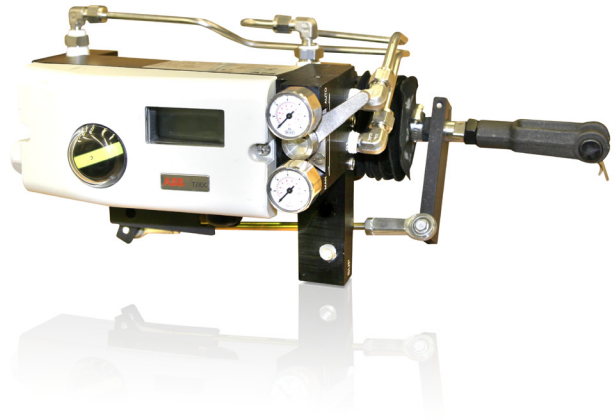


Actuators & Positioners

LP - Linear Pneumatic Piston Actuator

Cylinder Actuators



High resolution, sensitivity, and fast response

Cylinders available with Buna-N or Viton seals

Suitable for high temperature applications

Easy adaptability to air dampers and louvers

Drop in replacement for many "older" piston actuators

Available with 4 to 20mA position feedback

Digital features with TZIDC positioned

Explosion Proof application with TZIDC-200 positioners

Communication with HART / Foundation Fieldbus /
Profibus PA

LINEAR PISTON ACTUATORS - TYPE LP

Cylinder Actuators From 2-1/2" dia. x 5" Stroke to 10" dia. x 16" Stroke

LP linear piston actuators are typically used to control the position of airflow regulating dampers, butterfly valves, and other similar process regulating devices on furnaces, boilers and air distribution systems. They are most often used on windbox dampers in NOx reduction control systems. When directly connected to a lever on the damper shaft, these actuators provide accurate positioning control at minimum.

The LP air cylinders are available with either Buna-N nitrile rubber seals or with Viton seals. The Buna-N seals offer lower internal friction, somewhat longer life, and are suitable over a wider temperature range from 40°F to 185°F. Viton seals, while excellent at temperatures up to and exceeding 250°F, are not suitable for temperature below freezing.

LP Actuators can be supplied with either conventional Type AV pneumatic positioners, or TZIDC digital "Smart" positioners. The AV positioners with 3 to 15 psi or 3 to 27 psi control input signals can be supplied with Viton o-rings and Flouro-silicon diaphragms, making them suitable for operating temperatures up to 250°F. This same positioner can also be supplied with Buna-N seals suitable for up to 185°F. The 4 to 20 ma. input AV and the TZIDC positioner are also available in an Explosion-proof variation. These variations are selectable in the Nomenclature. Note that adding a 4 to 20 ma. position feedback transmitter option limits the operating temperature to 185°F.

The LP cylinder sizes range from 2.5" diameter x 5" stroke to 10" diameter x 16" stroke. The most common sizes, 2-1/2" x 5" and the 4" x 4", are typically available from stock or on short turn-around.

TZID-C Digital Features and Benefits

Microprocessor-based
Highest operating accuracy
Local keypad, two line LCD and position indicator
Easy local configuration operation
Digital communication via HART, Foundation Fieldbus, and Profibus
Remote configuration and monitoring
Configurable operating parameters
Easy set-up of direct/reverse action, limit stops, etc.

Integrated position feedback
Analog and / or digital feedback without additional external devices to calibrate and maintain
Diagnostics and self-monitoring capabilities
Easy trouble-shooting and preventive maintenance
Immunity to shock and vibration
Installation in high vibration areas

Thrust Ratings:

The basic thrust rating of a pneumatic piston is equal to the area of the piston times the supply pressure. The minimum supply pressure for both the TZIDC and the AV1 is 20 psi.

The maximum supply pressure for the TZIDC is 90 psi and 125 psi for the AV positioner.

The area of the piston is $A = \pi D^2/4$. Subtract about 10% for friction losses and because the rod side of the piston has less area. Then multiply this area by supply pressure in psi. An example is given below for an 80 psi air supply.

Notes:

- To find the lever length for 90° rotation, multiply the cylinder stroke length by 0.707.
- Torque equals thrust (lbs) times the lever radius (ft.).

Operating Torque/Thrust Characteristic	Actuator Type						
	LP10	LP20	LP30	LP32	LP40	LP50	LP60
Area-Retracting (Rod Side)	4.71 in. ²	11.2 in. ²	26.8 in. ²	26.8 in. ²	48.8 in. ²	48.8 in. ²	76.1 in. ²
Area-Extending (other side)	4.91 in. ²	11.94 in. ²	28.3 in. ²	28.3 in. ²	50.3 in. ²	50.3 in. ²	78.5 in. ²
Force out @ 80 psi ¹	339 lbs.	806 lbs.	1930 lbs.	1930 lbs.	3514 lbs.	3514 lbs.	5479 lbs.
Lever Length for 90° Rotation	3.54 in.	2.83 in.	5.66 in.	11.32 in.	5.66 in.	11.32 in.	11.32 in.
Operating Torque @ 80 psi ²	71 ft. lbs.	134 ft. lbs.	643 ft. lbs.	1286 ft. lbs.	1172 ft. lbs.	2341 ft. lbs.	3651 ft. lbs.

Note 1: Use the rod side area x psi to calculate force. Subtract 10% for friction loss.

Note 2: Torque at mid-stroke is 1.4x torque at +/- 45°

TABLE 1 Suggested Maximum Operating Force at Minimum & Maximum Supply Pressure

Note: The Torque calculation values are provided based on the stroke length of the LP and the required lever arm dimension for 90 deg damper travel.

LP10		
Cylinder diameter	2.5"x5"	
Lever for 90deg	3.53"	
Supply psi	Force lbf	Torque ft-lb
40	170	35
45	191	40
50	212	44
55	233	48
60	254	53
65	276	57
70	297	62
75	318	66
80	339	71
85	360	75
90	382	79

Table 1.1

LP20		
Cylinder diameter	4"x4"	
Lever for 90deg	2.83"	
Supply psi	Force lbf	Torque ft-lb
40	403	67
45	454	76
50	504	84
55	554	92
60	605	101
65	655	109
70	706	118
75	756	126
80	806	134
85	857	143
90	907	151

Table 1.2

LP30		
Cylinder diameter	6"x8"	
Lever for 90deg	5.66"	
Supply psi	Force lbf	Torque ft-lb
40	965	322
45	1,085	362
50	1,206	402
55	1,327	442
60	1,447	483
65	1,568	523
70	1,688	563
75	1,809	603
80	1,930	643
85	2,050	684
90	2,171	724

Table 1.3

LP32		
Cylinder diameter	6"x16"	
Lever for 90deg	11.31"	
Supply psi	Force lbf	Torque ft-lb
40	965	643
45	1,085	723
50	1,206	804
55	1,327	884
60	1,447	964
65	1,568	1,045
70	1,688	1,125
75	1,809	1,205
80	1,930	1,286
85	2,050	1,366
90	2,171	1,447

Table 1.4

LP40		
Cylinder diameter	8"x8"	
Lever for 90deg	5.66"	
Supply psi	Force lbf	Torque ft-lb
40	1,757	586
45	1,976	659
50	2,196	732
55	2,416	806
60	2,635	879
65	2,855	952
70	3,074	1,025
75	3,294	1,098
80	3,514	1,172
85	3,733	1,245
90	3,953	1,318

Table 1.5

LP50		
Cylinder diameter	8"x16"	
Lever for 90deg	11.31"	
Supply psi	Force lbf	Torque ft-lb
40	1,757	1,171
45	1,976	1,317
50	2,196	1,463
55	2,416	1,610
60	2,635	1,756
65	2,855	1,902
70	3,074	2,049
75	3,294	2,195
80	3,514	2,341
85	3,733	2,488
90	3,953	2,634

Table 1.6

LP60		
Cylinder diameter	10"x16"	
Lever for 90deg	11.31"	
Supply psi	Force lbf	Torque ft-lb
40	2,740	1,826
45	3,082	2,054
50	3,425	2,282
55	3,767	2,510
60	4,109	2,738
65	4,452	2,966
70	4,794	3,195
75	5,137	3,423
80	5,479	3,651
85	5,822	3,879
90	6,164	4,107

Table 1.7

Linear Pneumatic Piston actuators are supplied with either type AV analog or type TZIDC digital positioners mounted on the cylinder. Cylinders are supplied with a threaded clevis on the rod end. Base mounting pivots can be ordered as an accessory.

