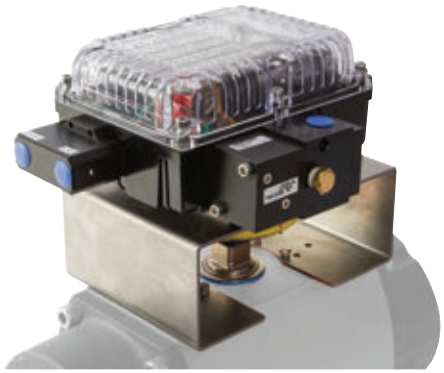
WESTLOCK CONTROLS

DIGITAL EPIC-2 POSITION TRANSMITTER

INTRINSICALLY SAFE OR EXPLOSION PROOF

An intelligent valve position transmitter that offers discrete position control and reliable, non-contact position feedback with digital communication via HART® protocol in a simple, integrated package



FEATURES

- Position transmitter with 4-20 mA position feedback.
- Non-contact local or remote mount magnetic sensor with no moving parts, providing high accuracy and reliability.
- Choice of factory configured solenoid coil & valve or custom solenoid valve with a choice of C_V rating and coil voltage.
- Password protected 3 button local user interface with high contrast graphic LCD (non-intrusive 3 button keypad on XP version).
- Remote user interface using HART® 7 DD/FDT® DTM 1.2 for seamless system integration.
- Easy configuration and auto calibration.
- Emergency Shutdown (ESD) status & alarm.
- Partial Stroke Testing (PST) & pressure profiling .
- Solenoid Operated Valve Testing (SOVT).
- Full Stroke Testing (FST) & pressure profiling.
- Intelligent alarm system.

GENERAL APPLICATION

Designed specifically for safety valves, Digital EPIC-2 has advanced diagnostic functions that enable ESD, PST, SOVT and FST to be carried out efficiently and reliably, to ensure effective maintenance of Safety Integrity Levels up to level 3 (IEC 61508).

TECHNICAL DATA

Input signal:	0-24 V analog
Output signal:	0-24 V digital
ESD signal:	5 to 30 V DC
Loop output:	9 to 35 V DC
Stroke	
Rotary:	30° to 90°
Linear:	½" to 36" (15 to 914 mm)
Temperature range	
Standard operational:	-40° to +185°F (-40° to +85°C)
Enclosures	
Intrinsically safe:	Engineered resin, aluminum, stainless steel
Explosion proof:	Aluminum, stainless steel

OVERVIEW

Digital EPIC-2 is a second generation, transmitter-based intelligent device that provides the ultimate in functionality at a realistic cost. Its sophisticated diagnostic functions lower the total cost of ownership by suggesting predictive maintenance of the valve under operation before it fails and interrupts the process, with intelligent alarms that pinpoint the root cause of problems, enabling the most appropriate and cost-efficient action.

It features an ultra-fast and reliable non-volatile memory for configuration and event logging with an unlimited number of write cycles and up to four maintenance signatures that can be compared to a baseline signature for preventive maintenance. It's also field upgradeable, via an integral USB port that eliminates the needs for proprietary tools, enabling new functions to be added simply.

SENSING AND CONTROL

Within the enclosure is a powerful industry leading ultra low power 32-bit ARM® microcontroller with one non-contact position sensor, two pressure sensors and one temperature sensor. The current consumption of the electronics keeps the device operating even at 3.6 mA with HART® communication during an ESD event.

Magnetic position sensor:
- Industrial grade magnetic sensor
- Remote option available up to 50 feet (15 m)
- Resolution: 0.2% FS
- Accuracy1: ± 2 - 4% FS
- Effect of temperature: ± 0.4% /10°F/°C
- Effect of external magnetic field: negligible (IEC 61000-4-8)
- Effect of vibration: negligible (IEC 61514-2)

Pressure sensors:
- For diagnostic and signature generation
- Input range: 0 to 120 psi
- Connection: ¼" NPT or ¼" BSP
- Resolution: 1 psi
- Accuracy[1]: ± 1 psi
- Effect of temperature: ± 1 psi / 100°C

Temperature sensor:
- Embedded digital temperature sensor
- Used for alarm generation
- Accuracy[2]: ± 2°F/°C

NOTES
1. Combined linearity, hysteresis and repeatability over the operating range.
2. Combined linearity, hysteresis and repeatability over the operating temperature range.

