

Honeywell



MAXON SMARTLINK® CV INTELLIGENT VALVE ACTUATOR

INSTRUCTION MANUAL



Please read the operating and mounting instructions before using the equipment. Install the equipment in compliance with the prevailing regulations.



使用本设备前, 请阅读操作和安装说明。安装本设备时请遵循现行法规。

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32M-96002-02

Honeywell



MAXON SMARTLINK® CV

INTELLIGENT VALVE ACTUATOR

TECHNICAL CATALOG



32M-06002-05

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PRODUCT DESCRIPTION

The MAXON SMARTLINK® Intelligent Valve Actuator Assembly is a rugged, turnkey solution for industrial flow control applications that require a high degree of precision, repeatability, and commissioning flexibility in a small space.

In addition, SMARTLINK® provides easy, on-site customization of the valve flow characteristics. This feature makes it an ideal solution for parallel valve positioning systems in combustion control applications.

The SMARTLINK® assembly includes two components: 1) a Valve Actuator direct-coupled to a valve and, 2) a Control Interface unit between the Valve Actuator and the user's process controller, PLC, or DCS.

The Valve Actuator is an industrial rated, factory-calibrated assembly that incorporates a heavy-duty, planetary gear-head with integrated, long-life position feedback. It also includes a stepper motor for continuous duty, high precision valve control. The Valve Actuator is powered by 24VDC through a four wire cable that also includes a digital position communications interface to ensure reliable operation in electrically noisy environments.

The Control Interface is a DIN rail-mounted electronic device that "links" the user's process controller to the Valve Actuator. Several front panel-mounted switches and lights are provided for displaying alarms, simple valve configuration, and valve characterization. The Control Interface also provides a precision, 4-20mA position feedback signal, several relay driver outputs for indication of alarm and control status, and digital inputs for commanding the valve to its maximum and minimum positions. The unit is typically mounted in a control panel along with a MAXON or user-supplied 24VDC supply and output interface relays.

FEATURES AND BENEFITS

- SMARTLINK® actuator fits various bodies to meet all combustion flow control needs - butterfly, ball, linkage arm
- Easy customization of the valve flow characteristic for high precision flow control and repeatability
- Maximize efficiency and minimize emissions with direct coupled, factory calibrated valve and actuator assembly
- Rugged industrial design for reliable, long-life operation
- Reduced maintenance - no lubrication required
- Hazardous Location approved: ATEX, IEC Ex and KC; Non-Incendive for Class I, Division 2; UL, FM, CE

APPLICATIONS

SMARTLINK® valve actuators are designed for precision control of industrial combustion systems, boiler combustion systems, and related heating process flows. The rugged industrial package adds value to many heating and manufacturing processes by providing highly accurate, characterizable flow control with enhanced, digital intelligence.

Typical applications include:

- Simple burner ratio controls
- Low NOx and low CO burner controls
- Control of combustion systems on processes sensitive to products of combustion
- Control of complex burners with staging or flue gas recirculation
- Precise control of process flows like feed water, atmosphere gases, and even product feeds
- Accurate flow control of metered processes and process heaters for liquids and gases

SMARTLINK® valve actuators have numerous types of applications in addition to those listed above. Contact your MAXON representative for additional application questions.

APPROVALS

Approval agency	Detail
Factory Mutual	Non-incendive for Class I Division 2, Groups A, B, C & D Hazardous (Classified) Indoor and Outdoor (Type 4X for Valve Actuator only) Locations Ta = 70°C FM 3600; FM 3611; FM 3810; ANSI/NEMA 250
UL (US and Canadian)	All actuator-related requirements in UL353 (Limit Controls)
ATEX	II 3 G Ex nA nC IIC T4 Ta= -40C to +70C; IP66 when components mounted in enclosure (valve actuator is II 3 G Ex nA nC IIC T4 Ta= -40C to +70C; IP66 and II 3 D Ex tc IIIC T135C)
IEC Ex	Ex nA nC IIC T4 -40°C ≤ Ta ≤ 70°C Gc, Ex tc IIIC T135C Dc
KC	Ex nA nC IIC T4, Ex tc IIIC T135C IP65
CCC Approvals	Actuators: GB 3836.1, GB 3836.8, GB 12476.1, GB 12476.5; Ex nA nC IIC T4 Gc; Ex tc A22 IP66 T135°C Panel Devices: GB 3836.1, GB 3836.8; Ex nA nC IIC T4 Gc Certification No: GYB21.1433X

MODEL NUMBER

Butterfly valves

Configured Item Number			Valve Body				Actuator			Fluid			
Valve Size	Flow Capacity	Series	Body Connection	Body Seats	Body Material	Body Internals	Torque Rating	Software Version	Language				
0100	S	SLCV	-	A	A	1	1	-	1	1C	A	-	I

<u>Size</u>	<u>Body Connection</u>	<u>Torque Rating</u>	<u>Fluid</u>
0100 - 1"	A - ANSI Flange	1 - 300 in-lbs	A - 158F/70C Max Air
0125 - 1.25"	M - "M" Style Flange	X - Special	B - 350F/177C Max Air
0150 - 1.5"	X - Special	* - Valve Body Only	C - 400F/204C Max Air
0200 - 2"	* - Actuator Only		D - Butane Gas
0250 - 2.5"			E - Coke Oven Gas
0300 - 3"	<u>Body Seals</u>	<u>Software Version [1]</u>	F - Digester Gas
0400 - 4"	A - Buna-N	1C - Standard software	G - Landfill Gas
0600 - 6"	B - Viton	** - Valve Body Only	H - Manufactured Gas
0800 - 8"	X - Special	<u>Language</u>	I - Natural Gas
1000 - 10"	* - Actuator Only	A - English	J - Oxygen
1200 - 12"	<u>Body Material</u>	X - Special	K - Propane Gas
1400 - 14"	1 - Cast Iron	* - Valve Body Only	L - Propane/Butane
1600 - 16"	2 - Carbon Steel		Blend Gas
	3 - Brass		M - Refinery Gas
<u>Flow Capacity</u>	5 - Stainless Steel		N - Sour Natural Gas
S - Standard	X - Special		O - Town Gas
<u>Series</u>	* - Actuator Only		X - Special
SLCV - SMARTLINK® Butterfly Valve			
	<u>Body Internals</u>		
	1 - Trim Package 1		
	2 - Trim Package 1, Oxy Clean		
	5 - Trim Package 2		
	6 - Trim Package 2, Oxy Clean		
	X - Special		
	* - Actuator Only		

[1] The latest version is the default.

Trim Package Options and Typical Materials:

- 1 - 300 Series Stainless Steel stem, 300 Series Stainless Steel disc and Bronze bushings
- 2 - 300 Series Stainless Steel stem, 300 Series Stainless Steel disc and PEEK bushings

Ball valves

Configured Item Number			Valve Body				Actuator		
Valve Size	Flow Capacity	Series	Body Connection	Body Seals & Packing	Body Material	Body Internals	Torque Rating	Software Version	Language
0100	7	SLBV	-	B	E	2	1	-	1C

Size

0050 - .5"
0075 - .75"
0100 - 1"
0125 - 1.25"
0150 - 1.5"
0200 - 2"

Flow Capacity

1 - 1/32" Slot
2 - 1/16" Slot
3 - 1/8" Slot
4 - 3/16" Slot
5 - 1/4" Slot
6 - 30° V
7 - 60° V
8 - 90° V
9 - Round Port

Series

SLBV - SMARTLINK® Ball Valve

Body Connection

A - ANSI Flanged 150#
B - ANSI Threaded
X - Special [1]
* - Actuator Only

Body Seals & Packing

E - Teflon
X - Special [1]
* - Actuator Only

Body Material

2 - Carbon Steel
5 - Stainless Steel
X - Special [1]
* - Actuator Only

Body Internals

1 - Trim Package 1
X - Special [1]
* - Actuator Only

Torque Rating

1 - 300 in-lbs
X - Special
* - Valve Body Only

Software Version [2]

1C - Standard software
** - Valve Body Only

Language

A - English
X - Special
* - Valve Body Only

[1] Please see page 6 for all available ball valve options. These will require a special configuration.

[2] The latest version is the default.

Trim Package Options and Typical Materials:

1 - 300 Series Stainless Steel Ball, 300 Series Stainless Steel Stem and Teflon Seat Rings

Additional ball valve options for special configuration:

<u>Body Connection</u>	<u>Body Seals & Packing</u>	<u>Body Material</u>	<u>Body Internals</u>
Flat-Faced Flanged	Body Seals	Duplex	Stem & Ball
Butt Weld	Graphite	400 SS	Duplex
Extended Butt Weld	Kel-F	Alloy 20	400 SS
Clamp Ends	Peek	Monel	Alloy 20
Groove Ends	RPTFE	Bronze	Monel
Socket Weld	Carbon-Filled RPTFE	Hastelloy c	Bronze
Extended Socket Weld	UHMWPE	CF8	Hastelloy c
Tube Ends	Viton	Titanium	CF8
300# RF Flanged			Titanium
600# RF Flanged	Packing Graphite RPTFE Carbon-Filled RPTFE		Seat Rings PFA Delrin Hostaflon Kel-F Peek RPTFE Carbon-Filled RPTFE
	Thrust Washer Graphite Hostaflon Kel-F Peek RPTFE Carbon-Filled RPTFE UHMWPE		

Control actuator

Configured Item Number	Series	Actuator					
		Connection		Torque Rating	Software Version	Language	
SL CA	-	K1	-	1	1C	A	- 2

Series

SL CA - SMARTLINK® Control Actuator

Torque Rating

1 - 300 in-lbs
X - Special

Rotation

1 - Clockwise
2 - Counter-clockwise

Connection

K1 - 1/2" Keyed Output Shaft
L1 - Linkage Arm
S1 - 1/2" Square Output Shaft
S2 - 3/4" Square Output Shaft

Software Version [1]

1C - Standard software

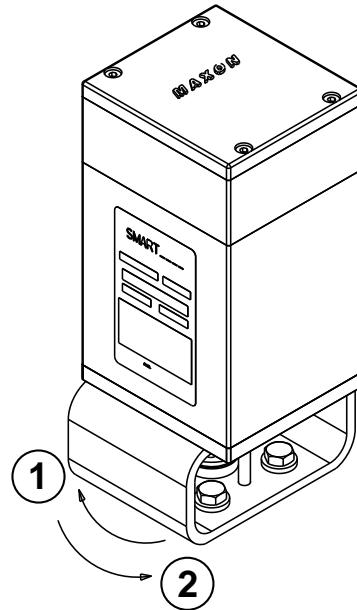
Language

A - English
X - Special

[1] The latest version is the default

Control actuator rotation

1. Clockwise rotation
2. Counter-clockwise rotation



Spare actuator

Configured Item Number		Actuator				
Series		Torque Rating	Software Version	Language		Rotation
SL SA	-	1	1C	A	-	2

Series

SL SA - SMARTLINK® Spare Actuator

Torque Rating

1 - 300 in-lbs
X - Special

Language

A - English
X - Special

Software Version [2]

1C - Standard software

Rotation [1]

1 - Clockwise
2 - Counter-clockwise

[1] The correct rotation must be specified.

- a. Butterfly Valves are always supplied in a counter-clockwise rotation.
- b. Ball Valves are always supplied in a counter-clockwise rotation.
- c. Control Actuators are customer-specific and rotation must be obtained from the actuator this spare is intended to replace.

[2] The latest version is the default.

Control interface

Configured Item #	Assembly Options												
	Series	Software Version	Language	Enclosure	Alarm	Control Enable	High Position Limit	Low Position Limit	Manual Control	Power Supply	DIN Rail Assembly	High Position Command	Low Position Command
SL CI	-	1C	A	A	1	1	1	1	1	A	1	-	A

Series

SL CI - SMARTLINK® Control Interface

Control Enable

- 0 - None
- 1 - 24VDC relay
- X - Special

Power Supply

- 0 - None
- A - 24VDC relay
- X - Special
- * - Included with enclosure

Software Version [1]

1C - Standard software

High Position Limit

- 0 - None
- 1 - 24VDC relay
- X - Special

DIN Rail Assembly

- 0 - None
- 1 - Parts mounted, factory wired
- 2 - Parts mounted, not wired
- X - Special
- * - Included with enclosure

Language

- A - English
- X - Special

Low Position Limit

- 0 - None
- 1 - 24VDC relay
- X - Special

High Position Command

- 0 - None
- A - 120VAC
- X - Special

Enclosure

- 0 - None
- A - 20x16x8, NEMA 4, window
- X - Special

Manual Control

- 0 - None
- 1 - 24VDC relay
- X - Special

Low Position Command

- 0 - None
- A - 120VAC
- X - Special

[1] The latest version is the default

SPECIFICATIONS

System specifications

Position accuracy	0.1 degrees (measured on the valve actuator shaft)
Position command	4-20mA isolated input; 4.8V burden @ 20mA
Position feedback	4-20mA isolated input; 400 ohm max load
Power input	24VDC +/-5%, 25W (maximum)
Duty cycle	Continuous
Relay driver outputs	Open collector, 30 VDC & 100mA max
Digital inputs	5-24 VDC @ 10mA (max)
Ambient temperature	-40°F to 158°F
Enclosure ratings	NEMA 1, IP20 (Control Interface and all DIN rail options) NEMA 4, IP66 (All standard, MAXON enclosures with factory-wired Control Interface and rail-mounted options) NEMA 4, IP66 (Valve actuator)
Output relays (optional)	Output contacts: 250 VAC/DC @ 6 amps DIN rail-mounted
Input relays (optional)	Input coil voltage: 120VAC (230VAC and 24VDC options available) DIN rail-mounted
Universal Power Supply (optional)	Power input: 115-230 VAC +/-10%, 50/60 Hz Power output: 24VDC, 2.3 amps (max)
Travel Time	14 seconds (full open to close)

Capacities - butterfly valves

Butterfly valves - 1" through 4"

Size	Minimum controllable Cv rating	Maximum Cv rating	Maximum inlet pressure (psig)	Maximum body pressure (psig)
1"	0.50	27	100	100
1.25"	0.60	70	100	100
1.5"	0.70	105	100	100
2"	1.30	190	100	100
2.5"	2.40	260	90	100
3"	3.00	360	60	100
4"	5.00	750	30	100

Fluid	Gas code	Suggested material options			Maximum fluid temperature rating	Maximum ambient temperature rating
		Body seals	Body material	Body internals		
Max Air	A	A, B	1, 2, 3, 5	1, 5	158°F	158°F
Butane Gas	D	A, B	1, 2, 3, 5	1, 5	158°F	158°F
Coke Oven Gas	E	B	1, 2, 5	1, 5	158°F	158°F
Digester Gas	F	B	5	5	158°F	158°F
Landfill Gas	G	B	5	5	158°F	158°F
Manufactured Gas	H	B	5	5	158°F	158°F
Natural Gas	I	A, B	1, 2, 3, 5	1, 5	158°F	158°F
Oxygen	J	B	3, 5	2, 6	158°F	158°F
Propane Gas	K	A, B	1, 2, 3, 5	1, 5	158°F	158°F
Propane/Butane Blend Gas	L	A, B	1, 2, 3, 5	1, 5	158°F	158°F
Refinery Gas	M	B	5	5	158°F	158°F
Sour Natural Gas	N	B	5	5	158°F	158°F
Town Gas	O	A, B	5	5	158°F	158°F

Body seals

A - Buna-N
B - Viton

Body material

1 - Cast iron
2 - Carbon steel
3 - Brass
5 - Stainless steel

Body internals

1 - Trim package 1
2 - Trim package 1, oxy clean
5 - Trim package 2
6 - Trim package 2, oxy clean

Butterfly valves - 6" through 16"

Size	Minimum controllable Cv rating	Maximum Cv rating	Maximum inlet pressure (psig)	Maximum body pressure (psig)
6"	12.5	1425	5	100
8"	22	2500	5	100
10"	35	4500	5	100
12"	50	6400	5	100
14"	67	8800	5	100
16"	88	11700	5	100

Fluid	Gas code	Suggested material options				Maximum fluid temperature rating	Maximum ambient temperature rating
		Body seals	Body material	Body internals	Gasket material		
158°F max air	A	A, B	1	1	NEOP, FIBR	158°F	158°F
350°F max air	B	B	1	1	FIBR	350°F	158°F
400°F max air	C	B	1	1	FIBR	400°F	140°F
Natural gas	I	A,B	1	1	NEOP, FIBR	158°F	158°F

Body seals

A - Buna-N
B - Viton

Body material

1 - Cast iron

Body internals

1 - Trim package 1

Gasket material

FIBR - Hi temp fiber
NEOP - Neoprene

Capacities - ball valves

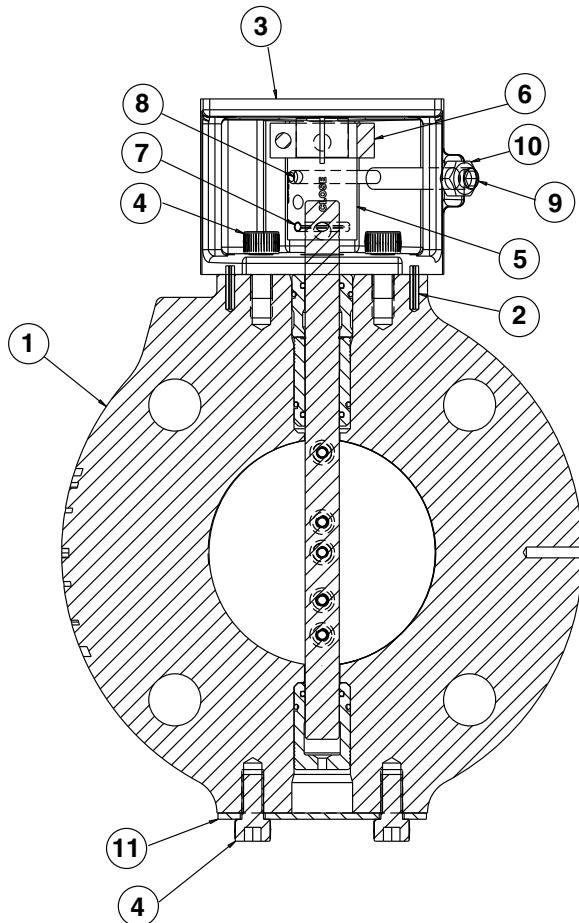
Flow Coefficient - Cv vs. % open											
Size	Insert	0.0%	11.1%	22.2%*	33.3%	44.4%	55.6%	66.7%	77.8%	88.9%	100%
0.5"	1/32" Slot	0.00	0.00	0.03	0.07	0.12	0.16	0.20	0.24	0.28	0.32
	1/16" Slot	0.00	0.01	0.07	0.20	0.33	0.46	0.60	0.73	0.86	1.00
	1/8" Slot	0.00	0.01	0.10	0.36	0.61	0.86	1.10	1.40	1.60	1.80
	30°V	0.00	0.01	0.11	0.24	0.36	0.56	0.84	1.10	1.60	2.10
	60°V	0.00	0.01	0.12	0.33	0.60	0.84	1.40	2.00	3.10	4.40
	Round Port	0.00	0.15	0.29	0.46	0.70	1.10	1.80	2.60	4.30	6.40
0.75"	1/16" Slot	0.00	0.01	0.06	0.24	0.40	0.56	0.73	0.90	1.00	1.20
	1/8" Slot	0.00	0.01	0.14	0.39	0.65	0.90	1.20	1.40	1.70	1.90
	30°V	0.00	0.01	0.11	0.24	0.41	0.67	1.00	1.40	1.90	2.60
	60°V	0.00	0.01	0.13	0.36	0.55	1.00	1.50	2.30	3.60	5.00
	Round Port	0.00	0.21	0.43	0.70	1.10	1.60	2.60	4.00	6.40	9.60
1"	1/16" Slot	0.00	0.03	0.10	0.40	0.67	0.94	1.20	1.50	1.70	1.90
	3/16" Slot	0.00	0.03	0.22	0.82	1.40	1.90	2.50	3.10	3.50	4.00
	30°V	0.00	0.03	0.21	0.56	1.00	1.60	2.40	3.40	4.60	6.20
	60°V	0.00	0.03	0.30	0.78	1.20	2.30	3.60	5.30	8.30	11.60
	90°V	0.00	0.03	0.48	1.20	2.30	3.50	5.40	7.70	10.80	12.10
	Round Port	0.00	0.58	1.20	1.90	2.80	4.30	7.00	10.50	17.00	26.00
1.25"	3/16" Slot	0.00	0.05	0.38	1.40	2.40	3.40	4.40	5.40	6.20	6.90
	30°V	0.00	0.05	0.39	1.00	1.80	2.90	4.40	6.40	8.60	11.40
	60°V	0.00	0.06	0.48	1.30	2.00	3.70	5.80	8.50	13.40	18.70
	90°V	0.00	0.06	0.78	2.00	3.70	5.70	8.80	12.50	17.50	19.70
	Round Port	0.00	0.91	1.80	3.00	4.40	6.70	10.90	16.40	26.60	40.60
1.5"	3/16" Slot	0.00	0.05	0.47	1.80	3.00	4.20	5.40	6.80	7.70	8.60
	30°V	0.00	0.05	0.41	1.20	2.10	3.50	5.20	7.60	10.30	13.70
	60°V	0.00	0.06	0.57	1.70	3.00	5.60	9.10	13.20	19.80	28.40
	90°V	0.00	0.06	1.00	2.80	4.50	8.10	13.40	19.70	30.90	47.10
	Round Port	0.00	1.50	3.00	4.80	7.20	11.00	18.00	27.00	44.00	65.50
2"	1/4" Slot	0.00	0.05	0.75	2.90	4.80	6.80	8.70	10.80	12.30	13.80
	30°V	0.00	0.05	0.55	1.70	3.40	5.70	8.30	12.10	16.60	22.20
	60°V	0.00	0.06	0.70	2.60	4.90	9.30	15.50	22.20	32.10	47.20
	90°V	0.00	0.06	0.88	3.30	6.10	11.70	19.40	27.50	40.10	59.00
	Round Port	0.00	2.20	4.30	7.00	10.50	16.20	26.40	39.60	64.00	96.00

*Select valves for minimum controllable Cv at 22°. Errors may become substantial below this point.

MATERIALS OF CONSTRUCTION

Butterfly valves

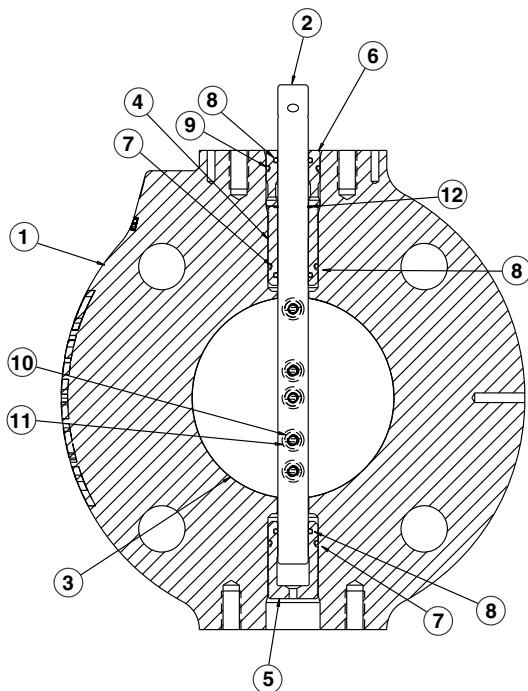
Butterfly valve body assembly - all sizes



Item number	Description	Material specifications
1	Valve body sub-assembly	See page 4
2	Locating spring pin	Zinc plated carbon steel
3	Adapter bracket	ASTM B179 T6 aluminum
4 [1]	Socket head cap screw	Zinc plated carbon steel
5	Coupling	ASTM A582 type 303 stainless steel
6	Locking collar	Zinc plated alloy steel
7	Spring pin	Zinc plated carbon steel
8	Dowel pin	303 stainless steel
9	Hard stop screw	18-8 stainless steel
10	Hard stop nut	Stainless steel
11 [1]	Cover plate	Aluminum

[1] These items used only on sizes 1" through 4"

Butterfly valve body sub-assembly - sizes 1" through 4"



Body Materials

Item No.	Description	Material Code			
		1	2	3	5
1	Valve Body	Cast Iron ASTM A159 Gr. 3000	Carbon Steel ASTM A216 Gr. WCB	Brass ASTM B62 UNS No. C83600	Stainless Steel ASTM A351 Gr. CF8M

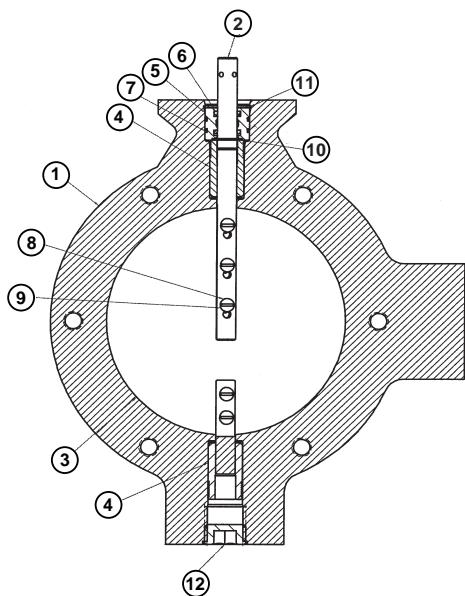
Body Seals

Item No.	Description	Material
7	O-Ring	
8	O-Ring	Standard material options are Buna-N and Viton
9	O-Ring	

Trim Package Materials

Item No.	Description	Internal Trim Package	
		1	2
2	Valve Stem	303 Stainless Steel, ASTM A157 Gr. G3000	
3	Butterfly Disc	304 Stainless Steel (1.4301), ASTM A240 Type 304 UNS No. S30400	
4	Top Bushing	Bronze	
5	Bottom Bushing	ASTM B271, B505 and B584 UNS No. C93200	PEEK
6	Top Shim Bushing		
10	Screw	18-8 Stainless Steel	
11	Washer	304 Stainless Steel (1.4301)	
12	Retaining Ring	316 Stainless Steel	

Butterfly valve body sub-assembly - sizes 6" through 16"

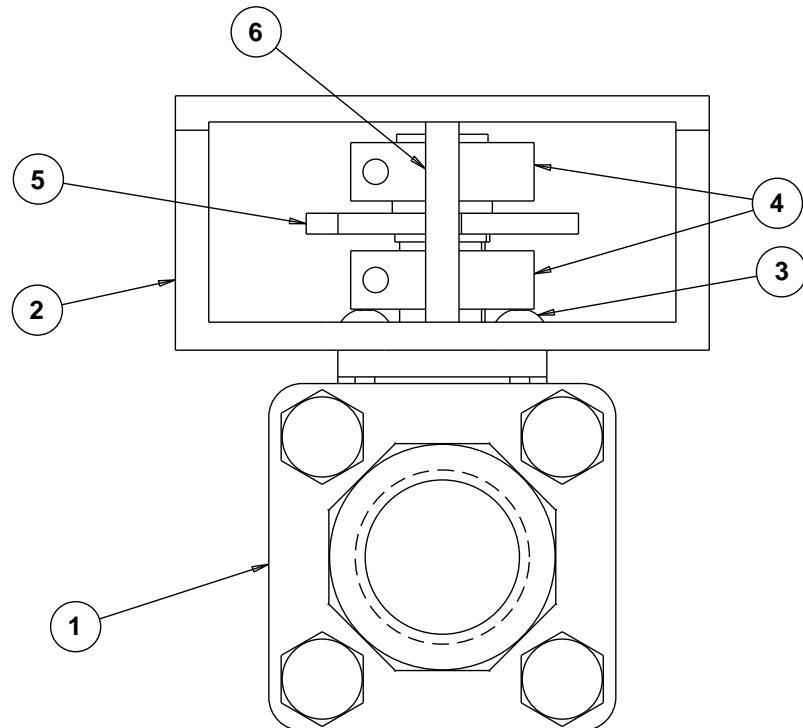


Body Materials		
Item No.	Description	Material Code
		1
1	Valve Body	Cast Iron ASTM A159 Gr. 3000

Body Seals		
Item No.	Description	Material
6	O-Ring	Standard material option is Buna-N
7	O-Ring	

Trim Package Materials			
Item No.	Description	Internal Trim Package	
		1	
	Valve Size	6" & 8"	10" through 16"
2	Valve Stem	316 Stainless Steel, ASTM A276	
3	Butterfly Disc	304 Stainless Steel (1.4301) ASTM A167 UNS No. S30400	Carbon Steel ASTM A108 UNS No. G10180
4	Top & Bottom Bushing	Bronze ASTM B271, B505 and B584 UNS No. C93200	
5	Shim Bushing	304 Stainless Steel (1.4301)	
8	Screw	Zinc Plated Carbon Steel	
9	Washer	316 Stainless Steel	Zinc Plated Carbon Steel
10	Retaining Ring	Carbon Steel	
11	Retaining Ring	SAE 1060-1090 UNS No. G10600-G10900	
12	Pipe Plug	Alloy Steel, ASTM A322 UNS G40370	

Ball valves

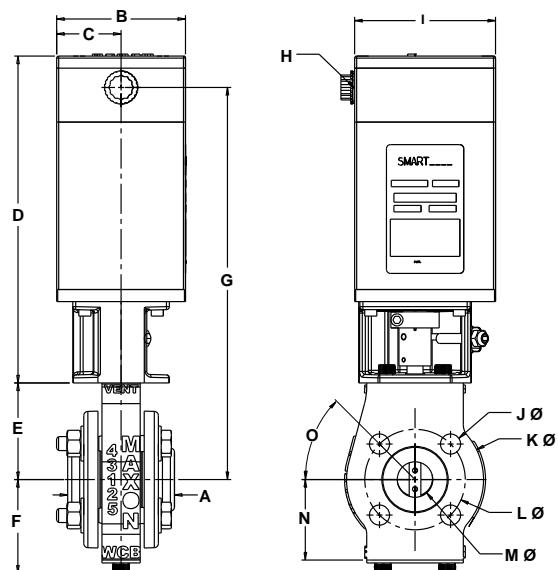


Item number	Description	Material specification
1	Valve Body Sub-assembly	Based on selection on page 5
2	Bracket	6063-T6 Aluminum Alloy UNS A96063
3	Button Head Screw	18-8 (type 303) Stainless Steel
4	Coupling Collar	Zinc Plated Alloy Steel
5	Coupling	303 Stainless Steel ASTM A582 UNS No. S30300
6	Hard Stop Pin	420 Stainless Steel

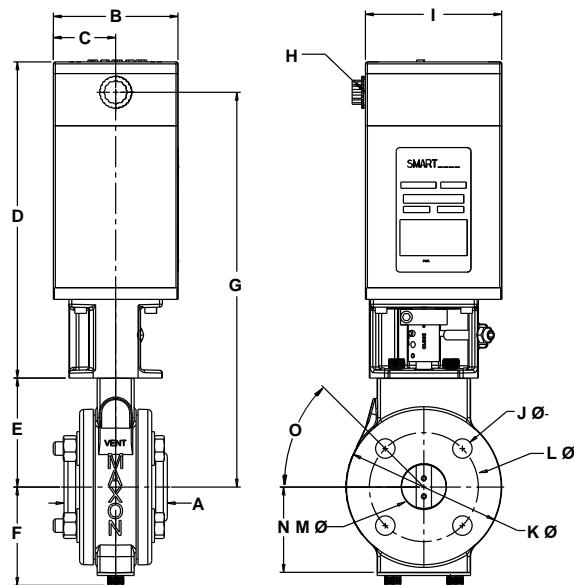
DIMENSIONS AND WEIGHTS

Butterfly valves

1" SMARTLINK® Butterfly Valve



1.25" SMARTLINK® Butterfly Valve



Flange Dimension "A" (in inches)		
Iron	Threaded	2.87
Steel	Threaded	3.15
	Socket Welded	2.84
Stainless Steel	Threaded	3.15
	Socket Welded	2.84
Brass	Threaded	2.81

Approximate weight: 22 lbs; w/flanges 26 lbs

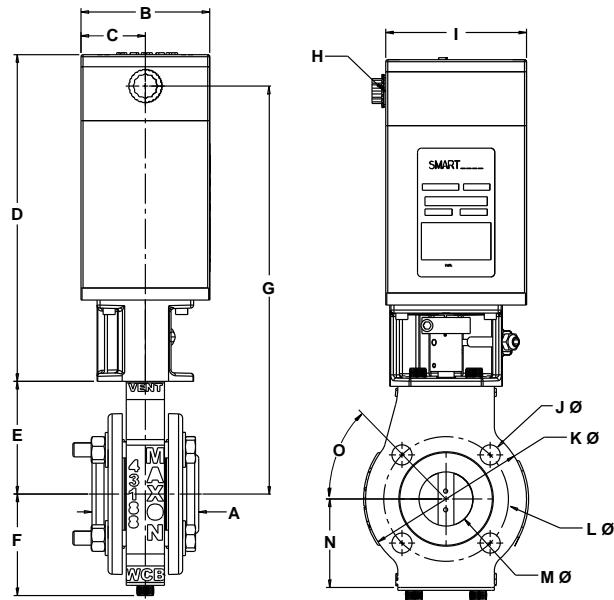
Flange Dimension "A" (in inches)		
Iron	Threaded	3.05
Steel	Threaded	3.12
	Socket Welded	3.05
Stainless Steel	Threaded	3.15
	Socket Welded	2.84
Brass	Threaded	3.05

Approximate weight: 25 lbs; w/flanges 29 lbs

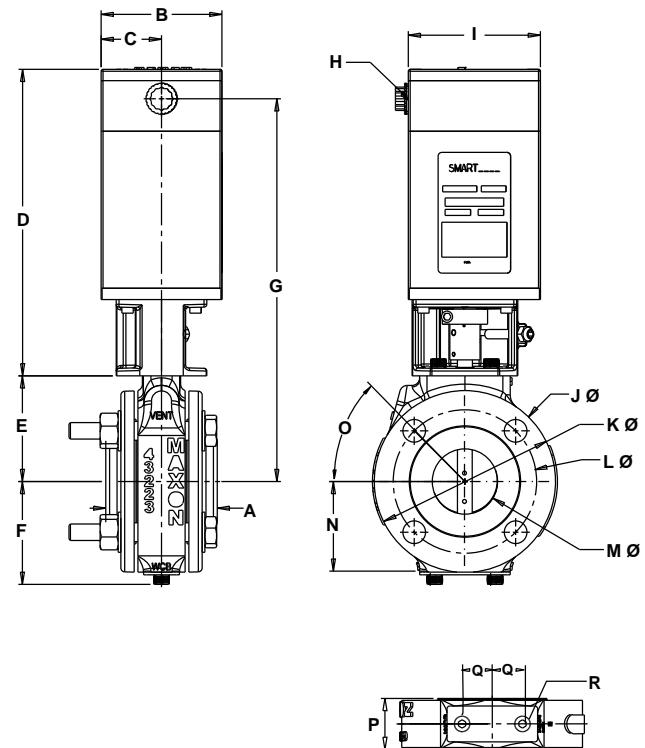
Dimensions in inches unless stated otherwise																	
Size	B	C	D	E	F	G	H NPT	I	J Ø	K Ø	L Ø	M Ø	N	O	P	Q	R [1]
1.0	4.0	2.0	10.2	3.0	2.9	12.2	0.5	4.4	0.62	4.2	3.1	1.1	2.5	45°	1.31	1	0.62
1.25	4.0	2.0	10.2	3.5	3.2	12.7	0.5	4.4	0.62	5.0	3.5	1.4	2.7	45°	1.31	1	0.62

[1] M8 - 1.25 tap, 0.62 deep, 2 holes

1.5" SMARTLINK® Butterfly Valve



2" SMARTLINK® Butterfly Valve



Flange Dimension "A" (in inches)		
Iron	Threaded	3.27
Steel	Threaded	3.23
	Socket Welded	3.24
Stainless Steel	Threaded	3.23
	Socket Welded	3.24
Brass	Threaded	3.15

Approximate weight: 28 lbs; w/flanges 34 lbs

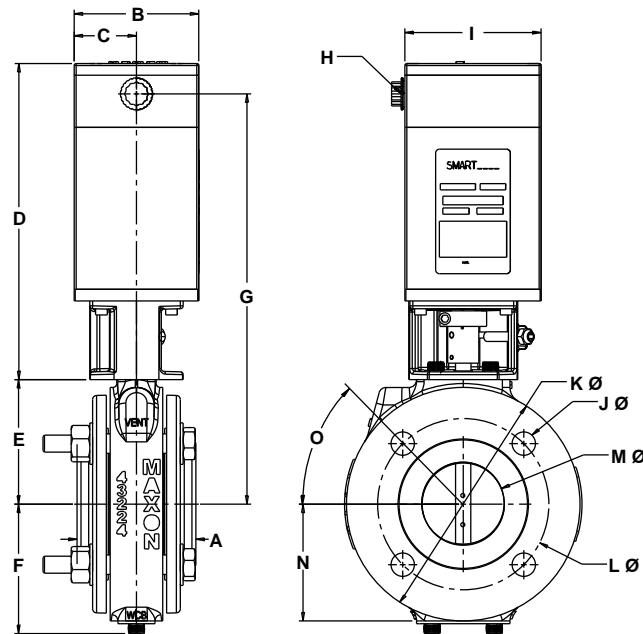
Flange Dimension "A" (in inches)		
Iron	Threaded	3.43
Steel	Threaded	3.56
	Socket Welded	3.51
Stainless Steel	Threaded	3.56
	Socket Welded	3.51
Brass	Threaded	3.72

Approximate weight: 31 lbs; w/flanges 39 lbs

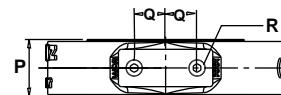
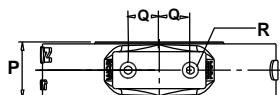
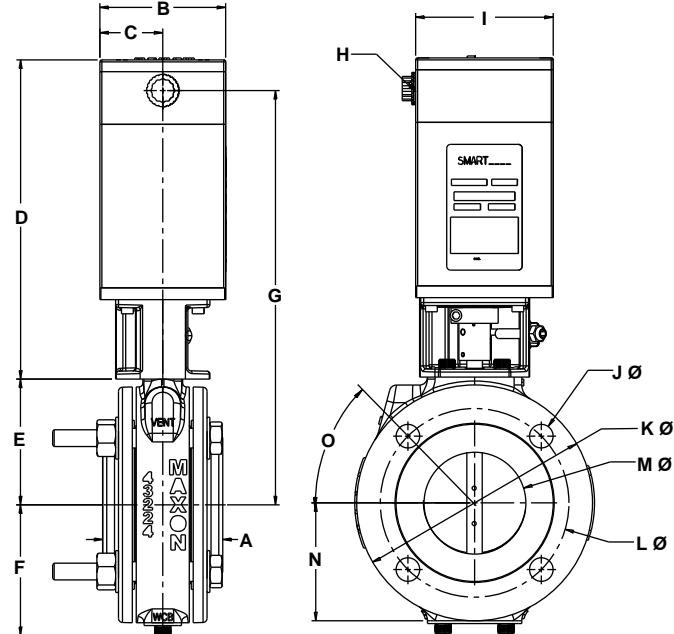
Dimension in inches unless stated otherwise																	
Size	B	C	D	E	F	G	H NPT	I	J Ø	K Ø	L Ø	M Ø	N	O	P	Q	R [1]
1.5"	4.0	2.0	10.2	3.5	3.2	12.7	0.5	4.4	0.62	5.0	3.9	1.7	2.8	45°	1.31	1	0.62
2"	4.0	2.0	10.2	3.5	3.4	12.7	0.5	4.4	0.75	6.0	4.8	2.2	3.0	45°	1.69	1	0.62

[1] M8 - 1.25 tap, 0.62 deep, 2 holes

2.5" SMARTLINK® Butterfly Valve



3" SMARTLINK® Butterfly Valve



Flange Dimension "A" (in inches)

