Honeywell

MAXON

ERTL COMBUSTION

SMARTLINK® DS
Intelligent Control Actuator

ERTL Part #DSSA-0000-CA001 **TECHNICAL CATALOG**

PRODUCT DESCRIPTION

The SMARTLINK® DS Intelligent Control Actuator provides highly accurate positioning with continuous duty maintenance-free operation. The actuator offers a wide range of customizable features making it a highly scalable and flexible control valve. The wide operating temperature range and Class I, Division 2 ratings make it suitable for the most demanding installations.

FEATURES AND BENEFITS

- **The SMARTLINK® DS offers many advantages and flexible configurations making it well suited for a myriad of industrial applications. It is a general purpose control actuator designed for the precise control of air, fuel, gas, steam, chemicals and liquids for industrial combustion applications, as well as for general industrial process control applications.**
- **Standard torque option is 300 in-lbs.**
- **Standard 2-line backlit LCD display, 120V AC power rating.**
- **Valve commissioning accomplished with simple to understand graphical user interface via on-board LCD display, via commissioning PC software or via DCS direct programming.**
- **The electronic shaft brake provides the capability to limit shaft movement of the actuator in the event of a loss of AC or DC power input to the actuator or if the rated torque capability of the actuator is exceeded.**
- **Optional hazardous location ratings are available and the standard general purpose NEMA 4x offering is rated for wash-down/exterior applications and performs under a wide temperature range, making it well suited for the most extreme installations.**
- **Available as stand-alone unit or direct coupled with ERTL's line of Flex Flow valves. Also separate brackets and couplings are available to support integration to other valves.**
- **Industry standard communications protocols; analog 4-20 mA and Modbus digital for input and output of valve position confirmation as well as valve status, diagnostics, historical performance, and health reporting.**
- **Built-in, on-line diagnostics to continuously assess the health and performance of the actuator. Alarm and lockout detection algorithms are performed every 50 milliseconds. Any alarm or lockout event that occurs can be externally detected by monitoring an alarm relay contact or viewing the local display at about a 1 second sampling interval.**
- **Simple to install, wire and configure with dual NPT conduit ports for separate power and low voltage control wiring.**
- **Rugged, small footprint extruded and cast aluminum housing with impact, UV and chemical resistant powder coating. Flexible industrial design for reliable, long-life operation and mounting in any orientation.**
- **The permanently lubricated planetary gears are precision machined from hardened alloy steels minimizing any slip or hysteresis providing efficient, smooth, quiet, and controlled positioning. This precise mechanism enables continuous rotation of valves to positions within +/-0.1° accuracy and 1000 positions over a full 100 degrees of rotation with a long service life of over 100 million re-positions.**
- **Operates with a temperature range of -40°C to +70°C (-40°F to +158°F) enabling the units to operate in a wide variety of installations and regions. Actuators have on-board temperature sensors to monitor internal operating temperatures preventing overheating of the actuator and tracking and reporting temperature alarms.**

Approvals

Factory Mutual Global	Non-incendive; Class I, Division 2, Groups A, B, C and D; T4; -40°C < Ta < 70°C Dust-Protected; Class II, III, Divisions 1 & 2, Groups E, F and G Hazardous (classified) Locations, T4; NEMA 4X and IP67 CAN/CSA C22.2 No. 0-M91, No. 142-M1987, No. 213-M1987, No. 157-92, No. 1010.1, No. 94, No. 25, ANSI/IEC60529; File No. 3041711
	ANSI / ISA 61010-1 Safety Requirements for Electrical Equipment
	ATEX Certificate No. FM13ATEX0020: II 3 G Ex nA nC IIC Gc T4 -40°C ≤ Ta ≤ 70°C II 3 D Ex tc IIIC T135°C Dc EN60079-0; EN60079-15; EN60079-31; EN60529
	IECEx Certification Reference No. IECEx FMG 13.0012: Ex nA nC IIC T4 Ex tC IIIC 135°C -40°C ≤ Ta ≤ 70°C IEC60079-0; IEC60079-15; IEC60079-31; EN60529
	Safety Feedback Relay Outputs: Performance Level: (PL) of "e" in a Category 4, as calculated per EN/ISO 13849-1
	UKCA Certificate No. FM21UKEX0099: II 3 G Ex nA nC IIC Gc T4 -40°C ≤ Ta ≤ 70°C II 3 D Ex tc IIIC T135°C Dc EN60079-0; EN60079-15; EN60079-31; EN60529
Underwriters Laboratories, Inc. (File No. MH49631)	UL 353 - Standard for Safety for Limit Controls UL 1998 - Standard for Safety, Software in Programmable Components
	CSA C22.2 No. 24 - Temperature-Indicating and -Regulating Equipment
MAXON - Self Declaration	Compliance with European CE requirements defined by:
	- EMC Directive 2004/108/EC EN 61000-6-2
	- Low Voltage Directive 2006/95/EC
	- RoHS Directive 2011/65/EU EN 50581
	- ATEX Directive 2014/34/EU EN 60079-0; EN 60079-15; EN 60079-31; EN 50581
CCC Approvals	GB 3836.1, GB 3836.8, GB 12476.1, GB 12476.5 Ex nA nC IIC T4 Gc; Ex tD A22 IP67 T135°C

