DD51-E
DD51-E-RF

Electronic position indicators

OPERATING INSTRUCTION

elesa®

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1 Safety Instructions

The product has been designed and manufactured in accordance with the current regulations. The product leaves the factory ready for use and complies with the safety standards.
To maintain the product in this state, it is necessary that it is assembled and used properly, in the closest compliance with this instruction manual and with the following specific safety precautions.
Ensure that the user has read and understood the instruction manual and in particular the chapter “Safety Instructions”.
In addition to the instruction manual, all the rules of law must be observed, in regard to accident prevention and environmental protection.
This manual is intended as an indispensable supplement to the existing documentation (catalogues, data sheets and assembly instructions).

The use without complying with the descriptions / specific parameters, in combination with systems / machines / processes to be controlled, it can lead to a malfunction of the product, causing:
- health hazards,
- environmental hazards,
- damage to the product and its proper functionality.

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.
Do not open nor modify the case of the indicator. Tampering with this product may endanger the correctness and accuracy of its operation.
In case of malfunction, do not attempt any repairs to the units and contact Elesa sales office.

1.1 Release Informations

Even if almost all the functionalities are the same as in the previous releases, the maual refer to devices with release higher than 5.01.00 (see cap. 8.6.3).

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

DD51-E position indicators, with battery power supply, can be used on passing through shafts in any position to provide the reading of the absolute or incremental positioning of a machine component.

Mechanical and electrical characteristics	
Power supply	Lithium battery CR2450 3.0 V
Battery life	Up to 5 years (3 years for RF version)
Display	5-digit LCD of 8 mm height and special characters
Reading scale	-19999; 99999
Number of decimal digits	programmable (1)
Unit of measure	mm, inches, degrees programmable (1)
Rotation max. speed	300/600/1000 r.p.m. (2) programmable (1)
Precision	10.000 impulses/revolution
Protection level	IP65 or IP67
Working 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) See cap. 8.1

(2) Default: 600 r.p.m.

WARNINGS!

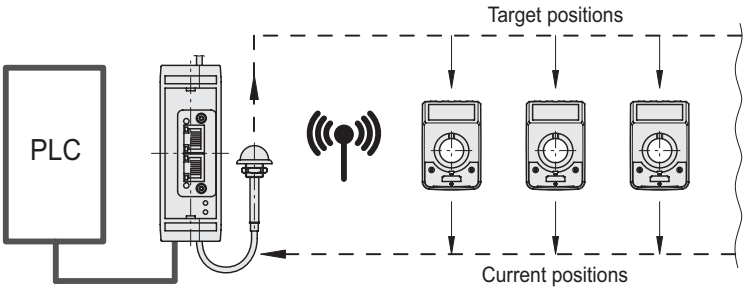
Higher rotation speeds to 600 r.p.m. can be maintained for short periods of time.
The value of the max speed affects the battery life.

2.1 Wireless devices network

DD51-E-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



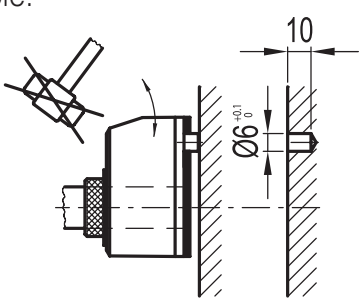
The control unit UC-RF is provided with a standard interface for the most common industrial busses to be connected to the PLC and allows the transmission of the information between the PLC and the DD51-E-RF position indicators.

The UC-RF exchanges information with the DD51-E-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.

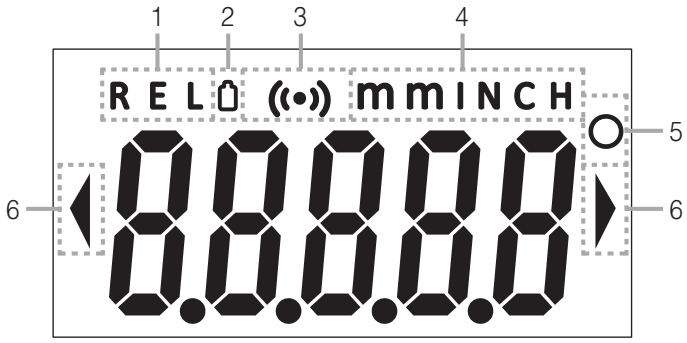
WARNINGS! Check the UC-RF instruction for more detail regarding the configuration.

