MaestroGuard® – The Guardian of Measurement Integrity

MaestroGuard® MF-60-316L-100

Single Stage Membrane Protection Filter

Installation, Operation & Maintenance Manual



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1. Product Overview

The MF-60 MaestroGuard® Filter is a compact, State-of-the Art membrane protection filter designed for precision gas analysis systems.

The MF-60 is a **pure membrane protection filter separator**. It provides absolute droplet and particle protection and a self-cleaning bypass, resulting in exceptional purity, long service life, and minimal maintenance.

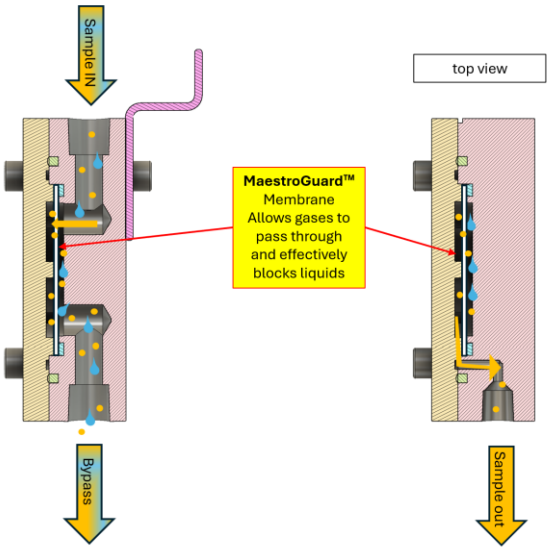
Key Features

- **Single MaestroGuard® Membrane System**
  One PTFE membrane assembly with < 0.1 µm retention (other pore sizes on request).
- **Absolute Liquid Stop Technology**
  Prevents passage of droplets, aerosols and fine particles.
- **Self-Stabilizing Membrane Behavior**
  Inherent self-cleaning behavior during operation.

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- **Robust 316L Stainless Steel Housing**
  Corrosion-resistant and suitable for ATEX environments.
- **Very Low Dead Volume**
  Optimized internal geometry for fast analyzer response time.
- **No Moving Parts**
  Passive design for maximum reliability.
- **Designed for Analyzer Protection**
  Ideal as final protection stage before sensitive analytical instruments.

Functional diagram illustrating the MF-series of MaestroGuard™ filters



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2. Technical Specifications

Model: MF-60-316L-50-x
Housing material: 316L stainless steel
Membrane: 1x MaestroGuard® 100% pure PTFE membrane system, available as Membrane V1 or Membrane V2
Pressure rating: up to 50 bar
Temperature range: –40 to +260 °C, depending on sealing material
Membrane and Flow Options

Membrane version	Nominal pore size	Typical air flow	Liquid stop performance	Recommended use
V1	< 0.1 µm	40 l/h air @ 100 mbar Δp	Excellent liquid stop performance	Standard version for maximum analyzer protection
V2	high-flow PTFE membrane version	100 l/h air @ 100 mbar Δp	Comparable liquid stop performance	Higher flow

Bypass flow: 0.2 – 2.0 l/min, application dependent
Connections: NPT Female or on request
Seal materials: FKM, FFKM or PTFE
Internal volume: < 2 ml in bypass, < 1 ml downstream of the membrane

Compliance / suitability:
CE conformity according to applicable EU requirements; passive non-electrical component with no own potential ignition source; suitable for integration in sampling systems used in explosive gas atmospheres when correctly installed and assessed as part of the complete sampling system. PED applicability depends on final configuration, pressure, volume and application category. Material compliance with ISO 11114-4 and ISO 15156 / NACE MR0175 available on request.

Material certificate:
EN 10204-3.1 material certificate available for pressure-retaining metallic parts.