SMARTLINK® DS to Flex Flow

SMARTLINK® DS to NA APV (retrofit)

Actuator specifications

SMARTLINK® DS Actuator	300 in-lb torque actuator
	AC
Size	6” x 4.4” x 9.5”
Weight	15 lbs.
Torque rating in Nm	33 Nm
Torque rating in ft-lb	25 ft-lb
Power train stepper motor	Continuous duty, permanently lubricated planetary gear set
Full travel	With no valve option, maximum full travel span: 100 degrees
Resolution	0.1 degrees or a maximum of 1000 position points over the full range of operation (with no valve option)
Torque travel timing	15 seconds (100° degree travel)
Overhung shaft load	750 lbs.
Standard features	
4-20 mA input	100 Ohms; isolated input
4-20 mA ouput	275 Ohms (maximum, including DC resistance in cable)
F-Terminal input	When this terminal is connected to the 4-20 mA input (-) terminal, the actuator shaft will move to a user selected position; Function is disabled (default) when unit is shipped
RS-485 Modbus interface	Needed to configure actuator when no display option is ordered. MAXON PC-based configuration software and RS-485 cable required.
Diagnostics via Modbus	Alarm-lockout, communication, and move (repositioning) diagnostic counters Loss-of-motor sync, position control, position (feedback), temperature, and hardware alarms Alarm-lockout event history, position move histogram
Reverse direction	User selectable clockwise or counter-clockwise movement
Wiring connections	Accessible high and low voltage terminal connections without opening valve housing
Supply voltage	100-240 VAC ± 10% 50/60 Hz (0.2 A rms @ 120 VAC)
Average power	19 watts
Output relay contacts	5A @ 120VAC, 3A @ 250VAC/24VDC (resistive) (general purpose, non-safety ratings) 1.5A @ 120VAC, 250 VAC, 24VDC (for safety applications/200,000 minimum operations)
Control deadband (mA input)	User selectable: ±0.1, ±0.2, ±0.3, ±0.4, ±0.5 degrees