Iron	Threaded	3.72
Steel	Threaded	3.67
	Socket Welded	3.79
Stainless Steel	Threaded	3.67
	Socket Welded	3.79
Brass	Threaded	3.80

Flange Dimension "A" (in inches)

Iron	Threaded	3.83
Steel	Threaded	4.13
	Socket Welded	4.03
Stainless Steel	Threaded	4.13
	Socket Welded	4.03
Brass	Threaded	4.02

Approximate weight: 39 lbs; w/flanges 58 lbs

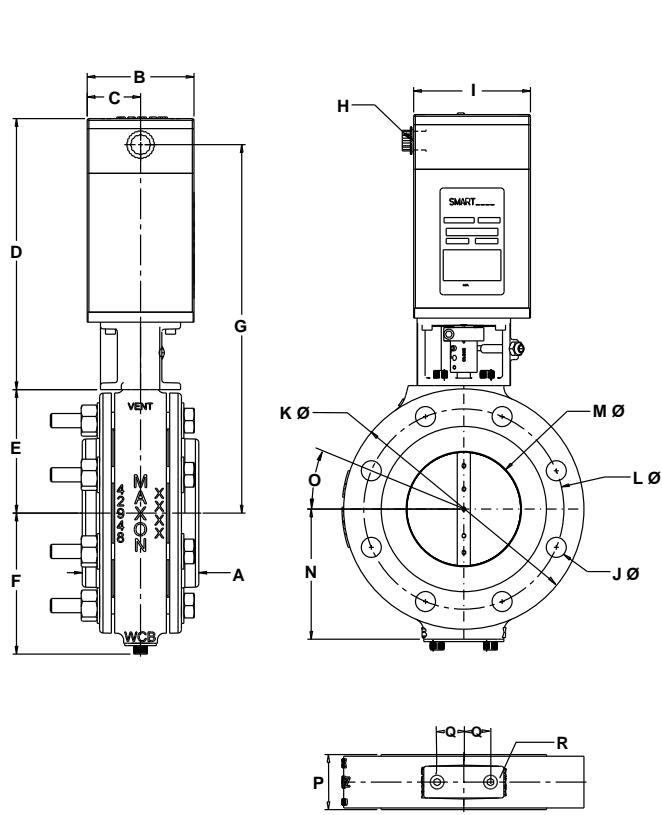
Approximate weight: 44 lbs; w/flanges 62 lbs

Dimensions in inches unless stated otherwise

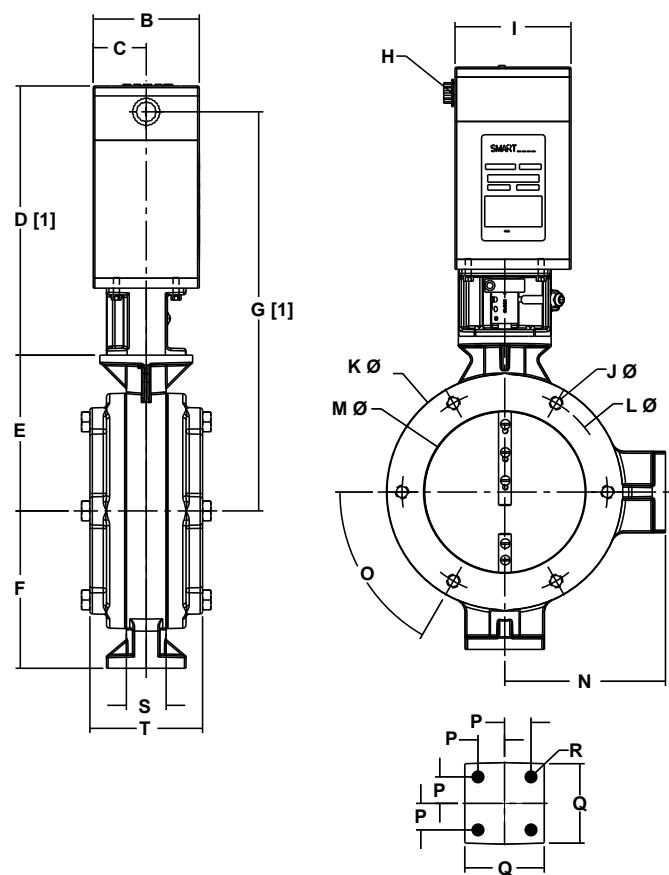
Size	B	C	D	E	F	G	H NPT	I	J Ø	K Ø	L Ø	M Ø	N	O	P	Q	R [1]
2.5"	4.0	2.0	10.2	4.0	4.2	13.2	0.5	4.4	0.75	7.5	5.5	2.6	3.8	45°	1.81	1	0.62
3"	4.0	2.0	10.2	4.0	4.2	13.2	0.5	4.4	0.75	7.5	6.0	3.3	3.8	45°	1.81	1	0.62

[1] M8 - 1.25 tap, 0.62 deep, 2 holes

4" SMARTLINK® Butterfly Valve



6" SMARTLINK® Butterfly Valve



Flange Dimension "A" (in inches)

Iron	Threaded	4.13
Steel	Threaded	4.06
	Socket Welded	4.06
Stainless Steel	Threaded	4.06
	Socket Welded	4.06

[1] Add 2.5" for high temperature (>158°F) configuration

Approximate weight: 49 lbs; w/flanges 71 lbs

Approximate weight: 55 lbs; w/flanges 71 lbs

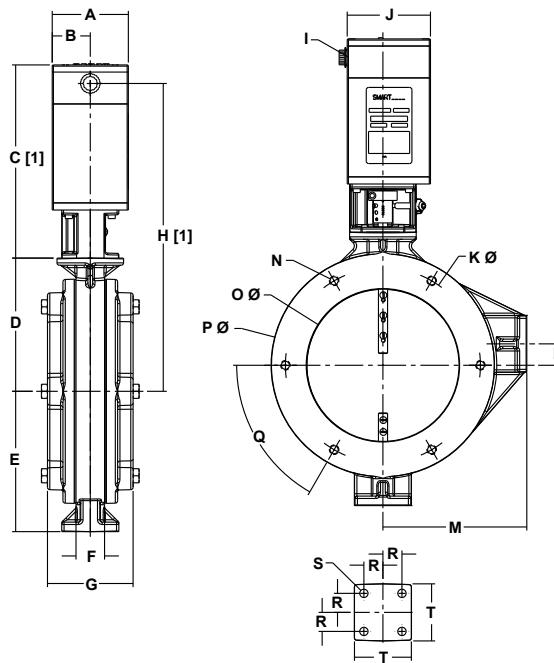
Dimensions in inches unless stated otherwise

Size	B	C	D	E	F	G	H NPT	I	J	K Ø	L Ø	M Ø	N	O	P	Q	R [2]	S	T
4"	4.0	2.0	10.2	4.6	5.3	13.8	0.5	4.4	0.75	9.0	7.5	4.3	4.9	22.5°	2.06	1	0.62	---	---
6"	4.0	2.0	10.2	5.9	5.9	15.1	0.5	4.4	[1]	8.9	7.75	6.1	6.1	60°	1.0	3.0	0.438	1.5	4.3

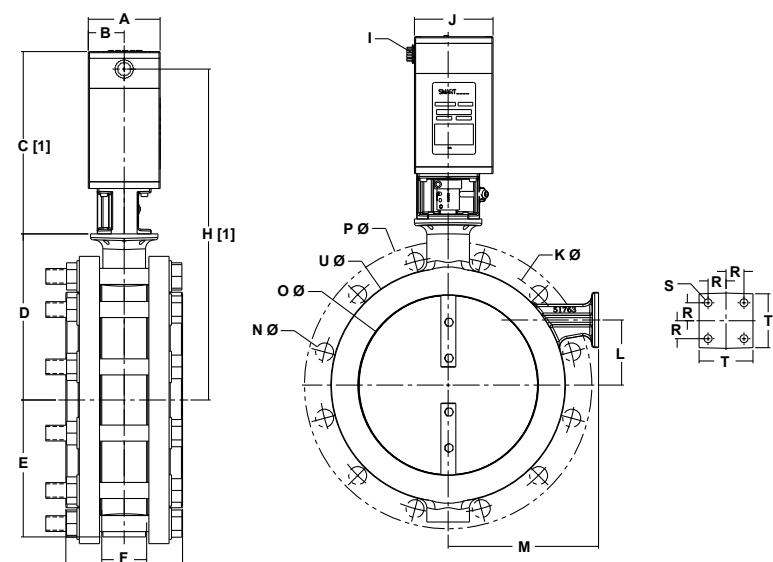
[1] 1 1/2-13 UNC, 6 holes

[2] For 4" Valve: M8-1.25 tap, 0.62 deep, 2 holes. For 6" Valve: 1 1/2-13 UNC, 4 holes

8" SMARTLINK® Butterfly Valve



10" SMARTLINK® Butterfly Valve



[1] Add 2.5" for high temperature ($>158^{\circ}\text{F}$) configuration

Approximate weight: 61 lbs; w/flanges 91 lbs

NOTE: [1] Add 2.5" for high temperature ($>158^{\circ}\text{F}$) configuration
Flanges are shipped loose.

Approximate weight: 66 lbs; w/flanges 139 lbs

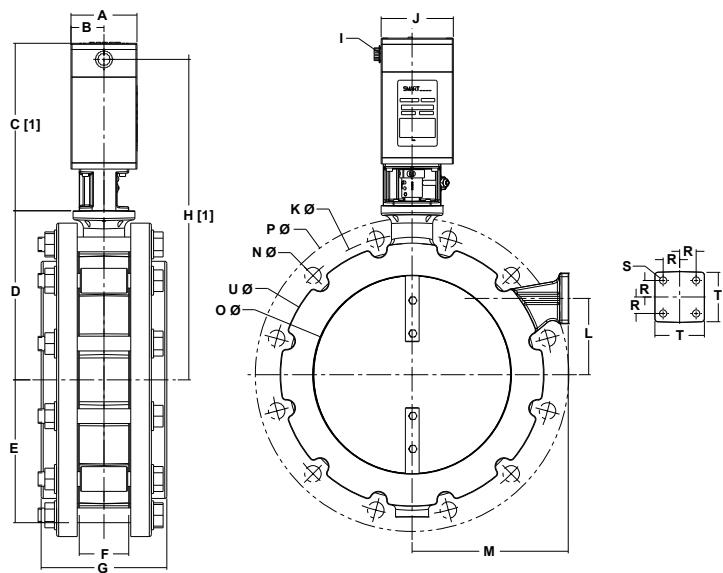
Dimensions in inches unless stated otherwise																					
Size	A	B	C	D	E	F	G	H	I NPT	J	K Ø	L	M	N	O Ø	P Ø	Q	R	S [3]	T	U Ø
8"	4.0	2.0	10.2	7.0	7.4	1.5	4.4	16.2	0.5	4.4	10.25	1.1	7.6	[1]	8.0	11.8	60°	1.0	0.438	3.0	---
10"	4.0	2.0	10.2	9.2	7.6	2.5	6.5	18.4	0.5	4.4	14.2	3.6	8.4	[2]	10.0	16.0	---	1.0	0.438	3.0	13

[1] 1/2-13 UNC, 6 holes

[2] 1.0 diameter, 12 holes

[3] 0.438 deep, 4 holes

12" SMARTLINK® Butterfly Valve

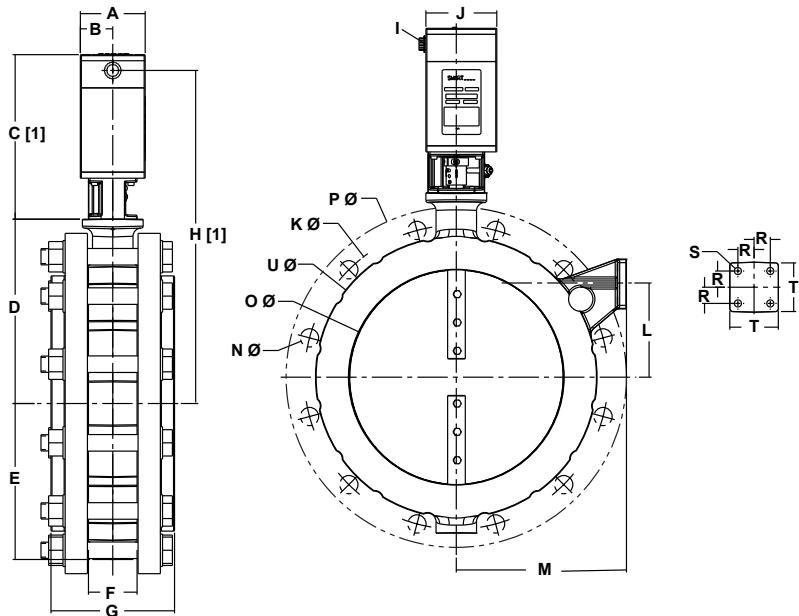


[1] Add 2.5" for high temperature (>158°F) configuration

NOTE: Flanges are shipped loose.

Approximate weight: 77 lbs; w/flanges
197 lbs

14" SMARTLINK® Butterfly Valve



[1] Add 2.5" for high temperature (>158°F) configuration

NOTE: Flanges are shipped loose.

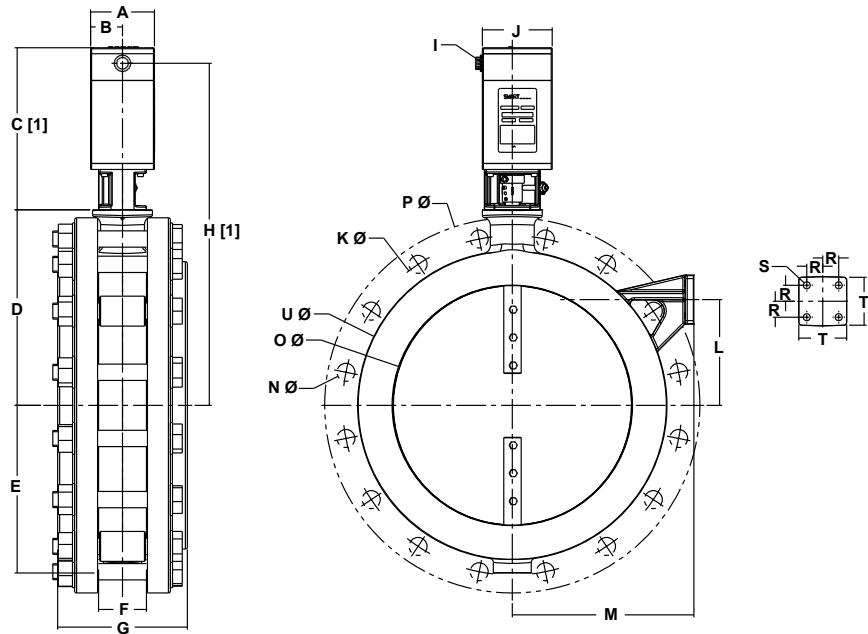
Approximate weight: 109 lbs; w/flanges
266 lbs

Dimensions in inches unless stated otherwise

Size	A	B	C	D	E	F	G	H	I NPT	J	K Ø	L	M	N Ø	O Ø	P Ø	R	S [1]	T	U Ø
12"	4.0	2.0	10.2	10.2	8.7	3.0	7.6	19.4	0.5	4.4	17.0	4.6	9.5	1.0	12.0	19.0	1.0	0.438	3.0	16.0
14"	4.0	2.0	10.2	11.4	9.6	3.0	7.6	20.6	0.5	4.4	18.8	5.8	10.5	1.1	13.2	21.0	1.0	0.438	3.0	17.4

[1] 0.438 deep, 4 holes

16" SMARTLINK® Butterfly Valve



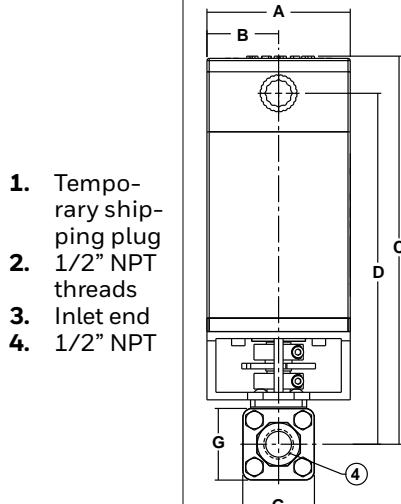
Dimensions in inches unless stated otherwise

Size	A	B	C	D	E	F	G	H	I NPT	J	K Ø	L	M	N Ø	O Ø	P Ø	R	S [1]	T	U Ø
16"	4.0	2.0	10.2	12.2	10.5	3.0	8.1	21.4	0.5	4.4	21.2	6.6	11.4	1.12	15.0	23.5	1.0	0.438	3.0	19.4

[1] 0.438 deep, 4 holes

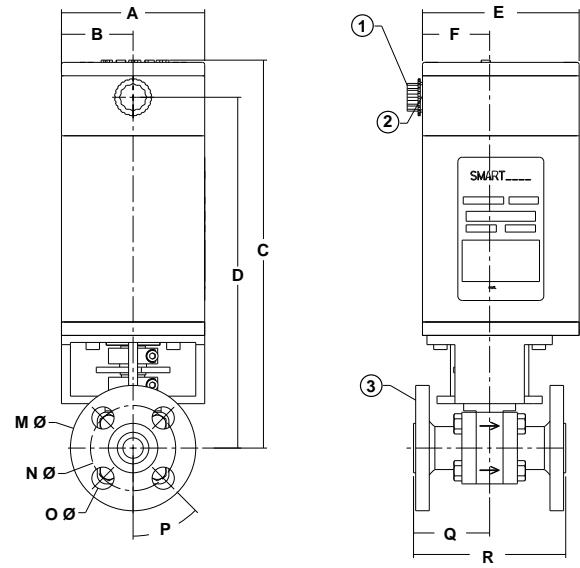
Ball valves

0.5" SMARTLINK® Ball Valve - Threaded



Approximate weight: 12 lbs.

0.5" SMARTLINK® Ball Valve - Flanged



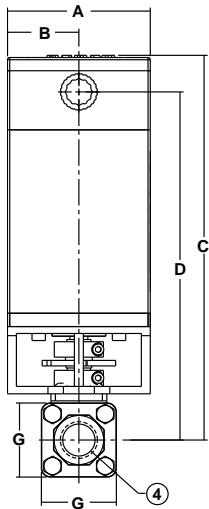
Approximate weight: 14 lbs.

Dimensions in inches unless stated otherwise

Size	A	B	C	D	E	F	G	H oct.	I	J	K	L	M Ø	N Ø	O Ø	P	Q	R
0.5"	4.0	2.0	10.83	9.8	4.38	1.89	2.0	1.2	1.0	2.0	1.45	2.9	3.5	2.38	0.62	45°	2.12	4.25

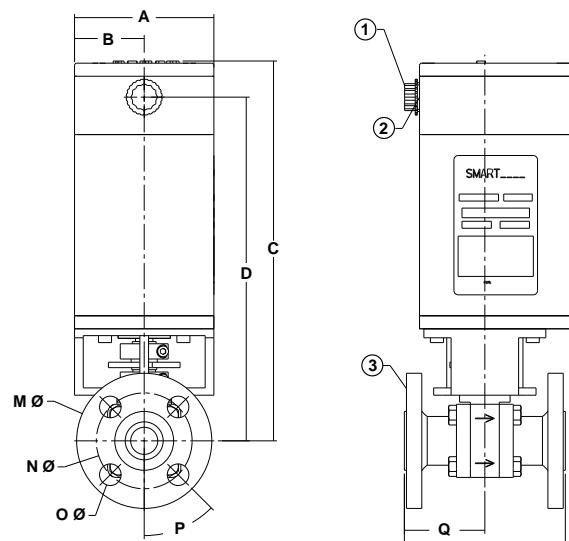
0.75" SMARTLINK® Ball Valve - Threaded

1. Temporary shipping plug
2. 1/2" NPT threads
3. Inlet end
4. 3/4" NPT



Approximate weight: 13 lbs.

0.75" SMARTLINK® Ball Valve - Flanged



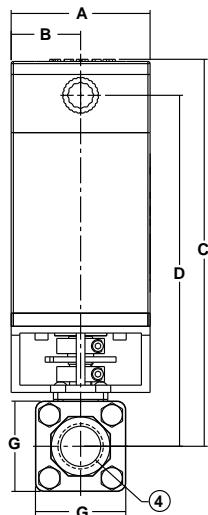
Approximate weight: 16 lbs.

Dimensions in inches unless stated otherwise

Size	A	B	C	D	E	F	G	H oct.	I	J	K	L	M Ø	N Ø	O Ø	P	Q	R
0.75"	4.0	2.0	10.9	9.87	4.38	1.89	2.1	1.4	1.04	2.08	1.6	3.2	3.88	2.75	0.62	45°	2.31	4.62

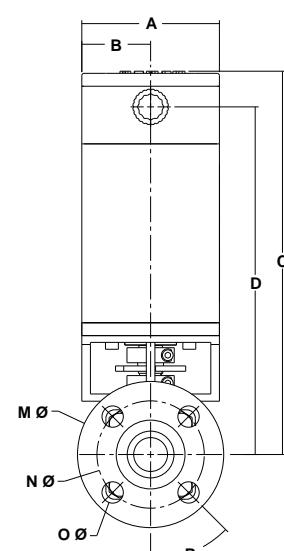
1" SMARTLINK® Ball Valve - Threaded

1. Temporary shipping plug
2. 1/2" NPT threads
3. Inlet end
4. 1/2" NPT



Approximate weight: 15 lbs.

1" SMARTLINK® Ball Valve - Flanged



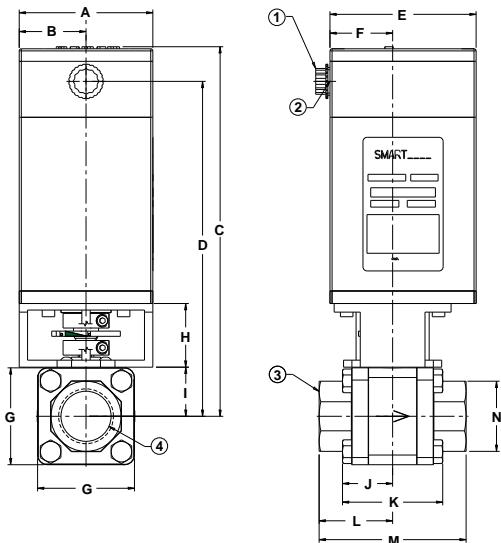
Approximate weight: 18 lbs.

Dimensions in inches unless stated otherwise

Size	A	B	C	D	E	F	G	H oct.	I	J	K	L	M Ø	N Ø	O Ø	P	Q	R
1"	4.0	2.0	11.14	10.11	4.38	1.89	2.6	1.7	1.25	2.5	1.95	3.9	4.25	3.12	0.62	45°	2.5	5.0

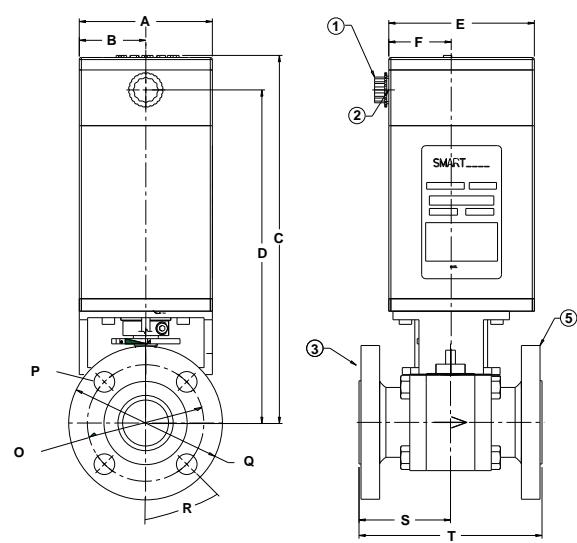
1.25" SMARTLINK® Ball Valve - Threaded

1. Temporary shipping plug
2. 1/2" NPT threads
3. Inlet end
4. 1-1/4" NPT
5. 150# ANSI flange



Approximate weight: 16.5 lbs.

1.25" SMARTLINK® Ball Valve - Flanged

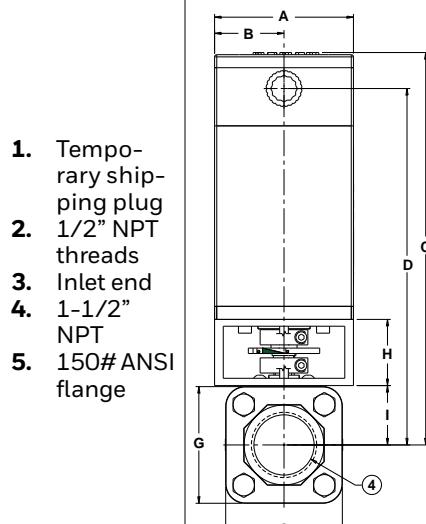


Approximate weight: 21.5 lbs.

Dimensions in inches unless stated otherwise

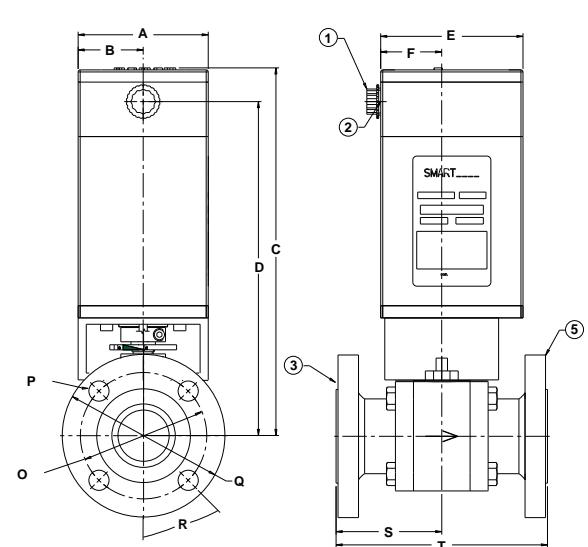
Size	A	B	C	D	E	F	G	H	I	J	K	L	M	N oct.	O Ø	P Ø	Q Ø	R	S	T
1.25"	4.0	2.0	11.06	10.03	4.38	1.88	2.9	1.91	1.47	1.5	3.0	2.2	4.4	2.1	3.5	.62	4.62	45°	2.75	5.5

1.5" SMARTLINK® Ball Valve - Threaded



Approximate weight: 19 lbs.

1.5" SMARTLINK® Ball Valve - Flanged



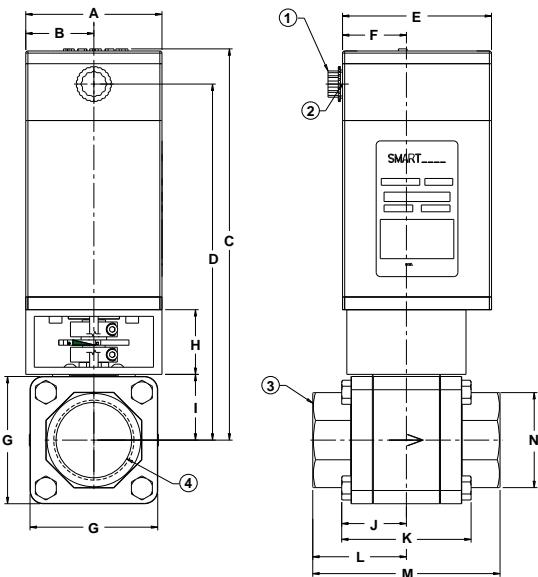
Approximate weight: 26 lbs.

Dimensions in inches unless stated otherwise

Size	A	B	C	D	E	F	G	H	I	J	K	L	M	N oct.	O Ø	P Ø	Q Ø	R	S	T
1.5"	4.0	2.0	11.3	10.27	4.38	1.88	3.36	1.91	1.71	1.7	3.4	2.35	4.7	2.3	3.88	.62	5.0	45°	3.25	6.5

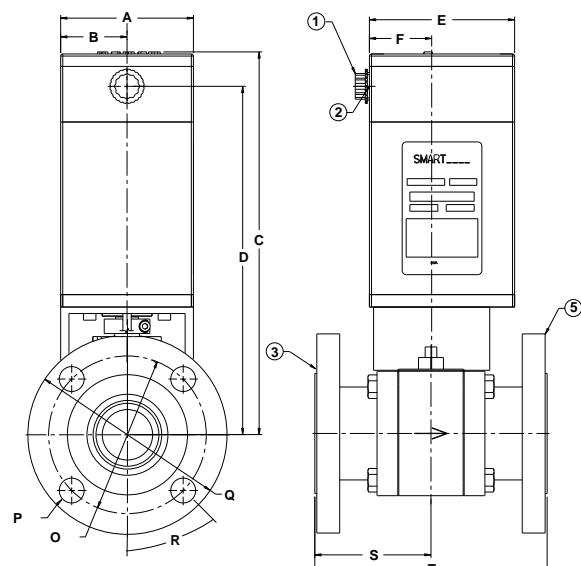
2" SMARTLINK® Ball Valve - Threaded

1. Temporary shipping plug
2. 1/2" NPT threads
3. Inlet end
4. 2" NPT
5. 150# ANSI flange



Approximate weight: 22 lbs.

2" SMARTLINK® Ball Valve - Flanged

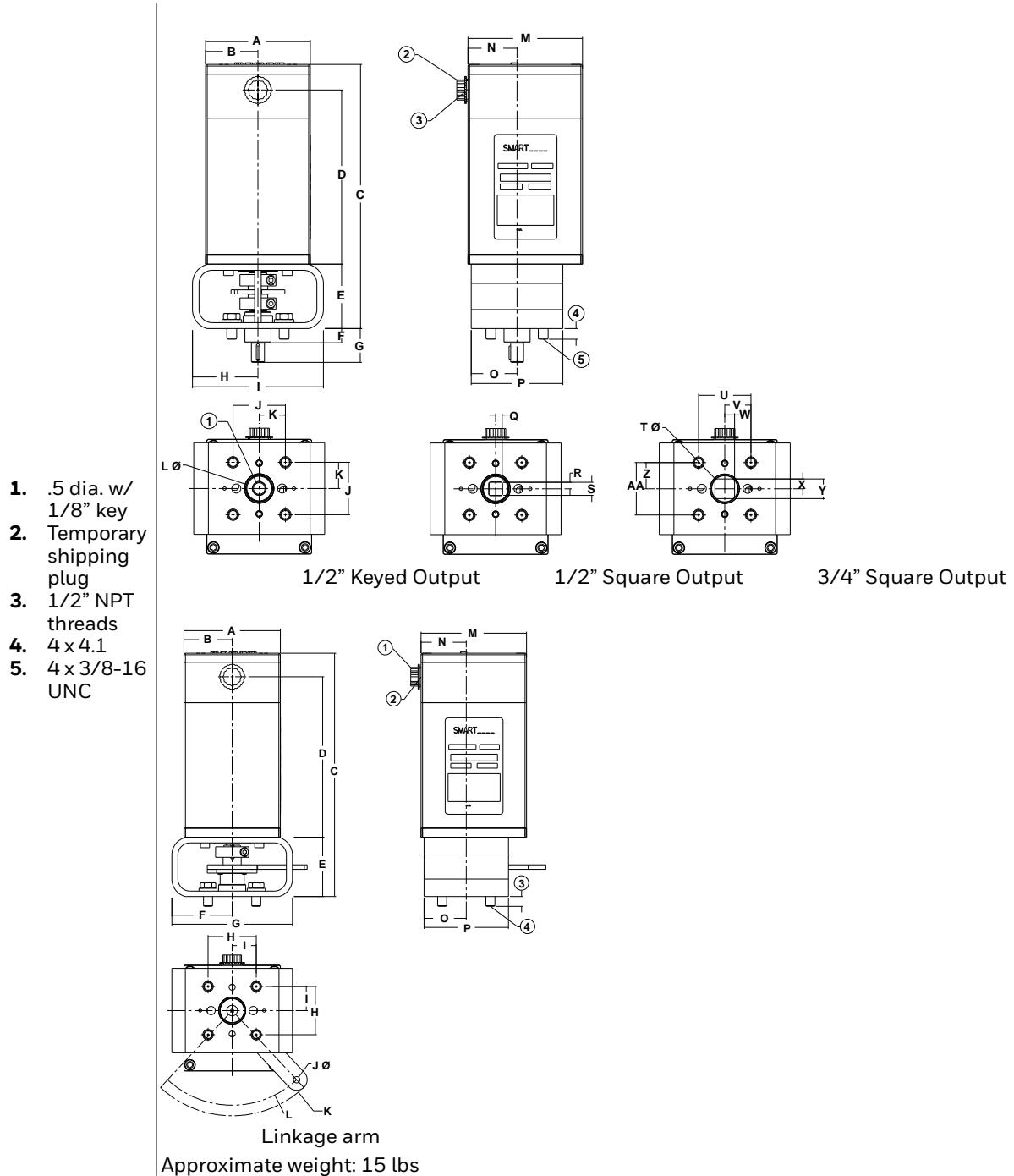


Approximate weight: 31 lbs.

Dimensions in inches unless stated otherwise

Size	A	B	C	D	E	F	G	H	I	J	K	L	M	N oct.	O Ø	P Ø	Q Ø	R	S	T
2"	4.0	2.0	11.53	10.49	4.38	1.88	3.75	1.91	1.94	1.90	3.80	2.75	5.5	2.8	4.75	.75	6.0	45°	3.5	7.0

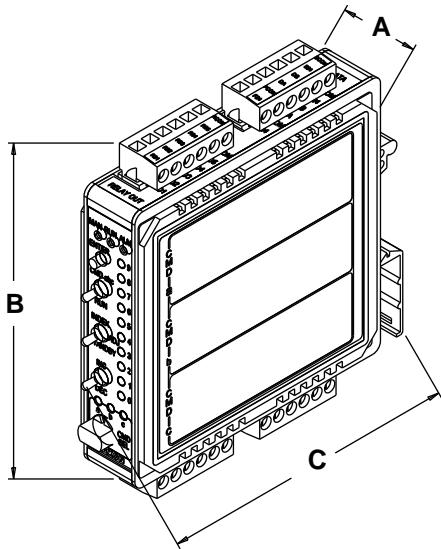
Control actuator



Dimensions in inches unless stated otherwise														
A	B	C	D	E	F	G	H	I	J	K	L Ø	M	N	
4.0	2.0	10.08	6.65	2.46	0.54	1.29	2.5	5.0	2.0	1.0	1.0	4.38	1.88	

Dimensions in inches unless stated otherwise														
O	P	Q	R	S	T Ø	U	V	W	X	Y	Z	AA		
1.75	3.5	0.25	0.25	0.5	1.0	2.0	1.0	0.375	0.375	0.75	1.0	2.0		

Control interface



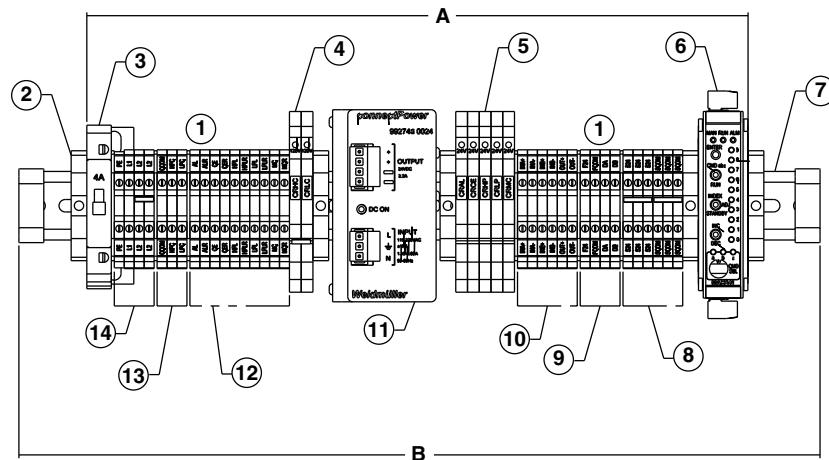
Dimensions in inches unless stated otherwise

A	B	C	Weight (lbs)
1.00	4.57	4.53	1

DIN rail assembly

(maximum options shown)

1. Terminal blocks
2. DIN rail end stop (5)
3. 4.0 amp circuit breaker
4. 120VAC relays (optional) 2 max.
5. 24VDC relay (optional) 5 max.
6. Control interface
7. TS 35X15 high rise slotted DIN rail
8. 24VDC power
9. Actuator network
10. 4 to 20 mA I/O
11. 24VDC 2.3A power supply (optional)
12. Relay output contacts
13. Relay input contacts
14. 120VAC power

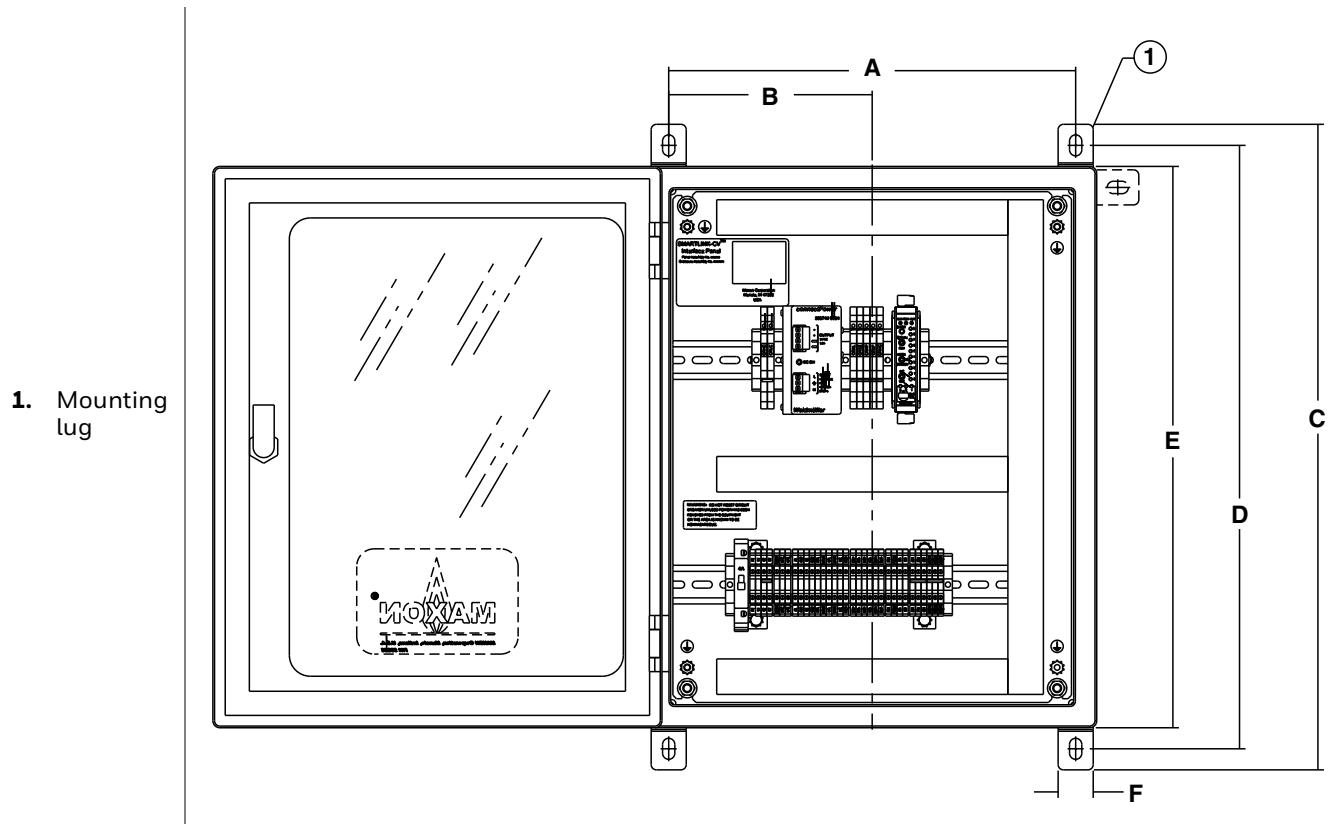


Dimensions in inches unless stated otherwise

A	B	Weight (lbs)
13.289	16.1	5

Interface panel

(maximum options shown)



Dimensions in inches unless stated otherwise

A	B	C	D	E	F	Weight (lbs)
14.5	7.25	23.0	21.5	20.0	1.25	40

INSTALLATION INSTRUCTIONS



Please read the operating and mounting instructions before using the equipment. Install the equipment in compliance with the prevailing regulations.

