [3m], 16 ft. [5m]
Overload protection	electronic throughout 0 to 95° rotation
Operating range Y	0 to 20V phasecut
Feedback output U	2 to 10 VDC, 0.5mA max VDC variable
Input impedance	8 kΩ (50 mW)
Angle of rotation	90°, adjustable with mechanical stop electronically variable
Direction of rotation	reversible with ↷/↶ switch
Position indication	handle
Manual override	external push button
Running time	150 seconds (default)
Humidity	5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature	-22°F to 122°F [-30°C to 50°C]
Storage temperature	-40°F to 176°F [-40°C to 80°C]
Housing	NEMA 2/IP54
Housing material	UL94-5VA
Agency listings†	cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level	<45 dB(A)
Quality standard	ISO 9001

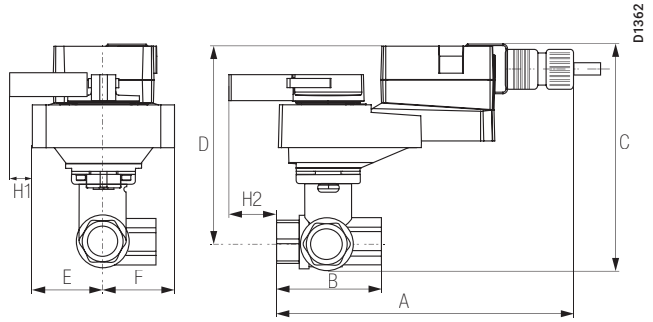
†Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3.

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B231-B232	1¼"	32	3.72" [94.6]	2.04" [51.9]
B238-B240	1½"	40	3.88" [98.5]	2.04" [51.9]
B248-B250	2"	50	4.21" [107.0]	2.27" [57.7]
B251-B254	2"	50	4.93" [125.2]	2.73" [69.5]
B261-B265	2½"	65	5.55" [140.9]	2.73" [69.5]
B277-B280	3"	80	5.82" [147.9]	2.73" [69.5]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B329-B331	1¼"	32	3.96" [100.6]	2.27" [57.7]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.51" [63.7]	2.40" [61.1]
B347-B352	2"	50	4.90" [124.5]	2.73" [69.5]	2.74" [69.7]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

3 Actuators may also be powered by 24 VDC.

***WARNING** Live Electrical Components!*
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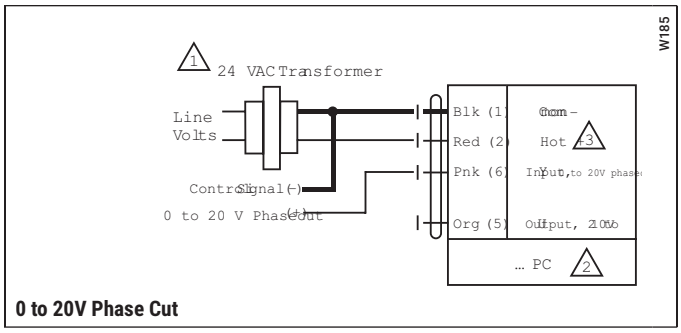
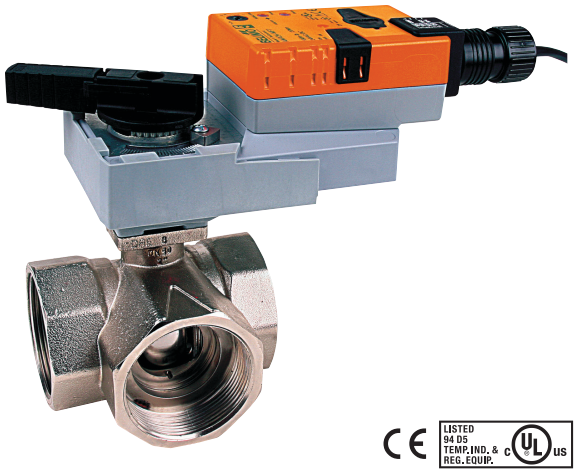


0 to 20V Phase Cut



5 YEAR WARRANTY

CE LISTED 94 DS TEMP.IND. & REG.EQUIP. c UL us

BRUSHLESS DC-motor

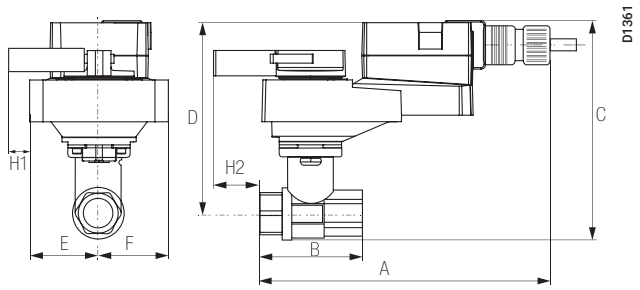
Models

ARX24-MFT95

Technical Data		
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	4 W
	holding	1.25 W
Transformer sizing		6 VA (Class 2 power source)
Electrical connection		½" conduit connector 18 GA plenum rated cable 3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection		electronic throughout 0 to 95° rotation
Operating range WRB		0 to 135 Ω Honeywell Electronic Series 90, 0 to 135 Ω input
Feedback output U		2 to 10 VDC, 0.5mA max
Input impedance		100 kΩ (0.1 mW)
Angle of rotation		90°, adjustable with mechanical stop electronically variable
Direction of rotation		reversible with ↷/↶ switch
Position indication		handle
Manual override		external push button
Running time		150 seconds (default) variable (90 to 350 seconds)
Humidity		5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA 2/IP54
Housing material		UL94-5VA
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level		<45 dB(A)
Quality standard		ISO 9001

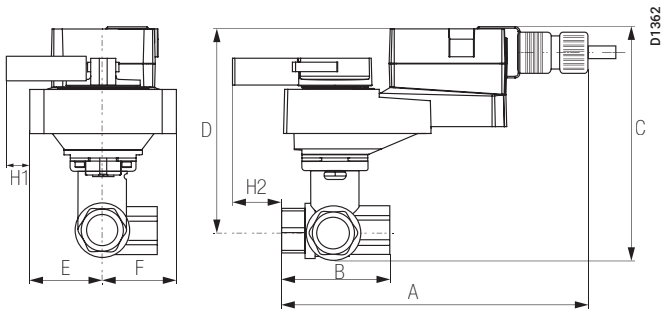
†Rated Impulse Voltage 800V, Type of action 1.AA, Control Pollution Degree 3.

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B231-B232	1¼"	32	3.72" [94.6]	2.04" [51.9]
B238-B240	1½"	40	3.88" [98.5]	2.04" [51.9]
B248-B250	2"	50	4.21" [107.0]	2.27" [57.7]
B251-B254	2"	50	4.93" [125.2]	2.73" [69.5]
B261-B265	2½"	65	5.55" [140.9]	2.73" [69.5]
B277-B280	3"	80	5.82" [147.9]	2.73" [69.5]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B329-B331	1¼"	32	3.96" [100.6]	2.27" [57.7]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.51" [63.7]	2.40" [61.1]
B347-B352	2"	50	4.90" [124.5]	2.73" [69.5]	2.74" [69.7]

Wiring Diagrams

INSTALLATION NOTES

1. Provide overload protection and disconnect as required.
2. ***CAUTION** Equipment damage!*
   Actuators and controller must have separate transformers.
3. Consult controller instruction data for more detailed installation information.
4. Resistor value depends on the type of controller and the number of actuators. No resistor is used for one actuator. Honeywell resistor kits may also be used.
5. To reverse control rotation, use the reversing switch.

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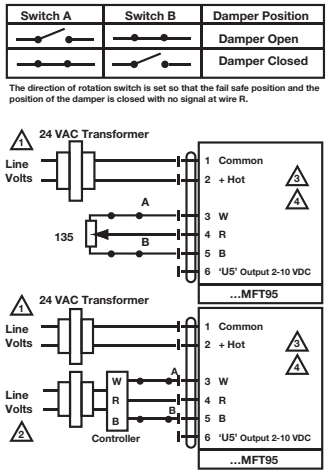
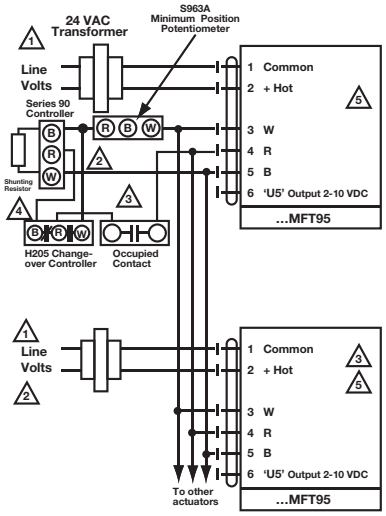
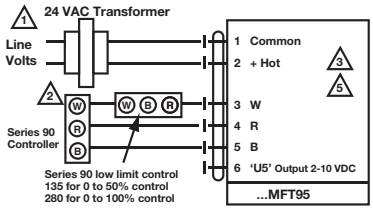


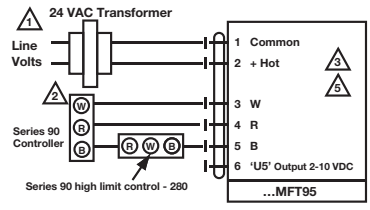
Override



Wiring multiple actuators to a Series 90 controller using a minimum position potentiometer.



Low Limit Control



High Limit Control

ARB24-3-T N4, ARX24-3-T N4 NEMA 4X Actuators, On/Off, Floating Point

5 YEAR WARRANTY

CE LISTED 94 DS TEMP.IND. & REG.EQUIP. c UL us

BRUSHLESS DC motor

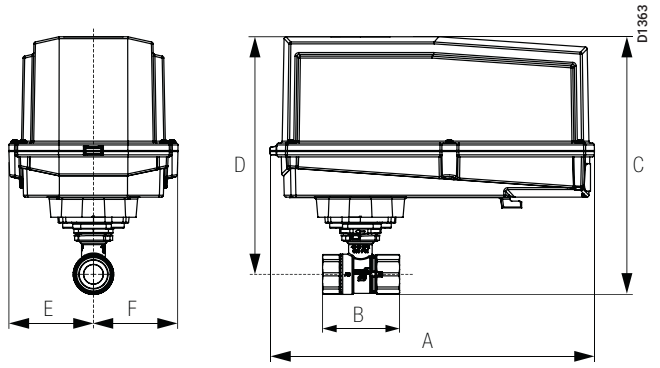
Models

ARB24-3-T N4	
ARB24-3-T N4H	w/built in heater
ARX24-3-T N4	
ARX24-3-T N4H	w/built in heater

Technical Data		
Control		on/off, floating point
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	2.5 W / heater 23 W
	holding	0.5 W
Transformer sizing		5.5 VA (class 2 power source) / heater 20.5 VA
Electrical connection		screw terminal (for 26 to 14 GA wire)
Overload protection		electronic throughout 0° to 95° rotation
Input impedance		600 Ω
Angle of rotation		90°, adjustable with mechanical stop
Direction of rotation		reversible with ↷/↶ switch
Position indication		visual pointer
Manual override		external push button
Running time		90 seconds constant independent of load
Humidity		100% RH
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing type		UL Type 4X/NEMA 4X/IP66 & IP67
Housing material		Polypropelene
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE according to 89/336/EEC.
Quality standard		ISO 9001

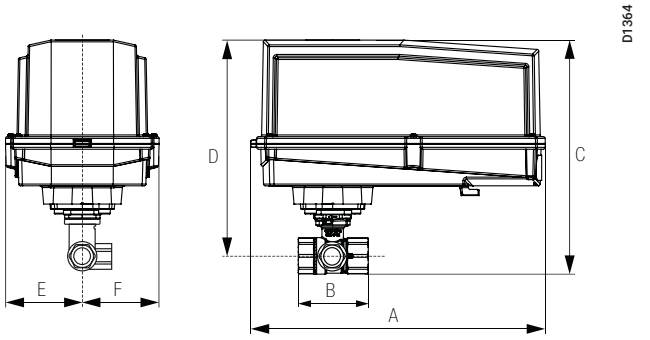
†Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3
*Cannot be used with the CCV-EXT-KIT

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B231-B232	1¼"	32	3.72" [94.6]	2.04" [51.9]
B238-B240	1½"	40	3.88" [98.5]	2.04" [51.9]
B248-B250	2"	50	4.21" [107.0]	2.27" [57.7]
B251-B254	2"	50	4.93" [125.2]	2.73" [69.5]
B261-B265	2½"	65	5.55" [140.9]	2.73" [69.5]
B277-B280	3"	80	5.82" [147.9]	2.73" [69.5]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B329-B331	1¼"	32	3.96" [100.6]	2.27" [57.7]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.51" [63.7]	2.40" [61.1]
B347-B352	2"	50	4.90" [124.5]	2.73" [69.5]	2.74" [69.7]

Wiring Diagrams

INSTALLATION NOTES

2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

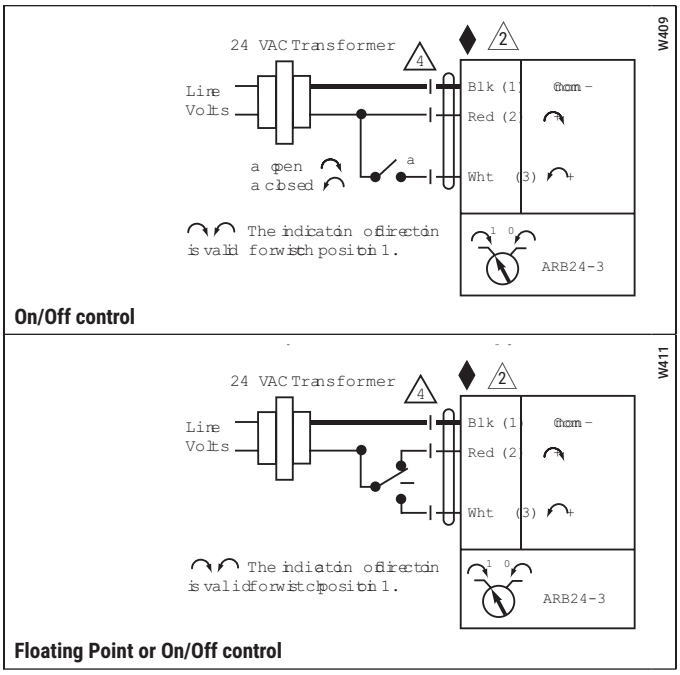
3 For end position indication, interlock control, etc.,
ARB24-3-S incorporates one built-in auxiliary switches:
1 x SPDT, 3A (0.5A) @250 VAC, UL listed, adjustable 0° to 95°.

4 Actuators may also be powered by 24 VDC.

APPLICATION NOTES

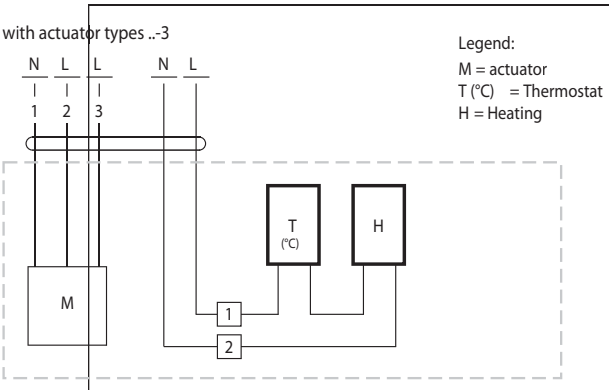
◆ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

⚠ ***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



On/Off control

Floating Point or On/Off control



Note
The following points must be taken into account with independent, external wiring:
- All contact between the cables or wires that are introduced and the heating element is to be avoided.
- Where necessary, use cables with sufficient numbers of wires, e.g. so that the heating and the actuator can be supplied separately with voltage.

Heater wiring

5 YEAR WARRANTY

CE LISTED 94 D5 TEMP.IND. & REG.EQUIP. c UL us

BRUSHLESS DC motor

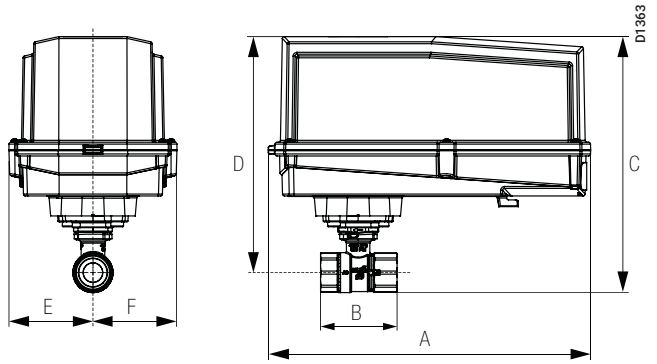
Models

ARB24-SR-T N4	
ARB24-SR-T N4H	w/built in heater
ARX24-SR-T N4	
ARX24-SR-T N4H	w/built in heater

Technical Data		
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	2.5 W / heater 23 W
	holding	0.4 W
Transformer sizing		5 VA (class 2 power source) / heater 20 VA
Electrical connection		screw terminal (for 26 tp 14 GA wire)
Overload protection		electronic throughout 0° to 95° rotation
Operating range Y		2 to 10 VDC, 4 to 20 mA
Input impedance		600 Ω
Angle of rotation		90°, adjustable with mechanical stop
Direction of rotation		reversible with ↷/↶ switch
Position indication		visual pointer
Manual override		external push button
Running time		90 seconds constant independent of load
Humidity		100% RH
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing type		UL Type 4X/NEMA 4X/IP66 & IP67
Housing material		Polypropelene
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE according to 89/336/EEC.
Quality standard		ISO 9001

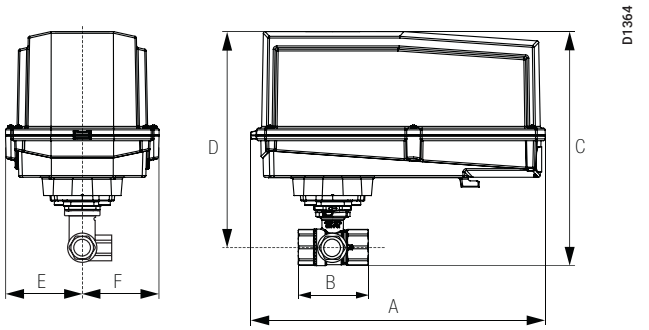
†Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3
*Cannot be used with the CCV-EXT-KIT

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B231-B232	1¼"	32	3.72" [94.6]	2.04" [51.9]
B238-B240	1½"	40	3.88" [98.5]	2.04" [51.9]
B248-B250	2"	50	4.21" [107.0]	2.27" [57.7]
B251-B254	2"	50	4.93" [125.2]	2.73" [69.5]
B261-B265	2½"	65	5.55" [140.9]	2.73" [69.5]
B277-B280	3"	80	5.82" [147.9]	2.73" [69.5]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B329-B331	1¼"	32	3.96" [100.6]	2.27" [57.7]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.51" [63.7]	2.40" [61.1]
B347-B352	2"	50	4.90" [124.5]	2.73" [69.5]	2.74" [69.7]

Wiring Diagrams

INSTALLATION NOTES

2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

3 Actuators may also be powered by 24 VDC.

5 Only connect common to neg. (–) leg of control circuits.

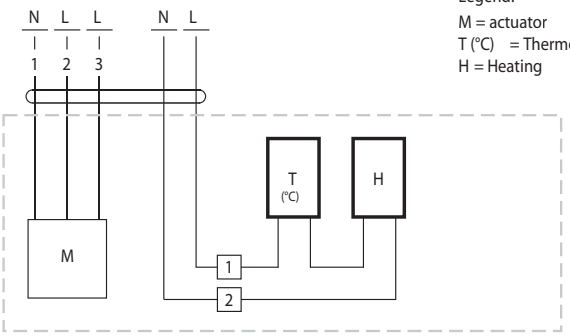
APPLICATION NOTES

The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

Wiring Diagrams

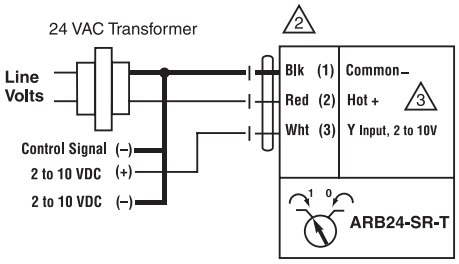
with actuator types ..-3



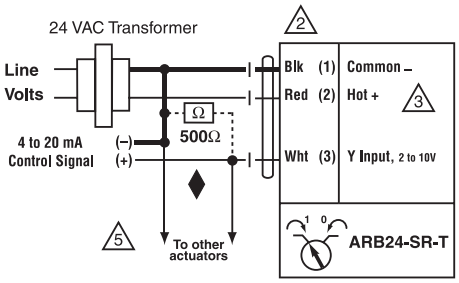
Legend:
M = actuator
T (°C) = Thermostat
H = Heating

Note
The following points must be taken into account with independent, external wiring:
- All contact between the cables or wires that are introduced and the heating element is to be avoided.
- Where necessary, use cables with sufficient numbers of wires, e.g. so that the heating and the actuator can be supplied separately with voltage.

Heater wiring



2 to 10 VDC control



4 to 20 mA control

MFT

5 YEAR WARRANTY

CE LISTED 94 D5 TEMP.IND. & REG.EQUIP. c UL us

BRUSHLESS DC motor

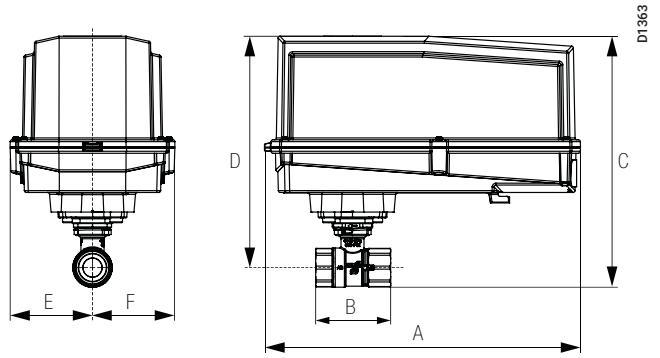
Models

ARX24-MFT-T N4
ARX24-MFT-T N4H w/built in heater

Technical Data		
Control		2 to 10 VDC, 4 to 20 mA (default) variable (VDC, PWM, floating point, on/off)
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	3.5 W / heater 24 W
	holding	1.25 W
Transformer sizing		6 VA (class 2 power source) / heater 21 VA
Electrical connection		screw terminal (for 26 tp 14 GA wire)
Overload protection		electronic throughout 0° to 95° rotation
Input impedance		100 kΩ for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20 mA 1500 Ω for PWM, floating point and on/off control
Angle of rotation		95°, adjustable with mechanical stop electronically variable
Direction of rotation		reversible with ↷/↶ switch
Position indication		visual pointer
Manual override		external push button
Running time		150 seconds (default) constant independent of load variable (75 to 350 seconds)
Humidity		100% RH
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing type		UL Type 4X/NEMA 4X/IP66 & IP67
Housing material		Polypropelene
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE according to 89/336/EEC.
Quality standard		ISO 9001

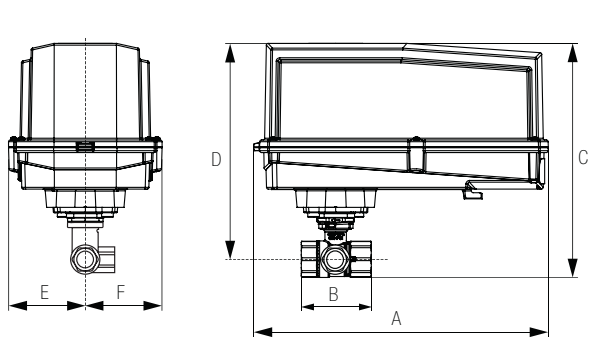
† Rated impulse voltage 4kV, Control pollution degree 3, Type of action 1
*Cannot be used with the CCV-EXT-KIT

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B231-B232	1¼"	32	3.72" [94.6]	2.04" [51.9]
B238-B240	1½"	40	3.88" [98.5]	2.04" [51.9]
B248-B250	2"	50	4.21" [107.0]	2.27" [57.7]
B251-B254	2"	50	4.93" [125.2]	2.73" [69.5]
B261-B265	2½"	65	5.55" [140.9]	2.73" [69.5]
B277-B280	3"	80	5.82" [147.9]	2.73" [69.5]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B329-B331	1¼"	32	3.96" [100.6]	2.27" [57.7]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.51" [63.7]	2.40" [61.1]
B347-B352	2"	50	4.90" [124.5]	2.73" [69.5]	2.74" [69.7]

Wiring Diagrams

INSTALLATION NOTES

△2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

△3 Actuators may also be powered by 24 VDC.

△4 Position feedback cannot be used with Triac sink controller.
The actuator internal common reference is not compatible.

△6 Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.

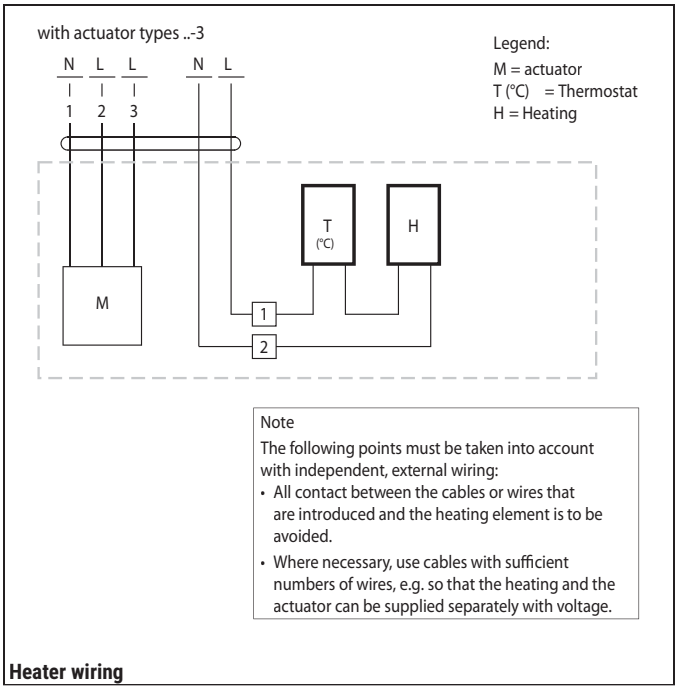
△8 Contact closures A & B also can be triacs.
A& B should both be closed for triac source and open for triac sink.

△9 For triac sink the common connection from the actuator must be connected to the hot connection.

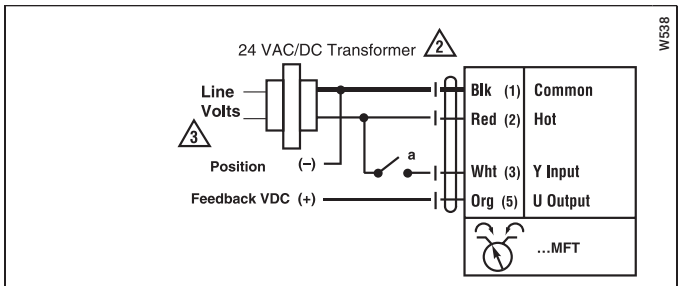
APPLICATION NOTES

♦ The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

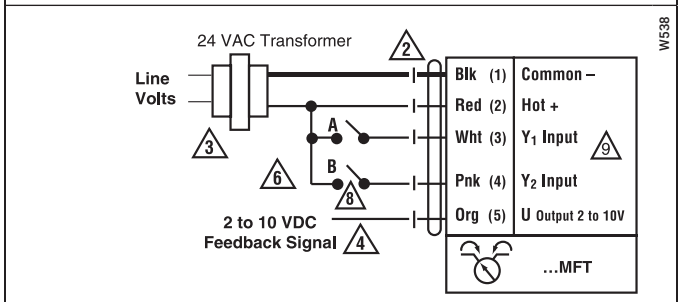
***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



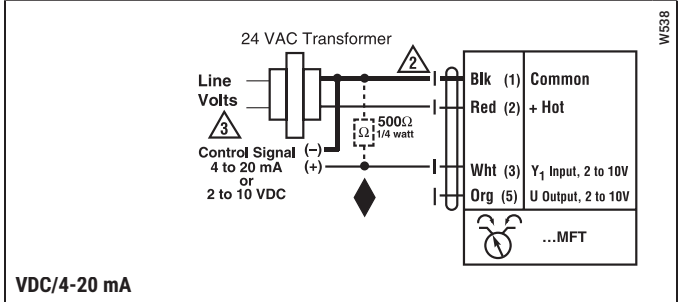
Heater wiring



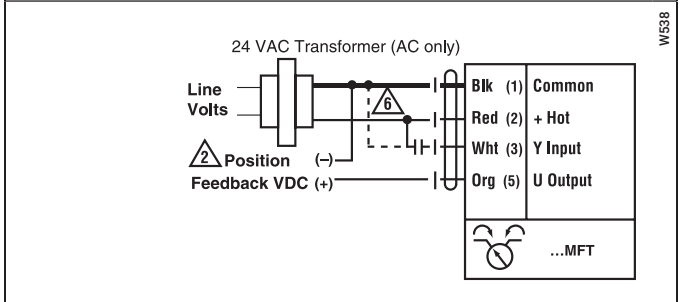
On/Off control



Floating Point



VDC/4-20 mA



PWM

5 YEAR WARRANTY

CE LISTED 94 D5 TEMP.IND. & REG.EQUIP. c UL us

BRUSHLESS DC motor

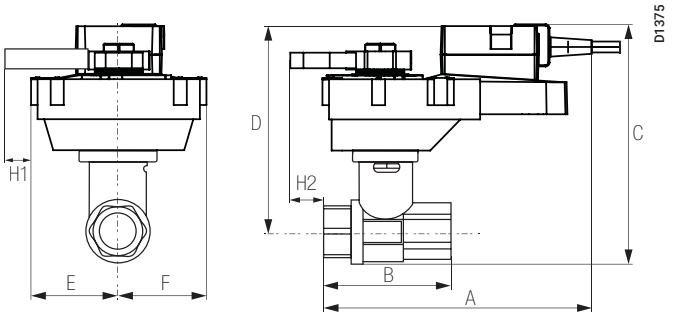
Models

ARQX24-1 Flexible Version

Technical Data		
Control		on/off
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	15 W
	holding	1.5 W
Transformer sizing		26 VA (Class 2 power source)
Electrical connection		½" conduit connector, 18 GA plenum rated cable 3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection		electronic throughout 0 to 95° rotation
Input impedance		100 Ω
Angle of rotation		max 95°, adjustable with mechanical stop
Direction of rotation		reversible with ↷/↶ switch
Position indication		reflective visual indicator (snap-on)
Manual override		external push button
Running time		constant of independent load 10 or 15 seconds
Humidity		5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA 2/IP54
Housing material		UL94-5VA
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level		<52 dB(A)
Quality standard		ISO 9001

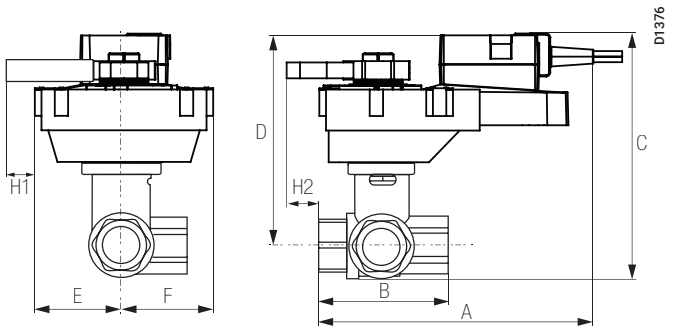
Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3.

