



## DESCRIPTION

The MFM-100 Magnetic Flux Measuring System is designed to monitor the magnetic field density and detect imbalances that contribute to machine vibration, overheating, and excessive stress on rotor and stator structures and components. It is composed of a MFP-100 Probe installed on the stator wall and a MFC-100 Signal Conditioner installed outside the generator. When combined with air gap, the probe is installed on the stator wall next the air gap sensor.

The MFC-100 offers two types of outputs: absolute maximum flux density per pole (which provides the maximum value for each rotor pole), and raw flux density which traces the flux density profile of each pole. For effective diagnostics, MFM results are correlated with air gap measurements using the ZOOM<sup>®</sup> system to determine if the imbalance is caused by an electrical fault or induced by an uneven air gap.

## MFM-100

### MAGNETIC FLUX MEASURING SYSTEM

## APPLICATIONS

- On-line magnetic flux measurements in most:
  - hydrogenerators
  - turbogenerators
  - synchronous condensers
  - large motors
- Installed as stand-alone or in combination with AGMS<sup>®</sup> for effective diagnostic of generator magnetic field

## FEATURES

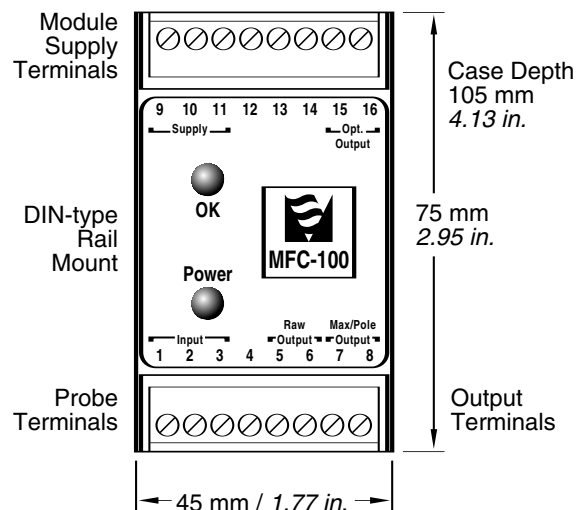
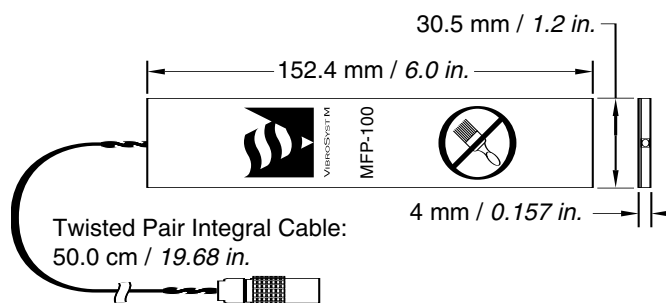
### MFP-100 Probe

- Up to 1.5 Tesla at 50/60 Hz
- Immune to deposits of carbon dust and oil, vibration and temperature variation
- Easy to install on stator wall without removing the rotor or poles
- Special model, safe for hydrogen-cooled environment, available on request

### MFC-100 Signal Conditioner

- Conditioned outputs available:
  - absolute maximum flux density (4-20 mA) of each pole
  - raw flux density ( $\pm 5$  V)
- Output available to ZOOM<sup>®</sup> or any other acquisition apparatus
- DIN rail-mount conditioner in wall-mounted enclosure