Bedrijfs- en montagehandleiding voor gebruik goed lezen! Apparaat moet volgens de geldende voorschriften worden geïnstalleerd.

Lire les instructions de montage et de service avant utilisation! L'appareil doit imperativement être installé selon les règlementations en vigueur.

Betriebs- und Montageanleitung vor Gebrauch lesen! Gerät muß nach den geltenden Vorschriften installiert werden.

MANUFACTURER AND IMPORTER ADDRESSES

Below are the addresses and contact information for the Honeywell – Maxon manufacturing location and European sales office. The European sales office serves as the importer and EU manufacturer's representative under the EU New Legislative Framework (NLF).

MUNCIE, INDIANA, USA – MANUFACTURER

201 East 18th Street
P.O. Box 2068
Muncie, IN 47307-0068

Tel: 765.284.3304

Fax: 765.286.8394

EUROPEAN SALES OFFICE –

IMPORTER
BELGIUM
Maxon International BVBA
Luchthavenlaan 16-18
1800 Vilvoorde, Belgium

Tel: 32.2.255.09.09

Fax: 32.2.251.82.41

Mechanical installation

Required components

The minimum SMARTLINK® system requires 1 Control Interface and 1 Valve Actuator assembly.

The SMARTLINK® Control Interface shall be mounted within a tool-secured enclosure which meets the requirements of EN 60079-0 and EN-60079-15 and is capable of accepting the applicable wiring methods specified in EN 60079-14. Where installed in outdoor and potentially wet locations, the enclosure shall, at a minimum, meet the requirements of IP54. Where installed in locations providing adequate protection against the entry of solid foreign objects or water capable of impairing safety, the enclosure shall, at a minimum, meet the requirements of IP4X.

Optional components

DIN rail-mounted interface relays, 24VDC supply, terminal block assembly, a pre-wired DIN rail assembly and a NEMA 4 enclosed panel are all options available from MAXON.

Mechanical installation of the SMARTLINK® Intelligent Valve and Actuator Assembly requires the following:

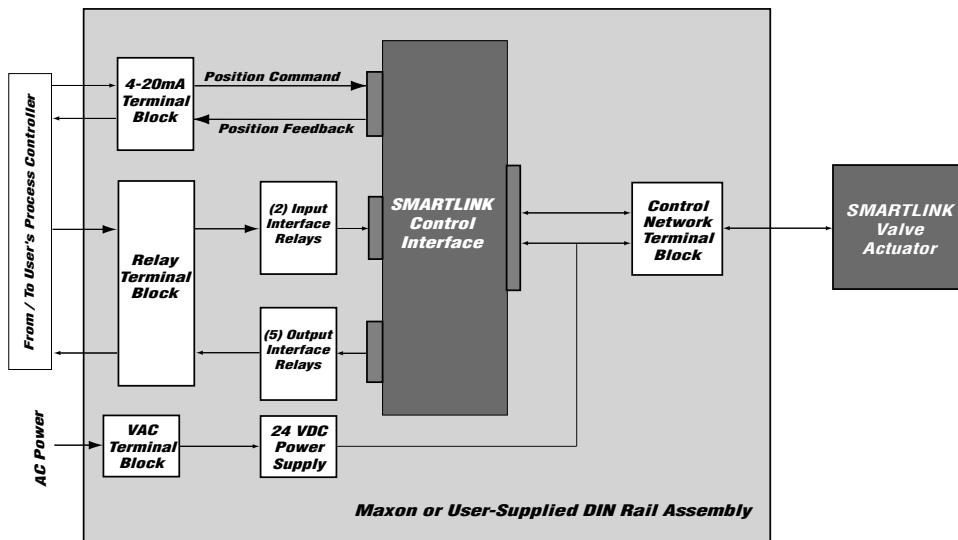
- Mount the SMARTLINK® Control Interface along with any optional interface relays on a DIN rail within an appropriate electrical enclosure or cabinet, and
- Install the SMARTLINK® Valve Actuator assembly in any orientation within the pipe train.

Electrical installation

System wiring requirements

The system block diagram below indicates the sources and destinations of the electrical wiring required by the SMARTLINK® Control Interface and Actuator assembly.

System block diagram



The basic electrical installation requires the following wiring:

- **Low voltage 4-20mA signal wiring** from the user's process controller to the SMARTLINK® Control Interface. Wiring of the 4-20mA position feedback signal is optional and may not be needed for specific applications.
- **Communications wiring** between the SMARTLINK® Control Interface and Valve Actuator.
- **Low-voltage supply wiring** between a 24VDC supply and the SMARTLINK® Control Interface. A pre-wired MAXON DIN Rail Assembly can be supplied that includes this wiring.
- **Low voltage DC relay coil wiring** from the SMARTLINK® Control Interface to output interface relays. All interface relays are optional. A pre-wired MAXON DIN Rail Assembly can be supplied that includes this wiring to the relays.
- **120/230 VAC input relay wiring** from the user's process controller to the optional input relays. This wiring is not required if input interface relays are not used by the application. A pre-wired MAXON DIN rail assembly can be supplied that includes the relays and the wiring.
- **Low voltage DC relay contact input wiring** from the input relay contacts to the Control Interface.
- **120/230 VAC output relay wiring** from the output interface relay contacts to the user's process control equipment. This wiring is not required if output interface relays are not required for the application.
- **120/230 VAC supply wiring** between a user's fused power source and the 24VDC power supply.

Electrical wiring should be performed in accordance with all local and NEC 1 codes. See Reference Table 1 (page 48) and Table 2 (page 49) for summaries of all of the input/

output terminals for the Control Interface and Valve Actuator. Reference Table 3 (page 49) summarizes the maximum wiring length, type, and size for all terminations.

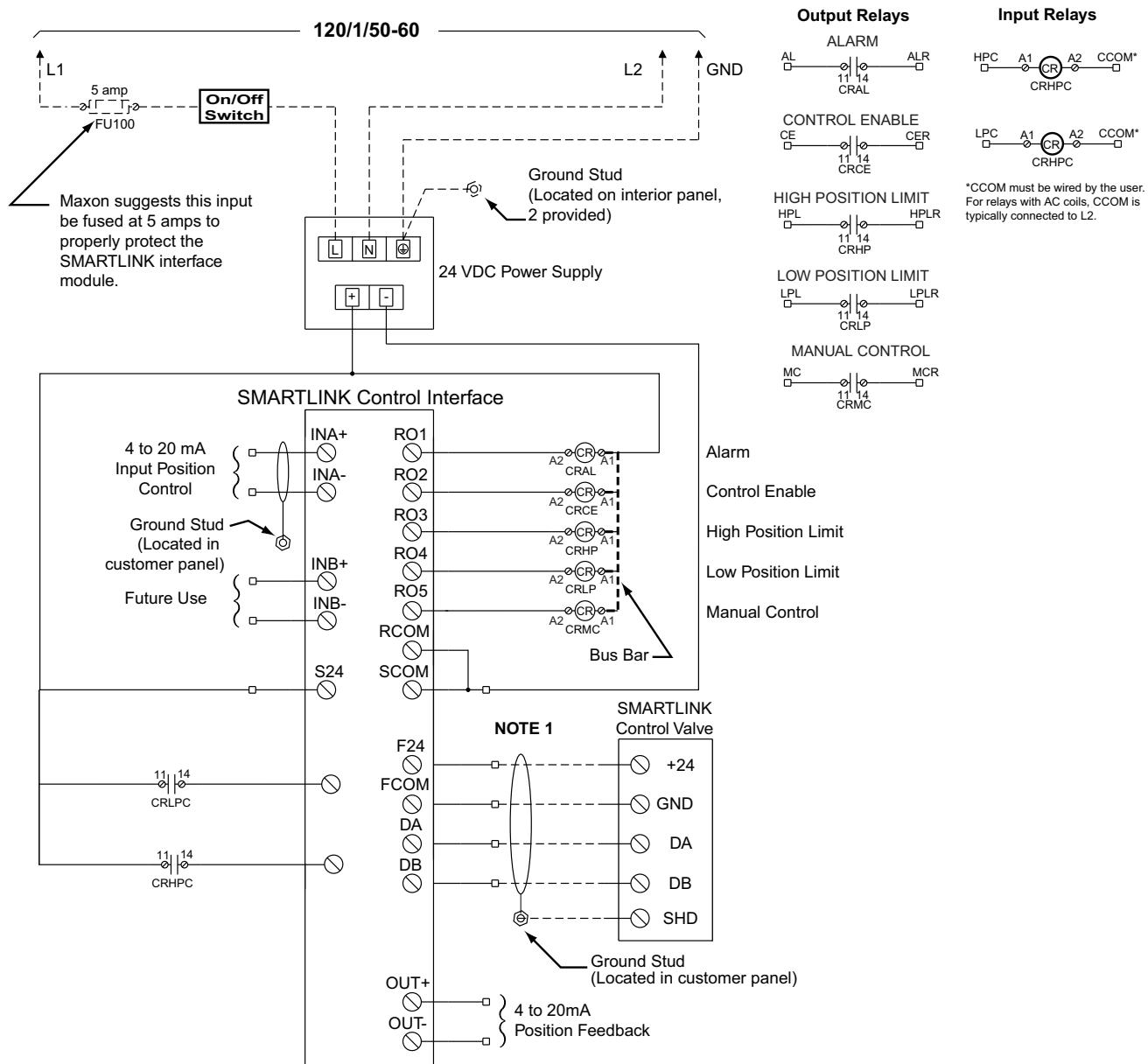
Typical wiring diagram of a SMARTLINK® Valve Actuator Assembly is shown on page 36.

If the Control Interface is shipped as part of the MAXON pre-wired DIN rail assembly, the electrical installation is simplified because the 24VDC power supply and interface relays are provided and wired to the Control Interface. The electrical installation for the pre-wired DIN rail assembly requires the following:

- **Low voltage 4-20mA signal wiring** from the user's process controller to the SMARTLINK™ DIN rail assembly. Wiring of the 4-20mA position feedback signal is optional.
- **Communications wiring** between the SMARTLINK™ Control Interface and Valve Actuator.
- **120/230 VAC input relay wiring** from the user's process controller to the optional input relays. This wiring is not required if input interface relays are not used by the application.
- **120/230 VAC output relay wiring** from the output interface relay contacts to the user's process control equipment. This wiring is not required if output interface relays are not required.
- **20/230 VAC supply wiring** between a user's fused power source and the 24VDC power supply.

All electrical wiring should be performed in accordance with all local and NEC 1 codes. Reference Table 4 (page 50) summarizes all of the input/output terminals for the DIN rail assembly and Reference Table 5 (page 51) summarizes the maximum wiring length, type, and size for all DIN rail assembly terminations.

Typical Wiring schematic (see note 2 below)



Note 1: Recommended wire color code for SMARTLINK®

Component terminal designation	Cable	
	Maxon #59829 (not to exceed 100 ft.)	Belden #3086A (not to exceed 300 ft.)
F24 / +24	white / orange	brown
FCOM / GND	orange	blue
DA	white / blue	white
DB	blue	black

Note 2: This wiring schematic represents electrical connections in a typical product application. Please refer to the schematic of the specific application for troubleshooting.

OPERATING INSTRUCTIONS

Instructions provided by the company or individual responsible for the manufacture and/or overall installation of a complete system incorporating MAXON products take precedence over the installation and operating instructions provided by MAXON. If any of the instructions provided by MAXON are in conflict with local codes or regulations, please contact MAXON before initial start-up of equipment.

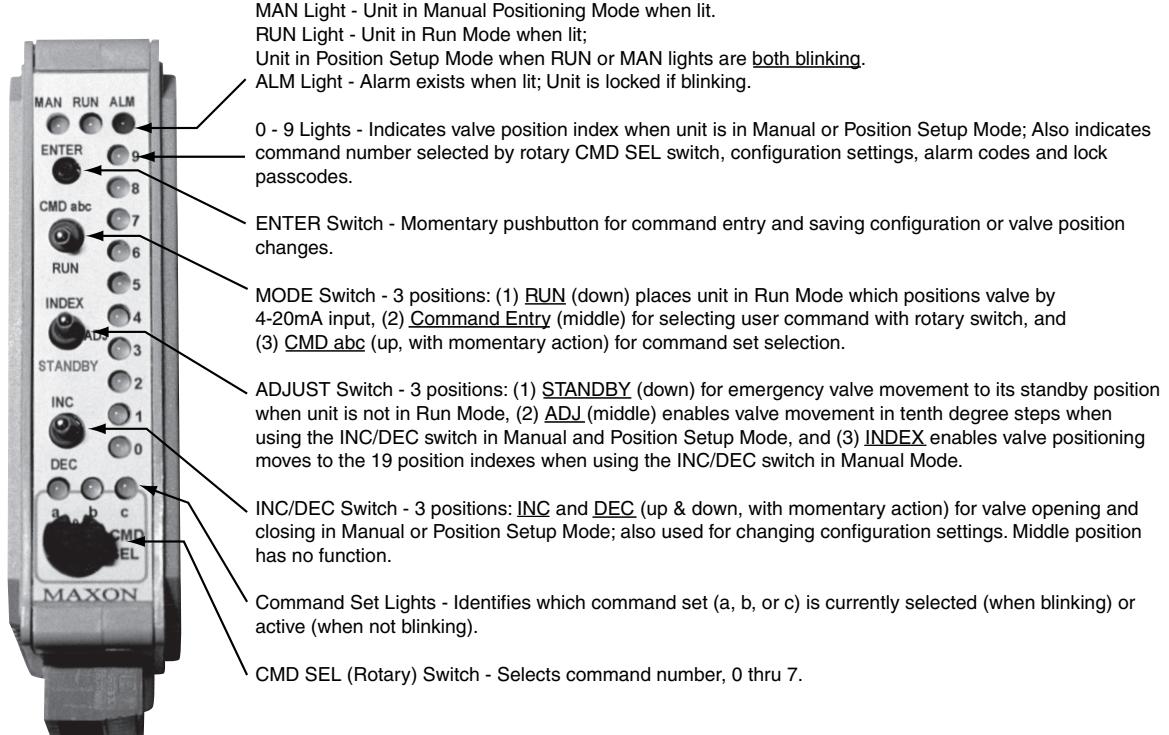


Read the instruction manual carefully before initiating the start-up and adjustment procedure. Verify that all of the equipment associated with and necessary to the safe operation of the system have been installed correctly, that all pre-commissioning checks have been carried out successfully and that all safety-related aspects of the installation are properly addressed.

The installer should perform the following commissioning steps for the SMARTLINK® Control Interface and Actuator Assembly:

- Wiring checkout prior to applying power
- Operational checkout after applying power
- System configuration if required by the application
- Valve characterization if required by the application

Control interface



Wiring checkout

Before applying power to the SMARTLINK® Control Interface and SMARTLINK® Valve Actuator Assembly, perform the following wiring checkout:

1. Verify that 120 VAC is not connected directly to SMARTLINK® Control Interface and Valve Actuator Assembly. Both devices are powered by a 24VDC supply. All output interface relay wiring from the Control Interface is connected to 24VDC relay coils.
2. Verify the proper wire type and maximum wire length requirements are satisfied for all connections.
3. Verify color code connections are correct on the 24V/ Data Connector of both the Control Interface and Valve Actuator Assembly.
4. Measure the resistance between earth ground at the user's panel enclosing the Control Interface and each of the four signals wired to the Valve Actuator: F24 (Field +24VDC), FCOM (Field Common), DA (Data-A), and DB (Data-B). The resistance should indicate an open circuit (i.e., a resistance value greater than 106 Ohms). If an open circuit is not measured, damage or incorrect wiring of the control network cable exists and must be corrected.
5. Verify proper termination of shields for the 4-20mA cables and the control cable between the Control Interface and Valve Actuator Assembly.
6. If MAXON SMARTLINK® Interface Relays are not provided with the Control Interface, verify that all required relays have a coil rating less than 30VDC and 100mA. The output interface relay coils are connected to the Control Interface, R01 through R05 terminals of the Relay Output driver connector.

Refer to SMARTLINK® Reference Tables 1 through 5 (page 48 through page 51) for all termination definitions and wiring/shielding requirements.

Maintain the integrity of the MAXON enclosure by using NEMA 4 or IP66 rated dust- and water-tight electrical connectors. Use cable-sealing grips and strain-relief loops for any cord or cable. Use internal sealing materials on all conduit connections. Moisture can have a harmful effect on device internals if permitted to enter through wiring connectors. Ensure that the device connection is not at a low point of the conduit to avoid condensation run-off into the housing; install a drip loop if necessary. Make sure that the access cover plate is in place and securely fastened. All cover screws should be tightened

using an alternate cross-corner tightening pattern. Cover screws should be checked periodically to ensure adequate sealing protection.

Operational checkout

Apply power to the SMARTLINK® Control Interface and SMARTLINK® Valve Actuator Assembly and perform the following operational checkout:

1. Verify the Control Interface Alarm light is off and the Run light is on after powering up the system. If the alarm light is on, see page 45 to determine the cause of the alarm and corrective actions.
2. Place the user's process controller into manual mode or temporarily replace the 4-20mA position command with a simulated 4-20mA current loop. With the Control Interface command switch in the "RUN" position, move the position command signal slowly from 4mA to 20mA and verify valve movement. The position of the valve can be visually observed by the "OPEN" or "CLOSED" markings on the machined coupling that connects the actuator to the valve shaft. If the application requires the 4-20mA position feedback signal, measure this feedback current loop while changing the position command and verify that the two currents (input vs. output) are approximately equal after pausing at several intermediate positions.
3. If the process controller cannot be placed in manual mode or if a simulated command signal cannot be produced, the SMARTLINK® assembly can be placed in a local manual mode. (Refer to Command A-O and the general command entry instructions on page 39). Once the system is in manual mode, drive the valve to its full open and closed positions using the INC/DEC switch on the Control Interface.
4. If installed, verify operation of each output interface relay by measuring the presence and disappearance of voltage on the relay's contact. If a DIN Rail Assembly is supplied with the Control Interface, the terminals for each relay contact are shown in Reference Table 6 on page 52. The Control Interface relay driver output terminals are also provided in Reference Table 6 to assist in testing of interface relays when not supplied and pre-wired by MAXON.

Do not remove power from an air valve actuator when both 1) the valve is open more than 30 degrees, and 2) the blower is running. Prior to power loss, ensure that the valve position is less than 30 degrees open, and/or that the blower has stopped. Failure to observe these precautions can result in permanent damage to the valve actuator.

User commands

There are 3 SMARTLINK® command sets (a, b, and c) as listed below. Entry requirements for each command (if applicable) are listed at right. Detailed descriptions of the following user commands are shown in Reference Tables 8 through 10 (page 54 through page 59).

Command Set "A"	A-0.....Enter Manual Positioning ModePosition command <= 4 mA A-1.....Display Alarm Codes A-2.....Enter Valve Position Setup Mode.....Position command = 4 to 20 mA A-3.....Reserved for future use A-4.....Reserved for future use A-5.....Set Max Position and Min/Max RampPosition command = 20 mA A-6.....Set Min Position and Min/Max RampPosition command = 4 mA A-7.....Unlock Valve ConfigurationUnit must be "locked"
Command Set "B"	B-0.....Select Loss of Signal Position B-1.....Reserved for future use B-2.....Select Standby Position B-3.....Select Deadband B-4.....Set High Limit Position ThresholdUnit in Manual Mode B-5.....Set Low Limit Position ThresholdUnit in Manual Mode B-6.....Set Auto Ramp Adjust On/Off B-7.....Reserved for future use
Command Set "C"	C-0.....Check Valve CalibrationFor MAXON-trained technician only C-1.....Calibrate ValveFor MAXON-trained technician only C-2.....Enable Valve Calibration / Check.....For MAXON-trained technician only C-3.....Reset Factory Default SettingsUnit in Position Setup Mode C-4.....Enter New Lock CombinationUnit "unlocked" to modify C-5.....Select Lock Enable / Disable.....Unit "unlocked" to modify C-6.....Save Profile as Backup C-7.....Restore Backup ProfileUnit in Position Setup Mode

General Command Entry Instructions:

1. A user command can be performed only when the following conditions are all satisfied:
 - a. MODE switch is not in the RUN position,
 - b. One of the green command set lights (a, b, c) is blinking,
 - c. ADJUST switch is not in the STANDBY position, and
 - d. Unit is “unlocked”. (Condition ‘d’ is not required for Command A-7, Unlock Valve Configuration and Command A-1, Display Alarm Codes.)
 - e. For some commands, the unit must be in a specific mode or have the correct 4-20 mA command signal (see command entry requirements listed above or in Reference Tables 8 through 10 on page 54 through page 59).
2. If the a, b, or c command set light is not blinking, momentarily push the MODE switch in the CMD abc position (up) or, change the position of the rotary CMD SEL switch. This will start the command set light blinking and permit a command to be entered.
3. Select the desired command set by momentarily pushing the MODE switch upward to the CMD abc position. Subsequent CMD abc switch entries will change the command set selection as indicated by the green command set (a, b, c) lights.
4. Select the desired command number by changing the position of the rotary CMD SEL switch. When one of the command set lights is blinking, the command number selected is indicated by the corresponding numbered (0-9) light being lit.
5. After the command set and number are selected, press the ENTER button. If all of the numbered lights flash momentarily after the ENTER button is pushed, a command entry error has occurred and the command was not executed. If an entry error occurs, check if the unit is locked (i.e. alarm light blinking) or the ADJUST switch is in the STANDBY position. If neither condition exists, check the specific entry requirements of the command.

System configuration

There are 8 SMARTLINK® configuration settings that can be changed through execution of the commands below, using the switches and lights on the Control Interface. Detailed explanations of each setting appear in Reference Table 7: SMARTLINK™ System Configuration Summary on page 53.

<u>Command Name</u>	<u>Command Number</u>	<u>Factory Default</u>
Select LOS Position	B-0	No position change
Select Standby Position	B-2	Position Index 0
Select Control Deadband	B-3	0.06% Deadband
Set High Limit Position Threshold	B-4	80.0 degrees
Set Low Limit Position Threshold	B-5	0.0 degrees
Set Auto Ramp Adjust On/Off	B-6	Auto Ramp ON
Enter New Lock Combination	C-4	Passcode: 0, 0, 0, 0
Select Lock Enable/Disable	C-5	Lock Disable

Review the factory default settings before changing any of the system configuration settings; in many applications, modification of the default settings is not necessary. If a setting does need to be changed, follow the procedure outlined below.

1. Select and enter the required system configuration command.
2. After the command is entered, one of the numbered (0-9) lights will be on, indicating the current configuration setting. (For example: If the lock configuration is set to #0, Lock Disable, the 0 light will be solidly lit after Command C-5, Lock Enable/Disable, is entered successfully.)
3. Select the desired configuration setting by using the INC/DEC switch. As the INC/DEC switch is momentarily pushed up or down, the selected setting changes as indicated by turning on the corresponding numbered light (0-9).
4. Push the ENTER button after the desired configuration setting is selected. The numbered light that is lit to indicate the selected configuration will momentarily turn off indicating the command is complete and the configuration setting is saved.
5. To confirm the correct setting is saved, re-enter the command and verify the new setting by the numbered light (0-9) indication.

Valve characterization

Valve characterization is necessary for changing the relationship between valve position and the 4-20mA position command. This process permits field adjustment of the “installed” valve characteristic without mechanically adjusting the valve or external linkages.

The SMARTLINK® is pre-set to a linear slope, but can be customized using either the 10 Point Characterization procedure or the 19 Point Characterization procedure.

10 Point Characterization

SMARTLINK® is shipped with the configuration setting to easily adjust valve positions at 10 of the 19 position indexes and automatically set the positions at the other 9 (intermediate) indexes.

1. Place the process controller that commands SMARTLINK® in manual mode and connect a 4-digit current meter on the 4-20mA position output. Execute Command B-6 and verify the Auto Ramp function is set to #1, Auto Ramp ON. If not set correctly, refer to page 40 or Reference Table 7 on page 53.
2. Execute Command A-2, Enter Position Setup Mode. In this mode, both the yellow and green run lights will be flashing. The position command signal determines which of the 19 position indexes can be modified as shown by the blinking numbered lights. Move the process controller’s output to either 0% (Index #0) or 100% (Index #9) to begin characterization.
3. With the ADJUST switch in the middle (ADJ) position, push the INC/DEC switch up or down to change the valve position. Each push of the INC/DEC switch moves the valve 0.1 degrees. If the switch is held in the up or down position for more than 3 seconds, the valve will move in 0.5-degree steps up to a total travel of 8 degrees from the stored valve position. (All the numbered lights will momentarily flash when this 8-degree limit is reached.) After moving the valve to the desired position, press the ENTER button to save the position setting. Record the valve position feedback in mA or %.
4. Move the controller’s output to the % or mA setting in the commissioning table (shown on page 42) for each consecutive whole digit index and repeat the adjustment procedure in Step 3. With the auto ramp function ON, adjustment at only the 10 whole digit indexes is necessary because positions at the intermediate indexes (0.5, 1.5, etc.) are automatically set to a value half way between the positions of the whole number indexes (0, 1, 2, etc.).
5. Execute Command C-6 to save the profile as a backup. Move the MODE switch to the RUN position and put the user’s process controller in AUTO.

19 Point Characterization

There are applications that require precision adjustment throughout the actuator’s control range. For these applications, adjustment of all 19 positions is necessary using the procedure below.

1. Place the process controller that commands SMARTLINK® in manual mode and connect a 4-digit current meter on the 4-20mA position output. Execute Command B-6 and set the auto ramp function to setting #0, Auto Ramp OFF. (Refer to page 40 or the Reference Table 7 on page 53 for changing configuration settings.)
2. Execute Command A-2, Enter Position Setup Mode. In this mode, both the yellow and green run lights will be flashing. The position command signal determines which of the 19 position indexes can be modified as shown by the blinking numbered lights. Move the process controller’s output to either 0% (Index #0) or 100% (Index #9) to begin characterization.
3. With the ADJUST switch in the middle (ADJ) position, push the INC/DEC switch up or down to change the valve position. Each push of the INC/DEC switch moves the valve 0.1 degrees. If the switch is held in the up or down position for more than 3 seconds, the valve will move in 0.5-degree steps up to a total travel of 8 degrees from the stored valve position. (All the numbered lights will momentarily flash when this 8-degree limit is reached.) After moving the valve to the desired position, press the ENTER button to save the position setting. Record the valve position feedback in mA or %.
4. Move the controller’s output to the next % or mA setting in the commissioning table (shown on page 42) and repeat the adjustment procedure in Step 3 for all 19 position indexes. With the auto ramp function OFF, the positions of adjacent indexes are not automatically ramped. Therefore, all 19 position indexes should be visited during this procedure and adjusted if necessary.
5. Execute Command C-6 to save the profile as a backup. Move the MODE switch to the RUN position and put the user’s process controller in AUTO.

If an unsafe operating condition is observed while characterizing the SMARTLINK® in a parallel positioning combustion application, follow the instructions below:

1. When SMARTLINK® is in the Position Setup Mode for valve characterization, the ADJUST switch can be pushed to the STANDBY position (down). This action will immediately move the valve to the Standby position, overriding the 4-20mA position command.
2. The factory default Standby position is the valve position at Index #0, the minimum position in the profile. While the ADJUST switch is in this position, no commands can be executed. The Standby position function is inhibited when the MODE switch is in the RUN position (down).

MAXON SMARTLINK® commissioning table

(should be completed at time of installation)

Serial No. / Install Date: _____

Position index	Interface output (light #'s)	Position command (%)	Position command (mA)	Custom position (% or mA)	Factory default (degs)	Field readings ("wc, 02%, etc.)
0	0	00.00%	4.000		0.0	
0.5	0, 1	05.56%	4.889		4.4	
1	1	11.11%	5.778		8.9	
1.5	1, 2	16.67%	6.667		13.3	
2	2	22.22%	7.556		17.8	
2.5	2, 3	27.78%	8.444		22.2	
3	3	33.33%	9.333		26.7	
3.5	3, 4	38.89%	10.222		31.1	
4	4	44.44%	11.111		35.6	
4.5	4,5	50.00%	12.000		40.0	
5	5	55.56%	12.889		44.4	
5.5	5, 6	61.11%	13.778		48.9	
6	6	66.67%	14.667		53.3	
6.5	6, 7	72.22%	15.556		57.8	
7	7	77.78%	16.444		62.2	
7.5	7, 8	83.33%	17.333		66.7	
8	8	88.89%	18.222		71.1	
8.5	8, 9	94.44%	19.111		75.6	
9	9	100.00%	20.000		80.0	
Low limit	---	---	---		00.0	
High limit	---	---	---		80.0	

Configuration command name (& number)	Factory default (& configuration setting number)	Field configuration setting
Select Loss of Signal (LOS) Position (B-0)	No Position Change (#4)	
Select Standby Position (B-2)	Position Index 0 (#0)	
Select Control Deadband (B-3)	0.06% Deadband (#2)	
Set High Limit Position Threshold (B-4)	80.0 degrees (N/A)	
Set Low Limit Position Threshold (B-5)	0.0 degrees (N/A)	
Set Auto Ramp Adjust ON/OFF (B-6)	Auto Ramp ON (#1)	
Enter New Lock Passcode (C-4)	Passcode: 0,0,0,0 (N/A)	
Select Lock Enable/Disable (C-5)	Lock Disable (#0)	

Unit locking and passcode entry

The SMARTLINK® Control Interface is shipped with the lock function disabled and a factory default 4-digit passcode or “combination” of 0,0,0,0. To lock the unit for the first time and change the default passcode, the lock function must first be enabled (Command C-5) and the default passcode entered (Command A-7) as described in the first two procedures below. After the lock function is enabled and the unit is “unlocked”, a new passcode can be entered using Command C-4 as described in the procedure below. If you forget the passcode, call MAXON for the “master” passcode.

Enabling the “Lock” Configuration Setting (Command C-5):

1. If the alarm light is blinking, the lock function is already enabled and the unit is in a “locked” state. Before changing the passcode, the unit must be unlocked by entering the current passcode (Command A-7) using the procedure below.
2. If the alarm light is not blinking, select and enter Command C-5, Lock Enable/Disable.
3. After the command is entered, one of the numbered (0-9) lights will be on, indicating the current configuration setting. If the #1 light is on, the lock function is already enabled and the procedure below can be performed to change the passcode. If the #0 light is on, the lock function is disabled.
4. To select the #1 setting (Lock Enable), momentarily push the INC/DEC switch in the up position. The #1 light will now be on, indicating the new setting is selected.
5. Push the ENTER button. The #1 light will turn off indicating the command is complete and the configuration setting is saved. The unit is now locked and the alarm light will be blinking.
6. To change the current passcode, perform the next two procedures (Command A-7 & C-4).

Entering the Current “Lock” Passcode (Command A-7):

1. Select and enter Command A-7, Unlock Valve Configuration.
2. After the command is entered, the INC/DEC switch is used to select the first passcode digit. The digit selected is indicated by a numbered light (0-9).
3. Once the first digit of the passcode is selected, push the ENTER button once. The numbered light should momentarily turn off indicating the entry was accepted.
4. Repeat steps 2 and 3 for the 2nd, 3rd, and 4th passcode digits. If the passcode was entered incorrectly, all the numbered lights will momentarily flash after entry of the 4th and final passcode digit. If the passcode was correct, the alarm light will stop flashing and will be turned off completely if no other alarms exist.
5. To change the current passcode, perform the procedure (Command C-4) below.

Entering a New “Lock” Passcode (Command C-4):

1. To enter a new lock passcode, the lock function must be enabled (Command C-5) and the current passcode must be entered (i.e. the unit must be “unlocked” using Command A-7). See the two previous procedures if these command entry requirements have not been satisfied.
2. Select and enter Command C-4, Enter New Lock Combination.
3. After the command is entered, the INC/DEC switch is used to select the first new passcode digit. The digit selected is indicated by a numbered light (0-9).
4. Once the first new digit of the passcode is selected, push the ENTER button once. The numbered light should momentarily turn off indicating the entry was accepted. Write down the new digit for later use.
5. Repeat steps 3 and 4 for the 2nd, 3rd, and 4th passcode digits, remembering to write down each passcode digit as it is entered.
6. Verify the new passcode by re-locking the unit (MODE switch to the RUN position and then back to the middle, Command Entry position), and entering the new passcode using Command A-7 as described in the procedure above.

Manual operation

Command A-0, Enter Manual Positioning Mode, is used to override the 4-20 mA position command input. (*This command should not be used when the valve is in an operating process that requires continuous positioning based on the 4-20 mA input signal.*)

Entering Manual Positioning Mode (Command A-0):

1. To enter the Manual Positioning Mode, the position command input signal must be first driven to 4mA or less.
2. Select and enter Command A-0, Enter Manual Positioning Mode. If the numbered lights flash momentarily after entering Command A-0: a) the position command may not be less than 4 mA, b) the adjustment mode switch may be in the STANDBY position, or c) unit may be “locked” to prevent tampering.
3. After entering the command, the yellow manual (MAN) light will be on and RO5 (Relay Output driver #5) will energize the Manual Control relay (if installed). The INC/DEC switch can be used to move the valve open or closed. If the adjustment mode switch is in the INDEX position, the INC/DEC switch is used to move between the 19 position “indexes”. If the adjustment mode switch is in the ADJ position, pushing the INC/DEC switch up or down changes the valve position in 1.0 degree steps. If the INC/DEC switch is held in the up or down position, the position is continuously adjusted until the maximum or minimum position is reached. When the max or min position setpoint is reached, all the numbered lights will momentarily flash.

This command should not be executed when the valve is part of an operating process that requires continuous, closed-loop valve positioning.

4. To return control back to the 4-20 mA position command input, move the MODE switch to the RUN position (down).

High and low valve position limits

The high and low limits are automatically set when the user adjusts the maximum (Index #19) and minimum (Index #0) valve position settings. If different high and low limits are required (other than the default or automatically set limits), Command B-4 and Command B-5 can be executed using the procedure below.

Command B-4 is a configuration command that is used to adjust the high limit position threshold. Relay driver Output #3, RO3 will energize the optional High Position Limit relay when the valve position is equal to or greater than the stored high limit position threshold. The high limit threshold has a factory default of 80.0 degrees and is automatically set to 1.0 degree less than the maximum valve position when modified using Command A-2, Enter Position Setup Mode, or A-5, Set Max Position & Min/Max Ramp. **If the factory default or automatic 1.0 degree offset is acceptable, execution of Command B-4 is not necessary.**

Command B-5 is a configuration command that is used to adjust the low limit position threshold. Relay driver Output #4, RO4 will energize the optional Low Position Limit relay when the valve position is less than or equal to the stored low limit position threshold. The low limit threshold has a factory default of 0.0 degrees and is automatically set to 1.0 degree above the minimum valve position when modified using Command A-2, Enter Position Setup Mode, or A-6, Set Min Position & Min/Max Ramp. **If the factory default or automatic 1.0 degree offset is acceptable, execution of Command B-5 is not necessary.**

Manually Adjusting the High or Low Limit Position Threshold (Command B-4 or B-5):

1. Before entering Command B-4 (or B-5), the unit must be in the Manual Positioning Mode (Execute Command A-0, as described on page 44 or in Reference Table 8 on page 54).
2. With the unit in Manual Positioning Mode (as indicated by the yellow, MAN light on) and the ADJUST switch in the “ADJ” middle position, select and enter Command B-4 (or B-5). After command entry, the valve will be driven to the high (or low) limit position.
3. To change the valve position in +/- 1.0 degree steps, momentarily push the INC/DEC switch up or down. If the INC/DEC switch is held in the up or down position, the valve position setpoint is continuously changed in +/- 1.0 degree steps.
4. After moving the valve to the desired high (or low) limit position, push the ENTER button to save the new setting. When the ENTER button is pressed, the numbered light(s) and command set “b” light will momentarily turn off, indicating the new value has been stored.
5. To return control back to the 4-20mA position command input, move the MODE switch to the RUN position (down). The unit is now in RUN mode.

Alarm codes

If the alarm light of the Control Interface is on or flashing, view the alarm condition by executing Command A-1, Display Alarm Codes. After command entry, the INC/DEC switch is used to scroll through the alarm codes. The cause of the alarm can be determined by observing the numbered lights turned on and matching the light pattern to a table entry below.

Alarm Code (Lights ON)	Alarm Name	Alarm Description, Possible Cause and Corrective Action
Actuator Alarm Light # Pattern		
0, 1	Position Overshoot	Actuator detected problem with position control. If alarm persists, replace valve actuator.
0, 2	Position Breakaway	Actuator detected problem holding commanded position. Check valve's operating differential pressure and compare with specification. If alarm persists and measured pressure does not exceed valve rating, replace actuator.
0, 1, 2	Sticky Valve	Actuator could not position to within 0.1 degree. Check if there is debris in the valve inhibiting movement and command the valve open and close. If alarm persists and no debris is found, replace actuator.
0, 3	Stuck Valve	Actuator could not position to within 0.1 degree. Re-power the actuator. Check if there is debris in the valve inhibiting movement and command the valve open and close. If alarm persists and no debris is found, replace actuator.
0, 1, 3	Temperature	Actuator senses out-of-specification ambient temperature. Check temperature of actuator's enclosure and remove heat source or promote circulation if too hot. If actuator ambient temperature is within specification, replace valve actuator.
0, 2, 3	Calibration	Actuator is not calibrated. Contact MAXON.
0, 1, 2, 3	DC Supply Voltage	Actuator senses improper +24VDC supply. Check for heavily loaded power supply, a failed supply, or cable length out-of-specification.
0, 4	Reset	Actuator detected a reset condition due to improper software execution, high electrical noise, improper shielding, or electronics failure. If alarm persists after checking for noise source and proper shielding, replace actuator.
0, 1, 4	Hardware	Actuator detected hardware failure. If alarm persists after re-powering actuator, replace actuator.
Control Interface Alarm Light # Pattern		
1, 2	Communication	Control Interface/Valve Actuator communication timeout occurred. Check for an intermittent control cable (4-wire cable and shield) connection. Replace Control Interface or Valve Actuator if control cable connections are sound.
1, 3	Memory	Control Interface detected data corruption. Reset factory defaults and re-commission valve actuator. If alarm persists, replace Control Interface.
1, 2, 3	Lock	Control Interface is "locked" and user has moved command switch from the RUN position to the Command Entry (middle) position. A flashing alarm light also indicates this condition. Move command switch to the RUN position or unlock the unit by entering Command A-7 followed by the 4-digit passcode.
1, 4	Reset	Control Interface detected a reset condition due to improper software execution, high electrical noise, improper shielding, or electronics failure. If alarm persists after checking for noise source and proper shielding, replace Control Interface.

NOTES:

1. If the alarm light is not on or flashing, no alarm conditions exist.
2. If the alarm light is on or flashing, view the alarm code by executing Command A-1, Display Alarms. After command entry, the INC/DEC switch is used to scroll through the alarm codes. The cause of the alarm can be determined by observing the numbered lights turned on and matching the pattern to a table entry above.

MAINTENANCE INSTRUCTIONS

Safety requirements

Regular inspection, testing and recalibration of combustion equipment according to the installation manual is an integral part of its safety. Inspection activities and frequencies shall be carried out as specified in the installation manual.

Actuator replacement

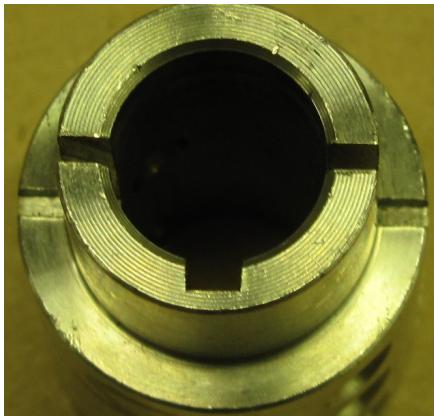
The SMARTLINK® valve actuator assembly is factory-calibrated to ensure 0.1 degree positioning accuracy. Therefore, the following actuator replacement procedures should be performed by MAXON personnel or maintenance personnel trained specifically by MAXON.

