

**Overhead Power Transmission Lines
New Approaches for Non-Destructive Inspection**



**Overhead ground wires
Steel-aluminum wires
Tower suspended ropes**

Steel ropes are widely used as guy ropes for power transmission towers, overhead ground wires as well as for purpose of reinforcement in steel-aluminum conducting wires. Wherever the steel ropes used they have to be in satisfactory technical conditions to ensure reliability. As soon as ropes are worn-out sufficiently they have to be replaced with the new ones to provide safety. Premature discard causes unjustified losses.

The wire rope tester INTROS is specially designed to non-destructively measure loss of metallic area (LMA) of ropes and to detect local flaws (LF) like broken wires, pitting corrosion. The tester utilizes magnetic flux leakage (MFL) principle and consists from magnetic head and basic unit. Magnetic heads are manufactured of different sizes to fit diameter of rope. To inspect the rope the magnetic head is installed on it and scan along the rope with the speed up to 2 m/s. MFL technique requires magnetization to saturation of the rope in the longitudinal direction, and this function is realized by the magnets of the magnetic head. When LMA or LF occurs in the rope, the MFL density over the rope varies. Hall sensors installed in the magnetic head respond to this variation. Basic unit is connected to the magnetic head with the cable and accumulates test data into the data logger. These data will be downloaded into computer with the special software WINTROS. Due to battery power supply and portable design basic unit can be easily mounted nearby or even on magnetic head before getting scan the rope and travels along the rope storing data. Memory capacity of the basic unit is sufficient to store data from ropes with total length exceeding 30 km. The most suitable sizes of magnetic heads for use at transmission lines are MH 6-24 and MH 20-40. Magnetic heads of bigger sizes are also available.



Basic unit with data logger

- Power supply 3 AA batteries
- 6 hours continuous work
- 2 LCD displays for test data and distance
- USB interface
- Weight 0,7 kg
- Dimensions 85 x 35 x 217 mm

Magnetic head MH 6-24

- Ropes diameter from 6 to 24 mm
- Weight 3 kg
- Dimensions 235 x 230 x 64 mm

Magnetic head MH 20-40

- Ropes diameter from 20 to 40 mm
- Weight 8 kg
- Dimensions 330 x 205 x 190 mm

The instrument provides operator with LMA and LF traces. Additional traces from each Hall sensor and from encoder can be activated by the operator.

Since 1997 INTRON PLUS has been delivering different sizes of rope testers INTROS for Russian Federal Grid Company. Apart from supplying the equipment we provide inspections of overhead transmission lines. The picture below shows how inspection of steel-aluminum conducting wire crossing the river was carried out. The wire was 86 m length being in service for 40 years. The voltage was off and rope scanning was provided manually.



The below LMA and LF traces obtained from this inspection show multiple brakes and corrosion. The brakes are recognized with multiple pulses on the traces. This wire was discarded and replaced with a new one.



