The MAC VALVES GLASS Gazette 8

Technical Bulletin

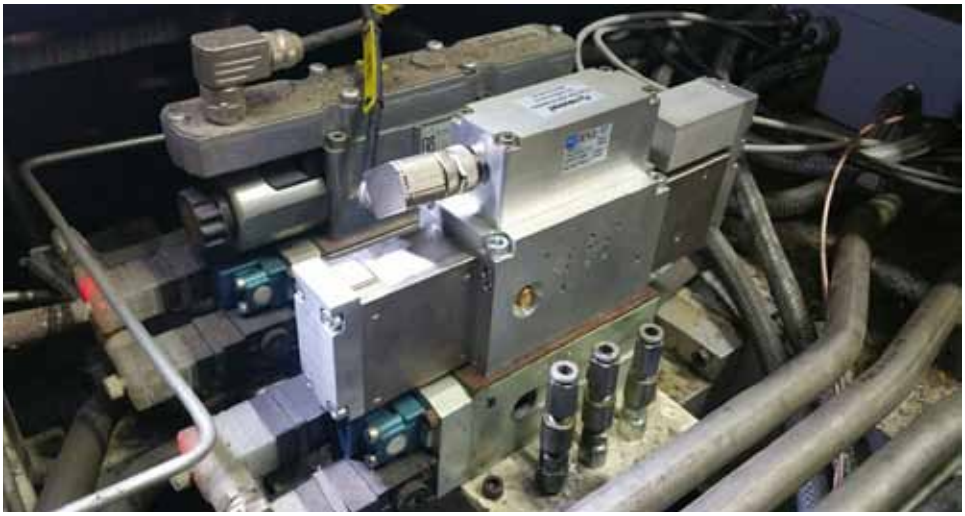
Liège, August 20th, 2016

Introduction - Plunger up / Plunger Cooling / Counterblow Solutions

MAC Valves, Inc., is pleased to announce the release of new proportional valves designed for the plunger control and plunger cooling / counterblow on container forming machines – **The Proportional Quick Exhaust (PQE)**

These new units are available in several configurations :

- The proportional valve used for plunger up for a direct competition replacement on existing machines (all interfaces and electrical connectors available)
- The proportional valve used for plunger up with an isolation valve and a transition plate to fit on existing competition base (several transition plates and electrical connectors available)
- The proportional valve used for plunger up with an isolation valve and a customized base for specific package size (for single, double, triple and quadruple GOB)
- The proportional valve used on plunger cooling / counterblow for a direct competition replacement on existing machines (all interfaces and connectors available)



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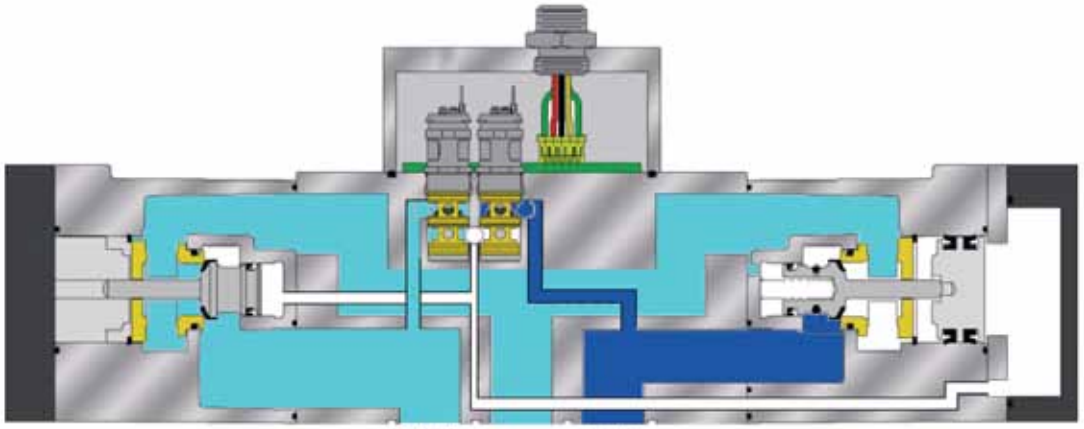
PQE Operation Principles

MAC Valves listened carefully to the specific needs of the users and took their observations into consideration to create a new proportional valve integrating all the MAC Valves features and technology.