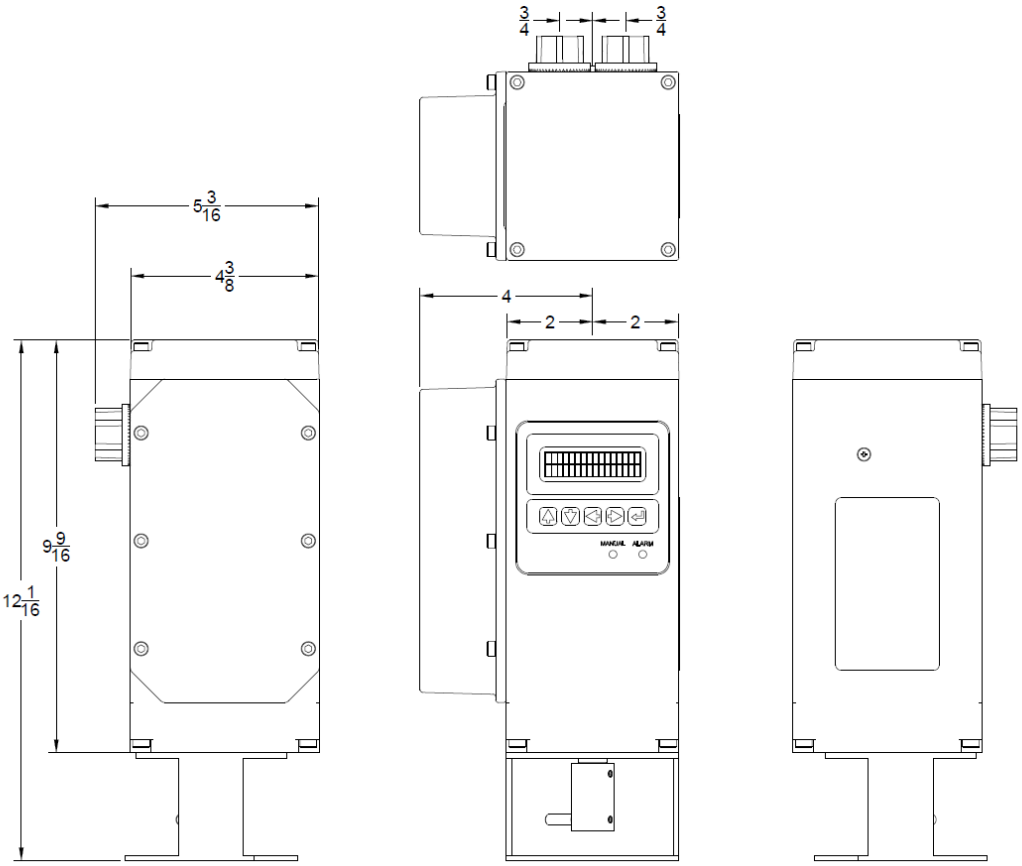
Actuator specifications continued

SMARTLINK® DS Actuator	300 in-lb torque actuator
	AC
Linearity	±0.5 degree (max)
Shaft configurations when no valve is selected	1/2" keyed output shaft w/ 1/8" sq key
Operating temperature	-40°C to +70°C (-40°F to +158°F) [1]
Storage temperature	-40°C to +80°C (-40°F to +176°F)
Vibration	Honeywell V2 test specification; 3 axes: 2-hour performance/resonant detection sweep: vibration sinusoidal: 5 Hz - 30 Hz; amplitude: 0.012 mil pk/pk 75 mm, vibration sinusoidal: 30 Hz - 300 Hz at 0.6G Endurance: 1.1G for 2 hours at resonant frequencies
EMC	EN61000-6-2 Heavy Industrial Immunity FCC Part 15 and EN55022, Class A Emissions
Enclosure contamination rating	NEMA 4, 4X, IP67
Housing materials	Extruded aluminum housing and gear train mounting plate. Coated with scratch and chemical resistant powder coating.
Life expectancy	10,000,000 repositions over 10-degree span or 100,000,000 repositions over entire 100-degree span

[1] The actuator will continue to operate down to -40°C but the LCD display may be unreadable below -20°C.

Dimensions

1) Conduit hub 1-2”-14 NPT hazardous locations (optional)
2) AC/DC power supply (optional)
3) Flange kit (optional)
4) Display/ keypad (optional)
5) Standard shipping cap plug with gasket. (2) .875” dia. holes in housing for 1/ 2” conduit entrance



Safety requirements

The SMARTLINK® DS actuator has been independently evaluated by Underwriters Laboratories to provide fail-safe high and low position proven and alarm relay outputs with a maximum safety position error of 2 degrees and a declared maximum detection/annunciation time of 2 seconds. The safety of the overall system, however, is ultimately the responsibility of: 1) The upstream safety control that commands and monitors the SMARTLINK® DS actuator, and 2) the trained commissioning engineer that configures the unit for system operation.

The SMARTLINK® DS actuator is shipped with the high/low position proven relay outputs disabled (or de-energized). It is the responsibility of the commissioning engineer to setup the position proven thresholds (or trip levels) and the minimum and maximum travel positions of the actuator for safe system operation.

The SMARTLINK® DS actuator is designed to operate the high and low position proven relays and alarm relay in a fail-safe mode, disabling (or de-energizing) the relay outputs when an internal potentiometer, electronic relay drive component, or software fault is detected.

