



TECHNICAL BULLETIN

Logix 505si Series

Digital Positioner

FCD LGENTB0505-03 09/13



Experience In Motion

Introduction

The Logix 505si is a basic positioner for most simple control loops. It is microprocessor based which allows for quick and easy setup along with very good control. Simply set the configuration on a few DIP switches, then push the Quick-Cal button.

The positioner will then automatically calibrate itself and autotune the gain parameters. The Logix 505si is an excellent replacement for the old-style I/P or analog electro-pneumatic positioners with their tedious manual adjustments and poor performance.

The Logix 505si is the basic model of the Logix 500 family.

Features and Benefits

Feature	Benefits
Easy commissioning	Commissioning is performed by simply setting a few switches and pressing the Quick-Cal button. The direct User Interface allows local access to positioner control without requiring multi-level menus, a handheld communicator or a laptop computer.
Local status LED	LEDs visible from a distance, indicate positioner's current status without removing the cover.
Internal diagnostic codes	LEDs providing instant information relating to internal diagnostic codes. These codes indicate positioner status and alarms to the user without the need for a handheld communicator or a laptop computer.
Fast and simple configuration	With its unique Direct User Interface, Logix 500 positioners provides fast and easy configuration. Local configuration switches allow the user to set all basic parameters for positioner operation.
Auto tune	A simple press of a button starts the self-calibration and auto-tune process, speeding up commissioning procedure and ensuring consistency between one valve and the next (regardless of who performs the procedure). Additionally, a gain selector allows the user to modify the calculated auto tune result.
Low air consumption	State-of-the art piezo technology combined with inner-loop feedback procedures provides high-performance control with minimal air consumption.
Two stage control design	Logix 500 positioners use two-stage control to provide faster response and tighter control.
Mounting	IEC534 (NAMUR) mounting as well as VDI/VDE 3845 and 3847 mounting options allows the Logix 500 to be mounted on almost all actuators available on the market. With its unique Flowserve direct mounting option the Logix 500 can be mounted directly without tubing to Flowserve's single acting diaphragm actuators.

Principle of Operation

The Logix 505si positioner is a basic digital positioner consisting of three main modules:

1. The microprocessor based electronic control module includes direct local user interface switches
2. The piezo valve based electro-pneumatic converter module
3. The infinite resolution valve position sensor.

The basic positioner operation is best understood by referring to Figure 1. The complete control circuit is powered by the two-wire, 4-20 mA command signal. The analog 4-20 mA command is passed to the microprocessor, where it is compared to the measured valve stem position. The control algorithm in the processor performs control calculations and produces an output command to the piezo valve, which drives the pneumatic amplifier. The position of the pilot valve within the pneumatic amplifier is measured and relayed to the inner loop control circuit. This two-stage control provides for more responsive and tighter control than is possible with a single stage control algorithm. The pneumatic amplifier controls the airflow to the actuator. The change of pressure and volume of the air in the actuator causes the valve to stroke. As the valve approaches the desired position, the difference between the commanded position and the measured position becomes smaller and the output to the piezo valve is decreased. This, in turn, causes the pilot valve to close and the resulting flow to decrease, which slows the actuator movement as it approaches the new commanded position. When the valve actuator is at the desired position, the pneumatic amplifier output is held at zero, which holds the valve in a constant position.

