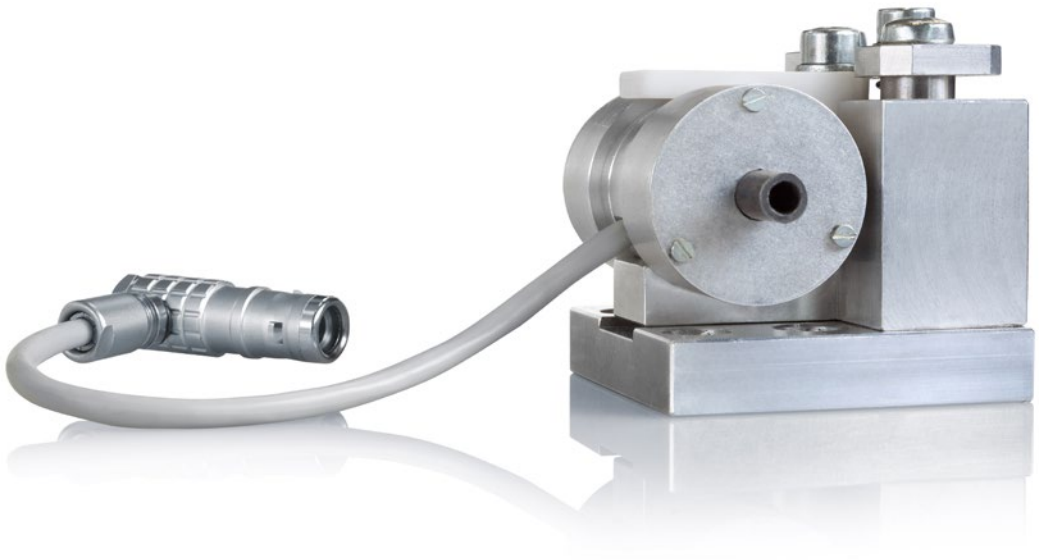
Product Information

FOERSTER

DEFECTOMINI®

Sensor System for Small Dimensions

2.865



proof.

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Application

The DEFECTOMINI sensor system has been specially developed for surface testing of wires and pipes with small diameter ranging from 0.3 mm to 4.0 mm. The DEFECTOMINI sensor system significantly improves flaw detection.

The field of application is diverse and varies from stainless steel with an excellent surface quality for medical use to wires of high quality precious metal for the chemical and electrical industry.

Test coils from 0.5 mm to 4.5 mm are available for detection of smallest surface flaws using the eddy current method. The sensor system DEFECTOMINI permits testing of all conductive metals including ferritic material by using permanent magnets. The compact design of the sensor system DEFECTOMINI allows perfect integration to wire drawing machines. With the optional roller guides the test coil guides itself on the wire.

Mode of Operation

The sensor system DEFECTOMINI operates according the eddy current principle with encircling test coils. The electrical test signals are generated by the electromagnetic interaction between the test object and test coil when the test object passes through the coil. Test coils in a differential configuration are used for most test tasks. Adjacent material areas are compared using differential coils. Short surface flaws that run deep to the material are detected by the differential coil with high sensitivity. Absolute winding can also be used to detect longitudinal flaws.

To test ferromagnetic test objects permanent magnets are used. This suppresses interference caused by the material permeability. The test electronic consists of a processor-controlled testing and evaluation unit featuring interactive operation and diverse display and documentation possibilities.

