

Technical Bulletin

Liège, June 27th, 2016

Introduction

MAC Valves, Inc. is pleased to announce the release of the new 53 series ('sister' of the well-known 54 series - around 40.000 units sold so far) and the 82 series valves with glass modification. These two valves series are designed to perfectly match all functions on the IS glass machines requiring a flow up to 2000 NI/min and compactness (manifold under the conveyor on the blow side, trip pilots controlling remote air valves, etc.).

MAC 82 series



Inline version



Manifold version

MAC 53 series



Manifold version



Inline version

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Requirements from the field

MAC Valves, Inc. has carefully taken into consideration the requests of glass forming equipment users & OEMs and understood their needs to develop these two new valve series adapted to the glass environment that give the possibility to modernize existing and new machinery, improve the reliability and enhance the quality of the final product. The new 53 and 82 series valves integrate all the MAC features and technology resulting from over 60 years of valve innovation.

The main focus of MAC Valves is to supply an innovative product based on users' experience that guarantees:

- An increased production thanks to less downtime, thus a better pack to melt
- An increased bottle quality due to fast and repeatable response times and flow
- A user friendly and ergonomic solution for the operators and the maintenance teams
- In this specific case, a compact solution that fits in reduced spaces with a high flow package

The most frequent complaints concerning valves from users all over the world are the following :

- Skinner / Asco pilot extremely sensitive to pressure variations and contamination
- Long stroke for long response times and low forces
- Metal/metal spool sensitive to contamination and creating sticking effect
- Wear sensitive O-Rings that can be easily torn during movements of the spool
- Reduced lifetime on poppet design valves due to high wear of the poppet
- Lack of consistency of the response times over the cycles
- Extremely time consuming repair/ maintenance process
- Lifetime often under 25 million cycles
- Not compact enough to fit for example under the conveyor or under the blank side platform where space is very limited



Typical competition solution - Valve with a flow up to 800 NI/min



Typical competition solution - Valve with a flow up to 1500 NI/min

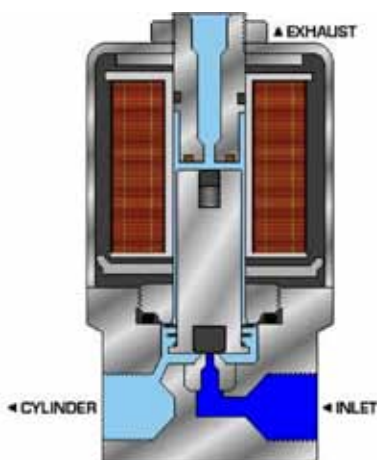
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Benefits - Typical Skinner design vs. MAC Valves design

Skinner design

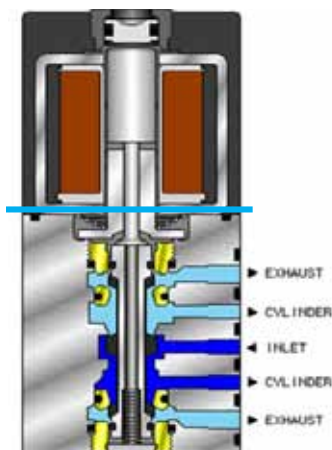


- Spring force (holding poppet on seat) is constant
- Inlet air acts upon a single sealing area
- Inlet pressure X sealing area creates a force that opposes return spring shifting forces
- Force created by inlet air pressure on inlet poppet seal varies as inlet air pressure varies
- Changing inlet pressures therefore affect energizing and de-energizing shifting forces

DISADVANTAGES:

- Normal pressure fluctuations cause inconsistent shifting forces
- Air pressure fights return spring, reducing shifting forces
- Weak return spring force
- Exhaust contaminants pass through operating solenoid parts causing sticking and coil burnout
- Exhaust, located in pole piece, is restricted due to core iron requirements