The technology brings short and consistent responses times and a better control at each step of the process.
The unit has been designed to resist harsh environments, and therefore all components are resistant to high temperature and aggressive lubrication.

Our unique and innovative design is composed of two mechanical boosters piloted by two 2/2 small valves integrated in the PQE.



MAC Advantages vs. Competition

The MAC technology pilot operating boosters for inlet & exhaust features the following advantages:

- **Less parts – increased reliability**
- **Reduced electrical consumption**
- **Faster & consistent response times throughout the process**

Competition proposing traditional proportional coils operating poppets on long strokes :

- Heavier weight
- Higher current consumption
- Slower and inconsistent response times

MAC Valves also proposes a repair kit for the entire unit, and a maintenance bench.

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New PQE with Isolation Valve for Plunger up System

MAC Valves is releasing a new assembly composed of one PQE and one 3/2 way isolation valve that isolates the PQE against contamination from the plunger. **The isolation valve can be either an external part or directly built in the PQE for a direct drop-in**.

The feedback from the field for this assembly is extremely positive. The solution offers huge advantages compared to competition:

- Less variation in plunger up process time
- Low pressure can be used during the complete plunger process, and this increases the bottle neck quality and reduces wear on mechanical parts
- The press time is extremely constant from cycle to cycle

This new assembly has been designed to be fitted on all IS machine types using existing proportional valve to control the plunger operation.

With this new MAC Valves assembly, the exhaust air is forced through a spool valve when commanding to 0 bar and no longer through the proportional valve itself.

This significantly reduces the presence of contaminants in parts involved in the proportional operation of the valve.

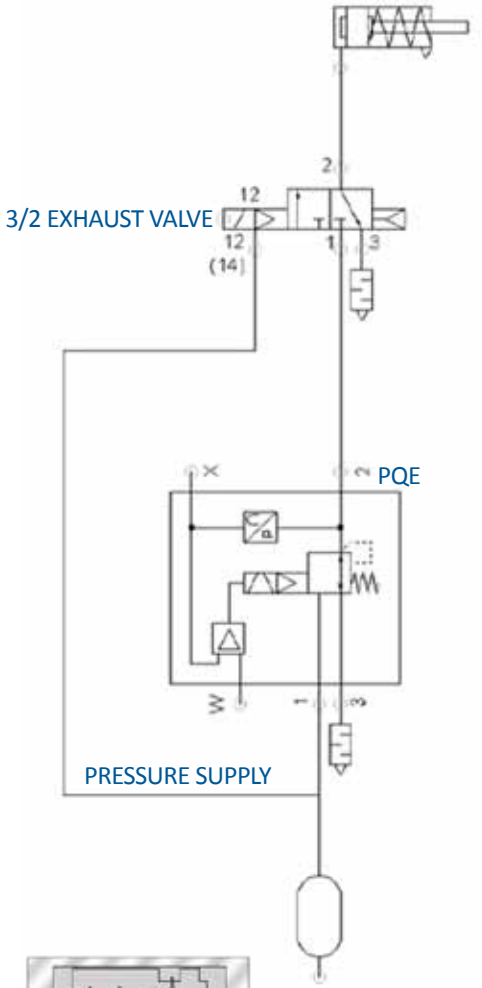
Different block configurations are available – the pictures below are illustrations

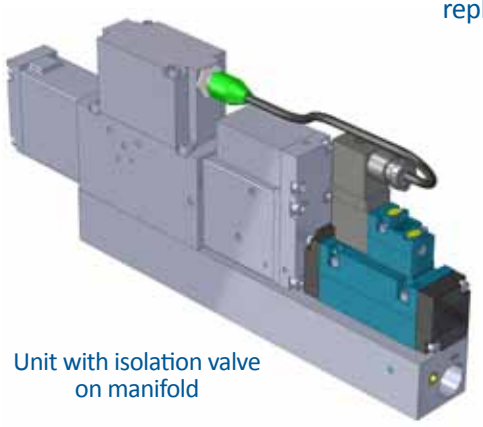
A needle can be integrated into the manifold to control the exhaust air coming back from the plunger up air line.