Actuator removal:

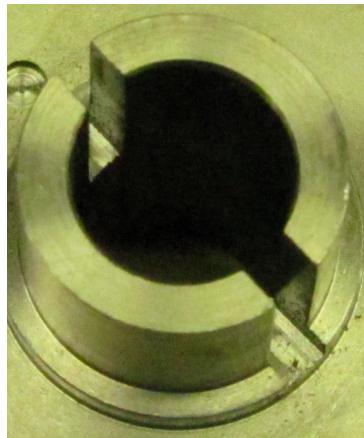
1. Disable the process controller connected to the SMARTLINK® and turn off power. Remove the actuator access cover using a 4 mm Allen wrench and verify the green power light is OFF.
2. Record the wire color code sequence and then disconnect the four wires and shield from the terminal block. Disconnect any conduit fittings.
3. Loosen the clamp collar screws with a 3/16" Allen wrench.
4. Remove the four M6x1x18 mm screws connecting the actuator to the adapter with a 5 mm Allen wrench.
5. Remove the actuator by holding the actuator housing and pulling the actuator away from the valve.

Actuator reinstallation:

1. Inspect the actuator coupling. Identify the type of key required based on the photos below.



Blind keyway



Open keyway

Blind keyway requires 1/8" x 1/8" square key

Open keyway requires 1/8" x 3/16" rectangular key

2. Verify the clamp collar is loose and position the screw head on the left when looking at the clamp collar at the top.
3. Place the actuator shaft with key into the clamp collar. Slide the keyed shaft into the coupling key slot, then rotate the actuator housing so the alignment pin mates with the pin hole in the valve adapter. The parts are a clearance fit but should slip together with little force. Apply pressure until the actuator is flat against the adapter. Do not apply an excessive force. If the sub-assemblies do not mate together, recheck that the clamp is loose and the key is pressed to the bottom of the key slot.
4. Verify that the valve will close completely. With the valve closed, the coupling hard-stop pin should be centered and touching the hard-stop set screw for butterfly valves. For ball valves, the coupling should hit on the two vertical hard-stop pins in the bracket.
5. With valve in the fully closed position, assemble the actuator to the valve adapter with four M6x1x18 mm fasteners using Loctite 242. Use a torque wrench with a 5 mm Allen bit to apply 18 in-lbs of torque in an alternating diagonal tightening sequence.
6. With the valve in the fully closed position, verify that the clamp collar is seated flush against the coupling shoulder. Tighten the stainless steel clamp collar with a torque wrench and 3/16" Allen bit to 170 in-lbs .
7. Make the necessary water-tight electrical conduit connection. Re-connect the four wires to the terminal strip per the original color code sequence. Re-connect the shield wire to the terminal strip, keeping it less than 1" in length.
8. Apply power to the SMARTLINK® system. Verify the green power light is ON.
9. Reinstall the access cover and torque the four fasteners to 18 in-lbs using a 4mm Allen wrench.

- 10.** Place the Control Interface in manual mode by executing Command A-0. Then execute Command C-2 (Enable Valve Calibration/Check) which places the actuator in a command mode for calibration. When the command is entered, if all the lights flash on the Control Interface, the command was not executed. When the command is properly executed, the green diagnostic (DIAG) light in the actuator terminal block compartment will be on and the unit will no longer respond to 4-20 mA position commands.
- 11.** Execute Command C-1 (Calibrate Valve) which closes the valve until the hard-stop is found, establishes a new home (or 0 degree) position, and moves the valve through all 800 positions. The command takes 2 or 3 minutes to execute during which half of the numbered lights on the Control Interface flash on and off. When the command is finished, the Control Interface will flash all of the numbered lights ON if the command was not successful. If the calibration failed, repeat the command a second time.
- 12.** Execute Command C-0 to check the new calibration. This command takes less than 90 seconds and will flash half of the numbered lights during execution. At the end of command execution, if all the number lights on the Control Interface flash ON and then OFF, the calibration test failed. Re-mount the valve to the assembly as described above and repeat the calibration procedure. If the calibration test passed, cycle power to the actuator and check for a calibration alarm. (The actuator's green diagnostic light should now be flashing and the alarm light on the Control Interface should be off.)
- 13.** Re-enable the process controller commanding SMARTLINK®.

SMARTLINK® REFERENCE TABLES

Table 1. Control Interface Input / Output Terminal Description.

Terminal Name (Abbreviation)	Description
24V / Data Connector	
Field 24VDC Power (F24)	Output: Valve actuator +24VDC power; 25 Watts peak, 12 Watts average
Field Common (FCOM)	Output: Valve actuator +24VDC common
Data A (DA)	Input / Output: Communications network data 'A' signal
Data B (DB)	Input / Output: Communications network data 'B' signal
Supply 24VDC (S24)	Input: Power supply +24VDC; 25Watts peak, 12Watts average
Supply Common (SCOM)	Input: Power supply common
4-20mA Connector	
4-20mA In A+ (INA+)	Input: 4-20mA valve position command, current into + and out of - terminal; 4mA = minimum position; 20mA = maximum position
4-20mA In A- (INA-)	
4-20mA In B+ (INB+)	
4-20mA In B- (INB-)	Reserved for future use
4-20mA Out + (OUT+)	Output: 4-20mA valve position feedback, current out of + and into - terminal; 4mA = 0.0 degrees; 20mA = 80.0 degrees; valve position = [current (mA) – 4.0mA] / 16.0mA * 80.0 degrees (for non-characterized valve actuator)
4-20mA Out - (OUT-)	
Relay Input Connector	The following relay inputs are solid-state and require 5 to 24VDC and 2mA (max) to turn "ON". Note #1: The input voltages applied to RI1 through RI6 must all be referenced to the RCOM terminal of the Control Interface.
Relay In 1 (RI1)	Input: The ON state of Relay Input #1 drives the valve actuator to its maximum characterized position, i.e. index #9. The 4-20mA position command signal is ignored when this input is ON. This input function is not supported in Software Version #1.
Relay In 2 (RI2)	Input: The ON state of Relay Input #2 drives the valve actuator to its minimum characterized position, i.e. index #0. The 4-20mA position command signal and RI1 are ignored when this input is ON. This input function is not supported in Software Version #1.
Relay In 3 (RI3)	Input: Reserved for future use
Relay In 4 (RI4)	Input: Reserved for future use
Relay In 5 (RI5)	Input: Reserved for future use
Relay In 6 (RI6)	Input: Reserved for future use
Relay Output Connector	
Relay Out 1 (RO1)	Output: Alarm relay driver output; External interface relay coil voltage is connected to Supply Common (SCOM) through RO1, an open collector transistor output, if one or more of the following alarm conditions exist: valve communications, memory fault, valve actuator alarm, or tamper alarm.
Relay Out 2 (RO2)	Output: Control Enable relay driver output; External interface relay coil voltage is connected to Supply Common (SCOM) through RO2, an open collector transistor output, if one or more of the following alarm conditions exist: valve communications, memory fault, or stuck valve alarm.
Relay Out 3 (RO3)	Output: High Position Limit relay driver output; External interface relay coil voltage is connected to Supply Common (SCOM) through RO3, an open collector transistor output, if valve position >= high limit position.
Relay Out 4 (RO4)	Output: Low Position Limit relay driver output; External interface relay coil voltage is connected to Supply Common (SCOM) through RO4, an open collector transistor output, if valve position <= low position limit position.
Relay Out 5 (RO5)	Output: Manual Control relay driver output; External interface relay coil voltage is connected to Supply Common (SCOM) through RO5, an open collector transistor output, if control interface is in manual control mode.
Relay Common (RCOM)	Output and Input Relay Common

Table 2. SMARTLINK® Valve Actuator Input / Output Terminal Description.

Terminal Name (Abbreviation)	Description
24V / Data Connector	
Field 24VDC Power (+24)	Input: Valve actuator +24VDC power; 25 Watts peak, 12 Watts average
Field Common (GND)	Input: Valve actuator +24VDC common
Data A (DA)	Input / Output: Communications network data 'A' signal
Data B (DB)	Input / Output: Communications network data 'B' signal
Shield (SHD)	Field device shield

Table 3. SMARTLINK® Control Interface Wiring Specifications.

Terminal Name (Abbreviation)	Wiring Specification (Maximum Length, Type, Min/Max Size, and special requirements)
24V / Data Connector	
Field 24VDC Power (F24) Field Common (FCOM) Data A (DA) Data B (DB)	100 feet maximum length; MAXON P/N 59829, Connect-Air International P/N W22P-1005, or equivalent; EIA Level 4 cable, 2 twisted pair with shield, 22 AWG; Suggested wiring color code convention: Orange/White (F24), Orange (FCOM), Blue (DA), Blue/White (DB); Requires shield wire termination at both ends. Shield should be connected to earth ground as it enters the enclosure for the Control Interface with a maximum length of 2 inches. 300 feet maximum length; Belden P/N 3086A; 2 twisted pair with shield; 16 AWG – power pair, 20 AWG – data pair; Suggested wiring color code convention: Brown (F24), Blue (FCOM), White (DA), Black (DB); Requires shield wire termination on both ends. Shield should be connected to earth ground as it enters the enclosure for the Control Interface with a maximum length of 2 inches.
Supply 24VDC (S24) Supply Common (SCOM)	No length limitations other than voltage drop considerations versus wire size constraints; +24VDC; 1A/25 Watt maximum; 14 to 22 AWG
4-20mA Connector	
4-20mA In A + (INA+) 4-20mA In A - (INA-) 4-20mA In B + (INB+) 4-20mA In B - (INB-) 4-20mA Out + (OUT+) 4-20mA Out - (OUT-)	1000 feet maximum length; Belden 9535, 2-conductor, 100% shield coverage, 300V 80C (UL 2464, CSA PCC FT 4) or equivalent; Inputs (INA+/- & INB+/-) Requires shield wire termination at Control Interface end. Shield should be connected to earth ground as it enters the enclosure for the Control Interface with a maximum length of 2 inches. Output (OUT+/-) shield should be terminated at user's controller end.
Relay Input Connector	
Relay In 1 (RI1) Relay In 2 (RI2) Relay In 3 (RI3) Relay In 4 (RI4) Relay In 5 (RI5) Relay In 6 (RI6)	No length limitations; 14 to 22 AWG; Follow local codes for wire type
Relay Output Connector	
Relay Out 1 (RO1) Relay Out 2 (RO2) Relay Out 3 (RO3) Relay Out 4 (RO4) Relay Out 5 (RO5) Relay Common (RCOM)	No length limitations; 30 VDC max & 100 mA max; 14 to 22 AWG; Follow local codes for wire type

Table 4. SMARTLINK® DIN Rail Assembly Input / Output Terminal Description.

Terminal Designator: Name (Abbreviation)	Description
Power Supply VAC Terminals	Provided only if optional DC supply is provided
Line Voltage (L1)	120 to 230 VAC power source, 50-60Hz
Neutral (L2)	Neutral
Ground (GND)	Earth Ground
Relay Output Terminal Block	
Alarm (AL) Alarm Return (ALR)	Output: Alarm relay contact, Normally open, 6A, 250VAC/DC max; Contacts closes if one or more of the following alarms exist: valve communications, memory fault, valve actuator alarm, or tamper alarm.
Control Enable (CE) Control Enable Return (CER)	Output: Control Enable relay contact; Normally open, 6A, 250VAC/DC max; Contact closes if one or more of the following alarm conditions exist: valve communications, memory fault, or stuck valve alarm.
High Position Limit (HPL) High Position Limit Return (HPLR)	Output: High Position relay contact; Normally open, 6A, 250VAC/DC max; Contact closes if valve position >= high limit position.
Low Position Limit (LPL) Low Position Limit Return (LPLR)	Output: Low Position Limit relay contact; Normally open, 6A, 250VAC/DC max; Contact closes if valve position <= low position limit position.
Manual Control (MC) Manual Control Return (MCR)	Output: Manual Control relay contact; Normally open, 6A, 250VAC/DC max; Contact closes if Control Interface is in manual control mode.
Relay Input Terminal Block	
Command Common (CCOM)	Common for all relay input command signals listed below and must be wired to ground reference of all input command signals below. End-user must make this connection for proper operation of input commands; For input relays with VAC-rated coils, this terminal is typically connected to L2.
High Position Command (HPC)	Input: High Position Command drives the valve actuator to its maximum characterized position, i.e. index #9. The 4-20mA position command signal is ignored when this input is energized. The HPC input function is not supported in Software Version #1.
Low Position Command (LPC)	Input: Low Position Command drives the valve actuator to its minimum characterized position, i.e. index #0. The 4-20mA position command signal and the HPC relay input are ignored when this input is energized. The LPC input function is not supported in Software Version #1.
4-20mA Terminal Block	
4-20mA In A + (INA+)	Input: 4-20mA valve position command, current into + and out of - terminal;
4-20mA In A - (INA-)	4mA = minimum position; 20mA = maximum position
4-20mA In B + (INB+)	
4-20mA In B - (INB-)	Reserved for future use
4-20mA Out + (OUT+)	Output: 4-20mA valve position feedback, current out of + and into - terminal;
4-20mA Out - (OUT-)	4mA = 0.0 degrees; 20mA = 80.0 degrees; valve position = [current (mA) – 4.0mA] / 16.0mA * 80 degs (for non-characterized valve actuator)
Network Terminal Block	
Field 24VDC Power (F24)	Output: Communications network +24VDC power
Field Common (FCOM)	Output: Communications network common
Data A (DA)	Input / Output: Communications network data 'A' signal
Data B (DB)	Input / Output: Communications network data 'B' signal
24VDC Terminal Block	Pre-wired only if optional DC supply is provided
Supply 24VDC Power (S24)	24VDC power source; 1A peak current
Supply Common (SCOM)	24VDC power source common

Table 5. SMARTLINK® DIN Rail Assembly Wiring Specifications.

Terminal Designator: Name (Abbreviation)	Wiring Specification (Maximum Length, Type, Min/Max Size, and special requirements)
VAC Terminal Block	
Line Voltage (L1) Neutral (L2) Ground (GND)	No length limitations; 14 to 22 AWG; Follow all local and NEC 1 wiring codes; Protective Earth should also be connected to the ground lug of the enclosure that houses the Control Interface.
Relay Output Terminal Block	
Alarm (AL) Alarm Return (ALR) Control Enable (CE) Control Enable Return (CER) High Position Limit (HPL) High Position Limit Return (HPLR) Low Position Limit (LPL) Low Position Limit Return (LPLR) Manual Control (MC) Manual Control Return (MCR)	No length limitations; 14 to 22 AWG; Follow all local and NEC 1 wiring codes.
Relay Input Terminal Block	
Command Common (CCOM) High Position Command (HPC) Low Position Command (LPC)	No length limitations; 14 to 22 AWG; Follow local codes for wire type.
4-20mA Terminal Block	
4-20mA In A + (INA+) 4-20mA In A - (INA-) 4-20mA In B + (INB+) 4-20mA In B - (INB-) 4-20mA Out + (OUT+) 4-20mA Out - (OUT-)	1000 feet maximum length; Belden 9535, 2-conductor, 100% shield coverage, 300V 80C (UL 2464, CSA PCC FT 4) or equivalent; Inputs (INA+/- & INB+/-) Requires shield wire termination at enclosure that houses the Control Interface end. Shield should be connected to the ground lug with a maximum length of 2 inches. Output (OUT+/-) shield should be terminated at user's controller end.
Network Terminal Block	
Field 24VDC Power (F24) Field Common (FCOM) Data A (DA) Data B (DB)	100 feet maximum length; MAXON P/N 59829, Connect-Air International P/N W22P-1005, or equivalent; EIA Level 4 cable, 2 twisted pair with shield, 22 AWG; Suggested wiring color code convention: Orange/White (F24), Orange (FCOM), Blue (DA), Blue/White (DB); Requires shield wire termination at both ends. Shield should be connected to ground lug of enclosure that houses the Control Interface with a maximum length of 2 inches.
	300 feet maximum length; Belden P/N 3086A; 2 twisted pair with shield; 16 AWG – power pair, 20 AWG – data pair; Suggested wiring color code convention: Brown (F24), Blue (FCOM), White (DA), Black (DB); Requires shield wire termination on both ends. Shield should be connected to earth ground as it enters the enclosure for the Control Interface with a maximum length of 2 inches.
24VDC Terminal Block	
Supply 24VDC Power (S24) Supply Common (SCOM)	No wiring required if optional supply and pre-wiring are specified; If supply is not provided, no length limitations exist other than voltage drop considerations versus wire size constraints; 14 to 22 AWG; Follow all local and NEC 1 codes

Table 6. Interface Relay Checkout Procedures.

SMARTLINK® DIN-Rail Assembly Terminal Number: Name (Abbreviation)	SMARTLINK® Control Interface Relay Driver Terminal Name (Abbreviation)	Checkout Procedure to verify proper relay contact operation
Relay Output Terminal Block	Relay Output Drivers	
Alarm (AL) Alarm Return (ALR)	Relay Out 1 (RO1)	Temporarily disconnect the Data A or B signal to the Valve Actuator. Within a few seconds, the Alarm relay (connected to the Control Interface RO1 terminal) should be energized.
Control Enable (CE) Control Enable Return (CER)	Relay Out 2 (RO2)	After power up, the Control Enable relay (connected to the Control Interface RO2 terminal) should normally be energized. Temporarily disconnect the Data A or Data B signal to the Valve Actuator. Within a few seconds, the Control Enable relay should not be energized.
High Position Limit (HPL) High Position Limit Return (HPLR)	Relay Out 3 (RO3)	Perform Operational Checkout Step #2 or #3 (page 38) to move the valve actuator throughout its full travel range. With the valve in its maximum position, the High Position Limit relay (connected to the Control Interface RO3 terminal) should be energized. With the valve commanded to a position 95% or less than its maximum position, the relay should not be energized.
Low Position Limit (LPL) Low Position Limit Return (LPLR)	Relay Out 4 (RO4)	Perform Operational Checkout Step #2 or #3 (page 38) to move the valve actuator throughout its full travel range. With the valve in its minimum position, the Low Position Limit relay (connected to the Control Interface RO4 terminal) should be energized. With the valve commanded to a position 5% or more above its minimum position, the relay should not be energized.
Manual Control (MC) Manual Control Return (MCR)	Relay Out 5 (RO5)	After power up, the Manual Control relay (connected to the Control Interface RO5 terminal) should not be energized. Put the SMARTLINK® in a local manual mode as described on page 44. Once the system is put in manual mode, the Manual Control relay should be energized.
Relay Input Terminal Block		
High Position Command (HPC)	Relay In 1 (RI1)	Energize HPC terminal and verify that valve moves to its maximum characterized position, index #9. (Input function not supported in Software Version #1.)
Low Position Command (LPC)	Relay In 2 (RI2)	Energize LPC terminal and verify that valve moves to its minimum characterized position, index #0. (Input function not supported in Software Version #1.)

Table 7. SMARTLINK® System Configuration Summary.

System configuration of SMARTLINK® is accomplished through execution of the commands shown below, using the switches and lights on the Control Interface. Before performing any system configuration function, review the factory default settings. In many applications, modification of the default configuration is not necessary.

Configuration Function (Command #)	Factory Default (Configuration #)	Description
Select LOS Position (B-0)	No position change (#4)	Desired valve position when a loss of signal (L.O.S.) event occurs. A loss of signal condition exists if the position command signal drops below 0.05 mA. Configuration setting #0, 1, 2, and 3 correspond to the positions defined at index #0, 3, 6, and 9, respectively. Setting #4 corresponds to no position change (i.e. actuator remains in last position before loss of signal).
Select Standby Position (B-2)	Position Index 0 (#0)	Desired valve position when adjustment mode switch is placed in the STANDBY position. (The STANDBY function is not active when the unit is in RUN mode.) Configuration setting #0, 1, 2, and 3 correspond to the positions defined at index #0, 3, 6, and 9, respectively.
Select Control Deadband (B-3)	0.06% Deadband (#2)	Control deadband placed around the position command input signal to eliminate unwanted actuator movement caused by electrical noise on the 4-20 mA position command. Configuration setting #0, 1, 2, 3, 4, and 5 correspond to a deadband of 0, 0.03, 0.06, 0.13, 0.16, and 0.19%, respectively.
Set High Limit Position Threshold (B-4)	80.0 degrees (N/A)	Relay driver Output #3 (R03) will energize the High Position Limit relay when the valve position is >= high position limit threshold. This value is automatically set to 1.0 degree less than the maximum valve position when modified using Commands A-2 or A-5.
Set Low Limit Position Threshold (B-5)	0.0 degrees (N/A)	Relay driver Output #4 (R04) will energize the Low Position Limit relay when the valve position is <= low position limit threshold. This value is automatically set to 1.0 degree above the minimum valve position when modified using Commands A-2 or A-6.
Set Auto Ramp Adjust On/Off (B-6)	Auto Ramp ON (#1)	The automatic ramp function is used during the Valve Position Setup Mode to create a linear position ramp between the position being adjusted and the two adjacent position indexes. This provides a position "smoothing" of the valve profile and simplifies valve characterization. Setting #0 is Auto Ramp OFF and setting #1 is ON.
Enter New Lock Combination (C-4)	Passcode: 0,0,0,0 (N/A)	4-digit electronic passcode to prevent tampering. The passcode is required to modify the configuration only if the lock is enabled. See Select Lock Enable/Disable configuration below.
Select Lock Enable / Disable (C-5)	Lock Disable (#0)	Enable / Disable selection of the electronic "lock" function. If enabled, the stored passcode must be entered to modify any configuration or valve profile data. Setting #0 and #1 correspond to Lock Disable and Lock Enable, respectively.

Changing a System Configuration Setting:

1. Select and enter the required system configuration command.
2. After the command is entered, one of the numbered (0-9) lights will be on, indicating the current configuration setting. (For example: If the lock configuration is set to #0, Lock Disable, the 0 light will be solidly lit after Command C-5, Lock Enable/Disable, is entered successfully.)
3. Select the desired configuration setting by using the INC/DEC switch. As the INC/DEC switch is momentarily pushed up or down, the selected setting changes as indicated by turning on the corresponding numbered (0-9) light.
4. Push the ENTER button after the desired configuration setting is selected. The numbered light that is lit to indicate the selected configuration will momentarily turn off indicating the command is complete and the configuration setting is saved.
5. To confirm the correct setting is saved, re-enter the command and verify the new setting by the numbered (0-9) light indication.

Table 8. SMARTLINK® User Commands - Command Set ‘A’.

SMARTLINK® Commands Number: Name	Description of command purpose and usage
Command Set ‘A’	
A-0: Enter Manual Positioning Mode	<p>Command A-0 is used to enter a Manual Positioning Mode that <u>overrides</u> the 4-20 mA, position command input. To execute Command A-0, the position command signal must first be driven to 4mA or less. If the numbered lights flash momentarily after entering Command A-0,</p> <ul style="list-style-type: none"> - the position command may not be less than 4mA, - the adjustment mode switch may be in the STANDBY position, or - unit may be “locked” to prevent tampering. <p>After entering Command A-0, the yellow manual light on the Control Interface will be on and R05 (Relay Output driver #5) will energize the Manual Control relay (if installed). Once this command has been entered, the INC/DEC switch can be used to move the valve open or close. If the adjustment mode switch is in the INDEX position, the INC/DEC switch is used to move between the 19 electronic position “indexes”. (See Commissioning Sheet on page 42 for the factory default valve positions for each index).</p> <p>If the adjustment mode switch is in the ADJ position, pushing the INC/DEC switch up or down changes the valve position in 1.0 degree steps. If the INC/DEC switch is held in the up or down position, the position is continuously adjusted until the max/min position is reached. <i>This command should not be executed when the valve is part of an operating process that requires continuous, closed-loop valve positioning.</i></p>
A-1: Display Alarm Codes	<p>After entering Command A-1, the INC/DEC switch is used to scroll through all current alarm conditions. If the red alarm (“ALM”) light on the Control Interface is on, one or more alarm condition exists. (See page 45 for Alarm Codes.)</p>
A-2: Enter Valve Position Setup Mode	<p>Command A-2 is used to enter the Valve Position Setup Mode for modifying the 19 position profile. To execute Command A-2, the position command signal must be 4 mA or greater. (If the numbered lights flash momentarily after entering A-0, the adjustment mode switch may be in the STANDBY position, or the unit may be “locked” to prevent tampering.)</p> <p>After entering Command A-2, both the yellow manual light and green run light will be flashing along with 1 or 2 of the numbered lights that are used to indicate the valve’s position index. The flashing lights indicate that one of the 19 position indexes can now be modified using the INC/DEC switch. (For example, if the #1 and #2 light are flashing, position index 1.5 can be adjusted.) The position command signal determines which of the 19 position indexes can be modified. With the adjustment mode switch in the ADJ position, pushing the INC/DEC switch up or down changes the valve position in +/-0.1 degree steps. If the INC/DEC switch is held in the up or down position for more than 3 seconds, the valve position is changed in 0.5 degree steps. After moving the valve to the desired position, the Enter button must be pressed to save the position setting. When the Enter button is pressed, the blinking position index lights (0-9) and command set light ‘a’ will momentarily turn off. See Commissioning Sheet on page 42 for a complete description of the valve characterization procedure.</p> <p>In the Position Setup mode a maximum movement of 8 degrees from the stored position is permitted. When the 8 degree limit is reached all of the position index lights will momentarily flash on. If the adjustment mode switch is in the INDEX position, valve positioning is inhibited and is indicated by a momentary flash of the position index lights if an INC/DEC switch adjustment is attempted. Valve positioning is also inhibited if the position command signal is less than 0.05 mA and is indicated by turning off the position index lights.</p>
A-3: Reserved for future use	N/A
A-4: Reserved for future use	N/A

Table 8. SMARTLINK® User Commands - Command Set 'A'. (Continued)

SMARTLINK® Commands Number: Name	Description of command purpose and usage
Command Set 'A'	
A-5: Set Max Position & Min/Max Ramp	<p>Command A-5 is used to enter the Valve Position Setup Mode for adjusting the maximum position (index #9) and setting a linear position ramp from the minimum to maximum stored positions. To execute Command A-5, the position command signal, must be 20.00mA, +/-0.15 mA. (If the numbered lights flash momentarily after command entry, the position command input is not 20mA or the adjustment mode switch is in the STANDBY position.) After entering the command, both the yellow manual light and green run light will be flashing along with a flashing #9 light. The valve's maximum position can now be modified using the INC/DEC switch. If the adjustment mode switch is in the ADJ position, pushing the INC/DEC switch up or down changes the valve position in +/-0.1 degree steps. If the INC/DEC switch is held in the up or down position for more than 3 seconds, the valve position is changed in 0.5 degree steps. After moving the valve to the desired position, the Enter button must be pressed to save the position setting. When the Enter button is pressed, the #9 position index light and the command set light 'a' will momentarily turn off.</p> <p>In the Position Setup mode a maximum movement of 8 degrees from the stored position is permitted. When the 8 degree limit is reached all of the position index lights will momentarily flash on. If the adjustment mode switch is in the INDEX position, valve positioning is inhibited and is indicated by a momentary flash of the position index lights when an INC/DEC adjustment is attempted. After the command is entered, valve positioning is also inhibited if the command signal changes from 20.00 mA.</p>
A-6: Set Min Position & Min/Max Ramp	Command A-6 is used to enter the Valve Position Setup Mode for adjusting the minimum position (index #0) and setting a linear position ramp from the minimum to maximum positions. To enter Command A-6, the position command signal must be 4.00mA, +/-0.15 mA. Adjustment of the minimum position is performed identical to adjustment of the maximum position, Command A-5.
A-7: Unlock Valve Configuration	Command A-7 permits entry of a 4-digit passcode to "unlock" the system configuration and position profile for user modification. A flashing alarm light indicates a "locked" unit. If the alarm light is not flashing, the unit is already unlocked and the numbered lights will flash momentarily if command entry is attempted. After the command is entered, the INC/DEC command is used to select a passcode digit as indicated by the lights. Once selected, the Enter button should be pushed and the process repeated 3 more times. If the 4-digit pass-code is correct, the alarm light will stop flashing and be turned off if no other alarms exist. To re-lock the unit, move the command switch to the RUN position

Table 9. User Commands - Command Set 'B'.

SMARTLINK® Commands Number: Name	Description of command purpose and usage
Command Set 'B'	
B-0: Select Loss of Signal (LOS) Position	<p>Command B-0 is a configuration command that permits selection of valve position when a loss of signal event occurs (below 0.05 mA). After B-0 is entered, the current configuration is shown by one of the numbered lights. Select an L.O.S. configuration, #0,1,2,3, or 4, using the INC/DEC switch and push the Enter button after the desired configuration is indicated by the numbered lights.</p> <p>Configuration #0, 1, 2, and 3 correspond to the positions defined at index #0, 3, 6, and 9 (max), respectively. (See Commissioning Sheet on page 42 for the default valve position for each index). Configuration #4 corresponds to no position change (actuator remains in last position before loss of signal). The factory default configuration is #4.</p>
B-1: Reserved for future use	N/A
B-2: Select Standby Position	<p>Command B-2 is a configuration command that permits selection of the STANDBY valve position. After command entry, the current configuration is shown by one of the numbered lights. Select a standby position configuration, #0-3, using the INC/DEC switch and push the Enter button after the desired configuration is indicated by the numbered lights. Configuration #0, 1, 2, and 3 correspond to the positions defined at index #0, 3, 6, and 9 (max), respectively. (See Commissioning Sheet on page 42 for the default position for each index).</p> <p>The STANDBY position is useful if an emergency situation occurs during Valve Position Setup and the user wants the valve to immediately move to a "safe" position, regardless of the 4-20 mA position command. The valve moves to the STANDBY position when the adjustment mode switch is in the downward "STANDBY" position.</p>
B-3: Select Deadband	<p>Command B-3 is a configuration command that is used to select the deadband placed around the position command input signal. If the input signal contains spurious noise, hunting of the actuator may occur. It is recommended that the source of the noise is eliminated or the 4-20 mA cable type is verified as well as its shield and ground connections. If the noise cannot be eliminated, the deadband can be increased as a last resort.</p> <p>After Command B-3 is entered, the current configuration is shown by one of the numbered lights. Select a deadband configuration, #0-5, using the INC/DEC switch and push the Enter button after the desired configuration is indicated by the numbered lights. Configuration #0, 1, 2, 3, 4 and 5 correspond to a deadband of 0, 0.03, 0.06, 0.13, 0.16 and 0.19%, respectively. The factory default configuration is #2, 0.06%.</p>
B-4: Set High Limit Position Threshold	<p>Command B-4 is a configuration command that is used to adjust the high limit position threshold. Relay driver Output #3 (R03) will energize the High Position Limit relay when the valve position is equal to or greater than the stored high limit position threshold. The factory default is 80.0 degrees and is automatically set to 1.0 degree less than the maximum valve position when modified using Commands A-2 or A-5. If the factory default or automatic 1.0 degree offset (from a user-selected maximum) is acceptable, this configuration is not necessary.</p> <p>To execute Command B-4, the valve system must be in the Manual Mode (See Command A-0). With the unit in Manual Mode and adjustment mode switch in the "ADJ" middle position, push the Enter button and the valve will be driven to the stored value. Then push the INC/DEC switch up or down to change the valve position in +/-1.0 degree steps. If the INC/DEC switch is held in the up or down position, the valve position is continuously changed in +/-1.0 degree steps. After moving the valve to the desired high limit position, the Enter button must be pressed to save the setting. When the Enter button is pressed, the position index and command set 'b' lights will momentarily turn off, indicating the new value has been stored.</p>

Table 9. User Commands - Command Set 'B'. (Continued)

SMARTLINK® Commands Number: Name	Description of command purpose and usage
Command Set 'B'	
B-5: Set Low Limit Position Threshold	<p>Command B-5 is a configuration command that is used to adjust the low limit position threshold. Relay driver Output #4 (RO4) will energize the Low Position Limit relay when the valve position is less than or equal to the stored low limit position threshold. The factory default is 0.00 degrees and is automatically set to 1.0 degree above the minimum valve position when modified using Commands A-2 or A-6. If the factory default or automatic 1.0 degree offset (from a user-selected minimum) is acceptable, this configuration is not necessary.</p> <p>To execute Command B-5, the valve system must be in the Manual Mode (See Command A-0). With the unit in Manual Mode and adjustment mode switch in the "ADJ" middle position, push the Enter button and the valve will be driven to the stored value. Then push the INC/DEC switch up or down to change the valve position in +/-1.0 degree steps. If the INC/DEC switch is held in the up or down position, the valve position is continuously changed in +/-1.0 degree steps. After moving the valve to the desired low limit position, the Enter button must be pressed to save the setting. When the Enter button is pressed, the position index and command set 'b' lights will momentarily turn off, indicating the new value has been stored.</p>
B-6: Set Auto Ramp Adjust On/Off	<p>Command B-6 is a configuration command that is used to set on or off the automatic ramp function. The factory default is Auto Ramp ON, configuration #1. Configuration #0 is Auto Ramp OFF.</p> <p>After command entry, the current configuration is shown by one of the numbered lights. Select Auto Ramp ON, #1, or Auto Ramp OFF, #0 using the INC/DEC switch and push the Enter button after the desired configuration is indicated by the numbered lights.</p> <p>The automatic ramp function is used during the valve Position Setup Mode to create a linear position ramp between the position being adjusted and the two adjacent position indexes. This provides a position "smoothing" of the valve profile and simplifies valve characterization because only 10 of the 19 position indexes (i.e. index 0, 1, 2, 3,instead of 0, 0.5, 1.0, 1.5, etc.) require adjustment. For custom valve characterization that requires precision adjustment of each of the 19 position indexes, the Auto Ramp function should be OFF.</p>
B-7: Reserved for future use	N/A

Table 10. SMARTLINK® User Commands - Command Set ‘C’

SMARTLINK® Commands Number: Name	Description of command purpose and usage
Command Set ‘C’	
C-0: Check Valve Calibration	For use by Maxon-trained field personnel.
C-1: Calibrate Valve	For use by Maxon-trained field personnel.
C-2: Enable Valve Calibration / Check	For use by Maxon-trained field personnel.
C-3: Reset Factory Default Settings	<p>Command C-3 is a configuration command that is used to reset all system configuration and valve position data with the exception of the backup position profile. To execute Command C-3, the valve system must first be in Position Setup Mode (See Command A-2). With the unit in Position Setup Mode and Command C-3 selected, push the Enter button. Light #3 and the command set ‘c’ light should momentarily turn off indicating the reset is complete.</p>
C-4: Enter New Lock Combination	<p>Command C-4 is a configuration command that is used to enter a new 4-digit electronic passcode to prevent tampering. To execute Command C-4, the electronic “lock” must be enabled and the unit must be in the “unlocked” state. (A locked unit is indicated by a flashing alarm light.) If all the numbered lights momentarily flash after command entry, the “lock” function is disabled or the unit is currently locked. See Command C-5 to enable the lock function or Command A-7 to unlock the unit.</p> <p>After the command is entered, the INC/DEC command is used to select a passcode digit as indicated by the numbered lights. After the first digit is selected, the Enter button should be pushed and the numbered light and command set light ‘c’ momentarily turn off. Repeat the previous digit entry process 3 more times for a total of 4 digits. After the 4th digit is entered, the number #4 light will turn on and the command set ‘c’ light will begin to flash, indicating that a new 4-digit passcode has been saved and the command is complete.</p> <p>If the 4-digit passcode is forgotten, call MAXON for assistance. The factory default 4-digit passcode is 0-0-0-0.</p>
C-5: Select Lock Enable / Disable	<p>Command C-5 is a configuration command that is used to enable or disable the electronic “lock” function. The factory default is configuration #0, Lock Disable. Configuration #1 is Lock Enable.</p> <p>To execute Command C-5, the unit must be in the unlocked state. (The alarm light will be flashing rapidly if the unit is locked. See Command A-7 to unlock the device.) After command entry, the current configuration is shown by one of the numbered lights. Select either configuration #0 or #1 using the INC/DEC switch and push the Enter button after the desired configuration is indicated by the numbered lights.</p>

Table 10. SMARTLINK® User Commands - Command Set 'C'. (Continued)

SMARTLINK® Commands Number: Name	Description of command purpose and usage
Command Set 'C'	
C-6: Save Profile as Backup	<p>Command C-6 is a configuration command that is used to save the currently stored valve position profile. This command is used in conjunction with C-7, Restore Backup Profile, to help ensure that a proven valve position profile can be restored without re-commissioning if a factory default reset is accidentally performed or incorrect position adjustments are made during the commissioning process.</p> <p>To execute Command C-6, the valve system must first be in Position Setup Mode (See Command A-2). With Command C-6 selected and the unit in Position Setup Mode, push the Enter button. Light #6 and the command set 'c' light should momentarily turn off, indicating the command has been executed.</p>
C-7: Restore Backup Profile	<p>Command C-7 is a configuration command that is used to restore a backup valve position profile as the current operating profile. This command is used in conjunction with C-6, Save Profile as Backup, to help ensure that a proven valve position profile can be restored without re-commissioning if a factory default reset is accidentally performed or incorrect position adjustments are made during the commissioning process.</p> <p>To execute Command C-6, the valve system must first be in Position Setup Mode (See Command A-2). With the unit in Position Setup Mode and Command C-7 selected, push the Enter button. Light #7 and the command set 'c' light should momentarily turn off, indicating the command has been executed.</p>

General Command Entry Instructions:

1. A user command can be performed only when the following conditions are all satisfied:
 - a. MODE switch is not in the RUN position,
 - b. One of the green command set light (a, b, c) is blinking,
 - c. ADJUST switch is not in the STANDBY position, and
 - d. Unit is "unlocked". (Condition 'd' is not required for Command A-7, Unlock Valve Configuration and Command A-1, Display Alarm Codes.)
 - e. For some commands, the unit must be in a specific mode or have the correct 4-20 mA command signal (see command entry requirements listed on page 39 or in Reference Tables 8 through 10 on page 54 through page 59).
2. If the a, b, or c command set light is not blinking, momentarily push the MODE switch in the CMD abc position (up) or, change the position of the rotary CMD SEL switch. This will start the command set light blinking and permit a command to be entered.
3. Select the desired command set by momentarily pushing the MODE switch upward to the CMD abc position. Subsequent CMD abc switch entries will change the command set selection as indicated by the green command set (a, b, c) lights.
4. Select the desired command number by changing the position of the rotary CMD SEL switch. When one of the command set lights is blinking, the command number selected is indicated by the corresponding numbered (0-9) light being lit.
5. After the command set and number are selected, press the ENTER button. If all of the numbered lights flash momentarily after the ENTER button is pushed, a command entry error has occurred and the command was not executed. If an entry error occurs, check if the unit is locked (i.e. alarm light blinking) or the ADJUST switch is in the STANDBY position. If neither condition exists, check the specific entry requirements of the command.

For More Information

The Honeywell Thermal Solutions family of products includes Honeywell Combustion Safety, Eclipse, Exothermics, Hauck, Kromschröder and Maxon. To learn more about our products, visit ThermalSolutions.honeywell.com or contact your Honeywell Sales Engineer.

