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IRCT Operating and Maintenance Manual

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⚠WARNING!

Equipment comprises rotating parts! Please, never handle drive in powered condition! When inserting and removing test device, always switch on tester with means of main switch! Ensure that other person can't start the tester!

IRCP drive units are powered by a rated supply voltage of 230VAC and therefore extra care must be taken when handling the power cord.

Connect the power cord to the power outlet only after connection to the IRCP drive unit.

Always visually inspect the device before starting! Check the power supply cord! If damaged, replace it!

1 Purpose of the Document

Document specifies the use and maintenance of MIREL IRCT test device.

Document is intended for:

- MIREL systems Producer personnel, which provides for tests, final inspections, installation and activation, periodic checks, warranty- and post-warranty service of MIREL systems. Said personnel must be trained for such activities by a MIREL systems Producer's authorized person.
- Operator's personnel, which provides for operational maintenance, diagnostics as well as operational repairs of MIREL systems. Said personnel must be trained for such activities by a MIREL systems Producer's authorized person.

Each person which comes into contact with MIREL IRCT test device must command over a suitable education, qualification, experience, technical equipment, and shall be trained by the Producer for the range of activities he performs with the tester.

The document follows up and refers to documentation stated below:

Related Documentation

No.	Version	Title
[A1]	-	-

Linked Documentation

No.	Version	Title
[B1]	-	-

Cited and related standards and specifications

No.	Version	Title and Additional Information
[C1]	-	-

2 Specification of Document Changes

Version 090807

Document introduction

Version 240304

Complemented Operation and Maintenance Manual for IRCT.3.A Tester.

Complete document update based on a new template.

3 Applied Designation and Terminology

CAN	Type of serial communication bus
HDV	Driving rail vehicle
HMI	(Human Machine Interface) terminal intended for system operation
HMIMM	HMI MIREL mobile
HW	Hardware
IRC	incremental axle speed sensor
IRCT	Designation of the equipment for IRC testing
IRCP	IRCT tester drive
MIREL	Trade marking of HMM Company products

4 Description of IRCT Device

MIREL IRCT test device is intended for:

- DRV speedometer testing
- Axle rotation sensor testing
- DRV movement simulation

It consists of an IRCP drive unit, one or two HMIMM mobile terminals and a KZIRCT interconnection cable or other accessories, e.g. a set of reducers for rotary sensors with flexible axle.

A D-Sub9 adapter piece (CAN9RVV) is included with the KZIRCT.1.A interconnection cable, which is used when combining the HMIMM.1.6xxA mobile terminal with the IRCP.2.A drive. When used with the IRCP.3.A drive, this adapter piece is not used.

4.1 Technical Parameters

4.1.1 IRCP Drive Unit

IRCP dimensions (w x h x d)	IRCP.2.A 230 x 400 x 200 mm IRCP.3.A 310 x 440 x 210 mm
Weight	IRCP.2.A 11,7 kg IRCP.3.A 15,5 kg
Mechanical design	Stand-alone device
Operating temperature	-10°C ÷ +70°C
Storage temperature	-25°C ÷ +70°C
Relative air humidity	Max. 90%, non-condensing
Power supply	AC 230V / 50Hz
Switching	Protective switch with thermal and magnetic trigger
Protection	10A
Protection Class	I
Safety element	Emergency stop pushbutton for drive unit rotation
Indication	LEDs green – device readiness indication red – drive activation indication

4.1.2 HMIMM Mobile Terminal

HIMIMM dimensions (w x h x d)	120 x 40 x 150 mm (without KZIRCT)
Weight	560g
Mechanical design	handheld control unit
Operating temperature	-10°C ÷ +70°C
Storage temperature	-25°C ÷ +70°C
Relative air humidity	max. 90%, non-condensing
Power supply	24VDC
Indication	TFT display 4,3"
Control	HIMIMM.1.6xxA touch display HIMIMM.1.6xxB without control option
Connection to IRCP	KZIRCT interconnection cable

4.2 IRCP Drive Unit

IRCP drive unit is one of IRCT tester components. It is a device comprising a servomotor and its associated inverter. It follows, therefore, that the drive unit serves to rotate the speed sensor under test. The mechanical design is such that most types of speed sensors can be tested by it. However, it was primarily designed and developed for MIREL IRC sensors. The IRCP drive comes in two versions, IRCP.2.A and IRCP.3.A.