A shut off can also be integrated into the manifold to cut the air inlet of the PQE and allow to change the unit in case of trouble.

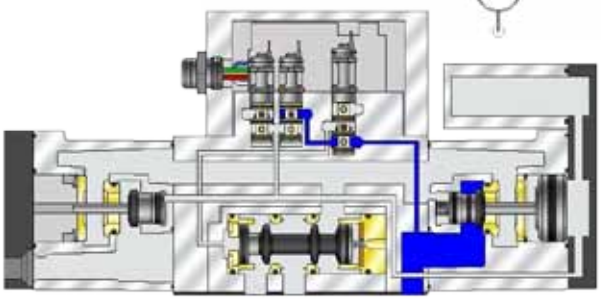
The isolation valve is electrically controlled by the PQE circuit board itself – an additional channel coming from the main PLC is thus not necessary.

Please see next page for direct drop-in replacement.





Unit with isolation valve on manifold



Direct drop-in with isolation valve directly built in the PQE

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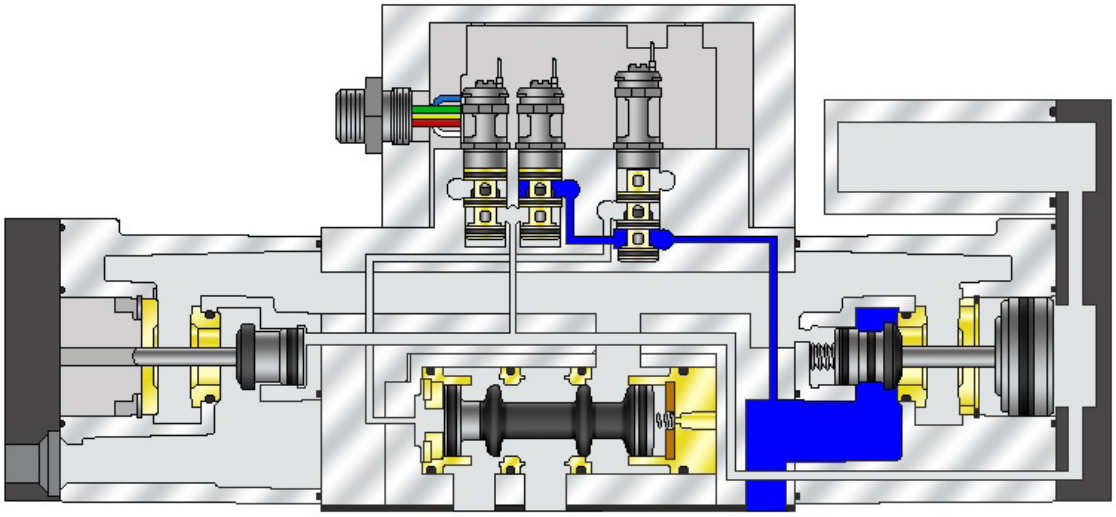
New PQE with Integrated Isolation Valve – Operation Principles

The operation of the new assembly combines the features of the two types of valves used. The PQE is used to create the pressure as it is required by the process.
The isolation valve is less sensitive to dirt and all exhaust air than the PQE. To avoid the contamination of the PQE with dirt, particles, residues of swabbing and lubrication, the main exhaust air flows through the isolation valve.
With this assembly, the speed and accuracy of the plunger movement to the loading position in NNPB and from the up position to the counterblow position in BB is significantly improved.

This step is ensured directly by the protected circuit board inside the PQE. At a pressure set to 0 bar (<=4mA), the PQE is closing both the supply and the exhaust, forcing all the air though the isolation valve.