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B248-B280	2"	50	4.21" [107]	2.27" [57.7]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B330-B332	1¼"	32	3.96" [100.6]	2.27" [57.7]	2.14" [54.3]
B338-B340	1½"	40	4.39" [111.6]	2.51" [63.7]	2.90" [61.1]
B348-B352	2"	50	4.95" [124.5]	2.73" [69.5]	2.74" [69.7]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

3 Actuators may also be powered by 24 VDC.

APPLICATION NOTES

♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

WARNING *Live Electrical Components!*

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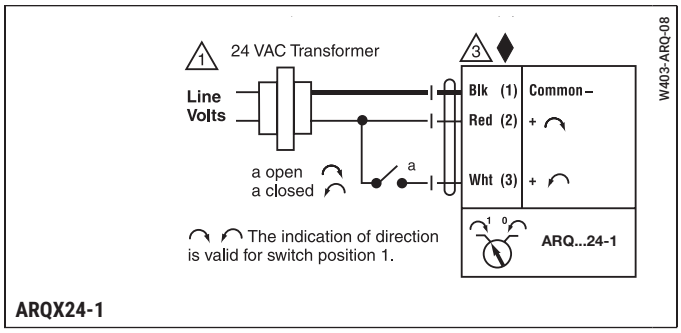


ARQX24-1

5 YEAR WARRANTY

CE LISTED 94 D5 TEMP.IND. & REG.EQUIP. c UL us

BRUSHLESS DC motor

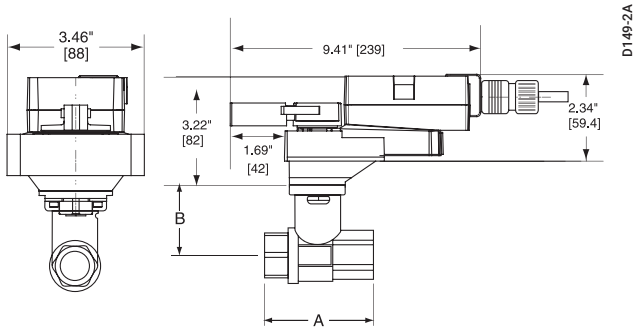
Models

ARQX24-MFT Flexible Version

Technical Data		
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	15 W
	holding	1.5 W
Transformer sizing		26 VA (Class 2 power source)
Electrical connection		½" conduit connector, 18 GA plenum rated cable 3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection		electronic throughout 0 to 95° rotation
Operating range Y		2 to 10 VDC, 4 to 20 mA (default) variable (VDC, on/off)
Feedback output U		2 to 10 VDC, 0.5mA max VDC variable
Input impedance		100 kΩ (0.1 mA), 500 Ω, 1500 Ω (on/off)
Angle of rotation		max 95°, adjustable with mechanical stop electronically variable
Direction of rotation		reversible with ↷/↶ switch
Position indication		reflective visual indicator (snap-on)
Manual override		external push button
Running time		constant of independent load 10 or 15 seconds
Humidity		5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA 2/IP54
Housing material		UL94-5VA
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level		<52 dB(A)
Quality standard		ISO 9001

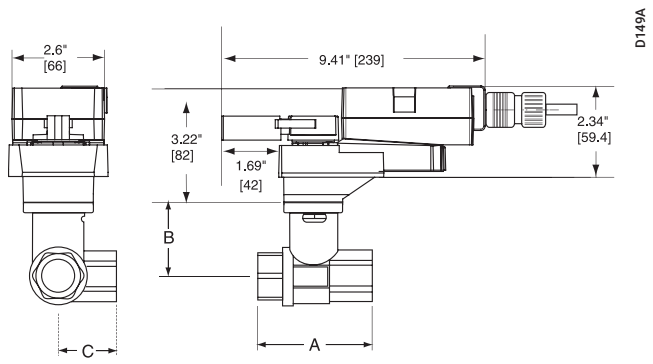
Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3.

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B231-B232	1¼"	32	3.72" [94.6]	2.04" [51.9]
B238-B240	1½"	40	3.88" [98.5]	2.04" [51.9]
B248-B250	2"	50	4.21" [107.0]	2.21" [56.2]
B251-B254	2"	50	4.93" [125.2]	2.68" [68.0]
B261-B265	2½"	65	5.55" [140.9]	2.68" [68.0]
B277-B280	3"	80	5.82" [147.9]	2.68" [68.0]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B330-B332	1¼"	32	3.96" [100.6]	2.27" [57.7]	2.14" [54.3]
B338-B340	1½"	40	4.39" [111.6]	2.51" [63.7]	2.90" [61.1]
B348-B352	2"	50	4.95" [124.5]	2.73" [69.5]	2.74" [69.7]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

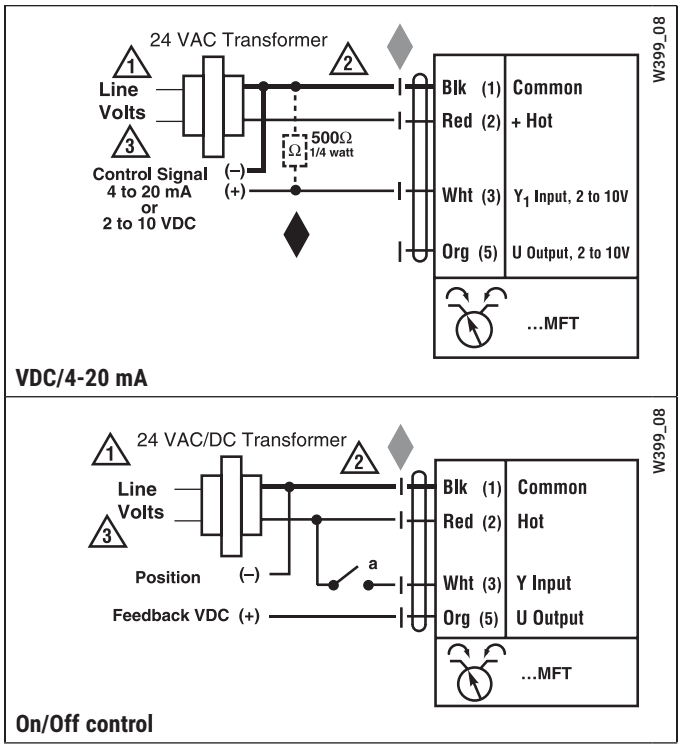
3 Actuators may also be powered by 24 VDC.

5 Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.

APPLICATION NOTES

♦ The ZG-R01 500 Ω resistor may be used.

***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



VDC/4-20 mA

On/Off control

5 YEAR WARRANTY

CE LISTED 94 DS TEMP.IND. & REG.EQUIP. c UL us

BRUSHLESS DC motor

Models

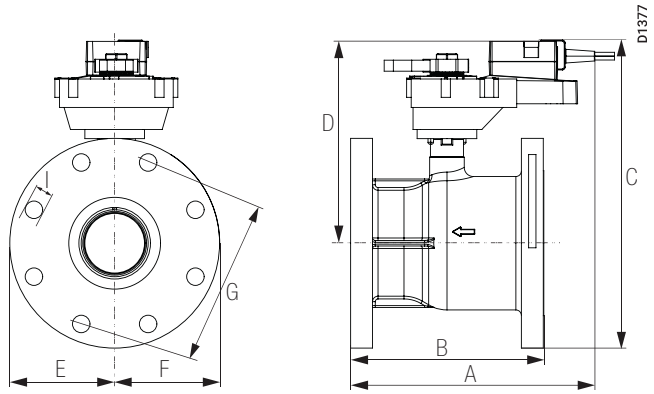
GRB24-3-5-14
GRX24-3-5-14

Technical Data

Control		on/off, floating point
Power supply		24 VAC ± 20% 50/60 Hz
Power consumption	running	4 W
	holding	2 W
Transformer sizing		6 VA (Class 2 power source)
Electrical connection		3 ft,18 GA plenum rated cable ½" conduit connector
	GRX	3 ft. [1m], 10 ft. [3m], 16 ft. [5m]
Overload protection		electronic throughout 0° to 95° rotation
Input impedance		600 Ω
Angle of rotation		max. 95°, adjustable with mechanical stop
Direction of rotation		reversible with ↷/↶ switch
Position indication		visual indicator
Running time		150 seconds, constant independent of load
Manual override		external push button
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Housing		NEMA 2/IP54, Enclosure Type 2
Agency listings †		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EEC and 2006/95/EC.
Noise level		<45 dB(A)
Quality standard		ISO 9001

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

Dimensions



Valve Body	Nominal Pipe Size	Top Flange Design	Flange Diameter	Face-to-Face Length	Height
			A	B	C
B6400	4" [100]	F05	9.00" [228.6]	8.30" [210.8]	9.30" [235.9]
B6500	5" [125]		10.00" [254]	10.30" [261.6]	10.50" [266.4]
B6600	6" [150]		11.00" [279.4]	12.50" [317.5]	11.70" [296.9]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

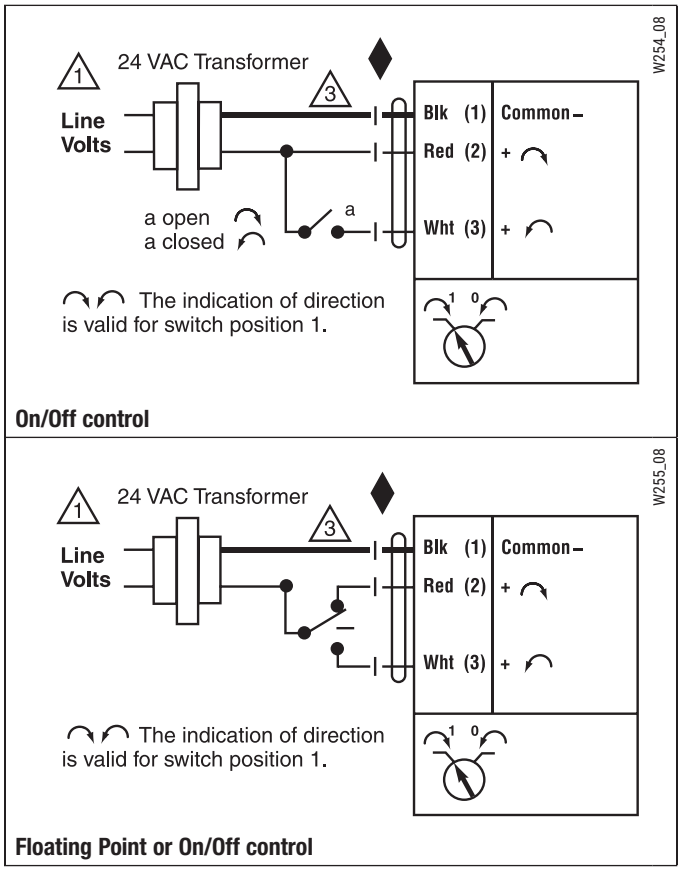
3 Actuators may also be powered by 24 VDC.

APPLICATION NOTES

♦ Meets cULus requirements without the need of an electrical ground connection.

WARNING *Live Electrical Components!*

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



On/Off control

Floating Point or On/Off control

5 YEAR WARRANTY

CE LISTED 94 DS TEMP.IND. & REG.EQUIP. c UL us BRUSHLESS DC motor

Models

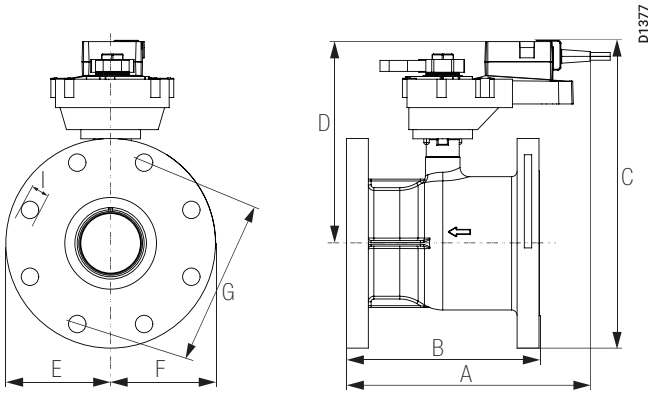
GRB120-3
GRX120-3

Technical Data

Power Supply		100 to 240 VAC, 50/60 Hz (nominal)
		85 to 265 VAC, 50/60 Hz (tolerance)
Power consumption	running	4 W
	holding	2 W
Transformer sizing		7 VA (Class 2 power source)
Electrical connection		18 GA appliance rated cable ½" conduit connector 3 ft. [1m], 10 ft. [3m], 16 ft. [5m]
Overload protection		electronic throughout 0° to 95° rotation
Control		on/off, floating point
Input impedance		600 Ω
Angle of rotation		max. 95°, adjustable with mechanical stop
Direction of rotation		reversible with ↷/↶ switch
Position indication		external push button
Running time		150 seconds, constant independent of load
Humidity		5 to 95% RH non condensing (EN 60730-1)
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Housing		NEMA 2/IP54, Enclosure Type 2
Housing material		UL94-5VA
Agency listings †		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EEC and 2006/95/EC.
Noise level		<45 dB(A)
Quality standard		ISO 9001

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

Dimensions



Valve Body	Nominal Pipe Size	Top Flange Design	Flange Diameter	Face-to-Face Length	Height
			A	B	C
B6400	4" [100]	F05	9.00" [228.6]	8.30" [210.8]	9.30" [235.9]
B6500	5" [125]		10.00" [254]	10.30" [261.6]	10.50" [266.4]
B6600	6" [150]		11.00" [279.4]	12.50" [317.5]	11.70" [296.9]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

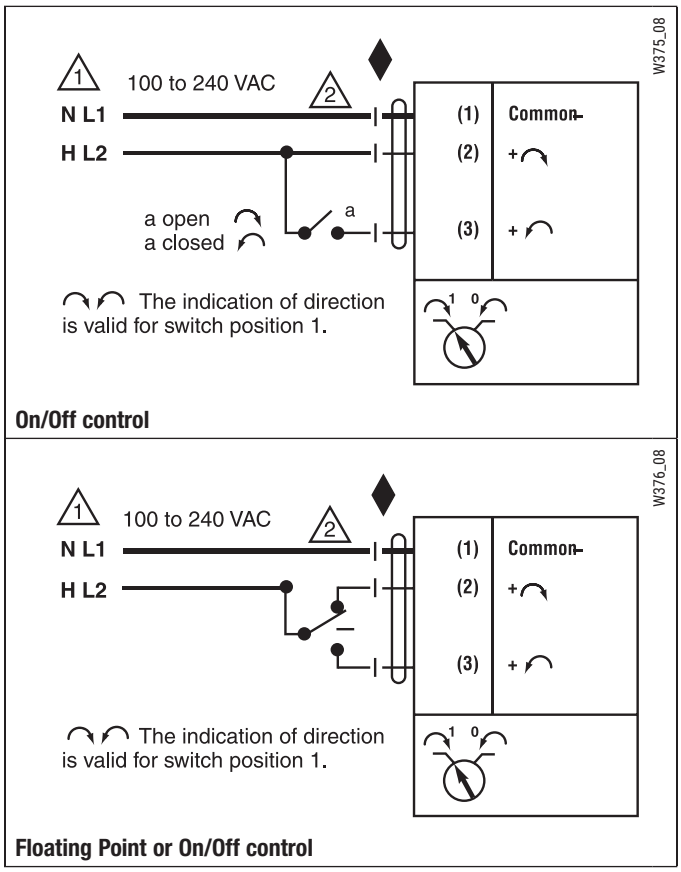
2 Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

APPLICATION NOTES

◆ Meets cULus requirements without the need of an electrical ground connection.

WARNING *Live Electrical Components!*

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



On/Off control

Floating Point or On/Off control

MFT 5 YEAR WARRANTY

CE LISTED 94 D5 TEMP.IND. & REG.EQUIP. c UL us BRUSHLESS DC motor

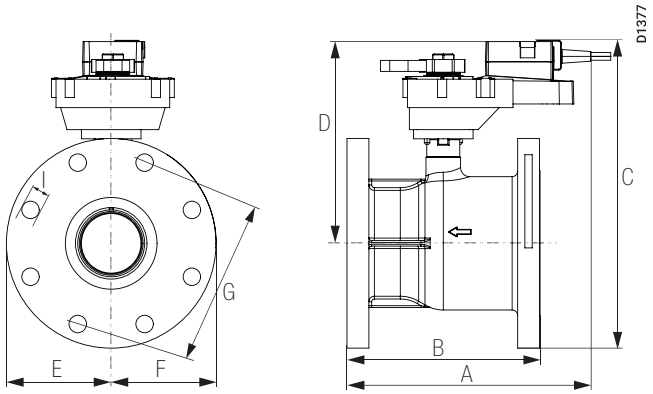
Models

GRX24-MFT-5-14

Technical Data		
Control		2 to 10 VDC, 4 to 40 mA (default) variable (VDC, PWM, floating point, on/off)
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	4.5 W
	holding	1.5 W
Transformer sizing		7 VA (Class 2 power source)
Electrical connection		3 ft,18 GA plenum rated cable ½" conduit connector 3 ft. [1m], 10 ft. [3m], 16 ft. [5m]
Overload protection		electronic throughout 0° to 95° rotation
Feedback output		2 to 10 VDC, 0.5 mA max, VDC variable
Input impedance		100 kΩ (0.1 mA, 500 Ω) 1500 Ω (PWM, floating point , on/off)
Angle of rotation		max. 95°, adjustable with mechanical stop electronically variable
Direction of rotation		reversible with ↷/↶ switch
Position indication		visual indicator
Running time		150 seconds (default) variable (75 to 300 seconds)
Manual override		external push button
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Housing		NEMA 2/IP54, Enclosure Type 2
Housing material		UL94-5V (flammability rating)
Agency listings †		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EEC and 2006/95/EC.
Noise level		<45 dB(A)
Quality standard		ISO 9001

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

Dimensions



Valve Body	Nominal Pipe Size	Top Flange Design	Flange Diameter	Face-to-Face Length	Height
			A	B	C
B6400	4" [100]	F05	9.00" [228.6]	8.30" [210.8]	9.30" [235.9]
B6500	5" [125]		10.00" [254]	10.30" [261.6]	10.50" [266.4]
B6600	6" [150]		11.00" [279.4]	12.50" [317.5]	11.70" [296.9]

Wiring Diagrams

INSTALLATION NOTES

1. Provide overload protection and disconnect as required.
2. ***CAUTION** Equipment Damage!*
   Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.
3. Actuators may also be powered by 24 VDC.
4. Position feedback cannot be used with Triac sink controller. The actuator internal common reference is not compatible.
5. Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.
8. Contact closures A & B also can be triacs. A & B should both be closed for triac source and open for triac sink.
9. For triac sink the common connection from the actuator must be connected to the hot connection of the controller.

APPLICATION NOTES

- Meets UL requirements without the need of an electrical ground connection.
- The ZG-R01 500 Ω resistor may be used.

***WARNING** Live Electrical Components!*
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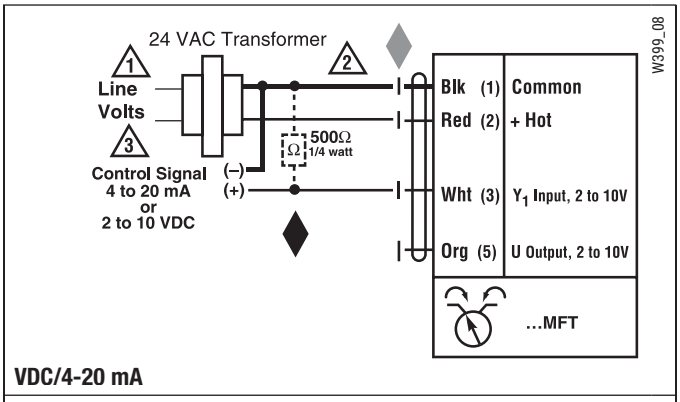
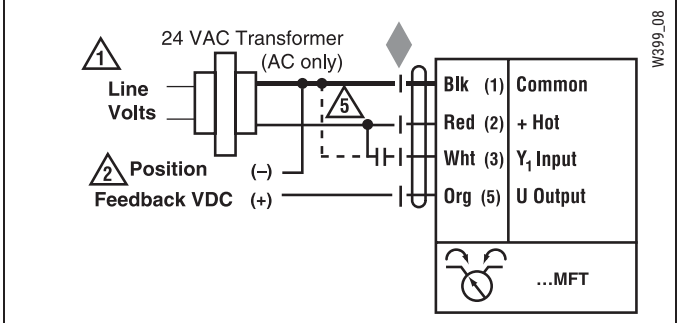
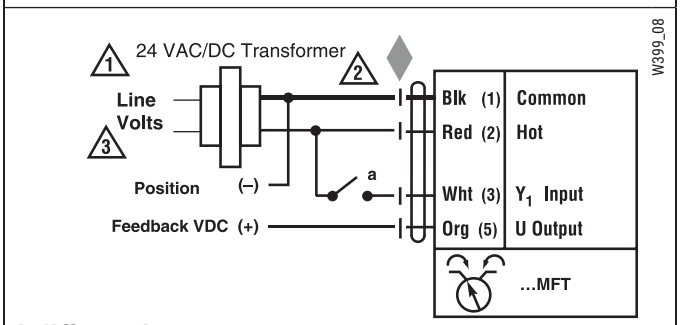


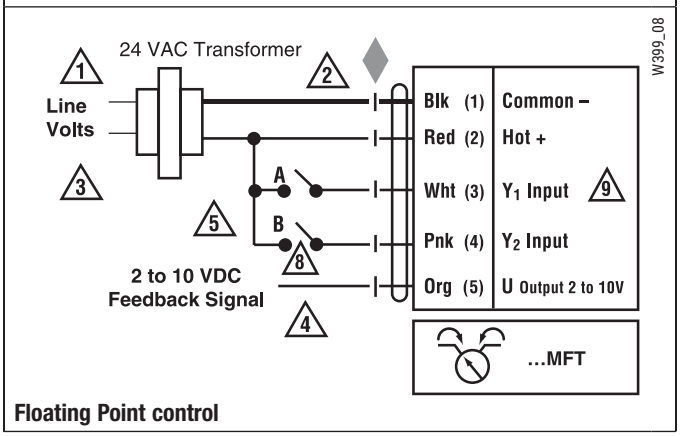
VDC/4-20 mA



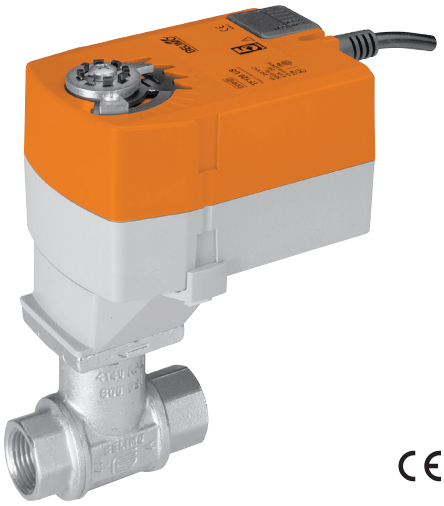
PWM



On/Off control



Floating Point control



5 YEAR WARRANTY

CE LISTED 94 D5 TEMP. IND. & REG. EQUIP. c UL us

BRUSHLESS DC MOTOR

Models

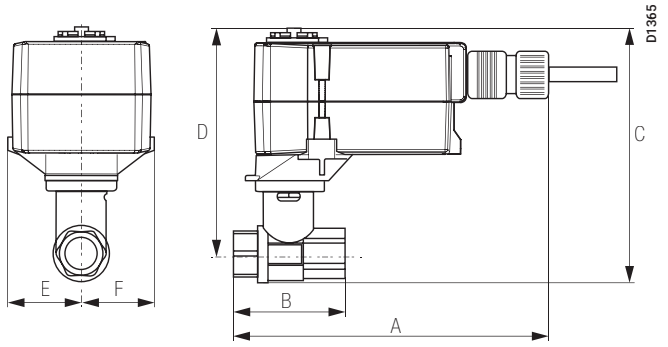
TFRB(X)24 TFRB(X)120
TFRB(X)24-S TFRB(X)120-S w/built-in Aux. Switch

Technical Data		
Control		on/off
Power supply		
TFRB(X)24(-S)		24VAC ± 20%, 50/60Hz 24VDC ± 10%
TFRB(X)120(-S)		(nominal) 100 to 240 VAC, 50/60 Hz (tolerance) 85 to 265 VAC, 50/60 Hz
Power consumption	running	2.5 W
	holding	1.3 W
Transformer sizing		
TFRB(X)24(-S)		5 VA (class 2 power source)
TFRB(X)120(-S)		5 VA (class 2 power source)
Electrical connection		½" conduit connector
(-S models have 2 cables)		18 GA appliance cable
TFRB(X)24...		3 ft [1m]
TFRB(X)120		10 ft [3m] 16 ft [5m]
Overload protection		electronic throughout 0° to 95° rotation
Angle of rotation		95°
Direction of rotation		reversible with protected ↷/↶ mounting
Position indication		visual indicator, 0° to 95°
Running time	motor	<75 seconds (0 to 18 in-lb)
	spring	<75 sec @ -22°F to 122°F [-20°C to 50°C]
Humidity		5 to 95% RH non-condensing
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA type 2/IP42
Housing material		UL94 - 5VA
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level (max)	running	<40 db (A)
	spring return	<40 dB (A)
Quality standard		ISO 9001

TFRB(X)...-S	
Auxiliary switch	1 x SPDT, 3A (0.5A) @ 250 VAC, UL Listed adjustable 0° to 95°

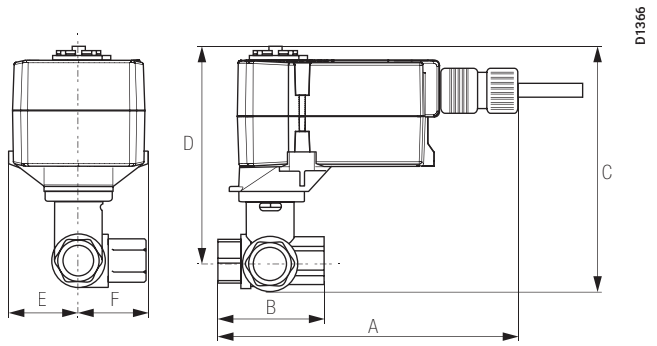
† Rated impulse voltage 800V (4kV for 120V model), Control pollution degree 3, Type of action 1.AA (1.AA.B for -S models)

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207(B)-B211(B)	½"	15	2.41" [61.1]	1.39" [35.2]
B212(B)-B215(B)	½"	15	2.38" [60.4]	1.78" [45.2]
B217(B)-B221(B)	¾"	20	2.73" [69.3]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307(B)-B311(B)	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312(B)-B315(B)	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317(B)-B321(B)	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]