AGENCY APPROVALS

North America
XP/I/1/BCD/T5 Ta = -50°C to +85°C
DIP/II, III/1/EFG/T5 Ta = -50°C to +85°C
I/1/AEx db IIB+H_2/T5 Gb Ta = -50°C to +85°C
21/AEx tb IIIC/T88°C Db Ta = -50°C to +85°C, Type 4, 4X, IP66, IP67

Intrinsically Safe for Class I, II and III Division1, Groups A,B,C,D; T4; Ta Type 4, 4X, 6P, IP67
Non Incendive Class 1, Division 2, Groups A, B, C, D; T4; Type 4, 4X, 6P, IP67
Class II, Division 2, Groups F, G, T4

ATEX/IECEx
EX ia IIC T4 Ga Ta = -40°C to +80°C IP66/IP67
EX nA IIC T4 Gc Ta = -40°C to +80°C IP66/IP67

COMMUNICATION

The Digital EPIC-2 is powered through an analog signal from the control system and provides 4-20 mA position feedback and digital HART communication on the same signal. The safety function is provided from an ESD digital signal from the safety system to the Digital EPIC-2 to de-energize the valve during an emergency shutdown event.

For Foundation Fieldbus and Profibus PA applications please call Westlock.

HART details:
- HART revision: 7.3
- PHY compliance: 7.3
- PV: Actual position in % FS
- SV: Loop current in mA FS
- TV: Pressure port 1 in psi
- FV: Pressure port 2 in psi
- Burst: No

Loop input:
- Polarity insensitive, two wire 4-20 mA, Namur NE43
- Normal operation: adjustable 3.8 ≤ I ≤ 20.5 mA
- Fixed calibration/PST/FST/SOV current: 12 mA
- Fail condition: I ≤ 3.6 or I ≥ 21.0 mA (configurable)
- Minimum operating voltage: 9 V DC
- Maximum operating voltage: 35 V DC

ESD input:
- Operating voltage: 5 to 30 V DC
- Polarity insensitive
- Isolated 1500 Vrms
- Maximum current: 1000 mA
- Voltage monitor with configurable HART alert

ESD/PST/SOV output:
- Operating voltage: 5 to 30 V DC
- Polarity insensitive
- Isolated 1500 Vrms
- Maximum current:
  - 1000 mA at 77°F (25°C)
  - 500 mA at 185°F (85°C)
- Options available up to 400 V AC/DC
- Contact Westlock for AC and high-voltage options

Discrete input:
- Suitable for dry-contact active closed outputs
- Optional remote PST/FST/SOV initiation

Discrete output:
- Isolated 1500 Vrms
- Normally closed switch
- Maximum operating voltage: 350 V AC/DC
- Maximum current:
  - 120 mA at 77°F (25°C)
  - 60 mA at 185°F (85°C)
- PST/FST/SOV complete/alert/alarm/fault indication

NOTE

1. For reference only. Check your actual device or consult Westlock for more information.

SETUP, OPTIONS AND RATINGS

Setup, calibration and operation

A step by step guided setup wizard on a graphic LCD provides an easy way to configure, calibrate and operate the device locally. Alternatively, a remote HART® DD or FDT® DTM can be used to configure, calibrate and perform advanced diagnostics functions on the device.

Graphic LCD:

- LCD readable temperature: -40°F to 158°F (-20°C to 70°C)

Keypad for local configuration:

- 3-key ruggedized tactile membrane
- Optional non-intrusive magnetic keypad with magnetic tool

OPTIONS

Real time clock:

- Adjusted using keypad or HART
- Used for automatic PST/FST/SOV[2] function and time-stamped events
- Back-up: Super-capacitor
- Back-up life: 14 days at 68°F (20°C)

Contact Westlock for other options including current/voltage input for 4-wire sensors.

Environmental:

- Operating: -40°F to +185°F (-40°C to +85°C)
- Storage: -76°F to +185°F (-60°C to +85°C)
- Relative Humidity: 0 to 95% non-condensed
- Vibration: 2 g, 10 Hz to 1000 Hz
- Shock: 18 g, 3 axis, 100 bumps each axis
- References: IEC61514-2, IEC 60068-2-29/27, IEC 61298-3, IEC 60068-2-1/2

Remote mount capability

The Digital EPIC-2 has the ability to be mounted remotely (up to 50 feet / 15 m) from the device it is controlling (please consult about greater distances). This allows the position transmitter to be isolated if the valve is located in either a high vibration, high temperature or extremely corrosive environment.

Reliability data

safety Integrity Level: Suitable for use in all SIL 3 applications.