A protective boot is optional. The cylinders can be supplied with either Buna-N nitrile rubber seals suitable for 93°C (200° F) operation or Viton seals suitable for 148°C (300° F) operation. The Buna-N seals have a lower breakway pressure, offering smoother modulating control.

The operating temperature for the AV15 & AV16 is 121°C (250°F). All other positioners have a 85°C (185°F) maximum ambient.

Buna-N seals are recommended unless temperature > 93°C (200°F) dictate Viton.

The TZIDC-200 is for Explosion Proof application Class 1 Div 1 Gr C-G. Refer to the AV or TZIDC positioner specifications for positioner details and specifications.

The maximum supply pressure with type TZID positioners is 90 psi. The maximum supply pressure with type AV positioners is 125 psi.

Standard Products=

Code

Linear Pneumatic Piston Actuator - Type LP

LP

1 : Cylinder Size

2-1/2 in. Diameter 5 in. Stroke (63.5 mm x 127 mm)	10
4 in. Diameter 4 in. Stroke (101.6 mm x 101.6 mm)	20
6 in. Diameter 8 in. Stroke (152.4 mm x 203.2 mm)	30
6 in. Diameter 16 in. Stroke (152.4 mm x 406.4 mm)	32
8 in. Diameter 8 in. Stroke (203.2 mm x 203.2 mm)	40
8 in. Diameter 16 in. Stroke (203.2 mm x 406.4 mm)	50
10 in. Diameter 16 in. Stroke (254 mm x 406.4 mm)	60

2 : Cylinder Seals

Buna-N Cylinder Seals -40 °C ... 85 °C (-40 ... 185 °F)	B
Viton Cylinder Seals -1°C ... 121 °C (30 ... 250 °F)	V

3 : Positioner Type(See Note A)

AV15, Input 3...15 psi (0.2...1 bar) 121 °C (250 °F)	1
AV16, Input 3 ... 27psi (0.2 ... 1.86 bar), 121 °C (250 °F)	2
AV232_00, 4 ... 20 mA, 85 °C (185 °F)	3
AV11, 3 ... 15 psi (0.2 ... 1 bar), 85 °C (185 °F)	4
AV12, 3 ... 27 psi (0.2...1.9 bar), 85 °C (185 °F)	5
TZIDC, HART 4 ... 20 mA, 85 °C (185 °F) , Fail Safe	A
TZIDC, HART 4 ... 20 mA, 85 °C (185 °F), Fail in Place	B
TZIDC-200 (EXP), HART, 4 ... 20 mA, 85 °C (185 °F), Fail Safe	C
TZIDC-200 (EXP), HART, 4 ... 20 mA, 85 °C (185 °F) , Fail in Place	D
TZIDC-110, Profibus PA, 85 °C (185°F) , Fail safe	K
TZIDC-110, Profibus PA, 85 °C (185°F) , Fail in Place	L
TZIDC-210 (EXP), Profibus PA, 85 °C (185°F) , Fail Safe	M
TZIDC-210 (EXP), Profibus PA, 85 °C (185°F) , Fail in Place	N
TZIDC-120, F. Fieldbus, 85 °C (185°F), Fail Safe	P
TZIDC-120, F. Fieldbus, 85 °C (185°F), Fail in Place	R
TZIDC-220 (EXP), F. Fieldbus, 85 °C (185°F) , Fail Safe	S
TZIDC-220 (EXP), F. Fieldbus, 85 °C (185°F) , Fail in Place	T

LP

Code

4 : Position Feedback and Direction Control (See Note B)

No Position Feedback, Piston Retracted at 4 mA/min Input signal		0
With 4 ... 20 mA Position Feedback, Piston Retracted at 4 mA/min Input signal	(Note:1,4)	1
No Position Feedback, Piston Extended at 4 mA/min Input signal		2
With 4-20 mA Position Feedback, Piston Extended at 4 mA/min Input signal	(Note:1,4)	3

5 : Travel Switches

No Travel Switches		0
With 2 Digital Switches in TZIDC Only (with FM / CSA Approval)	(Note: 2)	1
With 2 Micro Switches in TZIDC (no FM/CSA Approval) (See Note C)	(Note: 3)	2

6 : Manifold

No Manifold or Gage Block		0
Manifold with Bypass Valve & Gage Ports (See Note D)	(Note: 4)	1

7 : Mounting/Enclosure Classification Rating (See Note E)

Standard Clevis & Pivot Tab, NEMA 3R for AV / NEMA 4X for TZIDC		0
Standard Clevis & Pivot Tab with Cylinder Shaft Protective Boot, NEMA 3R for AV / NEMA 4X for TZIDC		1
Standard Clevis & Pivot Tab, NEMA 4X for AV		2
Standard Clevis & Pivot Tab with Cylinder Shaft Protective Boot, NEMA 4X for AV		3

8 : Tubing

Tubing with Brass Fittings (See note F)		0
Stainless Steel Tubing with Stainless Steel Fittings		S

Table LP-A

Instruction Manual LP	PN25008
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Table LP-A

Stainless Steel Tubing with Stainless Steel Fittings

LP10/LP20	Tubing option "S"
LP30/LP32/LP40	Tubing option "S"
LP50/LP60	Tubing option "S"

ACCESSORIES

Supply Pressure Alarm Switch adjustable 0...100psi rated 13 amps AC, 0.5 amps DC (See Note G)	1941099A1
Supply Air Coalescing Filter, 1/4 in. 18 NPT for LP10-LP40 (See Note H)	5328563D2
Supply Air Regulator with gage 1/4-18 NPT for LP10-LP40 (See Note H)	1951029D5
Supply Air Regulator/Filter - Coalescing with gage, 1/2 NPT (high capacity), for LP50-LP60 (See Note H)	1951439D1
Base Mounting Pivot Brackets LP60	353E435U01
Base Mounting Pivot Brackets LP30/LP32/LP40/LP50	353E435U02
Base Mounting Pivot Brackets LP10/LP20	353E435U04
Pin and retainers for pivot bracket LP30/LP32/LP40/LP50	398B203U02
Pin and retainers for pivot bracket LP10/LP20	398B203U03
Pin and retainers for pivot bracket LP60	398B203U04
Gages for supply pressure (1 required) (See Note D)	5326605A5
Gages for outlet pressure (2 required) (See Note D)	5326605A6

SPARES

Cylinder Seal Kit for LP10B	614B069U22
Cylinder Seal Kit for LP10V	614B069U23
Cylinder Seal Kit for LP20B	614B069U24
Cylinder Seal Kit for LP20V	614B069U25
Cylinder Seal Kit for LP30B & LP32B	614B069U26
Cylinder Seal Kit for LP30V & LP32V	614B069U27
Cylinder Seal Kit for LP40B & LP50B	614B069U28
Cylinder Seal Kit for LP50B & LP50V	614B069U29
Cylinder Seal Kit for LP60B	614B069U30
Cylinder Seal Kit for LP60V	614B069U31

LP Notes:

Note 1: Not available with Positioner Type code 1, 2, K, L, M, N, P, R, S, T

Note 2: Not available with Positioner Type code 1, 2, 3, 4, 5, K, L, M, N, P, R, S, T

Note 3: Not available with Positioner Type code 1, 2, 3, 4, 5

Note 4: Not available with Positioner Type code 1, 2

Note A: All positioners have FM/CSA approval, as standard, however see Note C for application exception

Note B: Direction Control refers to Stroke direction of cylinder (Direct Action), position feedback signal will follow Input signal

Note C: Cam operated microswitch option for TZIDC cannot be used in hazardous areas that require FM/CSA approval.

Cam operated microswitch option for TZIDC-200 can be used in Class 1 Div 1 Gr C-G application for FM/CSA.

