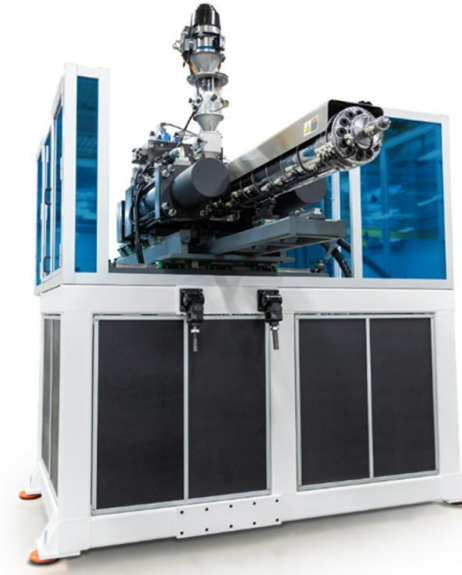


LIMITLESS SOLUTIONS, SINGLE SOURCE



MGS - Injection Unit Systems

Mold Mount
Vertical
Horizontal

| MGS Multishot™ – Pioneering Custom Molding Solutions

Statistics / FAQs

- Developed First Machine Solution in 1998
- All Products are Built to Order in Germantown, WI
- Over 1200 Products Deployed – Worldwide Install Base

Why Retrofit Solution vs OEM Solution?

- Ability to Easily Reconfigure Existing Assets
- Faster Leadtime than OEM Machines
- More Flexibility across Assets and Facility Locations

Why MGS vs Competitor Offerings?

- Complete System Solution – Injection Unit Product Offering + Downstream Rotary Solutions
- Better Performance is Standard – High Injection Speeds & Peak Pressures; Small Envelope
- Customizability – Each Solution Built to Order
- Answer Challenges with Unconventional Solutions
- Turnkey & Integration Capability



Injection Unit Features & Specifications

Mold Mount



Vertical Platen Mount



Horizontal "L-Configuration"

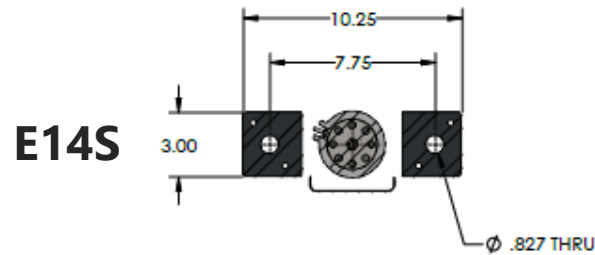
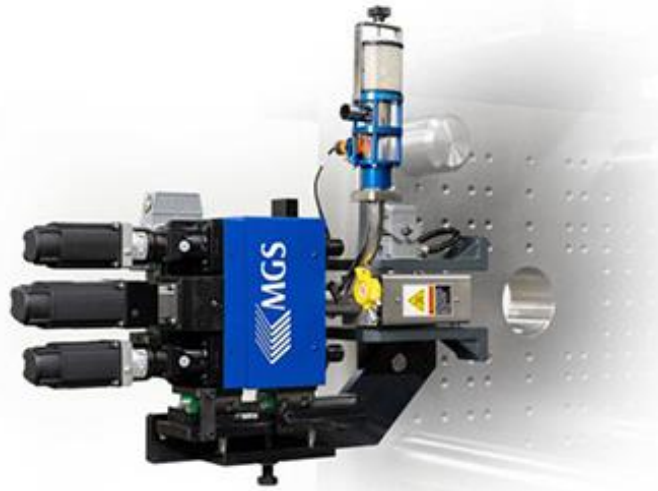


Full Servo Injection Models - E14S • E14 • E22 • E32 • E45

- ✓ High Performance Design
- ✓ Easy Integration
- ✓ Customizable Software

- ✓ Fully Independent Control
- ✓ Integration of IMM Robots and Auxiliaries
- ✓ Low Energy Usage

