GasMultiBloc®
Combined servo pressure regulator and safety shut-off valves

MBC-... 1000/602(L)
MBC-... 2500/602(L)
MBC-... 4000/602(L)

Technical Description
The DUNGS multifunctional control MBC... integrates filter, two safety shut-off valves and servo pressure regulator with the following functions:

- MBC-SE as positive pressure regulator
- MBC-SE S02 as zero governor
- MBC-VEF as gas / air proportionator

Each version also features:
- Dirt trap: Microfilter
- 2 fast opening / fast closing safety shut-off valves up to 5 PSI
- Servo pressure regulator with vent limiting device
- Outlet pressure ranges:
  - SE Version: -0.8 to +120 in. W.C.
  - VEF Versions: +6 to +40 in. W.C.
- Precision regulation of outlet pressure
- Flanged joints with pipe threads to ISO 7/1 or NPT
- Easy to install
- Low weight

The modular system design allows integration of valve proving systems, high and low gas pressure switches and other system accessories. The compact design allows for high flow rates at low pressure drop.

Application
The DUNGS MBC is recommended for commercial heating applications that require two safety shutoff valves.

For SE Versions, the servo pressure regulator permits optimal mixing in forced air burners and premix burners in conjunction with mechanical or electronic integrated gas-air regulation units; this applies to modulating and multi-stage floating operating mode.

For VEF Versions, the servo pressure regulator permits optimal mixing for gas / air ratio regulation.

Two normally closed automatic shutoff valves and servo regulator in one housing. Each valve has the following approvals.

UL Listed / Recognized
- UL 429
- File #MH16727

CSA Certified
- ANSI Z21.21 / CSA 6.5
- C/I marking
- ANSI Z21.18 / CSA 6.3
- File # 1641073

FM Approved
- FM 7400
- File No. 3046043

Commonwealth of Massachusetts Approved Product
- Approval code G3-1008-119

CSA Certified/FM Approved Models
- MBC 1000/602
- MBC 2500/602
- MBC 4000/602

UL Listed / FM Approved Models
- MBC 1000/602L
- MBC 2500/602L

UL Recognized / CSA / FM Models
- MBC 4000/602L

Codes and Standards
This product is intended for installations covered by but not limited to ANSI Z83.4, ANSI Z83.18, ANSI Z21.13, UL 795, CSD-1 or CSA B149.1, CSA B149.3 and NFPA 37.

DUNGS is an ISO 9001 manufacturing facility.
**Functional Description**

**Gas flow**
1. When valves V1 and V2 are closed, chamber a is subjected to inlet pressure.
2. The low gas pressure switch (optional) is connected to chamber a.
   If the inlet pressure drops below the setpoint on the pressure switch, the switch opens the limit circuit.
3. Once enabled by the control system, valves V1 and V2 open.
   Gas flow is released through chambers “a” and “b”.

**Closing function**
Upon interruption of power supply, valves V1 and V2, are closed by the closing springs within <1s.

**Zero Governor Versions**
If atmospheric diaphragm ruptures, the zero governor regulating disc closes.
**Functional Description**

**Gas flow**

1. If the V1 and V2 valves are closed, chamber a is under inlet pressure.
2. The min. pressure switch (option) is connected to chamber a via a bore-hole.
   If the inlet pressure exceeds the reference value set in the pressure switch, the switch switches through to the automatic burner control.
3. The V1 and V2 valves open after they are enabled by the combustion flame safeguard.
   Gas flow through the chambers a and b is enabled.

**Closing function**

If the supply voltage of the coils of V1 and V2 valves is interrupted, the pressure springs close the valves in <1s.

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**Block diagram MBC…VEF**

- **M**: Working diaphragm
- **D**: Restrictor
- **S1**: Servo diaphragm (atmospheric) $p_{F}$
- **S2**: Servo diaphragm for blower pressure $p_{L}$
- **R**: Regulator disc

- $p_{1}$: Inlet pressure
- $p_{Br}$: Burner pressure, outlet pressure:
- $p_{amb}$: Ambient pressure
- $p_{L}$: Blower pressure

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**Pressure taps, gas train diagram**

**MBC…VEF**

1. Pressure regulator unit
2. Regulator spring
3. Connecting flange
4. Coarse filter and microfilters
5. Valve V1
6. Closing spring V1
7. Housing
8. Plunger V1
9. Solenoid V1
10. Printed circuit board
11. Electrical connection
12. Valve V2
13. Closing spring V2
14. Plunger V2
15. Solenoid V2
16. Solenoid housing
17. Gas-air ratio
18. Zero point correction

