

# USER MANUAL

## LASERGUIDE MINI

- R.45.TC
- R.45.TC.PRO



This manual is an important part of your purchase. Please read it thoroughly before using your new equipment.

We recommend that you record details of your purchase here so that the information is readily available if you ever need to contact your supplier.

Serial number

Date of purchase

Purchased from

telephone

Email

Published by:

MOBA Mobile Automation Australia Pty Ltd  
90 Willandra Drive  
Epping, 3076  
Victoria, Australia

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MCE Lasers was acquired by MOBA in 2018, bringing 40 years of Australian development and manufacturing together with MOBA's globally recognised and trusted expertise in mobile automation technology.



## STATEMENT OF LIMITED WARRANTY

MOBA Mobile Automation Australia Pty Ltd (MOBA Australia) warrants all equipment it manufactures and sells to be free of defects in material and workmanship for a period specified below. This warranty period is from the date of sales invoice. All other components not manufactured by MOBA Australia and not specified below, such as hydraulic or electrical components, hoses, fittings and clamps, will carry the original manufacturer's warranty. The warranty covers only equipment sold by MOBA Australia and its authorised dealers and does not cover parallel imports, which are also known as grey or direct imports. Proof of purchase will be required before claiming warranty.

The warranty does not cover normal wear and tear or deterioration. Any evidence of negligence or abnormal use, accident, improper installation or an attempt to repair equipment by anyone other than factory authorised personnel even when using MOBA Australia's certified or recommended parts, automatically voids the warranty.

The warranty shall only be in force for the benefit of the Purchaser, not any third parties, including without limitation the Purchaser's customers, unless warranty transfer has been approved by MOBA Australia in writing.

Warranty period:

Products	Warranty (months)
Laser receiving systems and components, visual guidance	12
Repairs and Replacements	
Repairs and replacements made under warranty	Warranty expires at the same time as original equipment warranty
Repairs made out of warranty	3

MOBA Australia or its authorised service centre will repair or replace, at its option, any defective part or component of which notice has been given during the warranty period. If service in the field is necessary to repair machine-mounted equipment under warranty, MOBA Australia may authorize on-site repairs at no charge for parts and labour. Travel time, accommodation and other expenses incurred to and from the place where repairs are made will be charged to the purchaser at the prevailing rates. If warranty service can be done at a factory authorised service centre, the customer will pay only one-way freight charges.

The foregoing states the entire liability of MOBA Australia regarding the purchase and use of its equipment. MOBA Australia will not be held responsible for any consequential loss or damage of any kind.

This warranty is in lieu of all other warranties, expressed or implied, except as set forth above, including any implied warranty of merchantability or fitness for a particular purpose which are hereby disclaimed.

## SAFETY INFORMATION

Please become familiar with the important safety information in this section. Improper use or installation of the MOBA Laserguide may result in personal injury or damage to the receiver unit.

1. Read and become familiar with the manufacturer's operating manual for your machine, including safety information, before installing or using your Laserguide receiver.
2. A construction site can be hazardous and working around heavy construction equipment can be dangerous. Always exercise extreme caution when on a construction site.
3. The Laserguide is externally mounted on your machine. Do not install or adjust the unit while your machine is running.
4. Do not let any part of the unit protrude into traffic or limit the visibility of the operator.
5. Always use eye protection when welding, cutting or grinding is being done on the machine.
6. Hydraulic lines can be under extreme pressure, even when the machine is not running. When working on or near hydraulic lines, protect yourself at all times and wear protective clothing.