Servo Injection Unit – Mounting Examples



Vertical Platen Mount

Attaches to IMM Stationary Platen

Can easily be exchanged from machine to machine



Horizontal Freestanding 'L' Configuration

Positioned on Non-Operator side of IMM

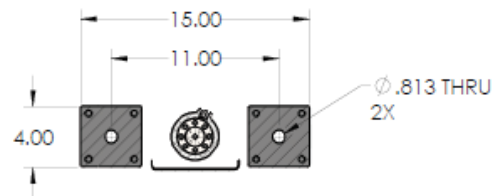
Shown is Model E45 & 1450 Ton Press

Mold Mount

Fasten Directly to the Mold

Mounted Vertically or Horizontal using standard mounting patterns

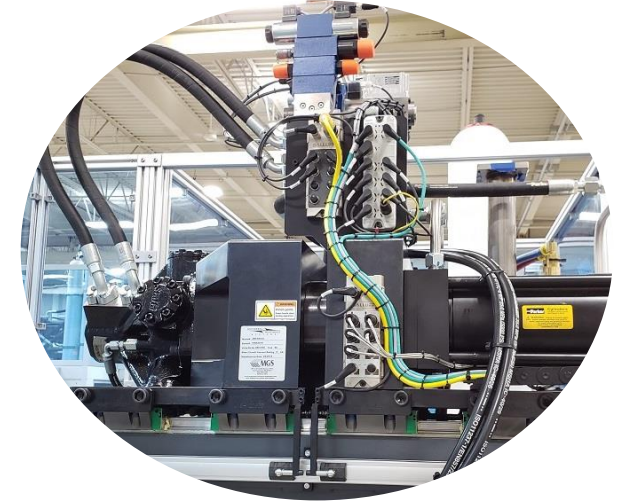
E14





Precision Ball Screws

E14S & E14 Utilize Dual Ball Screws for Precision Injection Sequencing



Load Cells

Dual Load Cells Precisely Monitor Recovery Backpressure and Injection Pressure



Planetary Roller Screws

Larger MGS IU utilize Dual Planetary Roller Screws capable of achieving high thrust loads and speeds in compact machine envelope

Remote I/O

Hi-speed signal response,
easy Maintenance and improved
Troubleshooting
Less wiring failure points

