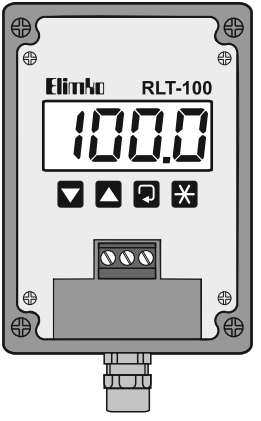
E-RLT-100
Radar Level Transmitter
User Manual



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WARNINGS:

E-RLT-100 Radar Level Transmitter is designed for measuring material level in silos and bins. Only appropriate in industrial environment.

The package of E-RLT-100 recorder contains;

E-RLT-100 Level sensor
4 pieces of mounting nut and bolts
User Manual
Guarantee Certificate
E-RLT-100 Configuration Software

- After opening the package, please check compatibility of the contents with the above list. If the delivered product is wrong type, any item is missing or there are visible defects, contact the agent from which you purchased the product.
- Before installing and operating the level sensor, please read the user manual thoroughly.
- The installation and configuration of the sensor must only be performed by a person qualified in instrumentation.
- Keep the unit away from flammable gases that could cause explosion.
- The product life of this instrument is 10 years.

CE

❑ This device complies with the European Low Voltage Directive 2006/95/EC, by the application of safety standard TS EN 61010-1. (Pollution Degree 2)

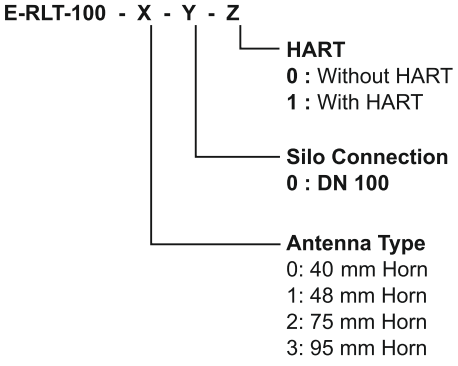
❑ This device complies with the EMC Directive 2004/108/EC by the application of EMC standard TS EN 61326.

1 - DESCRIPTION

E-RLT-100 series Radar Level Sensors is designed for measuring material levels in silos and bins. 24 Ghz K-Band FMCW Radar enables very narrow beamwidth radiation and high resolution reliable measurement. Two wire 4-20 mA electrical interface with optional HART output makes installation easy and decreases maintenance cost. Antenna options with different lengths can be adapted to several process conditions.

- 24 GHz K Band High Resolution FMCW Radar
- Very narrow beamwidth enabling interference free measurement in small silos.
- Stainless steel Horn antenna with different sizes
- 4-20 mA two wire easy connection
- Optional HART 7.0 communication interface
- Front panel LCD display for easy configuration of sensor parameters.
- False echo and interference elimination filtering
- PC configuraton software
- IP-65 Aluminyum Sensor Housing

1.1 - Type Coding



1.2 - Technical Data

Applications	Level measurement for solids and liquids
Max. range	35m
Measurement accuracy	± 5mm
Process connection	Flanged DN 100 PN 6
Antenna material	AISI304L
Process temperature	- 40 ... + 130 °C
Process pressure	- 1 ... 6 bar
Frequency range	24 … 26 GHz
Power supply	20 ... 35VDC
Output signal	2 wires 4 ... 20mA, HART (**optional**)
Output Resolution	0.25µA (16 bit)
Load	(VDC-19) x 50Ohm. (**see Figure 1**)
Cable input	PG 11 Cable Gland
Connecting terminals	Max. wire section 2.5mm²
Housing	Aluminium
Ambiant Temperature	- 20 ... + 50 °C
Storage Temperature	- 30 ... + 70 °C
Antenna Type (Beamwidth)	Antenna Diameter (Beam Width)
	Ø 40mm (20 º), Ø 48mm (15 º), Ø 75mm (10 º), Ø 95mm (8 º)