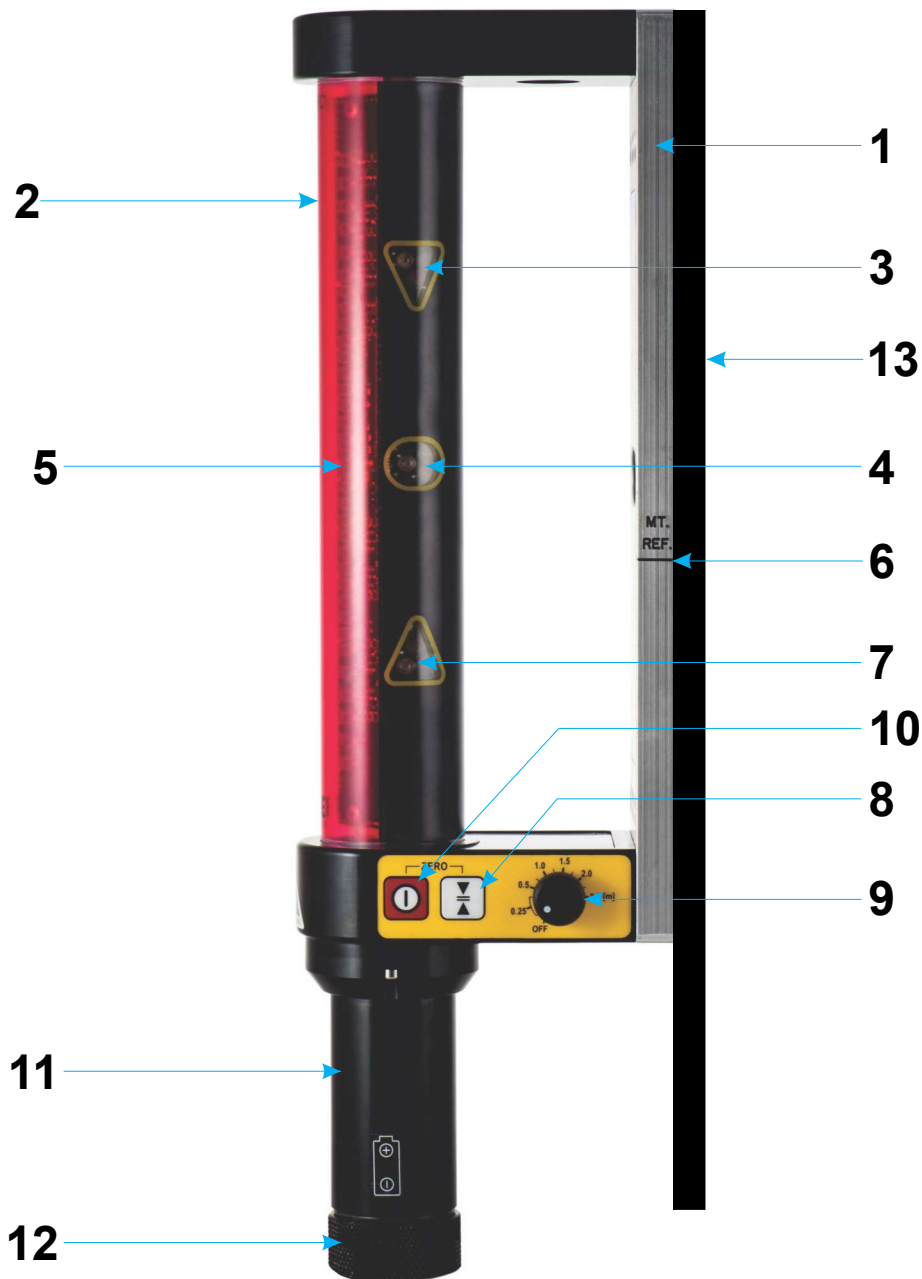
**Warning:**

Do not weld near any hydraulic line or on any equipment while it is in operation. It is best to remove any electronic gear near a welding job.

