Magnetic measuring system

Length and angle modes, data transmission via radio frequency

((•)) | RoHS | IP54 | IP67 | +50° 0°

CASE
Glass-fibre reinforced polyamide based (PA) technopolymer, black colour, matte finish.
Retaining clip in acetal resin based (POM) technopolymer, black colour, matte finish.

PLATE WITH KEYBOARD
Polycarbonate resistant to greases, oils, alcohol and mineral acids.

PROTECTION CLASS
- IP54, see EN 60529 table (on page A-19).
- IP67, see EN 60529 table (on page A-19).

MAGNETIC SENSOR WITH CABLE
FC-MPI (see page -) to be ordered separately.

ACCESSORIES ON REQUEST
Magnetic band M-BAND-10 (see page -).

SPECIAL EXECUTIONS ON REQUEST
The display of special plate may be supplied with customised graphic symbols, marks or writings.

ASSEMBLY INSTRUCTIONS
- Drill the sheet (thickness 0.7÷2 mm) according to the template dimensions.
- Remove all drilling burrs before fitting the case.
- Fit the lower part of the case into the housing and press until the complete snap fitting (Fig.1).

BATTERY REPLACEMENT INSTRUCTIONS
- Remove the indicator from its seat, applying pressure to the retention wing bringing it to the stop with the aid of a slotted screwdriver (Fig.2).
- Unscrew the AISI 304 stainless steel self-tapping screw with six-lobe socket for TORX®* T06 tool and remove the closing plate (Fig.3).
- Replace the battery paying attention not to invert the polarity (see the position indicated on the cover).
- The replacement of the battery if carried out within 10 seconds (duration of the buffer power supply) avoids the loss of the configuration parameters.
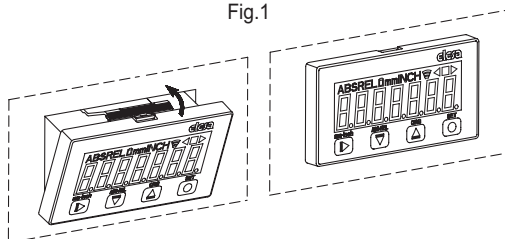
* Registered trademark by TEXTRON INC.
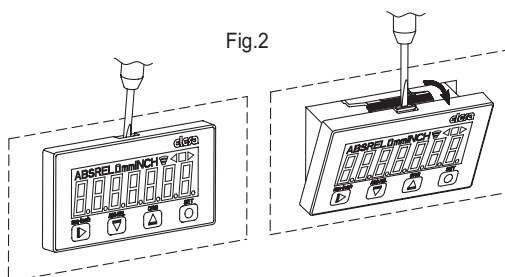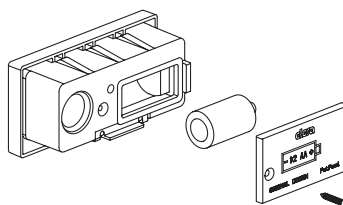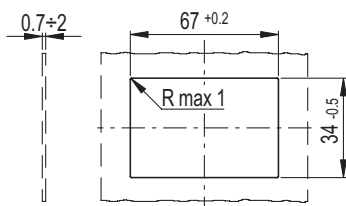

Fig.1

Fig.2

Drilling template

0.7÷2   67 +0.2   R max 1   34 -0.5

Fig.3

Position indicators

2

FEATURES AND APPLICATIONS

MPI-R10-RF measuring system connected to a specific sensor FC-MPI (see page -), combined with the magnetic band M-BAND-10 (see page -), is a complete system for the measurement of linear and angular displacement (with a minimum radius of 65 mm).

Characterised by an extremely easy assembly, it allows precise alignment and positioning, reducing time and machining procedures to the minimum.

- Maximum ease of assembly and disassembly operations of the device from the panel, thanks to a system with retention wing (ELESA PATENT).
- 7-digit LCD of 12 mm height and special characters.
- Programmable with 4 multifunction keys.
- Values displayed in millimeters, inches or angular degrees.
- Display of absolute or incremental mode.
- Up to 10 programmable offset values.
- Storage and display of 32 target positions.
- Long-life internal lithium battery.
- Buffered memory during battery substitution.
- Housing for FC-MPI connector with snap-in assembly system for easy insertion and removal.

For further information read the "Operating instructions"..

QUICK POSITIONING SYSTEM

MPI-R10-RF measuring system is networked to the control unit UC-RF via radio frequency (RF), constituting a wireless system for the rapid positioning of machine parts or multi-axial measurements (fig.4).

This system is particularly suitable for applications that require frequent format changes, facilitating the correct adjustment of the target/current position of the machine parts, also representing a safety system. In fact, even if a single MPI-R10 measuring system is not placed in the target position, PLC doesn't allow the beginning of the machine production cycle, thus avoiding production issues.

The installation of the system is quick and easy as it does not require the use of connecting cables between the control unit and the indicators.

Further technical information available in "Operating instructions".