1.2 - Technical Data

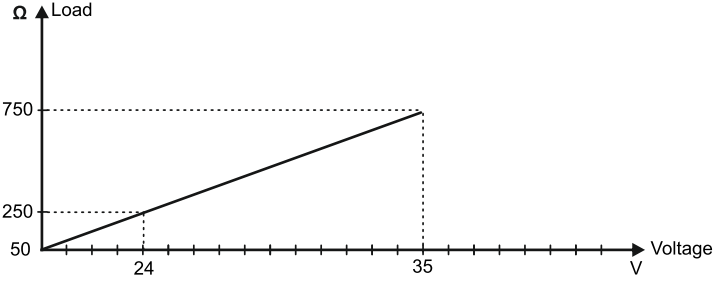


Fig.1 2-wire Load Resistance Diagram

1.3 - Accuracy

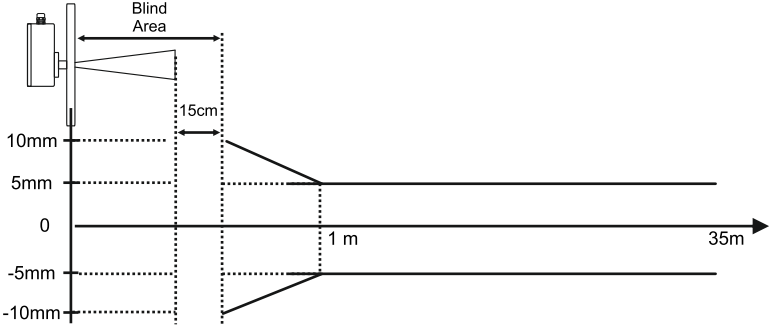
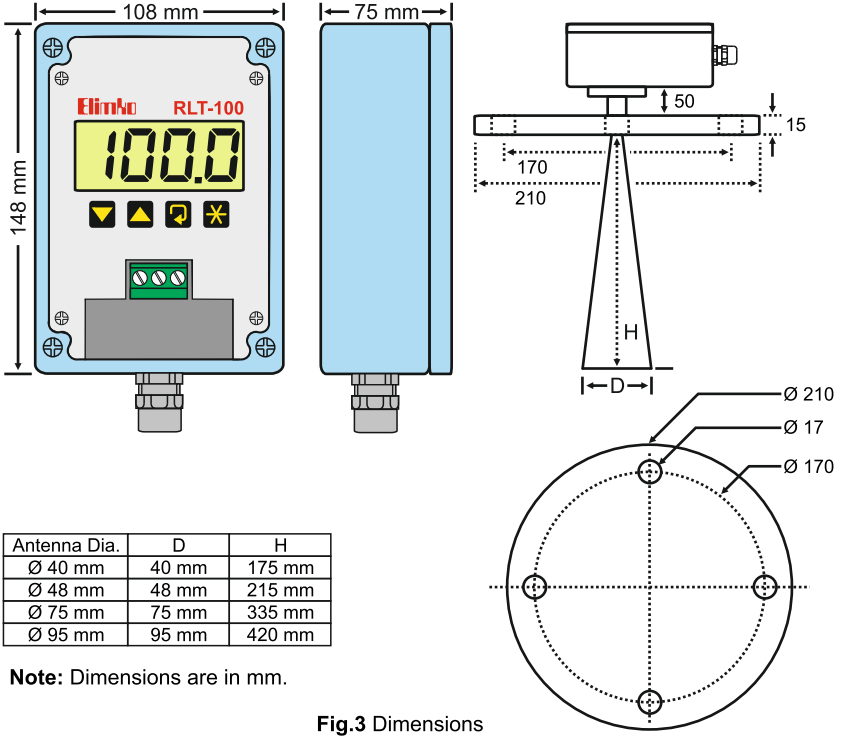


Fig.2 Accuracy

1.4 - Dimensions



Antenna Dia.	D	H
Ø 40 mm	40 mm	175 mm
Ø 48 mm	48 mm	215 mm
Ø 75 mm	75 mm	335 mm
Ø 95 mm	95 mm	420 mm

Note: Dimensions are in mm.

Fig.3 Dimensions

1.5 - Mounting

E-RLT-100 level sensor measure distance between Offset distance and (1) empty silo distance (2), both of which are referenced to the reference plane shown in **Figure 4**. Offset distance should include the blind zone which starts from reference plane and ends at 15 cm beyond the antenna aperture. Output range is defined in terms of level other than distance and should be defined in the measurement zone determined by Offset and Max. Distance.