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1. Screw plug G 1/8
2. 3, 4, 5
3. Seal plug G 1/8
4. 6, 7
5.
### Specifications

<table>
<thead>
<tr>
<th>Nominal widths</th>
<th>MBC 1000</th>
<th>MBC 2500</th>
<th>MBC 4000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flanges with pipe threads to ISO 7/1 (DIN 2999)</td>
<td>NPT 1/2, 3/4, 1, 1 1/4, 1 1/2 and their combinations</td>
<td>NPT 1, 1 1/4, 1 1/2, 2 and their combinations</td>
<td>NPT 1, 1 1/4, 1 1/2, 2 and their combinations</td>
</tr>
</tbody>
</table>

### Safety Shutoff Valves & Regulator

#### Maximum Operating Pressure
- 5 PSI (138 in. W.C.)

#### For SE Versions, recommended inlet pressure for optimal performance of the regulator*
- S22/S82: \( p_{in} = 6 - 138 \) in. W.C.
- S302: \( p_{in} = 14 - 138 \) in. W.C.
- S02 & N: \( p_{in} = 4 - 41 \) in. W.C.

#### For SE Versions, outlet pressure ranges
- S22: \( p_{Br} = 1.6 - 8 \) in. W.C.
- S82: \( p_{Br} = 2 - 32 \) in. W.C.
- S302: \( p_{Br} = 12 - 122 \) in. W.C.
- S02 & N: \( p_{Br} = 0 \pm 0.8 \) in. W.C.

#### For VEF Versions, inlet gas pressure range
- \( p_{in} = 6 \) to 138 in. W.C.
- \( p_{L} = 0.16 \) to 41 in. W.C.
- \( p_{Br} = 0.27 \) to 41 in. W.C.

#### Ambient temperature
- -40 °F to +140 °F (-40 °C up to +60 °C) for CSA Versions
- +5 °F to +140 °F (-15 °C up to +60 °C) for UL Versions
  (in LPG applications, do not operate MBC below 0 °C. Only suitable for gaseous LPG, liquid hydrocarbons destroy the seal materials)

#### Inlet filter
- 50 micron filter of two layer nonwoven fabric. Filter replaceable without removing MBC from application.

#### Gas Pressure switch (optional)
- Types GAO-A2, GML-A2, GMH-A2
  For further information refer to Gas Pressure Switch Sales Brochure. (# 226 359)

#### SE Versions
- Servo pressure regulator
  Servo pressure regulator with adjustable outlet pressure. Versions for constant positive pressure and zero pressure available.

#### VEF Versions
- Servo pressure regulator
  - Gas/Air ratio control with adjustable ratio V as well as correction of zero point N and combustion chamber pressure connection
  - Ratio setting range V
  - Zero point correction N
  - Burner pressure monitoring \( p_{Br} \)
  - Pulse and connection lines
  - Gas/Air ratio control with adjustable ratio V as well as correction of zero point N and combustion chamber pressure connection
  - Ratio setting range V
  - Zero point correction N
  - Burner pressure monitoring \( p_{Br} \)
  - Pulse and connection lines
  - G 1/8 connection as per DIN ISO 228 for burner pressure (\( p_{Br}; \) GAS), blower pressure (\( p_{L}; \) AIR), firing chamber pressure (\( p_{F}; \) combustion, atmosphere)

**Impulse and connection lines must be made of steel.**

#### Vent limiting device
- Factory installed, vent limiter per ANSI Z21.18 / CSA 6.3

#### Safety shut-off valve V1, V2
- Two valves in series (fast-closing, fast-opening)

#### Test ports / Pressure switch mounting ports
- G 1/8 DIN ISO 228, at inlet and outlet flanges, on both sides downstream of filter, between V1 and V2, downstream of V2.
  (fitting pressure switch may partially exclude measuring gas connection)

#### Voltage/frequency
- 110 - 120 VAC 50 - 60 Hz, 24 VAC 50 - 60 Hz, 24 VDC, 12 VDC.
  See Approval table and Power Consumption table on page 5.

#### Electrical connection
- DIN-connector with 1/2" NPT conduit connection for UL Versions.
  Order separately for CSA Versions.

#### Rating/power consumption
- See power consumption table

#### Switch-on duration
- 100 % Duty Cycle

#### Switching cycles
- 60 per hour (30 s on/off)

#### Enclosure rating
- NEMA Type 12

#### Radio interference suppression
- Interference level N

#### Materials of gas-conveying parts
- Housing: die-cast aluminium
- Diaphragms, seals: on NBR base
- Solenoid drive: steel, aluminium

#### Installation position
- MBC S02 Vertical with upright solenoid only
- MBC-VEF & MBC S22, 82, 302 Vertical with upright solenoid or horizontal with horizontal solenoid.