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 **MAXON**



MAXON SMARTLINK[®] CV

智能阀门执行器

技术手册



32M-06002C-05

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产品说明

MAXON SMARTLINK[®] 智能阀门执行器总成是一种坚固耐用的交钥匙解决方案，具有占用空间小、精度高、可重复性好，以及调试灵活等优势，广泛适用于各种工业流量控制应用。

它还能轻松在现场自定义阀门流量特性，从而成为燃烧控制应用中并联阀门开系统的理想解决方案。

SMARTLINK[®] 执行器总成包括两个组件：1) 一个直接联接到阀门的阀门执行器；2) 一个从阀门执行器到用户过程控制器、PLC 或 DCS 的控制接口单元。

阀门执行器是一种工厂校准的工业级总成，包括一个集成长寿命位置反馈的重载行星齿轮头和一个用于连续高精度控制阀门的步进电机。其工作电压为 24VDC，采用带数字位置通信接口的四芯电缆供电，可有效抵御电噪声环境，确保可靠运行。

控制接口单元是一种安装在 DIN 导轨上的电子设备，能将用户的过程控制器“链接”到阀门执行器。它具备多个前面板安装的开关和指示灯，用于显示报警、简单的阀门配置和阀门特性。控制接口单元还提供了一个精确的 4-20mA 位置反馈信号、多个用于指示警报和控制状态的继电器驱动器输出，以及用于命令阀门移动到其最大和最小位置的数字输入。该单元通常与 MAXON 或用户提供的 24VDC 电源和输出接口继电器一起安装在控制面板中。

特点和优势

- SMARTLINK[®] 执行器可安装在蝶阀、球阀、连杆阀等各种阀体内，满足各种燃烧流量控制需求
- 可轻松定制阀门流量特性，实现高精度和高可重复性的流量控制
- 工厂校准的阀门直接联接执行器总成，可实现高的效率和低的排放
- 坚固的工业设计，能长期可靠运行
- 减少维护需求 - 无需润滑
- 危险区域认证：ATEX、IEC Ex 和 KC；不可燃（I 类 2 区）；UL、FM 和 CE

应用

SMARTLINK[®] 阀门执行器专为工业燃烧系统、锅炉燃烧系统以及相关加热过程流量的精确控制而设计。其坚固的工业封装可提供高精度、可特性的流量控制以及增强的数字化智能功能，提升各种加热和制造过程的价值。

典型应用包括：

- 简单的燃烧器比例调节
- 低 NOx 和低 CO 燃烧器控制
- 须严格管理燃烧产物的过程燃烧系统的控制
- 带分级或烟气再循环的复杂燃烧器的控制
- 精确控制过程流量，如给水、气体及产品进料
- 液体 / 气体计量过程和过程加热器的精确流量控制

除上述应用外，SMARTLINK[®] 阀门执行器还广泛用于其他各类应用。有关更多应用信息，请联系您的 MAXON 代表。

认证

认证机构	详情
FM认证	非易燃，适用于 I 类，2 区，A、B、C & D 组危险区域（分类）室内和室外 (Type 4X 仅适用于阀门执行器) 场所 Ta = 70°C FM 3600; FM 3611; FM 3810; ANSI/NEMA 250
UL (美国和加拿大)	满足 UL353 (限位控制装置) 关于执行器的所有要求
ATEX	II 3 G Ex nA nC IIC T4 Ta= -40°C 至 +70°C; IP66 (当组件安装在外壳内) (阀门执行器为 II 3 G Ex nA nC IIC T4 Ta= -40°C 至 +70°C; IP66 和 II 3 D Ex tc IIIC T135C)
IEC Ex	Ex nA nC IIC T4 -40°C ≤ Ta ≤ 70°C Gc, Ex tc IIIC T135C Dc
KC	Ex nA nC IIC T4, Ex tc IIIC T135C IP65
CCC认证	执行器：GB 3836.1、GB 3836.8、GB 12476.1 和 GB 12476.5; Ex nA nC IIC T4 Gc; Ex tc A22 IP66 T135°C 面板设备：GB 3836.1、GB 3836.8; Ex nA nC IIC T4 Gc 证书编号：GYB21.1433X

型号

蝶阀

型号配置			阀体				执行器			流体	
阀门尺寸	流量	系列	阀体连接	阀体密封	阀体材料	阀体内件	额定转矩	软件版本	语言	流体	
0100	S	SLCV	-	A	A	1	1	-	1C	A	-

尺寸

0100 - 1"
0125 - 1.25"
0150 - 1.5"
0200 - 2"
0250 - 2.5"
0300 - 3"
0400 - 4"
0600 - 6"
0800 - 8"
1000 - 10"
1200 - 12"
1400 - 14"
1600 - 16"

流量

S - 标准

系列

SLCV - SMARTLINK®蝶阀

阀体连接

A - ANSI法兰
M - "M"式法兰
X - 特殊
* - 仅执行器

阀体密封

A - 丁腈橡胶
B - 氟橡胶

阀体材料

1 - 铸铁
2 - 碳钢
3 - 黄铜
5 - 不锈钢

阀体内件

1 - 阀芯套件1
2 - 阀芯套件1, 氧气清洗
5 - 阀芯套件2
6 - 阀芯套件2, 氧气清洗
X - 特殊
* - 仅执行器

额定转矩

1 - 33.9 N.m

软件版本[1]

1C - 标准软件
** - 仅阀体

语言

A - 英语
X - 特殊
* - 仅阀体

流体

流体

A - 最高温度为158°F/
70°C的空气
B - 最高温度为350°F/
177°C的空气
C - 最高温度为400°F/
204°C的空气
D - 丁烷气
E - 焦炉煤气
F - 沼气
G - 填埋气
H - 人工煤气
I - 天然气
J - 氧气
K - 丙烷气
L - 丙烷/丁烷混合气
M - 炼厂气
N - 酸性天然气
O - 城市燃气
X - 特殊

[1] 默认是最新版本。

阀芯套件选项和典型材料：

- 1 - 300 系列不锈钢阀杆, 300 系列不锈钢阀盘和青铜衬套
2 - 300 系列不锈钢阀杆, 300 系列不锈钢阀盘和 PEEK (聚醚醚酮) 衬套

球阀

型号配置			阀体				执行器		
阀门尺寸	流量	系列	阀体连接	阀体密封和填料	阀体材料	阀体内件	额定转矩	软件版本	语言
0100	7	SLBV	-	B	E	2	1	-	1 1C A

尺寸

0050 - .5"
0075 - .75"
0100 - 1"
0125 - 1.25"
0150 - 1.5"
0200 - 2"

流量

1 - 1/32"槽
2 - 1/16"槽
3 - 1/8"槽
4 - 3/16"槽
5 - 1/4"槽
6 - 30°V
7 - 60°V
8 - 90°V
9 - 圆形流道

系列

SLBV - SMARTLINK®球阀

阀体连接

A - ANSI法兰150#
B - ANSI螺纹
X - 特殊[1]
* - 仅执行器

阀体密封和填料

E - 特氟隆(Teflon)
X - 特殊[1]
* - 仅执行器

阀体材料

2 - 碳钢
5 - 不锈钢
X - 特殊[1]
* - 仅执行器

阀体内件

1 - 阀芯套件1
X - 特殊[1]
* - 仅执行器

额定转矩

1 - 33.9 N.m
X - 特殊
* - 仅阀体

软件版本[2]

1C - 标准软件
** - 仅阀体

语言

A - 英语
X - 特殊
* - 仅阀体

[1] 所有可用的球阀选项请参见第 6 页。这些选项将需特殊配置。

[2] 默认是最新版本。

阀芯套件选项和典型材料：

1 - 300 系列不锈钢阀球， 300 系列不锈钢阀杆和特氟隆阀座环

特殊配置的额外球阀选项：

<u>阀体连接</u>	<u>阀体密封和填料</u>	<u>阀体材料</u>	<u>阀体内件</u>
平面法兰	阀体密封	双相不锈钢	阀杆 & 阀球
对焊	石墨	400不锈钢	双相不锈钢
扩展对焊	Kel-F (氟橡胶)	Alloy 20不锈钢合金	400不锈钢
夹钳连接	Peek (聚醚醚酮)	蒙乃尔合金 (Monel)	Alloy 20不锈钢合金
沟槽面	RPTFE (增强聚四氟乙烯)	青铜	蒙乃尔合金 (Monel)
承插焊接	碳纤维填充RPTFE	哈氏合金 C (Hastelloy c)	青铜
扩展承插焊接	UHMWPE (超高分子量聚	CF8	哈氏合金 C (Hastelloy c)
环面连接	乙烯)	钛合金	CF8
300# RF法兰	氟橡胶		钛合金
600# RF法兰			
	填料		阀座环
	石墨		PFA (可溶性聚四氟乙烯)
	RPTFE (增强聚四氟乙烯)		Delrin (聚甲醛)
	碳纤维填充RPTFE		Hostaflon (聚四氟乙烯树 脂)
	止推垫圈		Kel-F (氟橡胶)
	石墨		Peek (聚醚醚酮)
	Hostaflon (聚四氟乙烯树 脂)		RPTFE (增强聚四氟乙烯)
	Kel-F (氟橡胶)		碳纤维填充RPTFE
	Peek (聚醚醚酮)		
	RPTFE (增强聚四氟乙烯)		
	碳纤维填充RPTFE		
	UHMWPE (超高分子量聚		
	乙烯)		

控制执行器

型号配置		执行器						
系列		连接		额定转矩	软件版本	语言		转向
SL CA	-	K1	-	1	1C	A	-	2

系列

SL CA - SMARTLINK®控制执行器

额定转矩

1 - 33.9 N.m

转向

1 - 顺时针

连接

K1 - 1/2"键连接输出轴

软件版本[1]

L1 - 连杆臂

1C - 标准软件

S1 - 1/2"方形输出轴

语言

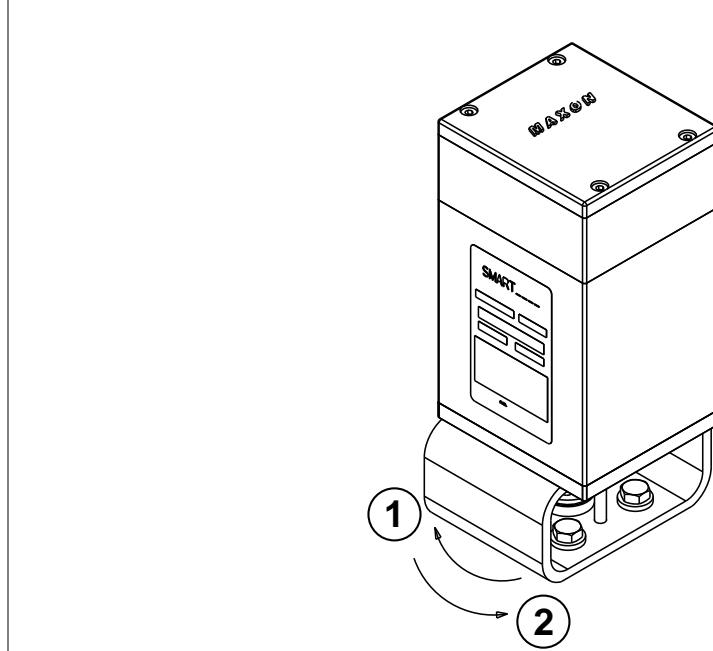
S2 - 3/4"方形输出轴

A - 英语

X - 特殊

[1] 默认是最新版本

控制执行器转向



1. 顺时针旋转
2. 逆时针旋转

备用执行器

型号配置		执行器				
系列		额定转矩	软件版本	语言		转向
SL SA	-	1	1C	A	-	2

系列

SL SA - SMARTLINK®备用执行器

额定转矩

1 - 33.9 N.m

X - 特殊

语言

A - 英语

X - 特殊

软件版本[2]

1C - 标准软件

转向[1]

1 - 顺时针

2 - 逆时针

[1] 必须指定正确的转向。

- a. 蝶阀交付时始终为逆时针旋转。
- b. 球阀交付时始终为逆时针旋转。
- c. 控制执行器由客户指定，且转向必须与待更换的执行器相符。

[2] 默认是最新版本。

控制接口单元

型号配置		装配选项													
系列	软件版本	语言	外壳	警报	控制启用	阀位上限	阀位下限	手动控制	电源	DIN 导轨装配	高阀位命令	低阀位命令			
SL CI	-	1C	A	A	1	1	1	1	1	-	A	1	-	A	A

系列

SL CI - SMARTLINK® 控制接口单元

控制启用

- 0 - 无
- 1 - 24VDC 继电器
- X - 特殊

电源

- 0 - 无
- A - 24VDC 继电器
- X - 特殊
- * - 包含在外壳内

软件版本[1]

1C - 标准软件

阀位上限

- 0 - 无
- 1 - 24VDC 继电器
- X - 特殊

DIN 导轨装配

- 0 - 无
- 1 - 零件已安装，工厂已接线
- 2 - 零件已安装，未接线
- X - 特殊
- * - 包含在外壳内

语言

- A - 英语
- X - 特殊

阀位下限

- 0 - 无
- 1 - 24VDC 继电器
- X - 特殊

高阀位命令

- 0 - 无
- A - 120VAC
- X - 特殊

外壳

- 0 - 无
- A - 20x16x8, NEMA 4, 检视窗
- X - 特殊

手动控制

- 0 - 无
- 1 - 24VDC 继电器
- X - 特殊

低阀位命令

- 0 - 无
- A - 120VAC
- X - 特殊

[1] 默认是最新版本

规格

系统规格

位置精度	0.1° (在阀门执行器轴上测量)
位置命令	4-20mA隔离输入；4.8V压降@ 20mA
位置反馈	4-20mA隔离输入；400Ω最大负载
电源输入	24VDC +/-5%，25W (最大)
占空比	连续
继电器驱动器输出	集电极开路输出，最大30 VDC & 100mA
数字输入	5-24 VDC @ 10mA (最大)
环境温度	-40°C到70°C
外壳保护等级	NEMA 1, IP20 (控制接口单元和所有DIN导轨选项) NEMA 4, IP66 (所有带工厂接线控制接口单元和导轨安装选项的标准、MAXON外壳) NEMA 4, IP66 (阀门执行器)
输出继电器 (可选)	输出触点：250 VAC/DC @ 6A DIN导轨安装
输入继电器 (可选)	输入线圈电压：120VAC (可用230VAC和24VDC选项) DIN导轨安装
通用电源 (可选)	电源输入：115-230 VAC +/-10%，50/60 Hz 电源输出：24VDC, 2.3A (最大)
行程时间	14秒 (全开到全闭)

性能 - 蝶阀

蝶阀尺寸 - 1" 到 4"

尺寸	最小可控 Cv 额定值	最大 Cv 额定值	最大入口压力 (bar)	最大阀体压力 (bar)
1"	0.50	27	6.21	6.21
1.25"	0.60	70	6.21	6.21
1.5"	0.70	105	6.21	6.21
2"	1.30	190	6.21	6.21
2.5"	2.40	260	5.59	6.21
3"	3.00	360	3.73	6.21
4"	5.00	750	1.86	6.21

流体	气体 代码	建议材料选项			最大流体温度额定值	最大环境温度额定值
		阀体密封	阀体材料	阀体内件		
空气	A	A, B	1, 2, 3, 5	1, 5	70°C	70°C
丁烷气	D	A, B	1, 2, 3, 5	1, 5	70°C	70°C
焦炉煤气	E	B	1, 2, 5	1, 5	70°C	70°C
沼气	F	B	5	5	70°C	70°C
填埋气	G	B	5	5	70°C	70°C
人工煤气	H	B	5	5	70°C	70°C
天然气	I	A, B	1, 2, 3, 5	1, 5	70°C	70°C
氧气	J	B	3, 5	2, 6	70°C	70°C
丙烷气	K	A, B	1, 2, 3, 5	1, 5	70°C	70°C
丙烷 / 丁烷混合气	L	A, B	1, 2, 3, 5	1, 5	70°C	70°C
炼厂气	M	B	5	5	70°C	70°C
酸性天然气	N	B	5	5	70°C	70°C
城市燃气	O	A, B	5	5	70°C	70°C

阀体密封

A - 丁腈橡胶

B - 氟橡胶 (Viton)

阀体材料

1 - 铸铁

2 - 碳钢

3 - 黄铜

5 - 不锈钢

阀体内件

1 - 阀芯套件1

2 - 阀芯套件1, 氧气清洗

5 - 阀芯套件2

6 - 阀芯套件2, 氧气清洗

蝶阀 - 6" 到 16"

尺寸	最小可控 Cv 额定值	最大 Cv 额定值	最大入口压力 (bar)	最大阀体压力 (bar)
6"	12.5	1425	0.31	6.21
8"	22	2500	0.31	6.21
10"	35	4500	0.31	6.21
12"	50	6400	0.31	6.21
14"	67	8800	0.31	6.21
16"	88	11700	0.31	6.21

流体	气体 代码	建议材料选项				最大流体温度额定值	最大环境温度额定值
		阀体 密封	阀体材料	阀体内件	垫片材料		
最高 70°C 的空气	A	A, B	1	1	NEOP, FIBR	70°C	70°C
最高 177°C 的空气	B	B	1	1	FIBR	177°C	70°C
最高 204°C 的空气	C	B	1	1	FIBR	204°C	60°C
天然气	I	A,B	1	1	NEOP, FIBR	70°C	70°C

阀体密封

A - 丁腈橡胶
B - 氟橡胶

阀体材料

1 - 铸铁

阀体内件

1 - 阀芯套件1

垫片材料

FIBR - 耐高温纤维
NEOP - 氯丁橡胶

性能 - 球阀

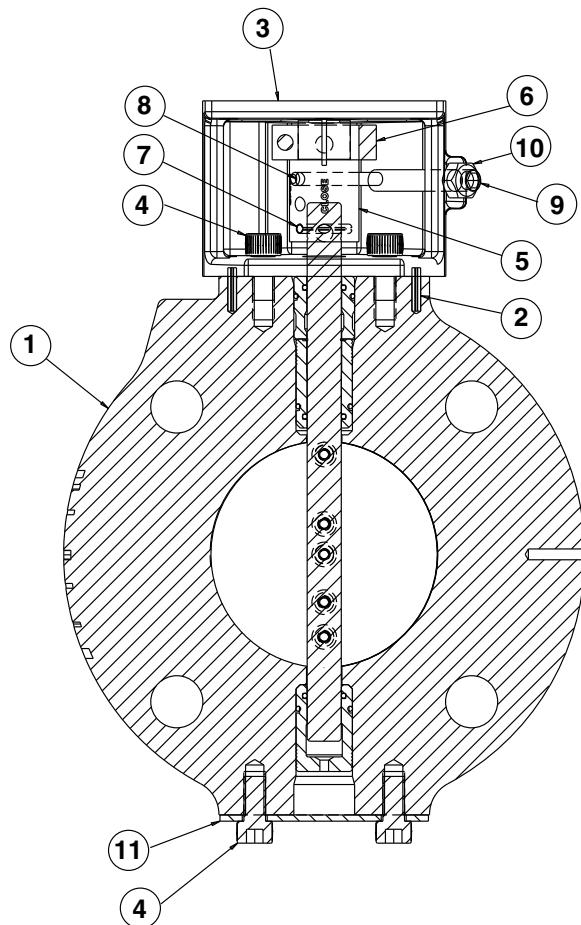
流量系数 - Cv vs. 开度 %											
尺寸	插件	0.0%	11.1%	22.2%*	33.3%	44.4%	55.6%	66.7%	77.8%	88.9%	100%
0.5"	1/32" 槽	0.00	0.00	0.03	0.07	0.12	0.16	0.20	0.24	0.28	0.32
	1/16" 槽	0.00	0.01	0.07	0.20	0.33	0.46	0.60	0.73	0.86	1.00
	1/8" 槽	0.00	0.01	0.10	0.36	0.61	0.86	1.10	1.40	1.60	1.80
	30°V	0.00	0.01	0.11	0.24	0.36	0.56	0.84	1.10	1.60	2.10
	60°V	0.00	0.01	0.12	0.33	0.60	0.84	1.40	2.00	3.10	4.40
	圆形流道	0.00	0.15	0.29	0.46	0.70	1.10	1.80	2.60	4.30	6.40
0.75"	1/16" 槽	0.00	0.01	0.06	0.24	0.40	0.56	0.73	0.90	1.00	1.20
	1/8" 槽	0.00	0.01	0.14	0.39	0.65	0.90	1.20	1.40	1.70	1.90
	30°V	0.00	0.01	0.11	0.24	0.41	0.67	1.00	1.40	1.90	2.60
	60°V	0.00	0.01	0.13	0.36	0.55	1.00	1.50	2.30	3.60	5.00
	圆形流道	0.00	0.21	0.43	0.70	1.10	1.60	2.60	4.00	6.40	9.60
1"	1/16" 槽	0.00	0.03	0.10	0.40	0.67	0.94	1.20	1.50	1.70	1.90
	3/16" 槽	0.00	0.03	0.22	0.82	1.40	1.90	2.50	3.10	3.50	4.00
	30°V	0.00	0.03	0.21	0.56	1.00	1.60	2.40	3.40	4.60	6.20
	60°V	0.00	0.03	0.30	0.78	1.20	2.30	3.60	5.30	8.30	11.60
	90°V	0.00	0.03	0.48	1.20	2.30	3.50	5.40	7.70	10.80	12.10
	圆形流道	0.00	0.58	1.20	1.90	2.80	4.30	7.00	10.50	17.00	26.00
1.25"	3/16" 槽	0.00	0.05	0.38	1.40	2.40	3.40	4.40	5.40	6.20	6.90
	30°V	0.00	0.05	0.39	1.00	1.80	2.90	4.40	6.40	8.60	11.40
	60°V	0.00	0.06	0.48	1.30	2.00	3.70	5.80	8.50	13.40	18.70
	90°V	0.00	0.06	0.78	2.00	3.70	5.70	8.80	12.50	17.50	19.70
	圆形流道	0.00	0.91	1.80	3.00	4.40	6.70	10.90	16.40	26.60	40.60
1.5"	3/16" 槽	0.00	0.05	0.47	1.80	3.00	4.20	5.40	6.80	7.70	8.60
	30°V	0.00	0.05	0.41	1.20	2.10	3.50	5.20	7.60	10.30	13.70
	60°V	0.00	0.06	0.57	1.70	3.00	5.60	9.10	13.20	19.80	28.40
	90°V	0.00	0.06	1.00	2.80	4.50	8.10	13.40	19.70	30.90	47.10
	圆形流道	0.00	1.50	3.00	4.80	7.20	11.00	18.00	27.00	44.00	65.50
2"	1/4" 槽	0.00	0.05	0.75	2.90	4.80	6.80	8.70	10.80	12.30	13.80
	30°V	0.00	0.05	0.55	1.70	3.40	5.70	8.30	12.10	16.60	22.20
	60°V	0.00	0.06	0.70	2.60	4.90	9.30	15.50	22.20	32.10	47.20
	90°V	0.00	0.06	0.88	3.30	6.10	11.70	19.40	27.50	40.10	59.00
	圆形流道	0.00	2.20	4.30	7.00	10.50	16.20	26.40	39.60	64.00	96.00

* 选择最小可控 Cv 值为 22% 开度的阀门。低于该值可能发生严重错误。

结构材料

蝶阀

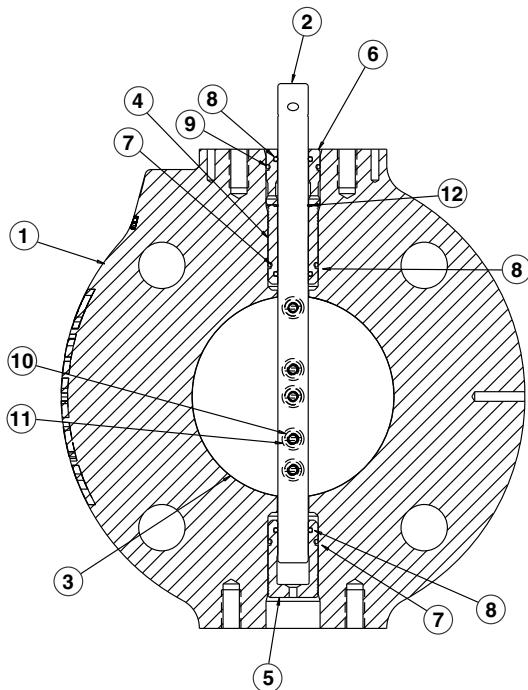
蝶阀阀体组件 - 所有尺寸



零件编号	说明	材料规格
1	阀体子组件	见第 4 页
2	定位弹簧销	镀锌碳钢
3	转接支架	ASTM B179 T6 铝合金
4 [1]	内六角螺钉	镀锌碳钢
5	联轴器	ASTM A582 type 303 不锈钢
6	锁紧环	镀锌合金钢
7	弹簧销	镀锌碳钢
8	定位销	303 不锈钢
9	硬防松螺钉	18-8 不锈钢
10	硬防松螺母	不锈钢
11 [1]	盖板	铝合金

[1] 这些零件仅适用于尺寸 1" 到 4"

蝶阀阀体子组件 - 尺寸 1" 到 4"

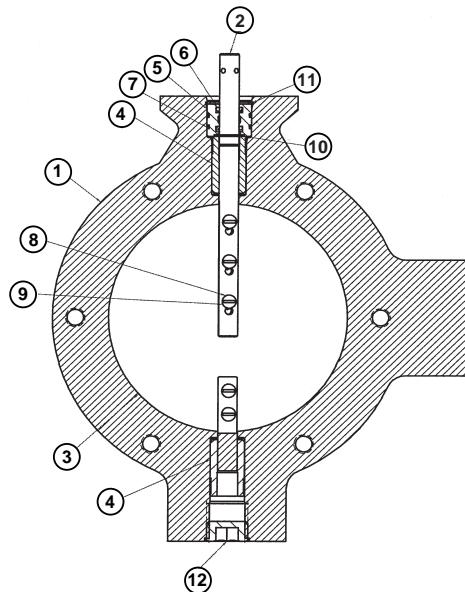


阀体材料					
零件编号	说明	材料代码			
		1	2	3	5
1	阀体	铸铁 ASTM A159 Gr.3000	碳钢 ASTM A216 Gr.WCB	黄铜 ASTM B62 UNS No. C83600	不锈钢 ASTM A351 Gr.CF8M

阀体密封		
零件编号	说明	材料
7	O型圈	
8	O型圈	标准材料选项为丁腈橡胶和氟橡胶 (Viton)
9	O型圈	

阀芯套件材料		
零件编号	说明	内部阀芯套件
		1 2
2	阀杆	303 不锈钢, ASTM A157 Gr.G3000
3	蝶板	304 不锈钢 (1.4301), ASTM A240 Type 304 UNS No. S30400
4	顶部衬套	青铜
5	底部衬套	ASTM B271、B505 和 B584 UNS No. C93200
6	顶部分隔衬套	PEEK (聚醚醚酮)
10	螺钉	18-8 不锈钢
11	垫圈	304 不锈钢 (1.4301)
12	定位环	316 不锈钢

蝶阀阀体组件 - 尺寸 6" 到 16"

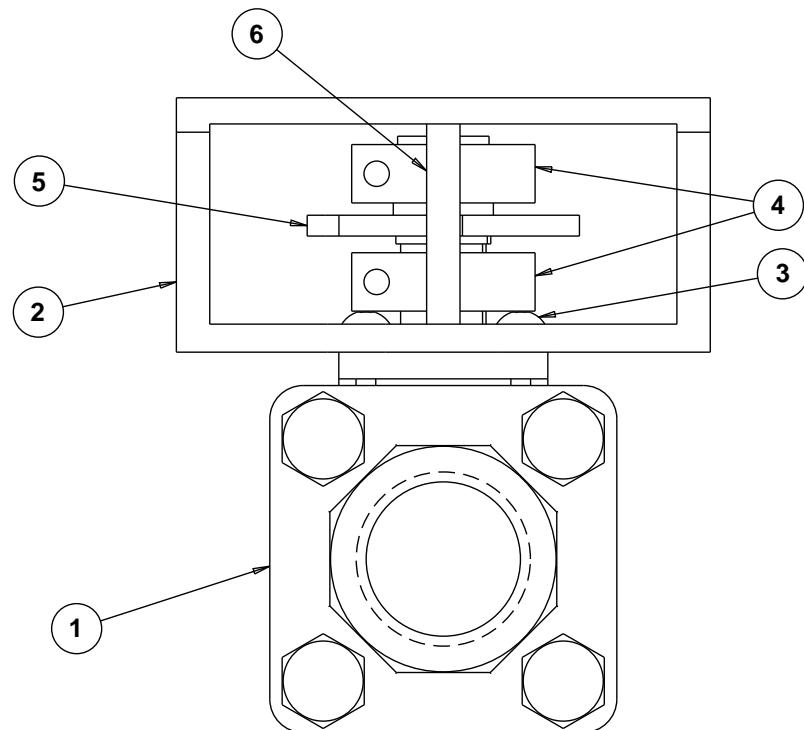


阀体材料		
零件编号	说明	材料代码
		1
1	阀体	铸铁 ASTM A159 Gr.3000

阀体密封		
零件编号	说明	材料
6	O型圈	
7	O型圈	标准材料选项为丁腈橡胶

阀芯套件材料		
零件编号	说明	内部阀芯套件
		1
	阀门尺寸	6" & 8" 10" 到 16"
2	阀杆	316 不锈钢, ASTM A276
3	蝶板	304 不锈钢 (1.4301) ASTM A167 UNS No. S30400 碳钢 ASTM A108 UNS No. G10180
4	顶部和底部衬套	青铜
5	分隔衬套	ASTM B271、B505 和 B584 UNS No. C93200
8	螺钉	304 不锈钢 (1.4301) 镀锌碳钢
9	垫圈	316 不锈钢 镀锌碳钢
10	定位环	碳钢
11	定位环	SAE 1060-1090 UNS No. G10600-G10900
12	管塞	合金钢, ASTM A322 UNS G40370

球阀

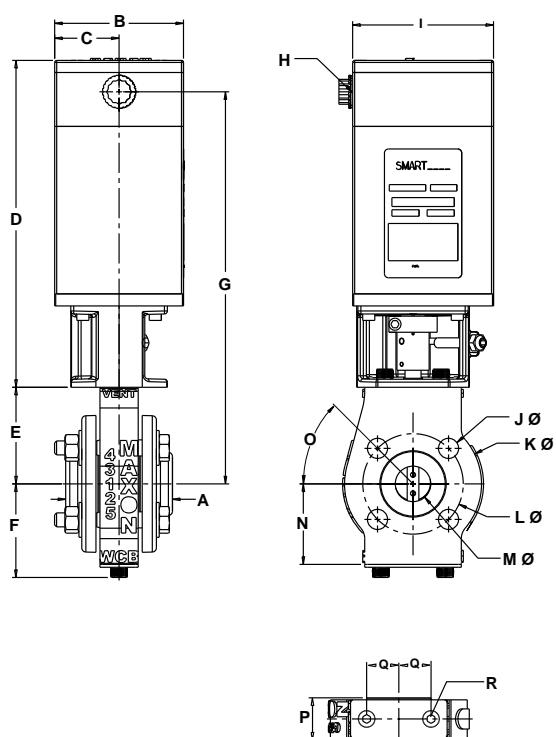


零件编号	说明	材料规格
1	阀体子组件	基于第 5 页的选项
2	支架	6063-T6 铝合金 UNS A96063
3	圆头螺钉	18-8 (Type 303) 不锈钢
4	联接环	镀锌合金钢
5	联轴器	303 不锈钢 ASTM A582 UNS No. S30300
6	硬止动销	420 不锈钢

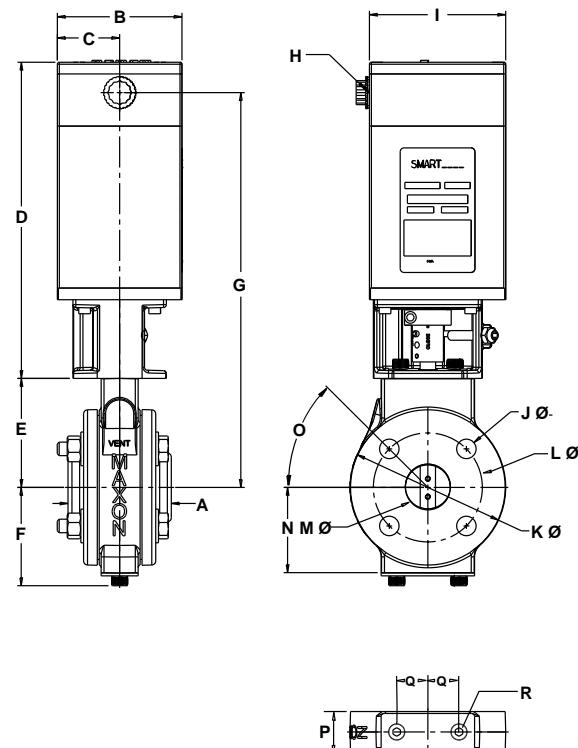
尺寸和重量

蝶阀

1" SMARTLINK®蝶阀



1.25" SMARTLINK®蝶阀



法兰尺寸 "A" (mm)		
铁	螺纹	72.9
钢	螺纹	80
	承插焊接	72
不锈钢	螺纹	80
	承插焊接	72
黄铜	螺纹	71

约重: 10 kg ; 带法兰 11.8 kg

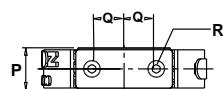
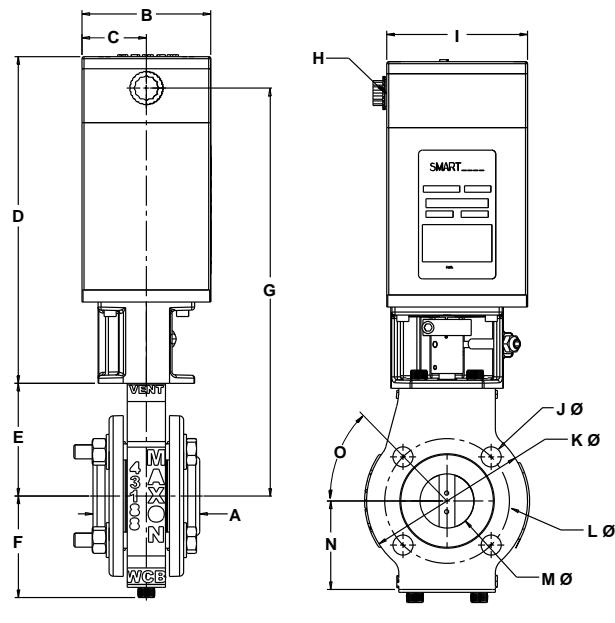
法兰尺寸 "A" (mm)		
铁	螺纹	77.5
钢	螺纹	79
不锈钢	承插焊接	77.5
	螺纹	80
黄铜	承插焊接	72
	螺纹	77.5

约重: 11.3 kg ; 带法兰 13 kg

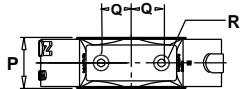
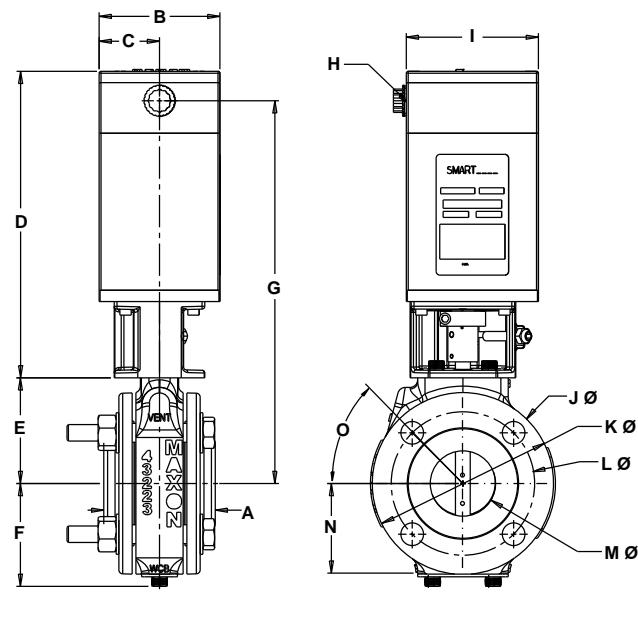
尺寸单位为 mm, 除非另有说明																	
尺寸	B	C	D	E	F	G	H NPT	I	J Ø	K Ø	L Ø	M Ø	N	O	P	Q	R [1]
1.0	102	51	259	76	73.7	310	0.5	112	15.7	107	78.7	28	63.5	45°	33.3	25.4	15.7
1.25	102	51	259	89	81.3	323	0.5	112	15.7	127	89	35.6	68.6	45°	33.3	25.4	15.7

[1] M8 - 螺距 1.25, 深 0.62, 2 孔

1.5" SMARTLINK®蝶阀



2" SMARTLINK®蝶阀



法兰尺寸 "A" (mm)

铁	螺纹	83
钢	螺纹	82
	承插焊接	82.3
不锈钢	螺纹	82
	承插焊接	82.3
黄铜	螺纹	80

法兰尺寸 "A" (mm)

铁	螺纹	87
钢	螺纹	90.4
	承插焊接	89.2
不锈钢	螺纹	90.4
	承插焊接	89.2
黄铜	螺纹	94.5

约重: 12.7 kg ; 带法兰 15.4 kg

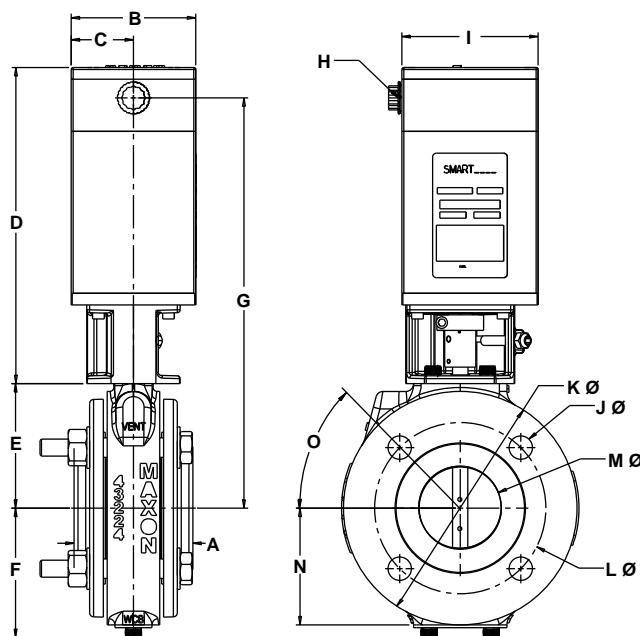
约重: 14 kg ; 带法兰 17.7 kg

尺寸单位为 mm, 除非另有说明

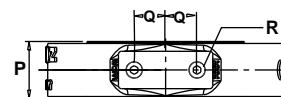
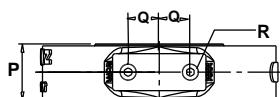
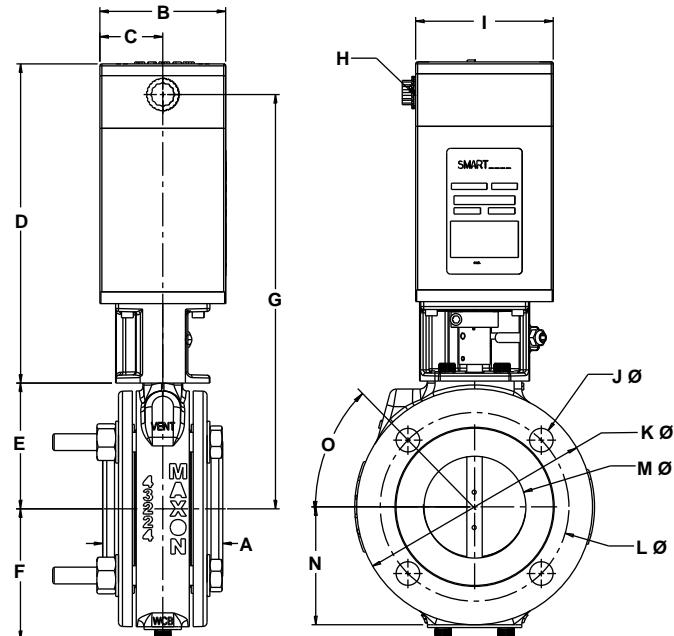
尺寸	B	C	D	E	F	G	H NPT	I	J Ø	K Ø	L Ø	M Ø	N	O	P	Q	R [1]
1.5"	101.6	50.8	259	88.9	81.3	322.6	0.5	112	15.7	127	99	43.2	71.1	45°	33.3	25.4	15.7
2"	101.6	50.8	259	88.9	86.4	322.6	0.5	112	19	152.4	122	55.9	76.2	45°	42.9	25.4	15.7