Wiring Diagrams

INSTALLATION NOTES

2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

3 Actuators may also be powered by 24 VDC.

APPLICATION NOTES

Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

***WARNING** Live Electrical Components!*
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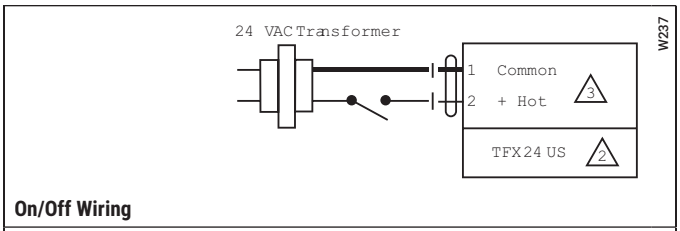
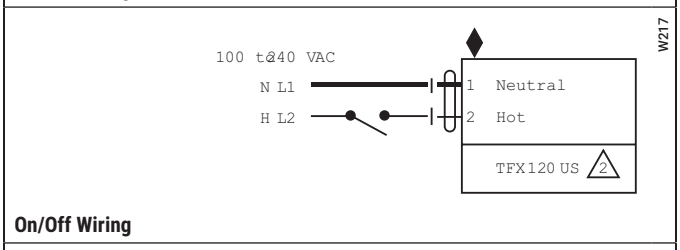
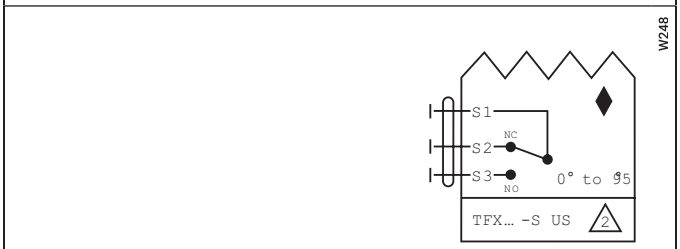


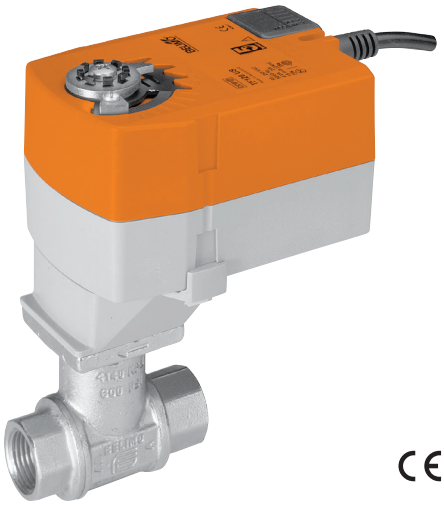
On/Off Wiring



On/Off Wiring



Auxiliary Switch



5 YEAR WARRANTY

CE LISTED 94 D5 TEMP. IND. & REG. EQUIP. c UL us

BRUSHLESS DC MOTOR

Models

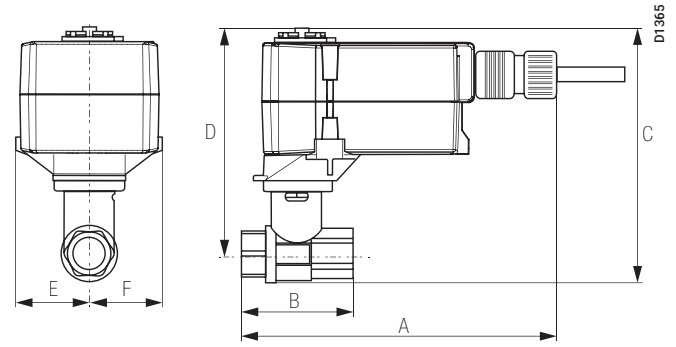
TFRB(X)24-3
TFRB(X)24-3-S w/built-in Aux. Switch

Technical Data		
Control		floating point
Power supply		24VAC ± 20%, 50/60Hz
Power consumption	running	2.5 W
	holding	1.0 W
Transformer sizing		4 VA (class 2 power source)
Electrical connection (-S models have 2 cables) TFRB(X)24-3...		½" conduit connector 18 GA plenum rated cable 3 ft [1m] 10 ft [3m] 16 ft [5m]
Overload protection		electronic throughout 0° to 95° rotation
Input impedance		1000 Ω (0.6w) control inputs
Angle of rotation		95°
Direction of rotation	spring	reversible with CW/CCW mounting
	motor	reversible with built-in ↷/↶ switch
Position indication		visual indicator, 0° to 95°
Running time	motor	95 sec constant, independent of load
	spring	<25 sec @ -4°F to 122°F [-20°C to 50°C] <60 sec @ -22°F [-30°C]
Humidity		5 to 95% RH non-condensing
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA type 2/IP42
Housing material		UL94 - 5VA
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level (max)	running	<35 db (A)
	spring return	62 dB (A)
Quality standard		ISO 9001

TFRB(X)24-3-S US	
Auxiliary switch	1 x SPDT, 3A (0.5A) @ 250 VAC, UL Listed, adjustable 0° to 95°

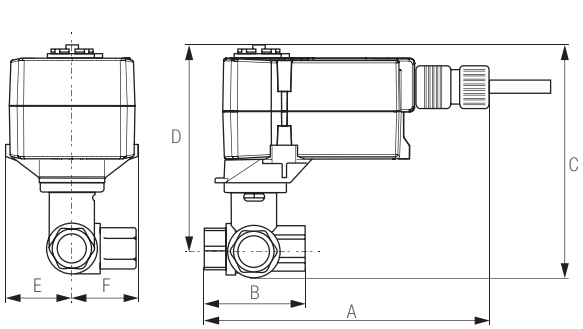
† Rated impulse voltage 800V (4kV for 120V model), Control pollution degree 3, Type of action 1.AA (1.AA.B for -S models)

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207(B)-B211(B)	½"	15	2.41" [61.1]	1.39" [35.2]
B212(B)-B215(B)	½"	15	2.38" [60.4]	1.78" [45.2]
B217(B)-B221(B)	¾"	20	2.73" [69.3]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307(B)-B311(B)	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312(B)-B315(B)	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317(B)-B321(B)	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]

Wiring Diagrams

INSTALLATION NOTES

2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

3 The common connection from the actuator must be connected to the Hot connection of the controller.

4 The actuator Hot must be connected to the control board common.

5 For end position indication, interlock control, fan startup, etc., TF24-3-S US incorporates one built-in auxiliary switch: 1 x SPDT, 3A (0.5A) @250 VAC, UL listed, adjustable 0° to 95°.

7 Actuators with plenum rated cable do not have numbers on wires; use color coded instead. Actuators with appliance rated cable use numbers.

APPLICATION NOTES

♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

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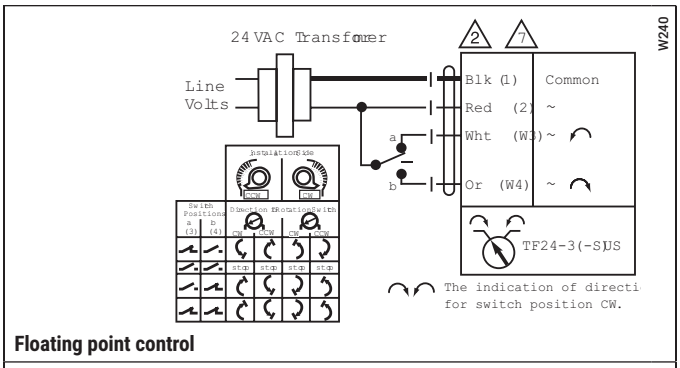
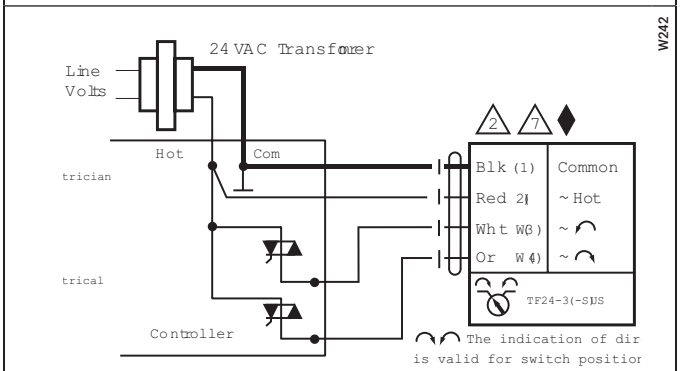
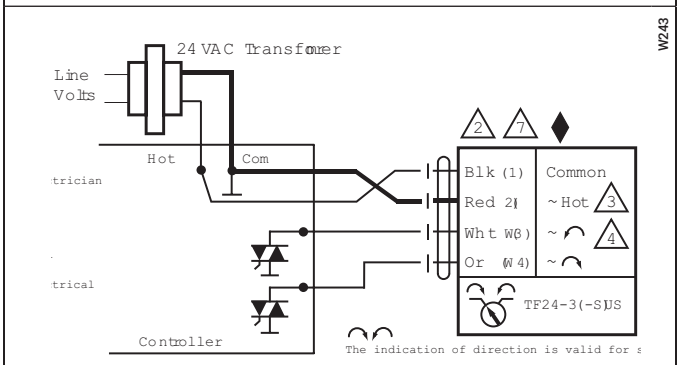


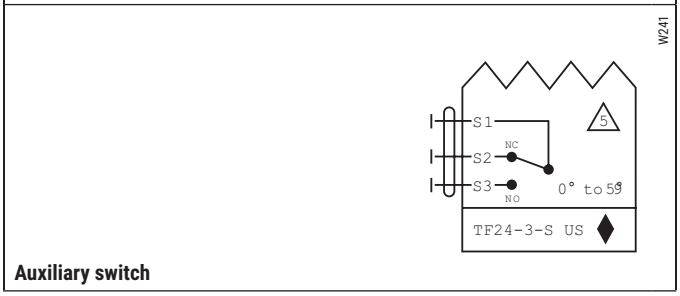
Floating point control



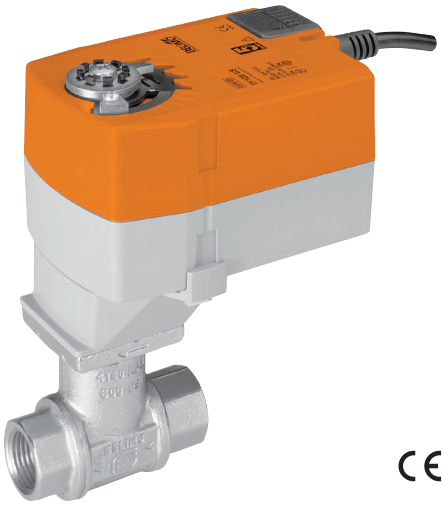
Triac source



Triac sink with separate transformers



Auxiliary switch



5 YEAR WARRANTY

CE LISTED 94 D5 TEMP. IND. & REG. EQUIP. c UL us

BRUSHLESS DC MOTOR

Models

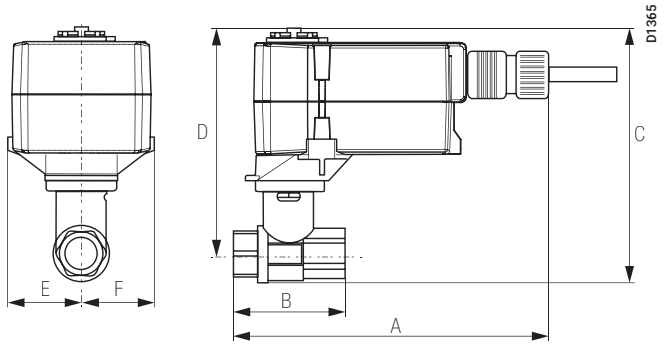
TFRB(X)24-SR
TFRB(X)24-SR-S w/built-in Aux. Switch

Technical Data		
Control		proportional
Power supply		24 VAC ± 20%, 50/60 Hz 24 VDC ± 10%
Power consumption	running	2.5 W
	holding	1.0 W
Transformer sizing		4 VA (class 2 power source)
Electrical connection (-S models have 2 cables) TFRB(X)24-SR...		½" conduit connector 18 GA plenum rated cable 3 ft [1m] 10 ft [3m] 16 ft [5m]
Electrical protection		actuators are double insulated
Overload protection		electronic throughout 0° to 95° rotation
Operating range Y		2 to 10 VDC, 4 to 20 mA
Input impedance		100k Ω (0.1mA), 500 Ω
Feedback Output U		2-10 VDC
Angle of rotation		95°
Direction of rotation	spring	reversible with CW/CCW mounting
	motor	reversible with built-in ↷/↶ switch
Position indication		visual indicator, 0° to 95°
Running time	motor	95 sec constant, independent of load
	spring	<25 sec @-4°F to 122°F [-20°C to 50°C] <60 sec @-22°F [-30°C]
Humidity		5 to 95% RH non-condensing
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA type 2/IP42
Housing material		UL94 - 5VA
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level (max)	running	<35 db (A)
	spring return	<62 dB (A)
Quality standard		ISO 9001

TFRB(X)24-SR-S	
Auxiliary switch	1 x SPDT, 3A (0.5A) @ 250 VAC, UL Listed, adjustable 0° to 95°

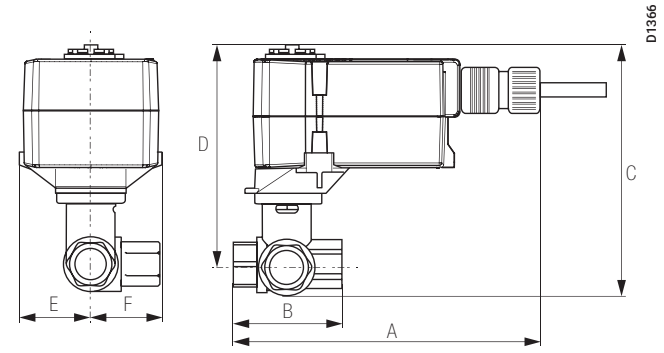
† Rated impulse voltage 800V (4kV for 120V model), Control pollution degree 3, Type of action 1.AA (1.AA.B for -S models)

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207(B)-B211(B)	½"	15	2.41" [61.1]	1.39" [35.2]
B212(B)-B215(B)	½"	15	2.38" [60.4]	1.78" [45.2]
B217(B)-B221(B)	¾"	20	2.73" [69.3]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307(B)-B311(B)	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312(B)-B315(B)	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317(B)-B321(B)	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]

Wiring Diagrams

INSTALLATION NOTES

△2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

△4 Up to 4 actuators may be connected in parallel. With 4 actuators wired to one 500 Ω resistor, a +2% shift of control signal may be required.
Power consumption must be observed.

△3 Actuators may also be powered by 24 VDC.

△5 Only connect common to neg. (–) leg of control circuits.

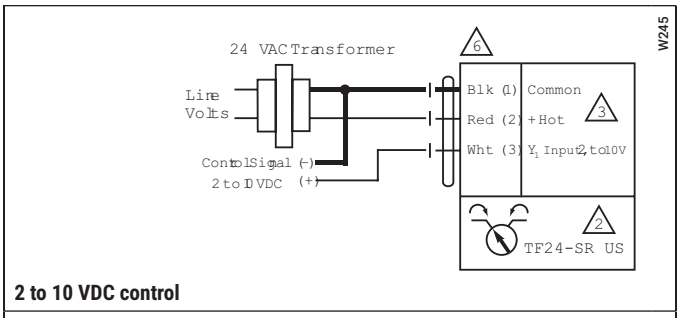
△6 Actuators with plenum rated cable do not have numbers on wires; use color codes instead.

△7 For end position indication, interlock control, fan startup, etc., TF24-SR-S US incorporates one built-in auxiliary switch: 1 x SPDT, 3A (0.5A) @250 VAC, UL listed, adjustable 0° to 95°.

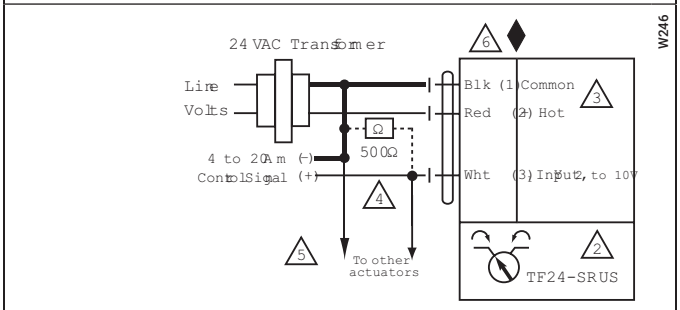
APPLICATION NOTES

♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

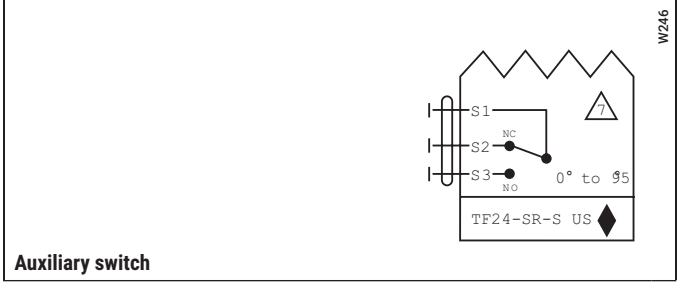
***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



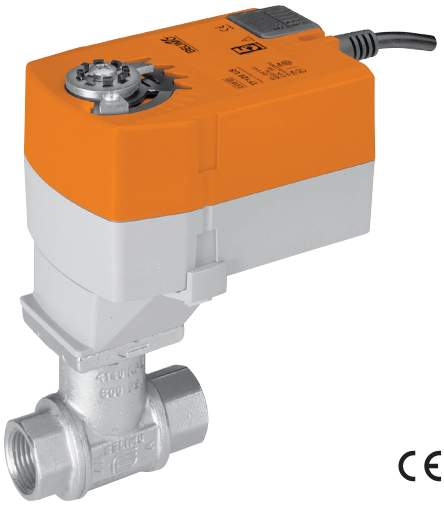
2 to 10 VDC control



4 to 20 mA control



Auxiliary switch



MFT

5 YEAR WARRANTY

CE LISTED 94 D5 TEMP. IND. & REG. EQUIP. c UL us

BRUSHLESS DC MOTOR

Models

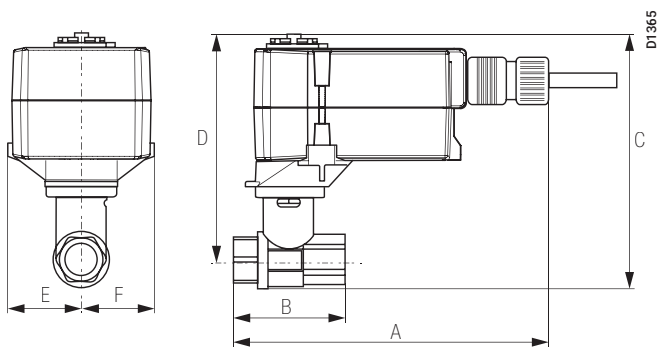
TFRX24-MFT

Technical Data		
Control		MFT
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	2.5 W
	holding	1.0 W
Transformer sizing		4 VA (class 2 power source)
Electrical connection		½" conduit connector 3 ft [1m], 18 GA plenum rated cable
Overload protection		electronic throughout 0° to 95° rotation
Operating range Y*		2 to 10 VDC, 4 to 20 mA (default) variable (VDC, PWM, floating point, on/off)
Feedback output U*		2 to 10 VDC, 0.5 mA max
Input impedance		100 kΩ for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20 mA 1500 Ω for PWM, floating point and on/off control
Mechanical angle of rotation*		95°
Angle of rotation adaptation*		Off (Default)
Direction of rotation	spring	reversible with CW/CCW mounting
	motor	reversible with built-in ↷/↶ switch
Position indication		visual indicator, 0° to 95°
Override control*		Min. (Min Position) = 0% - ZS (Mid. Position) = 50% - Max. (Max. Position) = 100%
Running time	motor*	95 seconds constant independent of load
	spring	<25 seconds @-4°F to 122°F [-20°C to 50°C] <60 seconds @-22°F [-30°C]
Humidity		5 to 95% RH, non-condensing
Ambient temperature		-22 to 122° F (-30 to 50° C)
Storage temperature		-40 to 176° F (-40 to 80° C)
Housing		NEMA 2/IP42
Housing material		UL 94-5VA
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level (max)	running	<35 dB (A)
	spring return	<65 dB (A)
Quality standard		ISO 9001

* Variable when configured with MFT options

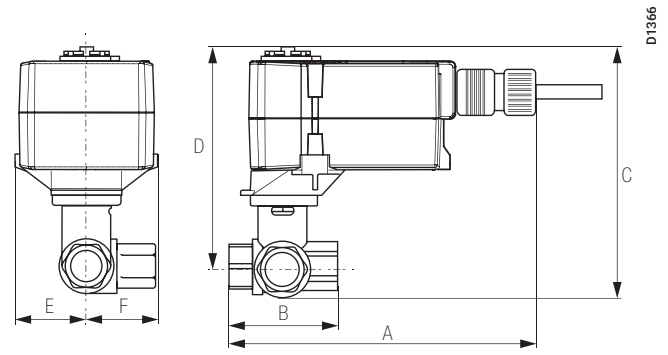
† Rated impulse voltage 0.8 kV, Control pollution degree 3, Type of action 1.AA.

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207-B211	½"	15	2.41" [61.1]	1.39" [35.2]
B212-B215	½"	15	2.38" [60.4]	1.78" [45.2]
B217-B221	¾"	20	2.73" [69.3]	1.87" [47.4]

Dimensions with 3-Way Valve



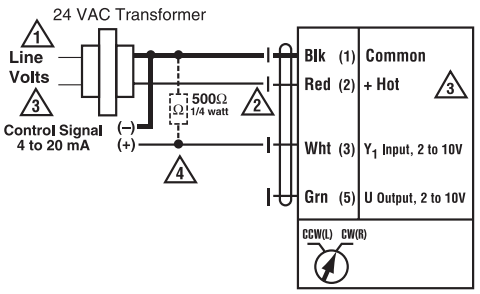
	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307-B311	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312-B315	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317-B321	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]

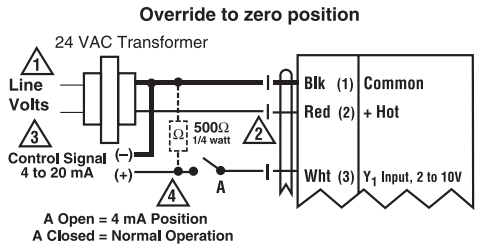
Wiring Diagrams

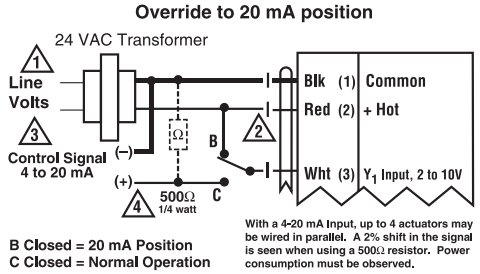
INSTALLATION NOTES

1. Provide overload protection and disconnect as required.
2. ***CAUTION** Equipment damage!*
   Actuators may be connected in parallel.
   Power consumption and input impedance must be observed.
3. Actuators may also be powered by 24 VDC.
4. ZG-R01 may be used.

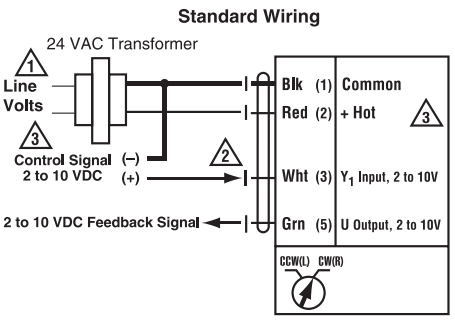
***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

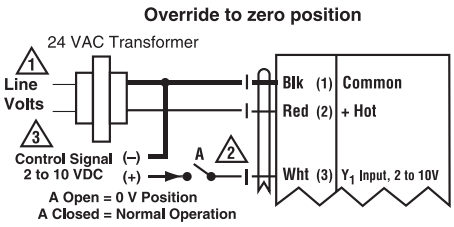


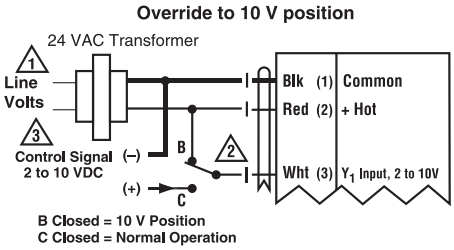


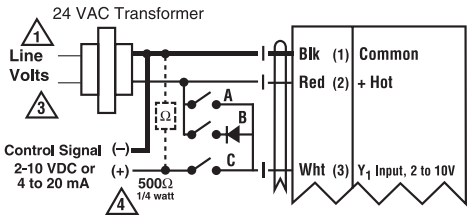


4 to 20 mA Control Signal









Functions	a	b	c
Min* 0%			
Mid* 50%			
Max* 100%			
Normal** Control mode acc. to Y			

* Default selectable 0-100%.
** Customizable.
See Configuration Data Sheet.

2 to 10 VDC Control Signal

5 YEAR WARRANTY

CE LISTED 94 D5 TEMP. IND. & REG. EQUIP. c UL us

BRUSHLESS DC MOTOR

Models

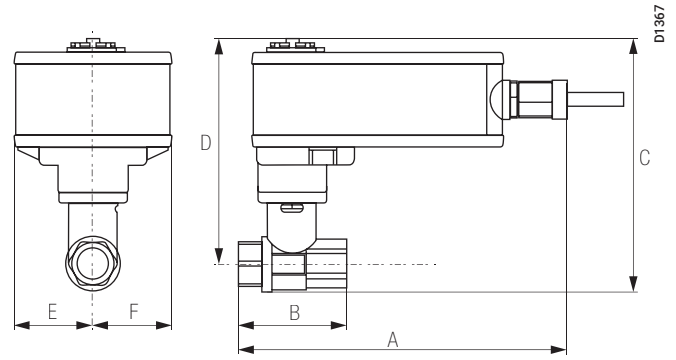
LF24 US	
LF24-S US	w/built-in Aux. Switch
LF120 US	
LF120-S US	w/built-in Aux. Switch

Technical Data		
Control		on/off, floating point
Power supply		
LF24(-S) US		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
LF120(-S) US		120 VAC ± 10% 50/60 Hz
Power consumption		
LF24(-S) US	running	5 W
	holding	2.5 W
LF120(-S) US	running	5.5 W
	holding	3.5 W
Transformer sizing		
LF24(-S) US		7 VA, class 2 power source
LF120(-S) US		7.5 VA, class 2 power source
Electrical connection (-S models have 2 cables)		½" conduit connector 3 ft [1m], 18 GA appliance cable
Electrical protection		120V actuators double insulated
Overload protection		electronic throughout rotation
Angle of rotation		95°
Spring return direction		reversible with CW/CCW mounting
Position indication		visual indicator 0° to 90°
Running time	motor	<40 to 75 seconds (on/off)
	spring	<25 sec. @-4°F to 122°F [-20°C to 50°C] <60 sec. @-22°F [-30°C]
Ambient temperature		-22° F to 122° F [-30° C to 50° C]
Housing		NEMA 2
Agency listings†		cULus according to UL 873 and CAN/CSA C22.2 No. 24-93
Noise level (max)	running	<30 db(A)
	spring return	62 dB(A)
Quality standard		ISO 9001

LF...-S US	
Auxiliary switch	1 x SPDT, 6A (1.5A) @ 250 VAC, UL Listed, adjustable 0° to 95° (double insulated)

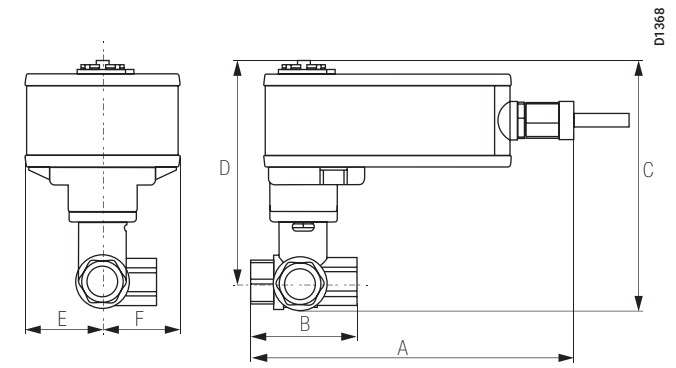
† Rated impulse voltage 800V (4kV for 120V model), Control pollution degree 3, Type of action 1.AA (1.AA.B for -S models)

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207(B)-B211(B)	½"	15	2.41" [61.1]	1.39" [35.2]
B212(B)-B215(B)	½"	15	2.38" [60.4]	1.78" [45.2]
B217(B)-B220(B)	¾"	20	2.73" [69.3]	1.87" [47.4]
B222-B225	1"	25	3.09" [78.4]	1.87" [47.4]
B229-B230	1¼"	32	3.72" [94.6]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307(B)-B311(B)	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312(B)-B315(B)	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317(B)-B320(B)	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption must be observed.

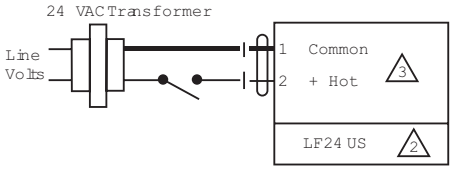
3 Actuator may also be powered by 24 VDC.

4 For end position indication, interlock control, fan startup, etc., LF24-S US and LF120-S US incorporates a built-in auxiliary switch: 1 x SPDT, 6A (1.5A) @ 250 VAC, UL listed, adjustable 0° to 95°.