In maintenance stop conditions, the isolation valve is exhausting the working line for plunger up in most cases, the plunger down valve is a normally open valve to force the plunger down in maintenance stop. This means the plunger up exhaust valve is able to exhaust the air leaking, which is flowing into the plunger up cylinder from the plunger down pressure and avoids the creeping up of the plunger while all valves are de-energized.
Thanks to this assembly, if there is no power supply or command signal, the plunger cylinder exhausts.

In addition to the functional benefits described, the lifetime of the PQE is expected to be longer as the valve is not energized for long periods of time.



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MAC Solutions/Options - Plunger up

OEM supplied assembly made of proportional valve and an exhaust valve

MAC Solution : PQE93A-AA10 Mod EP42

(OEM supplied exhaust valve stays or can be replaced by the MAC valve reference EMA-A1B-BV3-BFE0-CTR Mod. EP92)

OEM supplied proportional unit without exhaust valve

MAC Solution : PQE93A-AA10 Mod. Exxx

Please consult factory for modification number

Competition proportional valve without exhaust valve

(Command signal 0-10 V or 4 to 20 mA)

MAC Solution : PQE93A-AA10 Mod. Exxx

Please consult factory for modification number

Double connector options available.

Note: For the cooling / counterblow PQE unit, please refer to the white paper attached.

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NEW GENERATION Proportional Control Valves
For Plunger Control on IS Machines

- Solution for NNPB, PB and BB
- Automatic pressure control
- 100% drop-in solution - Several interfaces available
- Dual transducer for extreme precision
- High flow characteristics
- ***Additional 3/2 way valve (optional) that isolates the unit against contamination coming back from the plunger. Also prevents plunger cylinder actuation when command signal is set to 4 mA or 0 V***
- Twin booster design for better accuracy, lower electrical consumption and higher life time
- Components resistant to high temperatures
- Flow control needle available for plunger down on request
- Short and consistent response times for better control of each step of the process
- Repair kit available - Fully repairable unit

Shown with round connector - Other connectors available, please consult factory

CUSTOMER BENEFITS

- ✓ **Balanced design for high flow, high speed and high consistency**
- ✓ **Self cleaning device for inlet & exhaust booster.**
- ✓ **Proprietary high temperature seals for long life time, improved resistance to high temperature and aggresive lubricants**
- ✓ **Actual pressure measurement performed at outlet of Propotional Pressure Controller**
- ✓ **MAC Technology Pilot operating booster for inlet and exhaust: reduces overheat**
- ✓ **Aluminum alloy enclosure for control system**
- ✓ **100% interchangeable with existing solution**
- ✓ **MAC Technology Pilot operating booster for inlet and exhaust: less parts - more reliability**
  Vs. Traditional proportional coils operating poppets on long strokes: heavier weight
- ✓ **MAC Technology Pilot operating booster for inlet and exhaust: reduced electrical consumption.**
  Vs. Traditional proportional coils operating poppets on long strokes: higher electrical consumption
- ✓ **MAC Technology Pilot operating booster for inlet and exhaust: short and consistent response times for better control of each step of the process**
  Vs. Traditional proportional coils operating poppets on long strokes: longer & inconsistent response times
- ✓ **Repair kit available for the complete proportional control valve**
- ✓ **Optional test bench**

20 years of experience in the Glass Industry

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NEW GENERATION Proportional Control Valves
For Plunger Control on IS Machines

TECHNICAL DATA

Fluid:	*Compressed air, vacuum, inert gases*
Inlet pressure:	*5 bars / 73 PSI*
Output pressure:	*0 to 4 bar / 0 to 58.4 PSI*
Overall accuracy:	*± 2.5% full scale*
Lubrication:	*Not required, if used, select a medium aniline point lubricant*
Supply voltage:	*20.4 to 26.4 VDC*
Command signal:	*4 to 20 mA or 0 to 10 VDC*
Analog monitor signal:	*4 to 20 mA or 0-10 VDC (if 0-10 VDC command signal)*
Ambient temperature:	*-18°C to +50°C / - 0.4°F to 122°F*
Compressed air temperature:	*-18°C to +50°C / -0.4°F to 122°F*
Flow:	*3000 Nl/min / 3.0 Cv*
Connector available:	*Consult factory*