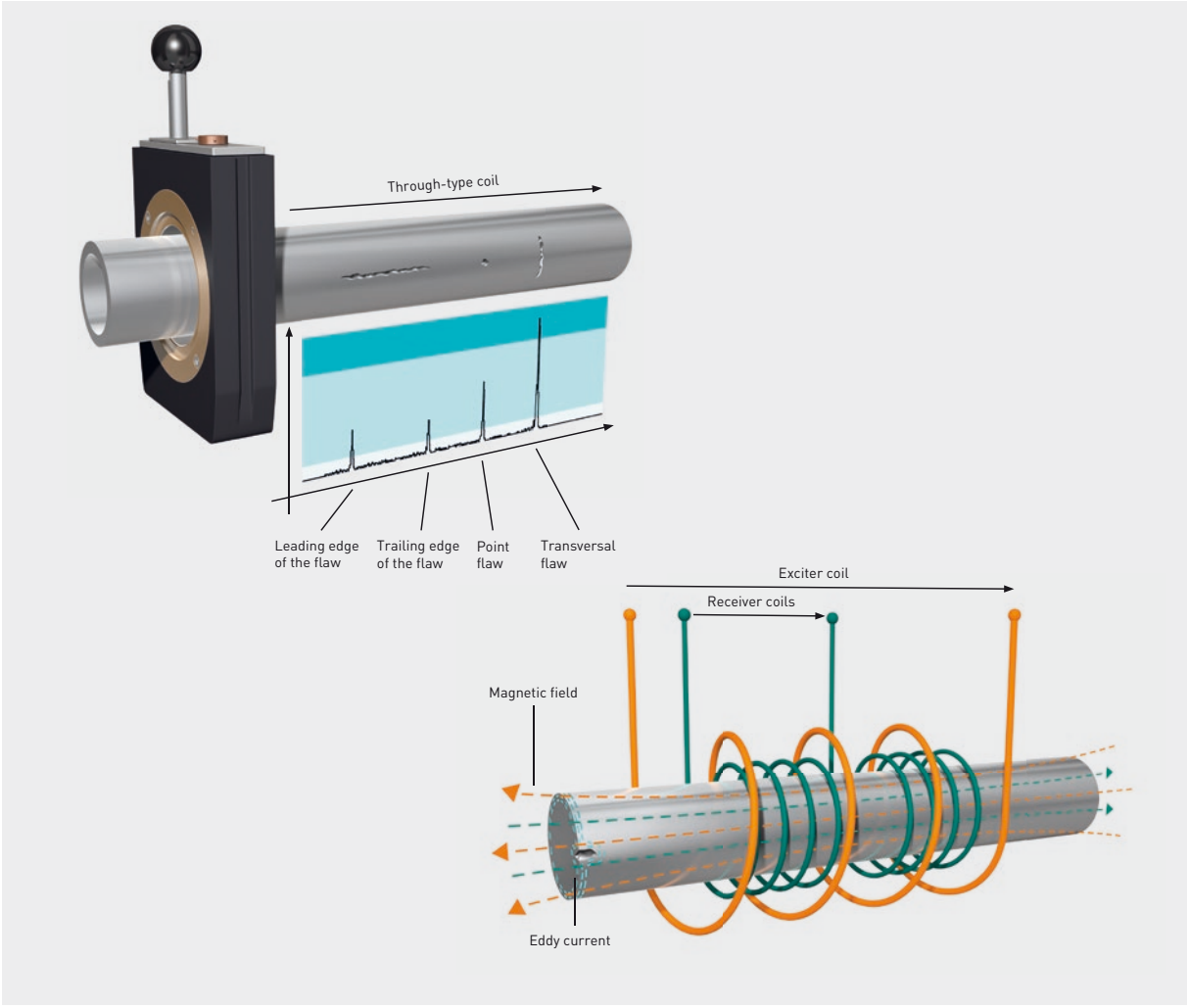

Abb. 1: Prinzip des Wirbelstromverfahrens

Mechanical Construction

In general a complete DEFECTOMINI sensor system is set up modularly and consists of:

- Pre-Amplifier
- Test coil
- Permanent magnets / field clamp
- Static or flexibel holder

Test Coil

Test coils from 0.5 mm to 4.5 mm in steps of 0.5 mm are available. Any test request can be achieved quickly by simply changing the test coil. The test coil consists of a coil housing with a supporting tube on each side (see Figure 2). The centrally positioned coil housing stores the coil unit.

In order to optimize test results, special attention must be paid to the choice of diameter for the test coil. The principal criteria are derived from the properties of the test material, e.g., its straightness, ovality or surface condition and the accuracy of the guidance mechanism.