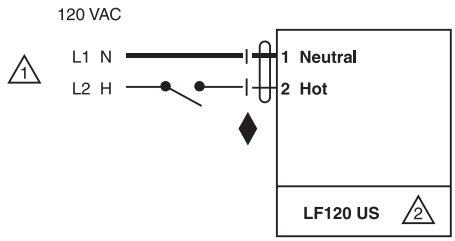
APPLICATION NOTES

Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

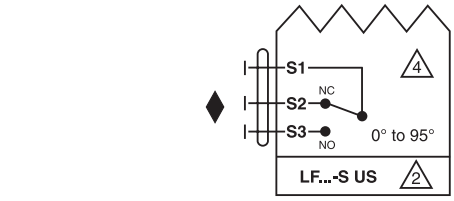
***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



On/Off wiring for 24 VDC



On/Off wiring for 120 VDC



Auxiliary Switch

5 YEAR WARRANTY

CE LISTED 94 D5 TEMP. IND. & REG. EQUIP. c UL us BRUSHLESS DC MOTOR

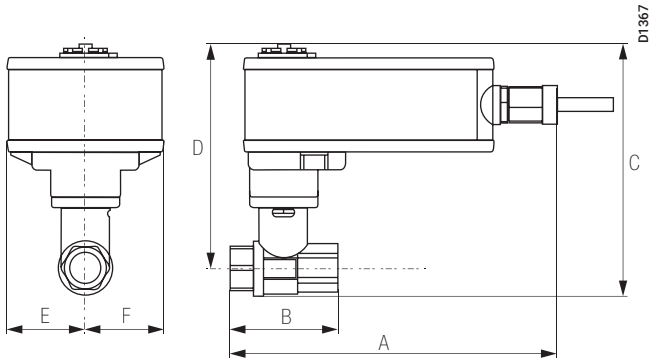
Models

LF24-3 US
LF24-3-S US w/built-in Aux. Switch

Technical Data		
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	2.5 W
	holding	1W
Transformer sizing		5 VA (class 2 power source)
Electrical connection (-S models have 2 cables)		½" conduit connector 3 ft [1m], 18 GA appliance cable
Overload protection		electronic throughout 0° to 95° rotation
Input impedance		1000 Ω (0.6w) control inputs
Angle of rotation		95°
Direction of rotation	spring	reversible with CW/CCW mounting
	motor	reversible with built-in ↷/↶ switch
Position indication		visual indicator 0° to 90°
Running time	motor	150 seconds constant independent of load
	spring	<25 seconds @ -4°F to 122°F [-20°C to 50°C] <60 seconds @ -22°F [-30°C]
Humidity		5 to 95% RH non-condensing
Ambient temperature		-22° F to 122° F [-30° C to 50° C]
Storage temperature		-40° F to 176° F [-40° C to 80° C]
Housing		NEMA type 2/IP54
Housing material		zinc coated metal
Agency listings		cULus according to UL 873 and CAN/CSA C22.2 No. 24-93
Noise level (max)	running	<30 db(A)
	spring return	62 dB(A)
Servicing		maintenance free
Quality standard		ISO 9001

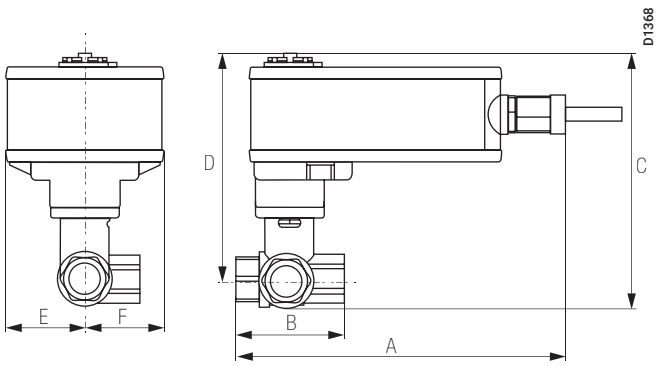
LF24-3-S US	
Auxiliary switch	1 x SPDT, 6A (1.5A) @ 250 VAC, UL Listed, adjustable 0° to 95° (double insulated)

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207(B)-B211(B)	½"	15	2.41" [61.1]	1.39" [35.2]
B212(B)-B215(B)	½"	15	2.38" [60.4]	1.78" [45.2]
B217(B)-B220(B)	¾"	20	2.73" [69.3]	1.87" [47.4]
B222-B225	1"	25	3.09" [78.4]	1.87" [47.4]
B229-B230	1¼"	32	3.72" [94.6]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307(B)-B311(B)	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312(B)-B315(B)	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317(B)-B320(B)	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]

Wiring Diagrams

INSTALLATION NOTES

CAUTION *Equipment damage!*

2 Actuators may be connected in parallel. Power consumption must be observed.

3 Actuators may also be powered by 24 VDC.

4 The common connection from the actuator must be connected to the Hot connection of the controller.

5 The actuator Hot must be connected to the control board common.

6 For end position indication, interlock control, fan startup, etc., LF24-3-S US incorporates one built-in auxiliary switch: 1 x SPDT, 6A (1.5A) @ 250 VAC, UL listed, adjustable 0° to 95°.

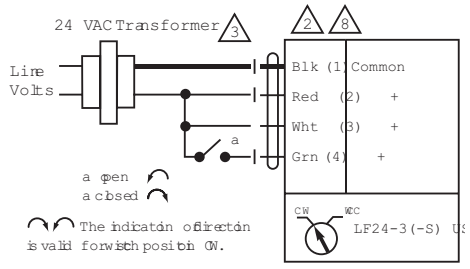
8 Actuators with plenum rated cable do not have numbers on wires; use color coded instead. Actuators with appliance rated cable use numbers.

APPLICATION NOTES

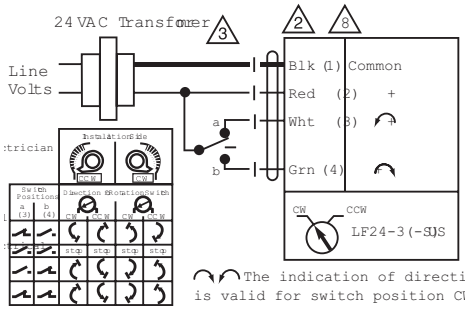
♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

WARNING *Live Electrical Components!*

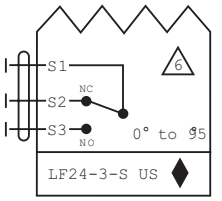
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



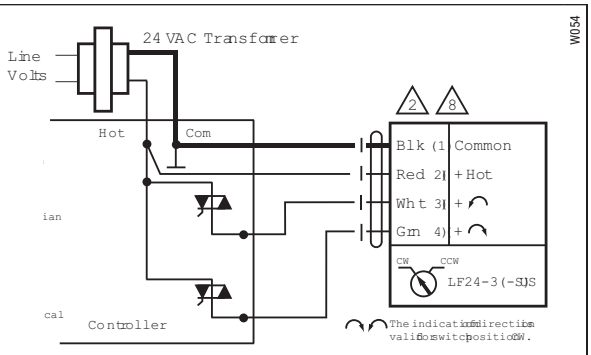
On/Off control



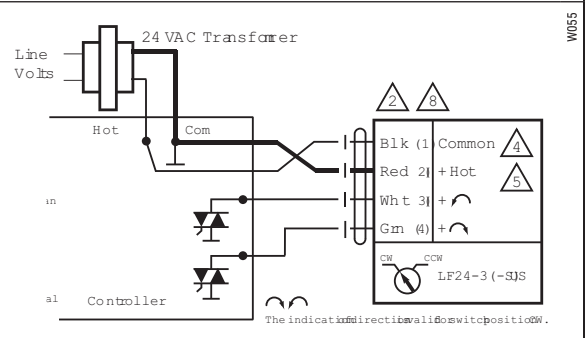
Floating Point control



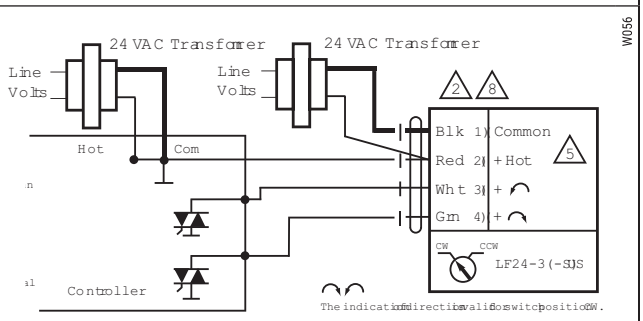
Auxiliary switch



Triac source



Triac sink



Triac sink with separate transformers

5 YEAR WARRANTY

CE LISTED 94 D5 TEMP. IND. & REG. EQUIP. c UL us

BRUSHLESS DC MOTOR

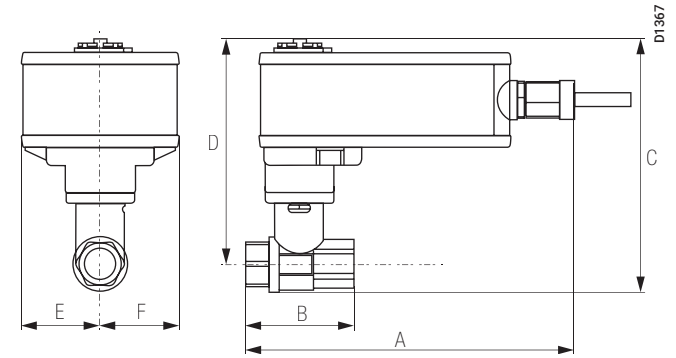
Models

LF24-SR US
LF24-SR-S US w/built-in Aux. Switch

Technical Data		
Control		proportional
Control signal		2 to 10 VDC 4 to 20 mA (with 500 Ω resistor)
Power consumption	running	2.5 W
	holding	1 W
Transformer sizing		5 VA, class 2 power
Electrical connection (-S models have 2 cables)		½" conduit connector 3 ft [1m], 18 GA appliance cable
Overload protection		electronic throughout 0° to 95° rotation
Feedback output		2 to 10 VDC
Input impedance		100 kΩ
Angle of rotation		95°
Direction of rotation	spring	reversible with CW/CCW mounting
	motor	reversible with built-in ↷/↶ switch
Position indication		visual indicator
Running time	motor	150 sec. independent of load (proportional)
	spring	<25 seconds @ -4°F to 122°F [-20°C to 50°C] <60 seconds @ -22°F [-30°C]
Ambient temperature		-22° F to 122° F [-30° C to 50° C]
Housing		NEMA 2
Agency listings		cULus according to UL 873 and CAN/CSA C22.2 No. 24-93
Noise level (max)	running	<30 db(A)
	spring return	62 dB(A)
Quality standard		ISO 9001

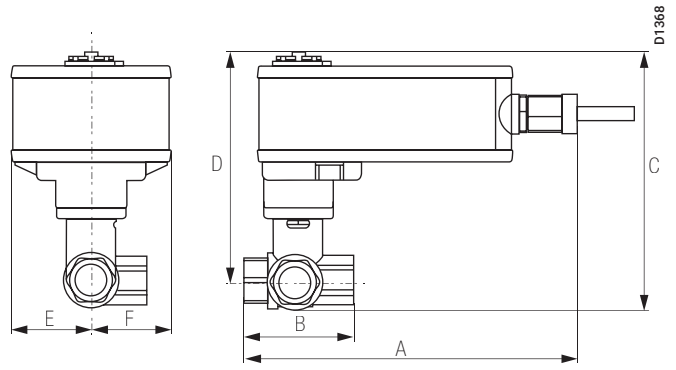
LF24-SR-S US	
Auxiliary switch	1 x SPDT, 6A (1.5A) @ 250 VAC, UL Listed, adjustable 0° to 95° (double insulated)

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207(B)-B211(B)	½"	15	2.41" [61.1]	1.39" [35.2]
B212(B)-B215(B)	½"	15	2.38" [60.4]	1.78" [45.2]
B217(B)-B220(B)	¾"	20	2.73" [69.3]	1.87" [47.4]
B222-B225	1"	25	3.09" [78.4]	1.87" [47.4]
B229-B230	1¼"	32	3.72" [94.6]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307(B)-B311(B)	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312(B)-B315(B)	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317(B)-B320(B)	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]

Wiring Diagrams

INSTALLATION NOTES

△2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel. Up to 4 actuators may be connected in parallel. With 4 actuators wired to one 500 Ω resistor, a +2% shift of control signal may be required. Power consumption must be observed.

△3 Actuators may also be powered by 24 VDC.

△4 Actuators with plenum rated cable do not have numbers on wires; use color codes instead.

△5 Only connect common to neg. (–) leg of control circuits.

△6 For end position indication, interlock control, fan startup, etc., LF24-SR-S US incorporates one built-in auxiliary switch: 1 x SPDT, 6A (1.5A) @ 250 VAC, UL listed, adjustable 0° to 95°.

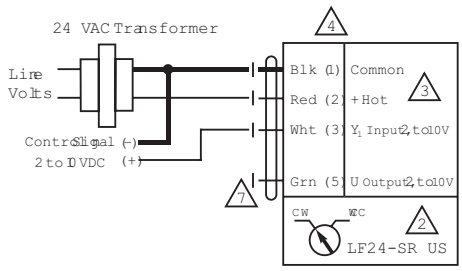
△7 The LF24-SR-S US wire 5 is white.

APPLICATION NOTES

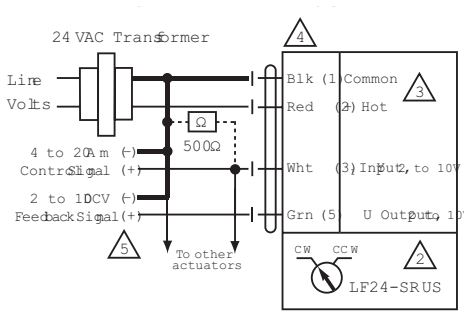
♦ The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

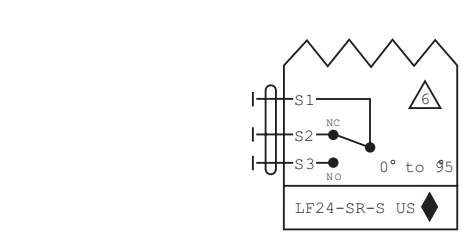
***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



2 to 10 VDC control



4 to 20 mA control



Auxiliary switch

MFT

5 YEAR WARRANTY

CE LISTED 94 D5 TEMP. IND. & REG. EQUIP. c UL us

BRUSHLESS DC MOTOR

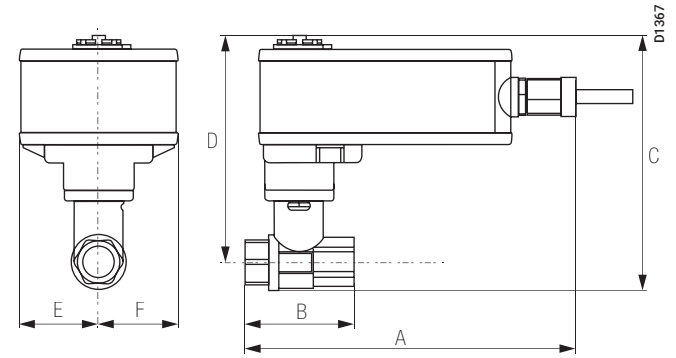
Models

LF24-MFT US
LF24-MFT-S US w/built-in Aux. Switch

Technical Data		
Control		MFT
Control signal		2 to 10 VDC
Power consumption	running	2.5 W
	holding	1 W
Transformer sizing		5 VA (class 2 power source)
Electrical connection (-S models have 2 cables)		½" conduit connector 3 ft [1m], 18 GA appliance cable
Overload protection		electronic throughout 0° to 95° rotation
Feedback output		2 to 10 VDC, 0.5 mA max
Input impedance		100 kΩ for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20mA 750 Ω for PWM 500 Ω for on/off and floating point
Angle of rotation		95°
Direction of rotation	spring	reversible with CW/CCW mounting
	motor	reversible with built-in ↷/↶ switch
Position indication		visual indicator
Running time	motor	150 seconds independent of load (proportional, default)
	spring	<25 seconds @-4°F to 122°F [-20°C to 50°C] <60 seconds @-22°F [-30°C]
Ambient temperature		-22° F to 122° F [-30° C to 50° C]
Housing		NEMA 2
Agency listings		cULus according to UL 873 and CAN/CSA C22.2 No. 24-93
Noise level (max)	running	<30 db(A)
	spring return	62 dB(A)
Quality standard		ISO 9001

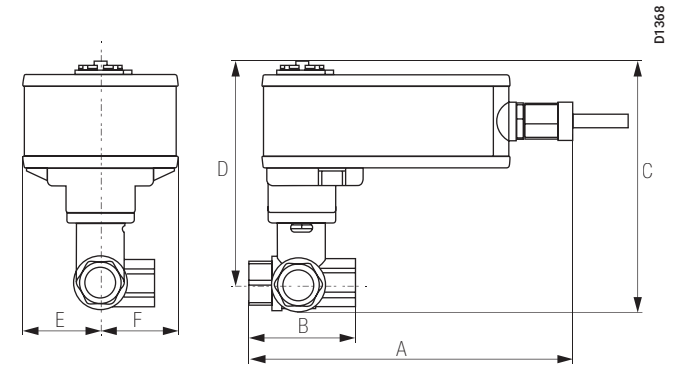
LF24-MFT-S US	
Auxiliary switch	1 x SPDT, 6A (1.5A) @ 250 VAC, UL Listed, adjustable 0° to 95° (double insulated)

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207-B211	½"	15	2.41" [61.1]	1.39" [35.2]
B212-B215	½"	15	2.38" [60.4]	1.78" [45.2]
B217-B220	¾"	20	2.73" [69.3]	1.87" [47.4]
B222-B225	1"	25	3.09" [78.4]	1.87" [47.4]
B229-B230	1¼"	32	3.72" [94.6]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307-B311	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312-B315	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317-B320	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]

Wiring Diagrams

INSTALLATION NOTES

2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.

3 Actuators may also be powered by 24 VDC.

4 IN4004 or IN4007 diode (IN4007 supplied, Belimo part number 40155).

5 Triac A and B can also be contact closures.

6 Control signal may be pulsed from either the Hot (Source) or Common (Sink) 24 VAC line.

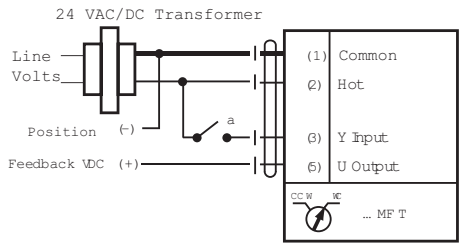
7 Position feedback cannot be used with Triac sink controller. The actuators internal common reference is not compatible.

APPLICATION NOTES

♦ The ZG-R01 500 Ω resistor converts the 4 to 10 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

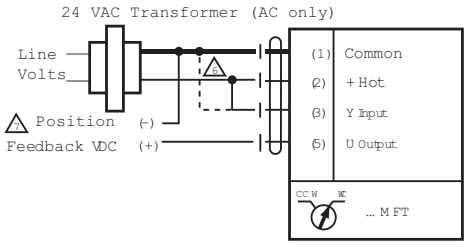
***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

W043



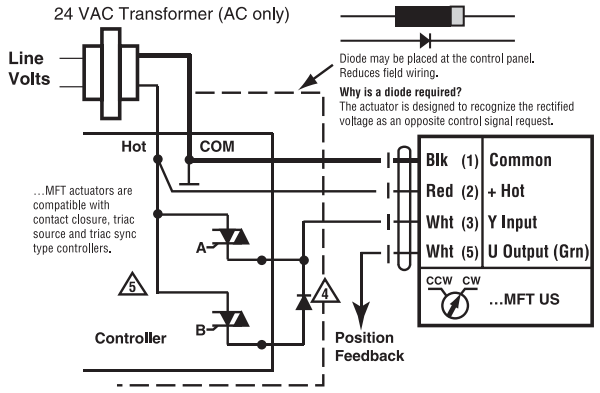
On/Off control

W041



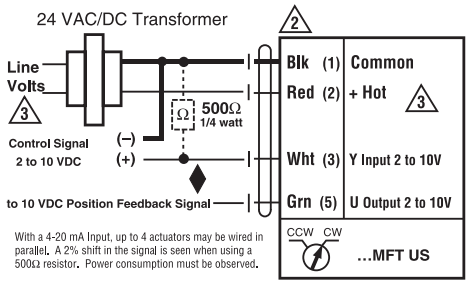
PWM, triac source and sink

W302



Floating Point control

W303



Proportional 2 to 10 or 4 to 20 mA control signal

5 YEAR WARRANTY

CE LISTED 94 D5 TEMP.IND. & REG. EQUIP. c UL us

BRUSHLESS DC MOTOR

Models

AFRB24
AFRB24-S
AFRX24
AFRX24-S

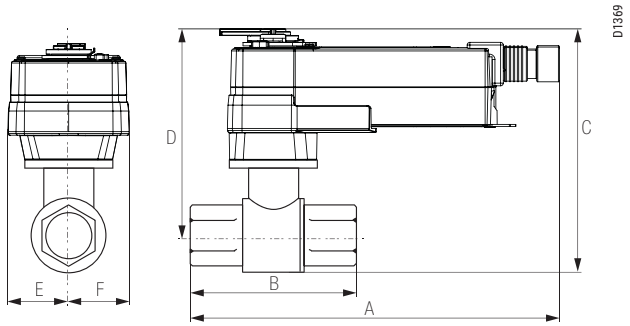
Technical Data

Power supply		24 VAC ± 20% 50/60 Hz 24 VDC +20% / -10%
Power consumption	running	5 W
	holding	2.5 W
Transformer sizing		7.5 VA (class 2 power source)
Electrical connection		
AFRB24...		3 ft., 18 GA appliance cable, 1/2" conduit connector **-S models:** two 3 ft., 18 gauge appliance cables with 1/2" conduit connectors
AFRX24...		3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] 18 GA appliance or plenum cables, with or without 1/2" conduit connector **-S models:** two 3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] appliance cables, with or without 1/2" conduit connectors
Overload protection		electronic throughout 0 to 95° rotation
Control		on/off
Direction of rotation	spring	reversible with CW/CCW mounting
Angle of rotation		95°
Running time	motor	< 75 seconds
	spring	20 seconds @ -4°F to 122°F [-20°C to 50°C]; < 60 seconds @ -22°F [-30°C]
Position indication		visual indicator, 0° to 95° (0° is full spring return position)
Manual override		5 mm hex crank (3/16" Allen), supplied
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA 2, IP54, Enclosure Type2
Agency listings †		cULus according. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE according. to 2004/108/EC & 2006/95/EC
Noise level		<50dB(A) motor @ 75 seconds ≤62dB(A) spring return
Quality standard		ISO 9001

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

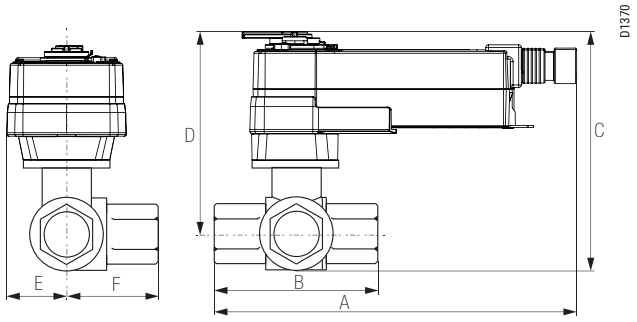
AFRB24-S, AFRX24-S	
Auxiliary switches	2 x SPDT 3A (0.5A) @ 250 VAC, UL approved one set at +10°, one adjustable 10° to 90°

Dimensions



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B212-B216	½"	15	2.38" [60.4]	1.72" [43.7]
B217-B221	¾"	20	2.73" [69.3]	1.81" [45.9]
B222-B225	1"	25	3.09" [78.4]	1.81" [45.9]
B229-B230	1¼"	32	3.72" [94.6]	1.81" [45.9]
B231-B232	1¼"	32	3.72" [94.6]	1.98" [50.4]
B238-B240	1½"	40	3.88" [98.5]	1.98" [50.4]
B248-B250	2"	50	4.21" [107.0]	2.21" [56.2]
B251-B254	2"	50	4.93" [125.2]	2.68" [68.0]
B261-B265	2½"	65	5.55" [140.9]	2.68" [68.0]
B277-B280	3"	80	5.82" [147.9]	2.68" [68.0]

Dimensions



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B312-B316	½"	15	2.38" [60.4]	1.72" [43.7]	1.26" [32.1]
B317-B321	¾"	20	2.73" [69.3]	1.81" [45.9]	1.45" [36.8]
B322-B325	1"	25	3.09" [78.4]	1.81" [45.9]	1.56" [39.8]
B329-B331	1¼"	32	3.96" [100.6]	2.21" [56.2]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.45" [62.2]	2.33" [59.1]
B347-B352	2"	50	4.90" [124.5]	2.68" [68.0]	2.60" [66.0]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment Damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

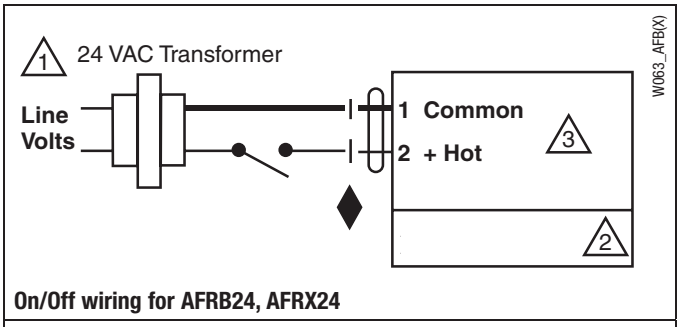
3 Actuators may also be powered by 24 VDC.

4 For end position indication, interlock control, fan startup, etc., AFRB24-S and AFRX24-S incorporates two built-in auxiliary switches: 2 x SPDT, 3A (0.5A) @250 VAC, UL Approved, one switch is fixed at +10°, one is adjustable 10° to 90°.

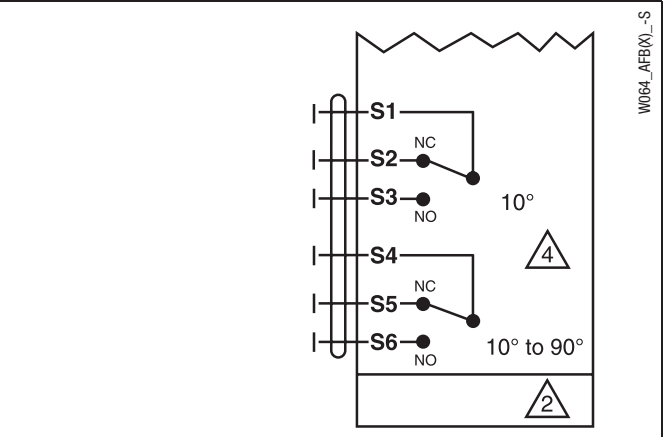
APPLICATION NOTES

Meets cULus requirements without the need of an electrical ground connection.

***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



On/Off wiring for AFRB24, AFRX24



Auxiliary Switches for AFRB24-S, AFRX24-S

5 YEAR WARRANTY

CE LISTED 94 D5 TEMP. IND. & REG. EQUIP. cULus BRUSHLESS DC MOTOR

Models

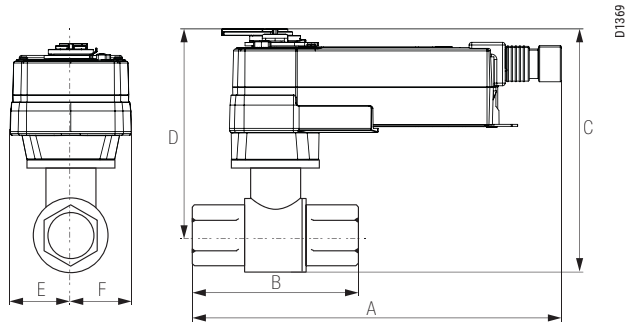
AFRBUP
AFRBUP-S
AFRXUP
AFRXUP-S

Technical Data		
Power supply		24 to 240 VAC -20% / +10%, 50/60 Hz 24 to 125 VDC ±10%
Power consumption	running	7 W
	holding	3.5 W
Transformer sizing		7 VA @ 24 VAC (class 2 power source) 8.5 VA @ 120 VAC 18 VA @ 240 VAC
Electrical connection		
AFRBUP...		3 ft., 18 GA appliance cable, 1/2" conduit connector **-S models:** two 3 ft., 18 gauge appliance cables with 1/2" conduit connectors
AFRXUP...		3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] 18 GA appliance or plenum cables, with or without 1/2" conduit connector **-S models:** two 3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] appliance cables, with or without 1/2" conduit connectors
Overload protection		electronic throughout 0 to 95° rotation
Control		on/off
Direction of rotation	spring	reversible with CW/CCW mounting
Angle of rotation		95° (adjustable with mechanical end stop, 35° to 95°)
Running time	motor	< 75 seconds
	spring	20 seconds @ -4°F to 122°F [-20°C to 50°C]; < 60 seconds @ -22°F [-30°C]
Position indication		visual indicator, 0° to 95° (0° is full spring return position)
Manual override		5 mm hex crank (3/16" Allen), supplied
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA 2/IP54, Enclosure Type2
Agency listings †		cULus according. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE according. to 2004/108/EC & 2006/95/EC
Noise level		<50dB(A) motor @ 75 seconds ≤62dB(A) spring return
Quality standard		ISO 9001

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

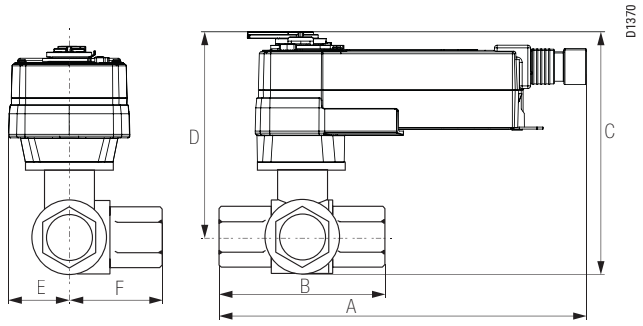
AFRBUP-S, AFRXUP-S	
Auxiliary switches	2 x SPDT 3A (0.5A) @ 250 VAC, UL approved one set at +10°, one adjustable 10° to 90°

Dimensions



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B212-B216	½"	15	2.38" [60.4]	1.72" [43.7]
B217-B221	¾"	20	2.73" [69.3]	1.81" [45.9]
B222-B225	1"	25	3.09" [78.4]	1.81" [45.9]
B229-B230	1¼"	32	3.72" [94.6]	1.81" [45.9]
B231-B232	1¼"	32	3.72" [94.6]	1.98" [50.4]
B238-B240	1½"	40	3.88" [98.5]	1.98" [50.4]
B248-B250	2"	50	4.21" [107.0]	2.21" [56.2]
B251-B254	2"	50	4.93" [125.2]	2.68" [68.0]
B261-B265	2½"	65	5.55" [140.9]	2.68" [68.0]
B277-B280	3"	80	5.82" [147.9]	2.68" [68.0]

Dimensions



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B312-B316	½"	15	2.38" [60.4]	1.72" [43.7]	1.26" [32.1]
B317-B321	¾"	20	2.73" [69.3]	1.81" [45.9]	1.45" [36.8]
B322-B325	1"	25	3.09" [78.4]	1.81" [45.9]	1.56" [39.8]
B329-B331	1¼"	32	3.96" [100.6]	2.21" [56.2]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.45" [62.2]	2.33" [59.1]
B347-B352	2"	50	4.90" [124.5]	2.68" [68.0]	2.60" [66.0]

Wiring Diagrams

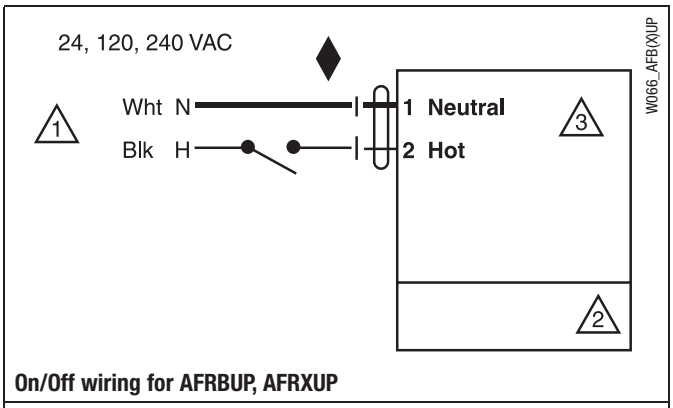
INSTALLATION NOTES

1. Provide overload protection and disconnect as required.
2. ***CAUTION** Equipment Damage!*
   Actuators may be connected in parallel.
   Power consumption and input impedance must be observed.
3. No ground connection is required.
4. For end position indication, interlock control, fan startup, etc., AFRBUP-S and AFRXUP-S incorporates two built-in auxiliary switches: 2 x SPDT, 3A (0.5A) @250 VAC, UL Approved, one switch is fixed at +10°, one is adjustable 10° to 90°.