FEEDBACK FROM THE FIELD

- More consistent plunger up process time
- Lower pressure can be used during all the plunger process, resulting in an improvement of the bottle neck quality, and a wear reduction on mechanical parts
- The duration of the holding pressure for the plunger is extremely consistent from cycle to cycle

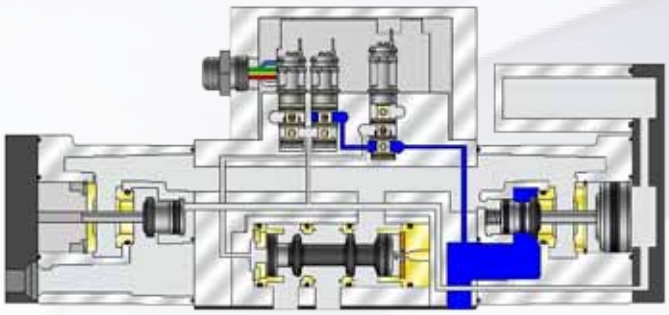
Approved

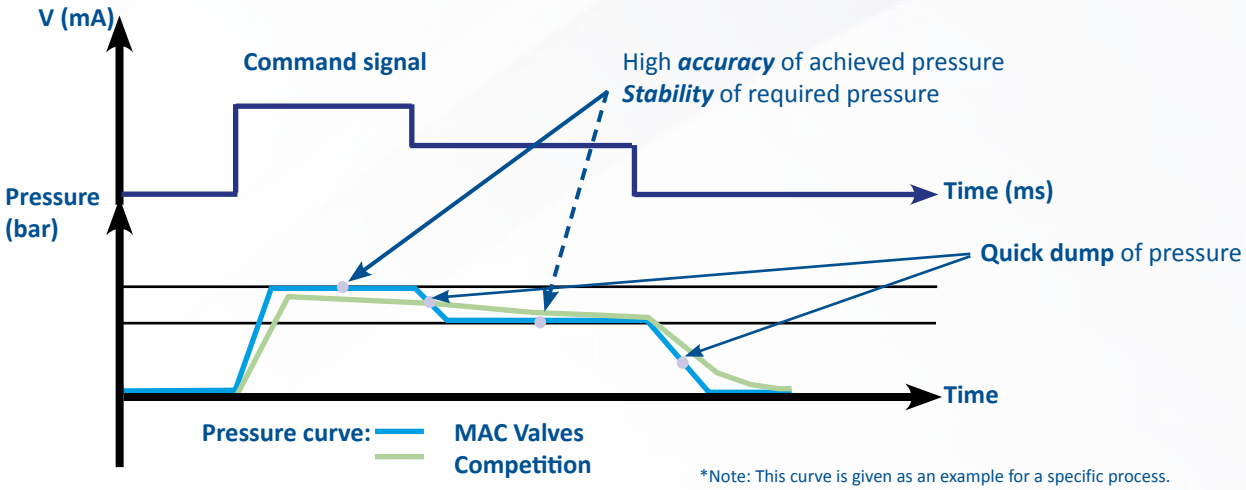
MAC SOLUTION - HOW TO ORDER

Plunger control:	*PQE93A-AA10 Mod. EXXX**
Repair kit for PQE Mod. EXXX:	*Consult factory*

* Please consult factory for modification number

DRAWING OVERVIEW





*Note: This curve is given as an example for a specific process.