Mechanical and electrical characteristics	
Power supply	Lithium battery 1/2 AA 3.6 V (included in the supply).
Battery life	2 years
Display	7-digit LCD of 12 mm height and special characters.
Reading scale	-199999; 999999
Number of decimal digits	programmable
Unit of measure	millimeters, inches or angular degrees. programmable
Max operating speed	1 ÷ 5 m/s programmable (1)
Resolution (2)	0.01 mm - 0.001 in - 0.01°
Precision (3)	±0.1 mm
Repeatability (4)	0.01 mm
Self-diagnostic	Battery check, sensor check, magnetic tape check
Protection class	IP54 or IP67
Working temperature	0 ÷ 50 °C
Storing temperature	-20 ÷ +60 °C
Relative humidity	Max. 95% at 25°C without condensation
Operating environment	Internal use
Altitude	Up to 2000 m

(1) Reading speed affects battery life.
(2) Resolution: the smallest variation in length that the system is able to display.
(3) Accuracy: the maximum deviation of the value measured by the system with respect to the real value.
(4) Repeatability: the degree of closeness between a measurement series of the same sample, when the individual measurements are made, leaving the measurement conditions unchanged.
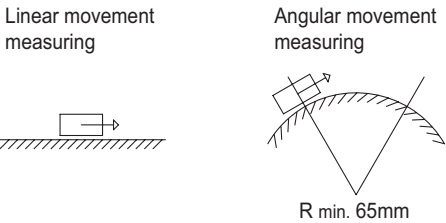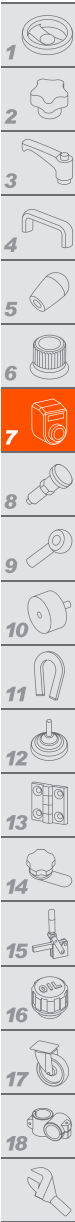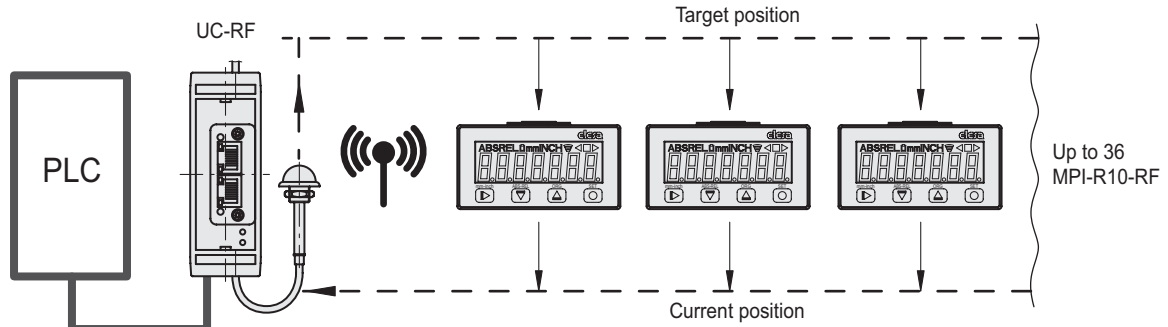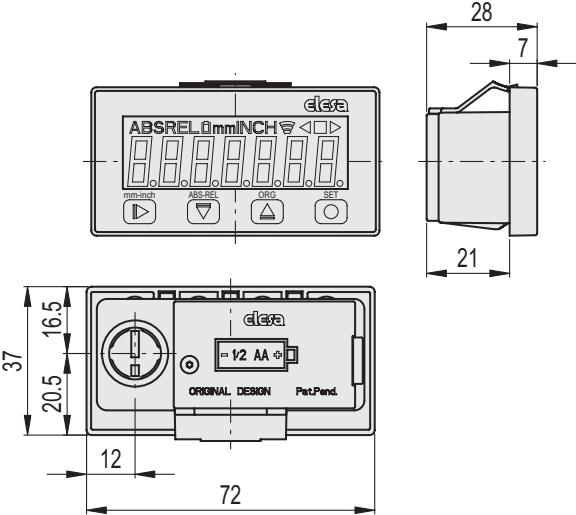
Linear movement measuring

Angular movement measuring

R min. 65mm

Fig.4

UC-RF

PLC

Target position

Up to 36 MPI-R10-RF

Current position

Position indicators

1
2
3
4
5
6
7
8
9
10
11
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17
18
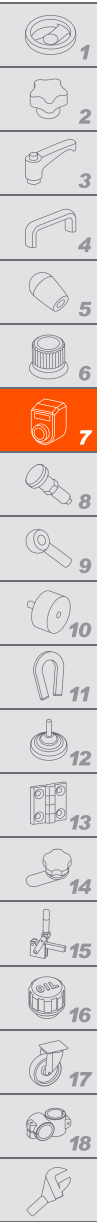
Code	Description	Protection class	⚖
CE.99971	MPI-R10-RF-IP54	IP54	50
CE.99976	MPI-R10-RF-IP67	IP67	50

MPI-R10-RF

Electronic Magnetic Meter

OPERATING INSTRUCTION

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Contents

1. Safety Instructions

General remarks

The equipment is designed and assembled according to the latest existing regulations. The equipment is delivered to the customer in perfect working order and in line with all safety-relevant conditions. To maintain this status of the equipment, it is imperative to consider the following when installing and using the device:
- use only according to the intended purpose;
- apply all measures regarding safety and hazards;
- observe the present manual and especially the relevant safety precautions! Make sure that the operating manual and especially the chapter describing the safety precautions is read and well understood by the staff in charge. Supplementary to the operating instructions, other generally or legally relevant regulations regarding accident prevention and environmental care are to be considered and observed. This manual is a supplement to already existing documentation (product information, mounting instructions, catalogues).