[1] M8 - 螺距 1.25, 深 0.62, 2 孔

2.5" SMARTLINK®蝶阀



3" SMARTLINK®蝶阀



法兰尺寸 "A" (mm)

铁	螺纹	94.5
钢	螺纹	93.2
	承插焊接	96.3
不锈钢	螺纹	93.2
	承插焊接	96.3
黄铜	螺纹	96.5

约重: 17.7 kg ; 带法兰 26.3 kg

法兰尺寸 "A" (mm)

铁	螺纹	97.3
钢	螺纹	104.9
	承插焊接	102.4
不锈钢	螺纹	104.9
	承插焊接	102.4
黄铜	螺纹	102.1

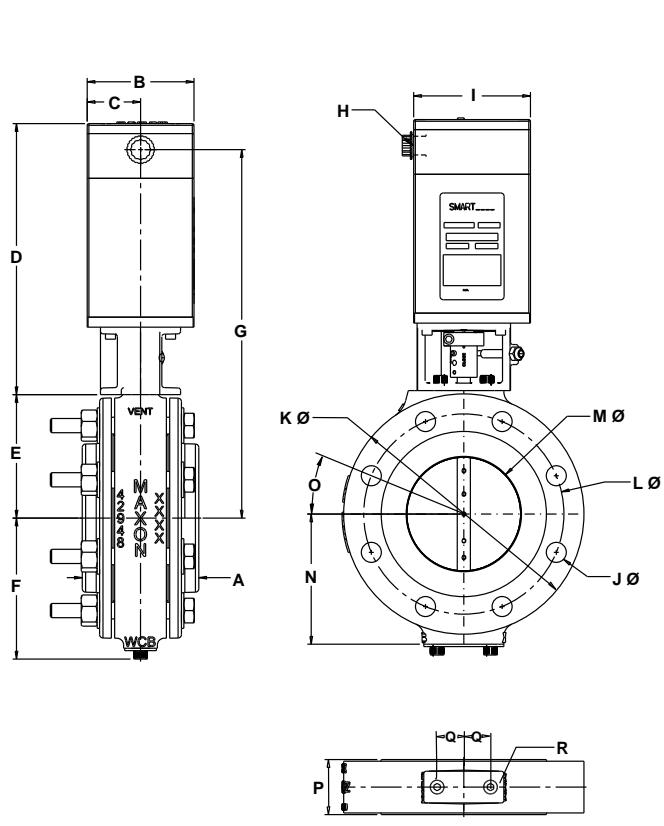
约重: 20 kg ; 带法兰 28 kg

尺寸单位为 mm, 除非另有说明

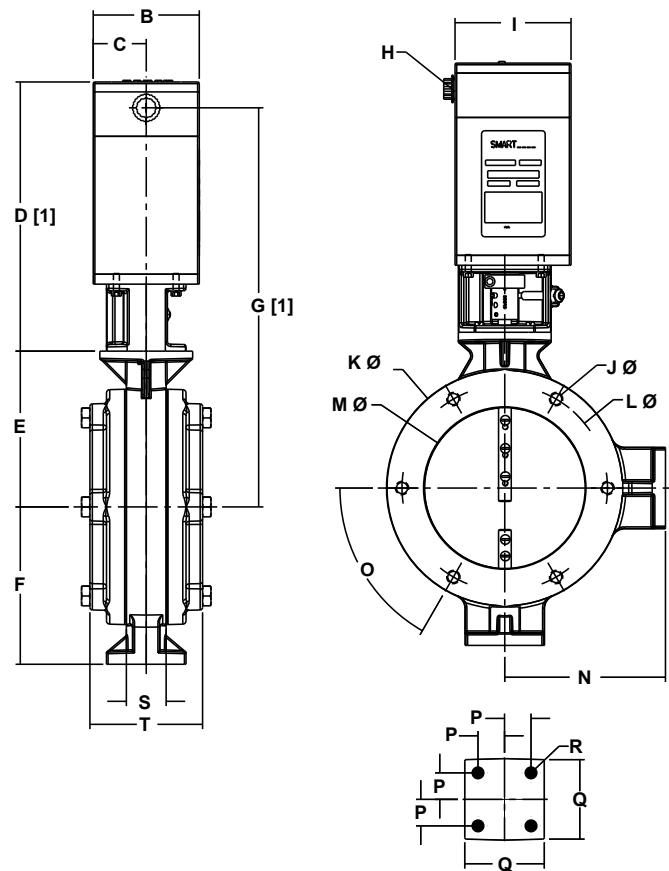
尺寸	B	C	D	E	F	G	H NPT	I	J Ø	K Ø	L Ø	M Ø	N	O	P	Q	R [1]
2.5"	101.6	50.8	259	101.6	106.7	335.3	0.5	111.8	19.1	190.5	139.7	66	96.5	45°	46	25.4	15.7
3"	101.6	50.8	259	101.6	106.7	335.3	0.5	111.8	19.1	190.5	152.4	83.8	96.5	45°	46	25.4	15.7

[1] M8 - 螺距 1.25, 深 0.62, 2 孔

4" SMARTLINK®蝶阀



6" SMARTLINK®蝶阀



法兰尺寸 "A" (mm)		
铁	螺纹	104.9
钢	螺纹	103.1
	承插焊接	103.1
不锈钢	螺纹	103.1
	承插焊接	103.1

[1] 对于高温 (>70°C) 配置增加64 mm

约重: 22.2 kg ; 带法兰 32.2 kg

约重: 24.9 kg ; 带法兰 32.2 kg

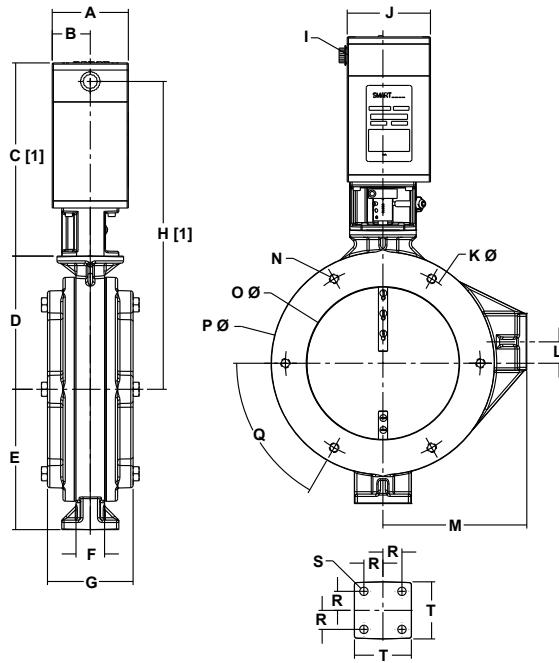
尺寸单位为 mm, 除非另有说明

尺寸	B	C	D	E	F	G	H NPT	I	J	K Ø	L Ø	M Ø	N	O	P	Q	R [2]	S	T
4"	101.6	50.8	259	116.8	134.6	350.5	0.5	111.8	19.1	228.6	190.5	109.2	124.5	22.5°	52.3	25.4	15.7	---	---
6"	101.6	50.8	259	149.8	150	383.5	0.5	111.8	[1]	226.1	196.9	154.9	154.9	60°	25.4	76.2	11.1	38.1	109.2

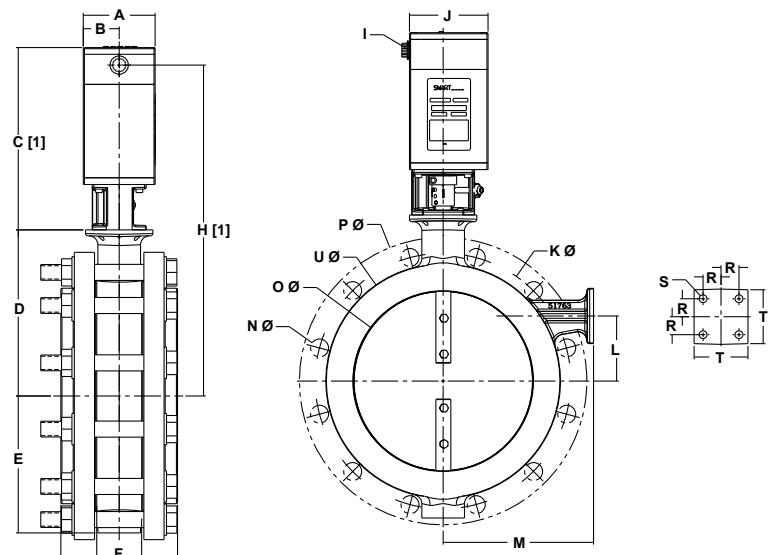
[1] 1 1/2-13 UNC, 6 孔

[2] 对于 4" 阀门: M8- 螺距 1.25, 深 0.62, 2 孔对于 6" 阀门: 1/2-13 UNC, 4 孔

8" SMARTLINK®蝶阀



10" SMARTLINK®蝶阀



[1] 对于高温 (>70°C) 配置增加 64 mm

[1] 对于高温 (>70°C) 配置增加64 mm

注意：法兰散装发货。

约重：27.7 kg；带法兰41.3 kg

约重：29.9 kg；带法兰63 kg

尺寸单位为 mm，除非另有说明

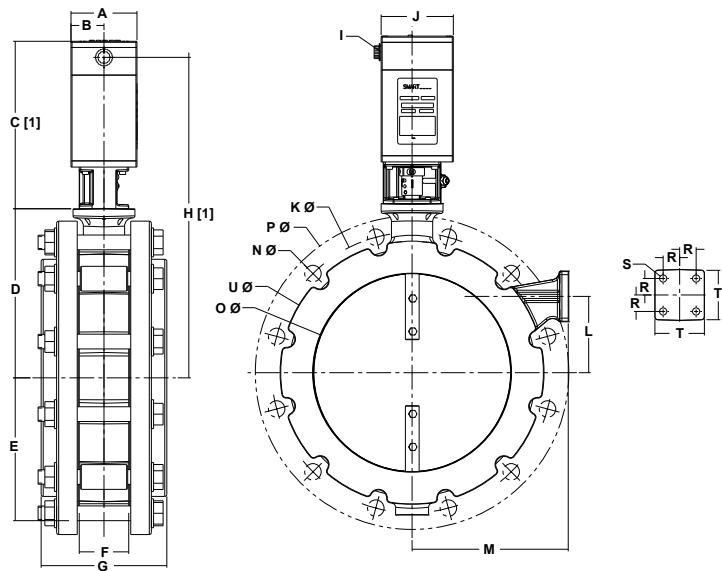
尺寸	A	B	C	D	E	F	G	H	I NPT	J	K Ø	L	M	N	O Ø	P Ø	Q	R	S [3]	T	U Ø
8"	101.6	50.8	259	177.8	188	38.1	111.8	411.5	0.5	111.8	260.4	27.9	193	[1]	203.2	299.7	60°	25.4	11.1	76.2	---
10"	101.6	50.8	259	233.7	193	63.5	165	467.4	0.5	111.8	360.7	91.4	213.4	[2]	254	406.4	---	25.4	11.1	76.2	330

[1] 1/2-13 UNC, 6 孔

[2] 直径 1.0, 12 孔

[3] 深 0.438, 4 孔

12" SMARTLINK®蝶阀

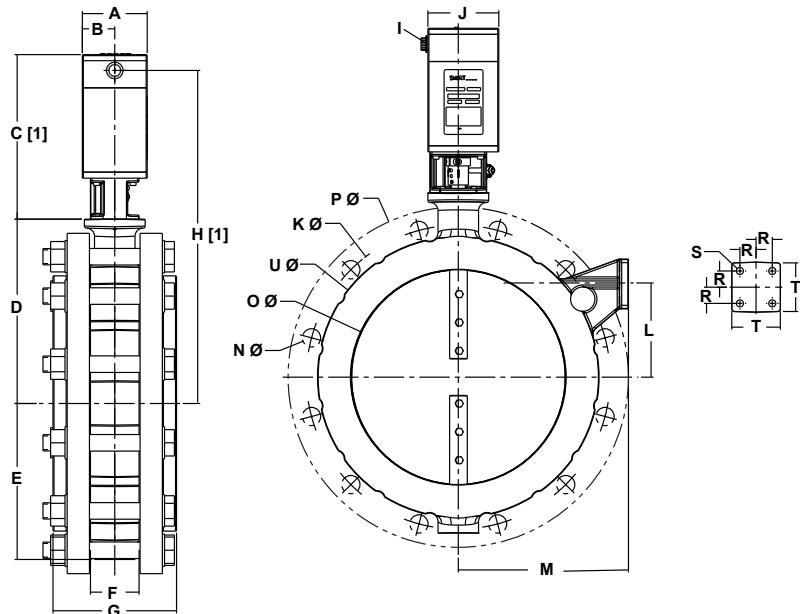


[1] 对于高温 ($>70^{\circ}\text{C}$) 配置增加64 mm

注意：法兰散装发货。

约重：34.9 kg；带法兰 89.4 kg

14" SMARTLINK®蝶阀



[1] 对于高温 ($>70^{\circ}\text{C}$) 配置增加64 mm

注意：法兰散装发货。

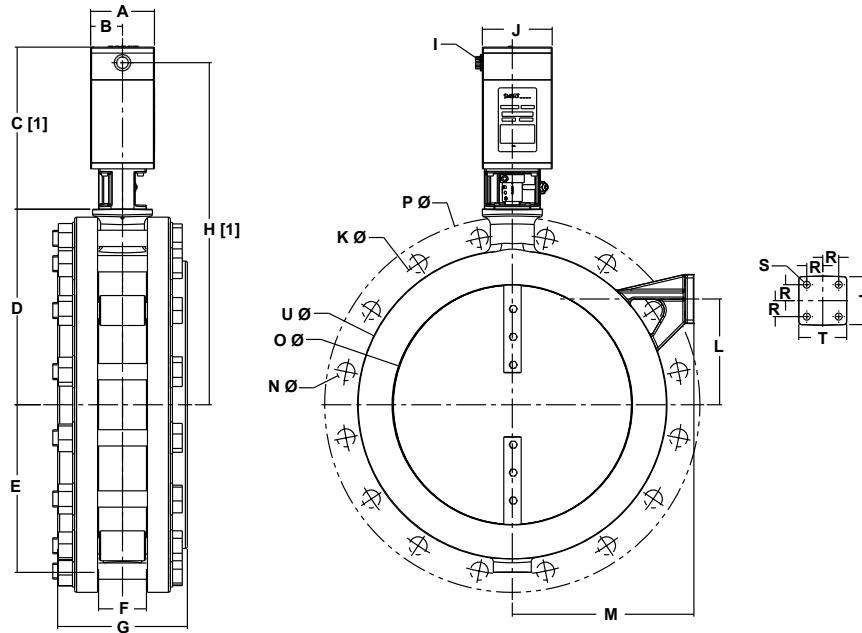
约重：49.4 kg；带法兰 120.7 kg

尺寸单位为 mm，除非另有说明

尺寸	A	B	C	D	E	F	G	H	I NPT	J	K Ø	L	M	N Ø	O Ø	P Ø	R	S [1]	T	U Ø
12"	101.6	50.8	259	259	221	76.2	193	492.8	0.5	111.8	431.8	116.8	241.3	25.4	304.8	482.6	25.4	11.1	76.2	406.4
14"	101.6	50.8	259	289.6	243.8	76.2	193	523.2	0.5	111.8	477.5	147.3	266.7	27.9	335.3	533.4	25.4	11.1	76.2	442

[1] 深 0.438, 4 孔

16" SMARTLINK®蝶阀



尺寸单位为 mm，除非另有说明

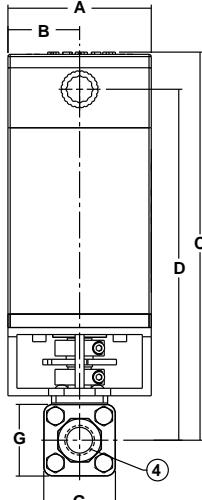
尺寸	A	B	C	D	E	F	G	H	I NPT	J	K Ø	L	M	N Ø	O Ø	P Ø	R	S [1]	T	U Ø
16"	101.6	50.8	259	309.9	266.7	76.2	205.7	543.6	0.5	111.8	538.5	167.6	289.6	28.4	381	596.9	25.4	11.1	76.2	492.8

[1] 深 0.438, 4 孔

球阀

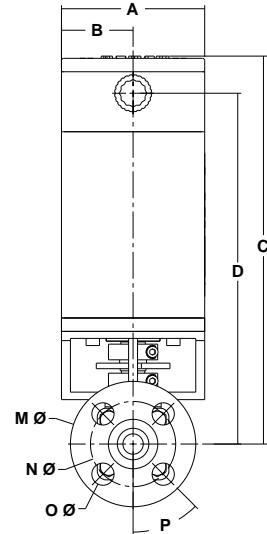
0.5" SMARTLINK® 球阀 - 螺纹

1. 临时装运塞
2. 1/2"NPT螺纹
3. 入口端
4. 1/2"NPT



约重: 5.4 kg

0.5" SMARTLINK® 球阀 - 法兰



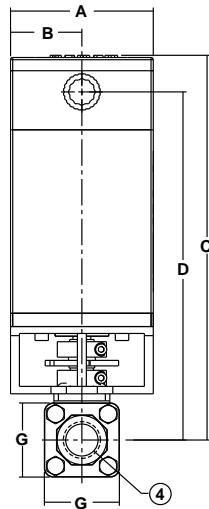
约重: 6.4 kg

尺寸单位为 mm, 除非另有说明

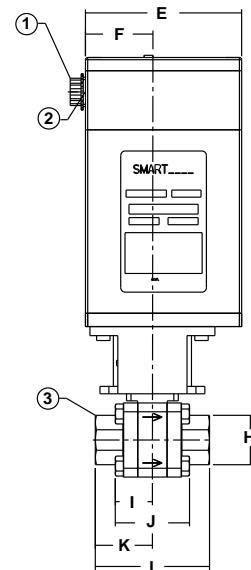
尺寸	A	B	C	D	E	F	G	H oct.	I	J	K	L	M Ø	N Ø	O Ø	P	Q	R
0.5"	101.6	50.8	275	249	111.3	48	50.8	30.5	25.4	50.8	36.8	73.7	88.9	60.5	15.7	45°	53.8	108

0.75" SMARTLINK® 球阀 - 螺纹

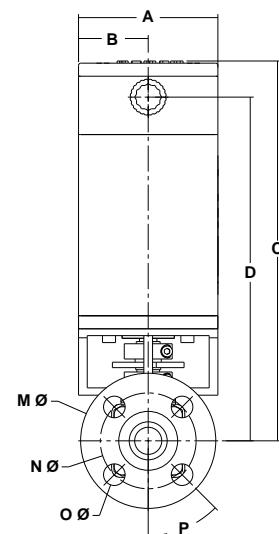
1. 临时装运塞
2. 1/2"NPT螺纹
3. 入口端
4. 3/4"NPT



约重: 5.89 kg



0.75" SMARTLINK® 球阀 - 法兰



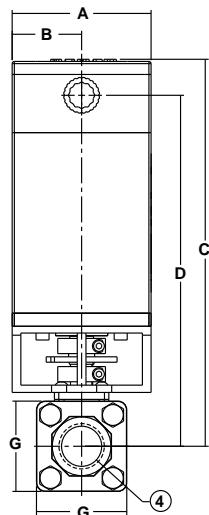
约重: 7.25 kg

尺寸单位为 mm, 除非另有说明

尺寸	A	B	C	D	E	F	G	H oct.	I	J	K	L	M Ø	N Ø	O Ø	P	Q	R
0.75"	101.6	50.8	276.9	250.7	111.3	48	53.3	35.6	26.4	52.8	40.6	81.3	98.6	69.9	15.7	45°	58.7	117.3

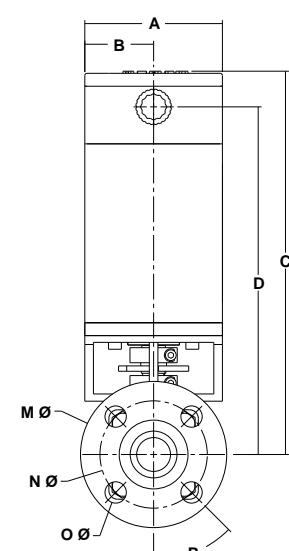
1" SMARTLINK® 球阀 - 螺纹

1. 临时装运塞
2. 1/2"NPT螺
纹
3. 入口端
4. 1/2" NPT



约重: 6.8 kg

1" SMARTLINK® 球阀 - 法兰



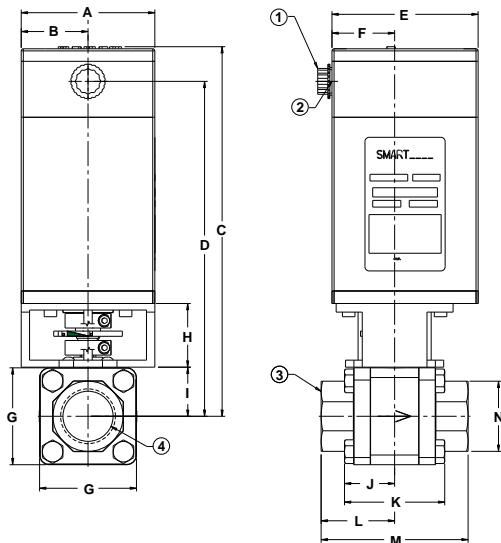
约重: 8.16 kg

尺寸单位为 mm, 除非另有说明

尺寸	A	B	C	D	E	F	G	H oct.	I	J	K	L	M Ø	N Ø	O Ø	P	Q	R
1"	101.6	50.8	283	256.8	111.3	48	66	43.2	31.8	63.5	49.5	99.1	107.9	79.2	15.7	45°	63.5	127

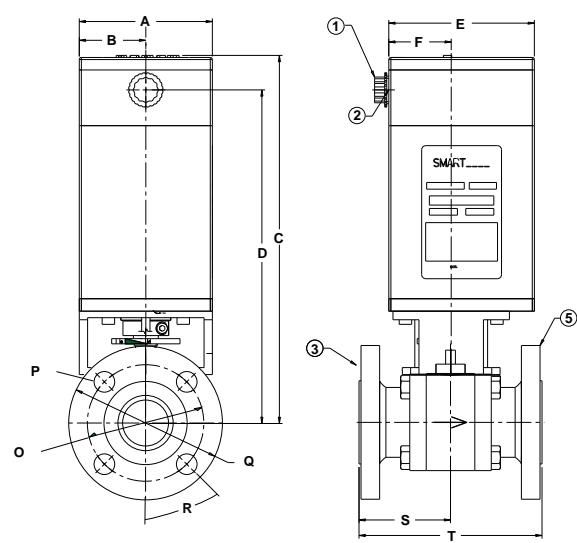
1. 临时装运塞
2. 1/2"NPT螺纹
3. 入口端
4. 1-1/4" NPT
5. 150# ANSI 法兰

1.25" SMARTLINK® 球阀 - 螺纹



约重: 7.5 kg

1.25" SMARTLINK® 球阀 - 法兰

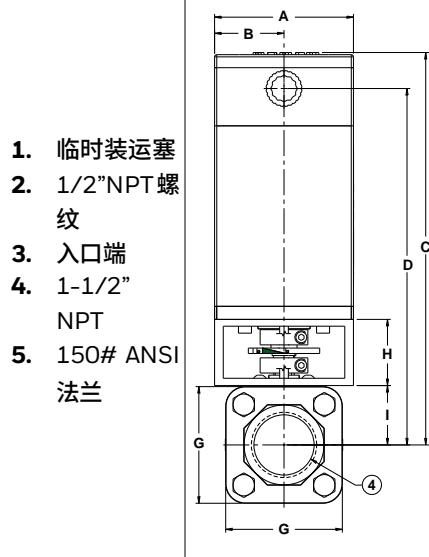


约重: 9.8 kg

尺寸单位为 mm, 除非另有说明

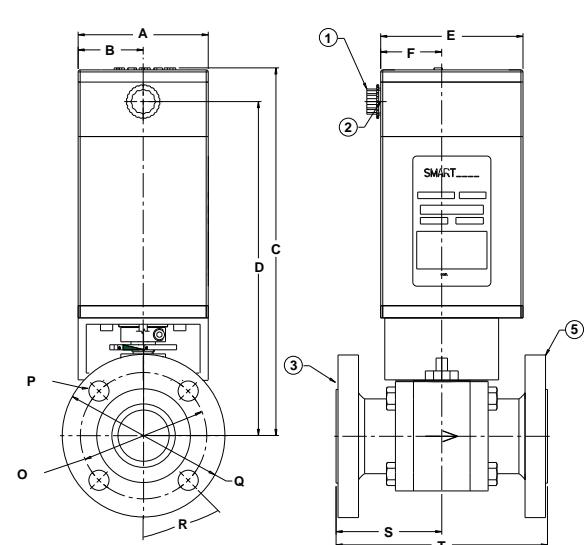
尺寸	A	B	C	D	E	F	G	H	I	J	K	L	M	N oct.	O Ø	P Ø	Q Ø	R	S	T
1.25"	101.6	50.8	281	255	111	48	74	49	37	38	76	56	112	53	89	16	117	45°	70	140

1.5" SMARTLINK® 球阀 - 螺纹



约重: 8.6 kg

1.5" SMARTLINK® 球阀 - 法兰



约重: 11.8 kg

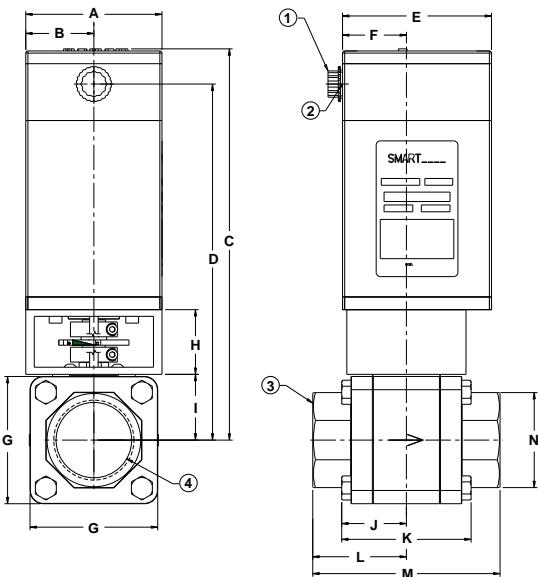
尺寸单位为 mm, 除非另有说明

尺寸	A	B	C	D	E	F	G	H	I	J	K	L	M	N oct.	O Ø	P Ø	Q Ø	R	S	T
1.5"	101.6	50.8	287	261	111	48	85	49	43	43	86	60	119	58	99	16	127	45°	83	165

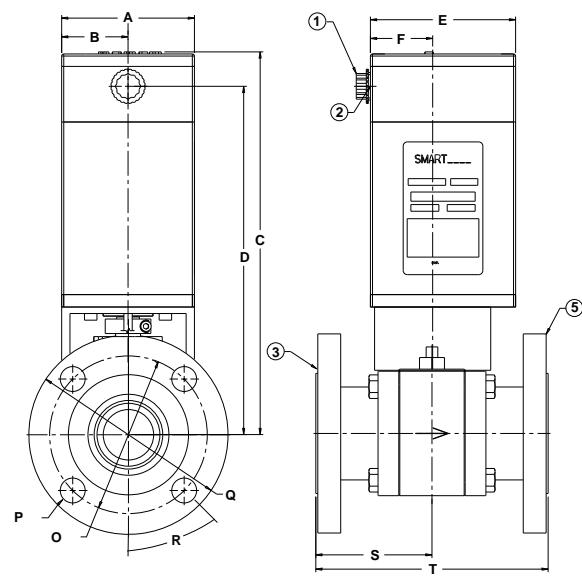
2" SMARTLINK® 球阀 - 螺纹

2" SMARTLINK® 球阀 - 法兰

1. 临时装运塞
2. 1/2"NPT螺纹
3. 入口端
4. 2" NPT
5. 150# ANSI法兰



约重: 10 kg

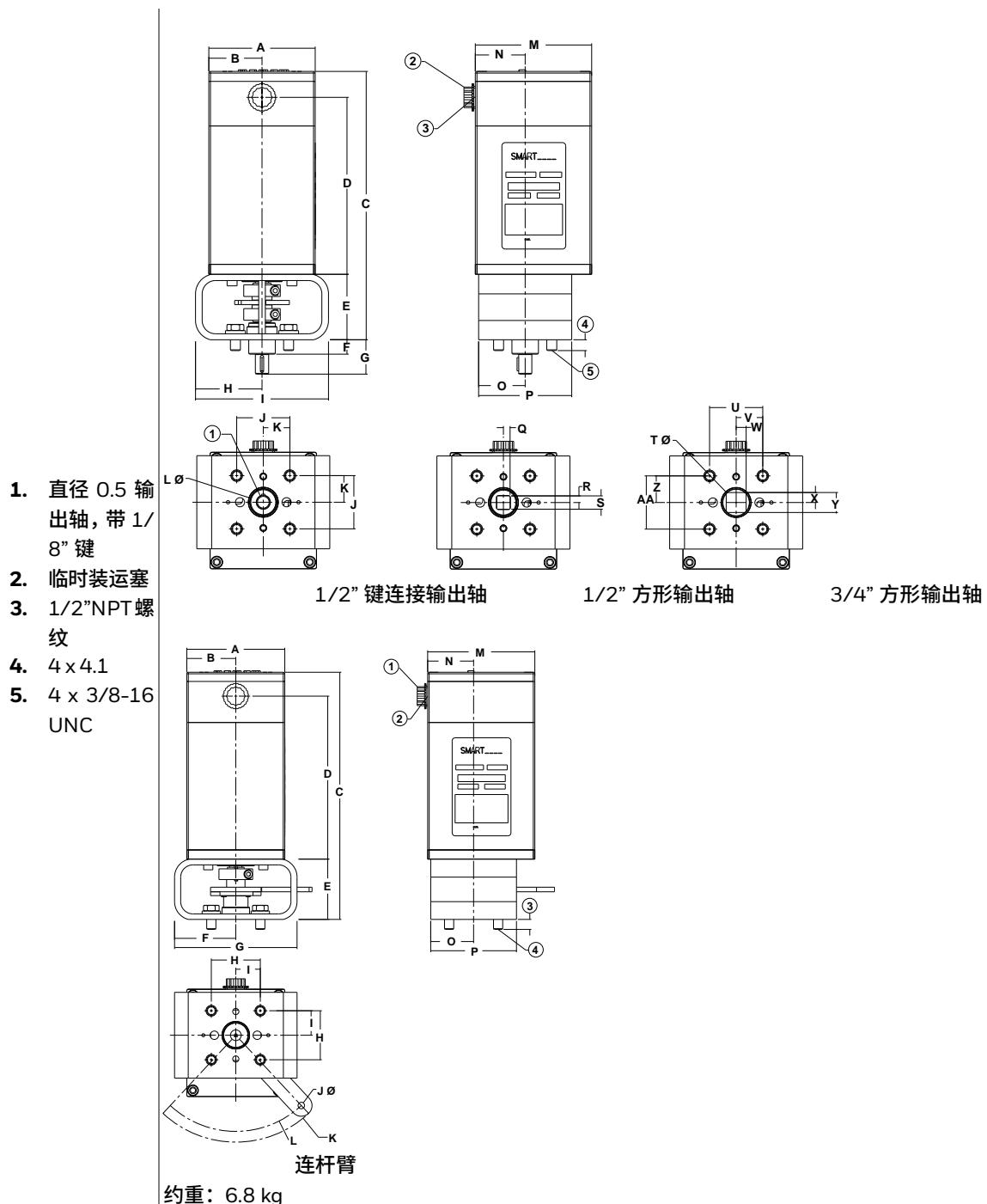


约重: 14 kg

尺寸单位为 mm, 除非另有说明

尺寸	A	B	C	D	E	F	G	H	I	J	K	L	M	N oct.	O Ø	P Ø	Q Ø	R	S	T
2"	101.6	50.8	293	266	111	48	95	49	49	48	97	70	140	71	121	19	152	45°	89	178

控制执行器



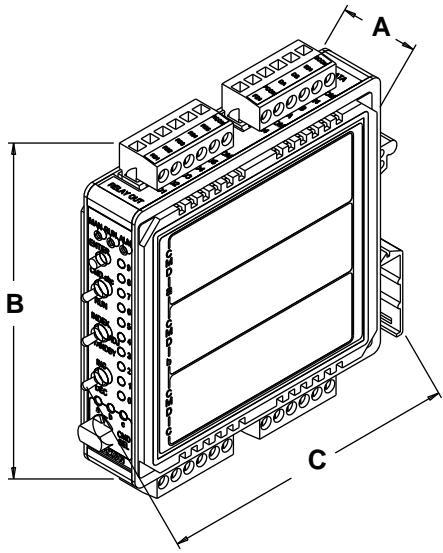
尺寸单位为 mm, 除非另有说明

A	B	C	D	E	F	G	H	I	J	K	L Ø	M	N
101.6	50.8	256	168.9	62.5	13.7	32.8	63.5	127	50.8	25.4	25.4	111.3	47.8

尺寸单位为 mm, 除非另有说明

O	P	Q	R	S	T Ø	U	V	W	X	Y	Z	AA
44.5	88.9	6.35	6.35	12.7	25.4	50.8	25.4	9.5	9.5	19.1	25.4	50.8

控制接口单元

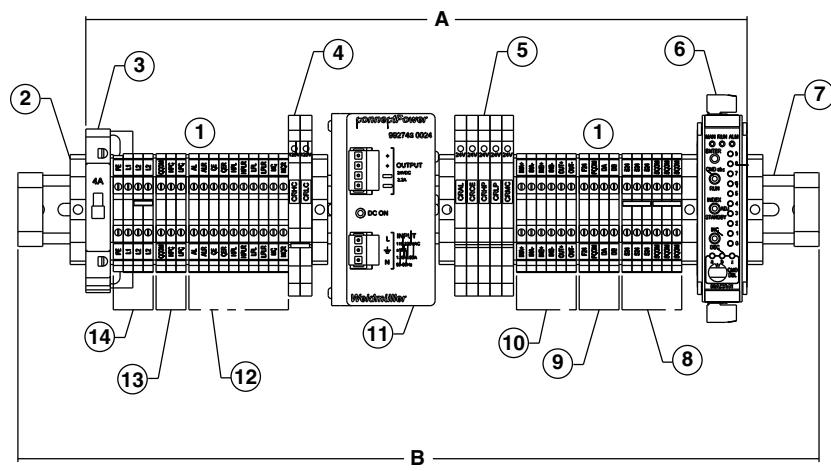


尺寸单位为 mm, 除非另有说明			
A	B	C	重量 (kg)
25.4	116.1	115.1	0.5

DIN 导轨组件

(图示为最大选项)

1. 接线端子
2. DIN 导轨末端止动装置 (5)
3. 4.0A 断路器
4. 120VAC 继电器 (可选),
最多 2 个
5. 24VDC 继电器 (可选),
最多 5 个
6. 控制接口单元
7. TS 35X15 高顶帽开槽 DIN 导轨
8. 24VDC 电源
9. 执行器网络
10. 4-20 mA I/O
11. 24VDC 2.3A 电源 (可选)
12. 继电器输出触点
13. 继电器输入触点
14. 120VAC 电源

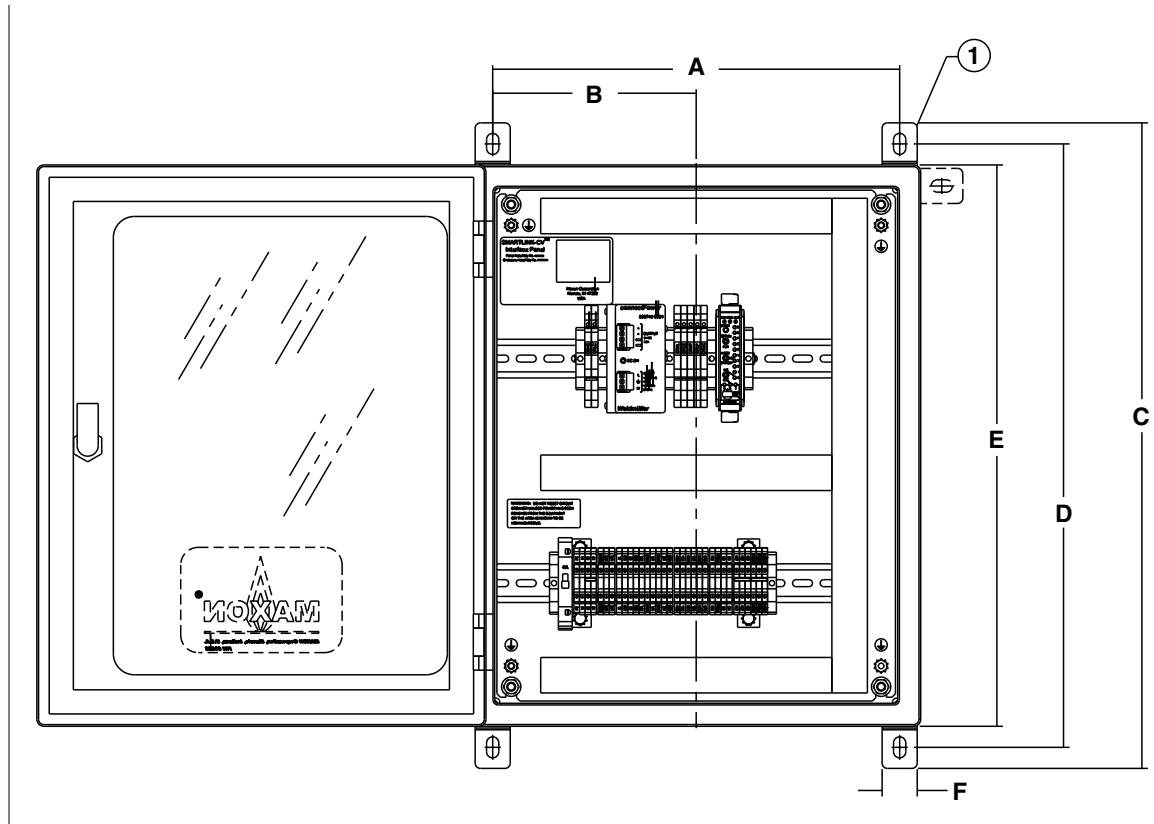


尺寸单位为 mm, 除非另有说明		
A	B	重量 (kg)
338	410	2.3

接口面板

(图示为最大选项)

1. 安装支耳



尺寸单位为 mm, 除非另有说明

A	B	C	D	E	F	重量 (kg)
368	184	584	546	508	32	18

安装说明

使用设备前, 请仔细阅读操作和安装说明, 且严格按照现行法规安装本设备。



制造商和进口商地址

下面是 Honeywell - Maxon 制造基地和欧洲销售办事处的地址及联系方式。欧洲销售办事处是符合欧盟新立法框架 (NLF) 的进口商和欧盟制造商的代表。

美国印第安纳州曼西市 - 制造商

201 East 18th Street
P.O. Box 2068
Muncie, IN 47307-0068

电话: 765.284.3304
传真: 765.286.8394

欧洲销售办事处 - 进口商

比利时
Maxon International BVBA
Luchthavenlaan 16-18
1800 Vilvoorde, Belgium
电话: 32.2.255.09.09
传真: 32.2.251.82.41

机械安装

所需部件

最小的 SMARTLINK® 系统需要 1 个控制接口单元和 1 个阀门执行器组件。

SMARTLINK® 控制接口单元应安装在被工具紧固的外壳内, 并且该外壳应符合 EN 60079-0 和 EN-60079-15 的要求, 支持 EN 60079-14 中规定的适用接线方法。若安装在室外和潮湿场所, 则外壳应至少符合 IP54 等级要求。若安装在提供足够防护以防止固体异物或水侵入的场所, 则外壳应至少符合 IP4X 等级要求。