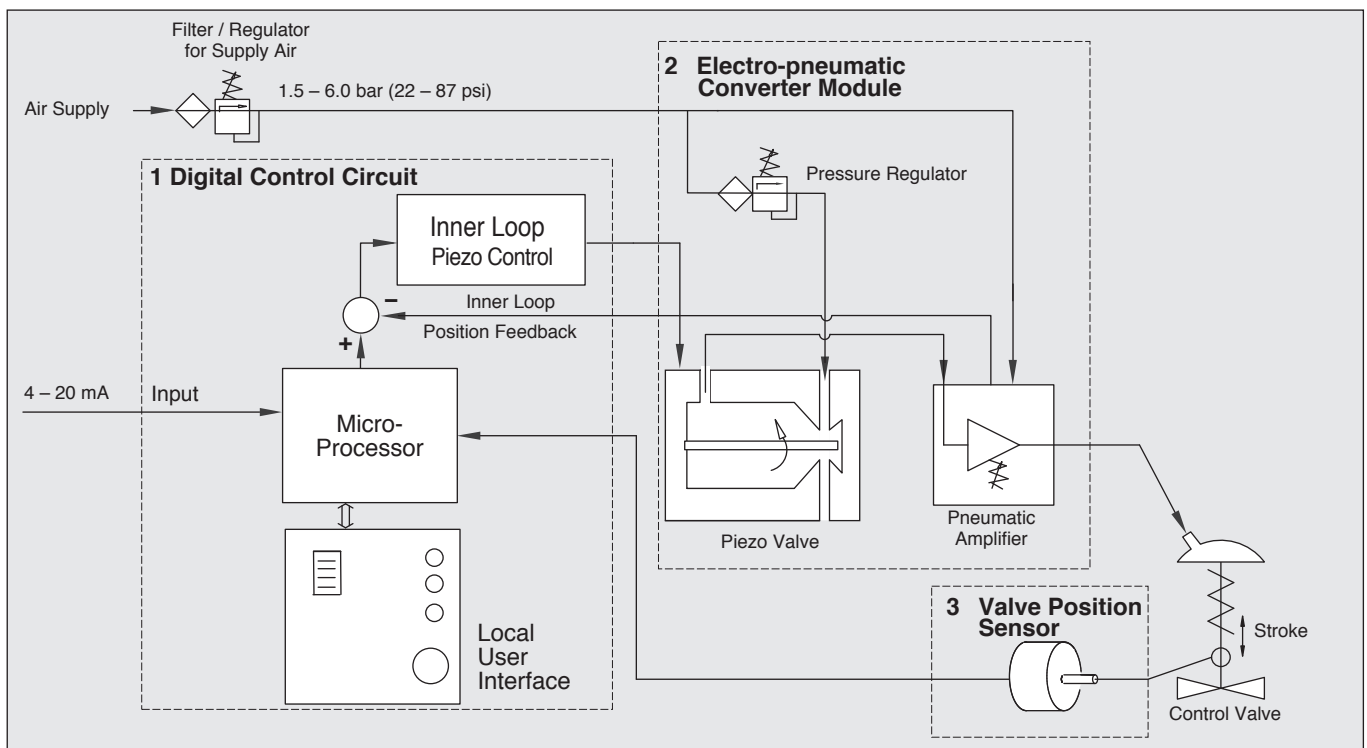


Figure 1: Logix 505si Principle of Operation

Specifications

Table 1: Input Signal

Input Signal Range	4 - 20 mA
Compliance Voltage	6 VDC
Voltage Supply (maximum)	30 VDC
Minimum Required Operating Current	3,6 mA

Table 2: Stroke Output

Feedback Shaft Rotation	Min. 15°, max 90° 40° recommended for linear applications
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Table 3: Air Supply

Air Supply Quality	Free from moisture, oil and dust per IEC 770 and ISA-7.0.01
Input Pressure Range	1,5 to 6,0 bar (22 to 87 psi)
Air Consumption (steady state)	0,08 Nm ³ /h @ 1,5 bar (0,047 SCFM @ 22 psi) 0,12 Nm ³ /h @ 6,0 bar (0,071 SCFM @ 87 psi)

Table 4: Output Signal

Output Pressure Range	0 to 100% of air supply pressure
Output Flow Capacity	2,4 Nm ³ /h @ 1,5 bar (1,41 SCFM @ 22 psi) 7,0 Nm ³ /h @ 6,0 bar (4,12 SCFM @ 87 psi)

Table 5: Shipping Weights

Base Positioner without Accessories	1,2 kg (2,65 lbs)
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Table 6: Performance Characteristics (typical)

Linearity	< +/- 1,0%
Resolution	< 0,3%
Repeatability	< 0,5%
Deadband	< 0,5%

Table 7: Environmental Conditions

Operating Temperature Standard	-20 °C to +80 °C (-4 °F to +178 °F)
Operating Temperature Low	-40 °C to +80 °C (-40 °F to +178 °F)
Transport and Storage Temperature	-40 °C to +80 °C (-40 °F to +178 °F)
Operating Humidity	0 to 100% non-condensing