A connecting cable with plug connects to the pre-amplifier.

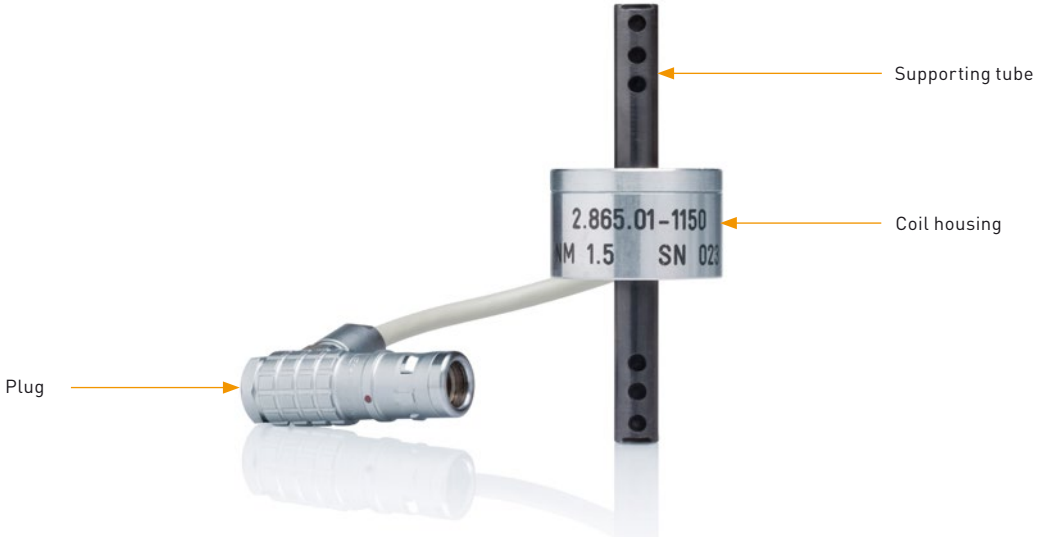

Fig. 2: Test coil

Pre-Amplifier

The pre-amplifier receives the signals picked up by the test coil. The pre-amplifier electronics are mounted inside a robust housing (see Figure 3). On the opposite side of the housing there is a socket for the test cable (standard coil cable). The decoupled test signals are transmitted to the testing and evaluation electronics.

Fig. 3: Pre-amplifier

Roller Guides

With the flexible holder an adjustable roller guide can be placed behind and in front of the test coil to guide the sensor system precisely on the wire. The roller guides assure a vibration-free material guidance within the sensor system.

Fig. 4: Set of roller guides

Magnetization

The sensor system permits testing of ferritic material by using permanent magnets. These are put on both sides of the supporting tube and fixed to the desired distance to the coil housing. Mechanical fixed positions permit a reproducible setting. Sets of magnets with single, double or triple magnets are protected against damage in an aluminium housing. For different quality levels of material the optimum field strength at test piece can be set. To achieve a magnetization, a field clamp is put across the test coil including the set of magnets and then locked.

Fig. 5: A set of single magnets

Fig. 6: Field clamp

Holder

For testing small tubes a static holder (see Figure 7) is used to fix the test coil to a central position. The height adjustment permits an adaptation to the test section. For testing small wires the test coil guides itself on the wire with help of the roller guides and is therefore able to balance variation in the tensile strength. Especially during feeding-in the wire and in case of wire break, the test coil is held by a flexible holder. For example the flexible holder may fit directly to the drawing die box and keeps the whole test system to a central position of the drawing die. Two models are available.

- short holder for testing wires **without** demagnetization
- long holder for testing wires **with** demagnetization (see Figure 8)

Fig. 7: Static holder

Fig. 8: Long model of flexible holder

Demagnetization

Various acceptance and delivery specifications for semi-finished products demand that these parts should not be magnetized or that their residual field strength lie below a stipulated limit value. This can be reduced back to the prescribed values only by using a magnetic alternating field. Demagnetizer EMAG Mini consists of a power supply and a demagnetization coil.
The power supply is mounted in a robust housing (see Figure 9). An indicator lamp reports existing power supply voltage. The power supply cable is mounted on the opposite side of the housing.

