SMART RANGER 2 MANUAL

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1.1   Scope

This manual is written according to the following hardware and software version and is only reliable for the specific version.

SW version 1.2.0

Date: 9th of October 2020

2   INTRODUCTION TO SMART RANGER 2

2.1   Mounting of the base station

SMART RANGER 2 is a tiny ultrasonic and radio distance measurement tool for filmsets.

The measurement system consist of a BASE UNIT and up to 2 radio TAGs. The ultrasonic sensor and the transmitter for the radio TAGs are part of the BASE UNIT. The distance between BASE UNIT and radio TAG is measured automatically. 2 TAGs can be used simultaneously with one BASE UNIT.

The ultrasonic sensor consists of 2 funnel-shaped apertures which have to be aligned at the desired motive when the BASE UNIT is mounted.

For fixing at the camera or at the matte box the SMART RANGER 2 BASE UNIT has 3x 1/4-20 UNC threads. With these the unit can be fixed to camera or matte box with common fixing tools.

By default the SMART RANGER 2 display is situated at the right side of the camera but it is also possible to operate it on the left side of the camera.

The BASE UNIT has 3 electric interfaces

- 1x LEMO 1B 6p (power, RS232)
- 2x LEMO 0B 4p (power, CAN bus)

on the back of the device.

The LEMO 1B 6p is equal to the standard "cinetape" connector. Any cable can be used between a Lens Control System LCS and the "cinetape" measurement device for supplying electricity to SMART RANGER 2 and transfer the data to the LCS.

When the LCS can't supply electricity via the 6p cable the BASE UNIT can be also supplied with the 4p connector.

After installation and plugging in of a cinetape cable SMART RANGER 2 is switched on at the back side of the BASE UNIT.
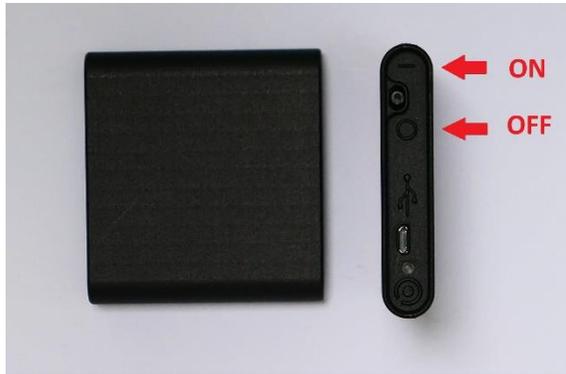
Immediately after activation the ultrasound measurement value is displayed at the display.

If one or both TAGS are also switched on the measurements can be seen directly on the display. There is a separate power switch for the TAGs.

The reference mark for the distance „0m" is situated at the front of the BASE UNIT where the apertures for the ultrasound sensor are visible. The reference mark for the radio TAG is beside the qinematiq icon, also at the front of the device.
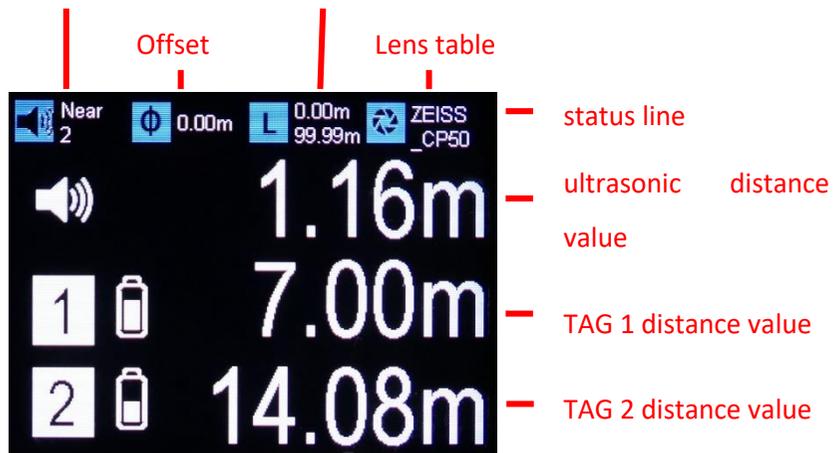
2.2   Display of distance values and general settings

At the BASE UNIT there are 5 buttons for the settings:

- Left: UP, MENU (M), DOWN
- Below: SET A, SET B, SET C

SMART RANGER 2 has two different display indications:

- **Triple distance readout**

The status line is always in the upper row of the display:

- US Range & Sensitivity: The ultrasonic measurement range and sensitivity are displayed
- Offset: The distance of the BASE UNIT to the film plane
- Limit: Limit Near und Limit Far are displayed
- Lens: The chosen lens table is displayed

Below the status line 3 distance measurement values are visible:

- Above: Distance measurement value of the ultrasound sensors

US Range & Sensitivity   Limits
Offset   Lens table
status line
ultrasonic distance value
TAG 1 distance value
TAG 2 distance value

- Middle: Icon TAG1, battery status and distance measurement value
- Below: Icon TAG2, battery status and distance measurement value

status line

merging distance value

ultrasonic value

handover value

TAG 2
TAG 1

- **Single distance readout with merging distance value:**

- The merging distance value is in capital letters is in the middle of the display. This merging distance value is calculated from the ultrasound measurement and the distance of TAG 1. See chapter 2.4 for more details.
- Lower row:
  - Left: Ultrasonic distance measurement value

  - Middle: Handover distance value
    This value determines at which distance the change from TAG to ultrasonic measurement is done.

