

BetaGauge 321MFM Kit

0.025% Accuracy Class
Measurement Calibrator

General Description

The BetaGauge 321MFM Kit is a special purpose, high accuracy pressure calibrator with features intended to facilitate calibration of **flow computers**.

With **two internal pressure ranges** and an available adapter for external BetaPort-P pressure modules, the possibilities are extensive.

In addition, the 321MFM Kit includes a **precision RTD probe** for the temperature factor calibration required for electronic flow meters (EFMs).

Differential Pressure Calibration

The first step in calibrating a mass flow meter is to calibrate the **volumetric flow measurement**, which is based on the principle of differential pressure flow measurement.

This differential pressure is a very low measurement of less than 400" of water column (WC).

In order to meet **API 21.1 standard requirements**, the 321MFM is offered in many ranges to suit the **exact range of the differential measurement** in the flow meter.

The available ranges are: 10"WC, 30" WC, 100"WC, 150"WC, 200" WC, 250" WC, 300"WC, 400"WC and 1000"WC.

Static Pressure Calibration

To convert the volumetric flow measurement from the differential signal to a mass flow, **two compensation factors** are applied. One of these is the static or line pressure. In general, a higher pressure for a given volume of gas results in a higher mass of gas.

The BetaGauge 321MFM offers a second pressure sensor, which can be selected to closely match the static conditions of any application.

Static measurement ranges are 30 PSI, 100 PSI, 300 PSI, 500 PSI, 1000 PSI, 1500 PSI and 3000 PSI.



Temperature Compensation Calibration

The **final active compensation factor** in mass flow calculations is the temperature of the gas in the line.

Mass flow meters usually have an RTD **temperature measurement** circuit for this purpose. Calibration is required at the normal operating temperature.

The BetaGauge 321MFM Kit uses a 4 wire **Class "A" RTD probe** connected to its **high accuracy, high resolution measurement circuit**. The probe is inserted in a well adjacent to the mass flow computer's well so a comparative **measurement and calibration** can be made.

Major Features

- Two high performance silicon pressure sensors
- Temperature compensation to ensure field use accuracy
- External pressure module connection supports all BetaPort-P pressure modules (29 ranges)
- Pt100 RTD input for temperature measurement
- Internal 24 V DC loop power supply
- Measure 24 mA or 30 V DC
- Large, backlit, configurable display
- Switch test on Pressure (internal or external)
- Five (5) frequently used setups and be stored and recalled
- % error and damping functions
- RS-232 port for remote operation
- Compact handheld design
- Powered by 4 AA Alkaline batteries



BetaGauge 321MFM Measurement Calibrator Kit

Available Ranges and Engineering Units

Differential Pressure Ranges ("WC):

10, 30, 100, 150, 200, 250, 300 & 400.

Static Pressure Ranges (PSI):

30, 100, 300, 500, 1000, 1500, 3000, 5000 and 10000.

Engineering Units

Pressure may be displayed in the user's choice of engineering units, which include PSI, Bar, mBar, kPa, MPa, kg/cm², cm H₂O @ 4°C, cm H₂O @ 20°C, cm H₂O @ 60°F, m H₂O @ 4°C, m H₂O @ 20°C, m H₂O @ 60°F, in H₂O @ 4°C, in H₂O @ 20°C, in H₂O @ 60°F, ft H₂O @ 4°C, ft H₂O @ 20°C, ft H₂O @ 60°F, mm Hg, in Hg.

Performance

Pressure Accuracy

Differential Ranges:

10"WC	±0.1% of full scale
30"WC	±0.05% of full scale
100, 150, 200	±0.025% of full scale
250, 300 & 400"WC	

Static Ranges

30 to 3000 PSI	±0.025% of full scale
5000 & 10000 PSI	±0.035% of full scale

Temperature (RTD)

Range: -40°F to 220°F (-40°C to 105°C)

Resolution: 0.001° (F or C)

Accuracy

±0.1°C at 0°C for Pt100 or
±0.015% of rdg ±0.02 Ohms

DC Measurement Accuracy

mA: ±0.015% of rdg ± 0.002 mA
Volts: ±0.015% of rdg ±0.002 V

Temperature Effect

No effect on accuracy for all functions from
15° to 35°C

Add ±0.002% FS/°C for temperatures outside
this range

General Specifications

Environmental

Operating Temperature	-10° to +50°C
Storage Temperature	-20° to +60°C

Power

Battery Four (4) AA Alkaline cells
Battery Life >35 hours continuous typical
usage

Physical

Dimensions

8.3" H x 3.9" W x 1.8"D
21 cm H x 10 cm W x 4.6 cm D

Weight

1 lb., 4 oz. (0.57 kg)

Connectors/Ports

Pressure, (2) 1/8" FNPT, BetaPort-P pressure
module, RTD (4 wire), std. banana jacks for
mA and V.

Included Accessories

Hard side carrying case,
Pt100 Class "A" RTD probe
Batteries
User Reference Manual
NIST traceable calibration certificate
Test leads

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