Fig. 9: Power supply

The demagnetization coils are placed behind the test coil and are sealed with a particularly resistant casting resin (see Figure 10). The casting resin has very good thermal properties. The heat is dissipated from the coil by convection and radiation. No additional cooling media is required with EMAG Mini coils. Two models are available.

- Demagnetization coil to test tubes (in combination with the static holder)
- Demagnetization coil with roller guide to test wires (in combination with the long flexible holder) (see Figure 11)

A connecting cable with plug connects to the power supply.

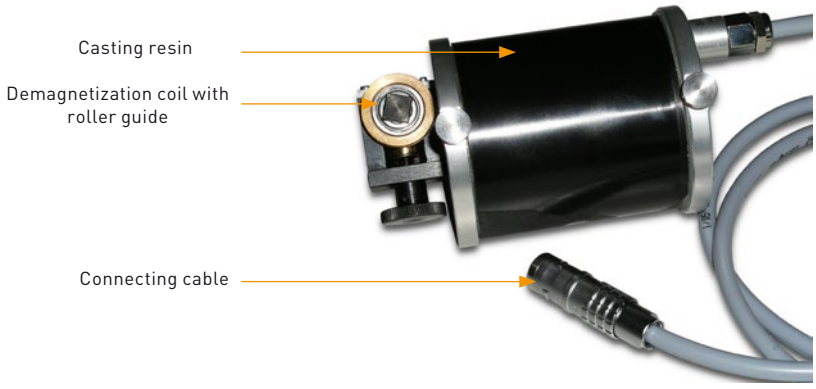

Fig. 10: Demagnetization coil

Technical Data

Sensor System DEFECTOMINI	
Typ. depth of test defect / Typ. width of test defect	start from 0.05 mm / 0.1 mm
Test frequency range	10 kHz – 1 MHz
Test coil diameter	0.5 - 4.5 mm
Max. field strength at test piece	200 kA/m
Environmental condition	as free as possible from dust and scales
Ambient temperature	5 – 45 °C
Max. relative air humidity	85%
Dimensions W x H x D [mm]	see chapter Dimensions
Power supply	230 V, 50 Hz (EMAG Mini)
Weight	approx. 0.5 kg (without magnetization) / approx. 1.5 kg (with magnetization)
Suitable for FOERSTER evaluating instruments	DEFECTOMAT DI / CI / DA

Specification of Test Material

	Specification of Test Material
Test method	Non-destructive surface inspection with eddy current method
Test material	Ferromagnetic, austenitic and non-ferromagnetic wires, tubes and bars with small diameter
Diameter	0.3 – 4 mm
Object temperature	0 – 80 °C