The 4-20 mA position feedback or digital, RS-485 serial feedback information provided by this product can be used in safety applications if the upstream safety control complies with software/functional safety requirements such as ANSI/UL 1998 Software Class 2, UL/IEC 60730-1 Software Class C appropriate for the safety requirements of the end application, and when used in one of the following (or equivalent) configurations:

- The upstream safety control compares its commanded actuator position with the 4-20 mA actuator position feedback from the SMARTLINK® DS while also monitoring the alarm relay output. In this configuration, if the alarm output becomes de-energized for more than 2 seconds, the upstream control should command other external hardware to achieve a safe system state.
- The upstream safety control compares its commanded actuator position with the digital, RS-485-based position information contained within the Feedback Safety Data (FSD) packet while also monitoring the alarm output and/or the state of this relay output (also contained within the FSD packet). If this RS-485 data is used for position feedback confirmation and alarm relay status fault monitoring, the upstream safety control must “validate” the Feedback Safety Data packet as follows: 1) verify the source of the information by testing for the correct actuator ID and data type ID, 2) ensure the information is current by verifying the packet counter is being incremented, and 3) verify the data is not corrupted by testing the CRC value of each communications packet and the CRC value of each FSD packet. In addition, a safety communications timeout period appropriate for the end application should be implemented to detect loss of communication between the upstream safety control and the actuator. Refer to the SMARTLINK® DS Modbus User Manual for more detailed information on the Feedback Safety Data packet.

Before operating this product, check all specifications (Pages 3/4) and safety requirements (Page 6) to ensure the product is suitable and safe for the intended application. In addition, read all installation, commissioning, and operating instructions. The SMARTLINK® DS actuator must be set-up and maintained in the field by qualified personnel. If the equipment is used in a manner not specified, the protection provided by the equipment may be impaired.

Mechanical installation

The valve actuator assembly may be installed in any orientation. Observe good piping practice when installing valves. Do not use valves or actuators to support the weight of the pipe.

Ensure pressures in pipe cannot exceed the rated valve pressure.

Ensure material compatibility of the valve body and trim options in combination with the process media, any possible contaminants, and any possible cleaning materials. Material incompatibility can lead to damage or failure.

If performing a line-breaking operation, relieve pipe pressure and purge any dangerous media prior to valve installation. If the process media poses any risk or hazard, consult the site safety manager prior to proceeding.

Observe national and local regulatory codes when installing on a pipeline.

Maintain the integrity of the enclosure by using NEMA 4X or IP67 rated dust- and water-tight electrical connectors. Use cable-sealing grips and strain-relief loops for any cord or cable. Plug unused conduit holes. 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 to the specified torque. Cover screws should be checked periodically to ensure adequate sealing protection.

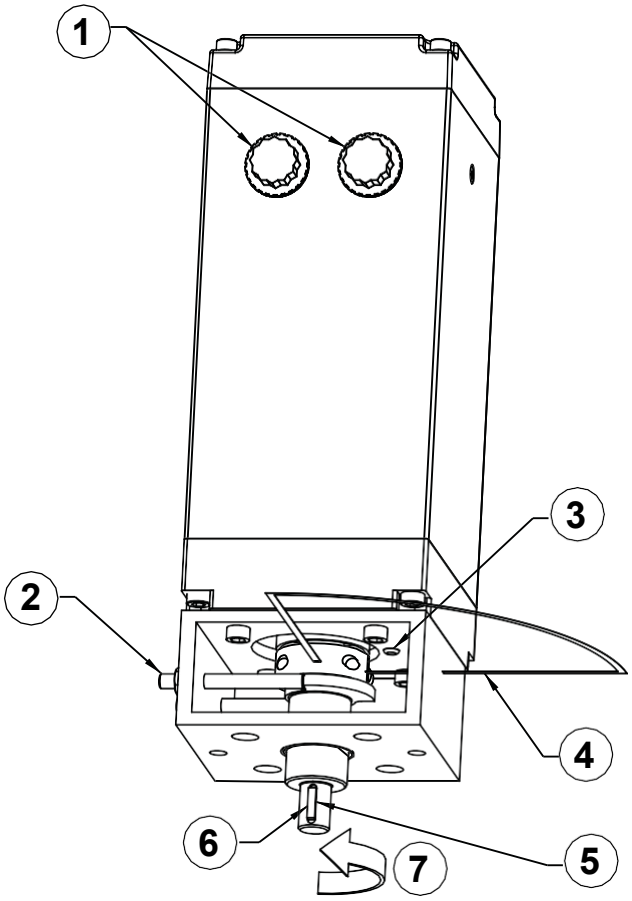
Ensure the media temperature cannot exceed the valve or actuator ratings. Use a coupling with thermal breaks if required. If the possibility exists for radiant heating (such as a furnace application), install a thermal barrier.