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NEW GENERATION Proportional Control Valves For Plunger Cooling and Counterblow

- Solution for plunger cooling / counterblow on glass machines
- High flow characteristics
- Automatic pressure control
- 100% drop-in solution
- Dual transducer for extreme precision
- Twin booster design for better accuracy, lower electrical consumption and higher life time
- Components resistant to high temperatures
- Short and consistent response times for better control of each step of the process
- Enclosed control circuitry - Protected against oil / contamination coming from the application
- Modular design for ease of repair
- Repair kit available - Field Repairable unit

Shown with round connector - Other connectors available, please consult factory

20 years of experience in the Glass Industry

CUSTOMER BENEFITS

- ✓ **Balanced design for high flow, high speed and high consistency**
- ✓ **Wiping action of seals to manage contamination**
- ✓ **Proprietary high temperature seals for long life time, improved resistance to high temperature and aggresive lubricants**
- ✓ **Actual pressure measurement performed at outlet of Propotional Pressure Controller**
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- ✓ **100% interchangeable with existing OEM solutions**
- ✓ **Repair kit available - Field repairable unit**

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NEW GENERATION Proportional Control Valves For Plunger Cooling and Counterblow

TECHNICAL DATA

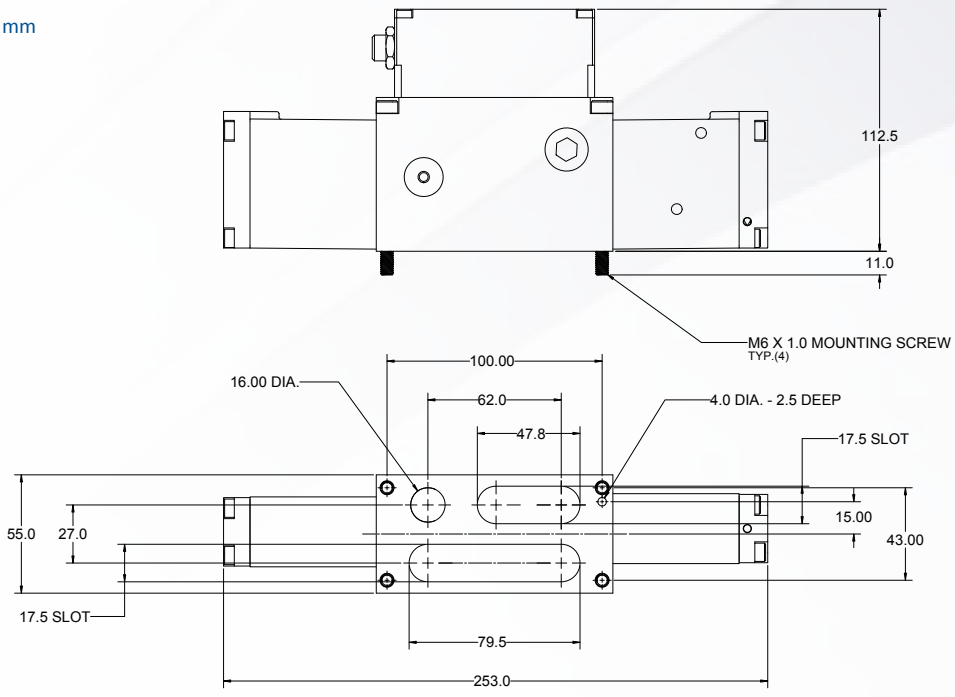
Fluid:	*Compressed air, inert gases*
Inlet pressure:	*6 bar / 87 PSI*
Output pressure:	*0 to 4 bar / 0 to 58.4 PSI*
Overall accuracy:	*± 2.5% full scale*
Lubrication:	*Not required, if used, select a medium aniline point lubricant*
Supply voltage:	*20.4 to 26.4 VDC*
Command signal:	*4 to 20 mA or 0 to 10 VDC*
Analog monitor signal:	*4 to 20 mA or 0-10 VDC (if 0-10 VDC command signal)*
Ambient temperature:	*-18°C to +50°C / - 0.4°F to 122°F*
Compressed air temperature:	*-18°C to +50°C / -0.4°F to 122°F*
Available connectors:	*Consult factory*

MAC SOLUTION - HOW TO ORDER

Plunger control:	*PQE93A-AA10 Mod. EXXX (Consult factory to define the appropriate modification number)*
Repair kit for PQE Mod. EXXX:	*Consult factory*

DIMENSIONAL DRAWING

All dimensions are in mm



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