MFT

User manual

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MFT_User_Manual

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1 Table of Contents

2 PREFACE

2.1 About this manual

This manual provided detailed information about MFT installation and general use of the systems using MC monitoring's matching accessories and software.

2.2 Who should use this manual?

The manual is intended for use by qualified installation personnel (e.g. mechanical and electrical fitters).

NOTE:
Any person involved in the installation of MC-monitoring equipment is assumed to have the necessary technical training in electronics and/or mechanical engineering (professional certificate/diploma, or equivalent) to enable the person to install the equipment in a safe and correct manner.

2.3 Respect the instructions!

The procedures described in this manual should be strictly applied to ensure the MFT and associated hardware are mounted correctly, and thus function as intended. The user should respect general safety procedures as well as general and specific machine constructor guidelines and instructions.

2.4 Limitation of this document

Not all mounting and connecting possibilities are described in this manual. Nevertheless, several specific configurations are described in detail. These can often be adapted for your own specific application. When in doubt, contact MC-monitoring so that an optimum measurement solution can be found.

2.5 Related documentation

Further information on products can be found in their corresponding data sheets. These documents can be obtained from your local MC-monitoring agent or directly downloaded through our website download page: http://www.mc-monitoring.com/download.html

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Documents	Description
MFT Datasheet	MFT technical datasheet
MFT Quick Guide	MFT quick installation guide

3 SAFETY

The following symbols are used in this manual where appropriate:

The WARNING safety symbol
THIS INTRODUCES DIRECTIVES, PROCEDURES OR PRECAUTIONARY MEASURES WHICH MUST BE EXECUTED OR FOLLOWED. FAILURE TO OBEY A WARNING CAN RESULT IN INJURY TO THE OPERATOR OR THIRD PARTIES.

The CAUTION safety symbol
This draws the operator's attention to information, directives or procedures which must be executed or followed. Failure to obey a caution can result in damage to equipment.

The ELECTROSTATIC SENSITIVE DEVICE symbol

This indicates that the device or system being handled can be damaged by electrostatic discharges.
Refer to Handling Precautions for Electrostatic Sensitive Devices.

3.1 Handling Precautions for Electrostatic Sensitive Devices

Certain devices used in electronic equipment can be damaged by electrostatic discharges resulting from built-up static electricity. Because of this, special precautions must be taken to minimize or eliminate the possibility of these electrostatic discharges occurring.

Read the following recommendations carefully before handling electronic circuits, printed circuit boards or modules containing electronic components.

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- Before handling electronic circuits, discharge the static electricity from your body by touching and momentarily holding a grounded metal object (e.g. a pipe or cabinet).
- Avoid the build-up of static electricity on your body by not wearing synthetic clothing material, as these tend to generate and store static electric charges. Cotton or cotton blend materials are preferred because they do not store static electric charges.
- Do not handle electronic circuits unless it is absolutely necessary. Only hold modules by their front panel handles.
- Do not touch printed circuit boards, their connectors or their components with conductive devices or with your hands.
- Put the electronic circuit, printed circuit board or module containing electronic components into an antistatic protective bag immediately after removing it from the system rack.

4 Introduction

This manual provides the technical information and mounting instructions for the MFT-100 *Magnetic Field Transducer* composed by one probe and one conditioning unit. This high precision system uses a hall measuring technique to measure magnetic field in severe electrical and electromagnetic environments like air gap in large generators and electrical motors. Non-contact measurement ensures an unlimited sensor lifetime without wear. For permanent monitoring application, the sensor is glued on the stator wall laminations e.g. on a stator tooth. For temporary testing, the sensor is slide in a special mounting device in epoxy material permanently glued on the laminations. The sensor is secured in place by means of adhesive/sealant and can be removed after the test. Please pay very close attention to the installation instructions provided in this manual before assembling the measuring chain. The accuracy and reliability of your measurements depends on it.

5 System overview

As shown on the drawing below, the MFT-100 system is composed by one sensor (MFS-100) and one conditioner (MFC-100). The MFS-100 has a built-in 10m shielded cable terminated by a grounding lug and a field-proof connector making the system disconnectable and interchangeable. The grounding lug is destined to be connected to a direct ground connection. It is recommended to connect it to the MFC-100 Conditioner box fixing screw.