3 Assembly

1. Drill a Ø 6x10 mm hole in the body of the machine with a 22 mm centre distance from the shaft to fit the rear referring pin.
2. Fit the indicator onto the shaft and make sure that the referring pin fits into the hole.
3. Clamp the bushing to the shaft by tightening the grub screw with hexagon socket and cup end, according to UNI 5929-85.

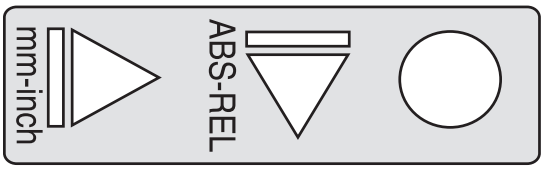


4 Symbols on the display



1. Relative mode indicator
2. Low battey level indicator
3. RF connection indicator
4. Unit of measure (mm / inch)
5. Unit of measure (degrees)
6. Target position indications

5 Key function



WARNINGS!

The keys' icons are conventionally shown with the default display rotation set to 180.

Key	Operating mode	Programming mode
○	Keep pressed for 3 sec to enter the programming mode. When the target is active, pressing the key will show the actual position or the target position on the display accordance to the setting of the menu ____0 see cap. 7.5.2	Parameter selection / Confirm of parameter change

	Select the: Absolute measuring mode 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 increase / programming mode exit
	Press the key to select the unit of measure needed.The options available are: mm, inch and degrees. It is possible to choose one of the following options (see the 0____ 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	Scroll for parameters / digit selection
	Programmable with one of the following options (see the 0___0 voice of the menu – cap. 8.3): P_OrG [DEFAULT]: show and set the OriGin parameter P_StP: show and set the StEP parameter P_OFS: show and set the OFFS parameters OFF: the key combination is not assigned to any function in the operating mode.	N/A

	Programmable with one of the following options (see the __0_0 voice of the menu – cap. 8.3): L_0rG [DEFAULT]: the key combination sets the absolute value to the sum of the parameters Origin and Offset. 0FF: the key combination is not assigned to any function in the operating mode.	N/A
	To turn on the indicator, hold mm•inch then press the key. After the start-up sequence the indicator will be ready to be used (see cap. 6)	N/A

6 Turning on the system

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

To turn the indicator on hold mm•inch then pressing the key. The display will light up and the indicator will be ready to be used.

6.1 Turning off the system (only for storage)

To turn the system off enter the programming mode, select the rESEt parameter then press the key. At this point, press the button ABS•REL for 5 seconds; the display will turn off and the indicator will go into into sleep mode.

7 Operating mode

7.1 Absolute / incremental measuring mode selection

Press the key ABS•REL to select the absolute or incremental measuring mode.

If the incremental measuring mode is selected, the symbol REL is show on the display.

If the absolute measuring mode is selected no symbol is show on the display.

It is possible to change the key function chosing one of the available otions in the menu voice __0__

The available options are:

- *ArCLr* (default): passing from *ABS* to *REL* the counter is set to zero.
- *Ar*: passing from *ABS* to *REL* the counter is not set to zero. In this case, the counter is set to zero by pressing ○ + ABS-REL.
- *OFF*: the key ABS-REL is disabled and does not allow changing the selected measuring mode.

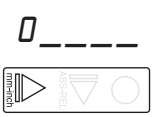
To program the parameters listed above, see cap. 8.

7.2 Unit of measure selection

Press the key mm-inch to select the unit of measure needed. The options available are millimeters, inches and degrees.

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

- *mm*: millimeters - *INCH*: inches - *D*: degrees



It is possible to change the key function chosing one of the available otions in 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
- *OFF*: the key is disabled and does not allow changing the selected measuring mode.

To program the parameters listed above, see cap. 8.

7.3 Setting the absolute reference

After having selected the absolute measuring mode and stopped the shaft in the starting position or in the reference position, press the key combination 

to set the absolute value to the sum of the values of the parameters *0rG* (absolute value of reference) and the selected *0FFS* (compensation value).