## DIMENSIONS





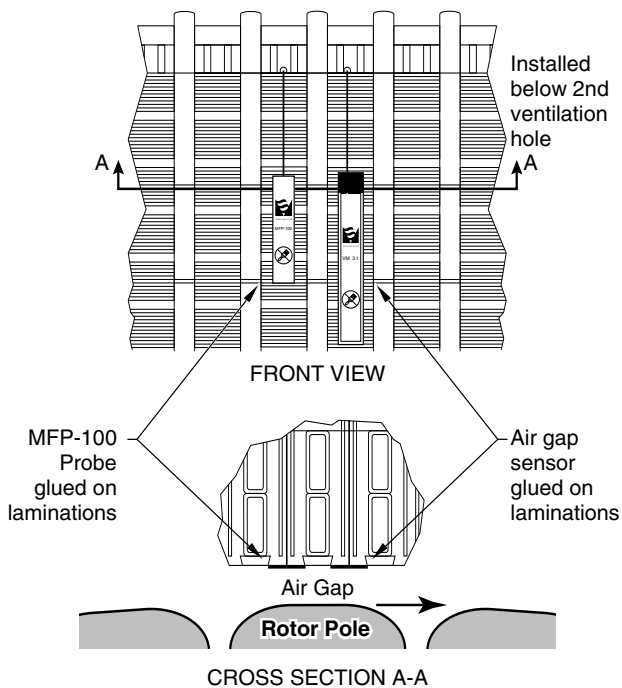
## MFP-100 DESCRIPTION

The MFP-100 Probe dynamically senses the magnetic flux density emitted from each rotor pole. It is a non-contact passive device highly immune to the harsh environment found in the generator air gap (deposits of carbon dust, dirt and oil, EMI-RFI, vibration). A special model for hydrogen environment is available upon request.

The MFP-100 is glued onto the lamination stack of the stator wall. When combined with air gap, the rotational direction (clockwise or counter-clockwise) of the machine in generation mode is important. The poles must cross the MFP-100 immediately before the air gap sensor. Therefore, the MFP-100 probe is installed on the stack beside the air gap sensor or one slot apart (i.e. to the left if clockwise; to the right if counter-clockwise).

A twin-axial extension cable connects the probe to the MFC-100 Signal Conditioner. Two lengths are available: 10 m (32.8 ft) standard and 20 m (65.6 ft) optional.

## MFP-100 INSTALLATION





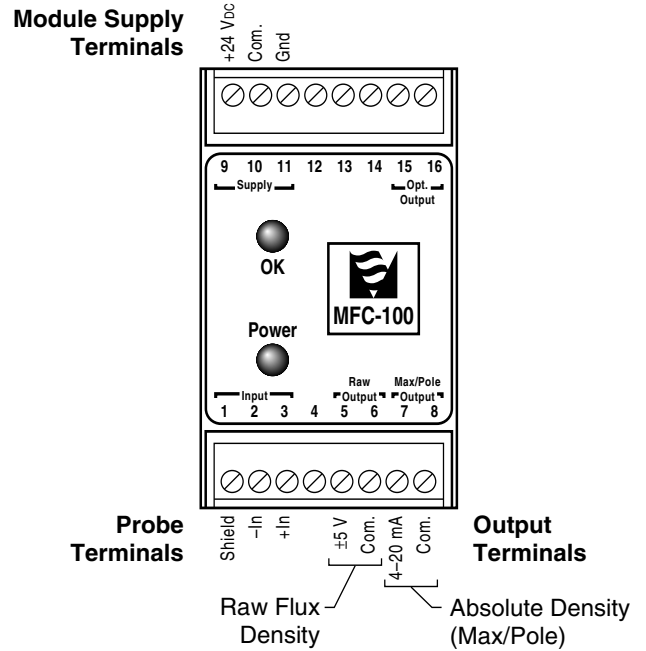
## MFC-100 DESCRIPTION

The MFC-100 Signal Conditioner conditions the probe signal and offers two outputs: raw flux density ( $\pm 5$  V) and absolute flux density (4–20 mA). Raw flux density is the dynamic flux density profile of the poles. Absolute flux density is the maximum flux density value of each rotor pole with rectified negative values. These outputs can be connected to the ZOOM system or any other acquisition devices.

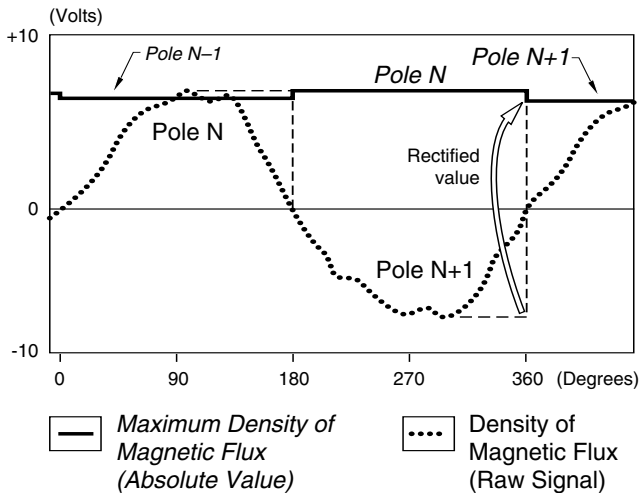
Magnetic flux density is closely related to the air gap characteristics of each rotor pole. Comparing flux density with air gap helps determine whether a field variation is mechanically induced by a gap variation or caused by an electrical fault. Correlation of synchronized measurements is done using the ZOOM system. The MFC-100 comes in a DIN-type rail mount casing and requires an external +24 Vdc supply. It is normally supplied in its own wall-mounted enclosure complete with power supply and terminal blocks, or can be installed in any existing enclosure.