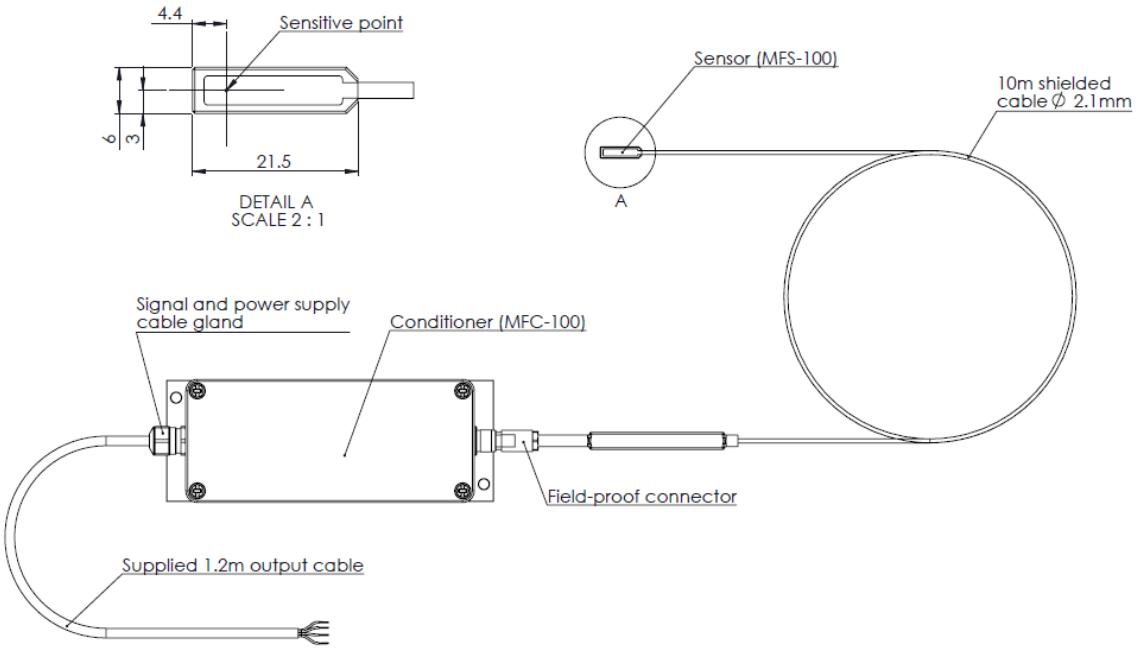


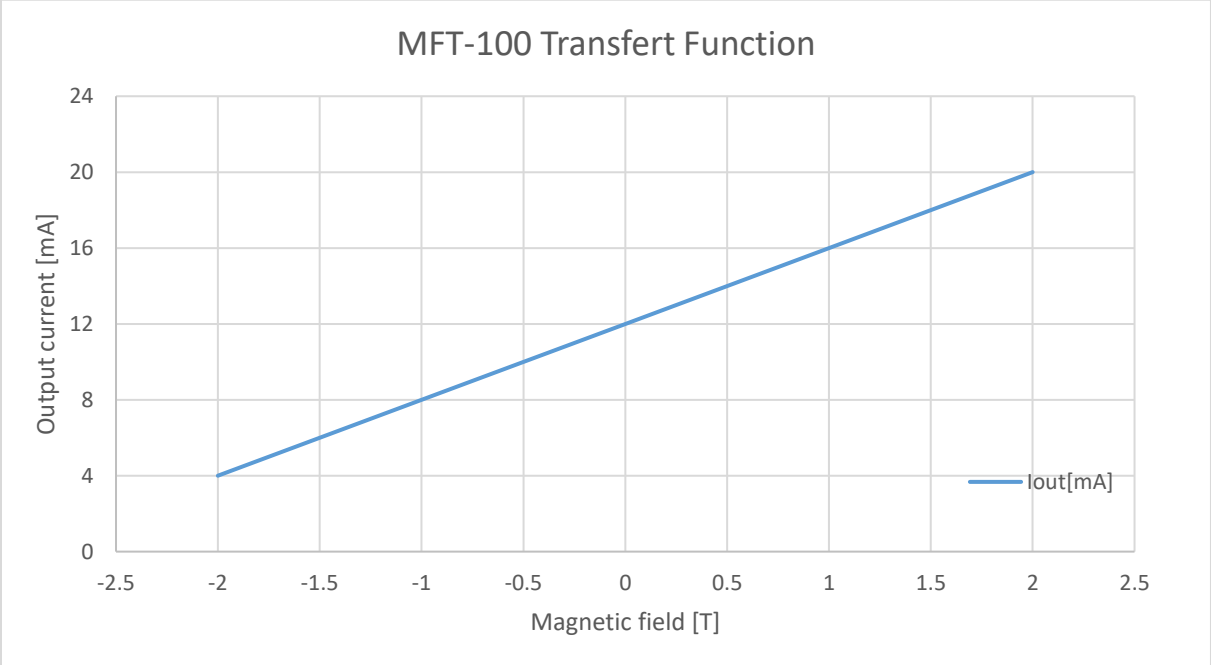
Figure 1 MFT-100 system overview

5.1 Operating Principle

The flat design of the sensor and the usage of insulated material for the manufacturing of the sensor allow its installation in the air gap of any alternator or electrical motor. The magnetic probe contains a high quality and high accuracy hall element connected via 10 meters shielded cable to the MFC-100 signal conditioner incorporating current sources, error correction circuits and output amplifiers. When mounted on the stator wall laminations, the probe is facing the rotor poles and senses the magnetic field perpendicular to the its visible face, this is the Y direction. The output signal is positive for a magnetic field vector parallel to the Y direction from pole to stator. After signal processing, the conditioner provides an output current exactly proportional to the measured magnetic field in a single axis Y.

5.2 Transfer function

The measuring range of the MFT-100 is +/- 2 Tesla and its current output range is 4…20mA, therefore the transfer function is given as follows.



5.3 Sensors polarity

The output of the MFT-100 will increase for a magnetic field crossing the sensor from back side to the front side as shown in the picture below.

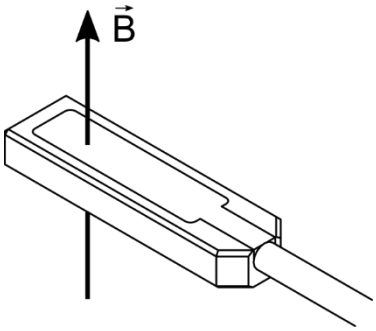


Figure 2 Sensor polarity identification

5.4 Sensor failure detection

The MFT-100 system is equipped with a detection of sensor failure. If the sensor is missing or broken, then the signal output of the system falls to 2mA +/- 1% so it can be easily detected by the monitoring system. The signal retrieves its nominal range of 4…20mA as soon as the sensor is working properly.