Intended purpose of the equipment

Intended purpose of the equipment is industrial process monitoring and control in packaging, wood, plastic, paper, glass and textile, etc. industry. It is imperative that the equipment is applied only:
- in properly installed condition;
- in line with the relevant technical data!

Any use beyond the instructions/ parameters described in this manual may lead to:
- fatal health injuries;
- material damages or damage to equipment and property.

The device must not be used:
- in explosion hazard areas;
- in medical/life support areas and equipment.

Do not open the equipment and do not apply any modifications! Modifying the equipment might have a negative impact on reliability of the device and might result in danger! Do not attempt any repairs, but return any defective equipment to the manufacturer! Any violation of the integrity of the device as delivered will null the warranty.

Setup/Commissioning

In case of any abnormal behaviour (including change in operating conditions), the device must be switched off immediately. It is imperative to switch off power supply during any installation work at the equipment. Installation and commissioning by correspondingly trained and authorised staff only. After correct mounting and commissioning the device is ready for operation.

Maintenance/repair

Switch off the power supply of the equipment before any action. Maintenance should be performed by trained and authorised persons only.

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NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

2. System description

The MPI-R10 connected to the dedicated sensor FC-MPI, combined with the Elesa magnetic band M-BAND-10, is a complete system for the measurement of linear and angular displacement. Characterised by extremely easy assembly, it allows precise alignment and positioning, reducing times and machining procedures to a minimum.

MPI-R10 mai features are:
- Multifunction LCD with 4 function keys.
- Absolute/ incremental mode.
- Programmable offset and targets function.
- Lithium battery powered.
- Accidental polarity inversion protection.

Mechanical and electrical characteristics	
Power supply	Lithium battery 1/2AA 3.6 V
Battery life	3 years
Display	7-digit LCD of 12 mm height and special characters
Reading scale	-199999; 999999
Number of decimal digits	programmable
Programmable measuring unit	mm, inches, degrees (angle)
Max operating speed [1]	1 ÷ 5 m/s programmable
Resolution [2]	0.01 mm - 0.001 in - 0.01°
Precision [3]	±0.03mm
Repeat accuracy [4]	0.0002xL mm (L is the measure in mm)
Self-diagnostic	battery check, sensor check, magnetic tape check
Protection level	IP65
Operating temperature	0°C ÷ +50°C
Storage temperature	-20°C ÷ +60°C
Relative humidity	max. 95% a 25°C without condensation
Environment	indoor use
Altitude	up to 2000 m

[1] The reading speed influences the battery life.
[2] Resolution: the smallest change in length that the system is capable of displaying.
[3] Precision: the maximum deviation of the value measured by the system from the actual one.
[4] Repeat accuracy: the degree of closeness between a series of measures of the same sample, when the single measurements are carried out with the conditions unchanged.

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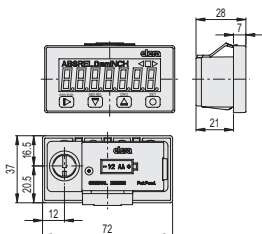
The sensor cable, FC-MPI, is made from a metallic enclosure containing the sensor electronic, a multipolar flexible cable and a connector to plug it in the MPI-R10.

The sensor cable is available in different lengths.
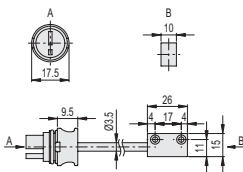
The magnetic band M-BAND-10 is made of two separate parts: the magnetic band and the cover strip. The magnetic band is made of a magnetic tape, a carrier strip and an adhesive tape (Fig. 2).

The cover strip is made of a protection strip and an adhesive tape (Fig. 1).