可选部件

MAXON 可提供 DIN 导轨安装的接口继电器、24VDC 电源、接线端子组件, 预接线的 DIN 导轨组件和 NEMA 4 封闭式面板。

SMARTLINK® 智能阀门和执行器总成的机械安装需要满足以下条件:

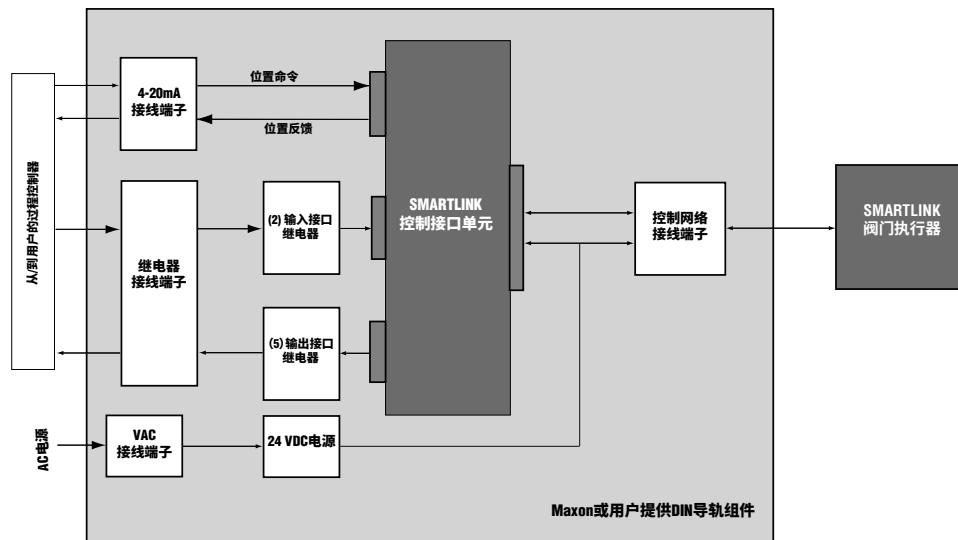
- SMARTLINK® 控制接口单元以及所有可选的接口继电器安装在适当的电气外壳或机柜内的 DIN 导轨上,
- 将 SMARTLINK® 阀门执行器组件以任意方向安装在管道系统中。

电气安装

系统布线需求

下面的系统框图说明了 SMARTLINK® 控制接口单元和执行器组件所需的电气布线的源头与走向。

系统框图



基本电气安装需要下列接线：

- 低压4-20mA信号接线**，从用户的过程控制器到SMARTLINK[®]控制接口。4-20mA 位置反馈信号接线是可选的，对于特定应用可能不需要。
- 通信接线**，连接SMARTLINK[®]控制接口单元与阀门执行器。
- 低压供电接线**，连接 24VDC 电源与 SMARTLINK[®] 控制接口单元。可提供包含该接线的预接线 MAXON DIN 导轨组件。
- 低压直流继电器线圈接线**，从 SMARTLINK[®] 控制接口单元到输出接口继电器。所有接口继电器都是可选的。可提供包含与继电器接线的预接线 MAXON DIN 导轨组件。
- 120/230 VAC 输入继电器接线**，从用户过程控制器到可选的输入继电器。若应用未使用输入接口继电器，则无需该接线。可提供包含继电器和接线的预接线 MAXON DIN 导轨组件。
- 低压直流继电器触点输入接线**，从输入继电器触点到控制接口单元。
- 120/230 VAC 输出继电器接线**，从输出接口继电器触点到用户的过程控制设备。若应用未使用输出接口继电器，则无需该接线。
- 120/230 VAC 供电接线**，连接用户的熔断电源与 24VDC 电源。

电气布线应按照所有本地和 NEC 1 法规进行。参考表 1 (第 48 页) 和表 2 (第 49 页) 总结了控制接口单元和阀门执行器的所有输入 / 输出端子。参考表 3 (第 49 页) 总结了所有端子的最大接线长度、类型和尺寸。

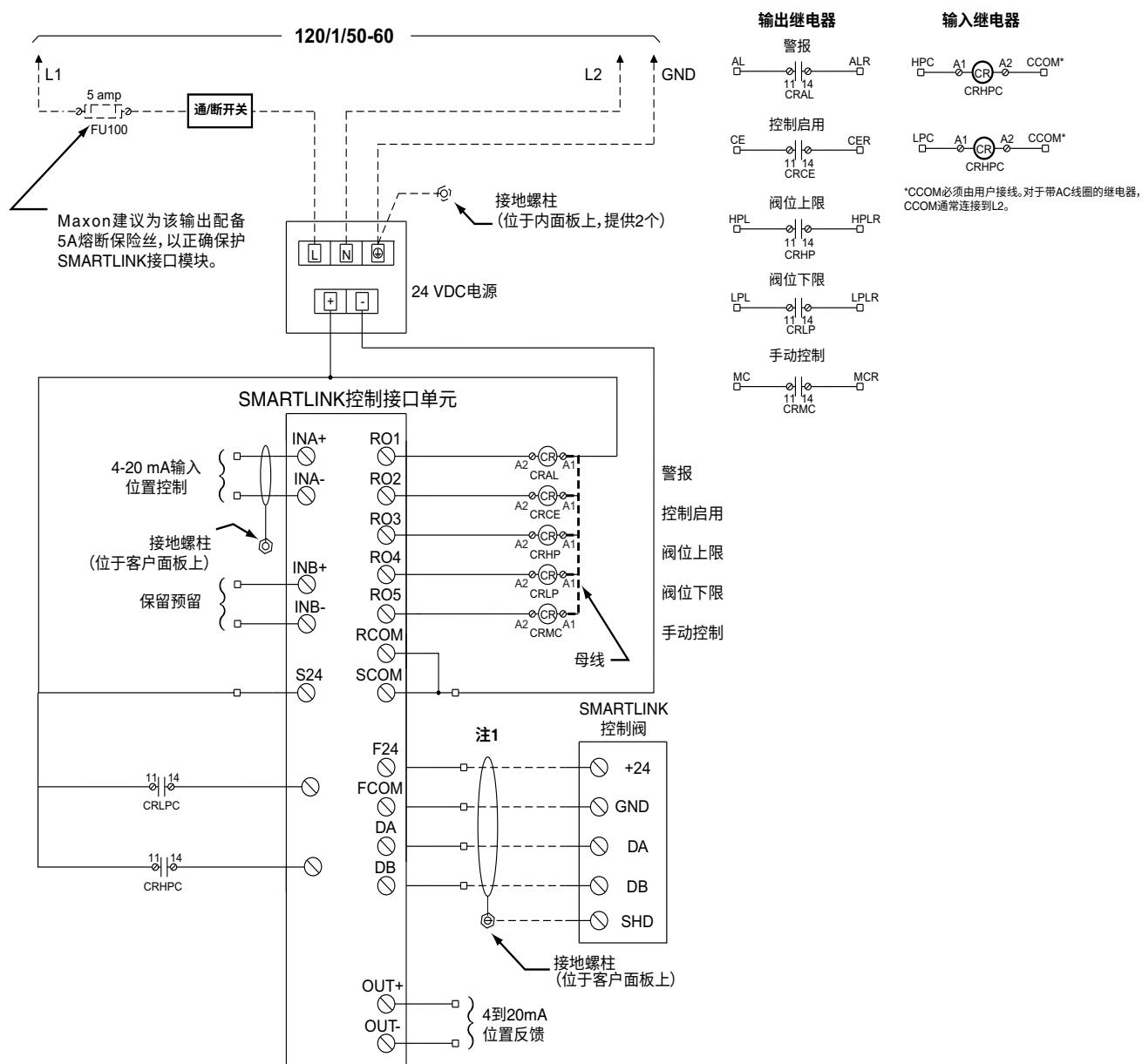
SMARTLINK[®] 阀门执行器总成的典型接线图如第 36 页所示。

若控制接口单元作为 MAXON 预接线 DIN 导轨组件的一部分提供，由于配备的 24VDC 电源和接口继电器已经接线到控制接口单元，这样电气接线变的简单。预接线 DIN 导轨组件的电气安装需要满足以下条件：

- 低压4-20mA信号接线**，从用户的过程控制器到SMARTLINK[™] DIN 导轨组件。4-20mA 位置反馈信号的接线是可选的。
- 通信接线**，连接SMARTLINK[®]控制接口单元与阀门执行器。
- 120/230 VAC 输入继电器接线**，从用户过程控制器到可选的输入继电器。若应用未使用输入接口继电器，则无需该接线。
- 120/230 VAC 输出继电器接线**，从输出接口继电器触点到用户的过程控制设备。若不需要输出接口继电器，则无需该接线。
- 20/230 VAC 供电接线**，连接用户的熔断电源与 24VDC 电源。

所有电气布线都应按照本地和 NEC 1 法规进行。参考表 4 (第 50 页)，其中总结了 DIN 导轨组件的所有输入 / 输出端子；参考表 5 (第 51 页)，其中总结了所有 DIN 导轨组件端子的最长接线长度、类型和尺寸。

典型接线原理图（参见下面的注 2）



注 1：SMARTLINK® 的建议导线颜色代码

部件端子名称	电缆	
	Maxon #59829 (不得超过 100 ft)	Belden #3086A (不得超过 300 ft)
F24 / +24	白色 / 橙色	棕色
FCOM / GND	橙色	蓝色
DA	白色 / 蓝色	白色
DB	蓝色	黑色

注 2：该接线原理图表示典型产品应用中的电气连接。请参见具体应用的接线图进行故障排除。

操作说明

负责制造和 / 或整体安装采用 MAXON 产品的完整系统的制造商或人员所提供的说明，其优先级高于 MAXON 提供的安装和操作说明。若 MAXON 提供的任何说明与当地法规或规范冲突，请在设备初次启动前联系 MAXON。

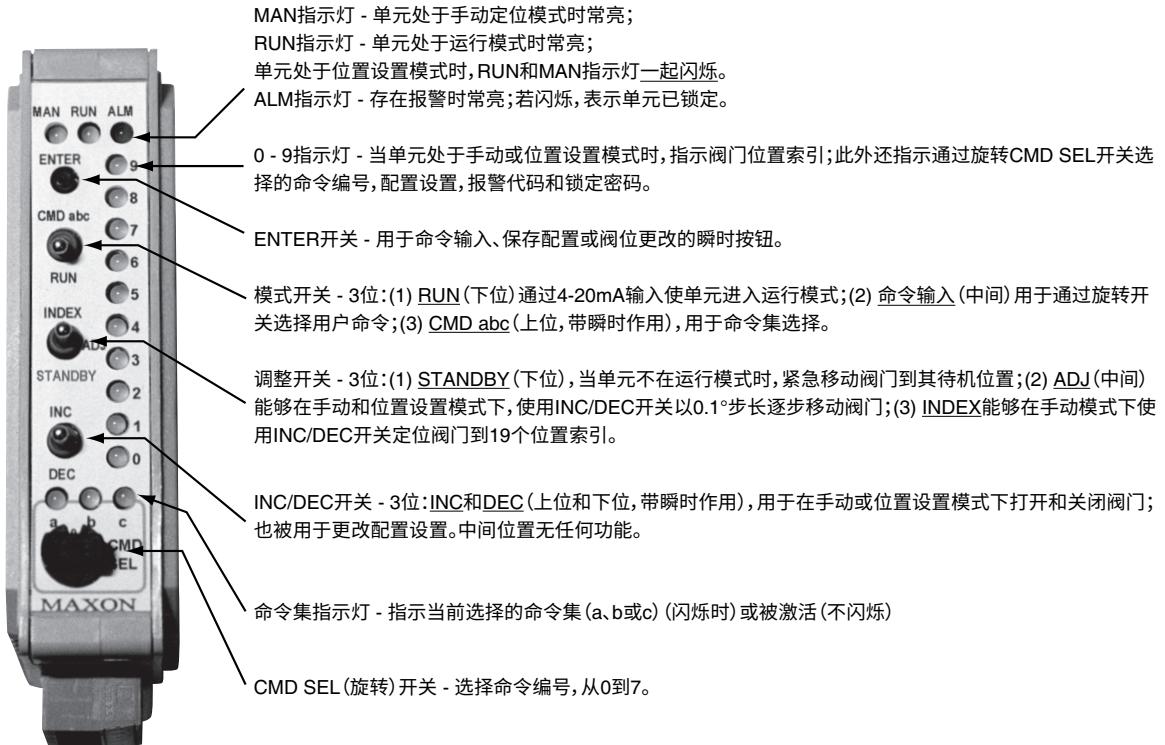


开始启动和调整程序之前，请仔细阅读说明书。确认所有与系统安全运行相关和必需的设备已正确安装，已成功执行所有调试前检查，并且安装的安全相关装置均已妥善就位。

对于 SMARTLINK® 控制接口单元和执行器组件，安装人员应执行以下调试步骤：

- 通电前进行接线检查
- 通电后进行操作检查
- 系统配置，若应用需要
- 阀门特性，若应用需要

控制接口单元



布线检查

在给 SMARTLINK® 控制接口单元和阀门执行器组件通电之前，请执行以下布线检查：

1. 确认 120V 交流电未直接连接到 SMARTLINK® 控制接口单元和阀门执行器组件。两种装置均由 24V 直流电源供电。控制接口单元的所有输出接口继电器接线均连接到 24V 直流电继电器线圈。
2. 确认所有连接都满足正确的线束类型和最大线束长度要求。
3. 确认控制接口单元和阀门执行器组件的 24V/ 数据连接器上的颜色代码连接是否正确。
4. 逐个测量封闭控制接口单元的用户面板上的接地，与连接到阀门执行器的四个信号之间的电阻：F24 (Field + 24VDC) , FCOM (Field Common) , DA (Data-A) 和 DB (Data-B)。电阻测量值应表示为开路状态（即电阻值大于 106 Ω）。若未测量到开路，则表示控制网络电缆存在损坏或接线错误，必须予以纠正。
5. 确认 4-20mA 电缆和控制接口单元与阀门执行器组件间的控制电缆的屏蔽层是否正确端接。
6. 如果 MAXON SMARTLINK® 接口继电器没有随控制接口单元一起提供，确认所有必需继电器的线圈额定值均小于 30VDC 和 100mA。输出接口继电器线圈被连接到控制接口单元，继电器输出驱动器连接器的 R01 到 R05 端子。

所有端接定义和接线 / 屏蔽需求请参见 SMARTLINK® 参考表 1 到表 5（第 48 页到第 51 页）。

通过使用 NEMA 4 或 IP66 防护等级的防尘防水的电连接器，保持 MAXON 外壳的完整性。对于任何电线或电缆，都使用电缆密封套和应变消除环。在所有管道连接上使用内部密封材料。若允许水分通过电线连接器进入，则可能会危害设备内部器件。确保设备连接位置不处于管道的低点，以避免冷凝水流

入外壳中；如有必要，安装滴水环。确保检修盖板安装到位并正确紧固。所有盖板螺钉应按照对角交叉拧紧方式紧固。应定期检查盖板螺钉，以确保充分的密封保护。

操作检查

给 SMARTLINK® 控制接口单元和 SMARTLINK® 阀门执行器组件通电，并执行以下操作检查：

1. 系统通电后，确认控制接口单元报警指示灯熄灭，并且运行指示灯亮起。若报警指示灯亮起，请参阅第 45 页，以确定报警原因和纠正措施。
2. 将用户的过程控制器设置到手动模式，或用模拟的 4-20mA 电流回路临时替代 4-20mA 位置命令。当控制接口单元的命令开关切换到“RUN”位置时，将位置命令信号逐渐从 4mA 提高到 20mA，并确认阀门运动。阀门的位置可以通过机械联轴器（连接执行器与阀轴）上的“OPEN”或“CLOSED”标记直接目视观察。若应用需要 4-20mA 位置反馈信号，则在更改位置命令时测量该反馈电流回路，并在多个中间阀位暂停后，确认两个电流（输入与输出）是否基本相等。
3. 若过程控制器无法置于手动模式或无法生成模拟命令信号，则可以将 SMARTLINK® 组件设置为本地手动模式。（参见第 39 页上的命令 A-O 和通用命令输入说明）。一旦系统进入手动模式，使用控制接口单元上的 INC/DEC 开关将阀门驱动到其完全打开和关闭位置。
4. 如果已安装，通过测量继电器触点上存在 / 消失电压来检查每个输出接口继电器的运行。若 DIN 导轨组件随控制接口单元提供，则每个继电器触点的端子显示在参考表 6（第 52 页）中。控制接口继电器驱动器输出端子也显示在参考表 6 中，以便在 MAXON 没有提供和预接线的情况下测试接口继电器。

以下两种情况出现时，不得切断空气阀执行器的电源：1) 阀门开启超过 30°；2) 鼓风机正在运行。在断电之前，请确保阀门位置的开启角小于 30°，和 / 或鼓风机已停止。不遵守这些注意事项可能会导致阀门执行器永久性损伤。

用户命令

下面列出了 3 个 SMARTLINK® 命令集 (a, b 和 c)。右侧列出了每个命令的输入要求 (若适用)。参考表 8 到表 10 (第 54 页到第 59 页) 中列出了以下用户命令的详细说明。

命令集 “A”

A-0.....进入手动定位模式	位置命令 <= 4 mA
A-1.....显示报警代码	
A-2.....进入阀位设置模式	位置命令 = 4-20 mA
A-3.....保留预留	
A-4.....保留预留	
A-5.....设置最大位置和最小 / 最大斜率.....	位置命令 = 20 mA
A-6.....设置最小位置和最小 / 最大斜率.....	位置命令 = 4 mA
A-7.....解锁阀门配置	单元必须被“锁定”

命令集 “B”

B-0.....选择信号丢失位置	
B-1.....保留预留	
B-2.....选择待机位置	
B-3.....选择死区	
B-4.....设置阀位上限阈值	单元处于手动模式
B-5.....设置阀位下限阈值	单元处于手动模式
B-6.....设置自动斜率调整开启 / 关闭	
B-7.....保留预留	

命令集 “C”

C-0.....检查阀门校准.....	仅适用于 MAXON 培训的技术人员
C-1.....校准阀门.....	仅适用于 MAXON 培训的技术人员
C-2.....启用阀门校准 / 检查.....	仅适用于 MAXON 培训的技术人员
C-3.....恢复出厂默认设置	单元处于位置设置模式
C-4.....输入新锁定密码	单元“已解锁”修改
C-5.....选择锁定启用 / 停用.....	单元“已解锁”修改
C-6.....将配置文件另存为备份	
C-7.....恢复备份配置文件	单元处于位置设置模式

通用命令输入说明：

1. 只有下列所有条件同时满足时才能执行用户命令：
 - a. MODE 开关未处于 RUN 位置，
 - b. 其中一个绿色命令集指示灯 (a、b 和 c) 正在闪烁，
 - c. ADJUST 开关未处于 STANDBY 位置，并且
 - d. 单元“已解锁”。(对于命令 A-7，解锁阀门配置和命令 A-1，显示报警代码，条件 d 不是必需的)
 - e. 对于某些命令，单元必须处于特定模式或有正确的 4-20 mA 命令信号 (参见上面列出的命令输入要求，或第 54 页到第 59 页的参考表 8 到表 10)。
2. 若 a、b 或 c 命令集指示灯未闪烁，则将 MODE 开关推动到 CMD abc 位置 (上位)，或更改 CMD SEL 旋转开关的位置。这将使命令集指示灯开始闪烁，并允许输入命令。
3. 通过将 MODE 开关向上推到 CMD abc 位置，选择所需的命令集。随后的 CMD abc 开关输入将更改命令集选择，如绿色命令集 (a、b 和 c) 指示灯所示。
4. 通过更改 CMD SEL 旋转开关的位置来选择所需的命令编号。当命令集指示灯之一闪烁时，所选的命令编号通过亮起相应的数字 (0-9) 指示灯表示。
5. 选择命令集和编号后，按下 ENTER 按钮。若在按下 ENTER 按钮后，所有数字指示灯立即闪烁，则表示发生了命令输入错误并且命令未被执行。若出现输入错误，检查单元是否已锁定 (即报警灯闪烁) 或 ADJUST 开关处于 STANDBY 位置。若两种情况都不存在，检查命令的具体输入要求。

系统配置

共有 8 个 SMARTLINK[®] 配置设置，可通过使用控制接口单元上的开关和指示灯，执行以下命令对 8 个配置设置进行更改。每个设置的详细说明可参见第 53 页上的参考表 7：SMARTLINK™ 系统配置摘要。

命令名称	命令编号	出厂默认设置
选择 LOS 位置	B-0	无位置变化
选择待机位置	B-2	位置索引 0
选择控制死区	B-3	0.06% 死区
设置阀位上限阈值	B-4	80.0°
设置阀位下限阈值	B-5	0.0°
设置自动斜率调整开启 / 关闭	B-6	自动斜率开启
输入新锁定密码	C-4	密码：0, 0, 0, 0
选择锁定启用 / 停用	C-5	锁定停用

更改任何系统配置设置之前，检查出厂默认设置；在许多应用中，无需修改默认设置。若确实需要更改设置，请遵循下列步骤。

1. 选择并输入所需的系统配置命令。
2. 输入命令后，数字 (0-9) 指示灯之一将亮起，指示当前的配置设置。（例如：若锁定配置被设置为 # 0，则锁定禁用，成功输入命令 C-5（锁定启用 / 禁用）后，指示灯 0 将常亮。）
3. 使用 INC/DEC 开关选择所需的配置设置。瞬时向上或向下推动 INC/DEC 开关后，所选设置会更改并且通过相应的数字指示灯亮起 (0-9) 来表示。
4. 选择所需的配置设置后，按下 ENTER 按钮。指示所选配置的常亮数字指示灯将立即熄灭，表示命令已完成并且配置设置已保存。
5. 为了确认已保存正确设置，重新输入命令并通过数字指示灯 (0-9) 的指示确认新设置。

阀门特征化

阀门特征化对于更改阀位与 4-20mA 位置命令之间的关系是必需的。该过程允许现场调节“已安装”的阀门特性，而无需机械调节阀门或外部连杆。

SMARTLINK[®] 预设为线性斜率，但可以使用 10 点特征化程序或 19 点特征化程序进行自定义。

10 点特征化

SMARTLINK[®] 交付时的配置设置可轻松地在 19 个位置索引中的 10 个位置调整阀门位置，并自动在其他 9 个（中间）索引处设置阀位。

1. 将命令 SMARTLINK[®] 的过程控制器设置到手动模式，并在 4-20mA 位置输出上连接一个 4 位电流表。执行命令 B-6 并确认自动斜率功能被设置为 #1，自动斜率开启。若设置不正确，参见第 40 页或第 53 页的参考表 7。
2. 执行命令 A-2，进入位置设置模式。在这个模式下，黄色和绿色的运行指示灯将同时闪烁。位置命令信号决定了 19 个位置索引中的哪一个 / 几个可以被修改，如闪烁的数字指示灯所示。将过程控制器的输出设置为 0%（索引 #0）或 100%（索引 #9）以开始特征化。
3. 当 ADJUST 开关处于中间（ADJ）位置时，向上或向下推动 INC/DEC 开关以更改阀门位置。每按一次 INC/DEC 开关，阀门就移动 0.1°。若开关保持在上位或下位超过 3 秒钟，则阀门将以 0.5° 的步长移动，直至从存储的阀门位置移动 8° 为止。（达到该 8° 极限时，所有数字指示灯都会瞬间闪烁。）将阀门移动到所需位置后，按下 ENTER 按钮保存位置设置。记录阀门位置反馈，以 mA 或 % 为单位。
4. 对于每个连续的整数索引，将控制器的输出调整到第 42 页所示调试表中的%或 mA 设置，然后重复第 3 步中的调整过程。自动斜坡功能启用时，仅需对 10 个整数索引进行调整，因为中间索引（0.5, 1.5 等）的位置会自动设置为整数索引（0、1、2 等）的位置的中间值。
5. 执行命令 C-6，将配置文件另存为备份。将 MODE 开关切换到 RUN 位置，并将用户的过程控制器置于 AUTO 模式。

19 点特征化

有些应用需要在执行器的整个控制范围内进行精确调节。对于这些应用，必须按照下列步骤调整所有 19 个位置。

1. 将命令 SMARTLINK[®] 的过程控制器设置到手动模式，并在 4-20mA 位置输出上连接一个 4 位电流表。执行命令 B-6 并设置自动斜率功能为 #0，自动斜率关闭。（更改配置设置请参见第 40 页或第 53 页的参考表 7）。
2. 执行命令 A-2，进入位置设置模式。在这个模式下，黄色和绿色的运行指示灯将同时闪烁。位置命令信号决定了 19 个位置索引中的哪一个 / 几个可以被修改，如闪烁的数字指示灯所示。将过程控制器的输出设置为 0%（索引 #0）或 100%（索引 #9）以开始特征化。
3. 当 ADJUST 开关处于中间（ADJ）位置时，向上或向下推动 INC/DEC 开关以更改阀门位置。每按一次 INC/DEC 开关，阀门就移动 0.1°。若开关保持在上位或下位超过 3 秒钟，则阀门将以 0.5° 的步长移动，直至从存储的阀门位置移动 8° 为止。（达到该 8° 极限时，所有数字指示灯都会瞬间闪烁。）将阀门移动到所需位置后，按下 ENTER 按钮保存位置设置。记录阀门位置反馈，以 mA 或 % 为单位。
4. 将控制器的输出调整到第 42 页所示调试表中的下一个% 或 mA 设置，然后对所有 19 个位置索引重复第 3 步中的调整过程。自动斜坡功能关闭时，相邻索引的位置不会自动计算。因此，在此过程中应移动到所有 19 个位置索引，并在必要时进行调整。
5. 执行命令 C-6，将配置文件另存为备份。将 MODE 开关切换到 RUN 位置，并将用户的过程控制器置于 AUTO 模式。

若在并联定位燃烧应用中特征化 SMARTLINK[®] 时发现不安全的操作条件，请遵循以下说明：

1. 当 SMARTLINK[®] 处于用于阀门特征化的位置设置模式时，可以将 ADJUST 开关推到 STANDBY 位置（下位）。该操作将立即将阀门移动到待机位置，从而覆盖 4-20mA 位置命令。
2. 出厂默认的待机位置是索引 #0 处的阀门位置，即配置文件中的最小阀位。当 ADJUST 开关位于该位置时，无法执行任何命令。当 MODE 开关位于 RUN 位置（下位）时，待机位置功能被禁止。

MAXON SMARTLINK® 调试表

(应在安装时完成)

序列号 / 安装日期: _____

位置索引	接口输出 (指示灯 #)	位置命令 (%)	位置命令 (mA)	自定义位置 (% 或 mA)	出厂默认 值 (°)	现场读数 (“wc, 02% 等)
0	0	00.00%	4.000		0.0	
0.5	0, 1	05.56%	4.889		4.4	
1	1	11.11%	5.778		8.9	
1.5	1, 2	16.67%	6.667		13.3	
2	2	22.22%	7.556		17.8	
2.5	2, 3	27.78%	8.444		22.2	
3	3	33.33%	9.333		26.7	
3.5	3, 4	38.89%	10.222		31.1	
4	4	44.44%	11.111		35.6	
4.5	4,5	50.00%	12.000		40.0	
5	5	55.56%	12.889		44.4	
5.5	5, 6	61.11%	13.778		48.9	
6	6	66.67%	14.667		53.3	
6.5	6, 7	72.22%	15.556		57.8	
7	7	77.78%	16.444		62.2	
7.5	7, 8	83.33%	17.333		66.7	
8	8	88.89%	18.222		71.1	
8.5	8, 9	94.44%	19.111		75.6	
9	9	100.00%	20.000		80.0	
下限	---	---	---		00.0	
上限	---	---	---		80.0	

配置命令名称 (和编号)	出厂默认值 (和配置设置编号)	现场配置设置
选择信号丢失 (LOS) 位置 (B-0)	无位置变化 (#4)	
选择待机位置 (B-2)	位置索引0 (#0)	
选择控制死区 (B-3)	0.06%死区 (#2)	
设置阀位上限阈值 (B-4)	80.0° (N/A)	
设置阀位下限阈值 (B-5)	0.0° (N/A)	
设置自动斜率调整开启/关闭 (B-6)	自动斜率开启 (#1)	
输入新锁定密码 (C-4)	密码: 0,0,0,0 (N/A)	
选择锁定启用/停用 (C-5)	锁定停用 (#0)	

单元解锁和密码输入

SMARTLINK® 控制接口单元出厂时已停用锁定功能，并且出厂默认为 4 位密码或 0,0,0,0 的密码组合。如要首次锁定设备并更改默认密码，按下面两个程序所述，必须首先启用锁定功能（命令 C-5）并输入默认密码（命令 A-7）。启用锁定功能并“解锁”单元后，可以按照下面的步骤使用命令 C-4 输入新密码。若忘记密码，请联系 MAXON 获取“主”密码。

启用“锁定”配置设置（命令 C-5）：

1. 若报警指示灯闪烁，则说明锁定功能已启用，并且单元处于“锁定”状态。更改密码之前，必须按照以下步骤，通过输入当前密码（命令 A-7）来解锁控制接口单元。
2. 若报警指示灯未闪烁，则选择并输入命令 C-5，锁定启用 / 停用。
3. 输入命令后，数字 (0-9) 指示灯之一将亮起，指示当前的配置设置。若 #1 指示灯亮起，则表示锁定功能已启用，可以执行以下步骤更改密码。若 #0 指示灯亮起，则表示锁定功能已停用。
4. 如要选择 #1 设置（锁定启用），立即将 INC/DEC 开关推到上位。#1 指示灯会马上亮起，表示已选择新设置。
5. 按下 ENTER 按钮。#1 指示灯将熄灭，表示命令完成并且配置设置已保存。单元现在已锁定，并且报警指示灯将开始闪烁。
6. 如要更改当前密码，执行以下两个程序（命令 A-7 和 C-4）。

输入当前“锁定”密码（命令 A-7）：

1. 选择并输入命令 A-7，解锁阀门配置。
2. 输入命令后，使用 INC/DEC 开关选择第一个密码数字。所选的数字将通过一个数字指示灯 (0-9) 指示。
3. 选择密码的第一个数字后，按一次 ENTER 按钮。数字指示灯应立即熄灭，表示输入被接受。
4. 重复步骤 2 和步骤 3，输入第 2、第 3 和第 4 个密码数字。若密码输入错误，则输入第四个，即最后一个密码数字后，所有数字指示灯将立即闪烁。若密码正确，则在无其他警报的情况下，报警指示灯将停止闪烁并完全熄灭。
5. 如要更改当前密码，执行以下程序（命令 C-4）。

输入新“锁定”密码（命令 C-4）：

1. 如要输入新锁定密码，必须启用锁定功能（命令 C-5）并且必须输入当前密码（即必须使用命令 A-7“解锁”单元）。若不满足这些命令输入要求，则参见上述两个程序。
2. 选择并输入命令 C-4，然后输入新锁定密码组合。
3. 输入命令后，使用 INC/DEC 开关选择第一个新密码数字。所选的数字将通过一个数字指示灯 (0-9) 指示。
4. 选择新密码的第一个数字后，按一次 ENTER 按钮。数字指示灯应立即熄灭，表示输入被接受。请记录新数字以备将来使用。
5. 重复步骤 2 和步骤 3，输入第 2、第 3 和第 4 个密码数字，记得记录每个输入的密码数字。
6. 通过重新锁定控制接口单元（将 MODE 开关切换到 RUN 位置，然后返回中间的命令输入位置），然后按照上述程序使用命令 A-7 输入新密码，来确认新密码。

手动操作

命令 A-0（进入手动定位模式）被用于覆盖 4-20 mA 位置命令输入。（当阀门正在运行过程中，需要根据 4-20 mA 输入信号连续定位时，不应使用此命令）

进入手动定位模式（命令 A-0）：

1. 如要进入手动定位模式，必须首先将位置命令输入信号降低到 4mA 或更小。
2. 选择并输入命令 A-0，进入手动定位模式。若在输入命令 A-0 后，数字指示灯立即闪烁，则：a) 位置命令可能大于 4 mA；b) 调节模式开关可能处于 STANDBY 位置；c) 单元可能被“锁定”以防止篡改。
3. 输入命令后，黄色手动（MAN）指示灯将亮起，并且 R05（继电器输出驱动器 #5）将给手动控制继电器（若已安装）通电。INC/DEC 开关可用于打开或关闭阀门。若调节模式开关处于 INDEX 位置，则 INC/DEC 开关将用于在 19 个位置索引之间移动。若调节模式开关处于 ADJ 位置，则向上或向下推动 INC/DEC 开关以 1.0° 步长逐步改变阀门位置。若将 INC/DEC 开关保持在上位或下位，则阀位将连续调节，直至达到最大或最小位置。当达到最大或最小位置设定点时，所有数字指示灯将立即闪烁。

当阀门正在运行过程中，需要连续的闭环阀门定位时，不应执行此命令。

4. 如要将控制返回到 4-20 mA 位置命令输入，将 MODE 开关切换到 RUN 位置（下位）。

阀位上限和下限

当用户调整最大（索引 #19）和最小（索引 #0）阀位设置时，将自动设置阀位上限和下限。若需要不同的上限和下限（默认或自动设置的限制除外），则可以按照以下程序执行命令 B-4 和命令 B-5。

命令 B-4 是用于调整阀位上限阈值的配置命令。当阀位等于或大于存储的阀位上限阈值时，继电器驱动器输出 #3, R03 将给可选的阀位上限继电器通电。阀位上限阈值的出厂默认设置为 80.0°，使用命令 A-2（进入位置设置模式）或命令 A-5（设置最大位置和最小 / 最大斜率）进行修改后，阀位上限阈值会自动设置为小于最大阀门位置 1.0°。若可接受出厂默认设置或自动设置的 1.0° 偏移，则无需执行命令 B-4。

命令 B-5 是用于调整阀位下限阈值的配置命令。当阀位小于或等于存储的阀位下限阈值时，继电器驱动器输出 #4, R04 将给可选的阀位下限继电器通电。阀位下限阈值的出厂默认设置为 0.0°，使用命令 A-2（进入位置设置模式）或命令 A-6（设置最小位置和最小 / 最大斜率）进行修改后，阀位下限阈值会自动设置为大于最小阀门位置 1.0°。若可接受出厂默认设置或自动设置的 1.0° 偏移，则无需执行命令 B-5。

手动调整阀位上限或下限阈值（命令 B-4 或 B-5）：

1. 在输入命令 B-4（或 B-5）之前，单元必须处于手动定位模式（执行命令 A-0，如第 44 页或第 54 页的参考表 8 所述）。
2. 当单元处于手动定位模式（通过黄色 MAN 指示灯亮起指示）并且 ADJUST 开关处于“ADJ”中间位置时，选择并输入命令 B-4（或 B-5）。输入命令后，阀门将移动到上限（或下限）位置。
3. 如要以 +/- 1.0° 步长更改阀门位置，立即向上或向下推动 INC/DEC 开关。若将 INC/DEC 开关保持在上位或下位，则阀位设定值将以 +/- 1.0° 步长连续变化。
4. 将阀门移动到所需的上限（或下限）位置后，按下 ENTER 按钮保存新设置。按下 ENTER 按钮后，数字指示灯和命令集“b”指示灯将立即熄灭，表示新阀位阈值已保存。
5. 如要将控制返回到 4-20mA 位置命令输入，将 MODE 开关切换到 RUN 位置（下位）。单元现在处于运行模式。

报警代码

若控制接口单元的报警指示灯亮起或闪烁，可通过执行命令 A-1（显示报警代码）来查看报警情况。输入命令后，可使用 INC/DEC 开关滚动报警代码。通过观察亮起的数字指示灯并将指示灯编号模式与下面的表格条目进行匹配，可以确定报警的原因。

报警代码 (指示灯亮起)	报警名称	报警说明，可能原因和纠正措施
执行器报警指示灯编号及模式		
0, 1	位置过冲	执行器检测到位置控制问题。若报警仍然存在，更换阀门执行器。
0, 2	位置脱离	执行器检测到保持命令位置问题。检查阀门的工作压差并对比技术规格。若报警仍然存在，并且测量压力未超过阀门额定值，则更换执行器。
0, 1, 2	阀门粘滞	执行器无法定位到0.1°以内。检查阀门中是否有阻碍移动的碎屑，并命令阀门打开和关闭。若报警仍然存在并且未发现碎屑，则更换执行器。
0, 3	阀门卡死	执行器无法定位到0.1°以内。重新通电执行器。检查阀门中是否有阻碍移动的碎屑，并命令阀门打开和关闭。若报警仍然存在并且未发现碎屑，则更换执行器。
0, 1, 3	温度	执行器检测到超出规格的环境温度。检查执行器外壳的温度，若温度过高，移开热源或加快散热。若执行器环境温度在规格范围内，则更换阀门执行器。
0, 2, 3	校准	执行器未校准。联系MAXON。
0, 1, 2, 3	直流供电电压	执行器检测到错误的+24VDC电源。检查是否存在电源负载过重，电源故障或电缆长度不合规格。
0, 4	复位	由于软件执行不当、高电气噪声、屏蔽不当或电子设备故障，执行器检测到复位状态。若在检查噪声源和适当屏蔽之后报警仍然存在，则更换执行器。
0, 1, 4	硬件	执行器检测到硬件故障。若重新通电执行器后报警仍然存在，则更换执行器。
控制接口单元报警指示灯编号及模式		
1, 2	通信	控制接口单元/阀门执行器间的通信发生超时。检查控制电缆（4线电缆和屏蔽线）的连接是否断续。若控制电缆连接良好，则更换控制接口单元或阀门执行器。
1, 3	存储器	控制接口单元检测到数据损坏。恢复出厂默认设置并重新调试阀门执行器。若报警仍然存在，更换控制接口单元。
1, 2, 3	锁定	控制接口单元已“锁定”，并且用户将命令开关从RUN位置切换到命令输入（中间）位置。闪烁的报警指示灯也指示这种情况。将命令开关切换到RUN位置，或输入命令A-7，然后输入4位数密码来解锁单元。
1, 4	复位	由于软件执行不当、高电气噪声、屏蔽不当或电子设备故障，控制接口单元检测到复位状态。若在检查噪声源和适当屏蔽之后报警仍然存在，则更换控制接口单元。

注：

1. 若报警指示灯未亮起或闪烁，则不存在报警情况。
2. 若报警指示灯亮起或闪烁，可通过执行命令A-1（显示报警）来查看报警代码。输入命令后，可使用INC/DEC开关滚动报警代码。通过观察亮起的数字指示灯并将指示灯编号模式与上面的表格条目进行匹配，可以确定报警的原因。

维护说明

安全要求

必须按照安装手册定期检查、测试和重新校准，以确保燃烧设备安全运行。检查活动和频率应按照安装手册中的规定进行。

执行器更换

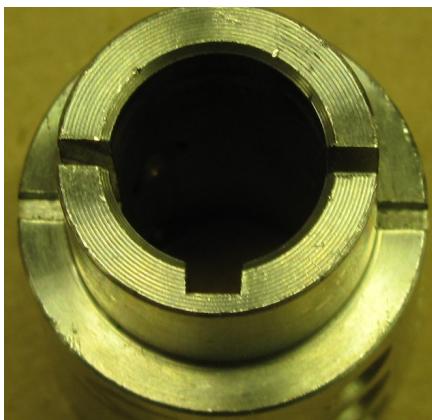
SMARTLINK[®] 阀门执行器组件经过工厂校准，以确保 0.1° 的定位精度。因此，以下执行器更换程序应由 MAXON 人员或经过 MAXON 专门培训的维护人员执行。