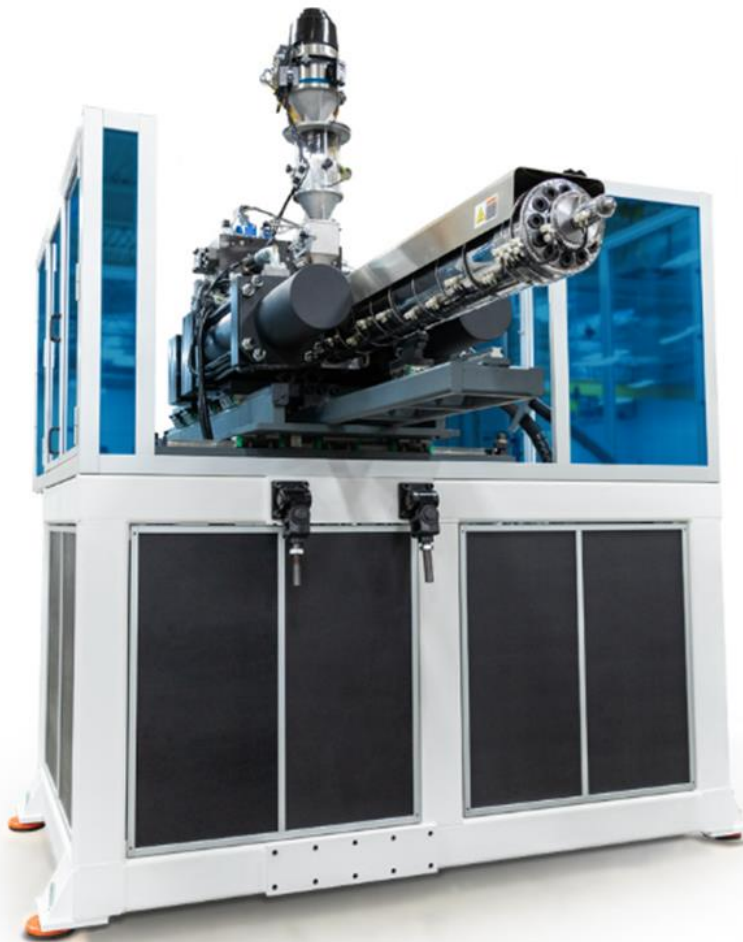
Servo Injection Unit - Specifications



MGS SERVO MODEL	MAX Injection Stroke inch (mm)	Screw Ø	MAX Shot Volume (in ³)	MAX Shot Volume (cc)	MAX Capacity PP** (oz.)	MAX Capacity HIPS** (oz.)	MAX Injection Pressure (psi)	MAX Injection Pressure (bar)	MAX Injection Velocity in/s (mm/s)	MAX Injection Velocity Volume (in ³ /s)	MAX Injection Velocity Volume (cc/s)	MAX Screw RPM	MAX Screw Torque Nu	
E14S	2.0 (50)	12mm	0.35	5.7	--	--	26,000	1,793	5.5 (140)	0.9	15.8	350	33.0	Mold Mount
		14mm	0.48	7.8	--	--	26,000	1,793			21.5			
		16mm	0.62	10.2	--	--	20,000	1,379			28.0			
E14	4.0 (101)	14mm	0.95	15.6	0.4	0.5	36,000	2,483	7.1 (180)	1.6	27.8	350	100.0	Vertical Horizontal Vertical Platen
		16mm	1.25	20.4	0.5	0.7	36,000	2,483			36.3			
		18mm	1.58	25.9	0.7	0.9	29,000	2,000			45.8			
		20mm	1.95	31.9	0.8	1.1	23,000	1,586			56.6			
E22	5.5 (139)	22mm	3.24	53.1	1.4	1.8	35,000	2,414	7.1 (180)	4.2	68.6	300	300	Horizontal Vertical Platen
		24mm	3.86	63.2	1.7	2.2	34,000	2,345			81.6			
		28mm	5.25	86.0	2.3	2.9	29,000	2,000			111.0			
		32mm	6.86	112.4	3.0	3.8	25,000	1,724			145.0			
E32	8.0 (203)	32mm	9.97	163.4	4.3	5.6	34,000	2,345	7.1 (180)	8.9	145.0	300	600	Horizontal Vertical Platen
		36mm	12.62	206.8	5.5	7.1	31,000	2,138			183.6			
		40mm	15.58	255.3	6.8	8.7	28,000	1,931			226.6			
		45mm	19.72	323.2	8.5	11.1	25,000	1,724			286.8			
E45	10.0 (254)	45mm	24.65	404.0	10.7	13.8	34,000	2,345	7.1 (180)	17.5	286.8	275	1100	Horizontal Vertical Platen
		50mm	30.43	498.7	13.2	17.1	31,000	2,138			354.1			
		55mm	36.82	603.4	16.0	20.6	27,000	1,862			428.4			
		60mm	43.82	718.1	19.0	24.6	23,000	1,586			509.9			
MGS SERVO MODEL	MAX Injection Stroke inch (mm)	Screw Ø	MAX Shot Volume (in ³)	MAX Shot Volume (cc)	MAX Capacity PP (oz.)	MAX Capacity HIPS (oz.)	MAX Injection Pressure (psi)	MAX Injection Pressure (bar)	MAX Injection Velocity in/s (mm/s)	MAX Injection Velocity Volume (in ³ /s)	MAX Injection Velocity Volume (cc/s)	MAX Screw RPM	MAX Screw Torque Nu	

Horizontal “L-Configuration”

Vertical Platen Mount



Hydraulic Injection Models

H45 • H60 • H80 • H110

- ✓ High Performance Design
- ✓ Easy Integration
- ✓ Customizable Software
- ✓ Fully Independent Control
- ✓ Integration of IMM Robots
- ✓ Vertical Plasticizers to 65mm
- ✓ Powder-coated Frames
- ✓ Capacity Range 11oz – 175oz HIPS



Vertical Platen Mount

- ✓ Industries largest vertical plasticizer – 32oz HIPS
- ✓ Plasticizer Size Range 40mm – 65mm
- ✓ Traverses clear of ‘mold area’
- ✓ X & Y axis adjustable for sprue location
- ✓ Power X axis via HMI display
- ✓ Includes self contained Hydraulic power unit
- ✓ Injection manifold remote mounted behind injection cylinders for improved performance
- ✓ Can easily be exchanged from machine to machine

Horizontal ‘L’ Configuration

- ✓ Positioned on Non-Operator side of IMM
- ✓ Industries largest horizontal plasticizer – 175oz HIPS
- ✓ Plasticizer Size Range 40mm – 120mm
- ✓ Auxiliary HMI for purging and manual functions
- ✓ In-frame self contained hydraulic power unit





Crescent Gear Pump

- ✓ Continuous high-pressure filtration
- ✓ Low noise emission
- ✓ Proven durable design



Independent Hydraulic Control Unit

- ✓ Secondary motor & pump for continuous side-stream temperature control and low-pressure filtration of oil
- ✓ Hard plumb oil lines wherever possible
- ✓ Visual site-glass for flow detection
- ✓ Portable design for easy deployment