Ensure that pipe and ductwork is free of debris that could impair valve function.

Note that if a brake option is selected, the actuator CANNOT be manually stroked without first powering the unit and disabling the motor and brake. If the unit has no brake, turn off power to the system before actuator replacement or valve body (or damper) servicing is performed to avoid unsafe operating conditions or injury.

For standalone models, note the quadrant of the keyway and rotation direction as shown in Figure 1.

Figure 1



1) Conduit entrance
2) Hard stops
3) Alignment pin in base of actuator
4) Shaft rotation quadrant
5) Key in shaft
6) Min. (close)
7) Max. (open)

Counter-clockwise (CCW-to-close) rotation, default mode (when viewing shaft end)

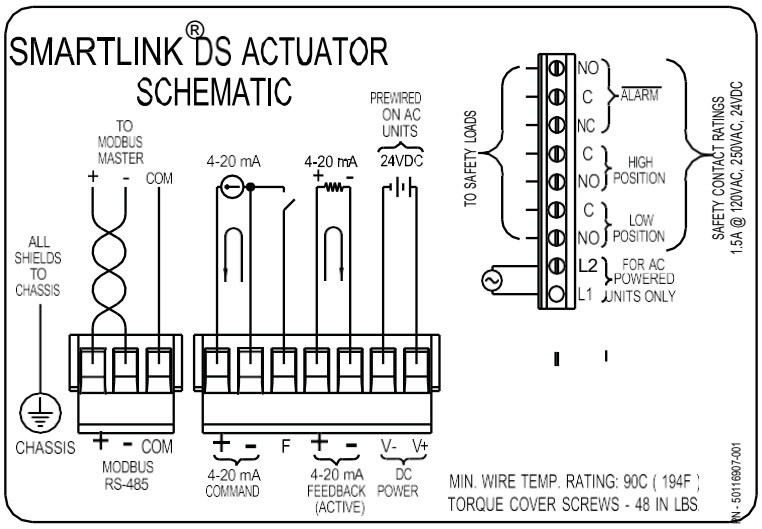
Ensure a key is installed and fully seated in all keyways; failure to install a key can compromise the safety of some applications. Hand tighten bolts on the mounting bracket and coupling collar and ensure good fit and that the shaft is centered prior to fully tightening all bolts. Ensure the coupling collar does not bind throughout the full rotation. Ensure coupling collar is tightened to 170 in-lbs, especially in high-torque applications. Tighten bracket bolts.

Electrical installation

If the possibility of a hazardous location exists, ensure the area is made safe and disconnect power before removing the actuator cover or conduit fittings.

Wiring terminals

The diagram below indicates each wiring terminal and the following reference table identifies each terminal's signal type and function. Many applications will not require connections to all terminals.