The value of compensation (offset) allows you to adjust the value shown on the display in such a way that takes into account, for example the 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 

, and then press the key 
to confirm.

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

To program the offset values, see parameter *0FFS* of cap. 8.

It is possible to change the key function chosing one of the available otions in the menu voice *__0_0*

The available options are:

- *L_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.

To program the parameters listed above, see cap. 8.

7.4 Direct programming of the absolute reference value (origin) – of the compensation value (offset) – of the reading after one revolution (step)

The function of the keys combination ○ + mm-inch allows direct access to the programming of one of the following parameters: Origin, Step or Offset.

It is possible to change the key function chosing one of the available otions in the menu voice 0___0

The available options are:

- P_0rG: direct programming of the absolute reference value (OrG parameter)
- P_StP: direct programming of the reading after one revolution (StEP parameter)
- P_0FS: direct programming of the compensation value (OFFS parameter)
- 0FF: the keys combination ○ + mm-inch is not linked to any function in the operating mode

For programming the parameters listed above see parameter 0___0 of cap. 8.3.

7.5 Targets

DD51-E allow to set up to 32 target positions to store relevant machine configuration setting.

To program the targets:

- selet tArGE in the main menu (see cap. 8.3)
- select PrOGt (see cap. 8.4)
- select the wanted memory location (PtG01 to PtG32) using the keys ABS-REL
- press the key ○ to select.
- follow the instruction in cap. 8.1 to set the wanted value.

To load a target:

- select *tArGE* in the main menu (see cap. 8.3)
- select *LOAdt* (see cap. 8.4)
- select the wanted target value (*LtG01* to **LtG32**) using the keys 

- press the key  to select.
- The value of the selected target is shown.
- Press  again to confirm or press 

to go back to the target selection list.

WARNINGS!
When a target is loaded the unit of mesure cannot be change.

7.5.1 Reaching the target position

When a target is selected the device will suggest the direction of rotation of the shaft to reach the target by means of the symbols ◀ and ▶

It is possible to set the tolerance of the target as absolute difference from the set value by means of the *PtOLL* parameter (see cap. 8)

The target position indicators will work, depending from the dir and *PtOLL* parameters, as in the following table:

T = set target
M = measured value
Toll = tolerance (see Ptoll)

	dir –o	**dir o--**
M < T - Toll	◀ (blinking)	▶ (blinking)
T - Toll ≤ M < T	◀	▶
M = T		
T < M ≤ T + Toll	▶	◀
M > T + Toll	▶ (blinking)	◀ (blinking)

If a target is selected, is possible to cancel it entering in programming mode and selecting the *StoPt* option.

7.5.2 Target display mode

The menu voice ____0 (see cap. 8.3) allows the user to choose one of the target following modes listed below:

- dtArG (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. 7.5.1. Pressing the key  the set target position is shown.

- dtoGo: 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. 7.5.1. If the target is not reached, the display blinks. Pressing the key  the display shows the actual absolute position.

- OFF: the key is not associated to any function in the operating mode.

7.5.3 Target tolerance

Set the value of Ptoll parameter to define the tollerance allowed for target (see cap. 8 for details).

7.6 RF version (DD51-E-RF)

7.6.1 Programming the network parameter (nEtid) and the channel parameter (nEtch)

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

nEt id: id 00/99 (NetID = 03 is reserved and is not possible to be used)

nEt ch: ch 01/36

These parameters can be configured in the Radio menu of the indicator (see cap. 8) and must be set according to the PLC recipe to guarantee a perfect communication between UC-RF and DD51-E-RF.

Warning

For DD51R-E-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

7.6.2 Targets

Using DD51-E-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 sameas decribed in cap. 7.5.

8 Programming mode

Press the key  for 3 seconds to enter the programming mode. Depending on the setting of *PASS* parameter (see cap. 8.6.4), the system may require you to enter a password.

Press the key  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 increase the flashing digit.

Press the key  to select the next digit.