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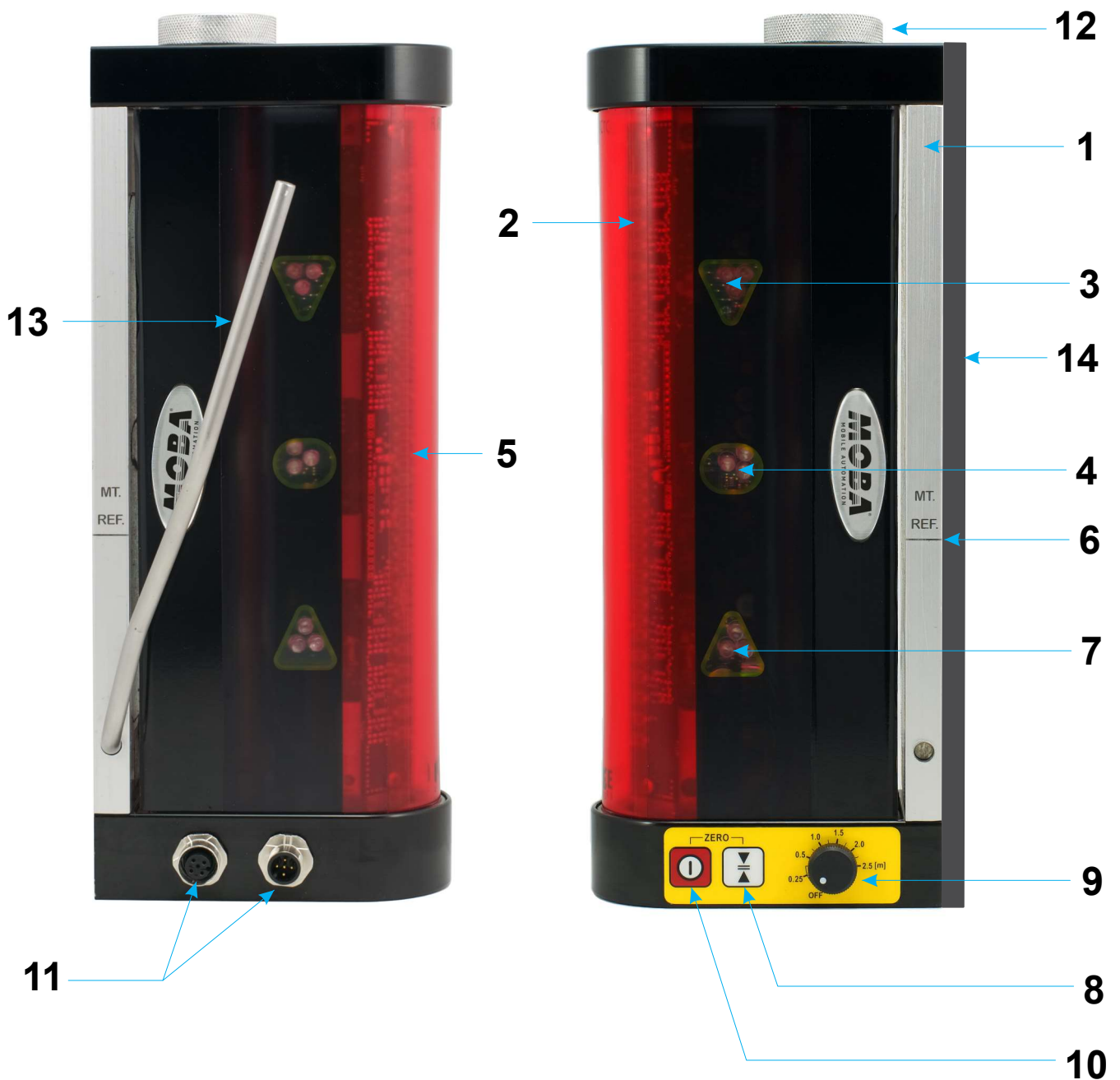
## 1. FEATURES OF THE LASERGUIDE



**R.45.TC**

**Figure 1.1**

- |                                |  |
|--------------------------------|--|
| 1. Magnetic Bracket            | 8. Accuracy Switch (Centre Band)         |
| 2. Receiving Area              | 9. Reference Dial                        |
| 3. Top LED Cluster (RED)       | 10. On/Off Switch                        |
| 4. Centre LED Cluster (GREEN)  | 11. Battery Compartment (Holding Handle) |
| 5. Power On LED                | 12. Battery Cap                          |
| 6. Mounting Reference Mark     | 13. Magnetic Bracket Protective Plate    |
| 7. Bottom LED Cluster (ORANGE) |  |



**R.45.TC.PRO**  
**Figure 1.2**

- |                                |                                       |
|--------------------------------|---------------------------------------|
| 1. Magnetic Bracket            | 8. Accuracy Switch (Centre Band)      |
| 2. Receiving Area              | 9. Reference Dial                     |
| 3. Top LED Cluster (RED)       | 10. On/Off Switch                     |
| 4. Centre LED Cluster (GREEN)  | 11. CAN Connectors                    |
| 5. Power On LED                | 12. Battery Cap                       |
| 6. Mounting Reference Mark     | 13. Dismounting Lever                 |
| 7. Bottom LED Cluster (ORANGE) | 14. Magnetic Bracket Protective Plate |