M-BAND-10 Technical data	
Accuracy class	± 40 μm
Material	magnetic tape: nitrilic rubber
	carrier strip: stainless steel
	cover strip: stainless steel
	acrylic adhesive tape
Width	magnetic band: 10 mm ± 0.20 mm
	cover strip: 10 mm ± 0.20 mm
Thickness	magnetic band: 1.43 ± 0.15 mm
	cover strip: 0.23 mm
Magnetic pole pitch	5 mm
Operating and storage temperature	min -40°C max +100°C
Linear thermic expansion factor	17×10^{-6} K^{-1}

Fig.1
Cover strip

Protection strip (0.1 mm)
Adhesive tape (0.13 mm)

Fig.3
Proper assembly

Cover strip

Fig.2
Magnetic band

Magnetic tape (1 mm)
Carrier strip (0.3 mm)
Adhesive tape (0.13 mm)

Magnetic band

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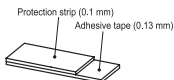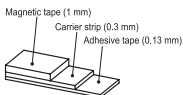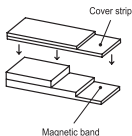
2.1. RF version – MPI-R10-RF

MPI-R10-RF is compatible with the Elesa's wireless network that allow electronic meters and indicators to communicate via radio with a PLC.

The Elesa's wireless network is made by the following components:

- One control unit UC-RF
- Max 36 electronic position indicators or meter as DD51-E-RF, DD52R-E-RF or MPI-R10-RF.
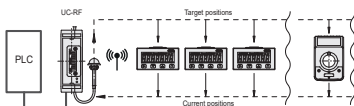
The control unit UC-RF is provided with a standard interface for the most common industrial busses to be connected to the PLC and allows the transmission of the information between the PLC and the MPI-R10-RF position indicators. The UC-RF exchanges information with the MPI-R10-RF via radio frequency and allows the setting of the target position and the control of the current position of each indicators, directly from the PLC.

3. Installation

3.1. Display installation

1. Drill the panel according to the template dimensions reported.
2. Remove all drilling burrs before fitting the MPI-R10.
3. Fit the lower part of the case into the housing.
4. Press onto the upper part until the case is completely snapped in.
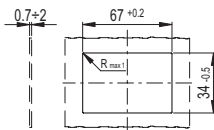
3.2. Sensor installation

Fix the magnetic sensor by using M3 screws (not included in the supply).

During the installation, use a planar spacer (max 1 mm is suggested) to grant the parallelism between the sensor and the magnetic band.

The maximum distance between the sensor and the magnetic band to ensure a correct reading of the displacement is 1mm.

3.3. Magnetic band installation

To mount the magnetic band follow the instructions below:

- Clean the mounting surface carefully.
- Remove the protective foil from the adhesive tape of the magnetic band.

- Stick the magnetic band on the mounting surface.
- Clean the surface of the magnetic band carefully.
- Remove the protective foil from the adhesive tape of the cover strip.
- Stick the cover strip on the magnetic band. The cover strip must be installed over the magnetic band to protect it from possible mechanical damages.
- In the absence of a seat for the housing of M-BAND-10, secure the ends of the cover strip to prevent unintentional peeling.

The mounting surface must be flat. Buckles or bumps will lead to measuring inaccuracies. To guarantee an optimal adhesion of the adhesive tapes, the mounting surfaces must be perfectly cleaned, dry and smooth. The following surface roughness is recommended: Ra <= 3,2 N8 (Rz <= 25). To maximize the adhesion install the strip applying pressure. Gluing should preferably be carried out at temperatures between 20 °C to 30 °C and in dry atmosphere.

WARNING
Once the installation is completed, the calibration procedure must be carried out as shown in cap. 8.5.2.

4. Display
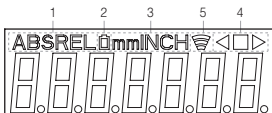
1. Absolute or relative mode indicator
2. Low battery level indicator
3. mm, INCH or degree unit of measure
4. Target position indication
5. RF connection indicator

5. Key's functions
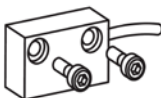
The function of the keys changes depending on the mode of the device.

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Key Or Key Combination	Operating Mode	Programming Mode
SET ○	Keep pressed for 3 sec to enter the programming mode.	Parameter selection/ Confirm of parameter change
ORG △	Keep the button pressed for 3 s to set the origin of the measurement. Programmable with one of the following options (see the $\_\_\_\_\ 0\_\_$ voice of the menu – cap. 8.3): **d_tArG**: when a target is loaded the display shows the actual absolute position. Pressing the key, on the display appears the target absolute position to reach **d_toGO** [DEFAULT]: when a target is loaded the display shows the distance to reach the target position. Pressing the key, on the display will appear the actual absolute position. **OFF**: the key is not assigned to any function in the operating mode.	Digit increase / Scroll for parameters bottom-top on the menu tree

Key Or Key Combination	Operating Mode	Programming Mode
ABS-REL ▽	Select the: ABS: absolute measuring mode REL: incremental measuring mode It is possible to choose one of the following options (see the $\_\_0\_\_\_\_$ voice of the menu – cap. 8.3): $ArCLr$ [DEFAULT]: switching from ABS to REL the counter is set to zero. Ar: switching from ABS to REL the counter is not set to zero. OFF: the key is not assigned to any function in the operating mode.	Digit decrease / Scroll for parameters top-bottom on the menu tree