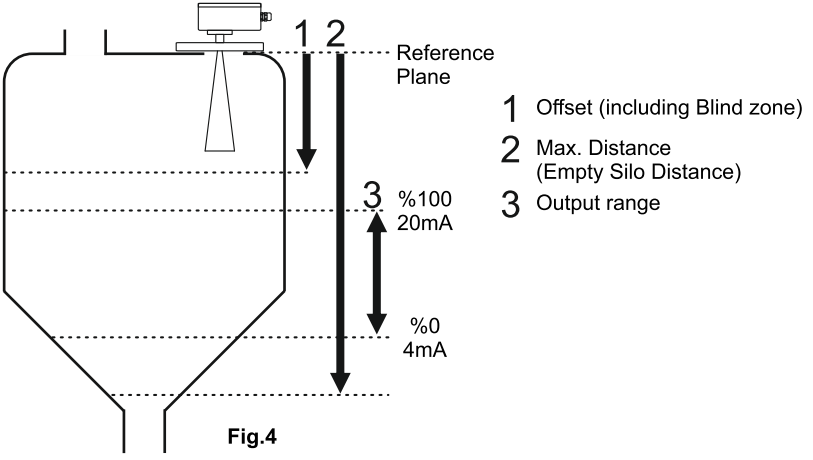


Fig.4

WARNING - To prevent damage to the sensor, mechanically remove the sensor before doing any arc welding and mechanical work in close vicinity of the sensor.

1.6 - Mounting Position

The minimum distance between the instrument and the vessel wall must be 50 cm (**Fig.5**).

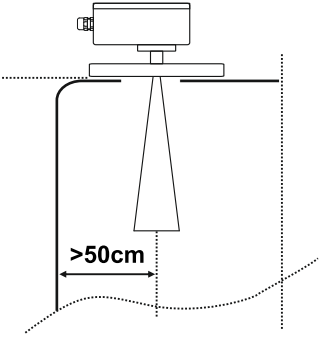


Fig.5 Mounting position

1.6 - Mounting Position

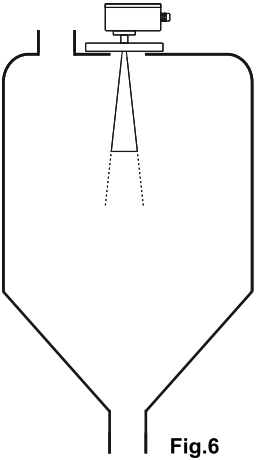


Fig.6

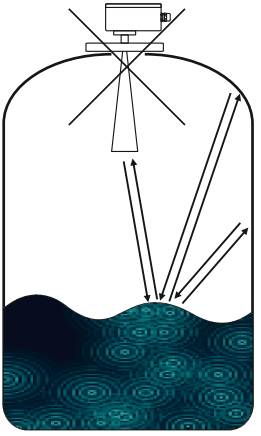


Fig.7

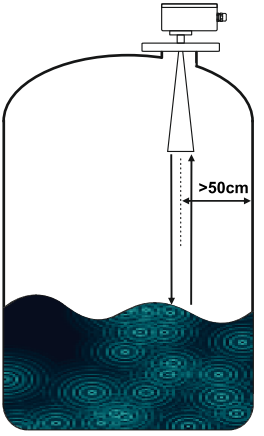
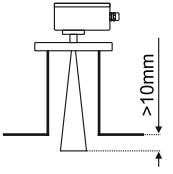


Fig.8

Sensor installation position on vessel top directly affects measurement accuracy. Precautions and recommendations described in this user manual should be adapted as much as possible in order to achieve reliable and accurate measurement. For the vessels with a conical bottom and flat top, position the sensor at the centre of vessel top for the widest coverage of material level (**Figure 6**). Contrary to that, the sensor should be positioned off centred for the vessels with flat bottom and curved top structure in order to eliminate multiple reflection (**Figure 7 and 8**)

1.6 - Mounting Position



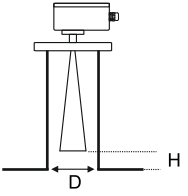
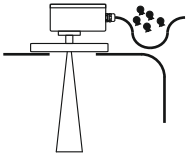


Table 1

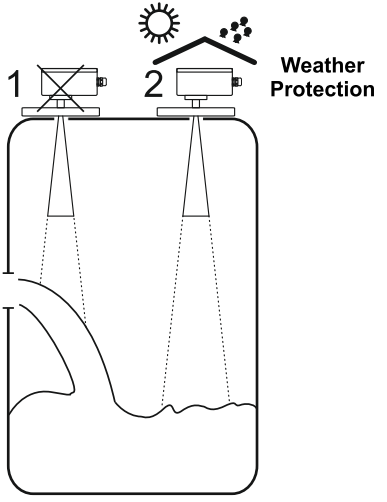
D	H
5 cm	<20 cm
7 cm	<25 cm
10 cm	<30 cm
15 cm	<50 cm
25 cm	<80 cm

Depending on stand pipe height and diameter, some installations can pose risk to measurement reliability by hindering RADAR emission. A s a general rule, the antenna should must protrude 10 mm into vessel after the stand pipe end. If it is not possible, maximum stand pipe height and stand pipe diameter should be examined from **Table 1**.