Refer to TZIDC-200 Data Sheet

Note D: Refer to accessories for Gages, supplied separate for field installation

Note E: Refer to accessories for Mounting Base/Pin or Retainer

Note F: All LP10/20 supplied with copper tubing as standard, larger sizes up to LP60 supplied with TBG-Nylon Tubing

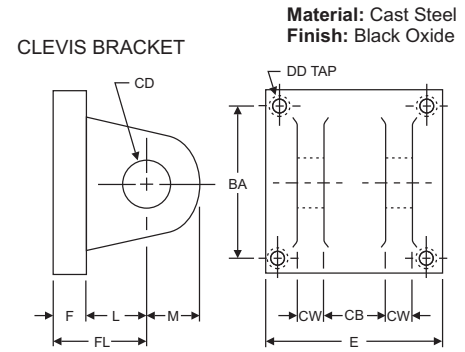
Note G: Not suitable for Hazardous process application that require FM/CSA approved equipment

Note H: Supplied separate for field installation

ACCESSORIES

CLEVIS BRACKET

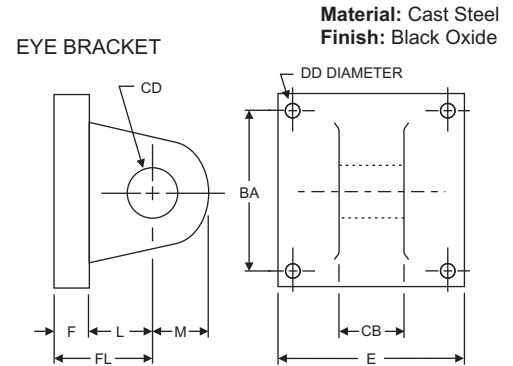
Part No	BA	CB	CD	CW	DD	E	F	FL	L	M
353E435U04	1.63	.75	.50	.50	.38-24	2.50	.38	1.13	.75	.50



(Clevis Pins sold separately from Clevis Brackets)

EYE BRACKET

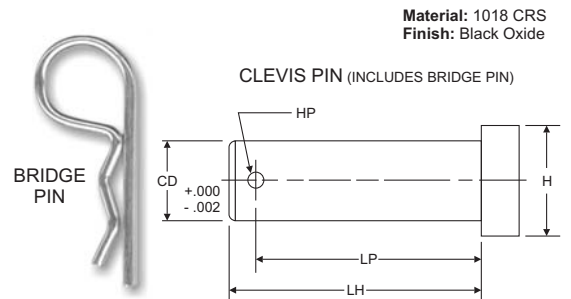
Part No	BA	CB	CD	DD	E	F	FL	L	M
353E435U02	3.25	1.50	1	.66	4.50	.75	2.25	1.50	1
353E435U03	3.81	2	1.38	.66	5	.88	3	2.13	1.38



(Clevis Pins sold separately from Eye Brackets)

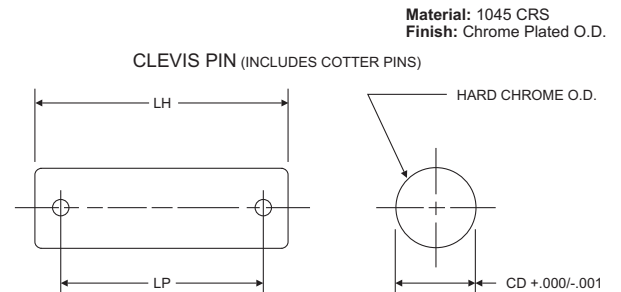
CLEVIS PIN (WITH BRIDGE PIN - STANDARD)

Part No	CD	H	HP	LH	LP
398B203U03	.50	.63	.16	2.25	2.09
398B203U02	1	1.19	.20	3.50	3.31



CLEVIS PIN (WITH COTTER PINS)