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

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

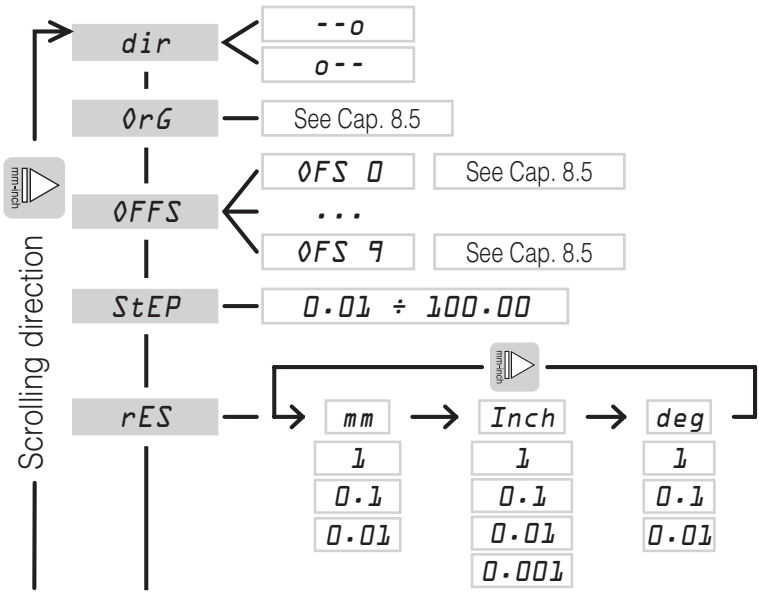
When a parameter is changed from its stored value, confirming it, the display will show the message *CHAnG*. When exiting from the programming mode, the parameter are stored in the internal memory. If a parameter was changed, the display will show the message *StorE*

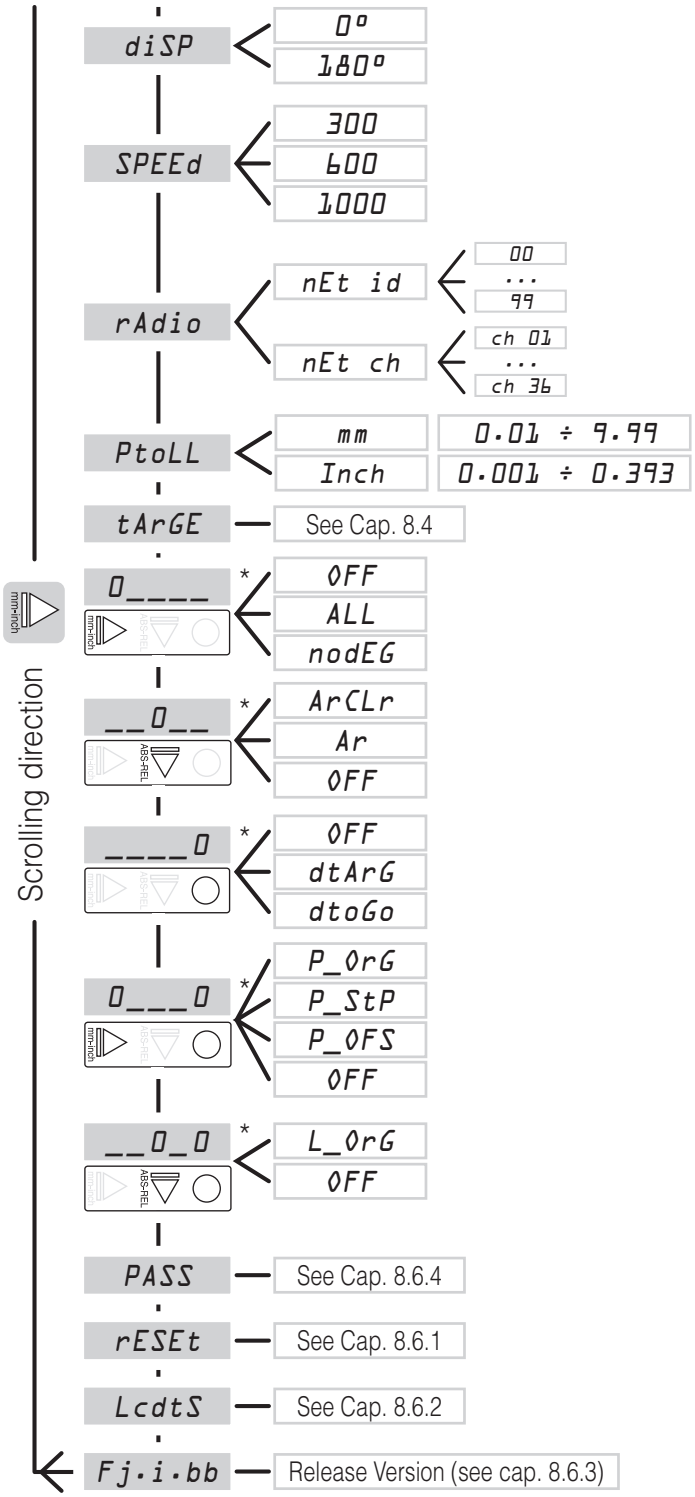
8.2 Device parameters (in alphabetic order)