执行器拆除：

1. 停用连接到 SMARTLINK[®] 的过程控制器并关闭电源。使用 4 mm 内六角扳手拆下执行器检修盖，并确认绿色电源指示灯熄灭。
2. 记录电线的颜色代码序列，然后从接线端子上断开四根电线和屏蔽线。断开所有导管接头。
3. 使用 3/16" 内六角扳手旋松夹紧环螺钉。
4. 使用 5 mm 内六角扳手拆下连接执行器与适配器的四个 M6x1x18 mm 螺钉。
5. 握住执行器外壳并将执行器从阀中拉出，从而拆除执行器。

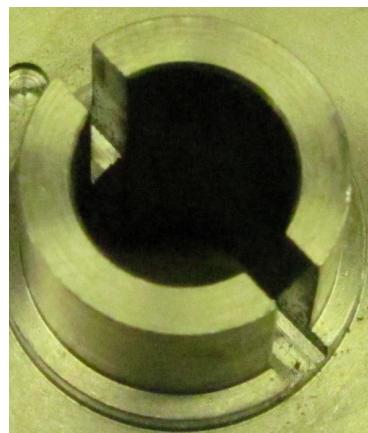
执行器重新安装：

1. 检查执行器联轴器。根据下图确定所需的键类型。



闭口键槽

闭口键槽需要 1/8" x 1/8" 方键



开口键槽

开口键槽需要 1/8" x 3/16" 矩形键

2. 确认夹紧环已松开，并在从夹紧环顶部视去时，将螺钉头定位到左侧。
3. 将带键的执行器轴放入夹紧环中。将带键的轴滑入联轴器键槽，然后旋转执行器外壳，使定位销与阀门适配器上的销孔对准。零件是间隙配合，但是应以很小的力一起滑动。施加压力，直到执行器与适配器贴紧。不要用力过大。若子组件未配对，重新检查夹紧环是否松动，以及键是否压入键槽底部。
4. 确认阀门将完全关闭。阀门关闭后，联轴器硬止动销应居中，并接触蝶阀的硬止动紧定螺钉。对于球阀，联轴器应撞击支架上的两个垂直硬止动销。
5. 当阀门处于完全关闭位置时，使用 Loctite 242（乐泰 242 锁固剂）和四个 M6x1x18 mm 螺钉将执行器装配到阀门适配器上。使用带 5 mm 内六角套筒的力矩扳手，按照对角交叉顺序用 2 N.m 力矩拧紧螺钉。
6. 当阀门处于完全关闭位置时，确保夹紧环完全贴紧在联轴器轴肩上。使用力矩扳手和 3/16" 内六角套筒将不锈钢夹紧环拧紧到 19 N.m。
7. 进行必要的水密电气导管连接。按照初始颜色代码顺序将四根电线重新连接到接线端子。将屏蔽线重新连接到接线端子，保持其长度小于 25 mm。

8. 给 SMARTLINK[®] 系统通电。确认绿色电源指示灯亮起。
9. 重新安装检修盖，并使用 4mm 内六角扳手将四个螺钉拧紧至 2 N.m。
10. 通过执行命令 A-0，使控制接口单元进入手动模式。然后执行命令 C-2（启用阀门校准 / 检查），使执行器进入命令模式进行校准。输入命令后，若控制接口单元上的所有指示灯开始闪烁，则说明该命令未执行。该命令正确执行后，执行器接线盒中的绿色诊断 (DIAG) 指示灯将亮起，并且单元将不再响应 4-20 mA 位置命令。
11. 执行命令 C-1（校准阀门），这将关闭阀门直至接触硬止动装置，然后建立新的原点（或 0°）位置，并将阀移动通过全部 800 个位置。执行该命令需要 2 到 3 分钟，在此期间，控制接口单元上一半的数字指示灯会闪烁。命令执行完毕后，若命令执行失败，则控制接口单元的所有数字指示灯将开始闪烁。若校准失败，再次重复该命令。
12. 执行命令 C-0 以检查新校准。执行该命令只需不到 90 秒，在执行过程中一半的数字指示灯会闪烁。命令执行结束后，若控制接口单元的所有数字指示灯闪烁然后熄灭，则校准测试失败。根据上面的说明，将阀门重新安装到组件上，然后重复校准程序。若校准测试通过，再次通电执行器并检查是否有校准报警。（执行器的绿色诊断指示灯现在应该闪烁，并且控制接口单元上的报警指示灯应熄灭）
13. 重新启用命令 SMARTLINK[®] 的过程控制器。

SMARTLINK® 参考表

表 1. 控制接口单元输入 / 输出端子说明。

端子名称 (缩写)	说明
24V/ 焰	
现场24VDC电源 (F24)	输出：阀门执行器+24VDC电源；最大25 W，平均12 W
现场公共端 (FCOM)	输出：阀门执行器+24VDC公共
数据A (DA)	输入/输出：通信网络数据“A”信号
数据B (DB)	输入/输出：通信网络数据“B”信号
供电24VDC (S24)	输入：电源+24VDC；最大25 W，平均12 W
供电公共端 (SCOM)	输入：电源公共
4-20mA焰	
4-20mA 输入 A+ (INA+)	输入：4-20mA阀位命令，电流输入+和输出-端子； 4mA = 最小位置；20mA = 最大位置
4-20mA 输入 A- (INA-)	
4-20mA 输入 B+ (INB+)	保留预留
4-20mA 输入 B- (INB-)	
4-20mA 输出+ (OUT+)	输出：4-20mA阀位反馈，电流输出+和输入-端子； 4mA = 0.0°；20mA = 80.0°；阀门位置 = [电流 (mA) - 4.0mA] / 16.0mA * 80.0° (适用于非特征化阀门执行器)
4-20mA 输出- (OUT-)	
杔 慢 烟 霉 焰	下列继电器输入是固态输入，需要5到24VDC和2mA（最大值）才能导通。 注#1：施加到RI1到RI6的输入电压必须全部参考控制接口单元的RCOM端子。
继电器输入1 (RI1)	输入：继电器输入1的ON状态将驱动阀门执行器到最大特征位置，即索引#9。当该输入为ON时，4-20mA位置命令信号将被忽略。软件版本#1不支持该输入功能。
继电器输入2 (RI2)	输入：继电器输入2的ON状态将驱动阀门执行器到最小特征位置，即索引#0。当该输入为ON时，4-20mA位置命令信号以及RI1将被忽略。软件版本#1不支持该输入功能。
继电器输入3 (RI3)	输入：保留预留
继电器输入4 (RI4)	输入：保留预留
继电器输入5 (RI5)	输入：保留预留
继电器输入6 (RI6)	输入：保留预留
杔 慢 烟 霉 焰	
继电器输出1 (R01)	输出：报警继电器驱动器输出；若存在以下一种或多种报警情况：阀门通信、存储器故障，阀门执行器报警或篡改报警，则外部接口继电器线圈电压通过R01（集电极开路晶体管输出）连接到供电公共端 (SCOM)。
继电器输出2 (R02)	输出：控制启用继电器驱动器输出；若存在以下一种或多种报警情况：阀门通信、存储器故障，或阀门卡死报警，则外部接口继电器线圈电压通过R02（集电极开路晶体管输出）连接到供电公共端 (SCOM)。
继电器输出3 (R03)	输出：阀位上限继电器驱动器输出；若阀门位置>=阀位上限，则外部接口继电器线圈电压通过R03（开路集电极晶体管输出）连接到供电公共端 (SCOM)。
继电器输出4 (R04)	输出：阀位下限继电器驱动器输出；若阀门位置<=阀位下限，则外部接口继电器线圈电压通过R04（开路集电极晶体管输出）连接到供电公共端 (SCOM)。
继电器输出5 (R05)	输出：手动控制继电器驱动器输出；若控制接口单元处于手动控制模式，则外部接口继电器线圈电压通过R05（开路集电极晶体管输出）连接到供电公共端 (SCOM)。
继电器公共端 (RCOM)	输入和输出继电器公共端

表 2. SMARTLINK® 阀门执行器输入 / 输出端子说明。

端子名称 (缩写)	说明
24V/数据连接器	
现场24VDC电源 (+24)	输入：阀门执行器+24VDC电源；最大25 W，平均12 W
现场公共端 (GND)	输入：阀门执行器+24VDC公共端
数据A (DA)	输入/输出：通信网络数据“A”信号
数据B (DB)	输入/输出：通信网络数据“B”信号
屏蔽线 (SHD)	现场设备屏蔽线

表 3. SMARTLINK® 控制接口单元布线规范。

端子名称 (缩写)	布线规范 (最大长度, 类型, 最小/最大线径以及特殊要求)
24V/数据连接器	
现场24VDC电源 (F24) 现场公共端 (FCOM) 数据A (DA) 数据B (DB)	最大长度100英尺；MAXON P/N 59829, Connect-Air International P/N W22P-1005或同等产品；EIA Level 4电缆，2根双绞线带屏蔽，22 AWG；建议的接线颜色代码约定：橙色/白色 (F24)，橙色 (FCOM)，蓝色 (DA)，蓝色/白色 (DB)；屏蔽线两端连接良好。屏蔽线应在进入控制接口单元外壳时接地，最大长度为2英寸。 最大长度300英尺；2根双绞线带屏蔽；16 AWG-电源双绞线，20 AWG -数据双绞线；建议的接线颜色代码约定：棕色 (F24)，白色 (DA)，黑色 (DB)；屏蔽线两端连接良好。屏蔽线应在进入控制接口单元外壳时接地，最大长度为2英寸。
供电24VDC (S24) 供电公共端 (SCOM)	除了电压降和电线线径的限制外，无长度限制；+ 24VDC；最大1A/25 W；14到22 AWG
4-20mA连接器	
4-20mA 输入 A + (INA+) 4-20mA 输入 A - (INA-) 4-20mA 输入 B + (INB+) 4-20mA 输入 B - (INB-) 4-20mA 输出 + (OUT+) 4-20mA 输出 - (OUT-)	最大长度1000英尺；Belden 9535，2芯，100%屏蔽范围，300V 80C (UL 2464, CSA PCC FT 4) 或同等产品；输入 (INA +/- 和 INB +/-)；要求在控制接口单元端屏蔽线端接。屏蔽线应在进入控制接口单元外壳时接地，最大长度为2英寸。 输出 (OUT +/-) 屏蔽线应连接到用户控制器接地端。
继电器输入连接器	
继电器输入1 (RI1) 继电器输入2 (RI2) 继电器输入3 (RI3) 继电器输入4 (RI4) 继电器输入5 (RI5) 继电器输入6 (RI6)	无长度限制；14到22 AWG；遵守电线类型的本地规范
继电器输出连接器	
继电器输出1 (RO1) 继电器输出2 (RO2) 继电器输出3 (RO3) 继电器输出4 (RO4) 继电器输出5 (RO5) 继电器公共端 (RCOM)	无长度限制；最大30 VDC & 100 mA；14到22 AWG；遵守电线类型的本地规范

表 4. SMARTLINK® DIN 导轨组件输入 / 输出端子说明。

端子标志符：名称（缩写）	说明
电源VAC端子	仅在配备可选直流电源时提供
线路电压 (L1)	120 到 230 VAC 电源, 50-60Hz
中性点 (L2)	中性点
接地 (GND)	接地
继电器输出接线端子	
报警 (AL)	输出：报警继电器触点，常开，6A，最大 250VAC/DC；若存在以下一种或多种报警情况：
报警返回 (ALR)	阀门通信、存储器故障，阀门执行器报警或异常动作报警，则触点会闭合。
控制启用 (CE)	输出：控制启用继电器触点；常开，6A，最大 250VAC/DC；若存在以下一种或多种报警
控制启用返回 (CER)	情况：阀门通信、存储器故障，或阀门卡死报警，则触点会闭合。
阀位上限 (HPL)	输出：高阀位继电器触点；常开，6A，最大 250VAC/DC；若阀门位置 >= 阀位上限，则触
阀位上限返回 (HPLR)	点闭合。
阀位下限 (LPL)	输出：低阀位继电器触点；常开，6A，最大 250VAC/DC；若阀门位置 <= 阀位下限，则触
阀位下限返回 (LPLR)	点闭合。
手动控制 (MC)	输出：手动控制继电器触点；常开，6A，最大 250VAC/DC；若控制接口单元处于手动控
手动控制返回 (MCR)	制模式，则触点闭合。
继电器输入接线端子	
命令公共端 (CCOM)	下列所有继电器输入命令信号的公共端子，并且必须连接到下面所有输入命令信号的接地参 考。最终用户必须完成此连接后才能正确运行输入命令；对于带有 VAC 额定线圈的输入继 电器，此端子通常连接到 L2。
高阀位命令 (HPC)	输入：高阀位命令将驱动阀门执行器到其最大特征位置，即索引 #9。当该输入激活时， 4-20mA 位置命令信号将被忽略。软件版本 #1 不支持 HPC 输入功能。
低阀位命令 (LPC)	输入：低阀位命令将驱动阀门执行器到其最小特征位置，即索引 #0。当该输入激活时， 4-20mA 位置命令信号以及 HPC 继电器输入将被忽略。软件版本 #1 不支持 LPC 输入功能。
4-20mA接线端子	
4-20mA 输入 A+ (INA+)	输入：4-20mA 阀位命令，电流输入 + 和输出 - 端子；4mA = 最小位置；20mA = 最大位置
4-20mA 输入 A- (INA-)	
4-20mA 输入 B+ (INB+)	保留预留
4-20mA 输入 B- (INB-)	
4-20mA 输出 + (OUT+)	输出：4-20mA 阀位反馈，电流输出 + 和输入 - 端子；4mA = 0.0°；20mA = 80.0°；阀
4-20mA 输出 - (OUT-)	门位置 = [电流 (mA) - 4.0mA] / 16.0mA * 80.0° (适用于非特征化阀门执行器)
网络接线端子	
现场24VDC电源 (F24)	输出：通信网络 +24VDC 电源
现场公共端 (FCOM)	输出：通信网络公共端
数据A (DA)	输入 / 输出：通信网络数据 “A” 信号
数据B (DB)	输入 / 输出：通信网络数据 “B” 信号
24VDC接线端子	仅在提供可选直流电源时预接线
供电24VDC电源 (S24)	24VDC 电源；最大电流 1A
供电公共端 (SCOM)	24VDC 电源公共端

表 5. SMARTLINK® DIN 导轨组件布线规范。

端子标志符：名称（缩写）	布线规范（最大长度，类型，最小/最大线径以及特殊要求）
VAC接线端子	
线路电压 (L1) 中性点 (L2) 接地 (GND)	无长度限制； 14 到 22 AWG； 遵守所有本地和 NEC 1 布线规范； 保护性接地也应连接到控制接口单元所在外壳的接地片。
继电器输出接线端子	
报警 (AL) 报警返回 (ALR) 控制启用 (CE) 控制启用返回 (CER) 阀位上限 (HPL) 阀位上限返回 (HPLR) 阀位下限 (LPL) 阀位下限返回 (LPLR) 手动控制 (MC) 手动控制返回 (MCR)	无长度限制； 14 到 22 AWG； 遵守所有本地和 NEC 1 布线规范
继电器输入接线端子	
命令公共端 (CCOM) 高阀位命令 (HPC) 低阀位命令 (LPC)	无长度限制； 14 到 22 AWG； 遵守电线类型的本地规范。
4-20mA接线端子	
4-20mA 输入 A+ (INA+) 4-20mA 输入 A- (INA-) 4-20mA 输入 B+ (INB+) 4-20mA 输入 B- (INB-) 4-20mA 输出 + (OUT+) 4-20mA 输出 - (OUT-)	最大长度 1000 英尺； Belden 9535， 2 芯， 100% 屏蔽范围， 300V 80C (UL 2464, CSA PCC FT 4) 或同等产品； 输入 (INA +/- 和 INB +/-)； 要求在控制接口单元所在外壳屏蔽线连接。屏蔽线应连接到接地片，最大长度 2 英寸。 输出 (OUT +/-) 屏蔽线应在用户控制器端中止。
网络接线端子	
现场24VDC电源 (F24) 现场公共端 (FCOM) 数据A (DA) 数据B (DB)	最大长度 100 英尺； MAXON P/N 59829, Connect-Air International P/N W22P-1005 或同等产品； EIA Level 4 电缆，2 根双绞线带屏蔽，22 AWG；建议的接线颜色代码约定：橙色 / 白色 (F24)，橙色 (FCOM)，蓝色 (DA)，蓝色 / 白色 (DB)；需要两端屏蔽线连接。屏蔽线应连接到控制接口单元所在外壳的接地片，最大长度为 2 英寸。 最大长度 300 英尺；2 根双绞线带屏蔽；16 AWG- 电源双绞线，20 AWG - 数据双绞线；建议的接线颜色代码约定：棕色 (F24)，白色 (DA)，黑色 (DB)；需要两端屏蔽线连接。屏蔽线应在进入控制接口单元外壳时接地，最大长度为 2 英寸。
24VDC接线端子	
供电24VDC电源 (S24) 供电公共端 (SCOM)	若指定了可选电源和预接线，则无需接线； 若不提供电源，则除了电压降与电线线径的限制外，无长度限制； 14 到 22 AWG； 遵守所有本地和 NEC 1 布线规范

表 6. 接口继电器检查程序。

SMARTLINK® DIN 导轨组件端子 编号：名称（缩写）	SMARTLINK® 控制接口继电器驱动器端子 名称（缩写）	确认继电器触点是否正确运行的检查程序
继电器输出接线端子	继电器输出驱动器	
报警 (AL) 报警返回 (ALR)	继电器输出1 (RO1)	暂时断开数据 A 或数据 B 信号与阀门执行器的连接。在几秒钟之内，报警继电器（连接到控制接口单元 RO1 端子）应被触发。
控制启用 (CE) 控制启用返回 (CER)	继电器输出2 (RO2)	通电后，控制启用继电器（连接到控制接口单元 RO2 端子）通常会被触发。暂时断开数据 A 或数据 B 信号与阀门执行器的连接。在几秒钟之内，控制启用继电器不应被触发。
阀位上限 (HPL) 阀位上限返回 (HPLR)	继电器输出3 (RO3)	执行操作检查步骤 #2 或 #3（第 38 页），以在整个行程范围内移动阀门执行器。当阀门位于其最大位置时，阀位上限继电器（连接到控制接口单元 RO3 端子）应被触发。当阀门被驱动到 95% 位置或小于其最大位置时，继电器不应被触发。
阀位下限 (LPL) 阀位下限返回 (LPLR)	继电器输出4 (RO4)	执行操作检查步骤 #2 或 #3（第 38 页），以在整个行程范围内移动阀门执行器。当阀门位于其最小位置时，阀位下限继电器（连接到控制接口单元 RO4 端子）应被触发。当阀门被驱动到 5% 位置或大于其最大位置时，继电器不应被触发。
手动控制 (MC) 手动控制返回 (MCR)	继电器输出5 (RO5)	通电后，手动控制继电器（连接到控制接口单元 RO5 端子）不应被触发。按照第 44 页说明，使 SMARTLINK® 进入本地手动模式。一旦系统进入手动模式，手动控制继电器应触发。
继电器输入接线端子		
高阀位命令 (HPC)	继电器输入1 (RI1)	给 HPC 端子加电，并确认阀门移动到其最大特征化位置，索引 #9。（软件版本 #1 不支持该输入功能）
低阀位命令 (LPC)	继电器输入2 (RI2)	给 LPC 端子加电，并确认阀门移动到其最小特征化位置，索引 #0。（软件版本 #1 不支持该输入功能）

表 7. SMARTLINK® 系统配置一览。

SMARTLINK® 的系统配置可使用控制接口单元上的开关和指示灯，通过执行下表所示的命令完成。在执行任何系统配置功能之前，请查看出厂默认设置。在许多应用中，无需修改默认配置。

配置功能 (命令#)	出厂默认值 (配置#)	说明
选择LOS位置 (B-0)	无位置变化 (#4)	发生信号丢失 (L.O.S.) 事件时所需的阀门位置。若位置指令信号下降到 0.05 mA 以下，则存在信号丢失。配置设置 #0、1、2 和 3 分别对应于索引 #0、3、6 和 9 定义的阀门位置。设置 #4 对应无位置变化（即执行器保持在信号丢失之前的最后位置）。
选择待机位置 (B-2)	位置索引0 (#0)	调节模式开关位于待机 (STANDBY) 位置时所需的阀门位置。（当单元处于 RUN 模式时，待机功能无效）配置设置 #0, 1, 2 和 3 分别对应于索引 #0, 3, 6 和 9 定义的阀门位置。
选择控制死区 (B-3)	0.06%死区 (#2)	控制死区设置在位置命令输入信号周围，以消除 4-20 mA 位置命令上电气噪声导致的不必要的执行器运动。配置设置 #0, 1, 2, 3, 4 和 5 分别对应于 0, 0.03, 0.06, 0.13, 0.16 和 0.19% 的死区。
设置阀位上限阈值 (B-4)	80.0° (N/A)	当阀位 \geq 阀位上限阈值时，继电器驱动器输出 #3 (R03) 将触发阀位上限继电器。使用命令 A-2 或 A-5 进行修改后，该阈值会自动设置为小于最大阀门位置 1.0°。
设置阀位下限阈值 (B-5)	0.0° (N/A)	当阀位 \leq 阀位下限阈值时，继电器驱动器输出 #4 (R04) 将触发阀位下限继电器。使用命令 A-2 或 A-6 进行修改后，该阈值会自动设置为大于最小阀门位置 1.0°。
设置自动斜率调整开启/关闭 (B-6)	自动斜率开启 (#1)	在阀位设置模式下，自动斜率功能被用于在要调节的位置和两个相邻位置索引之间创建线性斜率。这提供了阀门配置的位置“平滑过渡”，并简化了阀门特性。设置 #0 为自动斜率关闭，设置 #1 为开启。
输入新锁定密码 (C-4)	密码：0, 0, 0, 0 (N/A)	4 位电子密码，以防止篡改。只有锁定启用时，才需要密码来修改配置。参见下面的选择锁定启用 / 停用配置。
选择锁定启用/停用 (C-5)	锁定停用 (#0)	启用 / 停用电子“锁定”功能选择。若启用，则必须输入存储的密码才能修改任何配置或阀门配置文件数据。设置 #0 和 #1 分别对应锁定停用和锁定启用。

更改系统配置：

1. 选择并输入所需的系统配置命令。
2. 输入命令后，数字 (0-9) 指示灯之一将亮起，指示当前的配置设置。（例如：若锁定配置被设置为 # 0，则锁定禁用，成功输入命令 C-5（锁定启用 / 禁用）后，指示灯 0 将常亮。）
3. 使用 INC/DEC 开关选择所需的配置设置。瞬时向上或向下推动 INC/DEC 开关后，所选设置会更改，如亮起的数字指示灯 (0-9) 所示。
4. 选择所需的配置设置后，按下 ENTER 按钮。指示所选配置的常亮数字指示灯将立即熄灭，表示命令已完成并且配置设置已保存。
5. 为了确认已保存正确设置，重新输入命令并通过数字指示灯 (0-9) 的指示确认新设置。

表 8. SMARTLINK® 用户命令 - 命令集“A”。

SMARTLINK® 命令编号：名称	命令用途和用法说明
命令集“A”	
A-0：进入手动定位模式	<p>命令 A-0 被用于进入手动定位模式，该模式会覆盖 4-20 mA 位置命令输入。如要执行命令 A-0，必须首先将位置命令输入信号降低到 4mA 或更小。在输入命令 A-0 后，若数字指示灯立即闪烁，则：</p> <ul style="list-style-type: none"> - 位置命令可能大于 4 mA； - 调节模式开关可能处于 STANDBY 位置； - 单元可能被“锁定”以防止篡改。 <p>输入命令 A-0 后，控制接口单元上的黄色手动 (MAN) 指示灯将亮起，并且 R05 (继电器输出驱动器 #5) 将给手动控制继电器 (若已安装) 通电。</p> <p>输入该命令后，INC/DEC 开关可用于打开或关闭阀门。若调节模式开关处于 INDEX 位置，则 INC/DEC 开关将用于在 19 个电子位置“索引”之间移动。(每个索引的出厂默认阀门位置请参见第 42 页的调试表)</p> <p>若调节模式开关处于 ADJ 位置，则向上或向下推动 INC/DEC 开关以 1.0° 步长逐步改变阀门位置。若将 INC/DEC 开关保持在上位或下位，则阀位将连续调节，直至达到最大或最小位置。当阀门正在运行过程中，需要连续的闭环阀门定位时，不应执行此命令。</p>
A-1：显示报警代码	<p>输入命令 A-1 后，可使用 INC/DEC 开关滚动所有当前报警情况。若控制接口单元上的红色报警 (ALM) 指示灯亮起，则存在一种或多种报警情况。（报警代码请参见第 45 页）</p>
A-2：进入阀位设置模式	<p>命令 A-2 被用于进入阀位设置模式，以修改 19 个位置配置。如要执行命令 A-2，位置命令输入信号必须大于或等于 4 mA。（若在输入命令 A-0 后，数字指示灯立即闪烁，则调节模式开关可能处于 STANDBY 位置，或单元可能被“锁定”以防止修改。）</p> <p>输入命令 A-2 后，黄色手动指示灯和绿色运行指示灯将与 1 个或 2 个指示阀门位置索引的数字指示灯一起闪烁。闪烁的指示灯表示现在可以使用 INC/DEC 开关修改 19 个位置索引之一（例如，若 #1 和 #2 指示灯闪烁，则可以调整位置索引 1.5）。位置命令信号确定了 19 个位置索引中可修改的索引。当调节模式开关处于 ADJ 位置时，向上或向下推动 INC/DEC 开关可以 +/-0.1° 步长逐步改变阀门位置。若将 INC/DEC 开关保持在上位或下位超过 3 秒钟，则阀位将以 +/- 0.5° 步长变化。将阀门移动到所需位置后，必须按下 ENTER 按钮保存位置设置。按下 Enter 按钮后，闪烁的位置索引指示灯 (0-9) 和命令集指示灯 “a” 将立即熄灭。阀门特征化程序的完整说明请参见第 42 页的调试表。</p> <p>在位置设置模式下，允许从存储的阀门位置移动最多 8°。当达到 8° 极限时，所有位置索引指示灯都会立即闪烁。若调节模式开关位于 INDEX 位置，则阀门定位将被禁止并且若试图调整 INC/DEC 开关，位置索引指示灯将立即闪烁。若位置命令信号小于 0.05 mA，阀门定位也会被禁止，并且通过关闭位置索引指示灯来指示。</p>
A-3：保留预留	N/A
A-4：保留预留	N/A

表 8. SMARTLINK® 用户命令 - 命令集“A”。(续)

SMARTLINK® 命令编号：名称	命令用途和用法说明
命令集“A”	
A-5：设置最大位置和最小/最大斜率	<p>命令 A-5 被用于进入阀位设置模式，以调整最大位置（索引 #9）和设置从最小到最大存储位置的线性斜率。如要执行命令 A-5，位置命令信号必须为 20.00mA +/- 0.15 mA。（若输入命令后数字指示灯立即闪烁，则位置命令输入不是 20mA，或调节模式开关位于 STANDBY 位置）。输入命令后，黄色手动指示灯和绿色运行指示灯将与指示灯 #9一起闪烁。现在可以使用 INC/DEC 开关修改阀门的最大位置。若调节模式开关处于 ADJ 位置，则向上或向下推动 INC/DEC 开关以 +/-0.1° 步长逐步改变阀门位置。若将 INC/DEC 开关保持在上位或下位超过 3 秒钟，则阀位将以 +/- 0.5° 步长变化。将阀门移动到所需位置后，必须按下 ENTER 按钮保存位置设置。按下 Enter 按钮后，#9 位置索引指示灯和命令集指示灯 “a” 将立即熄灭。</p> <p>在位置设置模式下，允许从存储的阀门位置移动最多 8°。当达到 8° 极限时，所有位置索引指示灯都会立即闪烁。若调节模式开关位于 INDEX 位置，则阀门定位将被禁止并且若试图调整 INC/DEC 开关，位置索引指示灯将立即闪烁。输入命令后，若命令信号不是 20.00 mA，阀门定位也会被禁止。</p>
A-6：设置最小位置和最小/最大斜率	<p>命令 A-6 被用于进入阀位设置模式，以调整最小位置（索引 #0）和设置从最小到最大存储位置的线性斜率。如要输入命令 A-6，位置命令信号必须为 4.00mA +/- 0.15 mA。最小位置的调整与最大位置的调整，命令 A-5 相同。</p>
A-7：解锁阀门配置	<p>命令 A-7 允许输入 4 位密码来“解锁”系统配置和位置配置文件，以便用户修改。闪烁的报警指示灯表示单元已“锁定”。若报警指示灯不闪烁，则说明单元已解锁，并且若尝试输入命令，数字指示灯将立即闪烁。输入命令后，INC/DEC 命令可用于选择指示灯指示的密码数字。完成选择后，应按下 Enter 按钮并再重复三次该过程。若 4 位密码正确，报警指示灯将停止闪烁，若无其他报警，报警指示灯将熄灭。如要重新锁定单元，将命令开关切换到 RUN 位置。</p>

表 9. 用户命令 - 命令集“B”。

SMARTLINK® 命令编号： 名称	命令用途和用法说明
命令集“B”	
B-0：选择信号丢失(LOS) 位置	<p>命令 B-0 是一个配置命令，允许选择发生信号丢失事件时（低于 0.05 mA）的阀门位置。输入命令 B-0 后，当前配置将通过一个数字指示灯显示。使用 INC/DEC 开关配置选择一个 L.O.S. 配置 (#0、1、2、3 或 4)，并在数字指示灯指示所需的配置后按下 Enter 按钮。</p> <p>配置 #0, 1, 2 和 3 分别对应于索引 #0, 3, 6 和 9（最大）定义的阀门位置。（每个索引的出厂默认阀门位置请参见第 42 页的调试表）。配置 #4 对应无位置变化（即执行器保持在信号丢失之前的最后位置）。出厂默认配置为 #4。</p>
B-1：保留预留	N/A
B-2：选择待机位置	<p>命令 B-2 是一个配置命令，允许选择待机阀门位置。输入命令后，当前配置将通过一个数字指示灯显示。使用 INC/DEC 开关配置选择一个待机位置配置 (#0-3)，并在数字指示灯指示所需的配置后按下 Enter 按钮。配置 #0, 1, 2 和 3 分别对应于索引 #0, 3, 6 和 9（最大）定义的阀门位置。（每个索引的出厂默认位置请参见第 42 页的调试表）</p> <p>若阀位设置过程中发生紧急情况并且用户希望阀门立即移动到“安全”位置，而忽略 4-20 mA 位置命令，则待机位置非常有用。当调节模式开关位于 STANDBY 位置（下位）时，阀门将移动到待机位置。</p>
B-3：选择死区	<p>命令 B-3 是用于选择位置命令输入信号周围死区的配置命令。若输入信号包含杂散噪声，则可能会导致执行器摆动。建议消除噪声源或验证 4-20 mA 电缆类型及其屏蔽和接地连接。若噪声无法消除，则死区可作为最后手段。</p> <p>输入命令 B-3 后，当前配置将通过一个数字指示灯显示。使用 INC/DEC 开关配置选择一个死区配置 (#0-5)，并在数字指示灯指示所需的配置后按下 Enter 按钮。配置 #0, 1, 2, 3, 4 和 5 分别对应 0, 0.03, 0.06, 0.13, 0.16 和 0.19% 的死区。出厂默认配置为 #2, 0.06%。</p>
B-4：设置阀位上限阈值	<p>命令 B-4 是用于调整阀位上限阈值的配置命令。当阀位等于或大于存储的阀位上限阈值时，继电器驱动器输出 #3 (R03) 将给可选的阀位上限继电器通电。出厂默认值为 80.0°，使用命令 A-2 或 A-5 进行修改后，该阈值会自动设置为小于最大阀门位置 1.0°。若可接受出厂默认设置或自动设置的 1.0° 偏移（相对于用户选择的最大位置），则无需进行配置。</p> <p>如要执行命令 B-4，阀门系统必须处于手动模式（参见命令 A-0）。当单元处于手动模式并且调节模式开关位于“ADJ”中间位置时，按下 Enter 按钮，阀门将移动到存储的阈值位置。然后向上或向下推动 INC/DEC 开关，以 +/- 1.0° 步长更改阀门位置。若将 INC/DEC 开关保持在上位或下位，则阀门位置将以 +/- 1.0° 步长连续变化。将阀门移动到所需阀位上限后，必须按下 ENTER 按钮以保存设置。按下 Enter 按钮后，位置索引和命令集“b”指示灯将立即熄灭，表示新阀位阈值已保存。</p>

表 9. 用户命令 - 命令集“B”。(续)

SMARTLINK® 命令编号： 名称	命令用途和用法说明
命令集“B”	
B-5：设置阀位下限阈值	<p>命令 B-5 是用于调整阀位下限阈值的配置命令。当阀位小于或等于存储的阀位下限阈值时，继电器驱动器输出 #4 (RO4) 将给可选的阀位下限继电器通电。出厂默认值为 0.00°，使用命令 A-2 或 A-6 进行修改后，该阈值会自动设置为大于最小阀门位置 1.0°。若可接受出厂默认设置或自动设置的 1.0° 偏移（相对于用户选择的最小位置），则无需进行配置。</p> <p>如要执行命令 B-5，阀门系统必须处于手动模式（参见命令 A-0）。当单元处于手动模式并且调节模式开关位于“ADJ”中间位置时，按下 Enter 按钮，阀门将移动到存储的阈值位置。然后向上或向下推动 INC/DEC 开关，以 +/- 1.0° 步长更改阀门位置。若将 INC/DEC 开关保持在上位或下位，则阀门位置将以 +/- 1.0° 步长连续变化。将阀门移动到所需阀位下限后，必须按下 ENTER 按钮以保存设置。按下 Enter 按钮后，位置索引和命令集“b”指示灯将立即熄灭，表示新阀位阈值已保存。</p>
B-6：设置自动斜率调整 开启/关闭	<p>命令 B-6 是用于启动或关闭自动斜率功能的配置命令。出厂默认设置为自动斜率开启，配置 #1。配置 #0 是自动斜率关闭。</p> <p>输入命令后，当前配置将通过一个数字指示灯显示。使用 INC/DEC 开关选择自动斜率开启 (#1) 或自动斜率关闭 (#0)，并在数字指示灯指示所需的配置后按下 Enter 按钮。</p> <p>在阀位设置模式下，自动斜率功能被用于在要调节的位置和两个相邻位置索引之间创建线性斜率。这提供了阀门配置的位置“平滑过渡”，并简化了阀门特征化，因为 19 个位置索引中只有 10 个需要调整（即索引 0、1、2、3 等替代 0、0.5、1.0、1.5 等）。对于需要精确调整全部 19 个位置索引的自定义阀门特征化，应关闭自动斜率功能。</p>
B-7：保留预留	N/A

表 10. SMARTLINK® 用户命令 - 命令集“C”。

SMARTLINK® 命令编号：名称	命令用途和用法说明
命令集“C”	
C-0：检查阀门校准	供经过Maxon培训的现场工作人员使用
C-1：校准阀门	供经过Maxon培训的现场工作人员使用
C-2：启用阀门校准/检查	供经过Maxon培训的现场工作人员使用
C-3：恢复出厂默认设置	命令 C-3 是用于恢复所有系统配置和阀门位置数据（备份的位置配置文件除外）的配置命令。如要执行命令 C-3，阀门系统必须处于位置设置模式（参见命令 A-2）。当单元处于位置设置模式并且选择了命令 C-3 时，按下 Enter 按钮。重置完成后，#3 指示灯和命令集“c”指示灯将立即熄灭。
C-4：输入新锁定密码	<p>命令 C-4 是用于输入新 4 位电子密码，以防止篡改的配置命令。如要执行命令 C-4，必须启用电子锁定并且单元必须处于“解锁”状态。（锁定的单元通过报警指示灯闪烁指示）。若命令输入后，所有数字指示灯都立即闪烁，则“锁定”功能已停用或单元当前已锁定。参见启用锁定功能的命令 C-5 或解锁单元的命令 A-7。</p> <p>输入命令后，INC/DEC 命令可用于选择指示灯指示的密码数字。选择第一个数字后，按下 Enter 按钮，数字指示灯和命令集指示灯“c”将立即熄灭。重复 3 次先前的数字输入过程，总共输入 4 个数字。输入第 4 个数字后，数字指示灯 #4 将亮起，并且命令集“c”指示灯将开始闪烁，表示新的 4 位密码已保存并且命令已完成。</p> <p>若忘记了 4 位密码，请联系 MAXON。出厂默认的 4 位密码是 0-0-0-0。</p>
C-5：选择锁定启用/停用	<p>命令 C-5 是用于启用或停用电子“锁定”功能的配置命令。出厂默认设置是配置 #0，锁定停用。配置 #1 是锁定启用。</p> <p>如要执行命令 C-5，单元必须处于解锁状态。（若单元被锁定，报警指示灯将快速闪烁。解锁设备请参见命令 A-7）。输入命令后，当前配置将通过一个数字指示灯显示。使用 INC/DEC 开关配置选择配置 #0 或 #1，并在数字指示灯指示所需的配置后按下 Enter 按钮。</p>

表 10. SMARTLINK® 用户命令 - 命令集“C”。(续)

SMARTLINK® 命令编号：名称	命令用途和用法说明
命令集“C”	
C-6：将配置文件另存为备份 C-7：恢复备份配置文件	<p>命令 C-6 是用于保存当前阀位配置文件的配置命令。该命令与 C-7（恢复备份配置文件）一起使用，以帮助确保在意外执行恢复出厂默认设置或调试过程中进行了错误的位置调整时，无需重新调试即可恢复经过验证的阀位配置文件。</p> <p>如要执行命令 C-6，阀门系统必须处于位置设置模式（参见命令 A-2）。在单元处于位置设置模式并且选择了命令 C-6 时，按下 Enter 按钮。#6 指示灯和命令集“c”指示灯应立即熄灭，表示命令已执行。</p> <p>命令 C-7 是用于将备份阀位配置文件恢复为当前配置文件的配置命令。此命令与 C-6（将配置文件另存为备份）一起使用，以帮助确保在意外执行恢复出厂默认设置或调试过程中进行了错误的位置调整时，无需重新调试即可恢复经过验证的阀位配置文件。</p> <p>如要执行命令 C-6，阀门系统必须处于位置设置模式（参见命令 A-2）。当单元处于位置设置模式并且选择了命令 C-7 时，按下 Enter 按钮。#7 指示灯和命令集“c”指示灯应立即熄灭，表示命令已执行。</p>

通用命令输入说明：

1. 只有满足下列所有条件时才能执行用户命令：
 - a. MODE 开关未处于 RUN 位置，
 - b. 绿色命令集指示灯 (a、b 和 c) 之一正在闪烁，
 - c. ADJUST 开关未处于 STANDBY 位置，
 - d. 单元“已解锁”。(对于命令 A-7，解锁阀门配置，命令 A-1 和显示报警代码，条件 d 不是必需的)
 - e. 对于某些命令，单元必须处于特定模式或有正确的 4-20 mA 命令信号（参见第 39 页列出的命令输入要求，或第 54 页到第 59 页的参考表 8 到表 10）。
2. 若 a、b 或 c 命令集指示灯未闪烁，则将 MODE 开关推动到 CMD abc 位置（上位），或更改 CMD SEL 旋转开关的位置。这将使命令集指示灯开始闪烁，并允许输入命令。
3. 通过将 MODE 开关向上推到 CMD abc 位置，选择所需的命令集。随后的 CMD abc 开关输入将更改命令集选择，如绿色命令集 (a、b 和 c) 指示灯所示。
4. 通过更改 CMD SEL 旋转开关的位置来选择所需的命令编号。当命令集指示灯之一闪烁时，所选的命令编号通过亮起相应的数字 (0-9) 指示灯表示。
5. 选择命令集和编号后，按下 ENTER 按钮。若在按下 ENTER 按钮后，所有编号指示灯瞬间闪烁，则表示发生了命令输入错误并且命令未被执行。若出现输入错误，检查单元是否已锁定（即报警灯闪烁）或 ADJUST 开关处于 STANDBY 位置。若两种情况都不存在，检查命令的具体输入要求。

如需更多信息

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