Table 8: Hazardous Area Specifications

ATEX	II1G Ex ia IIC T4 - T6
ATEX	II3G Ex ic IIC T4 - T6

Ordering Information

	Family	Series	Communication / Diagnostic	Software	Certifications	Housing	Threaded Conn.	Feedback Shaft	Temperature	Language	Position Indicator	Options	Add-in Electronics	Limit Switches
	Logix	5	XX	XX	XX	X	X	X	X	X	X	X	X	X
			AA	BB	CC	D	E	F	G	H	I	J	K	L
Positioner Model														
	Standard	5												
Communication and Diagnostic														
	505 - Basic		05	si										
Certifications														
	EEx nL nA II C T4, ATEX II 3G/D				-04-									
	General Purpose				-14-									
	Ex ia IIC, ATEX II 1G				-15-									
	Ex ic IIC, ATEX II 3G				-32-									
Housing														
	Flowserve: Aluminum, Black with white cover					W								
	Flowserve: Aluminum, Black with yellow cover					Y								
	Flowserve: Aluminum, Black					B								
Threaded Connections														
	1/2 NPT conduit, 1/4 NPT pneumatic						1							
	M20 conduit, 1/4 NPT pneumatic						2							
	1/2 NPT conduit, 1/4 NPT pneumatic, 1/4 NPT aux. vent						3							
	M20 conduit, 1/4 NPT pneumatic, 1/4 NPT aux. vent						4							
Feedback Shaft														
	D Shaft - 316SS (Valtek Standard)							D						
	VDI/VDE 3845 (NAMUR)							R						
Temperature														
	Standard -20 °C to 85 °C (-4 °F to 185 °F)								S					
	Extended -40 °C to 85 °C (-40 °F to 185 °F)								E					
Language														
	English									E-				
Position Indicator														
	No indicator										0			
	Flat										F			
	Domed										D			
Special Options														
	Standard											0		
Add-in Electronic Circuits														
	None												0	
Limit Switches														
	No switches													0

Manifold and Gauge Options Ordering Information

Manifold Options	Gauge Options
XX	X
MM	N

Manifold Options (MM)						
No manifold						00
Double acting						DA
Gauge adapter						GA
Gauge manifold - NPT Threads						GM
Gauge manifold - G Threads						GC
VDI/VDE 3847 semi-integrated manifold						VE

Gauge Options (N)						
	DA	GA	GM	GC	VE	
No gauges	x	x	x	x	x	0
Output, PSI/BAR/KPA Stainless steel with brass internals (qty. 1)		x	x	x	x	1
Output + Supply, PSI/BAR/KPA Stainless steel with brass internals (qty. 2)			x	x	x	2
Output + Output PSI/BAR/KPA Stainless steel with brass internals (qty. 2)	x					3
Output, PSI/BAR/KPA Stainless steel with stainless steel internals (qty. 1)		x	x	x	x	4
Output + Supply, PSI/BAR/KPA Stainless steel with stainless steel internals (qty. 2)			x	x	x	5
Output + Output, PSI/BAR/KPA Stainless steel with stainless steel internals (qty. 2)	x					6
Output, Kg/Cm ² /PSI Stainless steel with brass internals (qty. 1)		x	x	x	x	7
Output + Supply, Kg/Cm ² /PSI Stainless steel with brass internals (qty. 2)			x	x	x	8
Output + Output, Kg/Cm ² /PSI Stainless steel with brass internals (qty. 2)	x					9
Output, Kg/Cm ² /PSI Stainless steel with stainless internals (qty. 1)		x	x	x	x	A
Output + Supply, Kg/Cm ² /PSI Stainless steel with stainless steel internals (qty. 2)			x	x	x	B
Output + Output, Kg/Cm ² /PSI Stainless steel with stainless steel internals (qty. 2)	x					C
Any KPA gauges	x	x	x	x	x	D
Output + Output + Supply, PSI/BAR/KPA Stainless steel with brass internals (qty. 3)	x					E
Output + Output + Supply, PSI/BAR/KPA Stainless with stainless steel internals (qty. 3)	x					F
Output + Output + Supply, Kg/Cm ² /PSI Stainless steel with brass internals (qty. 3)	x					G
Output + Output + Supply, Kg/Cm ² /PSI Stainless with stainless steel internals (qty. 3)						H

Certifications

Noified Body	Certification Option	Approval	Entity Parameters	Temperature Codes	Enclosure Rating
	-02	Intrinsically Safe Class I Division 1 Groups A,B,C,D	Ui = 30V Ii = 100mA Pi = 800mW Ci = 0 Li = 0	T4 T _{amb} <85 °C (185 °F)	NEMA 4 X
	-08	Nonincendive Class I Division 2 Goups A,B,C,D	Install per NEC Article 501-4 when barriers are not used.	T4 T _{amb} <85 °C (185 °F)	NEMA 4 X
	-02	Intrinsically Safe Class I Division 1 Groups A,B,C,D	Ui = 30V Ii = 100mA Pi = 800mW Ci = 0 Li = 0	T4 T _{amb} <85 °C (185 °F)	NEMA 4 X
	-08	Nonincendive Class I Division 2 Goups A,B,C,D	Install per NEC Article 501-4 when barriers are not used.	T4 T _{amb} <85 °C (185 °F)	NEMA 4 X
	-15	II1G Ex ia IIC T4 - T6	Ui = 30V Ii = 100mA Pi = 800mW Ci = 0 Li = 0	T4 T _{amb} < 85 °C (185 °F) T5 T _{amb} < 55 °C (131 °F) T6 T _{amb} < 40 °C (104 °F)	IP65
	-32	II3G Ex ic IIC T4 - T6	Ui = 30V Ii = 100mA Pi = 800mW Ci = 40nF Li = 0	T4 T _{amb} < 85 °C (185 °F) T5 T _{amb} < 55 °C (131 °F) T6 T _{amb} < 40 °C (104 °F)	IP65