Patented MAC Valves' design



- High shifting force (energized) – Short stroke
- High shifting force (de-energized) – Strong return spring
- Shifting forces unaffected by changing air pressure (IN/EXH) – Balanced design
- Shifting forces virtually unaffected by typically contaminated air
- Wiping action - Low friction minimizes resistance to shifting forces
- Minimal friction

ADVANTAGES

- Short stroke solenoid produced high energization shifting force
- High force return spring due to high force solenoid, maximizes both energization and de-energization shifting forces
- Special D-rings to protect electrical part from external contamination
- Valves shifting forces are consistent and independent from pressure variations
- Solenoid isolated from exhaust of contaminants

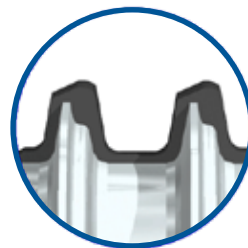
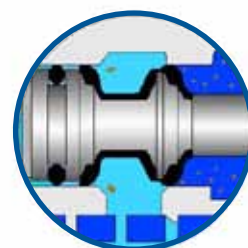
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Benefits

A. General benefits related to the MAC Valves Technology

- The rubber compounds integrated in all MAC valves are engineered and produced in-house.
- Precision ground bonded spool controls compression - Wipes contaminants away with minimum friction
- Chemically hardened seals eliminate creep, reduce friction and increase life
- Lubricant in rubber reduces friction - Enhances nonlube service
- Two seals each controlling a single orifice provide a short stroke, less wear, minimum friction and high flow in a small package
- Patented centering seals ensure spool alignment for minimum wear
- Bore is machined, roller burnished and polished for hard smooth surface and glasslike finish - Minimum friction, minimum wear and long life
- Lightweight aluminium spool allows for fast response
- One piece spool - simple construction and easy maintenance



MAC 53 series



MAC 82 series

B. Specific benefits linked to glass industry modifications

- High flow in a very compact design to fit in limited spaces
- High resistance to contamination and pressure variation
- Highly durable, accurate switching, increased reliability
- Fast switching with extremely repeatable response times
- High temperature modification with resistance up to 80°C
- Plug-in or non plug-in option
- Washdown modification
- Robust 2- or 3-position glass manual override (optional)
- Electrical/remote air option
- All connectors/coils available
- Standard, flexible & compact manifold with different options available
- Very easy to repair – Repair kit for all parts

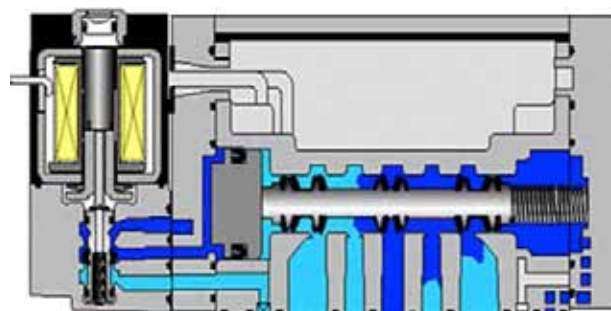
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MAC 82 Series - Main Advantages & Innovations

- Pilot operated spool valve – 3/2-way pilot valve with specific MAC design
- Permanent air/spring return allowing high return forces even at low pressures
- Piston amplifier on pilot side maximizing shifting forces
- Low friction between spool and body due to glasslike finish on the body and bonded rubber spool
- Contamination kept away from valve body due to wiping effect of the main spool
- High pneumatic shifting forces with short & consistent response times
- Balanced design of main spool and poppet pilot for higher shifting forces - Unaffected by pressure variations
- Plug-in option for all electrical parts inside the valve and base/manifold – Big and robust connector plug in
- High temperature components & lubrication (VITON parts, Washdown, class F coil, etc.)
- 2-position glass manual override in option
- Integrated LED and stainless steel captive screws on valve
- Modular manifold (compatible with competition footprint)
- Pressure regulator with or without gage and flow control in option
- Please consult factory for ordering information