6 Sensor details

6.1 MFS-100 drawing

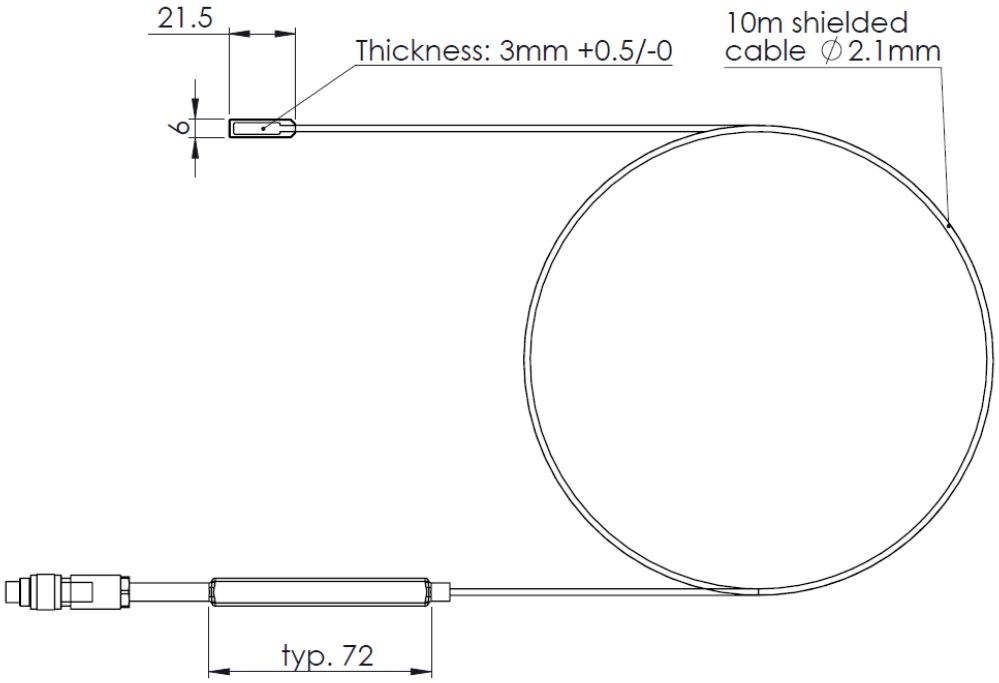


Figure 3 MFS-100 Drawing

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6.2 MFS-100 with optional protective shoe drawing

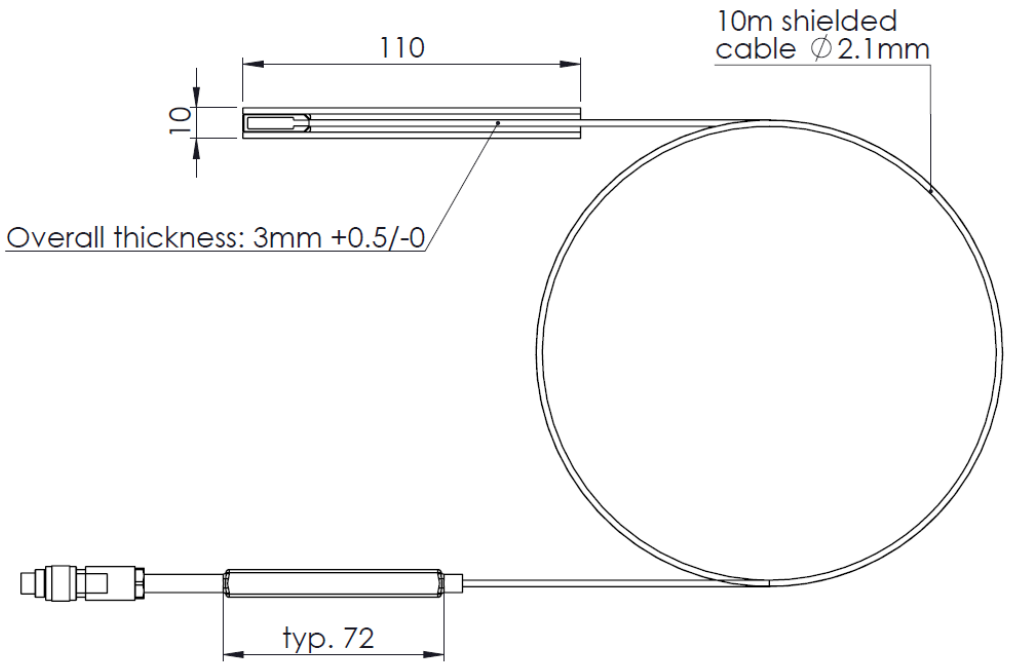

Figure 4 MFS-100 with optional protective shoe drawing

7 MFT-100 Installation

7.1 Sensor Installation

7.1.1 Preliminary considerations

The magnetic probe is generally glued against stator core laminations inside the air gap beneath a ventilation hole but sufficiently down the air gap in order that the probe surface is always totally covered by the pole shoe. Before installation of the probe, the stator surface shall be well prepared. A step by step instruction is provided in the following sections. Beforehand, make certain that all precautions have been taken to keep object falling or resting into the air gap. Furthermore, make sure the sensor is handled with care and always pay attention to the following guidelines:

- Never pull the cable
- Never apply paint or any varnish on the sensor front surface.