IEC 61508 Failure Rates in FIT[1]				
Device	λSD	λSU	λDD	λDU
D-EPIC 2 HART	1	586	0	1

[1] FIT = 1 failure / 10^8 hours

Assessment report PEN 16/01-024 R001 VIRI

Safety Manual: SMAN-004 Revision A or later

Ingress protection rating (base models):
- Resin enclosure: IP65 / TYPE 4/4X/6P
- XP enclosure (aluminum/stainless steel): IP67 / TYPE 4/4X/6P

Hazardous ratings (Reference only, contact Westlock for approvals and certificates):
Digital EPIC-2 is designed in accordance with criteria for NI, IS and XP applications. In some cases it requires the use of an agency approved barrier. For information on the barrier used by Westlock Controls to obtain the agency approvals listed, appropriate network architecture and segment device limits, contact Westlock.

HAZARDOUS RATINGS

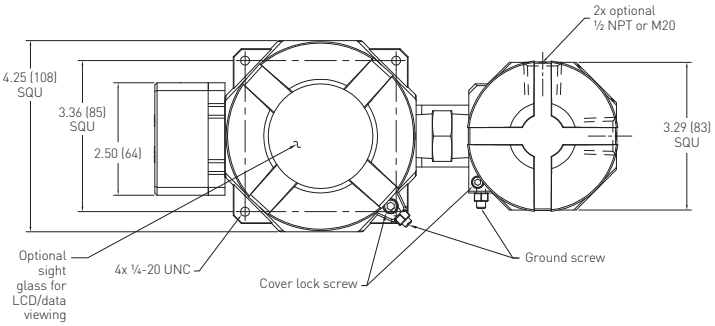
Type	Housing	Rating
Intrinsically safe Engineered resin, Aluminum or Stainless steel	D530 D540 D550	NEC 500: Class I, Division 2; Groups A, B, C & D Class II & III, Division 2; Groups F & G
		ATEX/IEC: Ex II 1 G Ex ia IIC T4 Ta = -20°C to +60°C Ex II 3 G Ex nA IIC T4 Ta = -20°C to +60°C
Explosion proof* Aluminum or Stainless steel	D510 D520	NEC 500: Class I, Division 1; Groups B, C & D Class I, Division 2; Groups A, B, C & D Class II, Division 1; Groups E, F & G
		ATEX/IEC: Ex d IIB+H2 AEx d IIB+H2 EX nA IIC AEx nA IIC

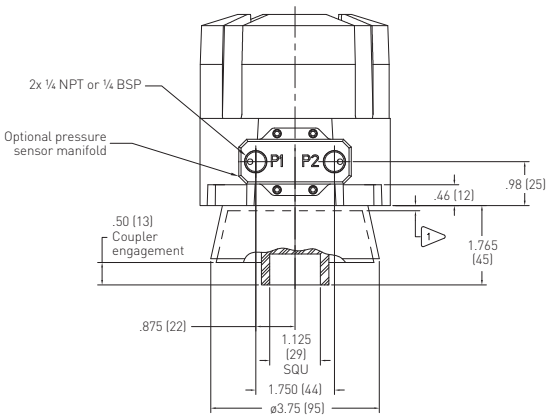
* Contact Westlock for more information.

Intrinsically safe parameters
Intrinsically safe parameters for loop output connector J1 pins 1, 2
Entity parameters[4]
Ui = 30 V
Ii = 100 mA
Pi = 0.75 W
Ci = 2.2 nF
Li = 40 uH