  - Right: 2x TAG distance measurement value
    A white icon (quadrat) is shown if a TAG is available.

The distance measurement values which are active and included in the merging distance calculation are shown in white characters.

The status line is in the upper row.

Pressing the button MENU (M) 2 times leads to the MAIN MENU.

By pressing the button MENU again the distance readout selection (SR GUI) can be changed.

- 1x: Single distance graphic user interface (GUI) with merging distance value
- 3x: Triple distance graphic user interface

The digit which can be changed is indicated as a red character.

With the buttons UP / DOWN the digit can be changed.

By pressing the button SET B the adjustment is fixed.

By pressing the button SET A you live the MAIN MENU.

Single distance graphic user interface (GUI)

SR GUI	3x
Sampling rate	3
Brightness	3
Limit Near	0.00m
Limit Far	99.99m
Handover	4.0m

>Esc<   >Back<   >Enter<

Near 2   0.00m   0.00m 99.99m   ZEISS _CP50

1.16m

1   7.00m

2   14.08m

Triple distance graphic user interface (GUI)

2.3 Ultrasonic and TAG distance measurement

After switch-on either single or triple distance readout is shown at the display depending on how the device was turned off.

2.3.1 Triple distance readout

If no TAG is switched on only the ultrasound measurement value is visible.

This value is shown in white characters; the characters for TAG 1 and TAG 2 are shown in grey characters.

After switching on TAG1 (with a correct channel selection) the icon for TAG1 and the distance measurement value of TAG1 are shown after a few seconds. Additionally the battery status symbol is visible. The display of TAG1 changes from grey to white characters.

If you switching on a TAG and no value is visible please check the supply of the TAG and the channel setting (MAIN MENU > SETTINGS > TAG channel).

Also after switching on TAG2 the icon, the distance measurement value and the battery status symbol for TAG2 are visible.

The battery status symbol for TAG1 and TAG2 has 4 grades. In grade 1 the symbol is red meaning that the TAG will fail during the next fifteen minutes. The TAG battery runs for more than 20 hours and can be charged with a 5V USB charger.

If TAG 1 and TAG 2 are switched on a mean value of TAG1 and TAG 2 can be built. The mean value is shown in-between the lines of TAG1 and TAG2. To switch the mean value on press the button SET C.

As example the mean value is helpful to determine the center of a car. For this purpose on TAG is placed in the front of the car and the other is in the rear trunk.

The mean value can be switched of by pressing the button SET C again.

2.3.2 Single distance readout

In the middle of the display the merging distance value is visible. The following chapter will explain this distance value and its calculation.

The lower line of the display show the measurement values for the ultrasonic sensor, the two TAGS and the handover value.

2.3.3 Range, sensitivity and offset of ultrasound signal

The sensitivity, range and offset of the ultrasonic beam can be adjusted in the QUICK MENU.

The SMART RANGER 2 ultrasound sensor has three different sensitivities:

- 1:   Low sensitivity
- 2:   Medium sensitivity
- 3:   High sensitivity

A high sensitivity (= 3) increases the possible range of the ultrasonic signal but also captures more lateral interference. A low sensitivity (= 1) reduces the lateral interference, but also reduces the possible range.

A measurement should start with sensitivity 2 ideally.

The sensitivity can be adjusted in the QUICK MENU. Pressing the button MENU leads to QUICK MENU. The sensitivity can be adjusted by pressing the button SET A.

The SMART RANGER 2 ultrasound sensor has two different ranges:

- NEAR: Measurements up to 4,8m
- FAR: Measurements up to 9m

The NEAR setting reduces the measuring range, but also reduces the lateral interferences again, and accelerates the measurement.