MAC 82 series - Cutaway



MAC 82 series valves in situ

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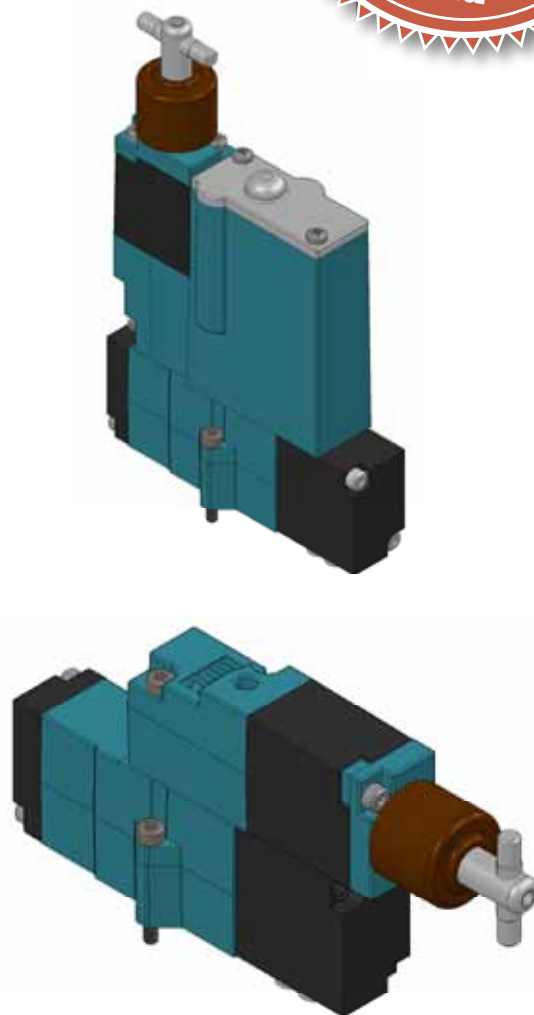


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 MAC Valves Europe Inc. – June 2016.

MAC 53 Series - Main Advantages & Innovations

- High flow characteristics (2000 NI/min) in a very compact package
- 3/2-way valve with the new technology patented 5-way pilot develops maximum shifting forces both ways
- Low friction between spool and body due to glasslike finish on the body and bonded rubber spool
- Contamination kept away from valve body due to wiping effect of the main spool
- High pneumatic shifting forces with short & consistent response times
- Balanced design of main spool and pilot poppet for higher shifting forces - Unaffected by pressure variations
- High temperature components & lubrication (VITON parts, Washdown, class F coil, etc.)
- Glass 2- or 3-position manual override in option
- Robust plug-in and guide pins for user friendly maintenance and reliability purposes
- Large LED facing operator for optimum visibility of valve operation
- NC/NO color identification to prevent any confusion between normally closed and normally open valves
- Valves with captive stainless steel screws for easier maintenance
- Identical repair kit for NC/NO valves
- Two versions available (see pictures)
- Please consult factory for ordering information

Over
40.000 units
of 'sister'
54 series
sold





NEW GENERATION HIGH FLOW & COMPACT 5/2-Way 82 Series Valve Designed for IS Machinery

- High speed valve designed to be used on the machine where space is reduced (under the conveyor, under the platform blank & blow side, etc.)
- High flow in a very compact package (1350 NI/min)
- 5/2 way valve can be used as a 3/2
- No cartridge – Spool technology for higher flow, less parts, enhanced reliability
- Designed to work in harsh environments
- High resistance to contamination - Unaffected by pressure variations
- Highly durable, accurate switching, increased reliability
- High temperature modification up to 80°C for the complete valve (coil included)
- Flexible manifold mounting alternatives with possibility to separate valve to valve on IN/OUT & EXHAUST
- Pressure regulators, flow control and pressure gauges in option
- Different types of manual overrides in option
- Less downtime – Increased pack to melt