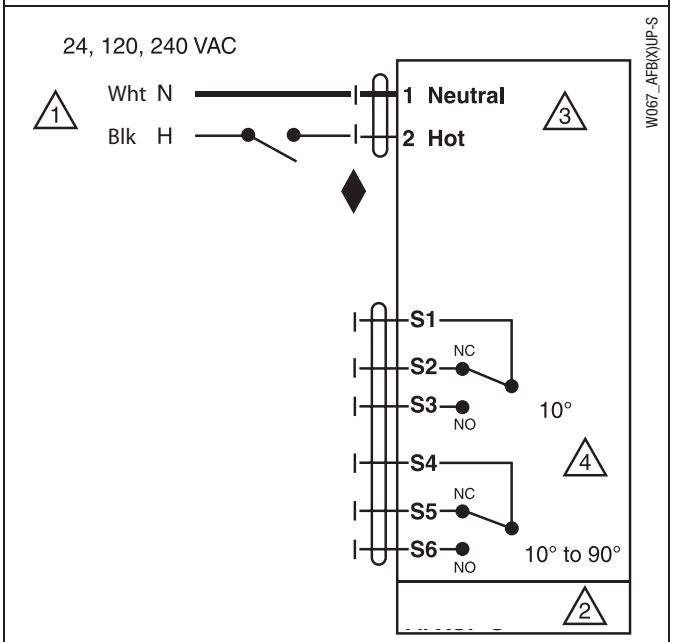
APPLICATION NOTES

- Meets cULus requirements without the need of an electrical ground connection.

***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



On/Off wiring for AFRBUP, AFRXUP



Auxiliary Switches for AFRBUP-S, AFRXUP-S

5 YEAR WARRANTY

CE LISTED 94 D5 TEMP. IND. & REG. EQUIP. c UL us

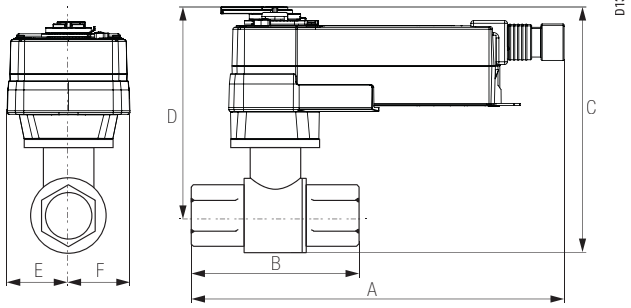
BRUSHLESS dc motor

Technical Data

Power supply		24 VAC ±20%, 50/60 Hz 24 VDC +20% / -10%
Power consumption	running	5.5 W
	holding	3 W
Transformer sizing		8.5 VA (class 2 power source)
Electrical connection		
AFRB...		3 ft, 18 GA appliance cable, 1/2" conduit connector **-S models:** two 3 ft, 18 gauge appliance cables with 1/2" conduit connectors
AFX...		3 ft [1m], 10 ft [3m] or 16 ft [5m] 18 GA appliance or plenum cables, with or without 1/2" conduit connector **-S models:** Two 3 ft [1m], 10 ft [3m] or 16 ft [5m] appliance cables, with or without 1/2" conduit connectors
Overload protection		electronic throughout 0 to 95° rotation
Operating range Y		2 to 10 VDC, 4 to 20mA
Input impedance		100 kΩ for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20 mA
Feedback output U		2 to 10 VDC (max. 0.5 mA)
Direction of rotation	spring	reversible with CW/CCW mounting
	motor	reversible with built-in switch
Mechanical angle of rotation		95° (adjustable with mechanical end stop, 35° to 95°)
Running time	spring	< 20 seconds @ -4°F to 122°F [-20°C to 50°C]; < 60 seconds @ -22°F [-30°C]
	motor	95 seconds
Position indication		visual indicator, 0° to 95° (0° is full spring return position)
Manual override		5 mm hex crank (3/16" Allen), supplied
Humidity		max. 95% RH non-condensing
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		Nema 2, IP54, Enclosure Type2
Housing material		zinc coated metal and plastic casing
Agency listings†		cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC & 2006/95/EC
Noise level		≤40dB(A) motor @ 95 seconds ≤62dB(A) spring return
Servicing		maintenance free
Quality standard		ISO 9001
Weight		4.6 lbs (2.1 kg); 4.9 lbs (2.25 kg) with switches

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

Dimensions



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B212-B216	½"	15	2.38" [60.4]	1.72" [43.7]
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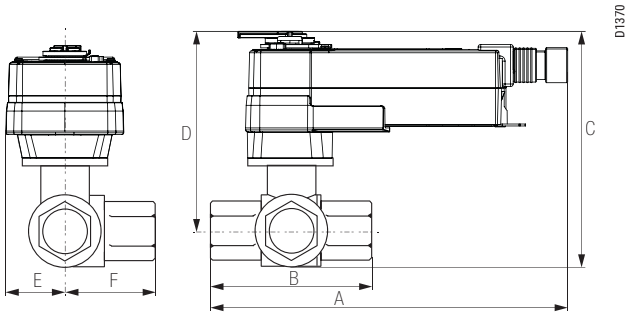

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Valve Body	Inches	DN [mm]	A	B	C
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B347-B352	2"	50	4.90" [124.5]	2.68" [68.0]	2.60" [66.0]

Accessories

AV 8-25	Shaft extension
IND-AFB	Damper position indicator
KH-AFB	Crank arm
K7-2	Universal clamp for up to 1.05" dia jackshafts
TF-CC US	Conduit fitting
Tool-06	8mm and 10 mm wrench
ZG-100	Universal mounting bracket
ZG-101	Universal mounting bracket
ZG-118	Mounting bracket for Barber Colman® MA 3../4.., Honeywell® Mod III or IV or Johnson® Series 100 replacement or new crank arm type installations
ZG-AFB	Crank arm adaptor kit
ZG-AFB118	Crank arm adaptor kit
ZS-100	Weather shield (metal)
ZS-150	Weather shield (polycarbonate)
ZS-260	Explosion-proof housing
ZS-300	NEMA 4X housing

NOTE: When using AFRB24-SR, AFRB24-SR-S, AFRX24-SR and AFRX24-SR-S actuators, only use accessories listed on this page.
For actuator wiring information and diagrams, refer to Belimo Wiring Guide.

Typical Specification

Spring return control damper actuators shall be direct coupled type which require no crank arm and linkage and be capable of direct mounting to a jackshaft up to a 1.05" diameter. The actuator must provide proportional damper control in response to a 2 to 10 VDC or, with the addition of a 500Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. The actuators must be designed so that they may be used for either clockwise or counterclockwise fail-safe operation. Actuators shall use a brushless DC motor controlled by a microprocessor and be protected from overload at all angles of rotation. Run time shall be constant, and independent of torque. A 2 to 10 VDC feedback signal shall be provided for position feedback. Actuators shall be cULus Approved and have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment Damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

2 Up to 4 actuators may be connected in parallel if not mechanically mounted to the same shaft. With 4 actuators wired to one 500 Ω resistor.
Power consumption must be observed.

3 Actuator may also be powered by 24 VDC.

4 For end position indication, interlock control, fan startup, etc., AFB24-SR-S and AFX24-SR-S incorporates two built-in auxiliary switches: 2 x SPDT, 3A (0.5A) @250 VAC, UL Approved, one switch is fixed at +10°, one is adjustable 10° to 90°.

5 Only connect common to neg. (–) leg of control circuits

APPLICATION NOTES

The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC.

ATTENTION: AFRB24-SR(-S) and AFRX24-SR(-S) **cannot** be tandem mounted on the same damper or valve shaft. Only On/Off and MFT AF models can be used for tandem mount applications.

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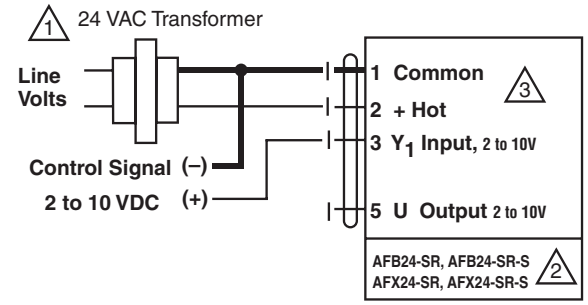
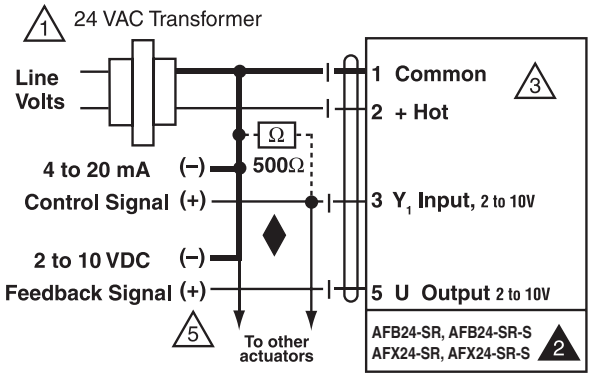
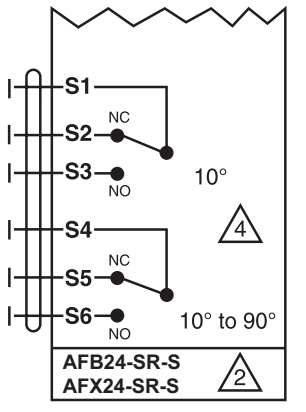


2 to 10 VDC control of AFRB24-SR and AFRX24-SR



4 to 20 mA control of AFRB24-SR and AFRX24-SR with 2 to 10 VDC feedback output



Auxiliary switches for AFRB24-SR-S, AFX24-SR-S

MFT

5 YEAR WARRANTY

CE LISTED 94 D5 TEMP.IND. & REG.EQUIP. c UL us BRUSHLESS DC motor

Models

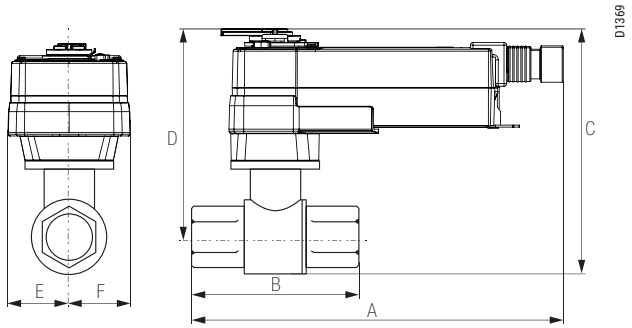
AFRX24-MFT
AFRX24-MFT-S

Technical Data		
Control		MFT
Control signal		2 to 10 VDC, 4 to 20 mA (default) variable (VDC, PWM, floating point, on/off)
Power supply		24 VAC, +/- 20%, 50/60 Hz 24 VDC, +20% / -10%
Power consumption†	running	7.5 W
	holding	3 W
Transformer sizing†		10 VA (Class 2 power source)
Electrical connection		3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] 18 GA appliance or plenum cables, with or without 1/2" conduit connector -S models: two 3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] appliance cables with or without 1/2" conduit connectors
Overload protection		electronic throughout 0 to 90° rotation
Feedback output*		2 to 10 VDC, 0.5 mA max (variable)
Input impedance		100 kΩ for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20 mA 1500 Ω for on/off and floating point
Angle of rotation		95°
Direction of rotation*	spring	reversible with CW/CCW mounting
	motor	reversible with built-in ↷/↶ switch
Position indication		visual indicator 0° to 95°(0° is spring return position)
Manual override		5 mm hex crank (3/16" Allen), supplied
Running time	motor*	150 seconds (default), variable (70 to 220 seconds)
	spring	<20 sec @ -4°F to 122°F [-20°C to 50°C]
Ambient temperature		-22° F to 122° F [-30° C to 50° C]
Housing		NEMA 2, IP54, Enclosure Type 2
Agency listings		cULus according. To UL60730-1A/-2-14, CAN/CSA E60730- 1:02, CE according. To 2004/108/EC & 2006/95/EC
Noise level		≤40dB(A) motor @ 150 seconds, run time dependent ≤62dB(A) spring return
Quality standard		ISO 9001

† Programmed for 70 sec motor runtime. At 150 sec motor run time, transformer sizing is 8.5 VA and power consumption is 6 W running/3 W holding.
* Variable when configured with MFT options
‡ Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

AFRX24-MFT-S	
Auxiliary switches	2 x SPDT 3A (0.5A) @ 250 VAC, UL approved one set at +10° to 90°

Dimensions



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B212-B216	½"	15	2.38" [60.4]	1.72" [43.7]
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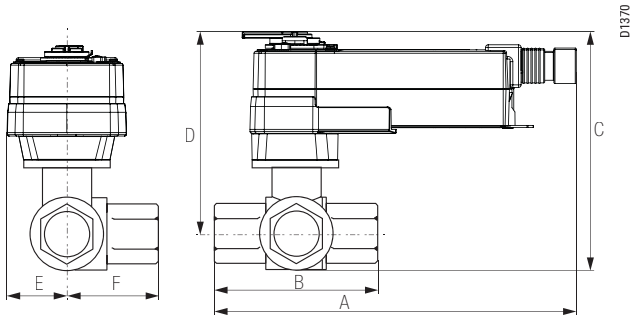
Dimensions



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
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B322-B325	1"	25	3.09" [78.4]	1.81" [45.9]	1.56" [39.8]
B329-B331	1¼"	32	3.96" [100.6]	2.21" [56.2]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.45" [62.2]	2.33" [59.1]
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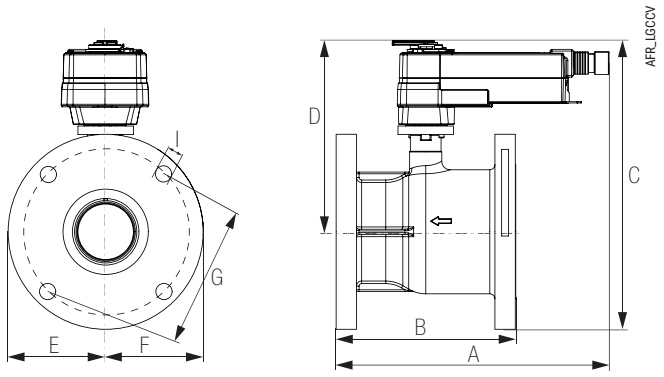
Dimensions



Valve Body	Nominal Pipe Size	Top Flange Design	Flange Diameter	Face-to-Face Length	Height
			A	B	C
B6250	2½" [65]	F05	7.50" [190.5]	5.50" [139.7]	8.10" [205.4]
B6300	3" [80]		8.00" [203.2]	6.60" [167.6]	8.40" [213.1]
B6400	4" [100]		9.00" [228.6]	8.30" [210.8]	9.30" [235.9]

Wiring Diagrams

INSTALLATION NOTES

1. Provide overload protection and disconnect as required.
2. ***CAUTION** Equipment Damage!*
   Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.
3. Actuators may also be powered by 24 VDC.
4. Position feedback cannot be used with Triac sink controller. The actuator internal common reference is not compatible.
5. Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.
8. Contact closures A & B also can be triacs. A & B should both be closed for triac source and open for triac sink.
9. For triac sink the common connection from the actuator must be connected to the hot connection of the controller.

APPLICATION NOTES

- Meets UL requirements without the need of an electrical ground connection.
- The ZG-R01 500 Ω resistor may be used.

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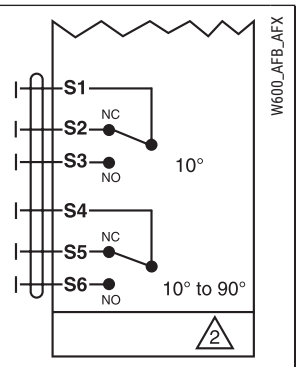
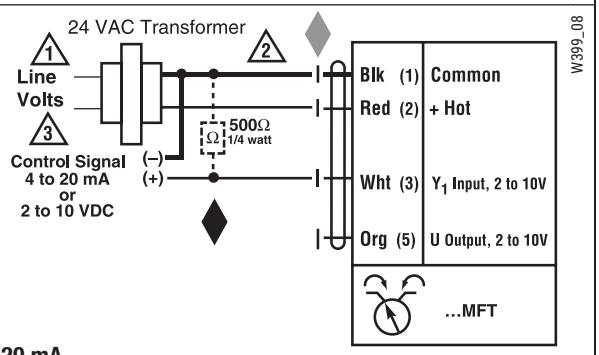
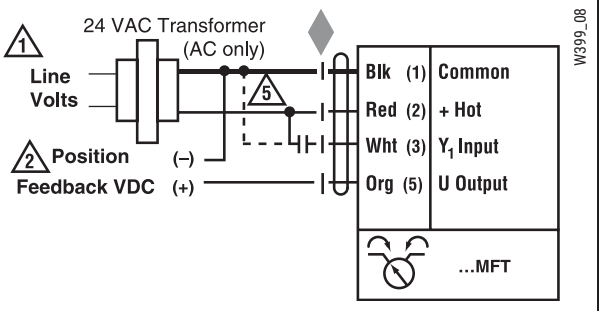


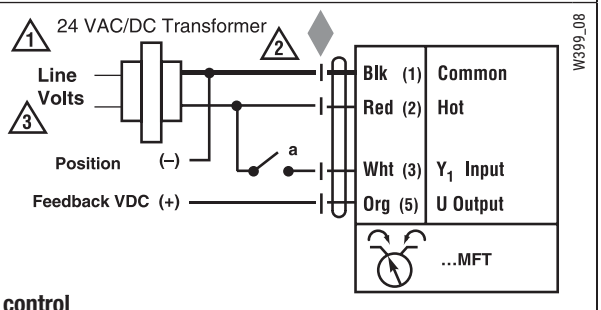
Auxiliary Switches for AFRX24-MFT



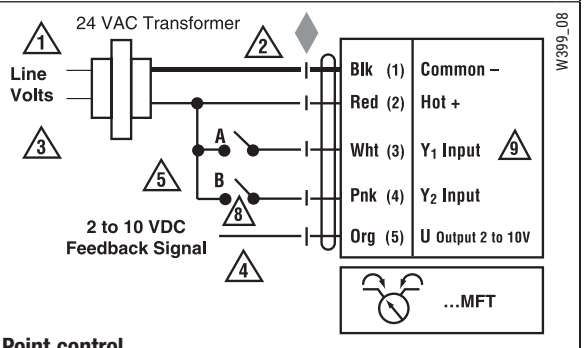
VDC/4-20 mA



PWM



On/Off control



Floating Point control

MFT

5 YEAR WARRANTY

CE LISTED 94 D5 TEMP.IND. & REG.EQUIP. c UL us

BRUSHLESS DC motor

Models

AFRX24-MFT95

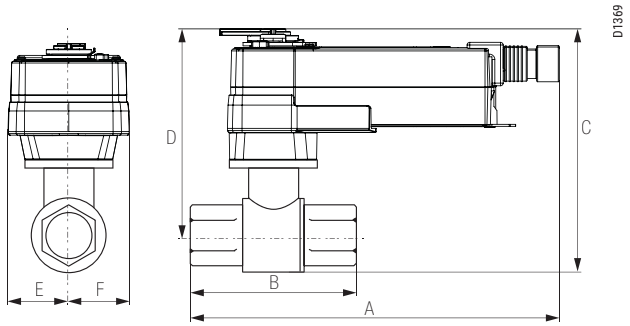
Technical Data		
Control		MFT
Control signal		0 to 135 Ω Honeywell Electronic Series 90, 0 to 135 Ω input
Power supply		24 VAC, +/- 20%, 50/60 Hz 24 VDC, +20% / -10%
Power consumption†	running	7.5 W
	holding	3 W
Transformer sizing†		10 VA (Class 2 power source)
Electrical connection		3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] 18 GA plenum cables, with or without 1/2" conduit connector
Overload protection		electronic throughout 0 to 90° rotation
Feedback output*		2 to 10 VDC, 0.5 mA max (variable)
Angle of rotation		95°
Direction of rotation*	spring	reversible with CW/CCW mounting
	motor	reversible with built-in ↷/↶ switch
Position indication		visual indicator 0° to 95°(0° is spring return position)
Manual override		5 mm hex crank (3/16" Allen), supplied
Running time	motor*	150 seconds (default), variable (70 to 220 seconds)
	spring	<20 sec @ -4°F to 122°F [-20°C to 50°C]
Ambient temperature		-22° F to 122° F [-30° C to 50° C]
Housing		NEMA 2, IP54, Enclosure Type 2
Agency listings		cULus according. To UL60730-1A/-2-14, CAN/CSA E60730- 1:02, CE according. To 2004/108/EC & 2006/95/EC
Noise level		≤40dB(A) motor @ 150 seconds, run time dependent ≤62dB(A) spring return
Quality standard		ISO 9001

† Programmed for 70 sec motor runtime. At 150 sec motor run time, transformer sizing is 8.5 VA and power consumption is 6 W running/3 W holding.

* Variable when configured with MFT options

‡ Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

Dimensions



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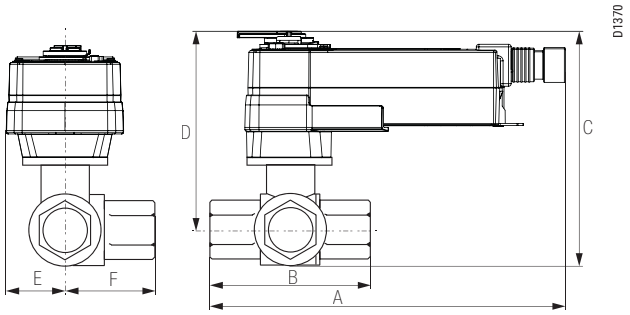
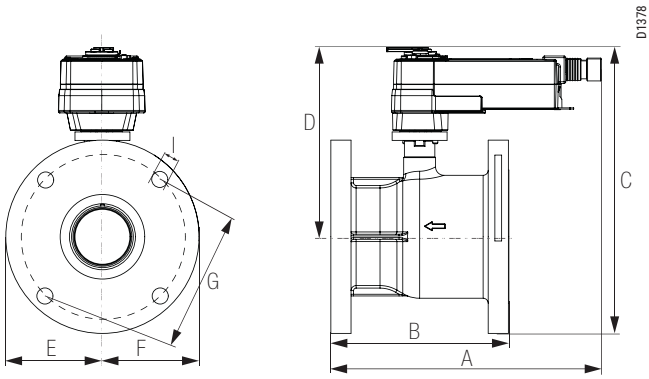
B212-B215	½"	15	2.38" [60.4]	1.72" [43.7]
B217-B221	¾"	20	2.73" [69.3]	1.81" [45.9]
B222-B225	1"	25	3.09" [78.4]	1.81" [45.9]
B229-B230	1¼"	32	3.72" [94.6]	1.81" [45.9]
B231-B232	1¼"	32	3.72" [94.6]	1.98" [50.4]
B238-B240	1½"	40	3.88" [98.5]	1.98" [50.4]
B248-B250	2"	50	4.21" [107.0]	2.21" [56.2]
B251-B254	2"	50	4.93" [125.2]	2.68" [68.0]
B261-B265	2½"	65	5.55" [140.9]	2.68" [68.0]
B277-B280	3"	80	5.82" [147.9]	2.68" [68.0]

Dimensions



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B312-B315	½"	15	2.38" [60.4]	1.72" [43.7]	1.26" [32.1]
B317-B321	¾"	20	2.73" [69.3]	1.81" [45.9]	1.45" [36.8]
B322-B325	1"	25	3.09" [78.4]	1.81" [45.9]	1.56" [39.8]
B329-B331	1¼"	32	3.96" [100.6]	2.21" [56.2]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.45" [62.2]	2.33" [59.1]
B347-B352	2"	50	4.90" [124.5]	2.68" [68.0]	2.60" [66.0]

Dimensions



Valve Body	Nominal Pipe Size	Top Flange Design	Flange Diameter	Face-to-Face Length	Height
			A	B	C
B6250	2½" [65]	F05	7.50" [190.5]	5.50" [139.7]	8.10" [205.4]
B6300	3" [80]		8.00" [203.2]	6.60" [167.6]	8.40" [213.1]
B6400	4" [100]		9.00" [228.6]	8.30" [210.8]	9.30" [235.9]

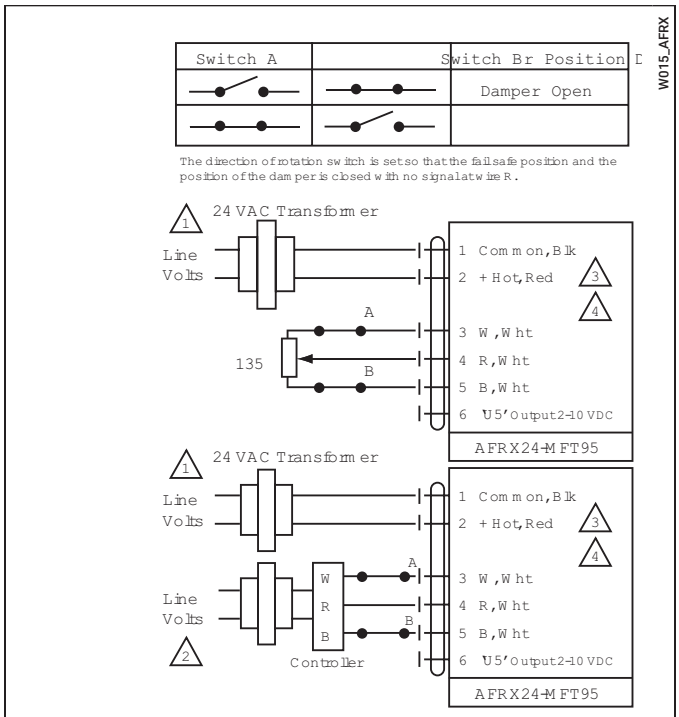
Wiring Diagrams

INSTALLATION NOTES

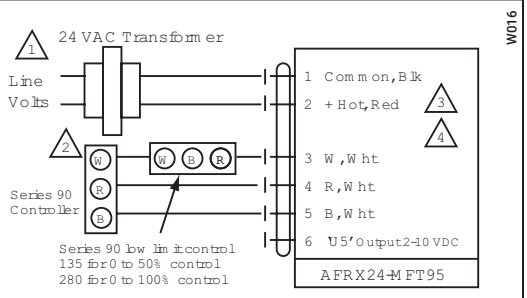
1. Provide overload protection and disconnect as required.
2. Actuators and controller must have separate transformers.
3. Consult controller instruction data for more detailed installation information.
4. To reverse control rotation, use the reversing switch.
5. Resistor value depends on the type of controller and the number of actuators. No resistor is used for one actuator. Honeywell resistor kits may also be used.