The range can be adjusted in the QUICK MENU. Pressing the button MENU leads to QUICK MENU. The range can be adjusted by pressing the button SET B.
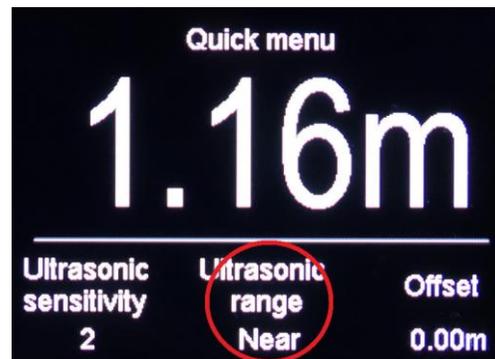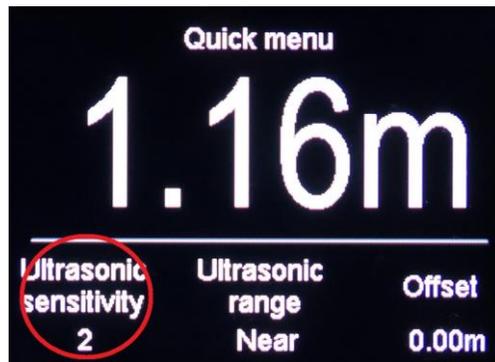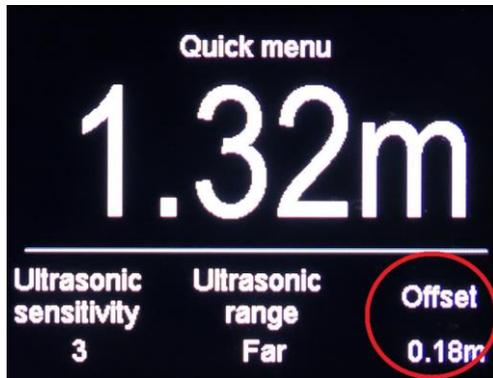
The reference mark for the distance „0m" is situated at the front of the BASE UNIT where the apertures for the ultrasonic sensor are visible. Please measure the distance between the reference mark of the BASE UNIT and the film plane of the camera. Normally the BASE UNIT is mounted next to the lens and is placed in front of the film plane of the camera. For this set a positive value to add the offset to the measurement value. The offset value is calculated in the measurement values for the ultrasonic and the TAG sensors.

An offset value is adjusted in the QUICK MENU. Pressing the button MENU leads to QUICK MENU. By pressing the button SET C the value starts to blink. It can be changed by button UP/DOWN. Blinking stops automatically after 3s.

The information about sensitivity, range and offset can be found in the status line.

2.4   Merging distance value and handover value

Ultrasonic Distance

TAG Distance

Merging Distance
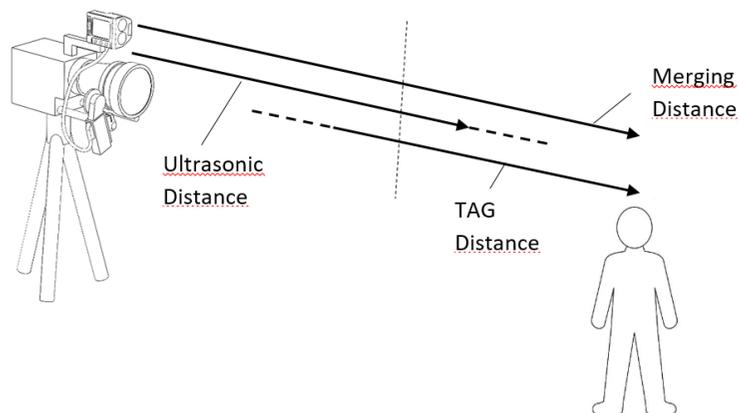
Merging Distance

From the ultrasonic distance measurement value and the distance measurement value of TAG 1 a merging distance value can be calculated and transmitted to the Lens Control System. The merging distance value can be used to control the focus motor.

The advantage of the ultrasonic sensor measurement is the excellent accuracy in close ranges in front of the camera. Measurements over 4m get more and more difficult and over 6 or 8m eventually impossible. The measurement with the TAG is possible for ranges over 80m. The advantage of the TAG measurement is that the measurement device need no alignment on the TAG. It works immediately after switch-on but the measurement is not as precise as the ultrasonic measurement and the TAG unit itself may not be visible in the cameras field of vision. Thus the SMART RANGER 2 System calculates a measurement value – the merging distance value – that combines the advantages of both sensor systems.

In close range the ultrasonic measurement is used as measurement value, in long range the TAG measurement. With SMART RANGER 2 it is possible switch between both measurement values automatically. Thus the merging distance values allow the permanent measurement of a motive that is moving from far range into close range.

If the BASE UNIT is connected with a standard "cinetape" cable at the Lemo 6p connector the merging distance value is transmitted to the Lens Control System.

The merging distance value can be found in the single measurement readout. To build the merging distance value, individual sensors for the measurement can be switched on and off.

2.4.1 Triple measurement readout

By pressing button SET A the ultrasonic measurement can be switched on and off. When the ultrasonic measurement is switched off, it is not included in the calculation of the merging distance values. That means that only the TAG measurement value is equal the merging distance value. A switched on ultrasonic distance measurement value is shown in white characters, a switched off value is in grey characters.

Merging Distance

By pressing the key SET C a TAG measurement value can be switched on and off. When it is switched off it is not included in the calculation of the merging distance values. That means the ultrasonic value is equal the merging distance value. If a TAG is available, the icon and the battery symbol of the TAG are in white characters, when switched of the characters are grey.