The following equipment is necessary to proceed to the installation:

- Acetone to remove grease
- Disposable rags
- Fine sandpaper (with no metallic particles)
- A probe installation kit with glue and silicone rubber
- Adhesive band for temporary fixation

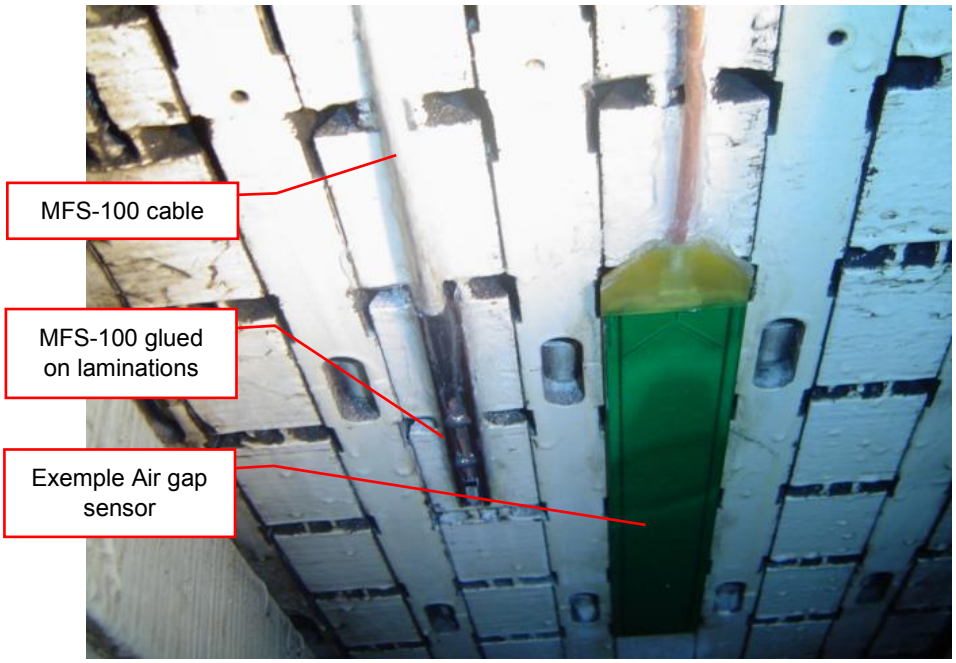

Figure 5 MFT-100 installation example

7.1.2 Identify the side of the probe to be glued

The probe is designed with only one side to be glued against to machine stator, the back side. The opposite side, (the front side) is not appropriated for gluing because it contains potting compound. Each side can be visually identified according to the drawing below:

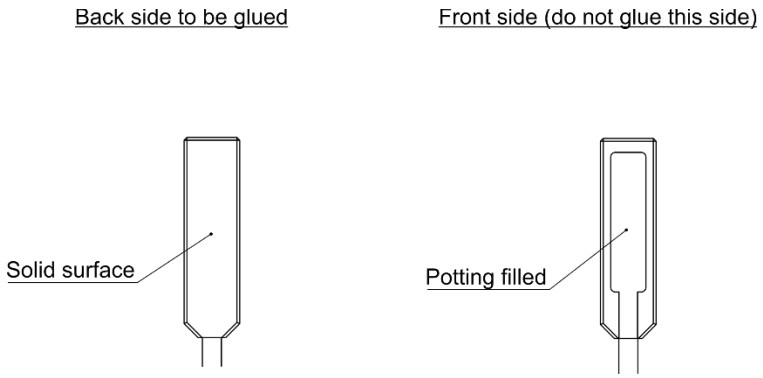

Figure 6 Gluing side identification

Note that in case where the optional protective shoe is present, the visual identification of sides follows the same criteria.

7.1.3 Preparation of the probe gluing surface onto the stator

It is imperative that the stator surface be thoroughly cleaned before the probe can be glued onto it. This step must not be neglected because probe adherence depends on it.

Please follow the instructions below to adequately prepare the stator surface.

- Determine the ideal location of gluing the probe
- Run a clean rag moistened with acetone on the probe gluing location on stator surface to remove oil and carbon deposits.
- Use paint thinner to remove paint if any.
- With the fine sandpaper, polish the surface straight along the laminations to remove paint asperities. Do not scratch and destroy the lamination insulation layer. Make sure to only use sandpaper with non-metallic particles.
- Once again, clean the probe gluing surface with clean rag moistened with acetone.
- Make sure that the gluing surface is flat, uniform and do not present protruding laminations. The probe shall only be glued on a flat surface to get full adherence.