Parameter	Description	Available options	Standard value
dir	Measurement direction Set direction of the positive axis	--o counterclockwise rotation to increment the measure o-- clockwise rotation to increment the measure	--o
diSP	Display orientation	0° 180°	180°
OFFS	Offset Value	See cap. 8.5 The system allows you to store up to 10 compensation values: OFS 0 ... OFS 9	0
OrG	Reference value displayed at the start point	See cap. 8.5	0.0
Ptoll	Tolerance of target position	mm: 0.01 ÷ 9.99 inches: 0.001 ÷ 0.393 degrees: 0.01 ÷ 9.99 The parameter value depends on the unit of measure selected.	mm: 0.10 inches: 0.004 Degree: 0.10
Radio	Wireless transmission parameters	nEt id: id00 ÷ id99 nEt ch: ch01 ÷ ch36	id00 ch01
rES	The parameter allows defining the resolution of the measure	mm: 1; 0.1; 0.01 inches: 1; 0.1; 0.01; 0.001 degrees: 1; 0.1; 0.01	mm: 0.1 inches: 0.01 degrees: 1
SPEEd	Set the maximum speed in rpm that can be correctly read	300; 600; 1000	600

Parameter	Description	Available options	Standard value
StEP	Reading after one revolution	0.01; 100.00	001.00
_____0 "t_Sho"	Display visualization during target mode	d_toGO: during the positioning the display show the distance from the target. Press the key ○ to show the actual position of the indicator. d_tArG: during the positioning the display show the present position, press the key ○ to show the target position to reach.	d_toGO
tArGe	Target options	See cap. 8.5	0.0

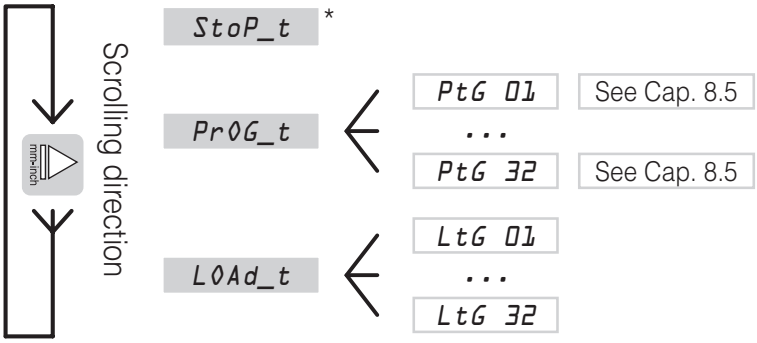
8.3 Main menu tree





* See key definition 7

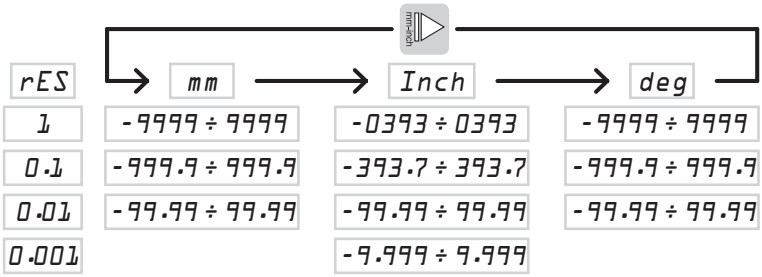
8.4 Target menù tree



* Displayed only if a target position is setted

8.5 Parameter value

The parameter value depends on the unit of measure and resolution set.