Merging Distance

If TAG 1 and TAG 2 are switched on the mean value of TAG1 and TAG 2 can be built. The mean value is shown in-between the lines of TAG1 and TAG2. To switch the mean value on press the button SET C. In that case only the mean value is used for the calculation of the merging distance.

If both TAGs are switched on, the value of TAG1 is used to calculate the merging distance value.

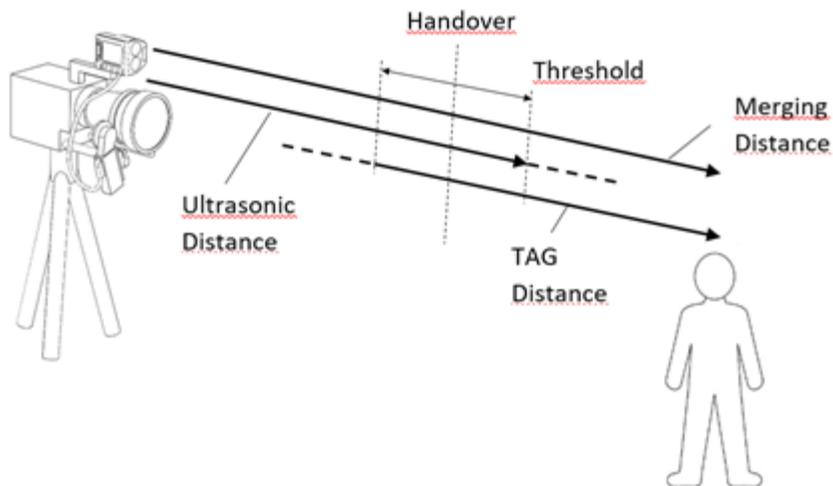Merging Distance

2.4.2 Single measurement readout

The single measurement readout shows the merging distance value in a large font. In the row below the ultrasonic measurement distance value, the handover value and the distance values for TAG1 and TAG2 are visible.

By pressing the button SET A the ultrasonic distance measurement value can be switched on and off.

Merging Distance

TAG1 value

By pressing the button SET C the TAG values can be switched on and off or a mean value of both TAGs can be build.

Is the TAG not available the icon and battery symbol of the TAG are in grey characters.

To switch off the mean value press button SET C again.

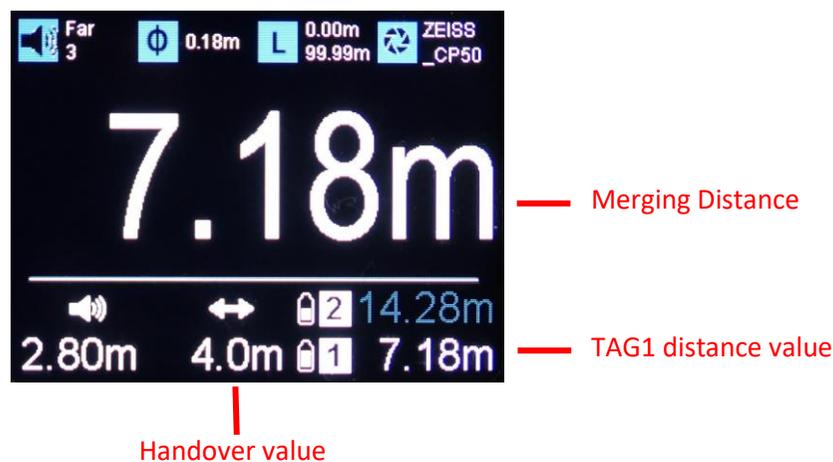Merging Distance

TAG1 & TAG2 mean value

2.4.3 Handover Value

The handover value defines the limit how near should the TAG value be used for the calculation of the merging distance value. The following calculation method is applied:

Is the TAG distance value considerably lower than the handover value, the merging distance value is equal to the ultrasonic distance value. The advantage of the ultrasonic sensor measurement is the excellent accuracy in close ranges in front of the camera.

Is the TAG distance value considerable higher than the handover value, the merging distance value is equal to the TAG value itself.

The merging distance value does not change erratically but with a transition which is determined by the threshold value. The threshold value can be changed in the MAIN MENU. A low threshold value causes rapid changes between ultrasound and TAG measurements and a higher value allows a smoother transition.

Example:

Handover value: 4m

Threshold: 1m

In case of a TAG distance value over 5m (= handover value + threshold) the merging distance value is calculated only from the TAG distance.

Merging Distance

TAG1 distance value

Handover value

In case of a TAG distance value between 3m and 5m there is a linear transition from TAG distance to ultrasonic distance.

In case of a TAG distance value below 3m (= handover value – threshold) the merging distance value is calculated only from the ultrasonic distance.

The single distance measurement readout shows the handover value between the ultrasound value and the distance value of the TAGs.

The handover value is adjusted by pressing the button SET B. When it starts to blink it can be changed by button UP/DOWN. Blinking stops automatically after 5s.