Dimensions

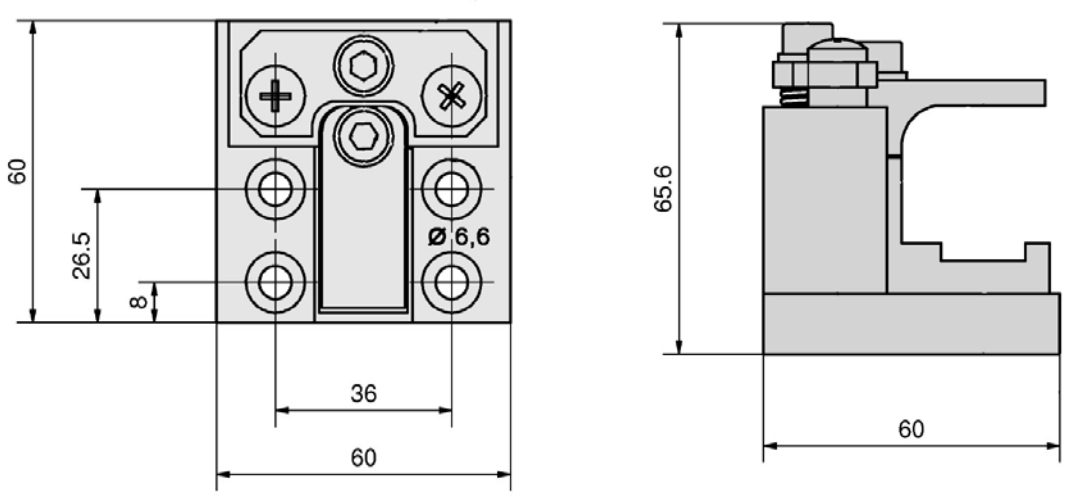

Fig. 11: Lift table

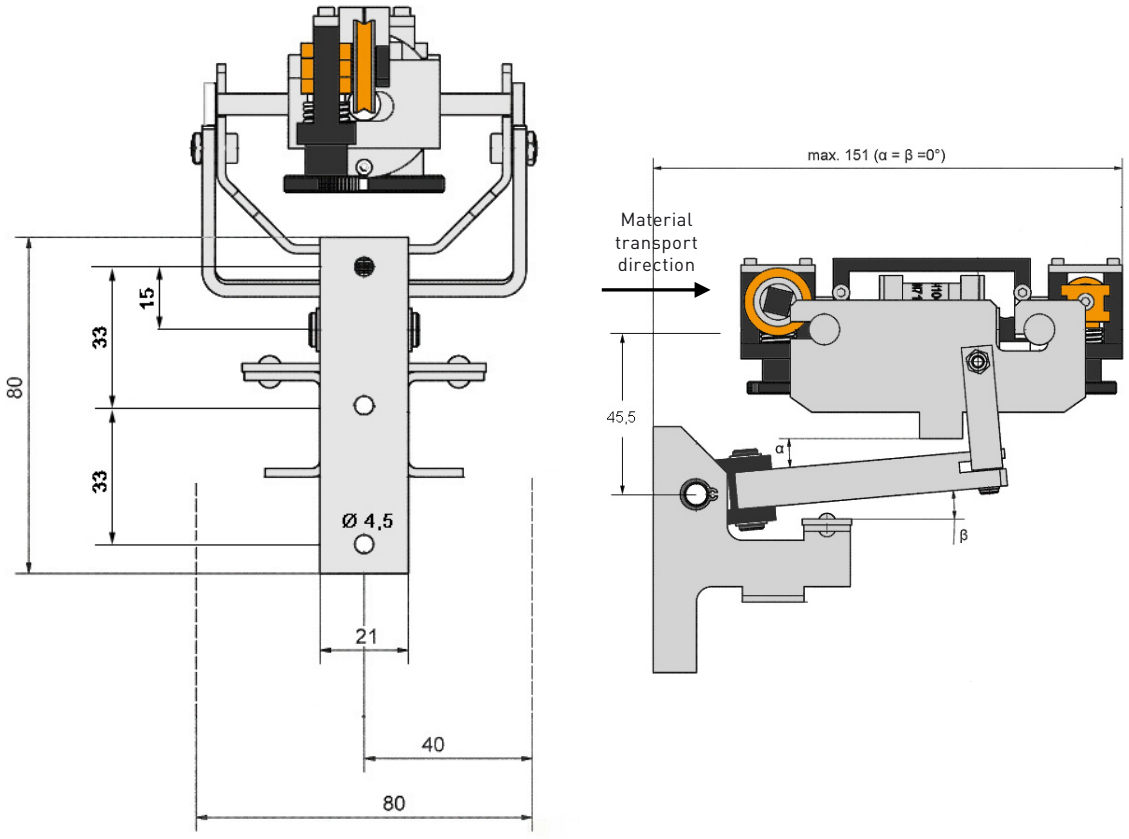

Fig. 12: Short holder (without demagnetization)