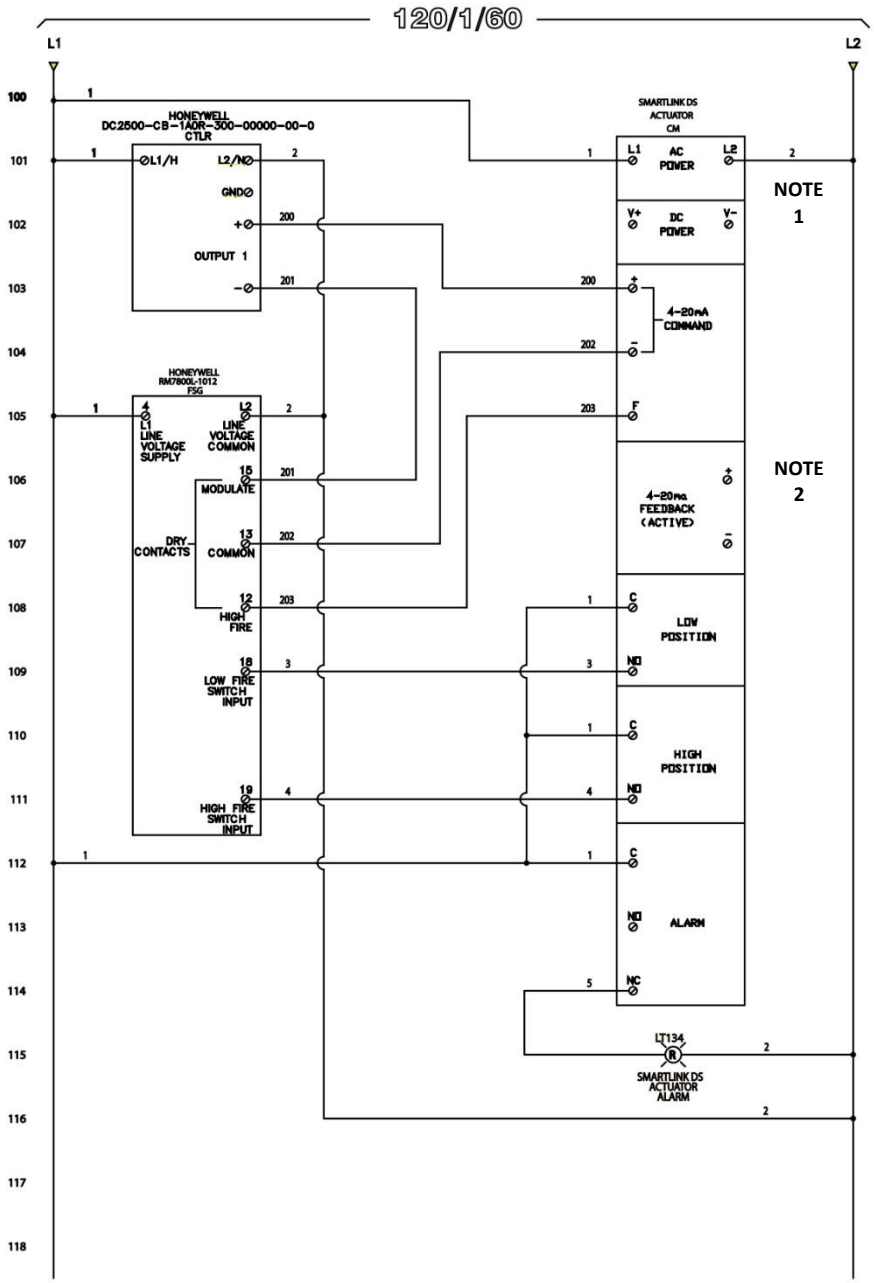
To access the field wiring compartment for power and signal connections, remove the 4 bolts and cover from the top of the actuator housing. Pass all customer-supplied wires into the enclosure through the 2 conduit hubs.

To ensure physical protection as well as electromagnetic immunity, the use of flexible, sunlight-resistant, jacketed, metallic, water-tight conduit is required. The conduit should be connected to earth ground on both ends.

One or both conduit holes may be used when wiring an actuator. When AC (mains) voltage is present for either power or relay signals, it is preferable to use a separate conduit for low voltage signal wire to avoid electrical interference.

In addition to a grounded conduit, the use of shielded, twisted-pair cable is strongly recommended for DC power and signal wires. The shield drain wires should be landed to chassis/earth on both ends of the cable, but ONLY if a conduit is also grounded on both ends. In other cases, earth the shields at one end only to prevent ground loops.

Typical installation



Notes:

1) When an AC actuator is provided, wire AC power to Terminals L1 and L2. An integrated DC power supply is provided and is factory wired to DC Terminals V- and V+.

2) For position feedback, wire to the 4-20 mA (+) and (-) terminals. 4mA=0% open 20mA=100% open. The 4-20 mA output signal is self-powered. DO NOT use an external supply in conjunction with this output.

Input power

Use cable rated for the temperatures, voltages, and currents required by the application. Ensure that voltage specifications are met under all conditions.