The handover value can also be changed in MAIN MENU. For the triple distance readout the handover value is only visible in MAIN MENU.

The threshold value can only by changed in MAIN MENU.

Merging Distance

TAG1 & TAG2 mean value

When TAG1 and TAG2 are active only the distance measurement value of TAG1 is included in the calculation of the merging distance value.

If TAG 1 and TAG 2 are switched on the mean value of TAG1 and TAG 2 can be built. The mean value is shown in-between the lines of TAG1 and TAG2. In that case the mean value is included in the calculation of the merging distance value.

2.5   QUICK MENU und MAIN MENU

Pressing the button MENU (M) leads to QUICK MENU. Pressing the button MENU again opens the MAIN MENU.
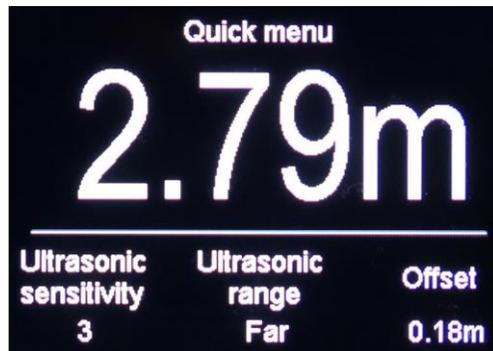
2.5.1 QUICK MENU

The window for QUICK MENU is open for two seconds, afterwards the display automatically changes back to the main display that is showing the distance measurement values.

In QUICK MENU three adjustments can be done by pressing the button SET A, SET B or SET C

- SET A   Ultrasonic sensitivity   1,2,3
- SET B   Ultrasonic range   Near, Far
- SET C   Offset   Dertermines the distance from the BASE UNIT to the filmplane

Please see chapter 2.3.3 for more details.

2.5.2 MAIN MENU

The MAIN MENU is divided in 3 submenus:

- SETTING
- LENS table
- INFO

With the buttons UP / DOWN the submenu can be selected. A blue icon shows the selected submenu.

By pressing the button MENU the selection is confirmed and the submenu can be adjusted.

2.5.3 Function of the buttons in MAIN MENU

Button MENU (M):   Selection and confirmation or calling next value

Button UP, DOWN: Adjustment of values

Button SET A: ESC - Exit MENU

Button SET B: BACK – One step back

Button SET C: NEXT or ENTER – Confirmation of value or calling next value

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2.6   MAIN MENU>SETTING

The following functions can be adjusted:

- SR GUI: 1x, 3x
  Changing between single and triple distance readout

- Sampling Rate   1,2,3,4
  Determines the sampling rate for the measurement sensors

- Brightness: 0, 1, 2, 3
  Determines the brightness of the readout display

- Limit Near & Limit Far: 0.00m to 99.99m
  Determines the range in which the measurement can be switched off

- Handover: 0.3m to 9.0m
  Determines the handover value

- Threshold: 0.1m to 1.0m
  Determines the threshold of the handover value

- Unit: Metric, Imperial

- TAG channel: 1, 2, 3, 4, 5, 6, 7
  Determines the TAG channel

- Calibration   0 cm to +- 200 cm
  Determines a shift in the distance of TAG1 orTAG2

- Display mode   0°, 180°
  The orientation of the readout can be skipped.

- Motor dir   Left, Right
  Determines the direction of rotation of an external motor

2.6.1 Changing display graphic user interface (GUI)

MENU > SETTING > SR GUI   **1x, 3x**

In this submenu the display user interface (GUI) can be changed. The readout is shown as single and triple distance values.

By pressing the button MENU again the distance readout selection (SR GUI) can be changed.

- 1x: Single distance graphic user interface (GUI) with merging distance value
- 3x: Triple distance graphic user interface

See chapter 2.2 for more details.

2.6.2 Sampling Rate

MENU > SETTING > Sampling rate   **1,2,3,4**

The sampling rate of the measurement can be adjusted in the MAIN MENU. Depending on the current adjustment the measurement follows the movement of the object in different speeds. The sampling rate influences the speed of the measurement for the ultrasonic beam and also the distance measurement for the radio TAG.

1: Low sampling rate (speed of measurement is slow)

4: High Sampling rate (speed of measurement is fast)

Pressing the button MENU three times and the button DOWN leads in the MAIN MENU for adjusting the sampling rate.

Press button MENU again to highlight the digit in red.

With the buttons UP / DOWN the digit can be changed.

By pressing the button SET B the adjustment is fixed.

Press the button SET A to exit the MAIN MENU.

2.6.3 Brightness

MENU > SETTING > Brightness   **0,1,2,3**

The menu item Brightness defines the brightness of the readout display.

2.6.4 Limit Near & Limit Far

MENU > SETTING > Limit Near & Limit Far   **0.00m to 99.99m**

Limit Near and Limit Far define the measuring range where the distance measurement can take place. If a subject is outside the range, it cannot be measured.

The value of Limit Far must be greater than the value of Limit Near.