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Key Or Key Combination	Operating Mode	Programming Mode
mm-inch ▷	Press the key to select the unit of measure needed. The options available are: millimeters, inches and degrees. It is possible to choose one of the following options (see the *D_____* voice of the menu – cap. 8.3): *ALL* [DEFAULT]: selectable units of measure: mm, inch, D *nodEG*: selectable units of measure: mm, inch *OFF*: the key does not allow the unit of measure conversion	Programming mode exit / Digit selection
SET ○ + mm-inch ▷	Programmable with one of the following options (see the *D_____D* voice of the menu – cap. 8.3): *Pr0G0rG* [DEFAULT]: show and set the OriGin parameter *Pr0G0FS*: show and set the OFFS parameters *OFF*: the key combination is not assigned to any function in the operating mode.	NA

Key Or Key Combination	Operating Mode	Programming Mode
SET + ABS-REL	Programmable with one of the following options (see the $\_\_ 0\_\_\_\_ 0$ voice of the menu – cap. 8.3): $L\,0\,A\,d\,0\,r\,G$ [DEFAULT]: Load one of the 10 programmed offsets. OFF: the key combination is not assigned to any function in the operating mode.	NA
SET + ORG	Programmable with one of the following options (see the $\_\_\_\_ 0\_ 0$ voice of the menu – cap. 8.3): $tArGEtS$: the keys combination allows to load/program one of the 32 target positions. See 8.4 OFF [DEFAULT]: the key is not assigned to any function in the operating mode	NA
mm-inch ▶ SET	To turn the indicator on hold ▶ then press the key ○. After the start-up sequence the indicator will be ready to be used (see cap. 4).	NA

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Key Or Key Combination	Operating Mode	Programming Mode
SET ○ ▸ ABS-REL ▽ ▸ mm-inch ▷		When the *rESEt* parameter is select. press the key ○ (SET). At this point, press the button ▽ (ABS-REL) and then press the key ▷ (mm-inch); the display will turn off and the indicator will go into low power mode of the battery (see cap. 4).

6. Switching on the system

After you have read and understood the section "Safety Instructions", proceed by switching on the indicator.

To switch the indicator on:

- hold the key ▷
- press the key ○.

The display will light up and the indicator is ready to be used.

6.1. Switching off the system (only for storage)

To switch the system off :

- enter the programming mode,
- select *rESEt* (see cap. 8.3)
- press ○
- press ▽
- press ▷

The display will turn off and the indicator will go into low power mode.

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7. Operating mode

7.3. Absolute/incremental measuring mode selection

Press the key ▽ to select the absolute or incremental measuring mode.

The measuring mode selected is shown on the display by the symbols:

- *ABS*: absolute measuring mode.

- *REL*: incremental measuring mode.

It is possible to change the key ▽ function by the menu voice *__0____* (see cap.8.3).

The available options are:

- *ArCLr* (default): when relative measurement is selected the value is always reset to zero.

- *Ar*: passing from *ABS* to *REL* the relative measurement is not reset to zero.

In this case, the counter is set to zero by pressing ○ + ▽

- *OFF*: the key ▽ is disabled and does not allow changing the selected measuring mode.

To program the parameters listed above, see cap. 8.3.

7.2. Unit of measure selection

Press the key ▷ to select the unit of measure.

The options available are millimeters, inches and degrees.

The measuring mode selected is shown on the display by the symbols: mm for millimeters, INCH for inches and with the ° suffix for degrees.

It is possible to change the key ▷ function by the menu voice $0_____$.

The available options are:

- ALL (default): units of measure that can be selected: mm, inch, degree.
- $nodEG$: units of measure that can be selected: mm, inch.
- $0FF$: the key is disabled and does not allow changing the selected measuring mode.

To program the parameters listed above, see cap. 8.3

7.3. Setting the origin

Press the key △ for three seconds to set the origin of the measurement.

Keeping pressed the $0RG$ key for three seconds, the display will show the question Set Org. At this point press the key ○, to confirm or another to cancel.

Confirming the setting of the origin, the disply will be reset to zero and the present point of the sensor will be considered as the origin of the measurements.

7.4. Setting the absolute reference

After having selected the absolute measuring mode and stopped the sensor in the starting or in the reference position, press the key combination ○ + ▽ to set the absolute value to the sum of the values of the parameters $Origin$ (absolute value of reference) and the selected $0FFS$ (compensation value).

The value of compensation ($0FFSET$) allows you to adjust the value shown on the display in such a way that takes into account, for example, wear or tool change. The system allows you to store up to 10 values of compensation.

Pressing the key combination ⊙ + ▽ , the screen will display the last compensation value used (eg *0FS 0*). It's possible to choose the desired compensation value by pressing the key ▽ or △ , and then pressing the key ⊙ to confirm.

The screen will display the absolute value equal to the sum of the values of the parameters *0rigin* and *0FFSet*.

To program the offset values, see parameter *0FFSet* of cap. 8.28.3.

It is possible to change the function of the keys combination ▽ + ⊙ chosing one of the available otions in the menu voice *_ _ 0 _ _ _ 0*

The available options are:

L0Ad_0rG: the key combination allow to choose an offset compensation and set the origin value

0FF: the keys combination ⊙ + ▽ is not associated to any function in the operating mode.