Part No	CD	LH	LP
398B203U04	1.38	5	4.25



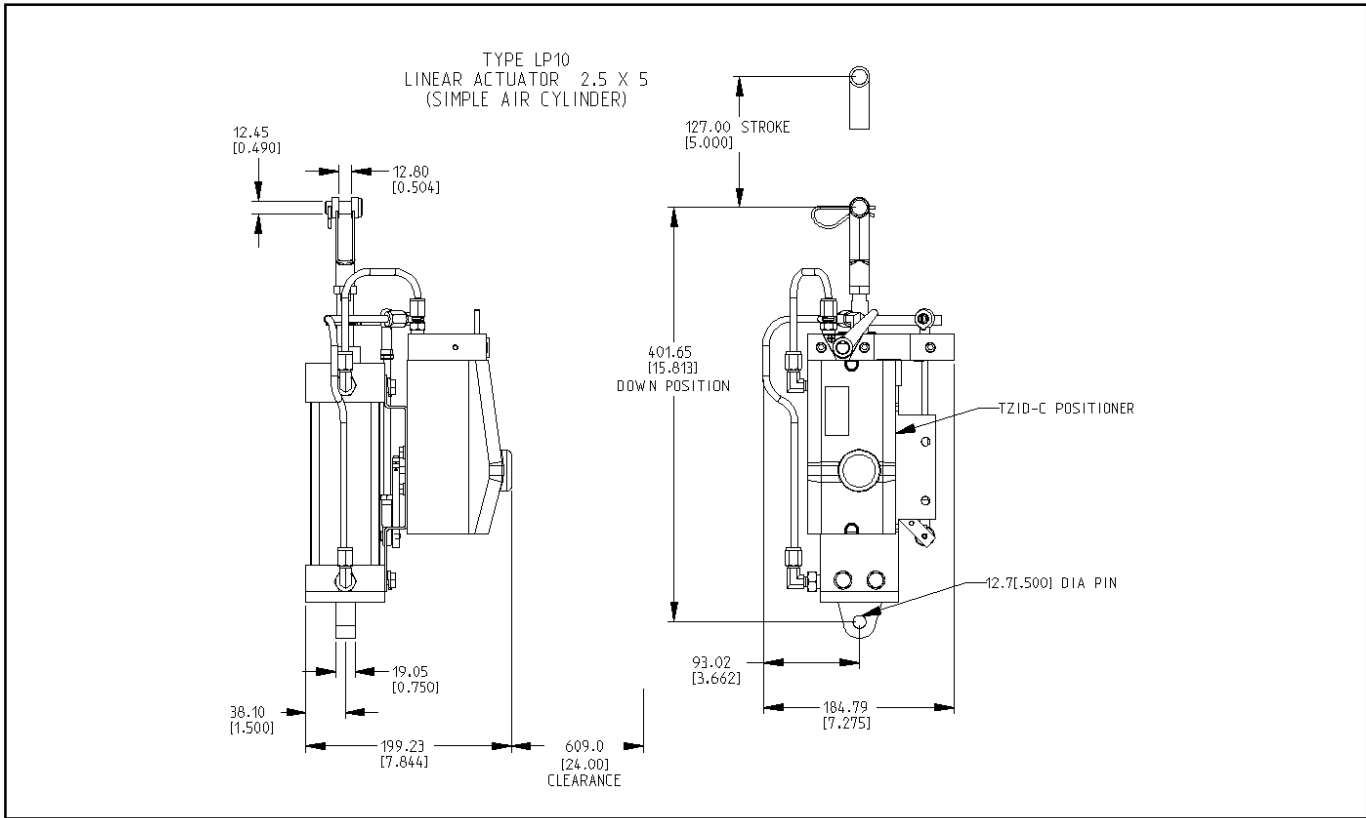


Figure 1. LP10 TZID-C Positioner with Manifold

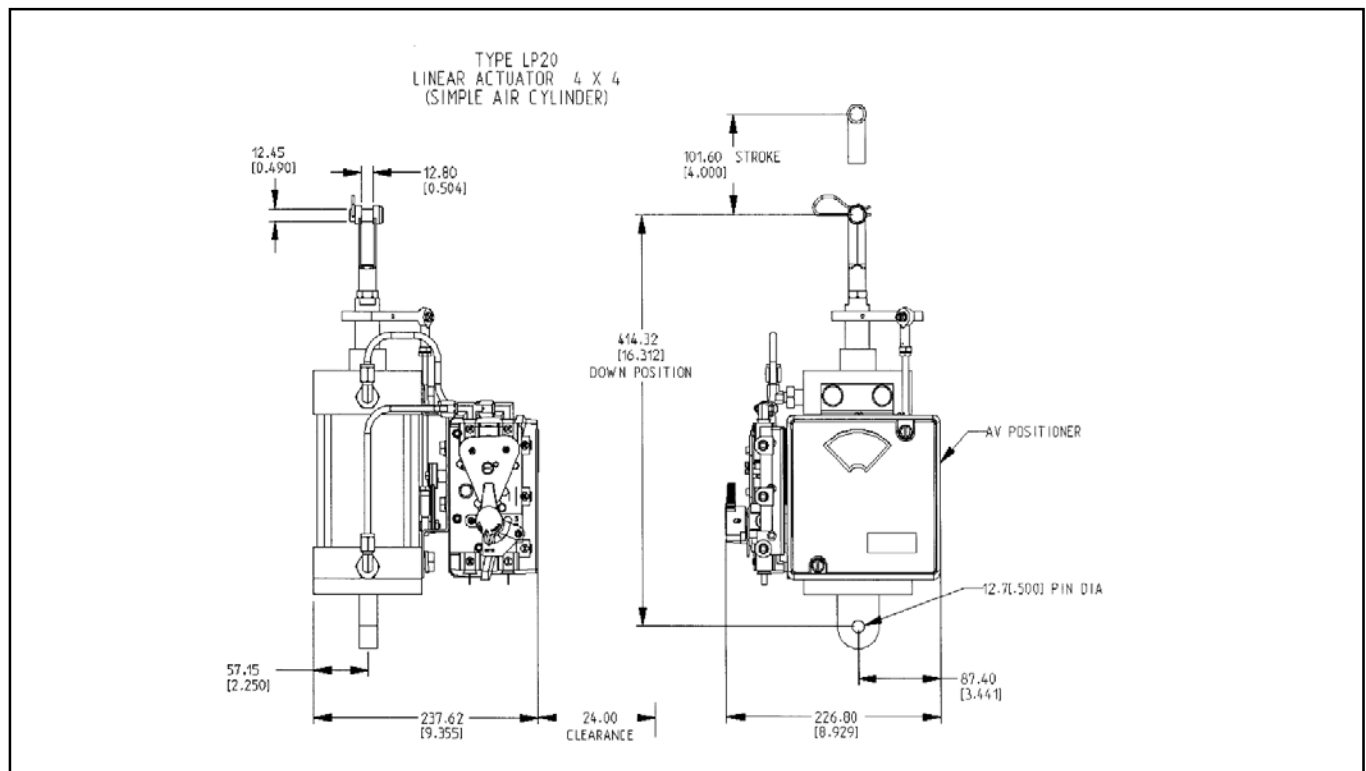


Figure 2. LP20 AV Positioner with Manifold

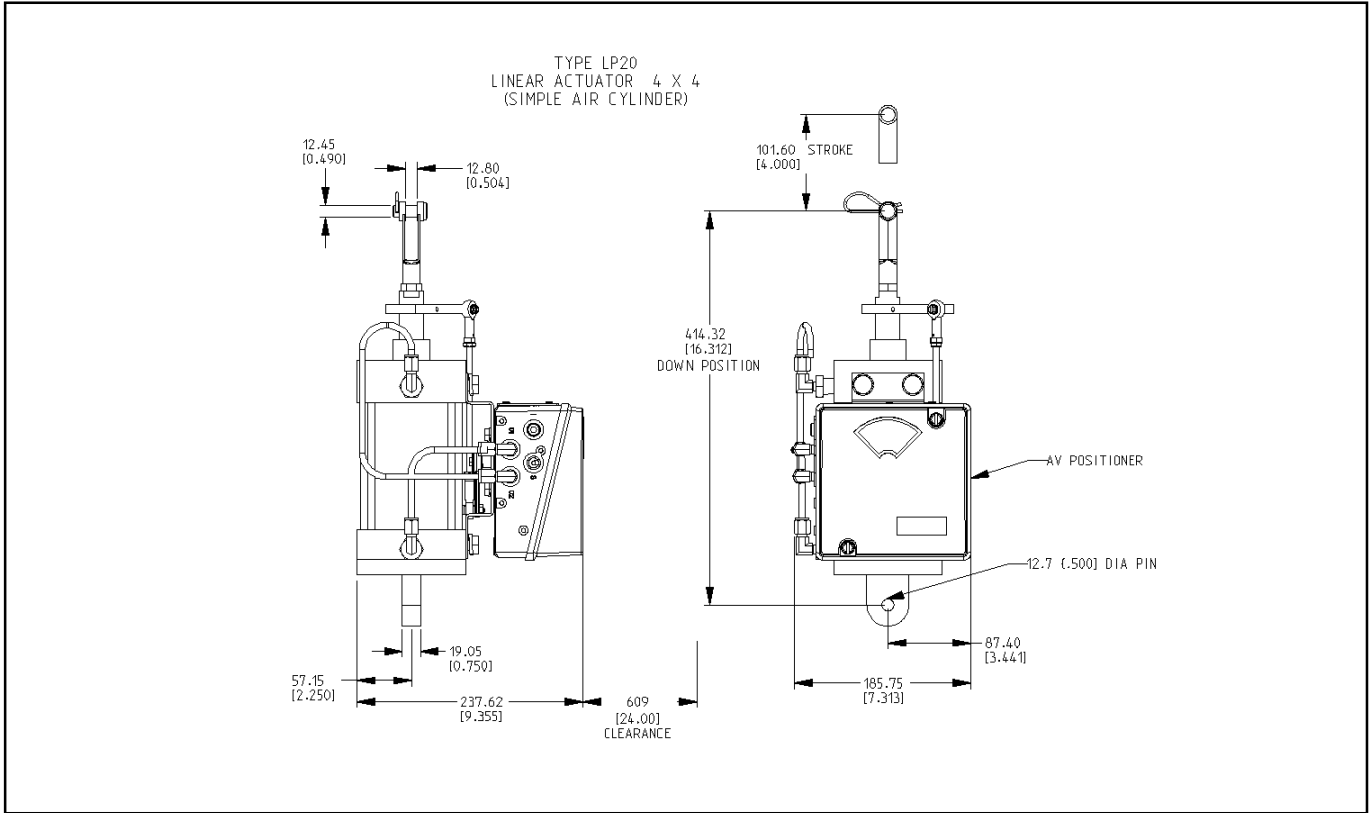