CUSTOMER BENEFITS

- ✓ Pilot operated spool valve – 5/2 way pilot valve with specific MAC design
- ✓ Permanent air/spring return allowing high return forces even at low pressures
- ✓ Piston amplifier on pilot side maximizing shifting forces
- ✓ Balanced design for high flow, high speed and high consistency (not sensitive to pressure variations)
- ✓ High speed valve: Energized: 8 ms / De-energized: 8 ms
- ✓ Bonded spool with minimum friction, shifting in a glasslike finished bore
- ✓ No lubrication required
- ✓ Wiping effect eliminates sticking
- ✓ Plug-in option for quick interchangeability and flexibility – Big and robust plug-in connector
- ✓ Proprietary high temperature seals for long life time, high temperature modification for resistance to high temperatures and aggressive lubrication
- ✓ Burn out proof MAC solenoid, life time guarantee on coils
- ✓ Valves with LED indicators
- ✓ Different types of manual overrides specifically designed for the glass industry
- ✓ 100 million cycles (est) MTBF life time
- ✓ All types of coils and electrical connectors available



MAC Valves – Highly engineered solutions for the highest performing applications since 1948



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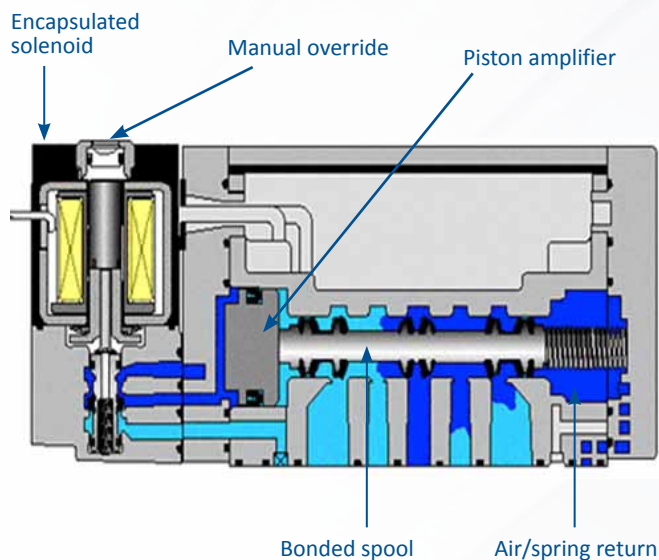


NEW GENERATION HIGH FLOW & COMPACT 5/2-Way 82 Series Valve Designed for IS Machinery

TECHNICAL DATA

| | |
|---------------------------|---|
| Fluid: | Compressed air, vacuum, inert gases |
| Pressure range: | External pilot 0 to 8 bar / 0 to 120 PSI |
| Pilot pressure: | 2,5 to 8 bar / 37.5 to 120 PSI |
| Lubrication: | Not required if used select a medium aniline point lubricant (between 80°C and 100°C / 176°F and 212°F) |
| Filtration: | 40 microns |
| Temperature: | -18°C to + 80°C / 0°F to 176°F |
| Orifice: | 7 mm / 0.28 in |
| Flow (at 6 bar, ΔP=1bar): | 1350 NI/min - Cv 1.35 |
| Coil: | Epoxy encapsulated - class F wires - long energization |
| Voltage range: | -15% to +10% of nominal voltage |
| High temperature mod. : | Viton seals, spool and poppet - high temperature grease |

MAC 82 SERIES - CUTAWAY & IN SITU



MAC 82 series in situ

MAC SOLUTION - HOW TO ORDER

PLEASE CONSULT FACTORY



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NEW GENERATION HIGH FLOW & COMPACT 3/2-Way Universal 53 Series Valve Designed for IS Machinery with Innovative 3-Position Manual Override

- 'Sister' of the well-known 54 series valve used on valve blocks (over 40.000 units sold)
- High flow characteristics (2000 NI/min) in an extremely compact package
- Universal valve can be used on machines where the space is very limited (under the conveyor, under the platform blank & blow side, etc.)
- 3-position glass manual override facing the operator (optional 2-position manual override)
- No cartridge – Spool technology for higher flow, less parts, enhanced reliability
- Designed to work in harsh environments
- High resistance to contamination - Unaffected by pressure variations
- Highly durable, accurate switching, increased reliability
- Incredibly fast switching responses times
- High temperature modification up to 80°C for complete valve (coil included)
- LED facing the operator
- Less downtime – Increased pack to melt