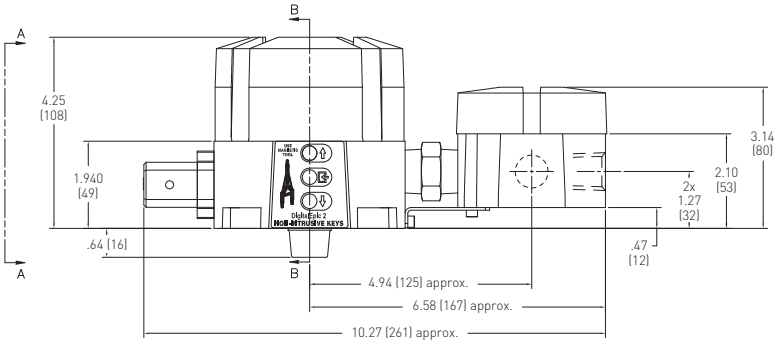
DIGITAL EPIC-2 POSITION TRANSMITTER

DIMENSIONS - D510 & D520 EXPLOSIONPROOF / FLAMEPROOF





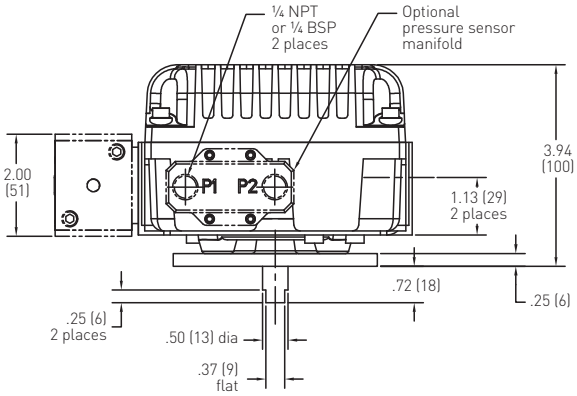
View A-A shown with Beacon for rotary applications



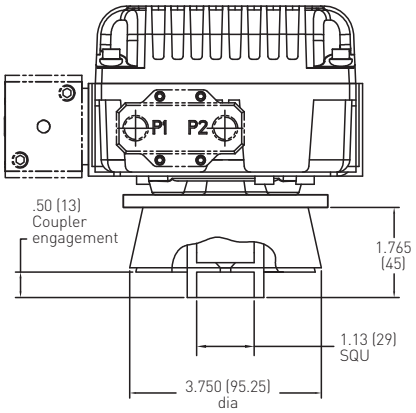
View shown w/o Beacon for linear applications

NOTES

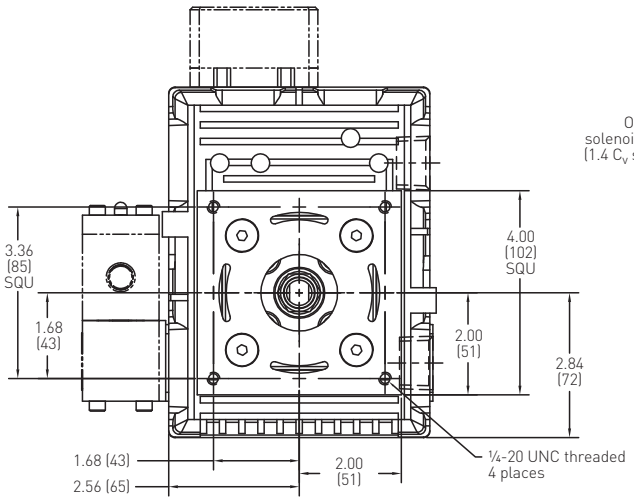
1. .115 (2.92) spacing is required for clearance between inner Beacon & bottom of housing.
2. All dimensions are in inches (millimeters).