Figure 3. Type LP20 AV Positioner without Manifold

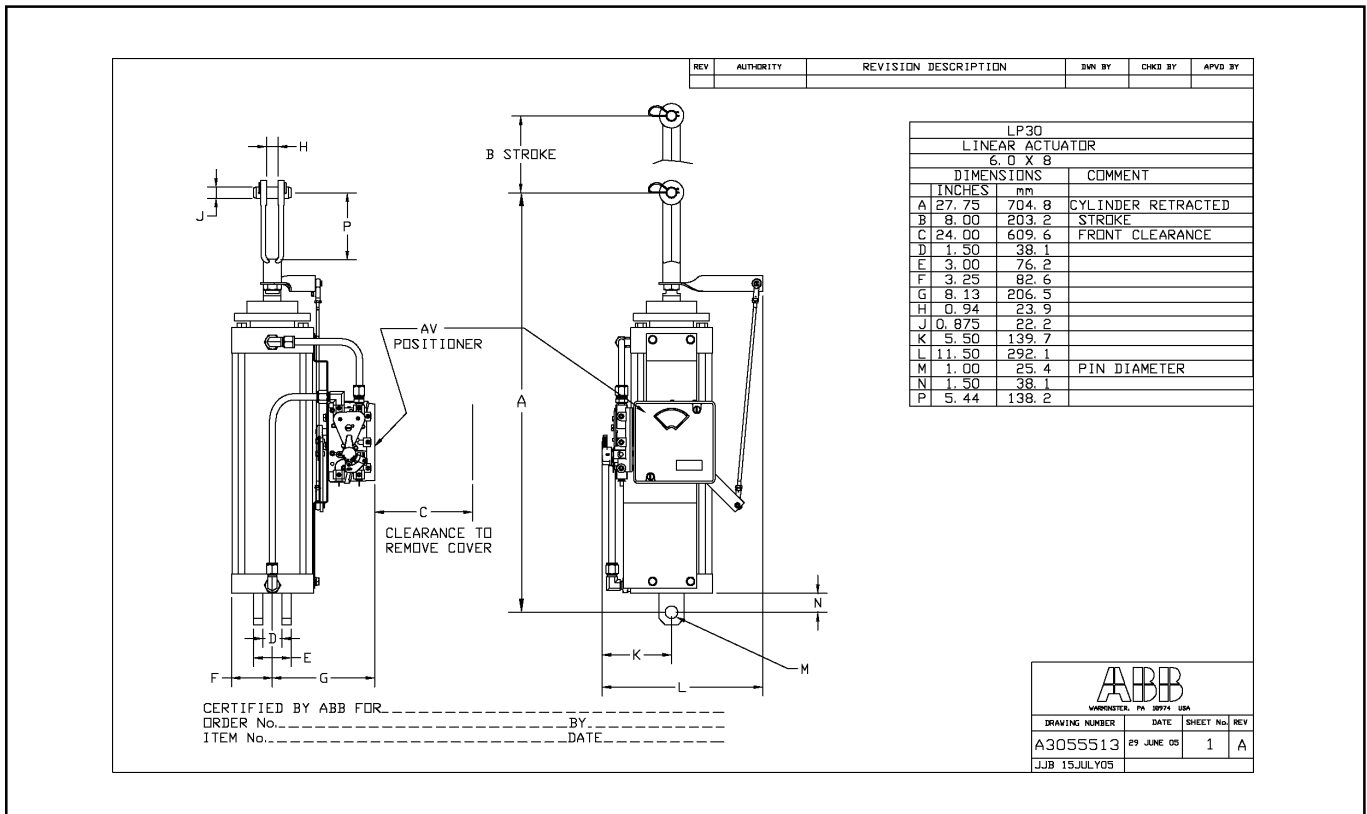


Figure 4. Type LP30 / AV Positioner with Manifold

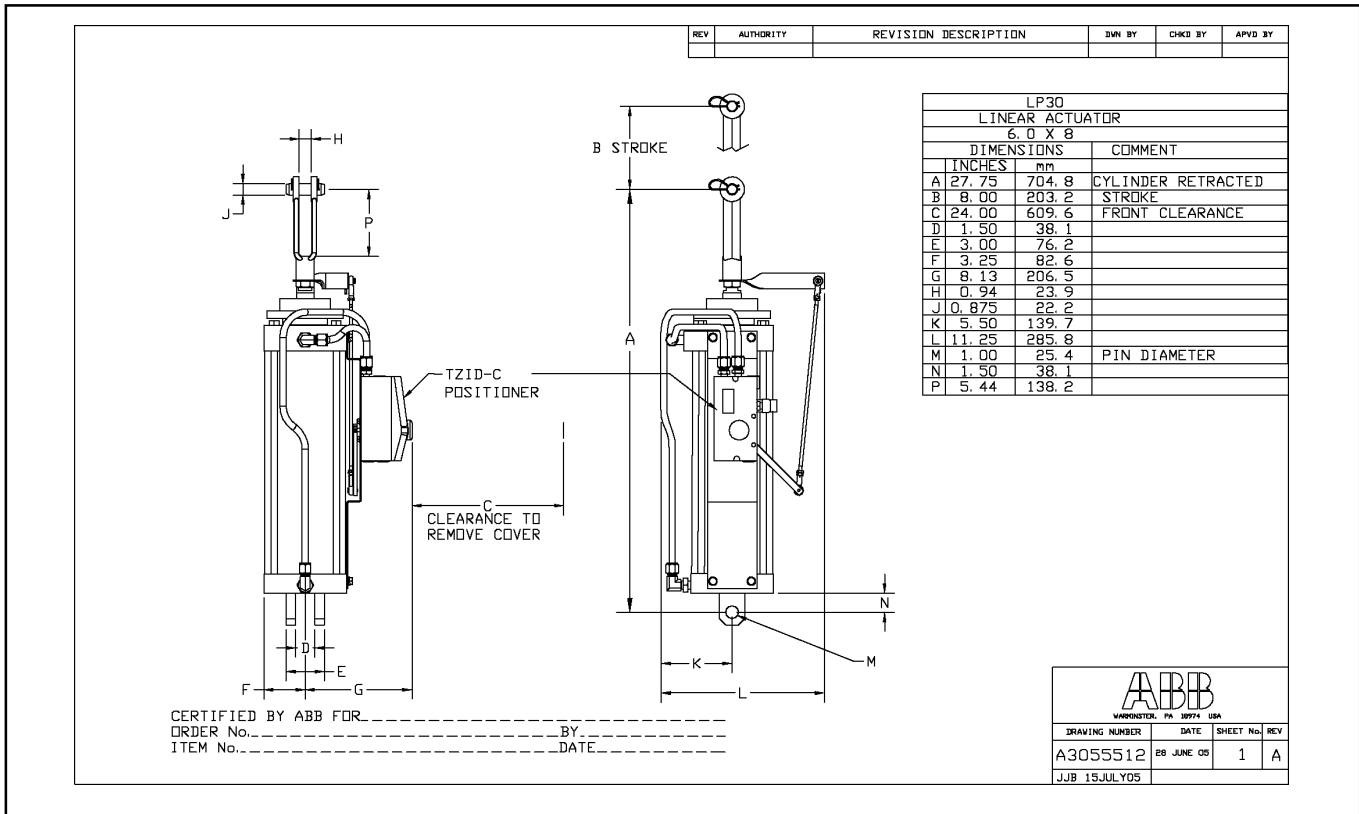


Figure 5. Type LP30 / TZIDC Positioner without Manifold

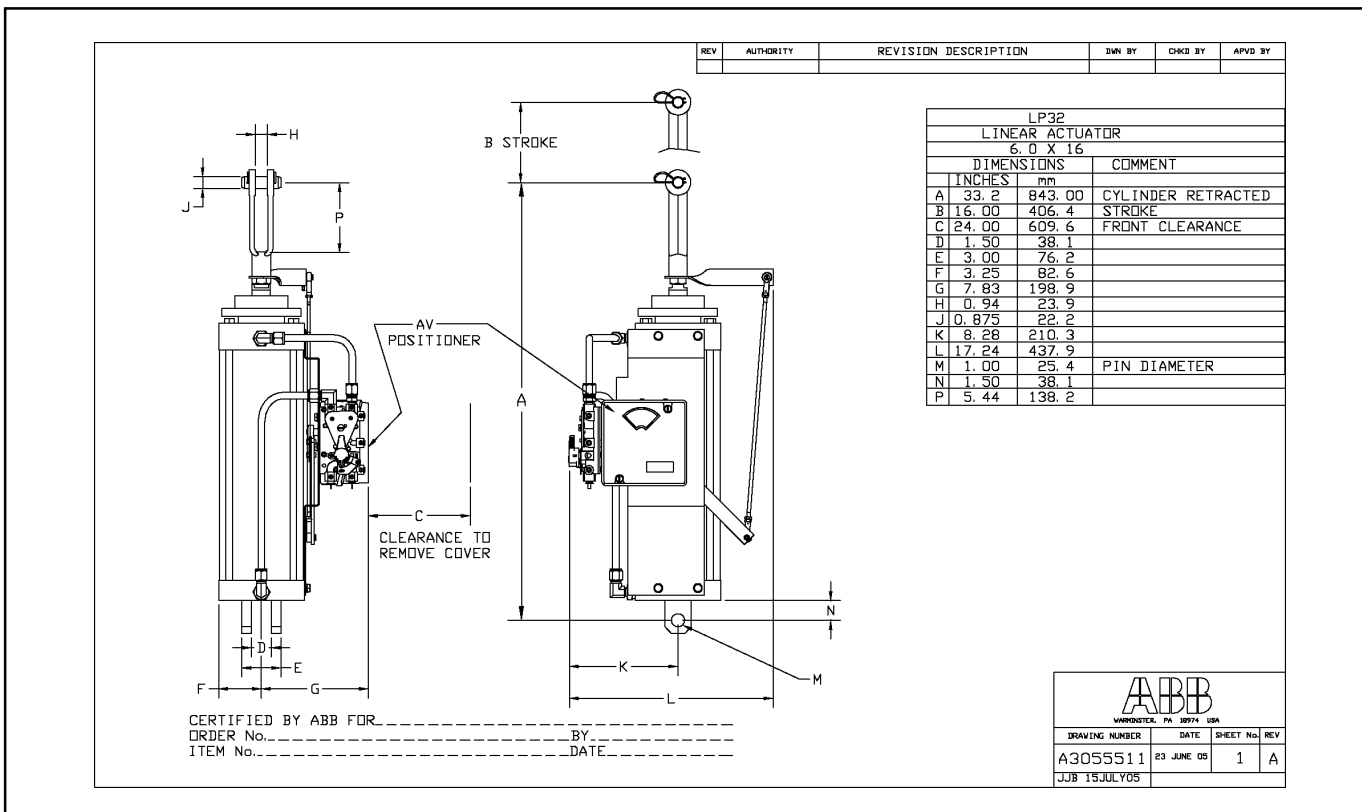