For programming the parameters listed above see paragraph 8.

7.5. Direct programming of the absolute reference value and compensation values

The keys combination ⊙ + ▽ can be programmed to allow direct access to the programming of the *0rIGIn* or *0FFSet* parameters.

It is possible to change the function of the keys combination chosing one of the available options in

the menu voice $0\_\_\_\_\_0$.

The available options are:

- $Pr0G0rG$: direct programming of the absolute reference value ($OrIGIn$ parameter).
- $Pr0G0FS$: direct programming of the compensation value ($OFFSEt$ parameter).
- $0FF$: the keys combination is not associated to any function in the operating mode.

7.6 Targets

MPI-R10 allow to set up to 32 target positions to store relevant machine configuration setting.

To program the targets:

- selet $tArGEtS$ in the main menu (see cap 8.3).
- select $Pr0G\_TG$ (see cap. 8.4).
- select the wanted memory location ($PtrG\ 01$ to $PtrG\ 32$).
- press the key $\overset{\text{SET}}{\bigcirc}$ to select.
- Follow the instruction in cap. 8.1 to set the wanted value.

To load a target:

- selet $tArGEtS$ in the main menu (see cap 8.3).
- select $L0Ad\_TG$ (see cap. 8.4).
- select the wanted target value ($LtrG\ 01$ to $LtrG\ 32$) using the keys   and
- press the key $\overset{\text{SET}}{\bigcirc}$ to select.
- The value of the selected target is shown.
- Press $\overset{\text{SET}}{\bigcirc}$ again to confirm or press $\overset{\text{mm-inch}}{\triangleright}$ to go back to the target selection list.

The keys combination $\overset{SET}{\bigcirc}$ + $\overset{ORG}{\triangle}$ allows direct access to the programming or loading of targets depending on the value assigned to parameter _ _ _ 0_ 0.

If enabled, the key combination allow to chose between the two following operations:

- L 0Ad_tG: choose one of the 32 available target positions, then press   to confirm.

- Pr0G_tG: choose to program one of the 32 available target positions, then press $\overset{SET}{\bigcirc}$ to start programming.

It is possible to change the function of the keys combination chosing one of the available otions in the menu voice _ _ _ 0_ 0.

The available options are:

- tArGet: enable the direct load or program targets functions.

- 0FF: the keys combination $\overset{SET}{\bigcirc}$ + $\overset{ORG}{\triangle}$ is not linked to any function in the operating mode.

7.6.1. Reaching the target position

When a target is selected ot is is sent by the PLC (RF version only) the device will suggest the direction of movement of the sensor to reach the target by means of the symbols ◀ ■ ▶.

It is possible to set the FLIP_tG parameter (see cap. 8.2) to adapt the target position indication to the actual sensor configuration.

It is possible to set the tolerance of the target as absolute difference from the set value by means of the P_tOLL parameter (see cap. 8.2).

The target position indicators will work, depending from the $FLIP\_tG$ and P_tOLL parameters, as in the following table.

	FLIP ◀	**FLIP ▶**
M < T - Toll	◀	▶
T - Toll <= M < T	◀■	■▶
M = T	■	■
T < M < = T + Toll	■▶	◀■
M > T + Toll	▶	◀

T = set target

M = measured value

Toll = tolerance (see P_toll)

If a target is selected is possible to cancel it by pressing the keys combination ○ + △ and confirm the $StOP\_tG$ command pressing the key ○. To keep the target selection press the key ▷.

7.6.2. Target display mode

Press the key △ to show the present or the target position depending on the settings of the device.

It is possible to change the function of the key and the target mode chosing one of the available options in the menu voice $\_\_\_\_ \boldsymbol{0} \_\_$.

The available options are:

- $\boldsymbol{d\_tArG}$ (default): when a target is loaded, the display shows the actual absolute position and the indication to reach the target as explained before in cap.7.6.1. Pressing the key _{ORG} △ the set target position is shown.
- $\boldsymbol{d\_to\_Go}$: when a target is loaded, the display shows the distance to the set target and the indication to reach the target as explained before in cap.7.6.1. If the target is not reached, the display blinks. Pressing the key ^{ORG}△ the display shows the actual absolute position.

7.6.3. Target tolerance

Set the value of $\boldsymbol{P\_toll}$ parameter to define the tollerance allowed for target (see cap. 8.2 for details).

7.7. Angular measurement

MPI-R10 allow to measure angular displacements. To obtain the correct measurement, is needed to set the parameter Radius with the measure of the radius of the arc where the magnetic band is placed.
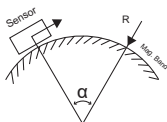
7.8. RF version (MPI-R10-RF)

7.8.1. Programming the network parameter (nEt id) and the channel parameter (nEt ch)

The system radio network is defined by the following two parameters:

- nEt id: id 00/99
- nEt ch: ch 01/36

These parameters can be configured in the Radio menu of the indicator (see cap. **Errore. L'origine riferimento non è stata trovata**.) and must be set according to the PLC recipe to guarantee a perfect communication between UC-RF and MPI-R10-RF.