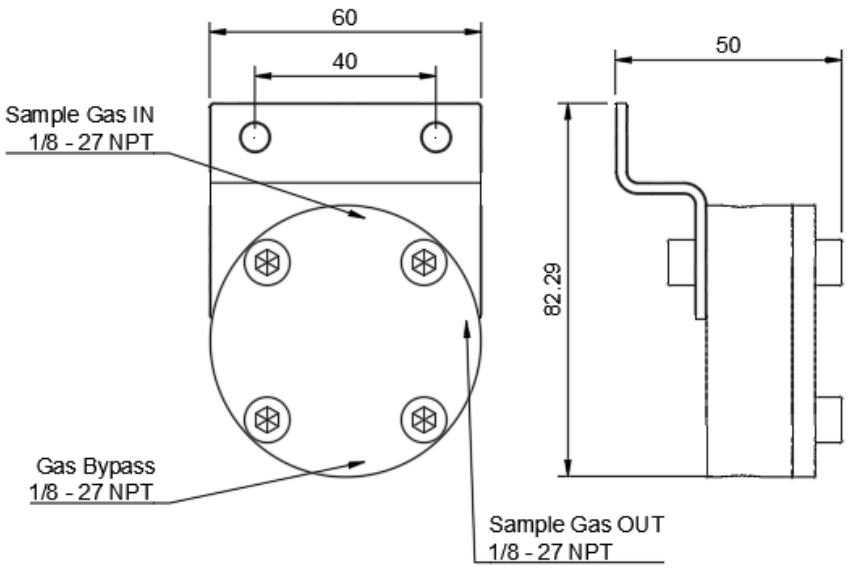
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3. Dimensions

- Diameter: 600, mm
- Height: 24 mm
- Effective membrane diameter: 28 mm
- Connection types: 1/8" NPT male / Sample OUT= 1/8 NPT male

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Mounting with optional stainless steel bracket:



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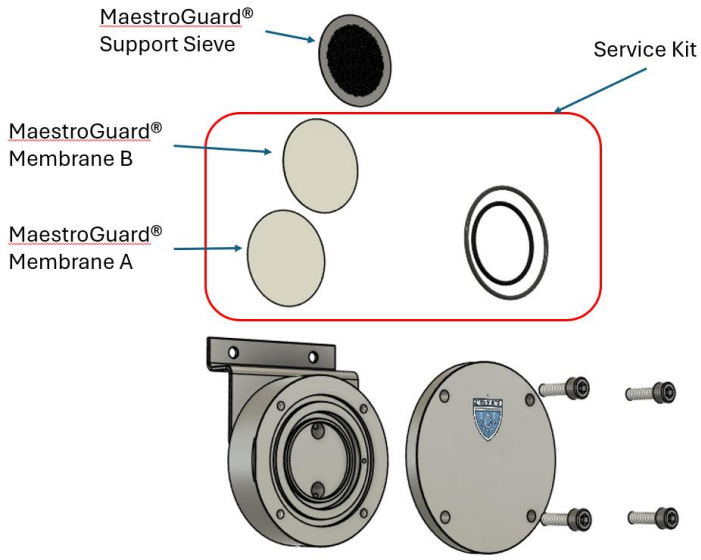
4. Application Areas

- **Gas Analysis Systems**
  Final protection of analyzers against droplets, particles and aerosols.
- **Hydrogen & Alternative Fuel Monitoring**
  Prevents water carry-over and protects H_2 analyzers.
- **Hydrocarbon Dew Point Systems**
  Prevents contamination of chilled mirror or sensor cells.
- **Moisture Analysis (including Trace Level)**
  Ensures droplet-free sampling without increasing lag time
- **Natural Gas & Refinery Applications**
  Protection against seal oil, MEG, condensates and fine solids
- **Process Gas Control**
  Ideal for wet, oily, or particle-rich process gases.

- **Pharmaceutical & Chemical Plants**
  Delivers dry, clean gas to analytical instruments.

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5. Installation Instructions



5.1 Preparation:

- Verify all parts are clean.
- Check that O-rings are undamaged
- Ensure membrane sealing surfaces are dust-free.

5.2 Assembly (refer to exploded drawing):

1. Prepare the **bottom housing part** (with optional wall bracket).
2. Insert new O-ring into groove.
3. Place MaestroGuard® membrane correctly oriented.
   Membrane A must always be placed on the upstream side (dirt side / gas inlet side).
   The side originally protected by the colored dust-free sheet must face toward the incoming contaminated gas stream.
4. Insert upper O-ring.
5. Close housing.

6. Close the housing using 4 M6x1 bolts – tighten in a cross pattern.

Note: Membrane A is positioned between a colored, dust-free protective sheet and Membrane B, and is packed together with its corresponding sealing components.

All surfaces in contact with the membrane must be clean and dust-free.