1.6 - Mounting Position



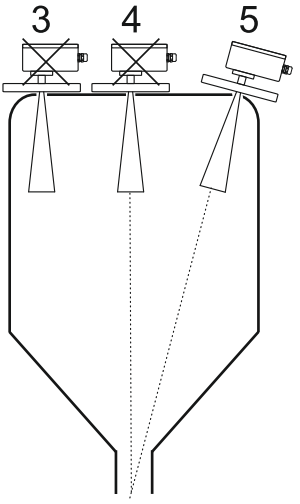
The cable should be formed as shown above in order to eliminate possible infiltration of water and other liquids.



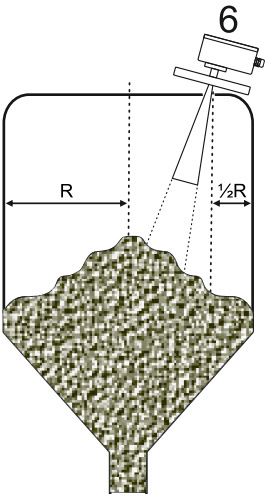
1) Avoid intersection of radiation beam and filled material beam in order to eliminate false echos during filling.

2) Install weather protection in order to decrease sun heating effect and to eliminate rain and dust.

1.6 - Mounting Position

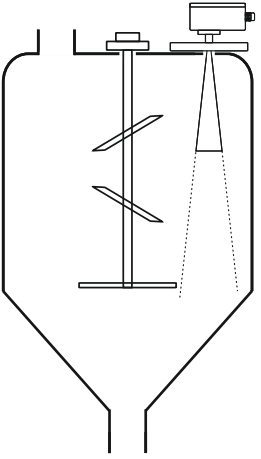


3,4,5) In silos with granules material, the antenna should be focussed toward silo discharge and should be located off-centered.



6) Half radius trace and silo discharge focus is the best positional installations for the radar and should be practised as much as the mechanical system allows.

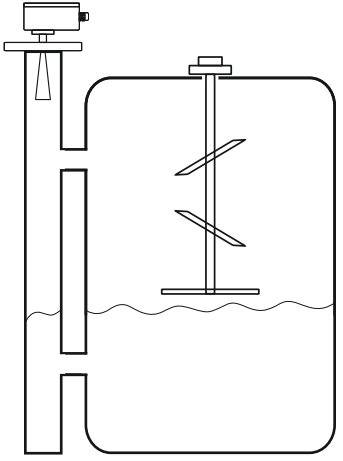
1.6 - Mounting Position

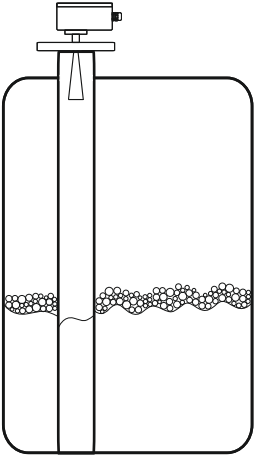


For the silos equipped with agitators, perform a false-echo storage in order eliminate false reading caused by agitator bladers. (**see Calibrator Parameters**)

1.6 - Mounting Position

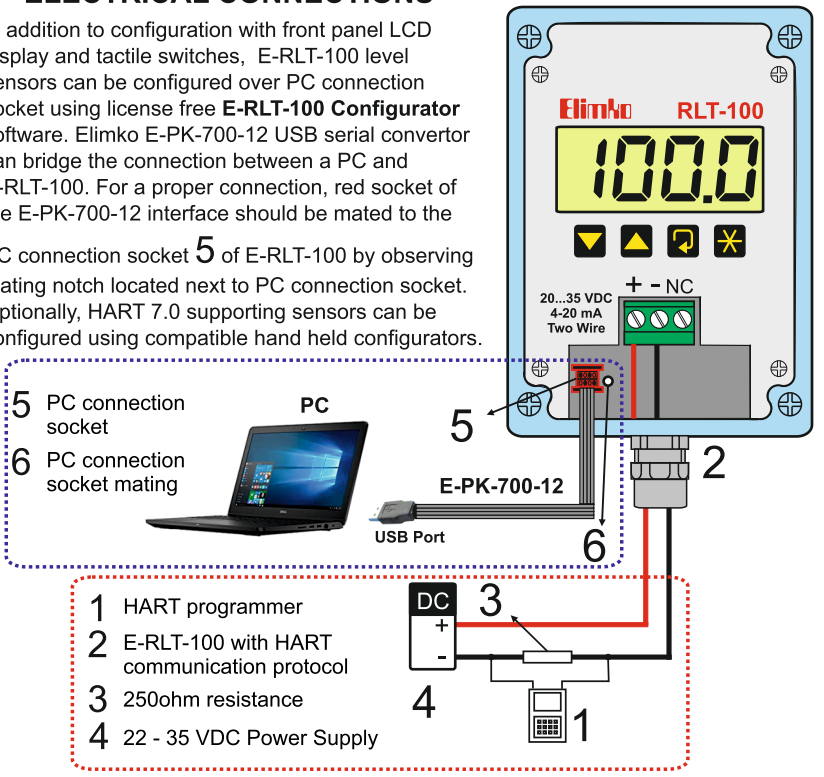
In case of a very turbulent material and several clutters like agitator, barriers, opt for installation with stilling or by-pass pipe in order to eliminate false reading. Stand pipe or by-pass pump diameter should be more than 100 mm for proper operation of microwave transmission.