4.2.1 IRCP.2.A

IRCP.2.A drive unit can be controlled locally (by switches on the main panel) or by the HMIMM mobile terminal.



Fig.1: IRCP.2.A Drive Unit

4.2.2 IRCP.3.A

IRCP.3.A drive unit can be controlled solely by means of HMIMM mobile terminal.



Fig.2: Drive Unit (IRCP.3.A)

4.3 HMIMM Mobil Terminal

The HMIMM mobile terminal is connected to the IRCP drive unit by a KZIRCT interconnect cable, which provides power supply and serial communication over the CAN bus. The mobile terminals are divided into two basic categories: Active (HMIMM.1.6xxA) and Passive (HMIMM.1.6xxB).

All mobile terminals are structurally identical. They differ only in software equipment.



Fig.3: HMIMM control terminals - Passive (left side) and Active (right side)

4.3.1 Active Mobile Terminals HMIMM.1.6xxA

Active mobile terminals are used to enter the following values:

- tester rotation start/stop
- wheel diameter (500 to 2000mm)
- tester rotational direction (forward - clockwise, reverse - counterclockwise)
- desired speed (0 to 200 km/h)

and indication of:

- actual true speed
- gearbox axle rotations
- set wheel diameter
- set speed
- set rotational direction

All active terminals are functionally identical. They differ only in compatibility with IRCP drive units.

HMIMM.1.601A

HMIMM mobile terminal in version with SW equipment in ver.01.

Compatibility with IRCP drive units:

- Compatible with IRCP.2.A

HMIMM.1.602A

HMIMM mobile terminal in version with SW equipment in ver.02.

Compatibility with IRCP drive units:

- Compatible with IRCP.2.A
- Compatible with IRCP.3.A

4.3.2 Passive Mobile Terminal HMIMM.1.601B

The passive mobile terminal only displays the quantities mentioned above. It also needs an active mobile terminal to operate.

The passive mobile terminal is only available in one version with SW equipment ver.01 and can therefore only be used with the active mobile terminal HMIMM.1.601A and IRCP.2.A drive unit.

5 IRCT Device Control

IRCT can be controlled in two ways: either locally or via an active HMIMM mobile terminal, depending on the version of the IRCT tester.

Local control is available only for drive units in version IRCP.2.A.

IRCP.3.A drive unit can be operated only by means of a HMIMM.1.602A mobile terminal.