Figure 6. Type LP32 / AV Positioner with Manifold

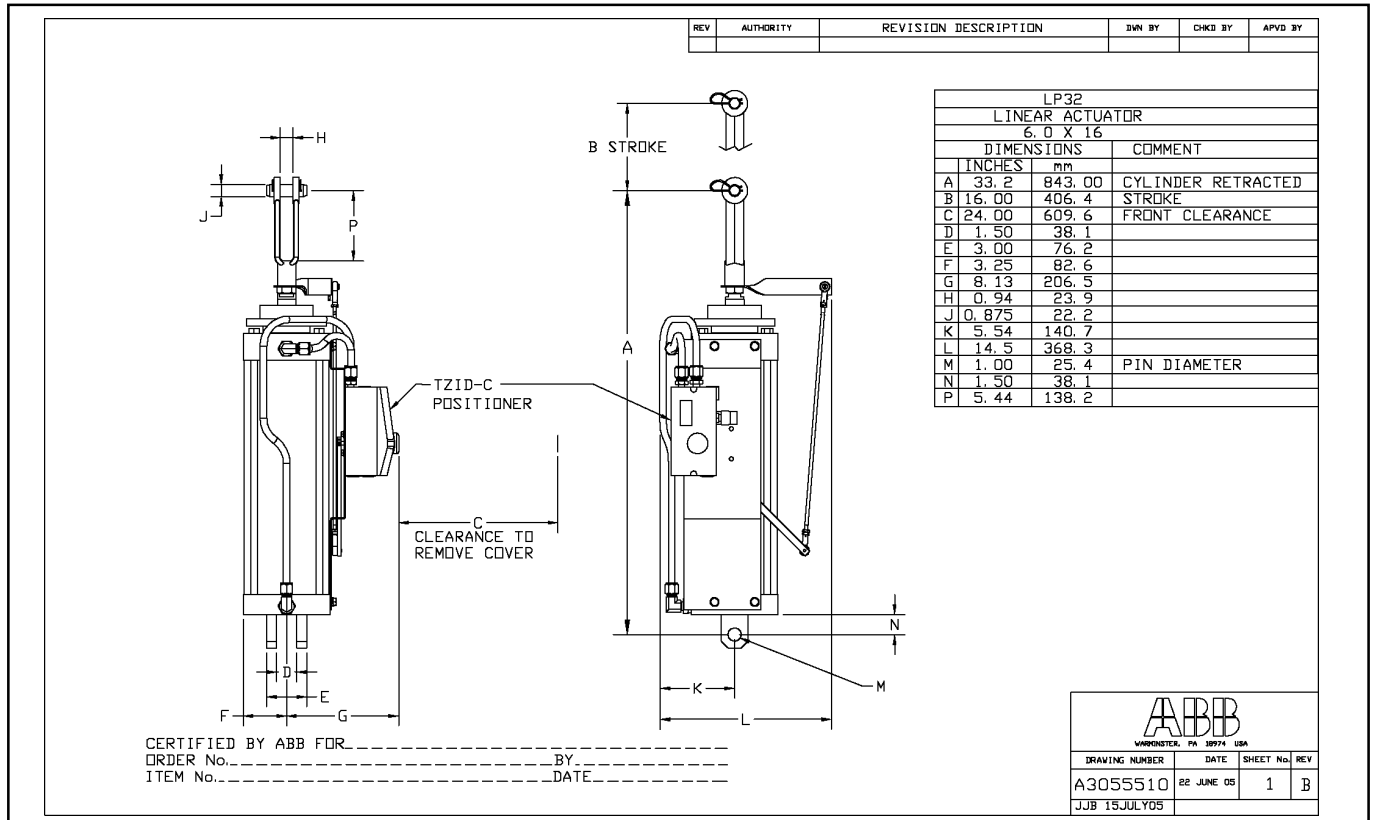


Figure 7. Type LP32 / TZID-C Positioner without Manifold

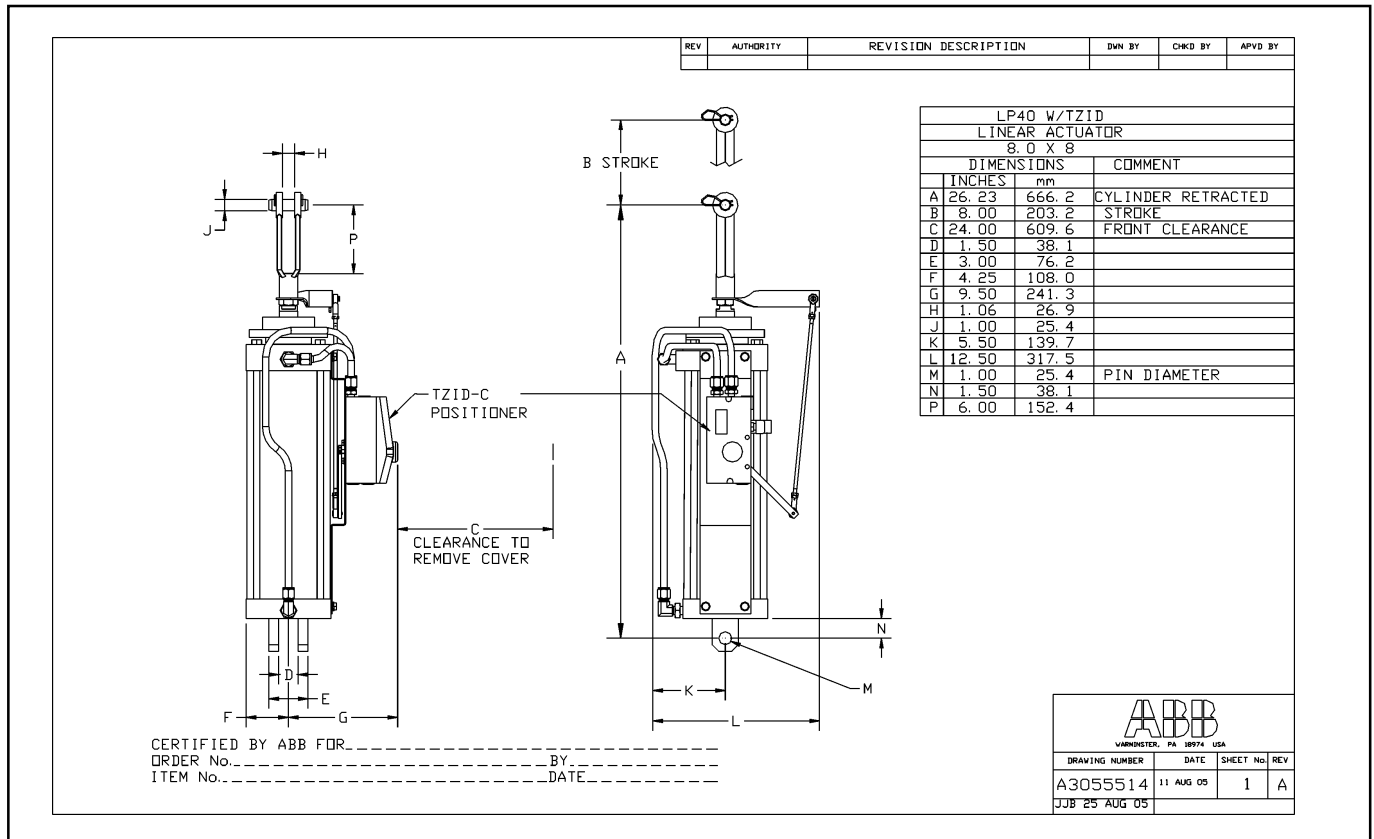


Figure 8. Type LP40 / TZID-C Positioner without Manifold