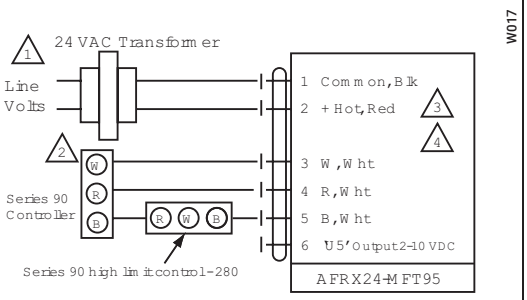
WARNING *Live Electrical Components!*

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

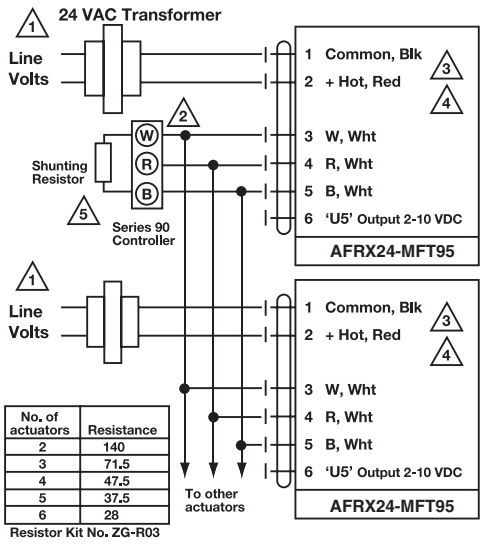


Override of AFRX24-MFT95

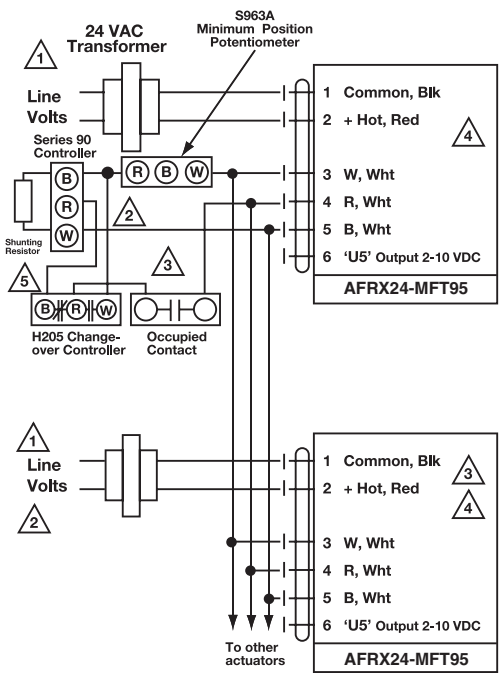




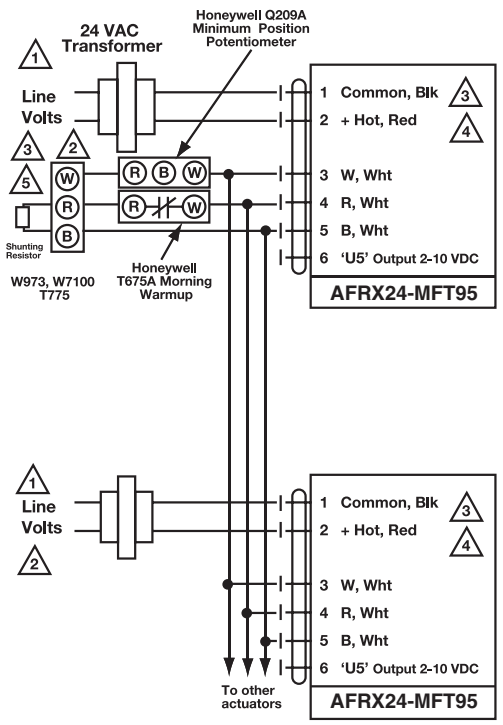
AFRX24-MFT95 used with a Series 90 controller and a Series 90 low limit control

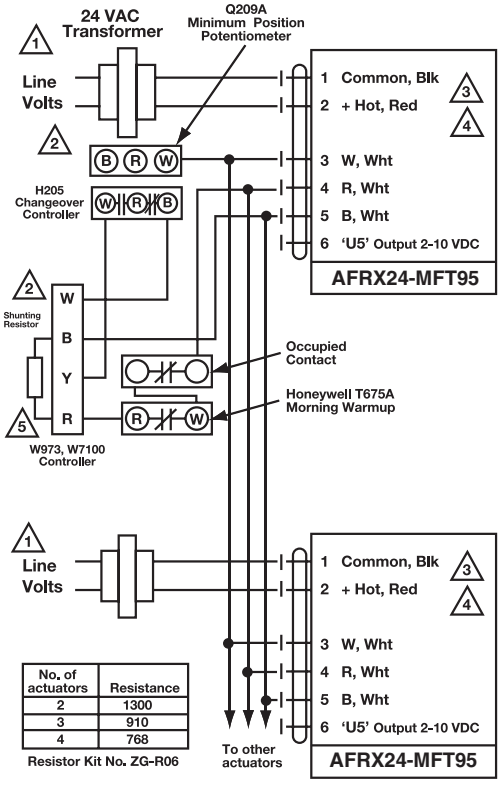


Wiring multiple actuators to a Series 90 controller.



Wiring multiple actuators to a Series 90 controller using a minimum position potentiometer.





Typical wiring diagrams for multiple actuators used with the W973, W7100 and T775 controllers.

AFRB24 N4, AFRB24 N4H, AFRB24-S N4, AFRB24-S N4H, AFRX24 N4, AFRX24 N4H, AFRX24-S N4, AFRX24-S N4H

NEMA 4, On/Off, Spring Return, 24 V

Models

AFRB24 N4	Basic Version
AFRB24 N4H	Basic Version w/built in heater
AFRB24-S N4	Basic Version w/built-in aux. switch
AFRB24-S N4H	Basic Version w/built-in aux. switch & heater
AFRX24 N4	Flexible Version
AFRX24-S N4	Flexible Version w/built-in aux. switch
AFRX24 N4H	Flexible Version w/built in heater
AFRX24-S N4H	Flexible Version aux. switch & heater

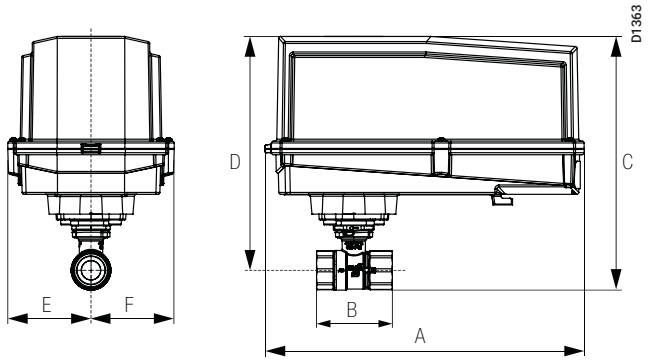
Technical Data

Power supply	24 VAC ± 20% 50/60 Hz 24 VDC +20% / -10%
Power consumption running	5 W / heater 25 W
holding	2.5 W
Transformer sizing	7.5 VA (class 2 power source) / heater 25 VA
Electrical connection AFR... N4	3 ft [1m], 10 ft [3m] or 16 ft [5m] 18 GA appliance cable, with or without 1/2" conduit connector **-S models:** Two 3 ft [1m], 10 ft [3m] or 16 ft [5m] appliance cables with or without 1/2" conduit connectors
heater (N4H)	terminal block, 26-16 GA
Overload protection	electronic throughout 0 to 95° rotation
Control	on/off
Torque	180 in-lb [20 Nm] minimum
Direction of rotation spring	reversible with CW/CCW mounting in housing
Mechanical angle of rotation	95° (adjustable with mechanical end stop, 35° to 95°)
Running time motor	< 75 seconds
spring	20 seconds @ -4°F to 122°F [-20°C to 50°C]; < 60 seconds @ -22°F [-30°C]
spring (with heater)	20 seconds @ -4°F to 122°F [-20°C to 50°C], <60 seconds @ -49°F [-45°C]
Position indication	visual indicator, 0° to 95° (0° is full spring return position)
Manual override	5 mm hex crank (3/16" Allen), supplied
Humidity	max. 95% RH non-condensing
Ambient temperature	-22°F to 122°F [-30°C to 50°C]
with heater	-49°F to 122°F [-45°C to 50°C]
Storage temperature	-40°F to 176°F [-40°C to 80°C]
Housing	UL Type 4, NEMA 4, IP66
Housing material	polycarbonate
Agency listings †	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC & 2006/95/EC
Noise level	<50dB(A) motor @ 75 seconds ≤62dB(A) spring return
Servicing	maintenance free
Quality standard	ISO 9001
Weight	9.7 lbs (4.4 kg); 10 lbs (4.5 kg) with switches; 10.5 lbs (4.8 kg) with heater

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 4.

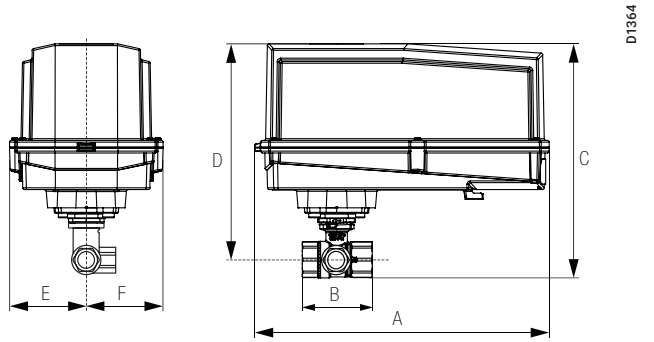
AFRB24-S N4, AFRB24-S N4H, AFRX24-S N4, AFRX24-S N4H	
Auxiliary switches	2 x SPDT 3A (0.5A) @ 250 VAC, UL approved one set at +10°, one adjustable 10° to 90°

Dimensions with 2-Way Valve



Valve Body	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B
B231-B232	1¼"	32	3.72" [94.6]	1.84" [47.4]
B238-B240	1½"	40	3.88" [98.5]	2.04" [51.9]
B248-B254	2"	50	4.93" [125.2]	2.73" [69.5]
B277-B280	3"	80	5.82" [147.9]	2.73" [69.5]

Dimensions with 3-Way Valve



Valve Body	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B	C
B329-B332	1¼"	32	3.96" [100.6]	2.27" [57.7]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.51" [63.7]	2.40" [61.1]
B347-B352	2"	50	4.90" [124.5]	2.73" [69.5]	2.74" [69.7]

Accessories

Tool-06	8mm and 10 mm wrench
43442-00001	Gland (needed for additional wires)
11097-00001	Gasket for Gland (needed for additional wires)

NOTE: When using AFRB24 N4, AFRB24 N4H, AFRB24-S N4, AFRB24-S N4H, AFRX24 N4, AFRX24 N4H, AFRX24-S N4, AFRX24-S N4H actuators, only use accessories listed on this page.
For actuator wiring information and diagrams, refer to Belimo Wiring Guide.

Typical Specification

The actuators must be designed so that they may be used for either clockwise or counterclockwise fail-safe operation. Actuators shall be protected from overload at all angles of rotation. If required, two SPDT auxiliary switch shall be provided having the capability of one being adjustable. Actuators with auxiliary switches must be constructed to meet the requirements for Double Insulation so an electrical ground is not required to meet agency listings. Actuators shall be cULus Approved and have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

Wiring Diagrams

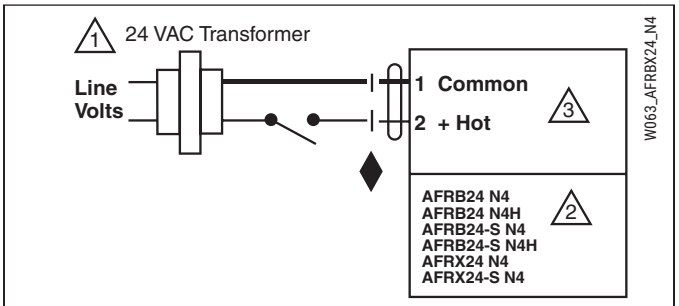
INSTALLATION NOTES

1. Provide overload protection and disconnect as required.
2. ***CAUTION** Equipment Damage!*
   Actuators may be connected in parallel.
   Power consumption and input impedance must be observed.
3. Actuators may also be powered by 24 VDC.
4. For end position indication, interlock control, fan startup, etc., AFRB24-S N4, AFRB24-S N4H, AFRX24-S N4, AFRX24-S N4H incorporates two built-in auxiliary switches: 2 x SPDT, 3A (0.5A) @250 VAC, UL Approved, one switch is fixed at +10°, one is adjustable 10° to 90°.

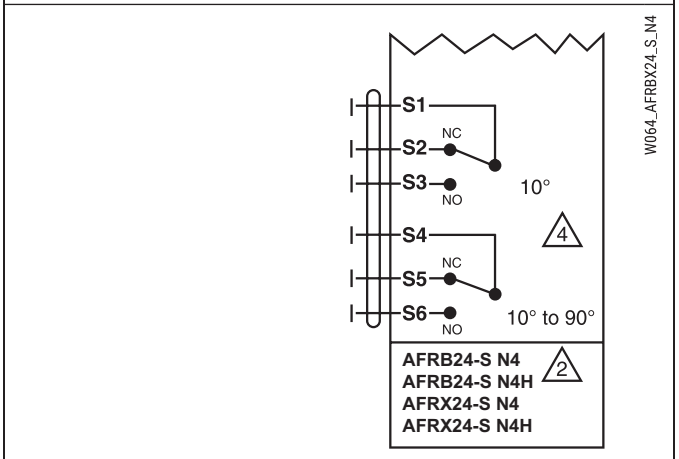
APPLICATION NOTES

- Meets cULus requirements without the need of an electrical ground connection.

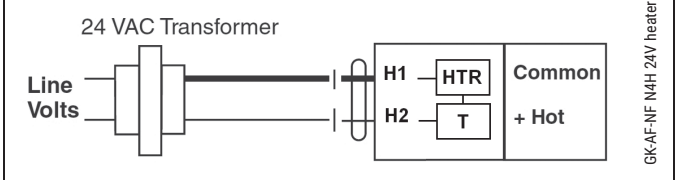
***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



On/Off wiring



Auxiliary Switches



NEMA 4 Heater

AFRBUP N4, AFRBUP-S N4, AFRBUP N4H, AFRBUP-S N4H, AFRXUP N4, AFRXUP-S N4, AFRXUP N4H, AFRXUP-S N4H

NEMA 4, On/Off, Spring Return, 24 to 240 VAC

Models

AFRBUP N4	Basic Version
AFRBUP-S N4	Basic Version w/built-in aux. switch
AFRBUP N4H	Basic Version w/built in heater
AFRBUP-S N4H	Basic Version w/built-in aux. switch & heater
AFRXUP N4	Flexible Version
AFRXUP-S N4	Flexible Version w/built-in aux. switch
AFRXUP N4H	Flexible Version w/built in heater
AFRXUP-S N4H	Flexible Version w/built-in aux. switch & heater

Technical Data

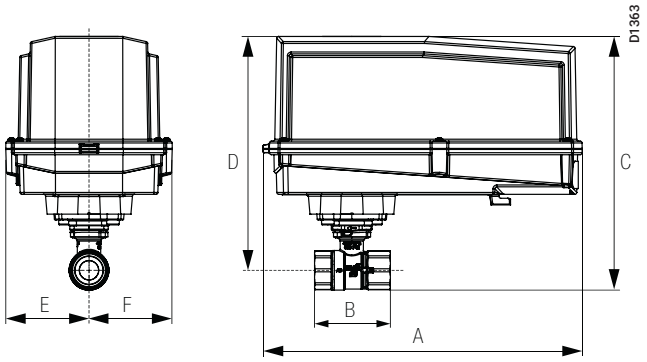
Power supply	24...240 VAC -20% / +10%, 50/60 Hz 24...125 VDC ±10%
Power consumption running	7 W / heater 25 W
holding	3.5 W
Transformer sizing	7 VA @ 24 VAC (class 2 power source) 8.5 VA @ 120 VAC / heater 25 VA @120 VAC 18 VA @ 240 VAC
Electrical connection AFRBUP... N4 AFRXUP... N4	3 ft [1m], 10 ft [3m] or 16 ft [5m] 18 GA appliance cable, with or without 1/2" conduit connector **-S models:** Two 3 ft [1m], 10 ft [3m] or 16 ft [5m] appliance cables with or without 1/2" conduit connectors
heater (N4H)	terminal block, 18-16 GA
Overload protection	electronic throughout 0 to 95° rotation
Control	on/off
Torque	180 in-lb [20 Nm] minimum
Direction of rotation spring	reversible with CW/CCW mounting inside housing
Mechanical angle of rotation	95° (adjustable with mechanical end stop, 35° to 95°)
Running time motor	< 75 sec
spring	20 sec @ -4°F to 122°F [-20°C to 50°C]; < 60 sec @ -22°F [-30°C]
spring (with heater)	20 sec @ -4°F to 122°F [-20°C to 50°C]; < 60 sec @ -49°F [-45°C]
Position indication	visual indicator, 0° to 95° (0° is full spring return position)
Manual override	5 mm hex crank (3/16" Allen), supplied
Humidity	max. 95% RH non-condensing
Ambient temperature	-22°F to 122°F [-30°C to 50°C]
with heater	-49°F to 122°F [-45°C to 50°C]
Storage temperature	-40°F to 176°F [-40°C to 80°C]
Housing	UL Type 4, NEMA 4, IP66
Housing material	polycarbonate
Agency listings †	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC & 2006/95/EC
Noise level	<50dB(A) motor @ 75 seconds ≤62dB(A) spring return
Servicing	maintenance free
Quality standard	ISO 9001
Weight	9.7 lbs (4.4 kg), 10 lbs (4.5 kg) with switches 10.5 lbs (4.8 kg) with heater

† Rated Impulse Voltage 4kV, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 4.

AFRBUP-S N4, AFRBUP-S N4H, AFRXUP-S N4, AFRXUP-S N4H

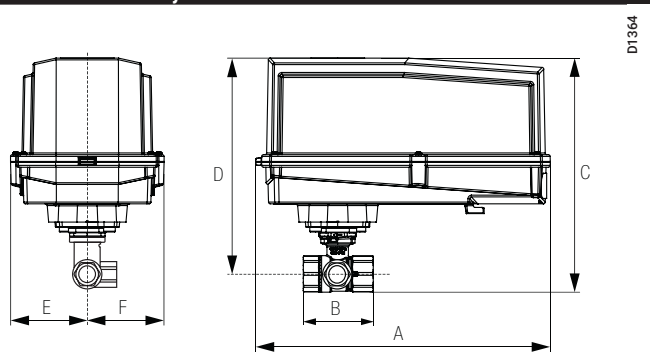
Auxiliary switches	2 x SPDT 3A (0.5A) @ 250 VAC, UL Approved one set at +10°, one adjustable 10° to 90°

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B231-B232	1¼"	32	3.72" [94.6]	1.84" [47.4]
B238-B240	1½"	40	3.88" [98.5]	2.04" [51.9]
B248-B254	2"	50	4.93" [125.2]	2.73" [69.5]
B261-B265	2½"	65	5.55" [140.9]	2.73" [69.5]
B277-B280	3"	80	5.82" [147.9]	2.73" [69.5]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B329-B331	1¼"	32	3.96" [100.6]	2.27" [57.7]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.51" [63.7]	2.40" [61.1]
B347-B352	2"	50	4.90" [124.5]	2.73" [69.5]	2.74" [69.7]

Accessories

Tool-06	8mm and 10 mm wrench
43442-00001	Gland (needed for additional wires)
11097-00001	Gasket for Gland (needed for additional wires)

NOTE: When using AFRBUP N4, AFRBUP-S N4, AFRBUP N4H, AFRBUP-S N4H, AFRXUP N4, AFRXUP-S N4, AFRXUP N4H, AFRXUP-S N4H actuators, only use accessories listed on this page.
For actuator wiring information and diagrams, refer to Belimo Wiring Guide.

Typical Specification

On/Off spring return damper actuators shall be direct coupled type which require no crank arm and linkage and be capable of direct mounting to a jackshaft up to a 1.05" diameter. The actuators must be designed so that they may be used for either clockwise or counterclockwise fail-safe operation. Actuators shall be protected from overload at all angles of rotation. If required, two SPDT auxiliary switch shall be provided having the capability of one being adjustable. Actuators with auxiliary switches must be constructed to meet the requirements for Double Insulation so an electrical ground is not required to meet agency listings. Actuators shall be cULus Approved and have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment Damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

3 Actuators may also be powered by 24 VDC.

4 For end position indication, interlock control, fan startup, etc., AFRB24-S N4, AFRB24-S N4H, AFRX24-S N4, AFRX24-S N4H incorporates two built-in auxiliary switches: 2 x SPDT, 3A (0.5A) @250 VAC, UL Approved, one switch is fixed at +10°, one is adjustable 10° to 90°.

APPLICATION NOTES

Meets cULus requirements without the need of an electrical ground connection.

***WARNING** Live Electrical Components!*
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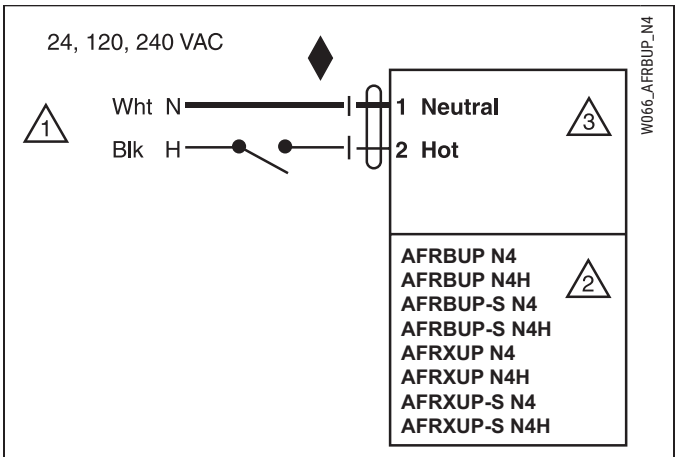
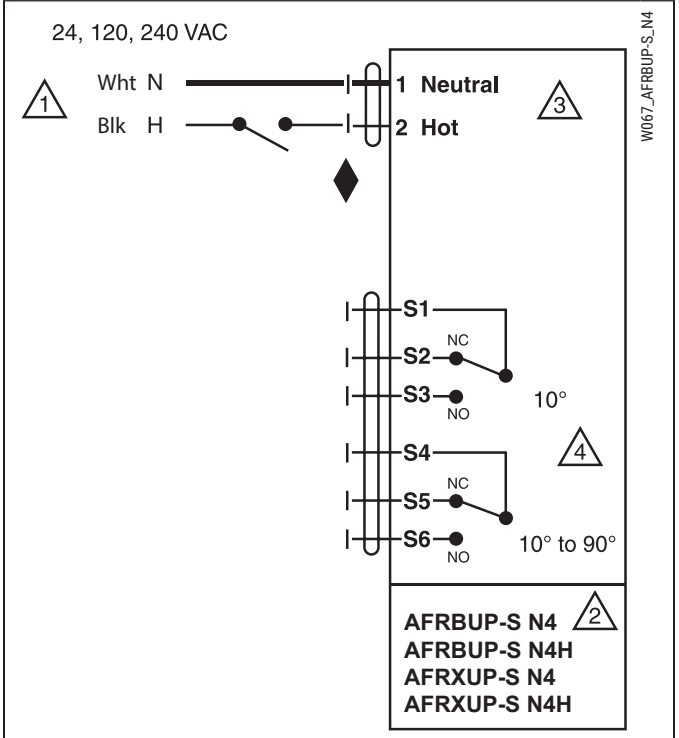
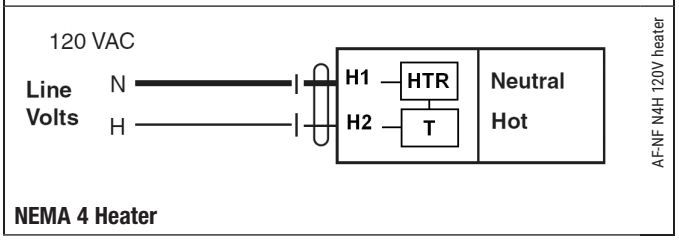


On/Off Wiring



Auxiliary Switches



NEMA 4 Heater

AFRB24-MFT N4, AFRB24-MFT-S N4, AFRB24-MFT N4H, AFRB24-MFT-S N4H
AFRX24-MFT N4, AFRX24-MFT-S N4, AFRX24-MFT N4H, AFRX24-MFT-S N4H

NEMA 4, Proportional, Spring Return, Direct Coupled, 24V, Multi-Function Technology®

MFT

5 YEAR WARRANTY

Models

AFRB24-MFT N4	Basic Version
AFRB24-MFT-S N4	Basic Version w/built-in aux. switch
AFRB24-MFT N4H	Basic Version w/built in heater
AFRB24-MFT-S N4H	Basic Version w/built-in aux. switch & heater
AFRX24-MFT N4	Flexible Version
AFRX24-MFT-S N4	Flexible Version w/built-in aux. switch
AFRX24-MFT N4H	Flexible Version w/built in heater
AFRX24-MFT-S N4H	Flexible Version w/built in aux. switch & heater

Technical Data

Power supply	24 VAC, +/- 20%, 50/60 Hz 24 VDC, +20% / -10%
Power consumption♦ running	7.5 W / heater 25 W
Power consumption♦ holding	3 W
Transformer sizing	10 VA (Class 2 power source) / heater 25 VA
Electrical connection AFRB... N4 ♦ AFRX... N4 ♦	3 ft [1m], 10 ft [3m] or 16 ft [5m] 18 GA appliance cables, with 1/2" conduit connector **-S models:** two 3 ft [1m], 10 ft [3m] or 16 ft [5m] appliance cables with 1/2" conduit connectors
heater (N4H)	terminal block, 26-16 GA
Overload protection	electronic throughout 0 to 95° rotation
Operating range Y*	2 to 10 VDC, 4 to 20 mA (default) variable (VDC, PWM, floating point, on/off)
Input impedance	100 kΩ for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20 mA 1500 Ω for PWM, floating point and on/off control
Feedback output U*	2 to 10 VDC, 0.5 mA max
Torque	minimum 180 in-lb (20 Nm)
Direction of rotation* spring	reversible with cw/ccw mounting inside housing
Direction of rotation* motor	reversible with built-in switch
Mechanical angle of rotation*	95° (adjustable with mechanical end stop, 35° to 95°)
Running time motor*	150 seconds (default), variable (70 to 220 seconds)
spring	<20 sec @ -4°F to 122°F [-20°C to 50°C]; <60 sec @ -22°F [-30°C]
spring (with heater)	<20 sec @ -4°F to 122°F [-20°C to 50°C]; <60 sec @ -49°F [-45°C]
Angle of Rotation adaptation	off (default)
Override control*	min position = 0% mid. position = 50% max. position = 100%
Position indication	visual indicator, 0° to 95° (0° is spring return position)
Manual override	5 mm hex crank (3/16" Allen), supplied
Humidity	max. 95% RH non-condensing
Ambient temperature	-22°F to 122°F (-30°C to 50°C)
with heater	-49°F to 122°F (-45°C to 50°C)
Storage temperature	-40°F to 176°F (-40°C to 80°C)
Housing	UL Type 4, NEMA 4, IP66
Housing material	polycarbonate
Noise level	≤40dB(A) motor @ 150 seconds, run time dependent ≤62dB(A) spring return
Agency listings †	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC & 2006/95/EC
Quality standard	ISO 9001
Servicing	maintenance free
Weight	9.7 lbs. (4.4 kg), 10 lbs. (4.5 kg) with switches 10.5 lbs (4.8 kg) with heater

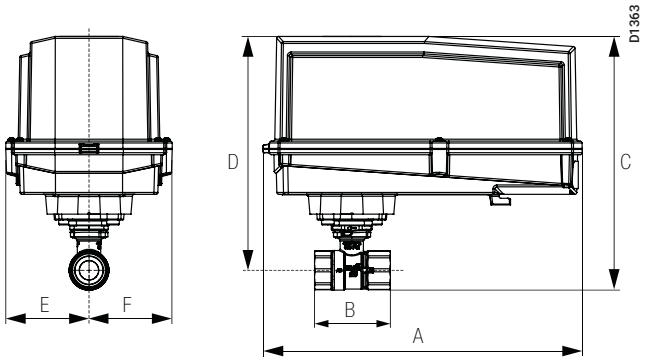
* Variable when configured with MFT options

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 4.