Press button MENU to highlight the first digit in red.

With the buttons UP / DOWN the digit can be changed.

Press button MENU again to highlight the next 2 digits.

With the buttons UP / DOWN the digit can be changed.

By pressing the button SET B the adjustment is fixed.

Press the button SET A to exit the MAIN MENU.

The selected settings are shown in the status line.

The same procedure can be carried out with LIMIT FAR.

2.6.5 Setting Handover

MENU > SETTING > Handover   **0.3m to 9.0m**

Determines the handover value. See chapter 2.4 for more details.

2.6.6 Setting Threshold

MENU > SETTING > Threshold   **0.1m to 1.0m**

Determines the threshold value. See chapter 2.4 for more details.

2.6.7 Setting Unit

MENU > SETTING > Unit   **Metric / Imperial**

This function sets the unit of the distance values.

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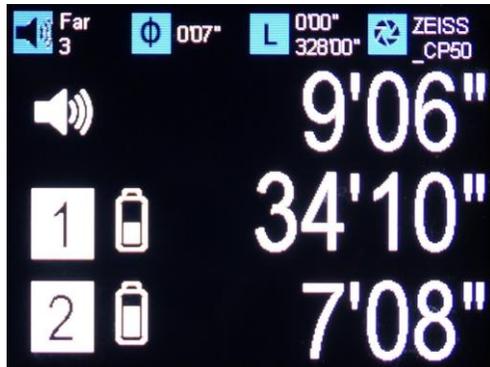
2.6.8 Setting TAG Channel

MENU > SETTING > TAG channel   **1,2,3,4,5,6,7**

This menu item defines the channel of the TAG. By default the channel is set to 1 and doesn't need to be changed. Only if a second SMART RANGER 2 units operate within 200m at the same time, the channel for the TAGs of one unit must be changed.

How set the channel of a TAG:

1. Switch of all TAGs
2. Switch on the relevant TAG
3. Call TAG channel selection in the MENU
4. Press the button SET C (character turns red) and adjust the channel with the buttons UP, DOWN . Confirm with the buttons MENU or button SET C.
5. Exit MENU
6. Use the same procedure for a second TAG.
7. Two TAGs can have the same channel.

PLEASE NOTE: To adjust the channel only one TAG may be switched on

The first switched on TAG is assigned as TAG #1.

PLEASE NOTE: If a second SMART RANGER 2 unit uses the same channel a distance of 200 m is necessary (in case of free sight) to avoid interferences between the radio systems.

Four SMART RANGER 2 systems can operate in the same area if the channels of the TAGs are adjusted differently.

2.6.9 Setting Calibration

MENU > SETTING > Calibration1 & 2   **0cm bis +- 200cm**

In this function the distance of the TAGs can be shiftet. If the TAG is disturbed by external influences or if a chosen offset shall be added to the measurement value it is possible to enter a calibration value.

The accuracy of the distance measurement of the TAG is determined by external influences. If the TAG is placed inside a car, for example, the metallic housing of the car distorts the measured value. If the TAG is worn on a person's body, the measured value is distorted because of the electromagnetic conductivity of the body. This distorted measured value can be corrected by an offset.

1. Switch on the TAGs
2. Call TAG calibration in the MENU
3. Press the button SET C. The character turns in red.
4. At the left side the actual distance measurement is shown.
5. Adjust the distance with the buttons UP, DOWN in 2 cm steps until the correct value is reached
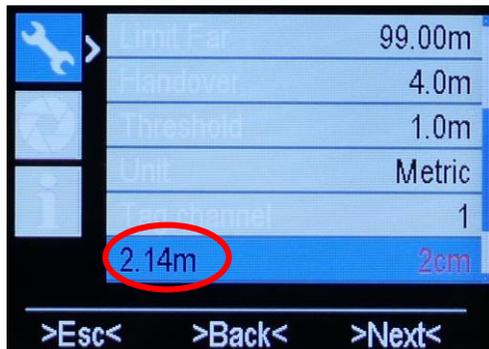
6. Confirm with calibration with button SET B
7. Exit MENU
8. Every TAG can be calibrated separately.

2.6.10 Display mode

MENU > SETTING > Display mode   **0° / 180°**

By default the BASE UNIT is situated at the right side of the camera but it is also possible to operate it on the left side of the camera. With "Distance mode" the orientation of the readout can be skipped.

2.6.11 Motor Dir

MENU > SETTING > Motor Dir   **left / right**

The clockwise or counterclockwise rotation direction of an external motor can be changed.

SMART RANGER 2 is able to calculate and control the position for an external focus motor. Lens data can be stored in the BASE UNIT. From this the system calculates the position of the focus motor. This allows lens control systems without the ability to store lens data to perform an autofocus function.