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*Regulator complies with ANSI Z21.18/CSA 6.3 for up to 5 PSI. Inlet pressures higher than recommended inlet pressures are possible provided the appliance complies with the applicable performance requirements.*
## Approval Table

<table>
<thead>
<tr>
<th>Type</th>
<th>FM Approved</th>
<th>CSA Certified</th>
<th>UL Listed</th>
<th>UL Recognized</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBC 1000/602</td>
<td>12 VDC, 24 VDC, 24 VAC, 120 VAC</td>
<td>12 VDC, 24 VDC, 24 VAC, 120 VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBC 2500/602</td>
<td>24 VDC, 24 VAC, 120 VAC</td>
<td>12 VDC, 24 VDC, 24 VAC, 120 VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBC 4000/602</td>
<td>24 VDC, 24 VAC, 120 VAC</td>
<td>12 VDC, 24 VDC, 24 VAC, 120 VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBC 1000/602L</td>
<td>24 VDC, 24 VAC, 120 VAC</td>
<td>12 VDC, 24 VDC, 24 VAC, 120 VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBC 2500/602L</td>
<td>24 VDC, 24 VAC, 120 VAC</td>
<td>12 VDC, 24 VDC, 24 VAC, 120 VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBC 4000/602L</td>
<td>12 VDC, 24 VDC, 24 VAC, 120 VAC</td>
<td>12 VDC, 24 VDC, 24 VAC, 120 VAC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Power Consumption Table

<table>
<thead>
<tr>
<th>Valve Body Size</th>
<th>Rated voltage</th>
<th>Inrush $P_{\text{max}}$ [VA] for $t = 3 \text{s}$</th>
<th>Inrush current peak (A)</th>
<th>Holding $P_{\text{max}}$ [VA] Operation</th>
<th>Recommended power of supply transformer (VA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBC 1000</td>
<td>12 VDC</td>
<td>140</td>
<td>20.1</td>
<td>16</td>
<td>DC battery</td>
</tr>
<tr>
<td>MBC 2500</td>
<td>12 VDC</td>
<td>160</td>
<td>20.1</td>
<td>20</td>
<td>DC battery</td>
</tr>
<tr>
<td>MBC 4000</td>
<td>12 VDC</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>MBC 1000</td>
<td>24 VDC</td>
<td>130</td>
<td>13.4</td>
<td>16</td>
<td>DC battery</td>
</tr>
<tr>
<td>MBC 2500</td>
<td>24 VDC</td>
<td>160</td>
<td>13.4</td>
<td>20</td>
<td>DC battery</td>
</tr>
<tr>
<td>MBC 4000</td>
<td>24 VDC</td>
<td>160</td>
<td>14</td>
<td>30</td>
<td>DC battery</td>
</tr>
<tr>
<td>MBC 1000</td>
<td>24 VAC</td>
<td>120</td>
<td>14.7</td>
<td>20</td>
<td>250</td>
</tr>
<tr>
<td>MBC 2500</td>
<td>24 VAC</td>
<td>160</td>
<td>13.9</td>
<td>20</td>
<td>300</td>
</tr>
<tr>
<td>MBC 4000</td>
<td>24 VAC</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>MBC 1000</td>
<td>120 VAC</td>
<td>120</td>
<td>3.1</td>
<td>16</td>
<td>250</td>
</tr>
<tr>
<td>MBC 2500</td>
<td>120 VAC</td>
<td>180</td>
<td>3.0</td>
<td>20</td>
<td>300</td>
</tr>
<tr>
<td>MBC 4000</td>
<td>120 VAC</td>
<td>160</td>
<td>2.4</td>
<td>25</td>
<td>300</td>
</tr>
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</table>