2 - ELECTRICAL CONNECTIONS

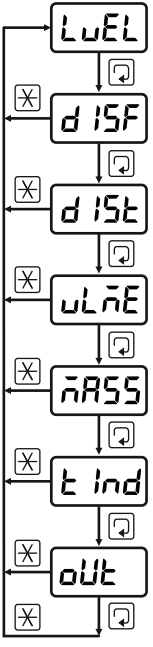
In addition to configuration with front panel LCD display and tactile switches, E-RLT-100 level sensors can be configured over PC connection socket using license free **E-RLT-100 Configurator** software. Elimko E-PK-700-12 USB serial convertor can bridge the connection between a PC and E-RLT-100. For a proper connection, red socket of the E-PK-700-12 interface should be mated to the PC connection socket 5 of E-RLT-100 by observing mating notch located next to PC connection socket. Optionally, HART 7.0 supporting sensors can be configured using compatible hand held configurators.



3 - MENU STRUCTURE

In Normal Operation State (NOS) in which menu is not active, several different process variables can be switched on display using ⟲ key. Pressing ✳ key returns to LuEL display. Please see in **Figure 9** for other possible process input and output variables available in NOS.

Normal Operation State:



Level (in selected unit)

Distance (Filtered) (in selected unit)

Distance (Instantaneous) (in selected unit)

Volume = uLoF + uLCF*LuEL
Volume is calculated linearly using measured level with an added offset. uLCF = Volume per unit of level. uLoF= Volume Offset.

Mass= dEnS * uLnE
Mass is calculated using configured density value based on calculated volume.

Target Detection Index.
Raw detection value based on measured echo. Used for diag. Only.

Output Current (mA)

Fig.9

3 - MENU STRUCTURE

In Normal Operation State (NOS), pressing [↵] and [✳] keys together accesses to configuration pages. Prior to configuration access, Cod is requested. After entering the correct code using [▲] and [▼], pressing the [↵] key reaches page selection parameter. Please see in **Figure 10** for available page selections. After selecting desired page using [▲] and [▼], pressing [↵] key enters to selected page. Factory default of Cod is 10 and can be adjusted to any other value using PASS parameter which resides in CLbr page.

When Cod is forgotten, pressing [▲][▼][✳] keys together deactivates code authenticity for the consecutive menu access.

Configuration Pages :

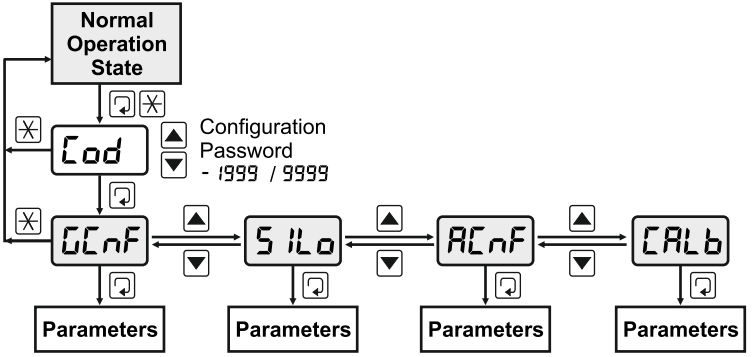
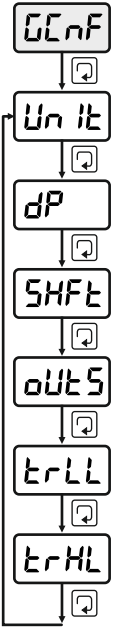