The value may change according to the resolutions of mm and inch.

Es.

If rES mm = 1 and res inch = 0.01

The max parameter in mm is -2539 ÷ 2539 because if we convert the value in inch 2539 / 25.4 = 99.96 which is the max value visible on the display with the res inch = 0.01

In case the parameter was 2540 it would not be possible to show the converted value because 2540 / 25.4 = 100.00

8.6 Addittional features

8.6.1 Reset

To reset the device to the factory setup:
- select the voice *rESEt* from the main menu (see cap. 8.3)
- change the value from *no* to *YES* by pressing the key 
- press the key  to confirm

8.6.2 Test LCD

The *LcdtS* voice in the main menu allow to switch on all the display segments and symbols.

8.6.3 Release version

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  .
Please note these values and communicate them to Elesa in case of support needed.

8.6.4 Password

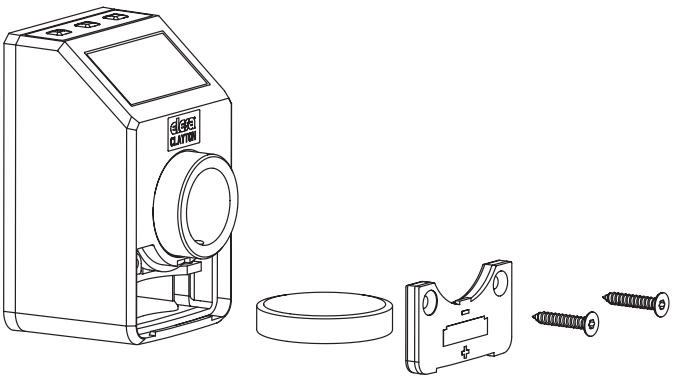
It is possible to avoid the unwanted access to the device menu by choosing "*on*" in the *PASS* voice of the menu.
In this case to enter the menu is asked to insert the correct password: 22011 (see cap. 8).

9 Battery replacement

The internal lithium CR2450 - 3.0 V battery ensures up to 5 years battery life (3 years for RF version).

The symbol  is shown on the display when the battery replacement is required.
The replacement is made by simply unscrewing the two TORX T6 screws and removing the front cover, without disassembly the indicator from the control shaft and keeping unchanged all the configuration parameters.

To simply remove the battery from the battery compartment, we recommend the use of a magnet. 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.



10 Problem solving

Message on the display	Description	Action
- - - - -	Exceeding the reading scale (-19999;99999) The value cannot be shown on the display.	The system continues to measure displacements; the value will be shown on the display again if re-included in the reading scale
S_Err	The shaft speed has exceeded the max system speed (see table on cap. 8).	Press ○ 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

COMPANY NAME:	Elesa S.p.a.
POSTAL ADDRESS:	Via Pompei 29
POSTCODE AND CITY:	20900 Monza
TELEPHONE NUMBER:	+39 039 28111
E-MAIL ADDRESS:	info@elesa.com

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

PRODUCT:	Electronic position Indicators
APPARATUS MODEL:	DD51-E
TRADE MARK:	Elesa

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

2014/30/UE (EMC): Electromagnetic Compatibility 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

EU DECLARATION OF CONFORMITY (DOC)

WE

COMPANY NAME:	Elesa S.p.a.
POSTAL ADDRESS:	Via Pompei 29
POSTCODE AND CITY:	20900 Monza
TELEPHONE NUMBER:	+39 039 28111
E-MAIL ADDRESS:	info@elesa.com

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

PRODUCT:	Electronic position Indicators
APPARATUS MODEL:	DD51-E-RF
TRADE MARK:	Elesa

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

2014/53/UE (RED): 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
- EN 61010-1:2010
- ETSI EN 301 489-1 V2.1.1
- ETSI EN 301 489-1 V2.2.3
- ETSI EN 301 489-17 V3.2.2
- Draft ETSI EN 301 489-17 V3.2.2
- EN 61326-1:2013
- ETSI EN 300 328 V2.2.2

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

ELESA S.p.A.
Via Pompei, 29
20900 Monza (MB) Italy
phone +39 039 28111
fax +39 039 836351
info@elesa.com
www.elesa.com