In the case of AC power, safety ground must be wired to the chassis ground screw.

A fuse or breaker should be installed at the power source.

If a brake option is not used, eliminate any possibility of externally driving the actuator. If the possibility exists for back-driving, particularly with a large (12" or larger) butterfly valve or damper, use of a battery-backup system is highly recommended to prevent an actuator over-speed condition on power loss. High speed or acceleration will irreparably damage the gearbox and/or motor.

Low voltage inputs

By default, the actuator is controlled by an analog 4-20 mA signal (alternatively, Modbus control is possible).

This input is polarity sensitive; observe the polarity shown in the wiring diagram, with current flowing INTO the positive terminal.

The F-terminal is a special command input that will trigger the actuator to move to a pre-defined location. It is active when shorted (via a switch or relay) to the 4-20 mA terminal.

The command input terminals, along with the F-terminal, are fully isolated from the power supply, feedback signal, and communication signals.

Low voltage outputs

The 4-20 mA position feedback signal works similarly to the 4-20 mA input signal. The output is polarity sensitive; observe the polarity shown in the wiring diagram, with the current flowing OUT of the positive terminal.

The 4-20 mA output signal is self-powered. DO NOT use an external supply in conjunction with this output.

The output terminals are fully isolated from the power supply, input terminals, and communication signals.

Relay connections

All relay connections are dry (unpowered) and isolated from each other and other signals. All 3 relay loads are de-rated when used in a safety-critical application; see the specification list. In addition, all relays are significantly de-rated if driving an inductive load, such as a motor. Use cable rated for the temperatures, voltages, and currents required by the application.

The low and high position relays are intended to act in the same way as mechanical limit switches. Each will energize and close when the limit threshold is met or exceeded. In addition, a small amount of hysteresis has been designed into these limits to avoid relay chatter. Both relays are guaranteed to open if the actuator becomes un-powered or enters a lockout condition. By default, no thresholds are set; the user must determine the safe limits for a given application.

The alarm relay will energize when the unit is powered and operating normally. By default, the alarm relay will alternately open and close (approximately every 1.5 seconds) when an aberrant (but non-lockout) condition is present, such as excessive temperature; this behavior may be de-activated. The relay is guaranteed to de-energize if the actuator becomes un-powered or enters a lockout condition.

The alarm relay is intended to operate either as a safety interlock, an interlock with the analog feedback signal, or as a means to drive an external warning light. As an interlock, the normally-open (NO) terminal should be used, since it will be closed only during normal operation. To drive a warning light, the light may be powered through the normally-closed (NC) terminal, since it will be closed only during a fault.

Communication (Modbus over RS-485)

Use appropriate communication cable (see table on page 12). A network will consist of a customer's Modbus master (with termination) and one or more actuator slaves. The recommended network layout for multiple actuators is a "star" topology where each branch/homerun length does not exceed 500 feet in length (2000 feet total); in this case use the termination resistor at each actuator. Multiple actuators may also be connected in a "multi-drop" or "daisy chain" topology as long as the total cable length does not exceed 3000 feet; in this case use the termination resistor at the furthest (end-run) actuator only and remove it from other actuators. Note that while communication and AC power may be daisy-chained, it is recommended that DC power distribution be via the star topology only to limit voltage droop.