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The probe must be aligned with the plane area of the rotor pole. It is therefore recommended that the sensor be installed **as deep as possible in the air gap just to be fully covered by the pole shoe but not more than 20 to 30cm from the beginning of lamination.**

Gluing surface and probe preparation shall be completed before the probe can be glued because the glue bonds quickly (approx. 2 minutes). Always follow glue manufacturer instructions.

- **Insert the cable through the endwindings inside a flexible or rigid polyethylene PVC tube like those used for electrical installation (min. diameter 12mm).**
- Clean the back of the sensor with a rag moistened with acetone.
- Apply glue on both edges of the clean back surface of the probe. Spread glue on the entire back surface of the probe to get a thin and uniform layer which will not run down when the probe is pressed against the stator surface.
- With the brush applies the catalyst on the stator laminations where the probe is to be glued. Now hurry up because the catalysator might penetrate and dry on the surface.
- Position the probe on the gluing surface of the stator and firmly hold in place the probe against the stator.
- Press probe evenly and maintain it in position for two minutes. Place a scotch band on it to keep it in place during the drying period of the glue.

After one hour, the probe cable can be installed on the stator with the Silicon RTV adhesive up to the PVC conduit through the endwindings. Add RTV on the peripheral of the probe to reinforce the fixation.

7.1.4 Sensor Cable Installation

The sensor cable is the link between the sensor and the signal conditioner. The cable shall be routed through the endwindings inside a protective tube to guarantee electrical isolation and mechanical protection. It is recommended to use the protective tube available as accessory (see section 8).

CAUTION: Insert the protective tube on the cable before installation of the probe. Route the cable on the wall of the stator.

Using instant glue or adhesive tape or cable tie stick the cable to the stator iron from place to place so that it holds firmly without protruding into the air gap. **Then apply silicon RTV ADHESIVE along the cable in the air gap up to the point of exit.**

WARNING:

Never attach the sensor cable directly to the stator bars. The bar voltage ranges from kV to tens of kV depending on the machine and can create an electric arc to the sensor shielded cable.

To ensure a mechanical protection and a good fixation of cable on its entire length, it is recommended to route the cable inside a PVC conduit up to the signal conditioner.

7.2 Conditioner Installation

The signal conditioner electronics is enclosed into an IP 66 industrial box. The fixing of the enclosure on a chassis is performed by means of two M5 screws. Opening of the enclosure cover is not required to install the box.

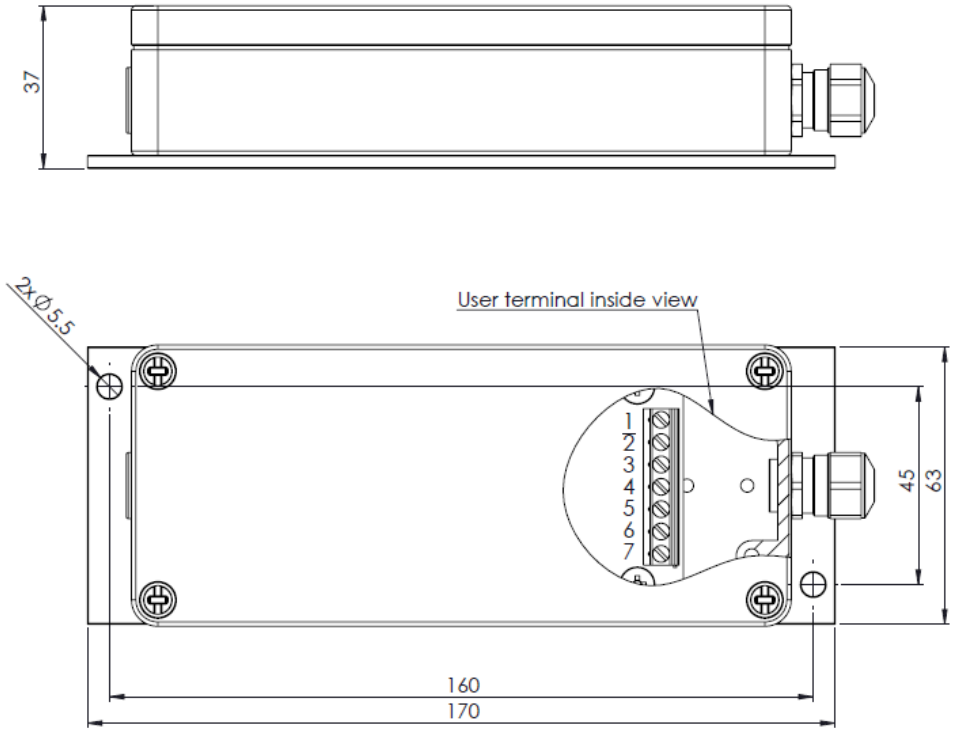

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Figure 7 MFC-100 Detailed view

WARNING:

Never let the signal conditioner without cover to avoid metallic particles or others entering and depositing on the electronic circuitry.