2.7 MAIN MENU>LENS
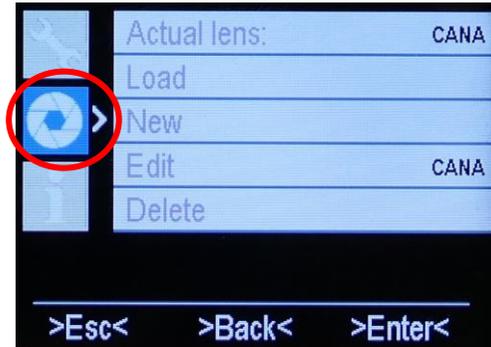
The following functions can be adjusted:

- Actual lens:
  For the readout of the currently selected lens

- Load
  An already stored lens can be loaded

- New
  A new lens table can be created

- Edit
  An existing lens table is loaded and can be edited

- Delete
  An existing lens table is deleted

2.7.1 Calibrate a new lens

MENU > LENS > New

With this function a new lens table can be created

PLEASE NOTE: It is necessary to connect a focus motor to SMART RANGER 2 (Lemo 4p)
or connect a lens control system with a focus motor (Lemo 6p) to create a lens table.
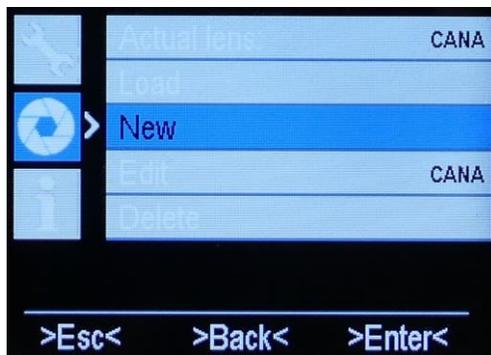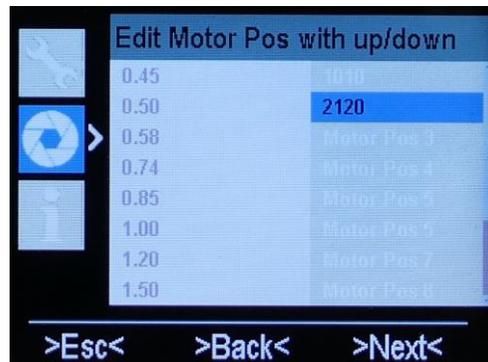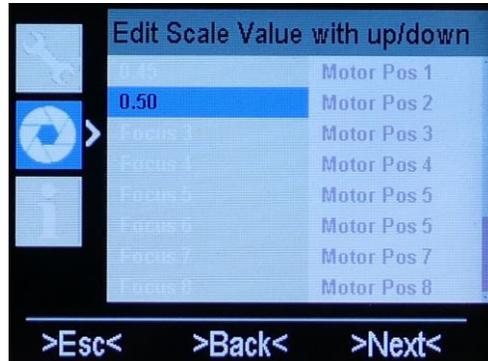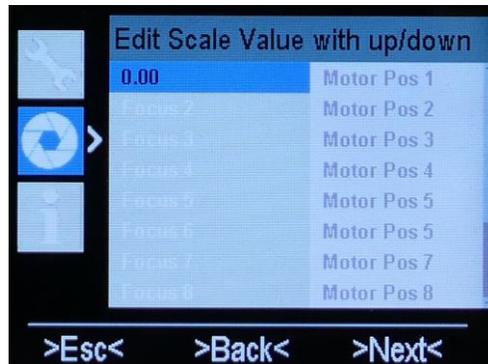
The display is divided in two halves. The scale values of the lens has to be entered in the left half, the relating motor position in the right half. Twelve scale values have to be entered for a lens table. Ideally, the 12 values are evenly allocated throughout the scale.

1. Select MENU>LENS>New
2. The first scale value is shown in a blue background
3. Adjust the value with the buttons UP, DOWN
4. Press button MENU or button SET C (>NEXT<) to select the next value
5. The next scale value is shown in a blue background
6. Adjust the value
7. Press button MENU or button SET C (>NEXT<) to select the next value
8. Press button SET B (>BACK<) to change back to the previous value
9. Set all 12 scale values

PLEASE NOTE: With button SET A (>ESC<) you leave this submenu without storing the values.

10. When all 12 values are selected, the cursor moves to the first motor position.
11. The buttons UP, DOWN move the focus motor to the corresponding scale value.
12. Press button MENU or button SET C (>NEXT<) to select the next value
13. Press button SET B (>BACK<) to change back to the previous value
14. When all 12 motor positions are selected please select a lens name to store it.
15. Press buttons UP, DOWN to select a character.
16. Press button MENU or button SET C (>NEXT<) to select the next character
17. By pressing button SET B (>SAVE<) the lens table is saved with the chosen name and can later be selected by this name.
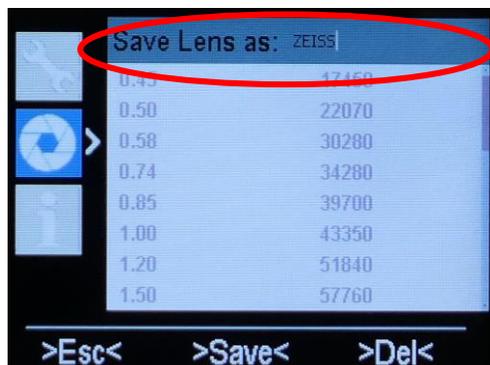
2.7.2 Edit lens

A stored lens table can be edited.