5.1 Basic Description of IRCP Drive Units

5.1.1 IRCP.2.A

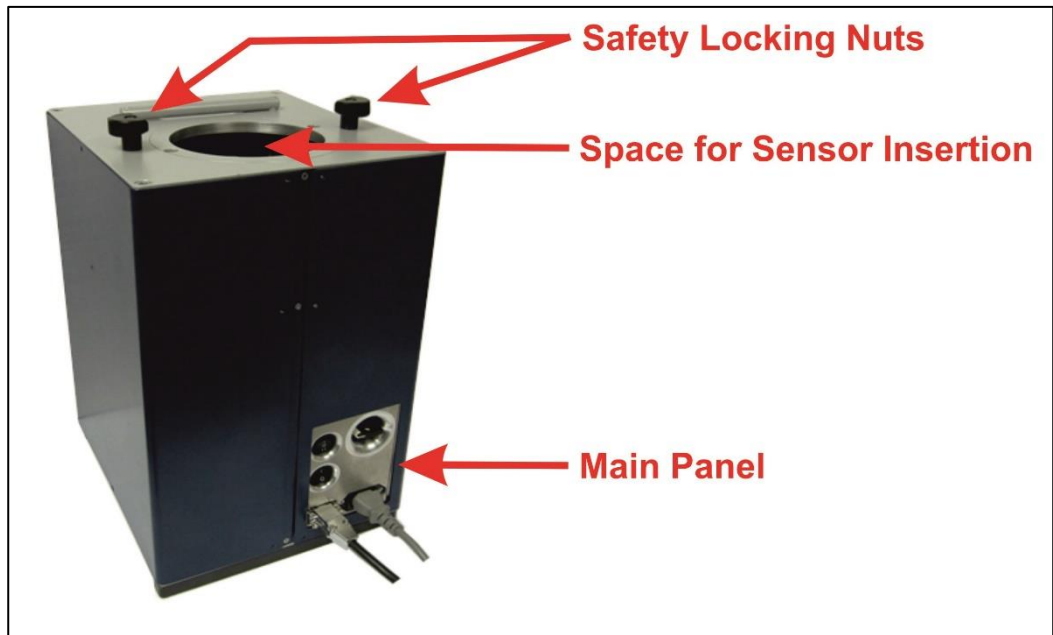


Fig.4a: Basic Elements Description for IRCP.2.A Drive Unit

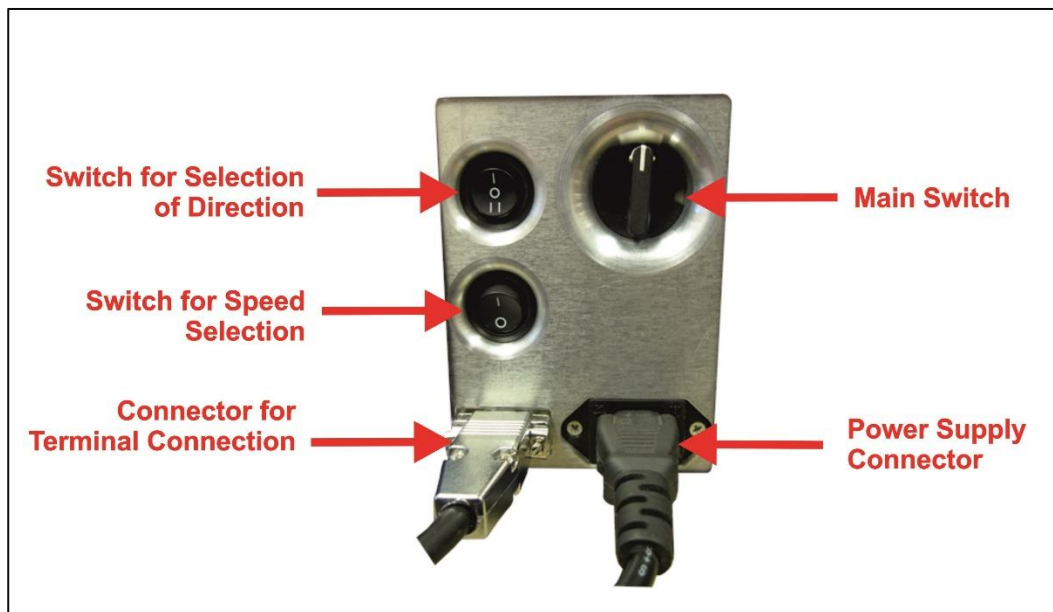


Fig.4b: Description of IRCP.2.A Drive Unit's Main Panel

5.1.2 IRCP.3.A



Fig.5a: Basic Elements Description for IRCP.3.A Drive Unit



Fig.5b: Description of IRCP.3.A Drive Unit's Main Panel

Compared to version 2, the IRCP.3.A drive unit also has an emergency stop button on the top and an indication LED.

Indication LED of IRCP.3.A drive:

- Green LED: indicates device readiness. If this LED is lit, the device is ready for use. If this LED is not lit, the device is not ready and must be rebooted.
- Red LED: indicates activation of the drive. If this LED is lit, the drive is in standby mode. The inner plate will start to rotate, according to the set speed from 0 to 200km/h (if the speed is set to 0km/h, the inner plate is stuck in the current position). If the LED is not lit, the power supply to the motor is disconnected, releasing the inner plate.

The emergency stop button is used to immediately stop the rotation of the tester drive unit. When this button is pressed, plate rotation stops and the tester switches to the unready state (both indicator LEDs go off). After using this button, to use it again, the button must be returned to the unpressed position and the tester restarted with the main switch.

5.2 Inserting the Speed Sensor into the IRCP Drive Unit

Make sure that the tester is in the off state (main switch) before putting on the sensor!