Dimensions

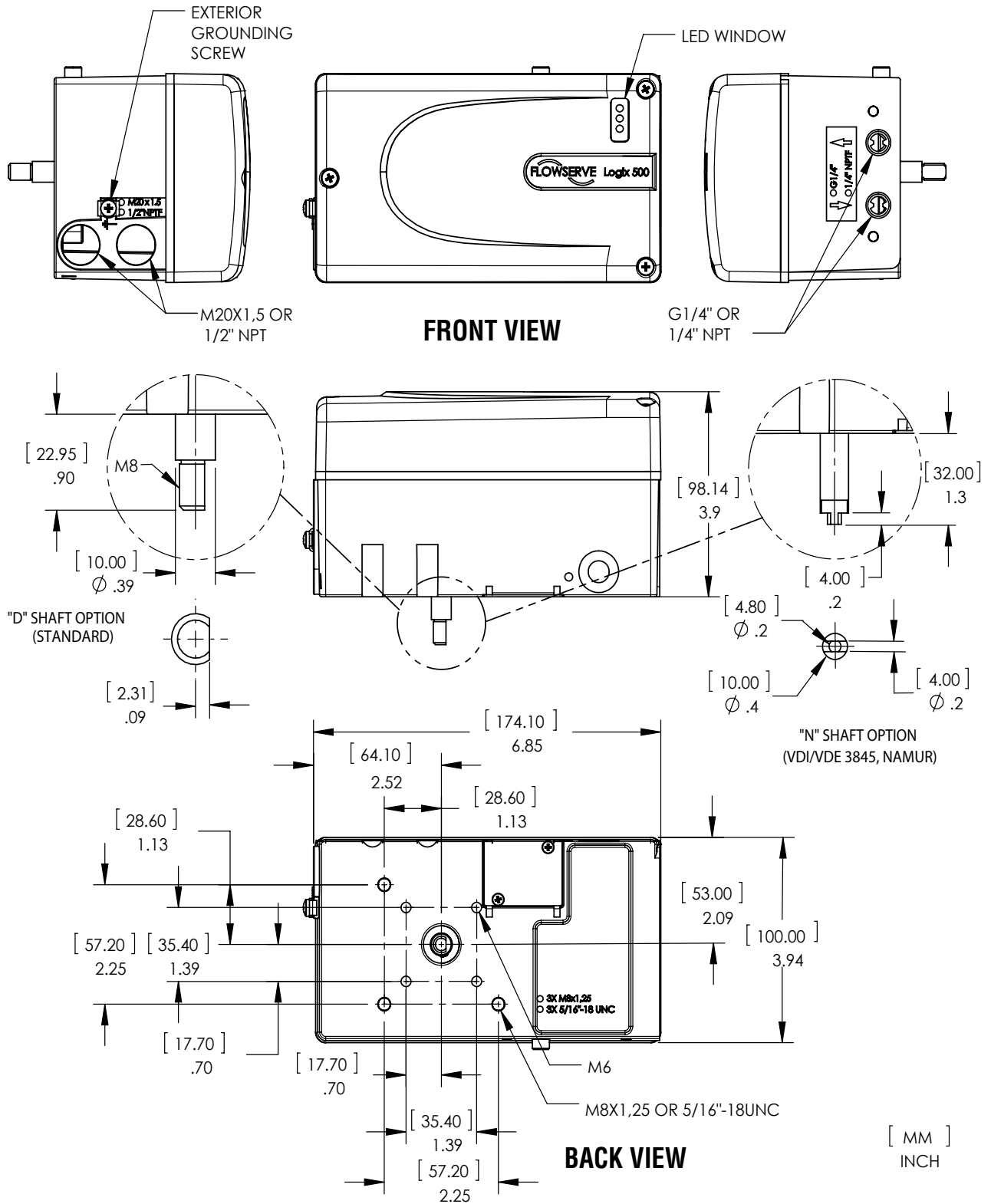


Figure 2: Dimensional Drawing of the Logix 505si Series Digital Positoner



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