Warning

For MPI-R10-RF with firmware release equal to 5.1 or higher, channel 1 is equivalent to channel 4 of the previous version. Consider it when used in old system with UC-RF with fw release lower than 5.1.

7.8.2 Targets

Using MPI-R10-RF, target positions can be sent from the PLC to the indicators through the control unit. When a target is set, the behaviour is the same as decribed in cap 7.6.

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8.Programming mode

Press the key ⃝ for 3 seconds to enter the programming mode. Depending on the setting of *PASS* parameter (see cap. 8.2), the system may require you to enter a password.

Press the key ▽ and △ to scroll through the list of parameters and selct the wanted one pressing ⃝.

Press the key ▷ to exit the programming mode. The programming mode is automatically dropped after 30 seconds of inactivity.

8.1. Programming parameters with numeric values

Press the key ▷ to select the digit to change. Then use ▽ and △ to respectively decrease or increase the flashing digit.

Press the key ⃝ to confirm the value and go back to the list of parameters.

> *i*   The numeric values of the parameters must be inserted taking into account the selected unit of measure.

When a parameter is changed from its stored value, confirming it, the display will show the message *CHAnGEd*.

When exiting from the programming mode, the parameter are stored in the internal memory. If a parameter was changed, the display will show the message *StorEd*.

8.2.   **Device parameters (in alphabetic order)**

Parameter	Description	Available options	Default
Deg corr	Angular scale correction	Programmable value: *0.000001 +/- 9.999999*. *0.00000* cannot be accepted (the coefficient is automatically set to 1.00000).	*1.000000*
Deg res	Resolution of the angular measurement	The parameter allows to define the resolution of angular measurement. The available options are: *1*; *0.1*; *0.01*	*0.01*
Dir	Measurement direction Set direction of the positive axis	*dir--* (▶) *--dir* (◀)	*dir--* (▶)

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Parameter	Description	Available options	Default
FLIPp_tG	Arrow to target indicators direction	◀ or ▶ The parameter set the direction of the arrow indicators when the target is not reached	▶
Lin corr	Linear scale correction	Programmable value: *0.000001, +/- 9.999999. 0.00000* cannot be accepted (the coefficient is automatically set to 1.00000).	*1.000000*
Offset	Offset Value	Programmable value *Res = 1:-999999 ÷ 999999* *Res = 0.1:-99999.9 ÷ 99999.9* *Res = 0.01:-9999.99 ÷ 9999.99* *Res =0.001:-999.999 ÷ 999.999* The system allows you to store up to 10 compensation values: *OFS 0 ... OFS 9*	*0000.00*

Parameter	Description	Available options	Default
Origin	Reference value	Programmable value *Res = 1:-999999 ÷ 999999* *Res = 0.1:-99999.9 ÷ 99999.9* *Res = 0.01:-9999.99 ÷ 9999.99* *Res =0.001:-999.999 ÷ 999.999*	*0000.00*
Pass	Password	*ON*: the system requires the password 22011 to enter the programming mode. *OFF* [DEFAULT]: the system does not require a password to enter the programming mode.	*OFF*
P toll	Tolerance of target position	*0.01÷9.99* The parameter value depends on the unit of measure selected.	*0.10*

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Parameter	Description	Available options	Default
Radius	Radius of the circumference where the reading sensor moves	Programmable value: *0.01-9999.99* The parameter allows to define the radius of the arc where the magnetic band is placed for angular measurement.	*100.00*
Res	Resolution	The parameter allows defining the resolution of the measure. The available options are: *mm: 1; 0.1; 0.01* *inches: 1; 0.1; 0.01; 0.001*	*mm: 0.01* *inches: 0.01*
Speed	Reading max speed	Programmable values *1;2;3;4;5* The parameter set the maximum speed of the movement in m/s that can be correctly read.	*3*

Parameter	Description	Available options	Default
Targets	Target value	Programmable value *Res = 1:-999999 ÷ 999999* *Res = 0.1:-99999.9 ÷ 99999.9* *Res = 0.01:-9999.99 ÷ 9999.99* *Res =0.001:-999.999 ÷ 999.999* The system allows you to store up to 32 compensation values: *LtG01 ... LtG32*. The parameter value depends on the unit of measure and resolution set.	*0*

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8.3. Main menu tree

dir	<	*dir--* [▶ ⁷]
		--dir [◀ ⁷]
OriGin	—	-999999 ÷ 999999 ᵇ
OFFSET	<	*OFS 0*
		-999999 ÷ 999999 ᵇ
		OFS 9
rES	—	If mm: 1, 0.1,0.01
		If inch 1, 0.1, 0.01, 0.001
LinCorr	—	0.000001÷9.999999
dEGCorr	—	0.000001÷9.999999
AnGuLar	<	*Radius* 0.01÷9999.99
		dEG_rES 1, 0.1, 0.01
SPEEd	—	SPEEd 1 ÷ SPEEd 5
P_toll	—	0.01 / 1.99
FLIP_tG	—	FLIP ◀, ▶ ⁷
tArGEtS	—	See cap.8.4