The speed sensor is inserted into the tester from the top by inserting the notch in the sensor fork into the drift pin on the inner plate. After inserting the sensor, secure the sensor with the safety retaining nuts.

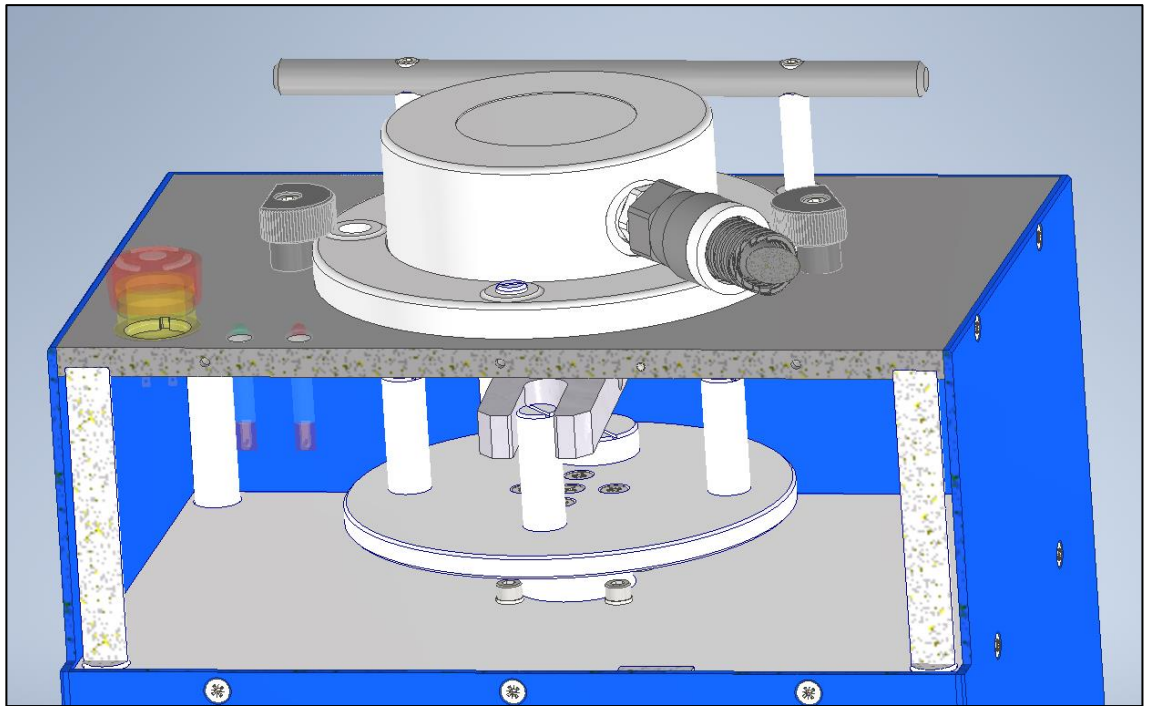


Fig.6: Principle of mounting the IRC sensor in the tester drive

5.3 Device Control in Local Mode

Local control of IRCT tester is available only with IRCP.2.A drive unit, where this control is implemented using the controls on the main panel.

The local control mode is activated simply by not connecting the HMIMM mobile terminal. In this case, the tester automatically switches to local control mode when the main switch is turned on. After turning on the main switch, wait 5s when the initialization of the tester drive unit takes place and after this time the drive automatically switches to standby mode. Vertical position of the main switch means the device is off, horizontal position means the device is on.

For a description of the components of the main panel of the IRCP.2.A drive unit, see Chapter 5.1.1.

The speed selector switch selects the pre-set rotation speed:

- position „0“ low speed (33,3 rev./min),
- position „I“ high speed (450 rev./min).

The direction selector switch controls the direction of rotation:

- position „I“ clockwise,
- position „II“ counter-clockwise.
- position „0“ rotation OFF

5.4 Controlling the Device Using the Mobile Terminal

CAUTION: Care must be taken not to exceed the speed guaranteed by the sensor manufacturer. The speed of rotation of the axle depends on the diameter of the wheel. For example, if a wheel diameter of 500mm is selected and a maximum speed of 200 km/h is set, the speed of the sensor will be up to 2122 rpm.