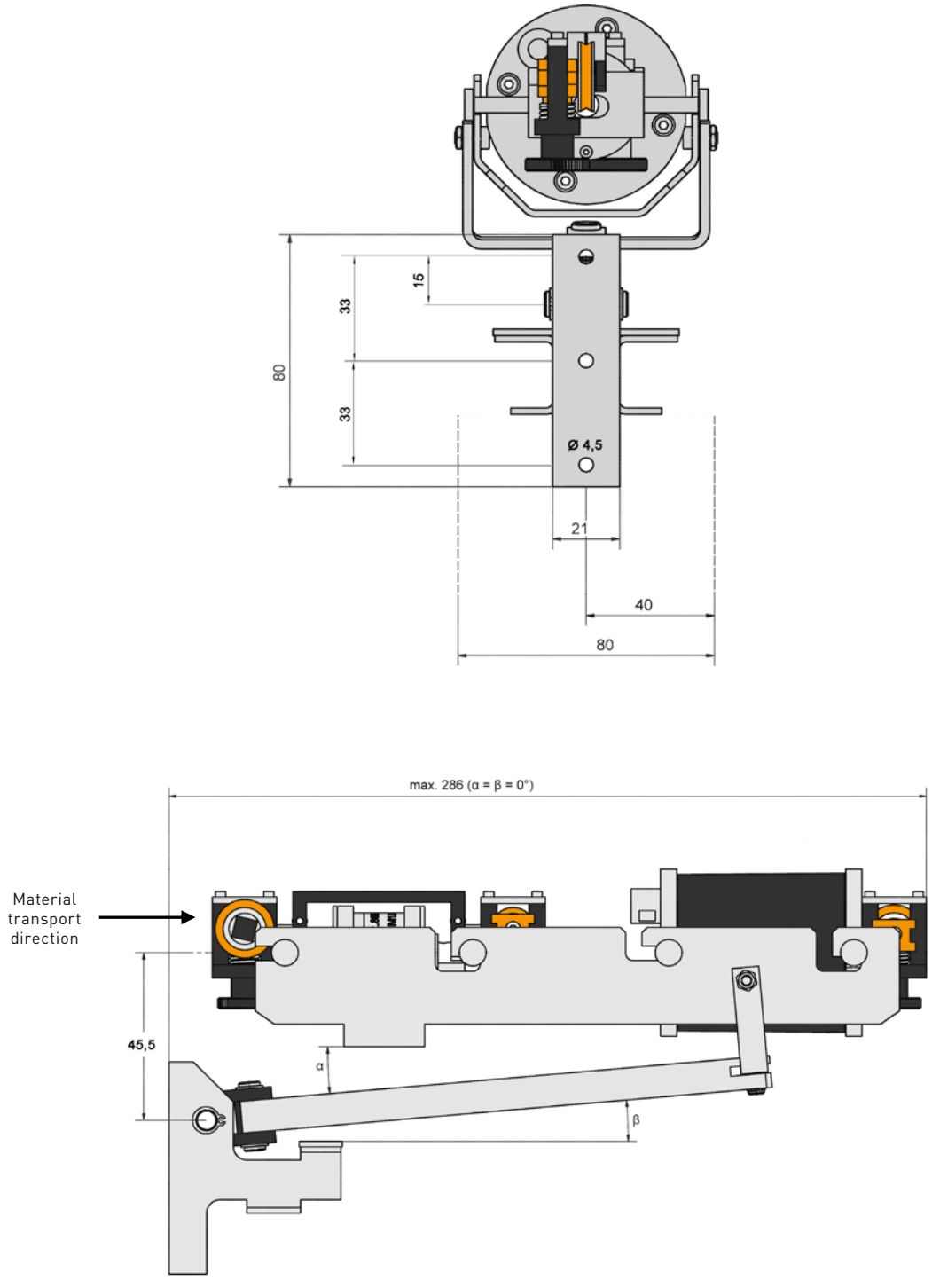

Fig. 13: Long holder (with magnetization)

Product Information

Worldwide Sales and Support Offices

Headquarters

- Institut Dr. Foerster GmbH & Co. KG, Germany

Subsidiaries

- Magnetische Pruefanlagen GmbH, Germany
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