Fig.10

3 - MENU STRUCTURE



Basic Parameters

Distance Unit
mm, cm, m, inch (mm, Cm, m, InCH)

Decimal Point
0, 0.0, 0.00, 0.000 (0, 0.0, 0.00, 0.000)

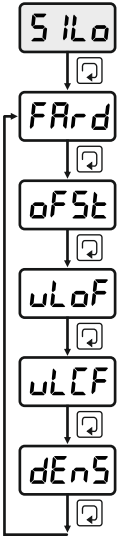
Level Shift Value. This parameter defines an offset value which is added to calculated level value.
-1999 / 9999 (-1999 / 9999)

Transmission variable: This parameter selects any of the following variables for output current transmission.
LEVEL, VOLUME, MASS, DISTANCE
(LEvL, voLm, mASS, d ISt)

4mA Transmission Value
0 - 9999 (0 - 9999)

20mA Transmission Value
0 - 9999 (0 - 9999)

3 - MENU STRUCTURE



Silo Parameters

Silo Height, Distance from reference plane to farthest point of measurement (in selected unit)
75 - 3500 (75 - 3500) (See Figure 4.)

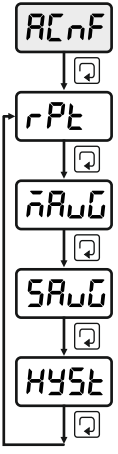
Offset, Distance from reference plane to nearest point of measurement (in selected unit)
50 - 1000 (50 - 1000) (See Figure 4.)

Volume Calculation Offset
0 - 9999 (0 - 9999)

Volume per unit of Level
(Volume= uLoF + uLCF*Level, Mass=Volume*dEnS
0 - 9999 (0 - 9999)

Density (mass per volume)
0 - 100 (0 - 100)

3 - MENU STRUCTURE



Advance Configuration

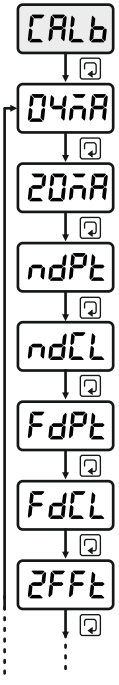
Repeat. Repeating of measurement value in hysterisis band before it takes effect. 0 - 10 (0 - 10)

Measurement Average. Number of past measurement to be averaged for filtered distance calculation.
1 - 32 (1 - 32)

Spectral Average. Number of past echos to be averaged in range calculation. This parameter causes additional delay to the measurement with added SNR improvement.
1 - 32 (1 - 32)

Measurement Hysteresis (in cm). Defines hysteresis of repeating detection algorithm. Please see rPt parameter.
0 - 20 (0 - 20)

3 - MENU STRUCTURE



CALb — Calibration Parameters

04mA — 4 mA Calibration. This device is factory calibrated and does not need any recalibration. For a recalibration, measure the loop current and change this parameter until the loop current becomes 4 mA . 0 - 9999 (0 - 9999)

20mA — 20 mA Calibration. This device is factory calibrated and does not need any recalibration. For a recalibration, measure the loop current and change this parameter until the loop current becomes 20 mA. 0 - 9999 (0 - 9999)

ndPt — Near Distance Point (in cm). Near distance calibration point. 50 - 1000 (50 - 1000)

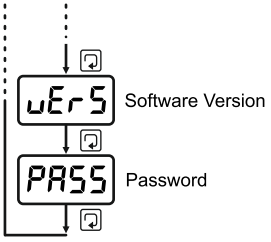
ndCL — Near Distance Calibration. Locate a target at Near Distance point and press ▲ and ▼ together to complete the near distance calibration. 0 - 9999 (0 - 9999)

FdPt — Far Distance Point (in cm). Far distance calibration point. 100 - 4000 (100 - 4000)

FdCL — Far Distance Calibration. Locate a target at Far Distance point and press ▲ and ▼ together to complete the far distance calibration. 0 - 9999 (0 - 9999)

2FFt — Empty silo echo storage. Sets and resets empty silo echo storage. If SET is selected, current echo is saved to the echo storage memory and RSET selection resets memory storage. This feature eliminates false echos caused by ladders, agitators etc and results more reliable measurement. (nooP, SEt, rSEt)

3 - MENU STRUCTURE



TS EN ISO 9001

Quality Management System Certificate

KY-RLT100-1017-0

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