♦ **Programmed for 70 sec motor run time. At 150 sec motor run time, transformer sizing is 8.5 VA and power consumption is 6 W running / 3 W holding.**

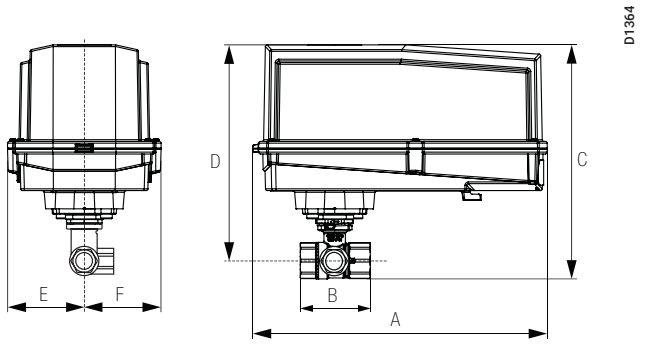
AFRB24-MFT-S N4, AFRB24-MFT-S N4H, AFRX24-MFT-S N4, AFRX24-MFT-S N4H	
Auxiliary switches	2 x SPDT 3A (0.5A) @ 250 VAC, UL approved one set at +10°, one adjustable 10° to 90°

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B231-B232	1¼"	32	3.72" [94.6]	1.84" [47.4]
B238-B240	1½"	40	3.88" [98.5]	2.04" [51.9]
B248-B254	2"	50	4.93" [125.2]	2.73" [69.5]
B261-B265	2½"	65	5.55" [140.9]	2.73" [69.5]
B277-B280	3"	80	5.82" [147.9]	2.73" [69.5]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B329-B331	1¼"	32	3.96" [100.6]	2.27" [57.7]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.51" [63.7]	2.40" [61.1]
B347-B352	2"	50	4.90" [124.5]	2.73" [69.5]	2.74" [69.7]

Accessories

Tool-06	8mm and 10 mm wrench
43442-00001	Gland (needed for additional wires)
11097-00001	Gasket for Gland (needed for additional wires)

NOTE: When using AFRB24-MFT N4, AFRB24-MFT-S N4, AFRB24-MFT N4H, AFRB24-MFT-S N4H
AFRX24-MFT N4, AFRX24-MFT-S N4, AFRX24-MFT N4H, AFRX24-MFT-S N4H actuators, only use accessories listed on this page. For actuator wiring information and diagrams, refer to Belimo Wiring Guide.

Typical Specification

The actuator must provide proportional damper control in response to a 2 to 10 VDC or, with the addition of a 500Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. The actuators must be designed so that they may be used for either clockwise or counterclockwise fail-safe operation. Actuators shall use a brushless DC motor controlled by a microprocessor and be protected from overload at all angles of rotation. Run time shall be constant, and independent of torque. A 2 to 10 VDC feedback signal shall be provided for position feedback. Actuators shall be cULus Approved and have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

Wiring Diagrams

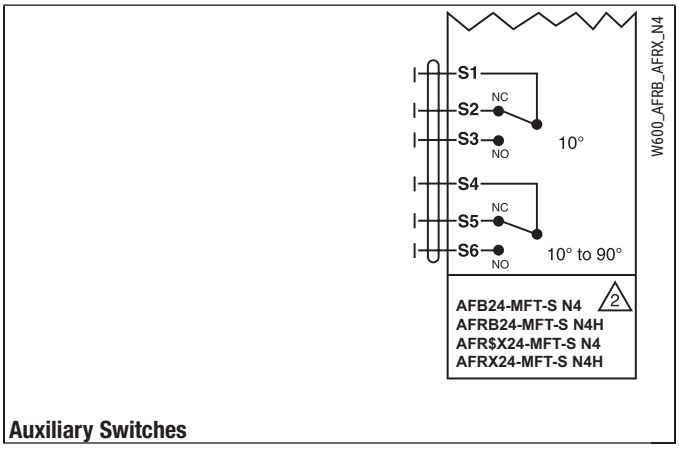
INSTALLATION NOTES

1. Provide overload protection and disconnect as required.
2. ***CAUTION** Equipment Damage!*
   Actuators may be connected in parallel if not mechanically linked. Power consumption and input impedance must be observed.
3. Actuators may also be powered by 24 VDC.
4. Position feedback cannot be used with Triac sink controller. The actuator internal common reference is not compatible.
5. Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.
8. Contact closures A & B also can be triacs. A & B should both be closed for triac source and open for triac sink.
9. For triac sink the common connection from the actuator must be connected to the hot connection of the controller.

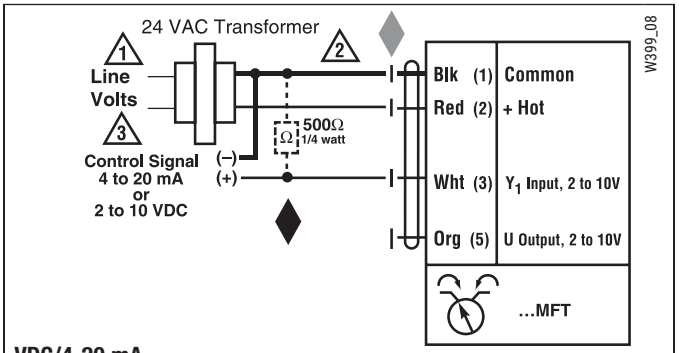
APPLICATION NOTES

- Meets UL requirements without the need of an electrical ground connection.
- The ZG-R01 500 Ω resistor may be used.

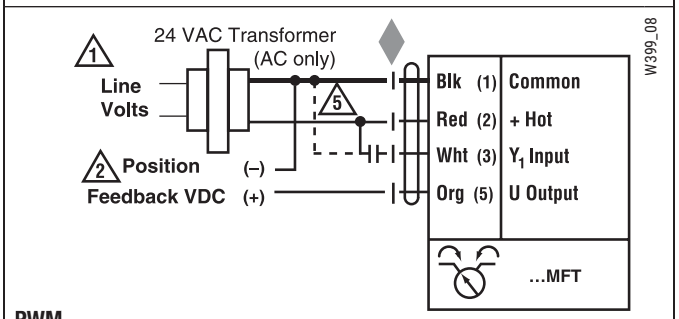
***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



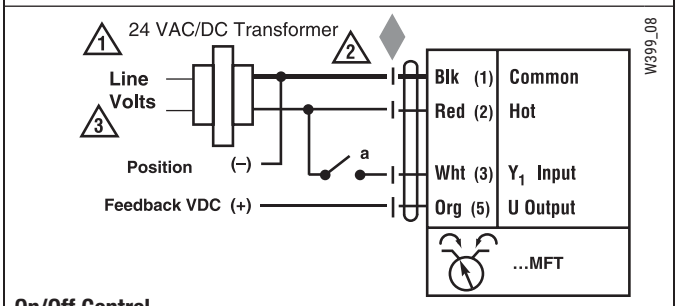
Auxiliary Switches



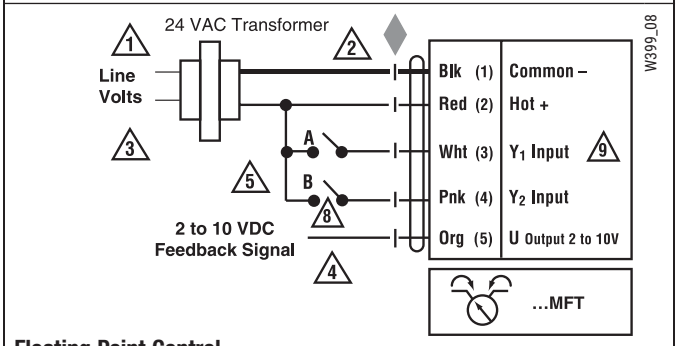
VDC/4-20 mA



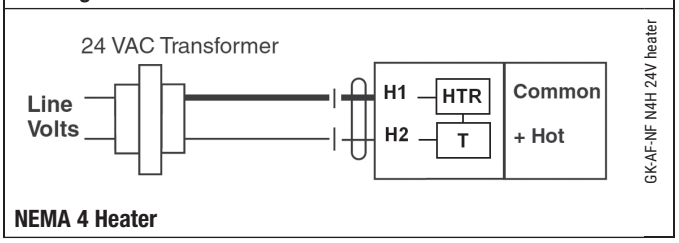
PWM



On/Off Control



Floating Point Control



NEMA 4 Heater

AFRB24-5-14, AFRB24-S-5-14 Actuators, On/Off

Models

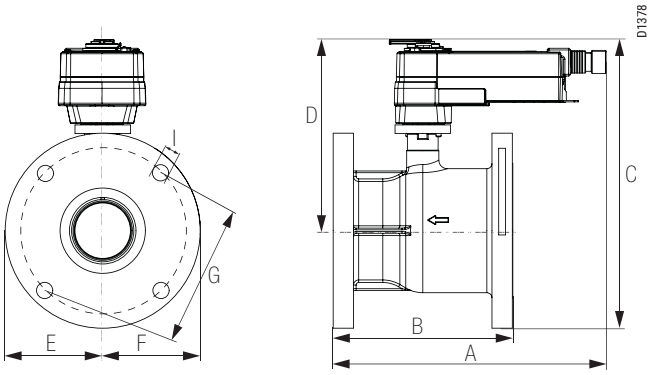
AFRB24-5-14
AFRB24-S-5-14

Technical Data		
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC +20% / -10%
Power consumption	running	5 W
	holding	2.5 W
Transformer sizing		7.5 VA (class 2 power source)
Electrical connection		
AFRB24...		3 ft., 18 GA appliance cable, 1/2" conduit connector **-S models:** two 3 ft., 18 gauge appliance cables with 1/2" conduit connectors
AFRX24...		3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] 18 GA appliance or plenum cables, with or without 1/2" conduit connector **-S models:** two 3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] appliance cables, with or without 1/2" conduit connectors
Overload protection		electronic throughout 0 to 95° rotation
Control		on/off
Direction of rotation	spring	reversible with CW/CCW mounting
Angle of rotation		95°
Running time	motor	< 75 seconds
	spring	20 seconds @ -4°F to 122°F [-20°C to 50°C]; < 60 seconds @ -22°F [-30°C]
Position indication		visual indicator, 0° to 95° (0° is full spring return position)
Manual override		5 mm hex crank (3/16" Allen), supplied
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA 2, IP54, Enclosure Type2
Agency listings †		cULus according. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE according. to 2004/108/EC & 2006/95/EC
Noise level		<50dB(A) motor @ 75 seconds ≤62dB(A) spring return
Quality standard		ISO 9001

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

AFRB24-S, AFRX24-S	
Auxiliary switches	2 x SPDT 3A (0.5A) @ 250 VAC, UL approved one set at +10°, one adjustable 10° to 90°

Dimensions



Valve Body	Nominal Pipe Size	Top Flange Design	Flange Diameter	Face-to-Face Length	Height
			A	B	C
B6250	2½" [65]	F05	7.50" [190.5]	5.50" [139.7]	8.10" [205.4]
B6300	3" [80]		8.00" [203.2]	6.60" [167.6]	8.40" [213.1]
B6400	4" [100]		9.00" [228.6]	8.30" [210.8]	9.30" [235.9]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment Damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

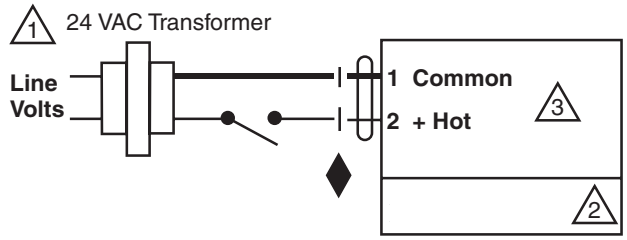
3 Actuators may also be powered by 24 VDC.

4 For end position indication, interlock control, fan startup, etc., AFRB24-S and AFRX24-S incorporates two built-in auxiliary switches: 2 x SPDT, 3A (0.5A) @250 VAC, UL Approved, one switch is fixed at +10°, one is adjustable 10° to 90°.

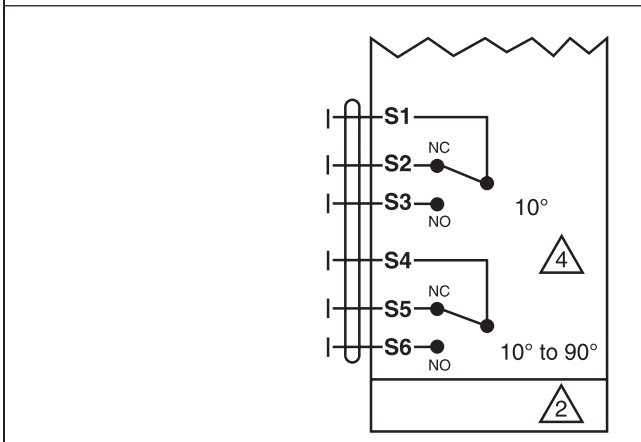
APPLICATION NOTES

Meets cULus requirements without the need of an electrical ground connection.

***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



On/Off wiring for AFRB24, AFRX24



Auxiliary Switches for AFRB24-S, AFRX24-S

AFRBUP-5-14, AFRBUP-S-5-14 Actuators, On/Off

Models

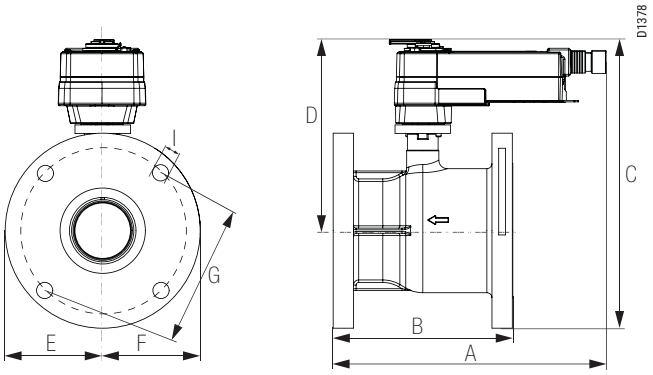
AFRBUP-5-14
AFRBUP-S-5-14

Technical Data		
Power supply		24 to 240 VAC -20% / +10%, 50/60 Hz 24 to 125 VDC ±10%
Power consumption	running	7 W
	holding	3.5 W
Transformer sizing		7 VA @ 24 VAC (class 2 power source) 8.5 VA @ 120 VAC 18 VA @ 240 VAC
Electrical connection AFRBUP...		3 ft., 18 GA appliance cable, 1/2" conduit connector **-S models:** two 3 ft., 18 gauge appliance cables with 1/2" conduit connectors
AFRXUP...		3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] 18 GA appliance or plenum cables, with or without 1/2" conduit connector **-S models:** two 3 ft. [1m], 10 ft. [3m] or 16 ft. [5m] appliance cables, with or without 1/2" conduit connectors
Overload protection		electronic throughout 0 to 95° rotation
Control		on/off
Direction of rotation	spring	reversible with CW/CCW mounting
Angle of rotation		95° (adjustable with mechanical end stop, 35° to 95°)
Running time	motor	< 75 seconds
	spring	20 seconds @ -4°F to 122°F [-20°C to 50°C]; < 60 seconds @ -22°F [-30°C]
Position indication		visual indicator, 0° to 95° (0° is full spring return position)
Manual override		5 mm hex crank (3/16" Allen), supplied
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA 2/IP54, Enclosure Type2
Agency listings †		cULus according. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE according. to 2004/108/EC & 2006/95/EC
Noise level		<50dB(A) motor @ 75 seconds ≤62dB(A) spring return
Quality standard		ISO 9001

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

AFRBUP-S, AFRXUP-S	
Auxiliary switches	2 x SPDT 3A (0.5A) @ 250 VAC, UL approved one set at +10°, one adjustable 10° to 90°

Dimensions



Valve Body	Nominal Pipe Size	Top Flange Design	Flange Diameter	Face-to-Face Length	Height
			A	B	C
B6250	2½" [65]	F05	7.50" [190.5]	5.50" [139.7]	8.10" [205.4]
B6300	3" [80]		8.00" [203.2]	6.60" [167.6]	8.40" [213.1]
B6400	4" [100]		9.00" [228.6]	8.30" [210.8]	9.30" [235.9]

Wiring Diagrams

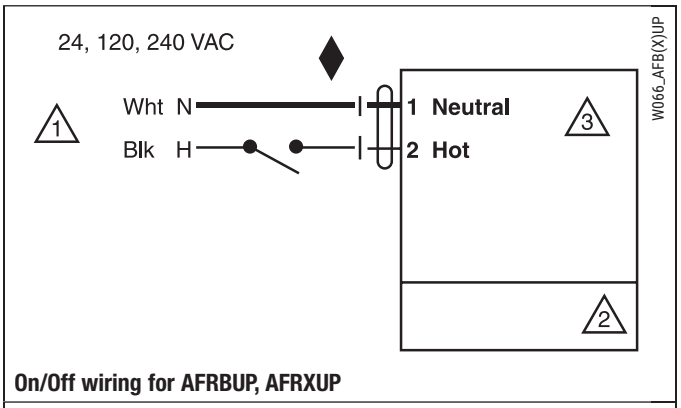
INSTALLATION NOTES

1. Provide overload protection and disconnect as required.
2. ***CAUTION** Equipment Damage!*
   Actuators may be connected in parallel.
   Power consumption and input impedance must be observed.
3. No ground connection is required.
4. For end position indication, interlock control, fan startup, etc., AFRBUP-S and AFRXUP-S incorporates two built-in auxiliary switches: 2 x SPDT, 3A (0.5A) @250 VAC, UL Approved, one switch is fixed at +10°, one is adjustable 10° to 90°.

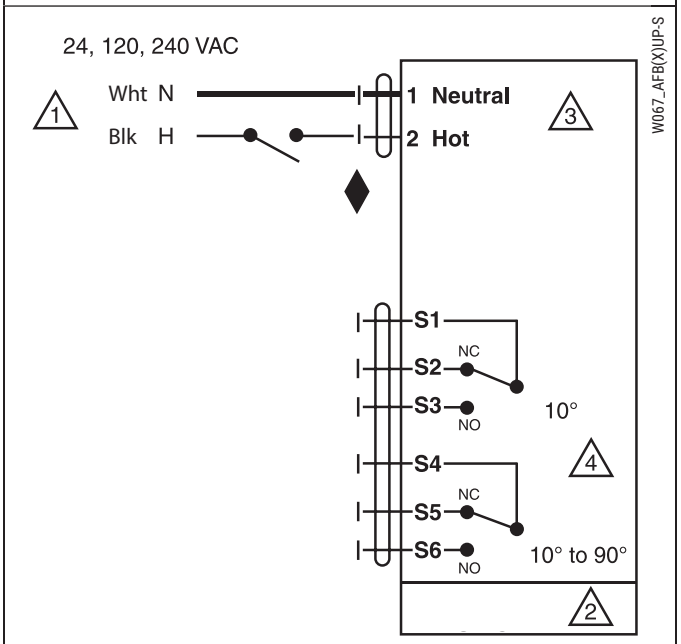
APPLICATION NOTES

- Meets cULus requirements without the need of an electrical ground connection.

***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



On/Off wiring for AFRBUP, AFRXUP



Auxiliary Switches for AFRBUP-S, AFRXUP-S

GKRB24-3-5-14 Actuators, On/Off, Floating Point, Fail-Safe

Models

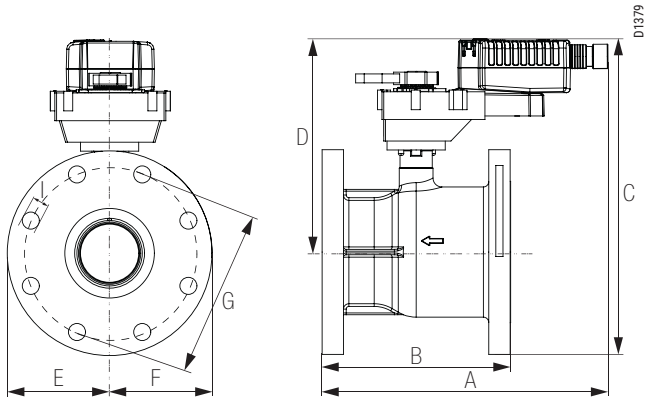
GKRB24-3-5-14

Technical Data

Control		on/off, floating point
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	12 W
	holding	3 W
Transformer sizing		18 VA (Class 2 power source)
Electrical connection		3 ft,18 GA plenum rated cable ½" conduit connector
Overload protection		electronic throughout 0° to 95° rotation
Input impedance		100 kΩ (0.1mA), 500 Ω, 1500 Ω (floating point, on/off)
Angle of rotation		max. 95°, adjustable with mechanical stop
Direction of rotation		reversible with ↷/↶ switch
Position indication		visual indicator
Running time	running	150 seconds
	fail-safe	35 seconds
Manual override		external push button
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Housing		NEMA 2/IP54, Enclosure Type 2
Agency listings †		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EEC and 2006/95/EC
Noise level		<45 dB(A)
Quality standard		ISO 9001

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

Dimensions

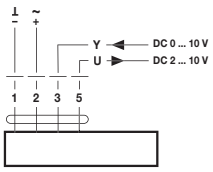


Valve Body	Nominal Pipe Size	Top Flange Design	Flange Diameter	Face-to-Face Length	Height
			A	B	C
B6400	4" [100]	F05	9.00" [228.6]	8.30" [210.8]	9.30" [235.9]
B6500	5" [125]		10.00" [254]	10.30" [261.6]	10.50" [266.4]
B6600	6" [150]		11.00" [279.4]	12.50" [317.5]	11.70" [296.9]

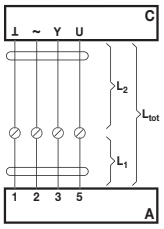
Electrical Installation

Wiring diagram

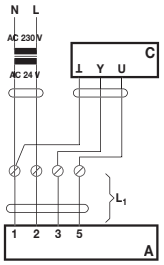
Note
- Connect via safety isolation transformer.
- Parallel connection of other actuators possible. Note performance data for supply.



Cable lengths



Note
When several actuators are connected in parallel, the maximum cable length must be divided by the number of actuators.



Note
There are no special restrictions on installation if the supply and data cable are routed separately.

Cable colors:
1 = black
2 = red
3 = white
5 = orange

A = Actuator
C = Control unit
L_1 = Belimo connecting cable, 1 m (4 x 0.75 mm²)
L_2 = Customer cable
L_{tot} = Maximum cable length

Cross section L_2 ⊥ / ~	Max. cable length $L_{tot} = L_1 + L_2$ AC	DC	Example for DC
0.75 mm²	≤30 m	≤5 m	1 m (L_1) + 4 m (L_2)
1.00 mm²	≤40 m	≤8 m	1 m (L_1) + 7 m (L_2)
1.50 mm²	≤70 m	≤12 m	1 m (L_1) + 11 m (L_2)
2.50 mm²	≤100 m	≤20 m	1 m (L_1) + 19 m (L_2)

A = Actuator
C = Control unit
L_1 = Belimo connecting cable, 1 m (4 x 0.75 mm²)

Wiring Diagrams

INSTALLATION NOTES

1. Provide overload protection and disconnect as required.

2. ***CAUTION*** *Equipment Damage!*
Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.

3. Actuators may also be powered by 24 VDC.

4. Position feedback cannot be used with Triac sink controller. The actuator internal common reference is not compatible.

5. Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.

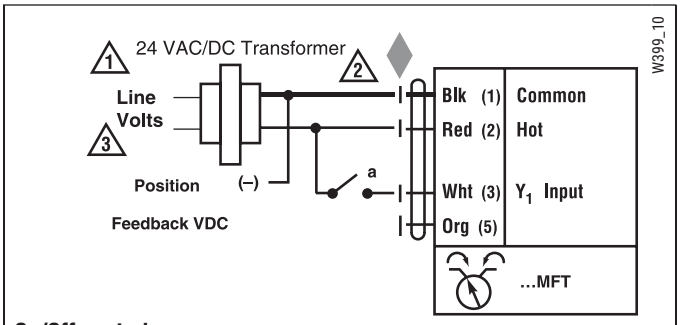
8. Contact closures A & B also can be triacs.
A & B should both be closed for triac source and open for triac sink.

9. For triac sink the common connection from the actuator must be connected to the hot connection of the controller.

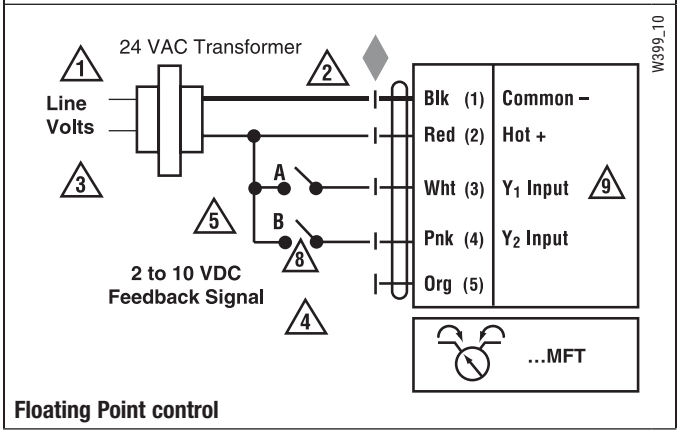
APPLICATION NOTES

Meets UL requirements without the need of an electrical ground connection.

WARNING *Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



On/Off control



Floating Point control

GKRX24-MFT-5-14 Actuators, Multi-Function Technology, Fail-Safe

MFT 5 YEAR WARRANTY

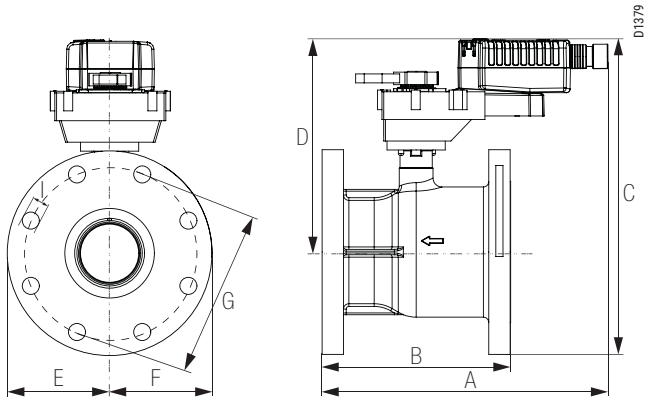
Models

GKRX24-MFT-5-14

Technical Data		
Control		2 to 10 VDC, 4 to 40 mA (default) variable (VDC, PWM, floating point, on/off)
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	12 W
	holding	3 W
Transformer sizing		21 VA (Class 2 power source)
Electrical connection		3 ft,18 GA plenum rated cable ½" conduit connector 10 ft. [3m], 16 ft. [5m]
Overload protection		electronic throughout 0° to 95° rotation
Feedback output		2 to 10 VDC, 0.5 mA max, VDC variable
Input impedance		100 kΩ (0.1 mA, 500 Ω) 1500 Ω (PWM, floating point , on/off)
Angle of rotation		max. 95°, adjustable with mechanical stop electronically variable
Direction of rotation		reversible with ↷/↶ switch
Position indication		visual indicator
Running time		150 seconds (default) variable (90 to 150 seconds)
	fail-safe	35 seconds
Manual override		external push button
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Housing		NEMA 2/IP54, Enclosure Type 2
Housing material		UL94-5V (flammability rating)
Agency listings †		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EEC and 2006/95/EC.
Noise level		<45 dB(A)
Quality standard		ISO 9001

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

Dimensions



Valve Body	Nominal Pipe Size	Top Flange Design	Flange Diameter	Face-to-Face Length	Height
			A	B	C
B6400	4" [100]	F05	9.00" [228.6]	8.30" [210.8]	9.30" [235.9]
B6500	5" [125]		10.00" [254]	10.30" [261.6]	10.50" [266.4]
B6600	6" [150]		11.00" [279.4]	12.50" [317.5]	11.70" [296.9]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment Damage!*
Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.

3 Actuators may also be powered by 24 VDC.

4 Position feedback cannot be used with Triac sink controller.
The actuator internal common reference is not compatible.

5 Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.

8 Contact closures A & B also can be triacs.
A & B should both be closed for triac source and open for triac sink.

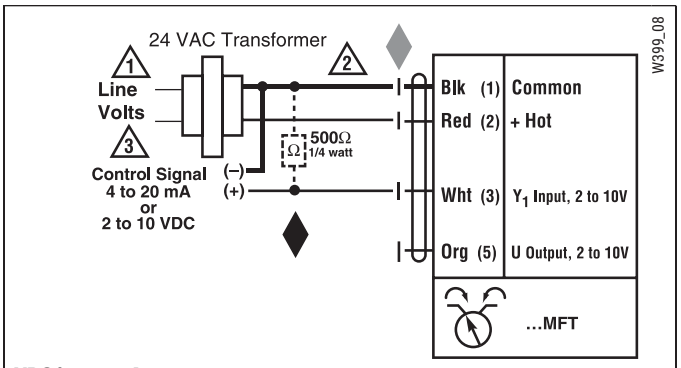
9 For triac sink the common connection from the actuator must be connected to the hot connection of the controller.

APPLICATION NOTES

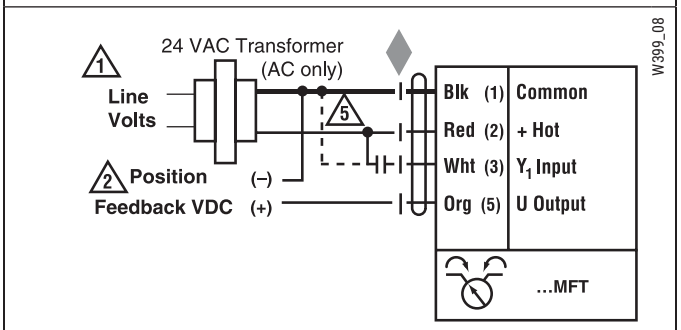
◆ Meets UL requirements without the need of an electrical ground connection.

◆ The ZG-R01 500 Ω resistor may be used.