Auxiliary Manifolds

- ✓ Valve Gate Sequences
- ✓ Core Control

Hydraulic Injection Unit - Specifications



MGS Hydraulic IU	MAX Injection Stroke inch (mm)	Screw Ø	MAX Shot Volume (in ³)	MAX Shot Volume (cc)	MAX Capacity PP** (oz.)	MAX Capacity HIPS** (oz.)	MAX Injection Pressure (psi)	MAX Injection Pressure (bar)	MAX Injection Velocity in/s (mm/s)	MAX Injection Velocity Volume (in ³ /s)	MAX Injection Velocity Volume (cm ³ /s)	MAX Screw RPM HYD	
H45	10.0 (254)	40mm	19.5	319.2	8.4	10.8	34,778	2,398	5.0 (127)	9.7	159.5	200	Horizontal Vertical Mount
		45mm	24.7	404.0	10.7	13.7	27,479	1,895		12.3	201.9		
		50mm	30.4	498.7	13.2	16.9	22,258	1,535		15.2	249.4		
H60	11.5 (292)	50mm	34.9	573.5	15.6	19.4	35,316	2,436	5.0 (127)	15.2	249.3	200	Horizontal Vertical Mount
		55mm	42.3	693.9	18.8	23.5	29,187	2,013		18.4	301.7		
		60mm	50.4	825.9	22.4	27.9	24,525	1,691		21.9	359.0		
		65mm	59.1	969.2	26.3	32.8	20,897	1,441		25.7	421.4		
H80	12.5 (317)	70mm	74.5	1221.8	33.1	41.3	31,343	2,162	5.0 (127)	29.8	488.7	200	Horizontal - ONLY
		80mm	97.3	1595.9	43.4	54.0	23,997	1,655		38.9	638.3		
		90mm	123.2	2019.8	54.8	68.4	20,609	1,421		49.3	807.9		
H110	18.0 (457)	100mm	219.1	3590.8	97.5	121.0	29,355	2,024	5.0 (127)	60.8	997.4	200	Horizontal - ONLY
		110mm	265.1	4344.9	118.0	147.0	27,899	1,924		73.6	1206.9		
		120mm	315.5	5170.8	140.0	175.0	23,443	1,617		87.6	1436.3		
MGS Hydraulic IU	MAX Injection Stroke inch (mm)	Screw Ø	MAX Shot Volume (in ³)	MAX Shot Volume (cc)	MAX Capacity PP (oz.)	MAX Capacity HIPS (oz.)	MAX Injection Pressure (psi)	MAX Injection Pressure (bar)	MAX Injection Velocity in/s (mm/s)	MAX Injection Velocity Volume (in ³ /s)	MAX Injection Velocity Volume (cm ³ /s)	MAX Screw RPM HYD	

Process

4/24/2018 11:25:36 AM MGS NPE 2018

Enable Unit: On Off

Inject: Max. Press.: 1517 463 (Bar), Shot Size: 3.50 (mm), Inject Delay: 0.00 (s)

Start Injection: At Mold Close, Injection Cycle: Every Cycle

Transfer: Time: 10.00 1.02 (s), Position: 0.00 0.54 (mm), Pressure: 200 31 (Bar), Enable Press.: 1.00 (mm), Transfer Mode: Ramp Position / Pressure

Injection: 1 2 3 4 5
 Velocity: 5.00 3.50 1.50 0.00 0.00 (mm/s)
 Start Position: 3.95 1.75 1.00 0.00 0.00 (mm)

Hold: 1 2 3
 Time: 2.00 0.00 0.00 (s)
 Pressure: 1000 0 0 (Bar)
 Actual: 1001 0 0 (Bar)
 Hold Speed: 5.00 (mm/s)
 Cushion: 0.45 (mm)

Screw Status: Position: -0.00 mm, Pressure: 0 Bar, Motor Temp: 0.0 °C, Torque: 0.0 %
 Carriage Status: Position: 490.40 mm, Force HI: 0.0 Tons, Force SP: 1.0 Tons, Horiz. Position: 0.00 mm

Recharge: Max Time Back Pressure Screw Speed Rotate Delay
 Setpoint: 60.00 1000 199 0.05
 Actual: 2.00 0 250.0 (rpm) (s)

Additional Functions: Pre-Decomp: 2.50 3.50, Post-Decomp: 2.00, Sprue Break: 2.00 (mm/s)

Buttons: Process, Manual, Settings, Quality, Diagnostics, Alarms (6)

4/24/2018 11:25:36 AM 108: Mold Rotate IOLink Module, BNI005T - Communication Fault

Cycle Graph - Velocity

4/24/2018 11:25:41 AM MGS NPE 2018

Velocity (mm/s) vs. Time (sec)