7.3 Electrical wiring

The MFT-100 system is supplied with a 4x0.14mm^2 shielded 1.2m output cable pre-wired to the user terminal according to the table below:

Terminal number	Wire color	Description
1	Brown	+24V power supply
2	White	0V power supply
3	-	0V (internally connected)
4	-	n.c.[1]
5	-	n.c.
6	Green	Iout+, Isolated 4-20mA output +
7	Yellow	Iout-, Isolated 4-20mA output -
-	Clear	Output cable shield (internally connected to the housing and 0V power supply)

[1] Not connected, reserved for future use

8 Ordering code and accessories

Part type	MFT-100
Ordering code	03.100.000
Description	Magnetic Field Transmitter, including sensor MFS-100 and conditioner MFC-100

Part type	MFS-100
Ordering code	03.100.100
Description	Magnetic Field Sensor with 10m shielded cable. Factory calibrated.

Part type	MFC-100
Ordering code	03.100.200
Description	Magnetic Field Conditioner with 4-20mA output corresponding to -2 Tesla to +2 Tesla

Part type	Installation protective tube
Ordering code	03.100.900
Description	Protective tube for MFS-100 installation ID=5.6mm, OD=10mm, material PA-6, Temperature range -40°C to +120°C. Made of two parts for easy in-line assembly. Total length 10m, shall be adjusted by the user.

Part type	Protective shoe for MFS-100
Ordering code	03.100.901
Description	Isolating and protective shoe for MFS-100 sensor, temperature range -40°C to +120°C, external dimensions 110x6x3mm. Factory installed and sealed to the MFS-100 when ordered.

Part type	Installation kit
Ordering code	INST-KIT-AG
Description	Installation kit made of one two-components LOCTITE 330 adhesive and two adhesive sealant DOW CORNING 3145 RTV clear.

9 Revision history

Date	Description	Author	Approved
30.04.2017	Original issue	JPa	SAd
21.02.2018	New revision system	DCl	SAd
18.06.2018	Add important notice, preface and safety instructions	DCl	SKu
11.11.2020	Add sensor polarity and gluing identification	JPa	SKu
29.04.2021	Update sensor thickness with tolerances	JPa	SKu
12.07.2023	Update cable shield information §7.3	JPa	SKu

10 MC-monitoring logos caption

Applications:

Hydrogenerators	Gearless millsdrives	Turbogenerators
Windturbines	Pumps, fans, cooling tower, …	Gas and steam turbines

Monitoring solutions:

Airgap monitoring	Runner clearance monitoring	Endwinding monitoring	Roller bearing monitoring
Shaft & bearing vibration	Axial thrust position monitoring	Magnetic flux monitoring	Partial discharge monitoring

Sensors:

Fiberoptic sensors	Airgap transducers	Magnetic field transducers	Partial discharge couplers
Proximity probes	Piezoeletric sensors	Linearized velocity sensors	Eddy current probes

Acquisition systems:

PMS-300	MMS-400	PPT-380	CMS-500

Return Merchandise Authorization (RMA) request form

Customer information

Company name: _____

Contact name: _____

Address: _____

_____

_____

_____

Email: _____

Phone: _____

Date: _____

MC-monitoring contact person: _____

Item detail

Item P/N: _____

Item description: _____

Quantity to return: _____

Invoice/Ship. document nr.: _____

Issue description

Please, fill in the form and send it by mail to: info@mc-monitoring.com. We will send you back a sales order return document including your RMA number.

Important: *No goods will be accepted without an RMA nr. delivered by MC-monitoring SA, even under warranty.*

For further information, please contact MC-monitoring by email (info@mc-monitoring.com) or phone (+41 58 411 54 00).