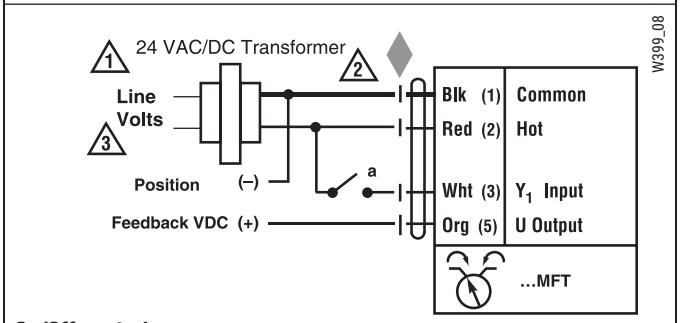
WARNING *Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



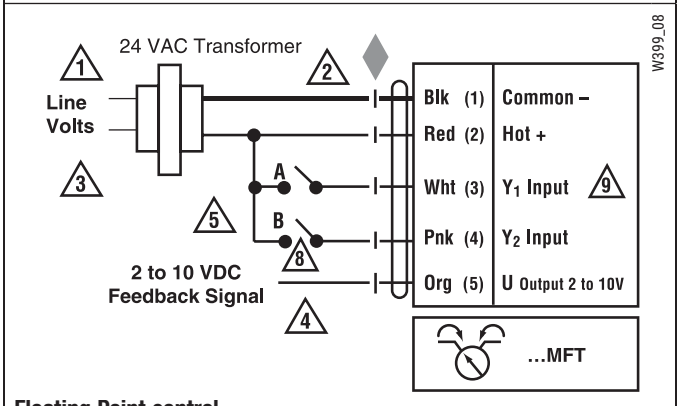
VDC/4-20 mA



PWM

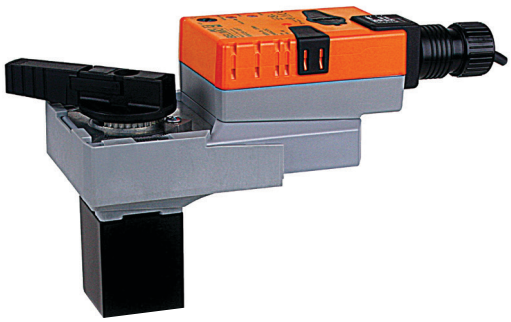


On/Off control



Floating Point control

ZR-EXT-01, CCV and PICCV Valve Neck Extension Kit



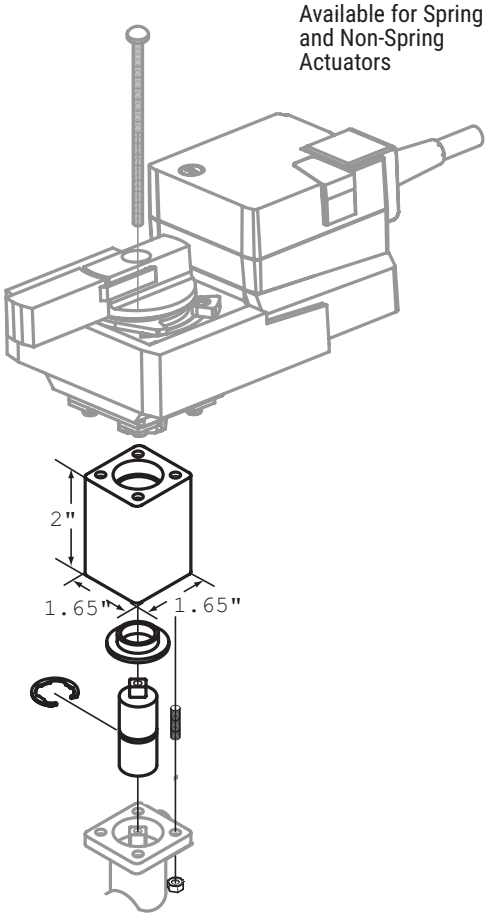
Application

The ZR-EXT-01 can be used with most CCV's* and PICCV in order to achieve a large clearance over the pipe. The Extension Kit will provide an additional 2" of space between the top of the valve and the base of the actuator. bracket is made from aluminum and is not intended as a thermal block.

Technical Data	
Extension Height	2"
Total Weight	0.7 lb

Material	
Extension Housing	Aluminum - Anodized
Shaft	Stainless Steel
Threaded Hardware	Stainless Steel
Bearing	Oilite® Bearing
Retaining Clip	Stainless Steel

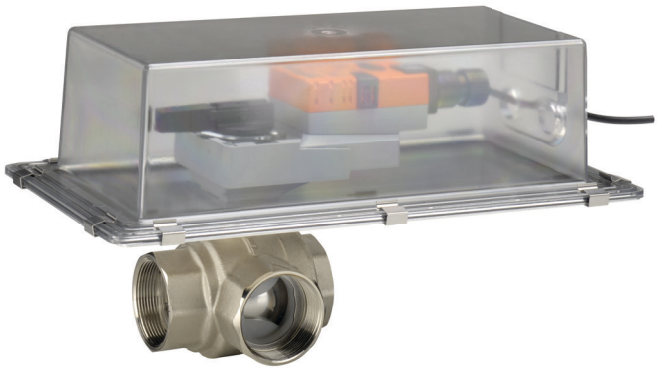
Available for Spring and Non-Spring Actuators



	TR	LRB (X)	ARB (X)	TF	LF	AF
Extension Bracket ZR-EXT-01	•	•	•	•	•	•

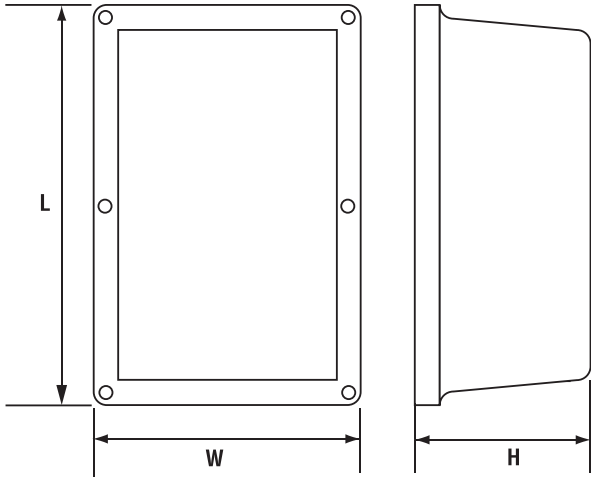
* Cannot be used with N4 actuators.
* Available for previous NF assemblies.
* ZR-EXT-01 cannot be used with any valve smaller than the B212(B) and B312(B).
* For use with B2 and B3 series only. Cannot be used with B6 series.

ZS-CCV... New Characterized Control Valve Weather Shield



Application

The ZS-CCV... weather shield provides moderate protection for valves which are mounted outdoors. This product is designed as a water tight enclosure. The housing allows easy mounting over the actuator, while allowing easy viewing of the actuator in operation. Weather shield for PICCV/CCV to provide protection for actuators in outdoor applications.



Specifications	
Cover	PETG with UV resistant smoke tint
Perimeter Gasket	Silicon Rubber
Rubber Gasket	Silicon Rubber
Spring Clips	Stainless Steel
Temperature limitations:	-22˚F to 122˚F (-30˚C to 50˚C)
Plate (ZS-CCV-100)	Aluminum
Plate	Galvaneal w/black powder coat

Part Number	Actuator
ZS - CCV - 90	LF, AF
ZS - CCV - 100	LRB(X), ARX
ZS - CCV - 110	AFRB(X)

L	W	H
16.25” [413]	8.75” [222]	4.5” [114]

Parts List

Cover including Rubber Perimeter Gasket, Rubber Gasket
Back Plate
Anti-Rotation Post with screw and lock washer
Valve Gasket
Assorted Cap plugs for unused holes

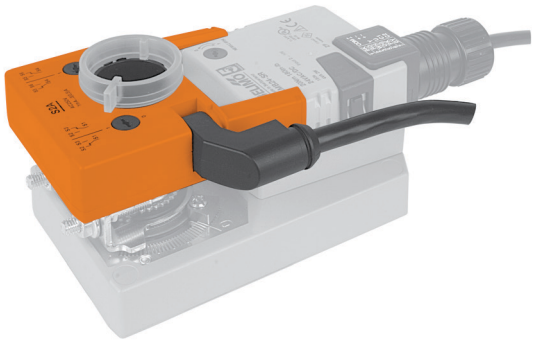
Screws AF - 2 bolts with nylon insert locking nuts
LRB(X), ARX - 1 screw, 1 washer

No weather shield available at this time for the TF and TR actuators.
Designed for NEMA 4 specifications.

* Cannot be used with B6 series.

Auxiliary Switches S1A, S2A

For non-spring return direct-coupled actuators



Application

The S1A and S2A auxiliary switches are used to indicate when a desired position of a valve is reached or to interface additional controls for a specific control sequence.

Operation

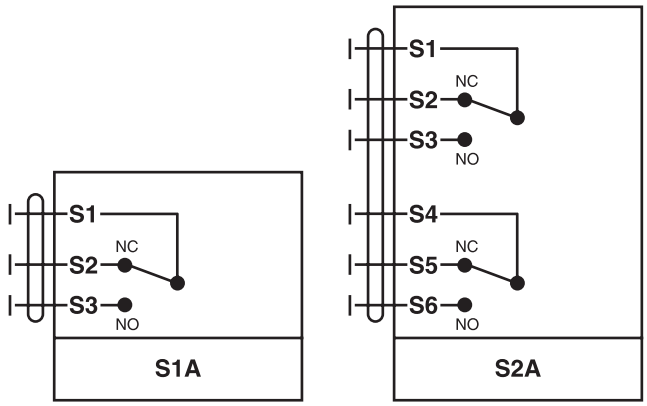
The S1A and S2A auxiliary switches are mounted onto the direct coupled actuator. The switches are modular units that mount directly onto LR and AR type actuators and are locked into place by guiding grooves on the sides of the actuator.

A driver disk is attached to the actuator handle and offers direct transmission of the actuator position to the micro switch cams. The switching points can be set over the full scale of 0 to 1 simply by adjusting the slotted discs.

Types		
S1A	1 SPDT	3 ft, 18 GA Appliance Cable
S1A/300	1 SPDT	6 ft, 18 GA Appliance Cable
S1A/500	1 SPDT	10 ft, 18 GA Appliance Cable
S2A	2 SPDT	3 ft, 18 GA Appliance Cable
S2A/300	2 SPDT	6 ft, 18 GA Appliance Cable
S2A/500	2 SPDT	10 ft, 18 GA Appliance Cable

Technical Data	S1A	S2A
Number of switches	1 SPDT	2 SPDT
Weight	4.6 oz [130 g]	6.0 oz [170 g]
Switching capacity	3A (0.5A), 250 VAC	
Switching point	adjustable over full rotation (0° to 95°)	
Pre-setting	with scale possible	
Humidity	5 to 95% RH non-condensing	
Ambient temperature	-22°F to 122°F [-30°C to +50°C]	
Storage temperature	-40°F to 176°F [-40°C to 80°C]	
Housing	NEMA 2 / IP54	
Housing rating	UL94-5VA	
Servicing	maintenance free	
Agency listings	cULus acc. to UL60730-1 CE according to 73/23/EEC	
Quality standard	ISO 9001	

Wiring Diagram



Mounting Instructions

1. Press down the manual override button and rotate the actuator fully counter clockwise.
2. Place the switch/potentiometer adaptor onto the hex shaft of the handle which is in the center of the valve/actuator coupling.
3. Slide switch onto the actuator using the actuator guiding grooves on the sides of the actuator.
4. Check for correct mating of the adaptor to the switch.
5. Adjust switch dials as necessary.

Feedback Potentiometer P...A

For the non-spring return direct-coupled actuators

Application

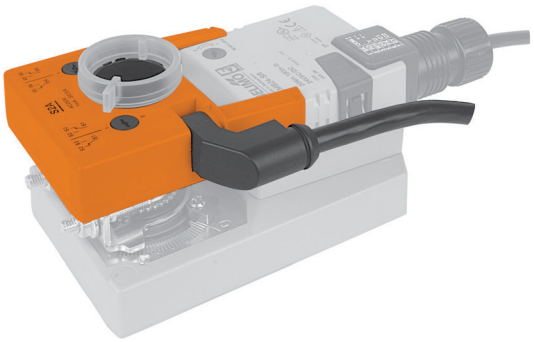
The P...A feedback potentiometers are used with LR and AR actuators to provide a resistive signal which varies with valve position.

The P...A units are applied with commercial proportional temperature controllers to provide feedback of the valve position, or with electric or electronic meters to provide position indication. The signal can also be used as a positioner for parallel operation of multiple actuators.

Operation

The P...A feedback potentiometers are mounted onto the direct coupled actuator. The switches are modular units that mount directly onto LR and AR type actuators and are locked into place by guiding grooves on the sides of the actuator.

A driver disk is attached to the actuator handle and offers direct transmission of the actuator position to the micro switch cams.

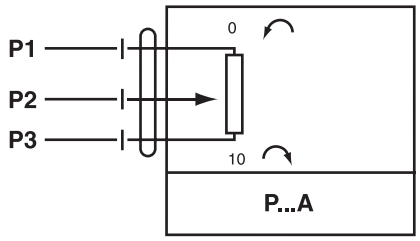


1. Press down the manual override button and rotate the actuator fully counter clockwise.
2. Place the switch/potentiometer adaptor onto the hex shaft of the handle which is in the center of the valve/actuator coupling.
3. Slide switch onto the actuator using the actuator guiding grooves on the sides of the actuator.
4. Check for correct mating of the adaptor to the switch.
5. Adjust switch dials as necessary.

Types		
P140A	Feedback Potentiometer	140 Ω
P200A	Feedback Potentiometer	200 Ω
P500A	Feedback Potentiometer	500 Ω
P1000A	Feedback Potentiometer	1000 Ω
P2800A	Feedback Potentiometer	2800 Ω
P5000A	Feedback Potentiometer	5000 Ω
P10000A	Feedback Potentiometer	10000 Ω

Technical Data	P...A
Resistance values	as above
Output	1 W
Tolerance	± 5%
Linearity	± 2%
Resolution	min. 1%
Residual resistance	max. 5% on both sides
Electrical connection	3 ft, 18 GA appliance cable ½" conduit connector
Humidity	5 to 95% RH non-condensing
Ambient temperature	-22°F to 122°F [-30°C to 50°C]
Storage temperature	-40°F to 176°F [-40°C to 80°C]
Housing	NEMA 2 / IP54
Housing rating	UL94-5VA
Servicing	maintenance free
Agency listings	cULus acc. to UL60730-1 CE according to 73/23/EEC
Quality standard	ISO 9001
Weight	4.6 oz [130 g]

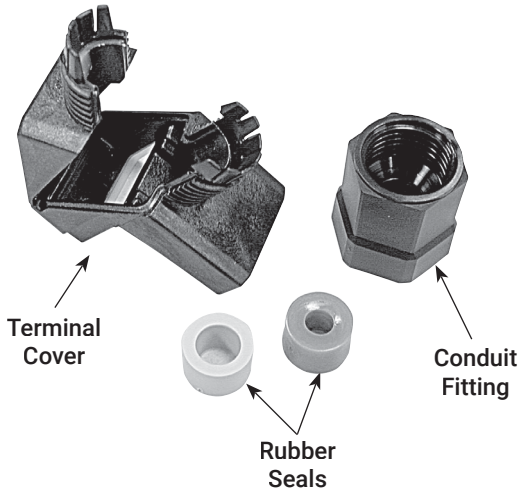
Wiring Diagram



Mounting Instructions

Protective Terminal Cover

For the non-spring return direct-coupled actuators

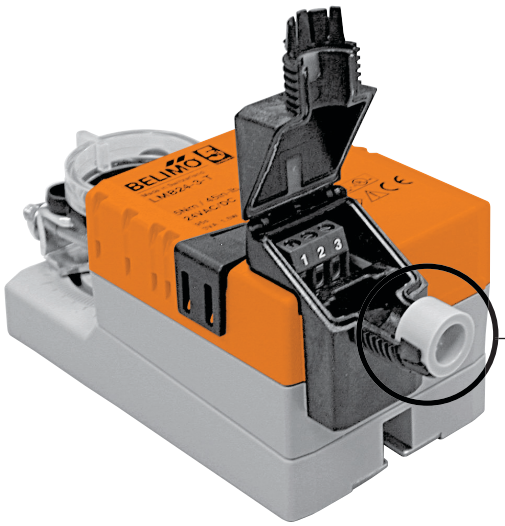


Application

Belimo non-spring return actuators with terminal strips are can be converted from NEMA 1/IP20 to NEMA 2/IP54 using the protective terminal cover ZS-T.

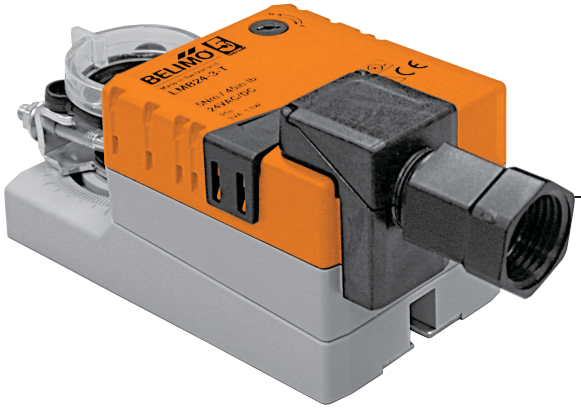
The ZS-T terminal cover accessory consists of:

- Terminal Cover
- Conduit Fitting
- Rubber Seal for Wire Diameter 4-6
- Rubber Seal for Wire Diameter 6-8



Mounting the Terminal Cover

1. Attach terminal cover to actuator, if not done already.
2. Slide the conduit fitting and correct size rubber seal onto wire.
3. Wire up actuator using the terminal strips.
4. Fit rubber seal into slot of terminal cover.
5. Shut terminal top and screw on conduit connector.



	Configuration (Substitute 'V' for 'P' for NV[F] actuators)	Code	Control		Motion		
			Input Range	Position Feedback	Running Time†	Torque %	Adaptation
Voltage	P-10001	A01	2.0 to 10.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10002	A02	0.0 to 10.0 VDC	0.0 to 10.0 VDC	150	100	Manual
	P-10003	A03	2.0 to 10.0 VDC	0.0 to 5.0 VDC	150	100	Manual
	P-10004	A04	4.0 to 7.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10005	A05	6.0 to 9.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10006	A06	10.5 to 13.5 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10007	A07	0.0 to 5.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10009	A09	5.0 to 10.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10010	A10	5.0 to 10.0 VDC	0.0 to 10.0 VDC	150	100	Manual
	P-10013	A13	0.0 to 10.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10015	A15	2.0 to 5.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10016	A16	2.0 to 6.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10017	A17	6.0 to 10.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10018	A18	14.0 to 17.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10020	A20	9.0 to 12.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10028	A28	0.0 to 10.0 VDC	0.0 to 10.0 VDC	100	100	Manual
	P-10031	A31	0.0 to 4.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10063	A63	0.5 to 4.5 VDC	0.5 to 4.5 VDC	150	100	Manual
	P-10064	A64	5.5 to 10.0 VDC	5.5 to 10.0 VDC	150	100	Manual
PWM	P-20001	W01	0.59 to 2.93 sec.	2.0 to 10.0 VDC	150	100	Manual
	P-20002	W02	0.02 to 5.00 sec.	2.0 to 10.0 VDC	150	100	Manual
	P-20003	W03	0.10 to 25.50 sec.	2.0 to 10.0 VDC	150	100	Manual
	P-20004	W04	0.10 to 25.60 sec.	2.0 to 10.0 VDC	150	100	Manual
	P-20005	W05	0.10 to 5.20 sec.	0.0 to 5.0 VDC	150	100	Manual
Floating Point	P-30001	F01	Floating point	2.0 to 10.0 VDC	150	100	Manual
	P-30002	F02	Floating point	0.0 to 10.0 VDC	150	100	Manual
	P-30003	F03	Floating point	2.0 to 10.0 VDC	100	100	Manual
	P-30004	F04	Floating point	0.0 to 5.0 VDC	100	100	Manual
	P-30005	F05	Floating point	0.0 to 10.0 VDC	100	100	Manual
	P-30006	F06	Floating point	0.0 to 5.0 VDC	150	100	Manual
On/Off	P-40001	J01	On/Off	2.0 to 10.0 VDC	75	100	Manual
	P-40002	J02	On/Off	2.0 to 10.0 VDC	150	100	Manual
	P-40003	J03	On/Off	2.0 to 10.0 VDC	75	100	Manual
	P-40004	J04	On/Off	0.0 to 5.0 VDC	100	100	Manual
	P-40005	J05	On/Off	0.0 to 10.0 VDC	100	100	Manual

*P-10001 is the default configuration.

Example: AF24-MFT US is the basic model. Add the P… pre-set MFT configuration number and list price to the actuator when ordering, as needed.
Note: V-codes used for NV…Series actuator. All other MFT actuators use P-codes.
Note: Most popular configurations available at no additional cost.
Note: If the configuration needed is not listed, please fill in pg. 112 or call Belimo Customer Service at 800-543-9038.
Note: For Non-Spring Return Actuators the 3-digit code can be used in place of the P… pre-set MFT configuration number.

MFT Programming Codes, Flexible Products

PRODUCTS

	MODEL	Base Actuator Codes	Control Input	Feedback	Running Time	Angle of Rotation/Stroke	Power Supply	VA Rating	Weight (lb)
45 in-lb [5 Nm]	LRX24-3	LR000	On/Off, Floating Point	–	95 (Default)	95 deg	24 VAC/DC	3	1.08
	LRX24-SR	LR030	2-10 VDC (4-20mA*)	–	95 (Default)	95 deg	24 VAC/DC	3	1.08
	LRX24-PC	LRXX0†	0-20 V Phasecut	2-10 VDC	95 (Default)	95 deg	24 VAC/DC	3	1.08
	LRX24-MFT	LR100	2-10 VDC (Default)	2-10 VDC	150 (Default)	95 deg	24 VAC/DC	3	1.08
	LRX24-MFT95	LRXX0†	0 to 135 Ohm	2-10 VDC	150 (Default)	95 deg	24 VAC/DC	3	1.08
	LRX120-3	LR060	On/Off, Floating Point	–	95 (Default)	95 deg	120-240 VAC	3	1.08
	LRX120-SR	LR450	2-10 VDC (4-20mA*)	–	95 (Default)	95 deg	120-240 VAC	3	1.08
180 in-lb [20 Nm]	ARX24-3	AR000	On/Off, Floating Point	–	95 (Default)	95 deg	24 VAC/DC	5	1.08
	ARX24-SR	AR030	2-10 VDC (4-20mA*)	–	95 (Default)	95 deg	24 VAC/DC	5	1.08
	ARX24-PC	ARXX0†	0-20 V Phasecut	2-10 VDC	95 (Default)	95 deg	24 VAC/DC	5	1.08
	ARX24-MFT	AR100	2-10 VDC (Default)	2-10 VDC	150 (Default)	95 deg	24 VAC/DC	5	1.08
	ARX24-MFT95	ARXX0†	0 to 135 Ohm	2-10 VDC	150 (Default)	95 deg	24 VAC/DC	5	1.08
	ARX120-3	AR060	On/Off, Floating Point	–	95 (Default)	95 deg	120-240 VAC	5	1.08
	ARX120-SR	AR450	2-10 VDC (4-20mA*)	–	95 (Default)	95 deg	120-240 VAC	5	1.08

† For correct code please call Belimo Customer service 800-543-9038

	Configuration (Substitute 'V' for 'P' for NV[F] actuators)	Code	Control		Motion		
			Input Range	Position Feedback	Running Time†	Torque %	Adaptation
Voltage	P-10001	A01	2.0 to 10.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10002	A02	0.0 to 10.0 VDC	0.0 to 10.0 VDC	150	100	Manual
	P-10003	A03	2.0 to 10.0 VDC	0.0 to 5.0 VDC	150	100	Manual
	P-10004	A04	4.0 to 7.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10005	A05	6.0 to 9.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10006	A06	10.5 to 13.5 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10007	A07	0.0 to 5.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10009	A09	5.0 to 10.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10010	A10	5.0 to 10.0 VDC	0.0 to 10.0 VDC	150	100	Manual
	P-10013	A13	0.0 to 10.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10015	A15	2.0 to 5.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10016	A16	2.0 to 6.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10017	A17	6.0 to 10.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10018	A18	14.0 to 17.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10020	A20	9.0 to 12.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10028	A28	0.0 to 10.0 VDC	0.0 to 10.0 VDC	100	100	Manual
	P-10031	A31	0.0 to 4.0 VDC	2.0 to 10.0 VDC	150	100	Manual
	P-10063	A63	0.5 to 4.5 VDC	0.5 to 4.5 VDC	150	100	Manual
	P-10064	A64	5.5 to 10.0 VDC	5.5 to 10.0 VDC	150	100	Manual
PWM	P-20001	W01	0.59 to 2.93 sec.	2.0 to 10.0 VDC	150	100	Manual
	P-20002	W02	0.02 to 5.00 sec.	2.0 to 10.0 VDC	150	100	Manual
	P-20003	W03	0.10 to 25.50 sec.	2.0 to 10.0 VDC	150	100	Manual
	P-20004	W04	0.10 to 25.60 sec.	2.0 to 10.0 VDC	150	100	Manual
	P-20005	W05	0.10 to 5.20 sec.	0.0 to 5.0 VDC	150	100	Manual
Floating Point	P-30001	F01	Floating point	2.0 to 10.0 VDC	150	100	Manual
	P-30002	F02	Floating point	0.0 to 10.0 VDC	150	100	Manual
	P-30003	F03	Floating point	2.0 to 10.0 VDC	100	100	Manual
	P-30004	F04	Floating point	0.0 to 5.0 VDC	100	100	Manual
	P-30005	F05	Floating point	0.0 to 10.0 VDC	100	100	Manual
	P-30006	F06	Floating point	0.0 to 5.0 VDC	150	100	Manual
On/Off	P-40001	J01	On/Off	None	75	100	Manual
	P-40002	J02	On/Off	2.0 to 10.0 VDC	150	100	Manual
	P-40003	J03	On/Off	None	75	100	Manual
	P-40004	J04	On/Off	0.0 to 5.0 VDC	100	100	Manual
	P-40005	J05	On/Off	0.0 to 10.0 VDC	100	100	Manual

*P-10001 is the default configuration.

BELIMO

Custom MFT Configuration Order Form

FAX: USA Toll Free 1-800-228-8283

#1 Select an Actuator

(use one sheet for each unique actuator/configuration)

	Quantity		Quantity
☐ AF24-MFT US	_____	☐ AMX24-MFT	_____
☐ AF24-MFT-S US	_____	☐ AMX24-MFTX1	_____
☐ NF24-MFT US	_____	☐ NMX24-MFT	_____
☐ LF24-MFT US	_____	☐ NMX24-MFTX1	_____
☐ LF24-MFT-S US	_____	☐ LMX24-MFT	_____
☐ AF24-MFT95 US	_____	☐ LMX24-MFTX1	_____
☐ NV24-MFT US	_____	☐ LRX24-MFT	_____
☐ NVF24-MFT US	_____	☐ GMX24-MFT95	_____
☐ NVF24-MFT-E US	_____	☐ AMX24-MFT95	_____
☐ NVFD24-MFT US	_____	☐ NMX24-MFT95	_____
☐ NVFD24-MFT-E US	_____	☐ LMX24-MFT95	_____
☐ GMX24-MFT	_____	☐ LHX24-MFT	_____
☐ GMX24-MFTX1	_____	☐ LUX24-MFT	_____

(-S=Auxiliary Switch)

Name _____

Company _____

Address _____

City _____ State _____ Zip _____

Phone _____ Fax _____

Email _____

FIELD LABELING: LBL-MFT

☐ **Custom configuration labels required**
1-3/8" X 1-¼" orange labels preprinted to your specifications 12 label sets per sheet.
Includes configuration code and wiring labels.

#2 Create a Custom Configuration

1 Angle of rotation setting

☐ **Deactivated** (Default) — The following settings 2 - 5 refer to the full angle of rotation of 95°.

☐ **Activated** — The following settings 2 - 5 are automatically adapted to the effective mechanical angle of rotation.

- ☐ **Manual** triggering by pressing the push button twice.
- ☐ **Automatic** triggering each time the unit is powered up or by pressing the push button twice.

2 Control Types

VDC	PWM	Floating Point	On/Off
☐ 2 – 10	☐ 0.2 to 5.0 seconds	☐	☐
☐ 0 – 10	☐ 0.1 to 25.5 seconds		
☐ Variable	☐ 0.59 to 2.93 seconds		
Start ☐☐.☐	☐ Variable		
Stop ☐☐.☐	Start ☐☐.☐		
	Stop ☐☐.☐		

3 Feedback Signals U_5

☐ **Position Feedback U** DC 2...10 V (Default)

☐ **Position Feedback U** DC 0...10 V

☐ **Position Feedback U**
Start DC ☐.☐ V (0...8 V)
Finish DC ☐☐.☐ V (2...10 V)
The finish must be at least 2 V above the start!

4 Running Time

☐ 150 seconds (Default)

☐ Running time ☐☐☐ seconds (75...300 seconds) (in 5 second increments)

Note: The sound power level [dB(A)] increases when the running time is below 150 seconds.

LM	**35…150 seconds**
NM	**45…170 seconds**
AM	**90…300 seconds**
GM	**90…300 seconds**
Others	**75…300 seconds**

5 Override control and electronic angle of rotation limiting

☐ Min. (min. position) = ☐☐☐ % (0...100%) ◁ (beginning of working range) default 0

ZS (intermediate position) = ☐☐☐ % (0...100%) (0% = Min.; 100% = Max.) default 50

Max. (max. position) = ☐☐☐ % (0...100%) ◁ (end of working range) default 100