Max: 6.00, Min: 0.00

Legend: Cycle 1 (On), Cycle 2 (On), Cycle 3 (On), Cycle 4 (On), Cycle 5 (On)

Buttons: Next Pan, Pause Trend, Replay Trend

Navigation: History, Pressure, Position, Velocity, Scatter Plot, Bar Graph

Buttons: Process, Manual, Settings, Quality, Diagnostics, Alarms

4/24/2018 11:25:36 AM 108: Mold Rotate IOLink Module, BNI005T - Communication Fault

Quality History

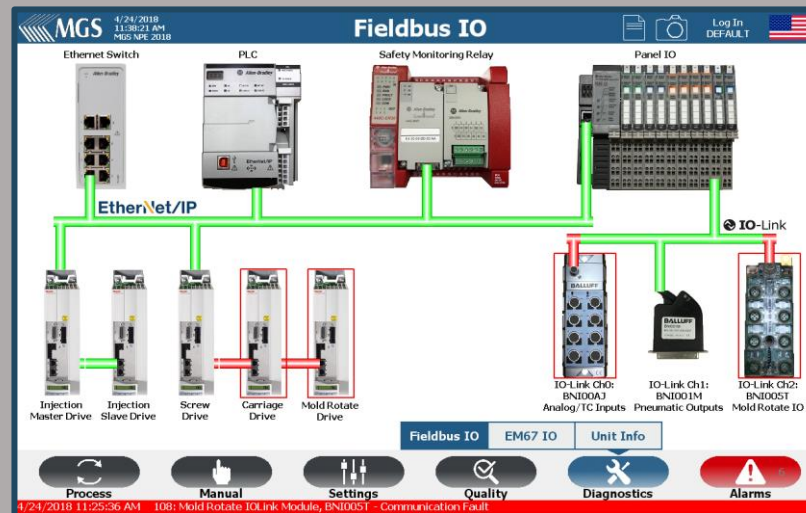
4/24/2018 11:25:36 AM MGS NPE 2018

Cycle	Shot Size (mm)	Transfer Position (mm)	Transfer Press. (Bar)	Cushion (mm)	Max Injection Press. (Bar)	Recharge Time (s)	Plastication Press. (Bar)	Rech. Max Torque (%)
31	3.50	0.55	47.00	0.45	482.00	2.01	0.00	0.00
32	3.50	0.55	52.00	0.45	454.00	2.00	0.00	0.00
33	3.50	0.55	36.00	0.45	475.00	2.00	0.00	0.00
34	3.50	0.55	43.00	0.45	466.00	2.00	0.00	0.00
35	3.51	0.55	80.00	0.45	477.00	2.00	0.00	0.00
36	3.48	0.55	107.00	0.46	473.00	2.00	0.00	0.00
37	3.51	0.55	12.00	0.44	472.00	2.00	0.00	0.00
38	3.51	0.55	118.00	0.45	466.00	2.01	0.00	0.00
39	3.50	0.55	113.00	0.46	458.00	2.00	0.00	0.00
40	3.50	0.55	71.00	0.45	461.00	2.00	0.00	0.00
41	3.50	0.55	50.00	0.45	468.00	2.00	0.00	0.00
42	3.49	0.55	9.00	0.45	470.00	2.00	0.00	0.00
43	3.50	0.55	0.00	0.44	491.00	2.01	0.00	0.00

MIN: 0.50 0.20 10.00 0.30 0.00 0.00 0.00 0.00 0.00
 MAX: 6.50 1.00 150.00 0.80 1000.0 4.00 520.00 80.00 80.00

Buttons: Process, Manual, Settings, Quality, Diagnostics, Alarms

4/24/2018 11:25:36 AM 108: Mold Rotate IOLink Module, BNI005T - Communication Fault



- ## User Interface Product Details
- ✓ 1000 Cycle Process History
 - ✓ 15 Cycle Comparison Table
 - ✓ User Selectable Comparison Values - 8 of 26 Parameters
 - ✓ Graphical Injection Curves – Velocity & Pressure / Time
 - ✓ Graphical Scatter Plot & Trend Analysis
 - ✓ Roll-around Pedestal Mount Design
 - ✓ Industry 4.0 Compliant
 - ✓ Support for Multilingual Display
 - ✓ Single Screen Process Parameters
 - ✓ Onscreen Electrical Drawings
 - ✓ Custom Mold Sequencing Offered
 - ✓ Remote Support via VPN

| Thank you for your time!



Please visit MGS Automation in Germantown, WI. for a personal tour.