1. Select MENU>LENS>Load and select a lens
2. Select MENU>LENS>Edit to start the function
3. The first scale value is shown in a blue background
4. Press buttons UP, DOWN to edit the value
5. Press button MENU or button SET C (>NEXT<) to select the next value
6. Press button SET B (>BACK<) to change back to the previous value
7. At the end, the lens name can also be edited.

2.7.3 Load lens

MENU > LENS > Load

In this function a previously created lens can be loaded.

1. Select MENU>LENS>Load to start the function
2. The first scale value is shown in a blue background
3. Press buttons UP, DOWN to select a lens. The name of the selected lens is in a blue backround.
4. By pressing button SET B (>LOAD&BACK<) the highlighted lens is loaded.

2.8   MAIN MENU> info

The current firmware revision is displayed.

3   INTRODUCTION TO RADIO TAG
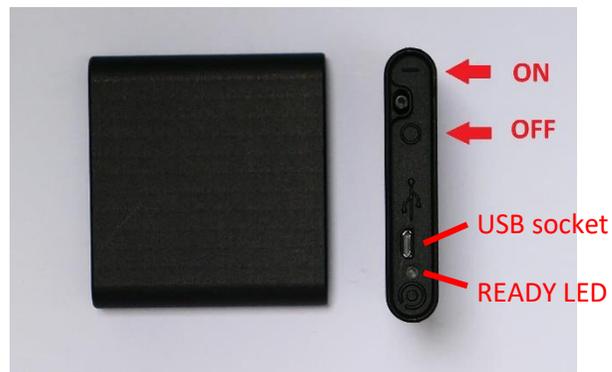
The radio TAG is an active radio transponder. Two Tags can be connected with one BASE UNIT. After switching on the TAG the BASE UNIT automatically shows the distance measurement.

The TAG has an on/off switch, a READY LED and a micro USB socket for charging the devise. The socket can also be used for a software update. After power on the device the READY LED indicates the charging status for 10s.

- READ Y LED on   Battery full
- 3 times fast blinking   Runtime about 4 hours
- 2 times fast blinking   Runtime about 1 hour
- 1 time blinking   Battery empty; runtime lower 15min

The battery status of the TAG is also shown at the display of the BASE UNIT.

If the distance measurement of the TAG is not displayed, this can be due to a wrong channel setting. For adjusting the channel of the TAG please see chapter 2.6.8.

4   MEASUREMENT RANGE

Dual distance measurement tool with distance determination based on ultrasound and /or radio TAG

	Ultrasonic	Radio TQG
Range:	0,22m – 8m	1m – 25m over 80m with free line of sight
Accuracy:	+-1cm @1m to +-2cm@6m	+-15cm (at all distances)
Measurement Rate:	50ms	80ms

5   TECHNICAL SPECIFICATION

5.1.1 Base unit SR2-1

Size:	75x64x56mm3
	180g
	2,4" TFT display included
Electrical Interfaces:	2x Lemo 0B 4pol; CAN bus protocol and power
	1x Lemo 1B 6pol; „cinetape" protocol and power
	1x Micro USB for update
Mechanical interface:	3 x UNC ¼-20
Power:	9 – 34V DC
Temperature Range:	-20 bis + 60°C

5.1.2 Radio Tag TAG-1:

Size:	72x71x15mm3
	88g (battery included)
Amount of tags for one base unit:	2
Technology:	Ultrawide band radio technology; IEEE802.15.4-2011
	3,5GHz – 6,5GHz
Electrical Interface:	1x Micro USB for charging and update
Power:	Internal LiPo battery
	Runtime > 20h
Temperature Range:	-20 bis + 60°C

6   SAFETY GUIDELINES

Do not use SMART RANGER 2 with wrong voltage

Do not drop SMART RANGER 2

Mount SMART RANGER 2 safely

Plug in all cables carefully and in the described direction and order. (Red dot goes to red dot.)

Always store SMART RANGER 2 in its supported case while not in use. The SMART RANGER 2 case is made for transportation and storage and should be used all the time for transportation or storage intentions. Make sure that SMART RANGER 2 is always stored dry and away from any dangerous hazardous gods.

SMART RANGER 2 is a high technological product and therefore should be handled with care. Electromagnetic interferences might cause working disorders in the system which might not even occur obvious but will lead to wrong measurements. Please avoid electromagnetic interferences and check accuracy of SMART RANGER 2 from time to time.

SMART RANGER 2 is housed in a metallic and closed housing which can lead to condensation inside the housing when quick temperature changes occur. Please wait and let dry, if you notice that condensation is likely.

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Safety Guidelines