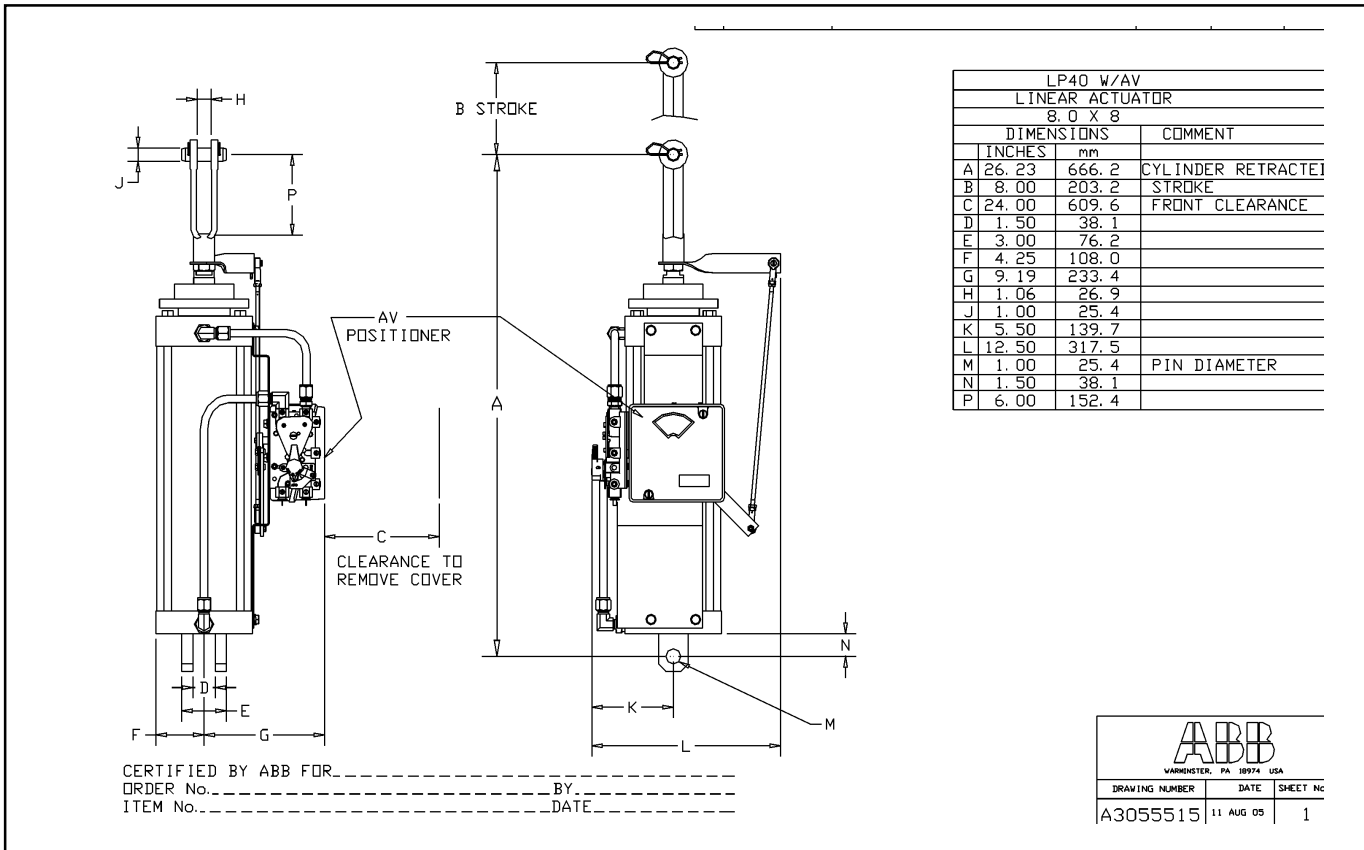


Figure 9. Type LP40 / AV Positioner with Manifold

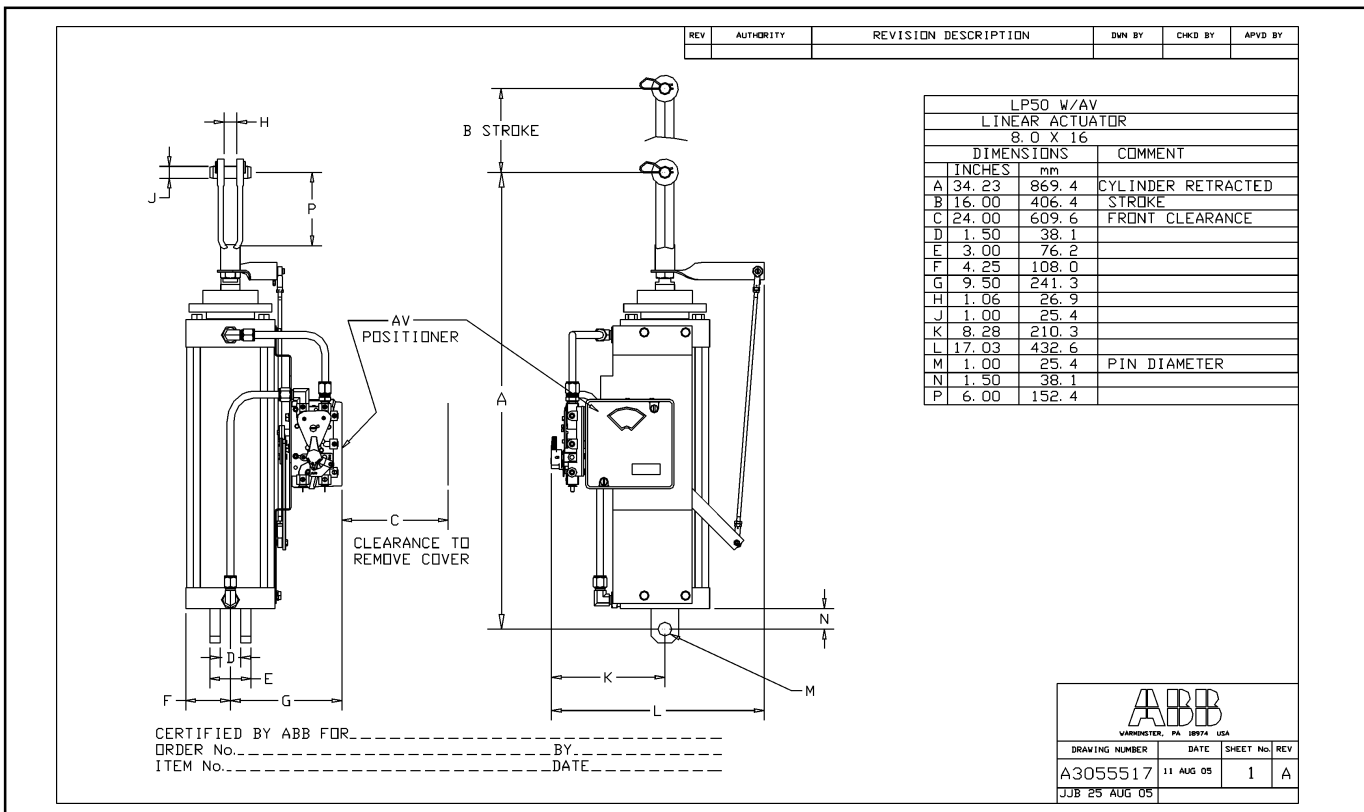


Figure 10. Type LP50 / AV Positioner with Manifold

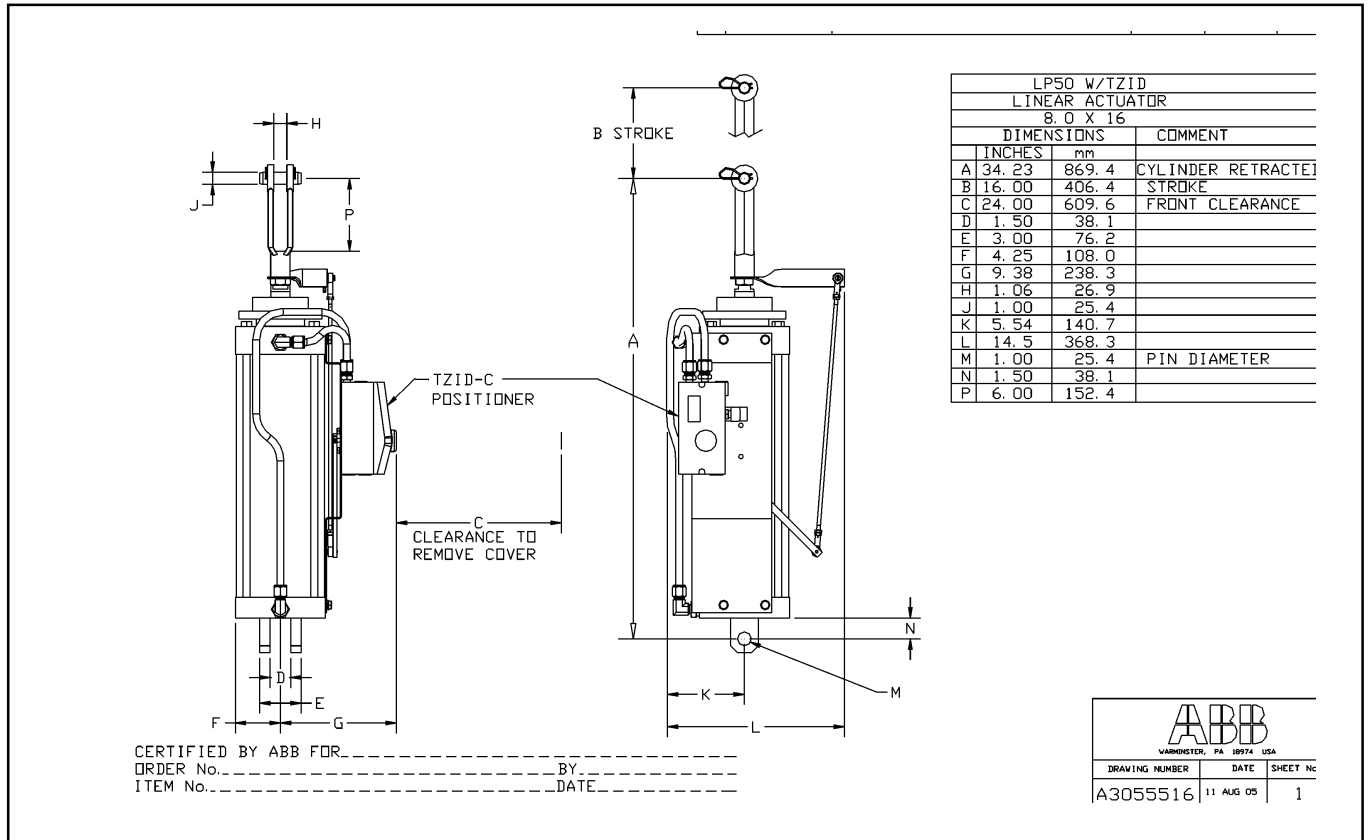


Figure 11. Type LP50 / TZIDC Positioner without Manifold