5.3 Tightening Torque

For **M6 DIN 912 screws**, the following tightening torque applies:

Recommended tightening torque: 10 – 11 Nm
Maximum permissible torque: 11 Nm

No additional lubrication is required when original screws are used.

⚠ **Do not exceed 11 Nm, as the internal thread in 1.4404 stainless steel is the limiting component and may be damaged by excessive preload.**

Tighten screws evenly in a cross pattern to ensure uniform gasket compression and proper housing sealing.

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6. Operation

- **Gas Inlet**: from the top.
- **Clean Gas Outlet**: from the side, left or right.
  - **Flow Rate:** 40l/h air @ 100mbar with standard 0,1µm membrane, 100l/h Air with optional 0,22 1µm membrane
- **Bypass Outlet**: from bottom — may drain or recirculate.
  - **Recommended Operation:** Bypass flow: 0,2 – 2.0 L/min (application dependent)
    Practical Selection Guide
- **Flow characteristic optimized for minimal analyzer lag time.**
- **Periodic inspection recommended for dirty or aggressive streams.**

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7. Maintenance

7.1 Safety-related Preventive Service Interval

The membrane replacement interval depends on the level of contamination and operating conditions.

For safety, reliability and warranty reasons, the MF-60 MaestroGuard® filter shall be included in the operator's preventive maintenance program.

A preventive inspection and service interval of **6 months** is recommended for standard analytical applications. This 6-month interval is provided as **safety-related service advice** to maintain the protective function of the filter and to reduce the risk of undetected liquid carry-over, contamination build-up, membrane blockage, seal degradation, analyzer drift, false readings or damage to downstream analytical equipment.

For applications involving corrosive, toxic, explosive, wet, oily or otherwise contaminated gases, shorter inspection and service intervals may be required depending on the actual process conditions and operating experience.

> ⚠ **Do Safety-related Service Advice**
> **The 6-month service interval is a preventive safety-related recommendation. It does not** replace the operator's own risk assessment, but it supports safe operation, reliable analyzer protection and documented maintenance practice.

7.2 Service Kit Contents

The service kit consists of **one set of O-rings** and **one MaestroGuard® membrane set (Membrane A and Membrane B).**

Membrane A is positioned **between a colored, dust-free protective sheet and Membrane B**, and is packed together with its corresponding sealing components.
The colored protective sheet prevents contamination and mechanical damage during handling and installation.

7.3 Membrane Replacement Procedure

1. Fully depressurize the system.
2. Remove the housing screws.
3. Carefully lift the cover.

4. Remove the used membranes.
5. Remove the used O-rings
6. Install the new O-rings from the official service kit
7. Install the new membranes from the official service kit.
   Ensure that Membrane A is installed on the upstream side (dirt side).
   Incorrect membrane orientation may reduce filtration efficiency and shorten service life.
8. Ensure all sealing surfaces are clean and undamaged.
9. Reassemble the housing and tighten screws to the specified torque.

Handling & Installation Instructions (Important)

- ⚠ Use tweezers when handling MaestroGuard® Membrane.
- ⚠ Avoid direct contact with the membrane surface at all times.
- ⚠ The membrane side originally facing the colored protective sheet must always be oriented toward the gas inlet side (upstream / dirt side).

Direct contact or incorrect orientation may contaminate or damage the membrane and negatively affect filtration performance.
Remove the colored protective sheet immediately before installation only.

7.4 Service Kits:

Kit Name	Contents
MK-MF-60-FKM-V1	1x MaestroGuard® membrane set, 2x FKM O-rings
MK-MF-60-FFKM-V1	1x MaestroGuard® membrane set, 2x FFKM O-rings
MK-MF-60-PTFE-V1	1x MaestroGuard® membrane set, 2x PTFE O-rings

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8. General Disclaimer and Limitation of Liability

The information contained in this manual is provided in good faith and is believed to be accurate at the time of publication.

Analytical Filters Engineering Kft. assumes no liability for damages, losses, failures, downtime, measurement errors, safety incidents or operational consequences resulting from improper installation, incorrect use, insufficient service or maintenance, unauthorized modification, use of non-original spare parts, incorrect membrane replacement, or operation outside the specified design limits.

The user remains solely responsible for verifying the suitability of the MaestroGuard® filter for the intended application, process conditions, gas composition, chemical compatibility and applicable safety requirements.

