MaintiValves

Test bench for maintenance and tightness of industrial valves

General description

➢ Sections

✓Industrial maintenance

➢ Key points & training activities

✓Ideal product for the mounting, dismounting, mechanical adjustments and handling activities
- Reconfiguration of valves (on/off configuration/position of the actuator/change of blowout preventer/change of the seat type for the modification of the tightness class etc.)
- Heavy material handling (valve series 35002: 50kg/valve series 21000: 100kg)

✓Unique training material for students in the field of process industry maintenance
✓High diversity of mechanical components: shafts and guides, levers, springs, membranes, cams, tightness joints and sealing…
✓Study of construction solutions of several types of industrial control valves (3D software)
✓Analysis of the choice of materials for the maintenance of industrial applications
✓Kinematic studies (cam positioning system, etc.)
✓Monitoring, inspections, diagnostics, maintenance interventions and improving maintenance
✓Functional testing (opening and closing) and tightness test (rotameter) of the valves
✓Pneumatic and electric connecting

➢ References:

✓MV10: Test bench for maintenance and tightness testing
✓MV11: Workshop crane option
✓MV12: 3-inch "Camflex" rotary valve with pneumatic and electropneumatic actuator and positioner (regulating valve)
✓MV13: 3-inch single seat valve with pneumatic actuator and positioner (control valve)
✓MV16: 1.5-inch manual membrane valve (on/off valve)
✓MV17: 1.5-inch manual pneumatic membrane valve (on/off valve)
✓MV18: 1.5-inch ball valve with electric servomotor (on/off valve)
✓MV19: 1.5-inch pneumatic membrane valve (on/off valve)

➢ Features

✓L/W/H Test bench : 1200 x 800 x 2000mm
✓Pneumatic energy: 3.5 bar pressure
✓Power: 230V single-phase
✓Weight: 3-inch Camflex rotary valve → 46kg
3-inch single seat valve → 105kg
1.5-inch membrane manual valve → 10kg
1.5-inch membrane pneumatic and manual control valve → 24kg
1.5-inch membrane pneumatic valve → 19kg
1.5-inch ball valve with electric servomotor → 28kg

➢ This system is provided with a technical file and workbook (on CD)

➢ Functional description

✓The system allows to manipulate, test and adjust industrial valves after maintenance operations.
✓It includes:
- A set of 6 valves (2 control valves, 4 on/off) on which maintenance operations are performed
- Two pneumatic and one electropneumatic positioner (for the 2 control valves)
- One support frame with valve mounting clamps
- One valve pneumatic control device
- One 24V power supply device for the on/off valves
- One testing device (charging and leak flow measuring by rotameter or bubble indicator)
- A set of spare parts for each valve (seat, flap gate, blowout preventer, joints, gland packing, etc.)

✓An optional valve handling device (500 kg workshop crane with slings and shackles).
✓The valves used are representative models of many industrial applications in the fields of petrochemistry, agri-food industry, or distribution of fluids of all kinds.
✓Each valve may be installed on the test bench by using a handling device. The connection between the valves and the bench is ensured by a system of screwed clamps.

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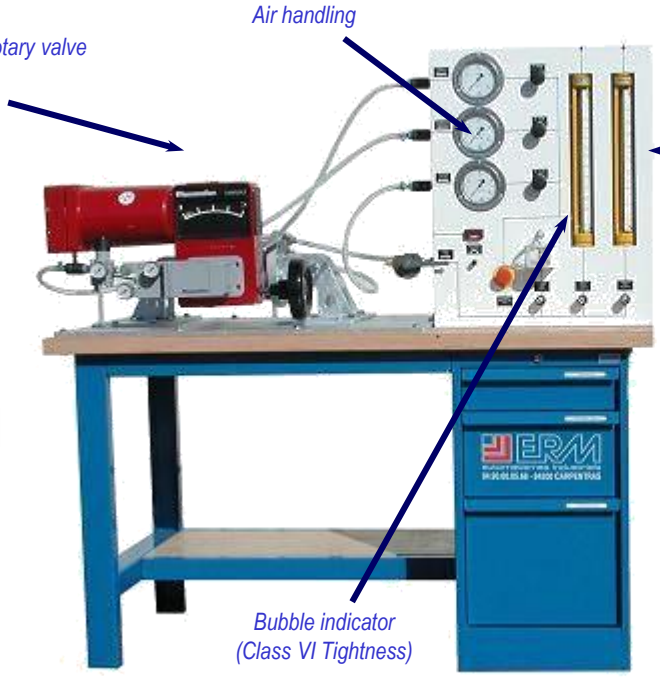
Architecture of the test bench for maintenance and tightness

Workshop crane (MV11)