In order to control the device using an active HMIMM mobile terminal, you need to connect this terminal using KZIRCT before it is started. This will start the tester in external control mode with the mobile terminal. When using the active mobile terminal alone, the KZIRCT.1.A communication cable is used. When using a combination of active and passive mobile terminals, the KZIRCT.1.B interconnect cable is used.

NOTE: To connect the active mobile terminal to the IRCP.2.A drive, use the D-sub9 reducer (CAN9RVV) included in the KZIRCT.1.A wiring bundle.

After the Main switch on the drive unit has been turned on and the initialization has taken place, the mobile terminal displays initial screen:



Fig. 7a: Initial screen upon terminal boot-up

By operating the blue „MODE“ pushbutton you can cyclically switch between individual screens.



Fig.7b: Screens 1 to 4

5.4.1 Screen No.1 (Initial Screen)

Screen No.1 displays all parameters with the option to increase or decrease the set speed in either 1km/h or 10km/h increments, or to start or stop the rotation (START/STOP).

Displayed parameters:

- Actual true speed [km/h]
- Wheel diameter [mm]
- Rotation direction [FORWARD/REVERSE]
- Set speed [km/h]
- Rotation count [rev/min]



Fig.7c: Initial Screen

5.4.2 Screen No.2 (Speed Setting by Direct Selection)

Screen No.2 displays actual true speed, where it also allows direct speed setting by pre-set pushbuttons, or rotation start and stop (START/STOP), eventually.



Fig.7d: Screen for Direct Screen Speed Setting

5.4.3 Screen No.3 (Rotation Direction Setting)

Screen No.3 displays actual true speed, and it allows also change of rotation direction (FORWARD/REVERSE), or rotation start and stop (START/STOP), eventually.



Fig.7e: Screen for Rotation Direction Setting

5.4.4 Screen No.4 (Wheel Diameter Setting)

After entering the wheel diameter in [mm], it is necessary to confirm this value with the "OK" button. To return to the original value, press the "ZRUS" button. The allowed range for wheel diameter setting is 500 to 2000mm.

By operating the „MODE“ pushbutton, device returns to initial screen.

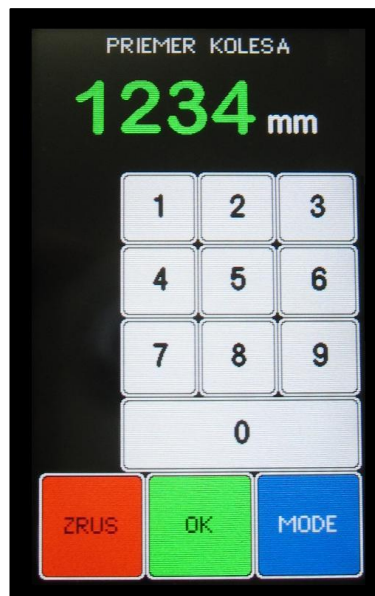


Fig.7f: Screen for Wheel Diameter Setting

6 Device Maintenance

IRCT device has been designed as a maintenance-free one.

However, a periodic inspection of mechanically stressed parts and a comprehensive check of the functionality of all elements of the tester with a periodicity of 1 year is recommended.

It is also recommended to carry out an electrical inspection of the power unit with a periodicity of 1 year.

6.1 Maintenance of HMIMM Mobile Terminal

Mobile terminal HMIMM doesn't require neither any periodic inspection nor maintenance.

6.2 Maintenance of IRCP Drive Unit

Periodic inspection of mechanical parts and a comprehensive check of the functionality of all elements of the tester is recommended for the IRCP drive.

It is recommended to check:

- Attachment strength of the inner plate
- Attachment strength of the drift pins on the inner plate
- Attachment strength of safety retaining nuts
- Fixing strength of covers
- Emergency button functionality (applies to IRCP.3.A only)
- Functionality of indication LEDs (applies to IRCP.3.A only)

6.3 Maintenance of the KZIRCT Interconnection Cable

The condition of the connectors and their outlets is checked for the KZIRCT interconnecting cable. There must be no damage to the insulation on the cable and the cable itself must be firmly anchored in the connector houses at both ends.