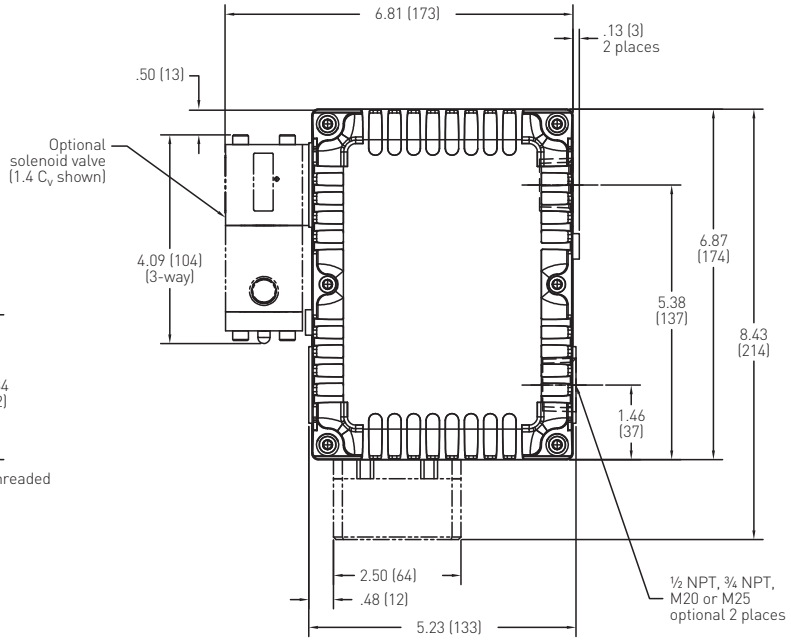
Front view



Front view shown
with Beacon for
rotary applications



Bottom view



Top view

DIGITAL EPIC-2 POSITION TRANSMITTER

SELECTION GUIDE - D510 & D520 EXPLOSIONPROOF / FLAMEPROOF

Base Model					
D510	D-EPIC2 Digital Transmitter with XP Site Glass, ESD/PST capability & Non-intrusive Calibration				
D520	D-EPIC2 Digital Transmitter				
	Application Type				
	LV	Linear Transmitter (Free magnet assy. Include up to 2½" stroke, for strokes > 2½", consult Sales Representative)*			
	LR	Linear Transmitter with Remote Mount Option (magnet note in LV options applies)*			
	RO	Rotary Transmitter			
	RR	Rotary Transmitter with Remote Mount Option			
		ESD/PST - Diagnostics			
		00	None (Required choice for D520)		
		11	ESD/PST Function (Simplex single coil)		
		1N	ESD/PST Function with Pressure profiling and SOVT (NPT fittings)		
		1B	ESD/PST Function with Pressure profiling and SOVT (BSP Fittings)		
			Optional Approval		
			F	FM Approval	
			A	ATEX Exd, E a and IEC Exd, E a approved	
				Conduit Options	
				1	½" NPT (Quantity based on ESD/PST option chosen)
				2	M20 (Quantity based on ESD/PST option chosen)
D510	RO	1N	F	1	= Model Number **D510RO1NF1**

* Valve stroke and fail position must be specified at time of quotation for LV and LR options.

DIGITAL EPIC-2 POSITION TRANSMITTER / FALCON V SOLENOID VALVE

SELECTION GUIDE - D530, D540, D550 NON-INCENDIVE AND D550 NON-SPARKING / INTRINSICALLY SAFE

Base Model

D530	D-EPIC2 Digital Transmitter (Lrg. Resin Encl. w/ three Conduits (F) or two (F) when used with Falcon Valve or push button)
D540	D-EPIC2 Digital Transmitter (Lrg. Aluminum w/ three conduits (F) or two conduits (F) when used with Falcon Valve or push button)
D550	D-EPIC2 Digital Transmitter (Lrg. 316 Stainless Steel Encl. w/ three conduits (F) or two conduits (F) when used with Falcon Valve or push button)

Application Type

LV	Linear Transmitter (Free magnet assy. Include up to 2½" stroke, for strokes > 2½", consult Sales Rep.)*
LR	Linear Transmitter with Remote Mount Option (magnet note in LV options applies)*
RO	Rotary Hall Effect Transmitter
RR	Rotary Hall Effect Transmitter with Remote Mt. Opt.

Future options

0000	Future options

ESD/PST - Diagnostics

11	ESD/PST Function (Simplex single coil)	31	ESD/PST Function (Simplex single coil with push button)
1N	ESD/PST Function with Pressure profiling (NPT fittings)	3N	ESD/PST Function with Pressure profiling (NPT fittings with push button)
1B	ESD/PST Function with Pressure profiling (BSP Fittings)	3P	ESD/PST Function with Pressure profiling (BSP fittings with push button)

Coil Voltage

0	None
I	24 V DC

Falcon V Valve Bodies

2V3	1.4 C_v, 3-Way, Brass	2V7	1.4 C_v, 4-Way, Brass
3V3	1.4 C_v, 3-Way, Aluminum	3V7	1.4 C_v, 4-Way, Aluminum
5V3	1.4 C_v, 3-Way, 316 SS	5V7	1.4 C_v, 4-Way, 316 SS
3V4	4.3 C_v, 3-Way, Aluminum****	3V8	4.3 C_v, 4-Way, Aluminum****
540	3.5 C_v, 3-Way, 316 SS***	580	3.5 C_v, 4-Way, 316 SS***

Over-ride Option (Adders must be doubled for Dual Coil)

0	None**
M	Momentary***
L	Locking***
R	No-voltage Release, Non-Latching (available in 1.4 C_v only)
N	No-voltage Release, Latching (available in 1.4 C_v only)
E	External Pilot***

Approval Options

IS	FM Approved IS/NI
AI	ATEX and IEC Approved Exia/Exna

Conduit Options

1	½" NPT (Quantity based on options)
2	M20 (Quantity based on options)
3	¾" NPT (Quantity based on options)
4	M25 (Quantity based on options)

D550	RO	0000	1B	I	5V3	0	AI	2	= Model Number **D550RO0001BI5V3AI2**

NOTES

* Valve stroke and fail position must be specified at time of quotation for LV and LR options.

** No overide should be used for ESD valves with SIL rating.

*** Options M, L, E are not available with option "54" & "58" Falcon Valve Bodies. These options are available in 303 SS, please contact Sales for availability.

**** 3V4 valves have ports 2 & 3 plugged at the factory for 3-way functionality.

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Westlock. We reserve the right to change designs and specifications without notice.