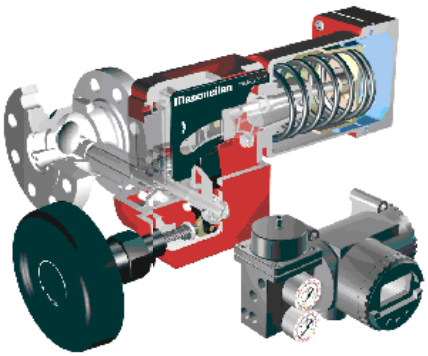


Single seat valve (MV13)

➢ Rotary valve with pneumatic and electropneumatic actuator and positioner (regulating valve) (MV12)

✓This valve has the following features:

- Flow size: 3 inch (80 mm)
- Weight: 50 kg
- External manual control
- Pneumatic actuator
- Transformation of movement by articulated arm
- Pneumatic reversible multi-position actuator
- Adjustable and removable seat (several materials)
- Pneumatic positioner for valve control (adjustable cams) or electropneumatic positioner 4-20mA
- Tightness by cable gland and joints
- Mounting by through clamp (tightening between clamps)

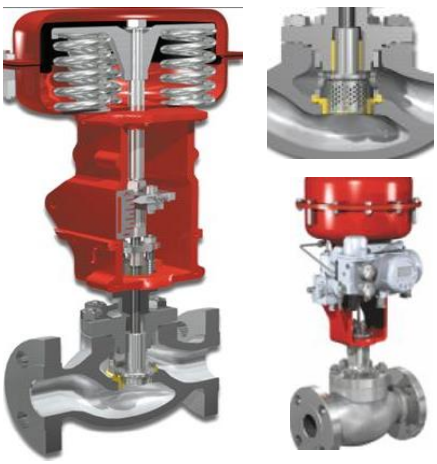


3-inch rotary valve - 50 kg
Closing by rotary movement of the sliding gate

➢ Single seat valve (control valve) (MV13)

✓This valve has the following features:

- Flow size: 3 inch (80 mm)
- Weight: 100 kg
- External manual control
- Membrane-type pneumatic actuator
- Service pressure adjustment by innerspring unit
- Adjustment of the operating threshold
- Reversible operation
- Adjustable and removable seat and sliding gate (different materials)
- On/off pneumatic control, pneumatic positioners
- Tightness by cable gland and joints
- Mounting by through clips



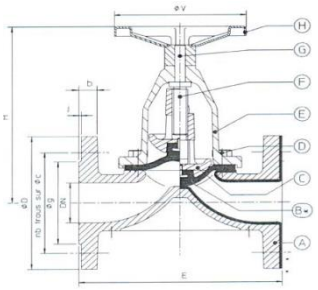
3-inch single seat valve - 100 kg
Closing by translation movement of the sliding gate

Architecture of the test bench for maintenance and tightness (continued)

➢ *Manual membrane valve (on/off valve) (MV16)*

✓This valve has the following features:

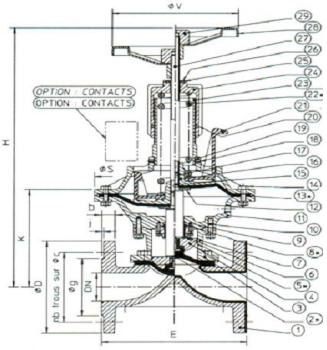
- Flow size : DN40 (1.5-inch)
- Weight : 10 kg
- External manual control by Ø150mm handwheel
- Mounting by screwed clip



➢ *Pneumatic membrane and manual control valve (on/off valve) (MV17)*

✓This valve has the following features:

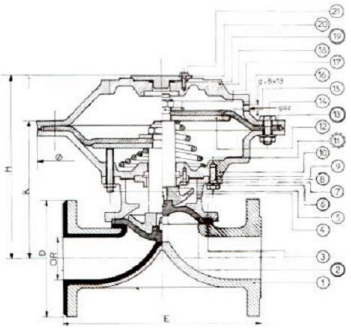
- Flow size: DN40
- Volume: 24 kg
- External manual control by handwheel
- Membrane pneumatic actuator (on/off-type membrane)
- Tightness by lip seals
- Mounting by screwed clip



➢ *Pneumatic membrane valve (on/off valve) (MV19)*

✓This valve has the following features:

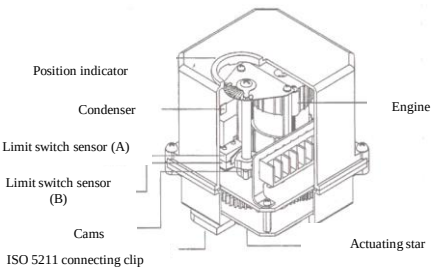
- Flow size : DN40
- Weight : 19 kg
- Membrane pneumatic actuator (on/off-type membrane)
- Reversible valve (on or off)
- Tightness by lip seals
- Mounting by screwed clip



➢ *Ball valve with electric servomotor (on/off valve) (MV18)*

✓This valve has the following features:

- Flow size : DN40
- Weight : 28 kg
- 24Vcc electrical actuator with gear motor and limit switch sensor
- Mounting by screwed clip



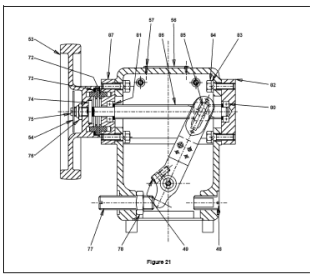
Training activities

➢ *The system allows to develop multiple activities in the field of industrial maintenance*

1 Preparation of interventions on mechanical equipment

CP 2.2: Analysing the mechanical solutions carrying out the operating functions.
CP 3.1: Preparing the intervention.