Scrolling menu direction

ORG △

ABS-REL ▽

0 _ _ _ _ _ ᵃ	<	ALL (default)
		No dEG
		OFF
_ _ 0 _ _ _ _ ᵃ	<	ArClr (default)
		Ar
		OFF
_ _ _ _ 0 _ _ ᵃ	<	dd_toGo (default)
		OFF
		d_tArGt
0 _ _ _ _ _ 0 ᵃ	<	ProGOrG (default)
		ProGOFS
		OFF
_ 0 _ _ _ 0 ᵃ	<	L0Ad0rG (default)
		OFF
_ _ _ _ 0 _ 0 ᵃ	<	tArGEtS (default)
		OFF
	PASS	<	OFF (default)
		0n
rESEt	—	See cap. 8.5.1
CALibr	—	See cap. 8.5.2
LcdtESt	—	See cap. 8.5.3
Rev	—	See cap. 8.5.5

8.4. Target menù tree

8.5. Additional features

8.5.1. Reset

To reset the device to its factory setup:

- select the voice $RESEt$ from the main menu (see cap. 8.3).

- select YES pressing the key $\overset{\text{ORG}}{\triangle}$ (pressing the key the visualized value toggle between YES and NO).

- press the key $\overset{\text{SET}}{\bigcirc}$ to confirm.

8.5.2. Calibration

The Calibration voice in the main menu activates the CALIBRATION MODE and the display shows GO.

At this point, the user must slowly move the sensor in one direction along the magnetic band.

After the GO it will be displayed a progress bar that will grow as long as the sensor is moved. The procedure end when the position measurement is shown again by the display.

This operation allow the sensor to be accurately bound to the magnetic tape and have to be done every time after the installation of the sensor.

8.5.3. Test LCD

The LcdtESt voice in the main menu allow to switch on all the display segments.

8.5.4. Correction coefficients

To improve the corerectness of the measurement, MPI-R10 allow to set two correction factors that take into account about differencies between ideal and actual installation of the magnetic band:

- *LinCorr*: is the ratio between the actual mesurement and the value measured by the device in linear measurements.
- *AngCorr*: is the ratio between the actual mesurement and the value measured by the device in angular measurements.

To calculate the correction factor, set it to 1 then read the value measured (call it M) in a reference point (call it K). The Correction fator will be equal to K/M.

Verify if the measurements done in the reference and/or other known points are correct.

8.5. 5. Revision

As last voice in the main menu, starting with the r letter, are shown the release data of the device that can be scrolled pressing the key $\stackrel{\text{SET}}{\bigcirc}$.

Please note these values and communicate them to Elesa in case support needed.
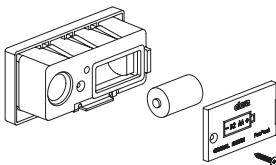
9. Battery replacement

The internal lithium 1/2 AA - 3.6 V battery ensures over 3 years battery life. (No RF version).

The symbol $\square$ is shown on the display when the battery replacement is required.

The replacement is made by simply removing the cover on the back.

By replacing the battery in less than 5 seconds, all the measurement and settings wil not be lost. If more time is required and the display turns off, the settings of the device have to be set or verified again.

By replacing the battery in less than 5 seconds, all the measurement and settings wil not be lost. If more time is required and the display turns off, the settings of the device have to be set or verified again.

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10. Display messages and troubleshoting

Message on the display	Description	Action
SEnSor	The sensor is not connected	Connect the sensor or verify the cable and the connector
no tAPE	The magnetic tape is not detected	Verify if the sensor is correctly mounted near to the magnetic tape
SPeed X	The sensor is moving too fast according the value of the set in the Speed parameter. X is the present setting of the Speed parameter.	Press ⊙ (SET) to go back to the value reading and re-set the absolute reference.
🔋 Flashing battery symbol	Low Battery	Replace the battery (see cap. 9).

EU DECLARATION OF CONFORMITY (DOC)

WE

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Declare that the DoC is issued under our sole responsibility and belongs to the following product:

PRODUCT: Magnetic measuring system
APPARATUS MODEL: MPI-R10
TRADE MARK: Elesa

The object of the Declaration described above is in conformity with the relevant Union harmonization legislation:

2014/30/EU(EMC): Radio Equipment Directive
2011/65/UE (RoHS): Restriction of the use of certain Hazardous Substances in electrical and electronic equipment

The following harmonized standards and technical specifications have been applied:

EN 61326-1:2013

Notified Body:

Not Involved (Annex II - Conformity Assessment Module A)

Additional information:
Software Version: 5.1 or higher

PLACE, DATE OF ISSUE: CARLO BERTANI
Monza – Italy   MANAGING DIRECTOR
18/05/2020   GENERAL MANAGER