CUSTOMER BENEFITS

- | | |
|--|---|
| <ul style="list-style-type: none"> ✓ 3/2-way valve with the new technology patented 5-way pilot develops maximum shifting force both ways ✓ Balanced design for high flow, high speed and high consistency (not sensitive to pressure variations) ✓ High flow (2000 NI/min) for safer and better process accuracy ✓ High speed valve: Energized: 8 ms / De-energized: 8 ms ✓ Bonded spool with minimum friction, shifting in a glasslike finished bore ✓ No lubrication required ✓ Wiping effect eliminates sticking ✓ Plug-in option for quick interchangeability and flexibility ✓ Proprietary high temperature seals for long life time, resistance to high temperature and aggressive lubrication | <ul style="list-style-type: none"> ✓ Guide pins for easier mounting ✓ High temperature modification for the complete valve ✓ Burn out proof MAC solenoid, life time guarantee on coils ✓ Valves with LED indicators facing the operator ✓ Robust 3-position manual override (locked - neutral - on) - Optional 2-position version ✓ 100 million cycles (est) MTBF life time ✓ All types of coils and electrical connectors available ✓ Valves with captive stainless steel screws for easier maintenance ✓ Identical repair kit for NO / NC valves |
|--|---|



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NEW GENERATION HIGH FLOW & COMPACT 3/2-Way Universal 53 Series Valve Designed for IS Machinery with Innovative 3-Position Manual Override

TECHNICAL DATA

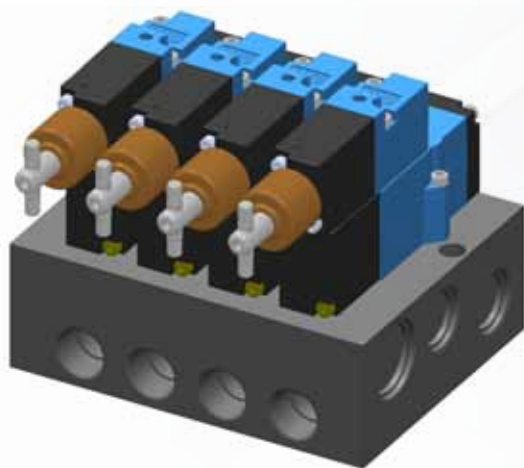
| | |
|----------------------------|---|
| Fluid: | Compressed air, vacuum, inert gases |
| Pressure range: | External pilot 0 to 8 bar / 0 to 120 PSI |
| Pilot pressure: | 2,5 to 8 bar / 37.5 to 120 PSI |
| Lubrication: | Not required if used select a medium aniline point lubricant (between 80°C and 100°C / 176°F and 212°F) |
| Filtration: | 40 µ |
| Temperature: | -18°C to + 80°C / 0°F to 176°F |
| Orifice: | 8,5 mm / 0.31 in |
| Flow (at 6 bar, Δ P=1bar): | 2000 NI/min - Cv 2.0 |
| Coil: | Epoxy encapsulated - class F wires - long energization |
| Voltage range: | -15% to +10% of nominal voltage |
| MOD. ER05: | Viton seals, spool and poppet - High temperature grease - Glass industry manual override design |

MAC SOLUTION - HOW TO ORDER

| | |
|-------------------|-------------------------------|
| NC Valve: | 53A-1B0-DP-DEWP-4FM Mod. ER05 |
| NO Valve: | 53A-2B0-DP-DEWP-4FM Mod. ER05 |
| Valve repair kit: | K-53001 Mod. ER05 |
| Pilot repair kit: | DBP-DEWP-4FM Mod. ER05 |

Note: Mod. ER05 is for vertical pilot only. For horizontal pilot versions, please consult factory.

MAC 53 SERIES - CONFIGURATION POSSIBILITIES



Manifold version



Version with vertical pilot



Version with horizontal pilot



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