The standard 10 m twin-axial extension cable can be replaced by a 20 m (65.6 ft) cable for connection to a remote enclosure installed outside the machine.

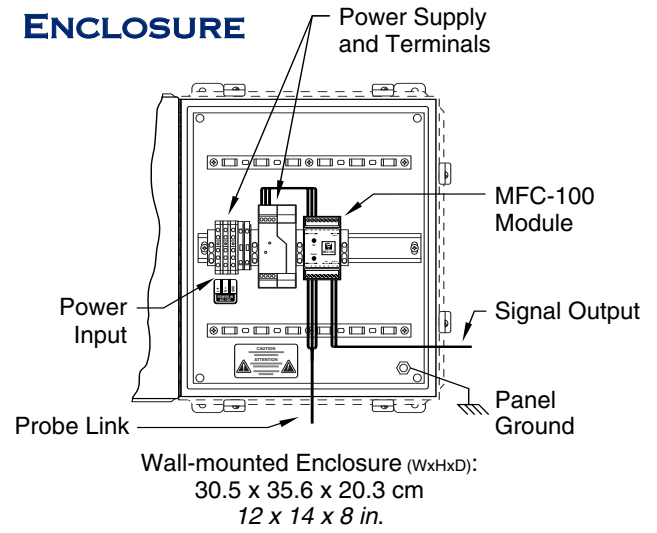
## MFC-100 MODULE



## OUTPUTS



## ENCLOSURE





## MFP-100 GENERAL SPECIFICATIONS

### Input

- Magnetic Field Density Up to 1.5 Tesla at 50 to 60 Hz
- Interchangeability Better than 1% FSR

### Cable

- Integral Length 50 cm (19.7 in.)
- Connector Female
- Extension Length 10 m standard (32.8 ft)  
20 m (65.6 ft) optional
- Connector Male on sensor end  
Skinned wires fitted with pins on conditioner end
- Temperature 0° to 200° C (32° to 392° F)

### Environmental

- Operating temperature 0° to 125° C (32° to 257° F)

### Dimension

- Height 152.4 mm (6.0 in.)
- Width 30.5 mm (1.2 in.)
- Thickness 4.0 mm (0.157 in.)

## MFC-100 GENERAL SPECIFICATIONS

### Signal Conditioning

- Input MFP-100
- Outputs
  - Raw flux density  $\pm 5$  V
  - Absolute flux density 4–20 mA, maximum per pole
- Connectors Screw terminals
- Accuracy  $\pm 1\%$  FSR
- Linearity  $\pm 0.5\%$  FSR
- Repeatability  $\pm 0.05\%$  FSR
- Detection Thresholds min. 30 mTesla, max. 1.5 Tesla
- Temperature Drift <500 ppm/°C

### Power Requirement

- Supply to module +24 VDC  $\pm 10\%$
- Power Consumption 2.4 W

### Environmental

- Operating Temperature 0° to 55° C (32° to 131° F)
- Storage Temperature -25° to 85° C (-13° to 185° F)

### Physical Characteristic

Module DIN-type rail mount  
Krlen case

- Height 75 mm (2.95 in.)
- Width 45 mm (1.77 in.)
- Depth 105 mm (4.13 in.)
- Weight 0.19 kg (0.4 lb)

### Enclosure (optional)

- Type EEMAC/NEMA4 and 4X
- Power Supply Included 85–264 VAC, 45–65 Hz  
90–350 VDC
- Height 35.6 cm (14 in.)
- Width 30.5 cm (12 in.)
- Depth 20.3 cm (8 in.)

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