Wiring requirement summary

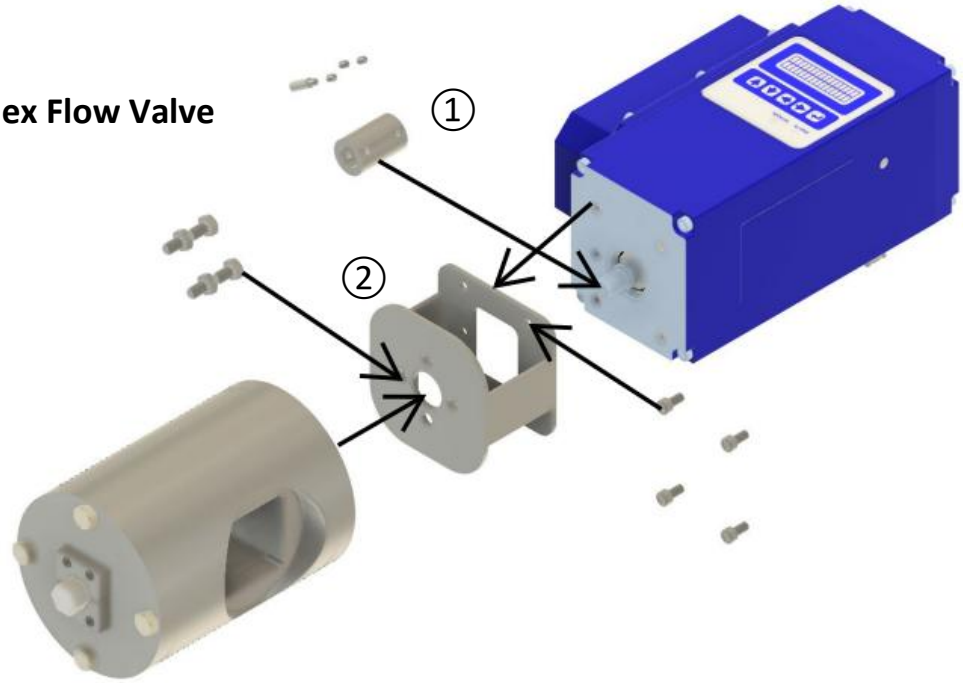
Type	Terminal	Description	Wiring
PE (Protective Earth)	Chassis ground screw	Chassis connection for mains power and shield/drain wires	Follow local codes for safety earth installation. See Electrical installation section for shield drain installation instructions.
Power/ground (AC models only)	L1	AC mains	Use a 3.15A slow-blow fuse. Use 12- 22 AWG wire.
	L2	AC mains	
DC power terminals (pre-wired on AC models)	24V+	24VDC positive terminal	Shielded twisted pair cable is recommended. Self-healing 1.8A fuse is provided in all units (AC or DC). If additional fusing protection is required in the DC input cabling, use a 3.15A slow-blow fuse. Required gauges are: Up to 80 ft: 24 AWG Up to 120 ft: 22 AWG Up to 500 ft: 16 AWG Up to 800 ft: 14 AWG Up to 1200 ft: 12 AWG Over 1200 ft: AC powered models are recommended to avoid large voltage drops.
	24V-	24VDC negative terminal	
Low voltage inputs	4-20 In+	Isolated 4-20 mA position command signal (current input)	Shielded twisted pair cable is recommended. Use 12-24 AWG wire.
	4-20 In-	Command signal current return	
	F	F-terminal input (see page 59)	<20 mA current. Use 12-24 AWG wire.
Low voltage outputs	4-20 Out+	Isolated, self-powered 4-20 mA position feedback signal (current output)	Shielded twisted pair cable is recommended. Use 12-24 AWG wire.
	4-20 Out-	Feedback signal current return	
Low voltage communication (Modbus over RS-485)	RS485 In+	Isolated RS-485: positive	Shielded twisted pair cable with a separate common wire is recommended. See Electrical installation section for length limitations. Use 12-24 AWG wire.
	RS485 In-	Isolated RS-485: negative	
	RS485COM	Isolated RS-485: common	
Relay contacts	$\overline{\text{Alarm}}$ RLY NO	Alarm (NOT) indication: CLOSED to COM when powered and no alarm or lockout condition	See specification sheet for current capacity. Use 12-22 AWG wire.
	$\overline{\text{Alarm}}$ COM	Alarm relay common	
	$\overline{\text{Alarm}}$ RLY NC	Alarm (NOT) indication: OPEN to COM when powered and no alarm or lockout condition	
	HIGH POS RLY COM	High position proven (HPP) dry contact return	
	HIGH POS RLY NO	High position proven (HPP) indication CLOSED to COM while user-defined high position condition is achieved	
	LOW POS RLY COM	Low position proven (LPP) dry contact return	
	LOW POS RLY NO	Low position proven (LPP) indication CLOSED to COM while user-defined low position condition is achieved	

Mounting accessories

SMART LINK DS to Flex Flow Valve

① Coupling
Part #FF-SL-001

② Bracket
Part #FF-SL-002



SMART LINK DS to Fives NA Valve

① Coupling

② Bracket