- ✓ Internal functional testing for each valve:
- ✓ Various constructive solutions
  - Shutter mode (sliding gate – flap gate)
  - Movement transformation devices
  - Adjustment devices
  - Tightness function
  - Reversibility principle
- ✓ Solidworks models provided
- ✓ Service Manual provided



2 Analysis of power devices

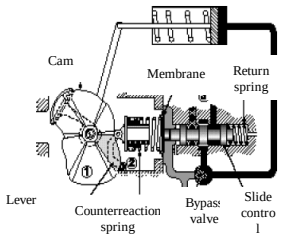
CP 2.3: Analysing energy management, distribution and conversion solutions.
CP 1.7: Identifying risks, defining and implementing adapted prevention measures.
CP 2.1: Analysing the operation and organisation of a system.

- ✓ Study of the actuators related to each valve
  - Membrane and spring pneumatic actuator
  - Bellow pneumatic actuator
- ✓ Prewired pneumatic control circuit on power cabinet

3 Analysis of control devices

CP 2.3: Analysing energy management, distribution and conversion solutions.
CP 1.7: Identifying risks, defining and implementing adapted prevention measures.
CP 2.1: Analysing the operation and organisation of a system.

- ✓ Study of pneumatic control devices
  - Control by pneumatic or electropneumatic positioner
  - On/off direct control
- ✓ Adjustment of the opening threshold
- ✓ Adjustment of the positioner by cams



4 Control of mechanical stresses and heavy material handling

CP 1.7: Identifying risks, defining and implementing adapted prevention measures.
CP 2.1: Analysing the operation and organisation of a system.
CP 2.2: Analysing the mechanical solutions carrying out the operating functions.

- ✓ Implementation of handling equipment
  - Transportation by crane and hoist
  - Stowage of valves by straps
  - Mounting by clips and screws

50 kg
100 kg

Training activities (continued)

5

Removal - Replacing - Exchange - Adjustment

CP 1.2: Restore an equipment.
CP 1.6: Commission an equipment in accordance with the procedures.
CP 4.2: Write reports and argue.

- ✓ Many possibilities of exchange and adjustments
  - Seats, sliding gates, removable flap gates
  - Removable actuators
  - Change of membranes and springs
  - Many joints
  - Adjustment of the operating thresholds
  - Modification of positions (ON-OFF)
  - Change of seat materials (upgrading tightness class)

6

Repairing by dismounting and remounting

CP 1.3: Repair a component.
CP 4.2: Write reports and argue.
CP 1.2: Restore an equipment.
CP 1.6: Commission an equipment in accordance with the procedures.

- ✓ Many possibilities of repair actions
  - Intervention on shutter devices
  - Intervention on the movement transformation devices
  - Intervention on the actuators

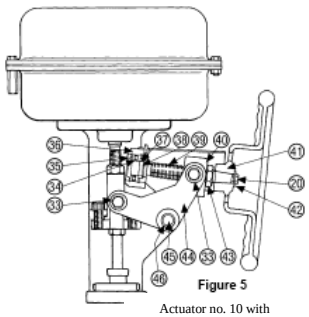


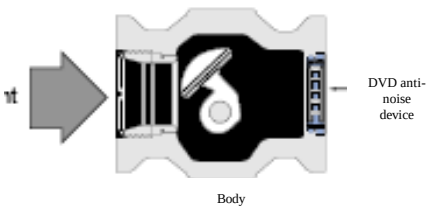
Figure 5
Actuator no. 10 with optional manual control

7

Monitoring and inspection

CP 1.4: Perform the monitoring and inspection operations.
CP 4.2: Write reports and argue.

- ✓Testing the valves on the bench
- ✓Pressure tightness test (1 to 3 bars)
- ✓Leakage flow measurement by rotameter
- ✓Flow measurement by counting air bubbles
- ✓Opening and closing test



8

Improving maintenance

CP 1.5: Perform improvements or modifications of the equipment.
CP 3.2: Submit proposals for improvements of an equipment.

- ✓ Improvement of the valve tightness class
  - Change of seats, sliding gates and flap gates (Teflon crossing)
  - Measurement of new features on the bench
- ✓ Increase of the working pressure
  - Change of springs
- ✓ Modification of the actuator's position