## 2. USING THE LASERGUIDE

### 2.1 Powering Up

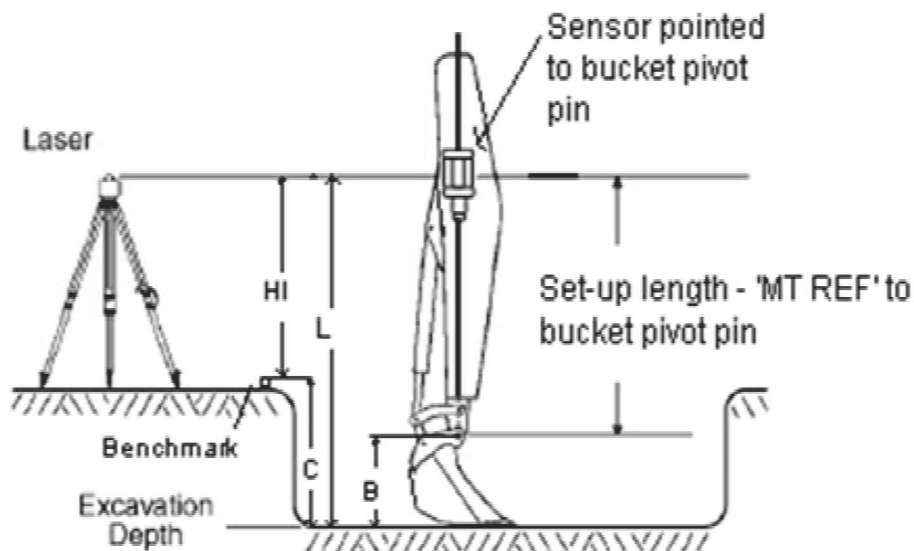
Press the On/Off switch (10) for 2 seconds to turn the unit on/off. The small red power-on LED (5) indicates the mode of operation as determined by the Reference Dial (9) position:

**LED flashing** – Tilt compensation feature is on. The unit automatically accounts for the dipper arm tilt to indicate correct digging depth. Reference Dial (9) not in Off position.

**LED solid** – Tilt compensation feature is off. The unit does not account for the dipper arm tilt when indicating correct digging depth. This mode is less accurate. Reference Dial (9) in Off position.

On power up, the sensor will do an LED test sequence, activating in turn the red, green and amber LEDs. It will then show the current accuracy selection by briefly flashing the appropriate LED pattern (see section 2.4).