## MBC Accessories

<table>
<thead>
<tr>
<th>Flange for</th>
<th>Thread type</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBC 1000</td>
<td>NPT 1/2</td>
<td>222371</td>
</tr>
<tr>
<td>MBC 1000</td>
<td>NPT 3/4</td>
<td>222368</td>
</tr>
<tr>
<td>MBC 1000</td>
<td>NPT 1</td>
<td>221999</td>
</tr>
<tr>
<td>MBC 1000</td>
<td>NPT 1 1/4</td>
<td>231178</td>
</tr>
<tr>
<td>MBC 1000</td>
<td>NPT 1 1/2</td>
<td>244021</td>
</tr>
<tr>
<td>MBC 2500 / MBC 4000</td>
<td>NPT 1</td>
<td>222369</td>
</tr>
<tr>
<td>MBC 2500 / MBC 4000</td>
<td>NPT 1 1/4</td>
<td>223700</td>
</tr>
<tr>
<td>MBC 2500 / MBC 4000</td>
<td>NPT 1 1/2</td>
<td>222003</td>
</tr>
<tr>
<td>MBC 2500 / MBC 4000</td>
<td>NPT 2</td>
<td>221997</td>
</tr>
<tr>
<td>MBC 1000 replacement filter</td>
<td></td>
<td>241916</td>
</tr>
<tr>
<td>MBC 2500 replacement filter</td>
<td></td>
<td>242072</td>
</tr>
<tr>
<td>MBC 4000 replacement filter</td>
<td></td>
<td>245624</td>
</tr>
</tbody>
</table>

## MBC Accessories

<table>
<thead>
<tr>
<th>Part description</th>
<th>MBC 1000</th>
<th>MBC 2500 / MBC 4000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot; NPT (flange only)</td>
<td>253205</td>
<td>256789</td>
</tr>
<tr>
<td>1&quot; NPT Flange set (with o-ring and 4 screws)</td>
<td>255132</td>
<td>256791</td>
</tr>
<tr>
<td>1.5&quot; NPT (flange only)</td>
<td>NA</td>
<td>253206</td>
</tr>
<tr>
<td>1.5&quot; NPT Flange set (with o-ring and 4 screws)</td>
<td>NA</td>
<td>255133</td>
</tr>
</tbody>
</table>

- Flanges and system accessories must be ordered separately.
### Mounting dimensions [mm]

#### MBC-1000/2500

#### MBC-4000

\[ e = \text{space requirement for solenoid replacement} \]

<table>
<thead>
<tr>
<th>Type</th>
<th>DN Rp</th>
<th>Opening time</th>
<th>Dimensions [inch]</th>
<th>Solenoid No.</th>
<th>Weight [lbs]</th>
<th>Weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBC 1000</td>
<td>1/2 - 1 1/2</td>
<td>&lt; 1 s</td>
<td>a: 4.0  b: 5.6  c: 2.4  d: 6.8  e: 10.6  f: 3.4  g: 9.2</td>
<td>032/P</td>
<td>8.4</td>
<td>3.8</td>
</tr>
<tr>
<td>MBC 2500</td>
<td>1 - 2</td>
<td>&lt; 1 s</td>
<td>a: 5.0  b: 6.9  c: 3.1  d: 7.3  e: 11.1  f: 4.5  g: 10.4</td>
<td>042/P</td>
<td>14.2</td>
<td>6.5</td>
</tr>
<tr>
<td>MBC 4000</td>
<td>1 - 2</td>
<td>&lt; 1 s</td>
<td>a: 18  b: 10  c: 3.1  d: 13  e: 20.9  f: 6.3  g: 16.7</td>
<td>052/P</td>
<td>37.0</td>
<td>16.8</td>
</tr>
</tbody>
</table>
Pressure drop v.s. flow
Volume flow pressure difference characteristics in steady state with microfilter

MBC 1000

Flow (CFH) of natural gas; s.g. 0.65 at 60 °F

Based on 60 °F
14.65 psia, dry

Pressure drop v.s. flow
Volume flow pressure difference characteristics in steady state with microfilter

MBC 2500

Flow (CFH) of natural gas; s.g. 0.65 at 60 °F

Based on 60 °F
14.65 psia, dry
Pressure drop v.s. flow
Volume flow pressure difference characteristics in steady state with microfilter
MBC 4000

![Graph showing pressure drop vs. flow](image)

Based on 60 °F
14.65 psia, dry

\[ V_{\text{gas used}} = V_{\text{Natural gas}} \times f \]

\[ f = \sqrt{\frac{\text{Density of Natural gas}}{\text{Density of gas used}}} \]

<table>
<thead>
<tr>
<th>Type of gas</th>
<th>Density [kg/m³]</th>
<th>s.g.</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural gas</td>
<td>0.81</td>
<td>0.65</td>
<td>1.00</td>
</tr>
<tr>
<td>Butane</td>
<td>2.39</td>
<td>1.95</td>
<td>0.58</td>
</tr>
<tr>
<td>Propane</td>
<td>1.86</td>
<td>1.50</td>
<td>0.66</td>
</tr>
<tr>
<td>Air</td>
<td>1.24</td>
<td>1.00</td>
<td>0.80</td>
</tr>
</tbody>
</table>

We reserve the right to make any changes in the interest of technical progress.

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