

Users Guide

Maniflow Mass Flow Meters / Controllers for gases (+/- 15 Vdc supply)

GENERAL DESCRIPTION

The Maniflow flow meter for gases is an economical device for measuring flows virtually independent of pressure and temperature changes. The instrument can also be provided with a modular control valve and an integral control circuit, to measure and control gas flows from: lowest range 0.1...5 ml_n*/min. up to highest range 20...1000 l_n/min.

* n means normal conditions.

At normal conditions volumes are converted to a temperature of 0°C and pressure of 1 atm. or 1013,25 mbar.

PRINCIPLE OF OPERATION

The flowsensor is operating on a principle of heat transfer by sensing the delta-T along a heated section of a capillary tube. The delta-T is directly proportional to the gas mass flow. The heat transfer function between gas mass flow and temperature difference can be described by the equation:

$$\Delta T = K \cdot C_p \cdot \Phi_m$$

- delta-T = temperature difference
- C_p = specific heat
- K = constant factor
- Φ_m = mass flow

The temperature sensors are part of a bridge circuit and the unbalance is amplified to the right signal level. The control valve is a normally closed solenoid valve. The plunger is lifted by the magnetic field of the coil.

SPECIFICATIONS

For general specifications see Maniflow brochure. Instruments are calibrated to operate within the specified accuracy limits. Customer specific information can be found on the ordering form, and on the instrument label.

INSTALLATION

Carefully check the packing box for damage. In case of damage the local carrier and the supplier must be notified at once. When returning material always describe the problem in a covering letter.

It is absolutely required that contaminated instruments are dispatched with a completely filled in "declaration on contamination" form.

Clearly note on top of the package, the customer clearance number of Bronkhorst High-Tech B.V., namely NL801989978B01

To avoid personal injury and/or damage to the equipment, only trained and qualified personnel should perform service.

Be sure that piping is absolutely clean, although it is recommended to install an inlet filter, and if backflow can occur, also an outlet filter.

Do not install small diameter piping on high flowrates, and abrupt angles and other disturbances direct on the inlet of the instrument. At least 10 pipe diameters distance are recommended.

If explosive and/or corrosive fluids are to be used, purge the system with a dry, inert gas, for at least 30 minutes. This is also required to remove these fluids from the system.

All instruments carry the CE-mark. Therefore they have to comply with the EMC requirements as are valid for these instruments. However compliance with the EMC requirements

is not possible without the use of proper cables and connector / gland assemblies.

When connecting the instrument to other devices (e.g. power supply), be sure that the integrity of the shielding is not affected. Do not use unshielded wire terminals. Bronkhorst High-Tech B.V. recommends to use their standard cables, in order to comply with CE-requirements.

Be sure that elastomeric seals are compatible with the fluids used in the system.

OPERATION

After switching on power, allow for at least 30 minutes to warm-up and stabilize. This may be done with or without gas flow.

Be sure that the specified pressure(s) has/have been applied. Pressure surges, as may occur during system pressurisation must be avoided. When starting up, always bring the instrument gradually up to the level of operating conditions. The control valve is not designed for positive shut-off.

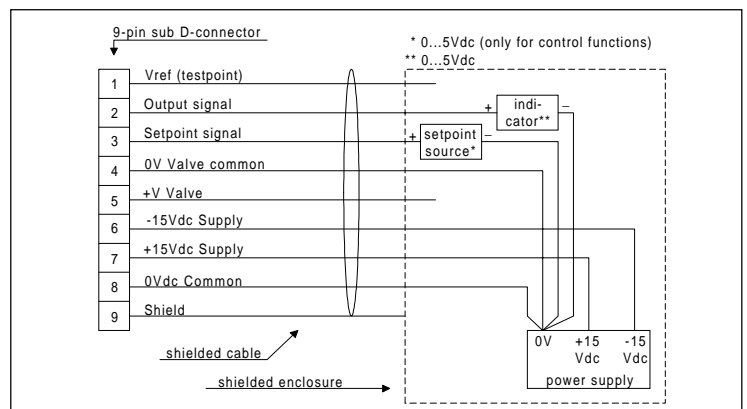
MAINTENANCE

No routine maintenance is required to be performed on the instruments. Inlet filters should periodically be cleaned ultrasonically.

TROUBLESHOOTING

- | | |
|---|---|
| <p>Problem:</p> <ul style="list-style-type: none"> - No output signal or control | <p>Check:</p> <ul style="list-style-type: none"> - power supply - cable - pressure - for stoppage in line |
| <p>Oscillation during control</p> | <p>- pressure</p> |
| <p>Small / high flow at zero setpoint</p> | <p>- for valve leak</p> |

HOOK-UP DIAGRAM



DIMENSIONAL DRAWING

See attached drawing