The user is also responsible for compliance with all applicable laws, safety regulations, installation standards, operating procedures and site-specific requirements.

Specifications, design details and product information may be changed without prior notice as part of continuous product improvement.

Warranty coverage is limited to the warranty and warranty conditions stated in this manual and/or agreed contractual terms. No additional warranty is expressed or implied beyond these stated warranty conditions and agreed contractual terms.

Only original MaestroGuard® service kits, replacement membranes, seals and approved replacement parts shall be used. The use of non-original or non-approved spare parts may result in unsafe operation and will void the warranty.

9. Warranty and Warranty Conditions

Analytical Filters Engineering Kft. provides a lifetime warranty for MaestroGuard® filter housings against defects in material and workmanship, provided that the filter is installed, operated, serviced and maintained in accordance with this operating manual.

The lifetime warranty is granted to the original purchaser only and is non-transferable. For purchases made through an authorized reseller or system integrator, the original end user who first places the filter into service shall be considered the original purchaser for warranty purposes.

For safety, reliability and warranty reasons, regular service and maintenance are mandatory. Unless otherwise defined by the operator's risk assessment or by more severe process conditions, the maximum recommended service interval for standard analytical applications is 6 months. The 6-month interval shall be understood as safety-related preventive service advice and shall be documented by the operator.
Service and maintenance shall be performed as described in this manual and must include inspection of the membrane, O-rings, seals, sealing surfaces and filter housing.

The lifetime warranty remains valid only if all service and maintenance procedures described in this manual are followed and if the maintenance work, including membrane replacement where required, is documented accordingly.

Membrane replacement must be carried out strictly in accordance with the membrane replacement procedure described in this manual. This includes the use of original MaestroGuard® replacement membranes and seals, correct handling of all sealing surfaces, correct tightening of the filter housing and proper leak testing before the filter is returned to service.

Failure to perform the required service and maintenance as described in this manual may result in unsafe operation and will void the lifetime warranty.

The lifetime warranty covers the filter housing and metallic pressure-retaining parts under normal operating conditions.

The lifetime warranty does not cover consumable or wear parts such as membranes, O-rings, seals, gaskets or filter elements. These parts must be inspected and replaced at suitable intervals, depending on the application, process conditions and contamination load.

The lifetime warranty does not apply in case of:

- transfer of ownership to another company, person or end user;
- incorrect installation or operation;
- missing, insufficient or undocumented service and maintenance;
- incorrect or undocumented membrane replacement;
- use outside the specified pressure, temperature or chemical compatibility limits;
- mechanical damage or improper handling;
- contamination, blockage or liquid overload caused by the process;
- use of non-original spare parts, replacement membranes, seals or maintenance kits;
- missing or insufficient maintenance documentation;
- unauthorized modification of the filter.

For applications involving corrosive, toxic, explosive or otherwise hazardous gases, the user is responsible for defining a suitable service and maintenance schedule based on the actual process conditions and applicable safety requirements.

Lifetime warranty coverage is granted only when the filter is serviced and maintained using original MaestroGuard® maintenance kits and when all service and maintenance activities described in this manual, including membrane replacement, are documented.

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10. Safety & Compliance

- **ATEX Compliant** – no ignition source

- **PED Certified** – Pressure Equipment Directive
- **ISO 15156 / NACE MR0175** – H_2S service compliant
- **Material Certificate EN 10204-3.1** available

Always purge with clean gas before first use.

Follow the safety-related preventive service recommendation of 6 months, or shorter intervals where required by process conditions, contamination load or site-specific risk assessment.

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11. Ordering Information

Part Number	Description
MF-60-316L-50-FKM-V1	Filter with FKM seals, 50 bar
MF-60-316L-50-FFKM-V1	Filter with FFKM seals, 50 bar
MF-60-316L-50-PTFE-V1	Filter with PTFE seals, 50 bar
MB-MF/MCF-50	Stainless steel mounting bracket
SS-MF/MCF-50	Stainless steel membrane support screen
LP-MG-01	Tag Plate Holder, (max 2 pro mounting bracket possible)

Surface treatment options available on request:
• MaestroInert 2010 – corrosion resistant metallic inert protection
• MaestroInert 2020 – hydrophobic low adsorption treatment for fast moisture response
• MaestroInert 2030 – ultra-inert surface for trace analytical applications

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12. Contact & Support

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