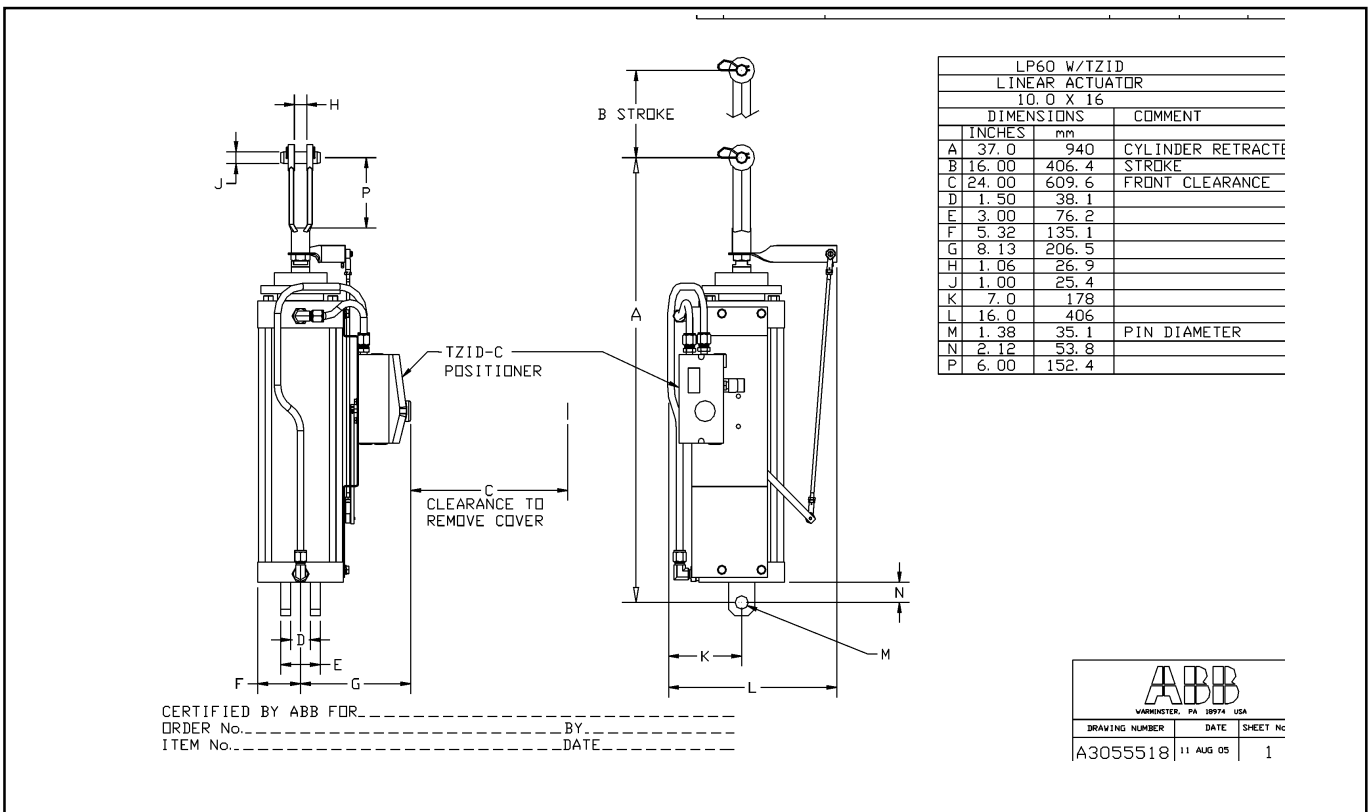


Figure 12. Type LP60 / TZIDC Positioner without Manifold

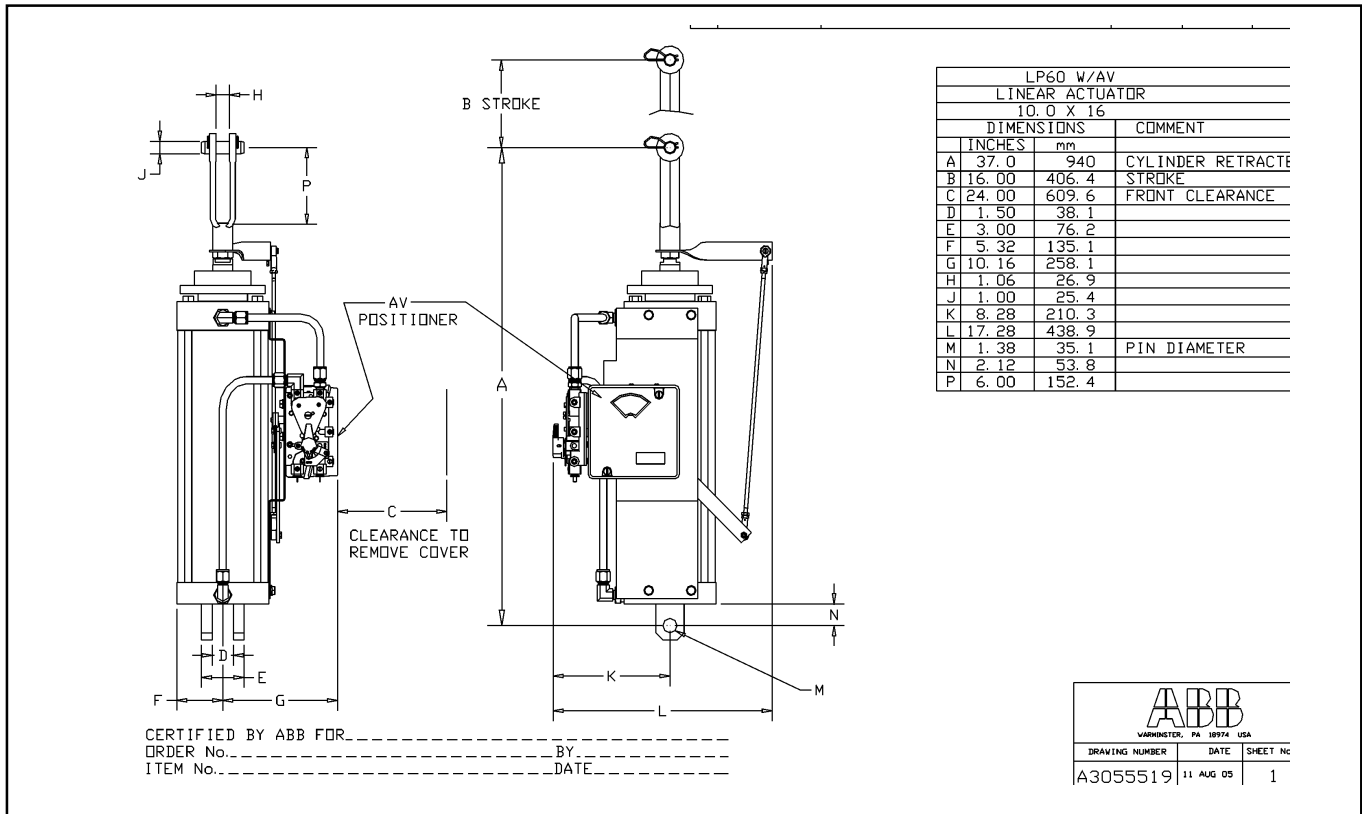


Figure 13. Type LP60 / AV Positioner with Manifold

Notes

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