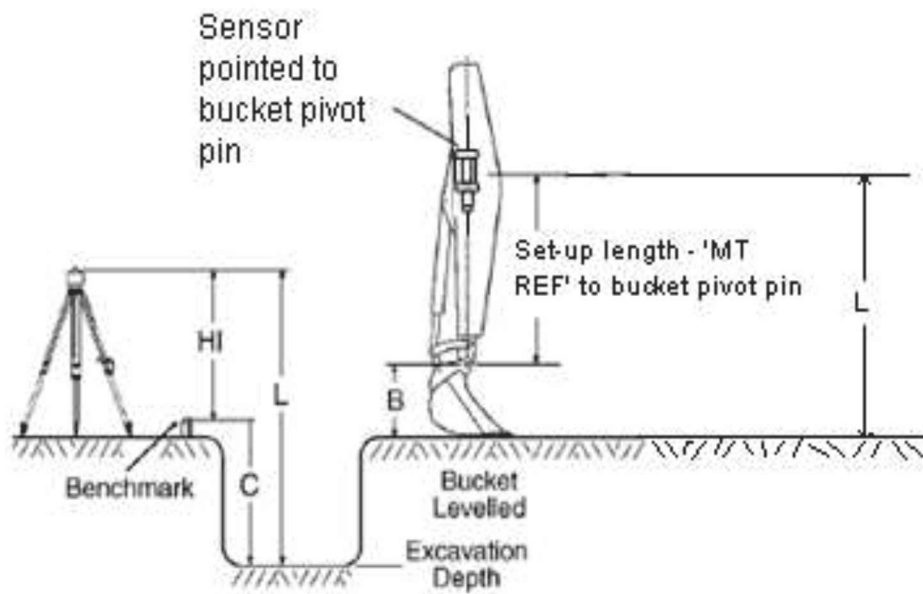
### 2.2 Mounting and Setting Up



#### IN-TRENCH SETUP

Figure 2.2.1





## OUT-TRENCH SETUP

**Figure 2.2.2**

*HI - Height of the laser instrument referenced to the benchmark.*

*C - Desired depth of cut or excavation referenced to the benchmark.*

*L - Height of the laser instrument referenced to the bottom of the trench.*

*B - Bucket height from bucket pivot pin to ground when the bucket is levelled.*

*Setup Length - Distance from bucket pivot pin to 'MT REF' line mark on the side of the R.45.TC/R.45.TC.PRO magnetic bracket (relevant only when using tilt compensation).*

With regard to above figures, refer to section 2.2.1 if intending to use the tilt compensation feature or to section 2.2.2 if intending NOT to use the tilt compensation feature.

### 2.2.1 Setting Up With Tilt Compensation On

1. Ensure the dipper arm is vertical and the bucket is level.
2. Set up the laser instrument on a steady tripod.
3. Mount the R.45.TC /R.45.TC.PRO on the dipper arm such that the 'MT REF' (Mounting Reference) line mark on the side of the magnetic bracket is at a distance L from the ground. Distance L equals the height of the laser instrument (HI) plus the desired depth of excavation (C), both with respect to the benchmark:

$$L = HI + C$$

The long side of the R.45.TC /R.45.TC.PRO body should be parallel with the dipper arm and in line with the top and bucket pivot pins of the dipper arm. The switchpad should be orientated to the bottom.

4. Determine the Setup Length by measuring the distance between the bucket pivot pin and the 'MT REF' line on the magnetic bracket. This is the same as the mounting distance L minus the bucket height B:

$$\begin{aligned} \text{Setup Length} &= L - B \\ &= HI + C - B \end{aligned}$$

The Setup Length should lie within the R.45.TC/R.45.TC.PRO's working range of 0.25-2.5m. If it is outside of this range, lower or raise the height of the laser instrument (HI) and readjust the R.45.TC/R.45.TC.PRO mounting position to bring it within range. For best accuracy, the Setup Length should coincide with one of the selectable values on the dial, that is, 0.25m, 0.5m, 0.75m, 1m, 1.25m, 1.5m, 1.75m, 2m, 2.25m or 2.5m. For most applications, a Setup Length as close as possible to one of these values is adequate.

5. Turn the Reference Dial (9) to the measured Setup Length value or to the closest available value.
6. 'Zero' the setup position by pressing and holding together the Accuracy (8) and On/Off (10) switches. A successful 'zeroing' is acknowledged by a brief flashing of the green LED cluster and sounding of the buzzer. An unsuccessful attempt is indicated by a brief flashing together of the red and amber LED clusters. A failed attempt can be caused if the R.45.TC/R.45.TC.PRO is angled too far from the vertical or if the Reference Dial (9) is in the off position.

**IMPORTANT NOTE:** Whenever the Reference Dial (9) value is changed to indicate a new Setup Length, 'zeroing' is required for the new value to take effect. Without 'zeroing', the previously 'zeroed' Setup Length remains in effect even though the dial may be turned to the new value.

The unit is now ready for use. With laser being received, the green LED cluster will indicate the correct digging depth for any dipper arm angle within the unit's compensation range (see section 2.3). Note that as the dipper arm swings, correct digging depth is achieved when the bucket orientation is in the level position.

### 2.2.2 Setting up With Tilt Compensation Off

1. Ensure the dipper arm is vertical and the bucket is level.
2. Set up the laser instrument on a steady tripod.
3. Ensure the Reference Dial (9) is in the Off position.
4. Mount the R.45.TC/R.45.TC.PRO sensor on the dipper arm such that the centre green LED cluster is at a distance L from the ground. Distance L equals the height of the laser instrument (HI) plus the desired depth of excavation (C), both with respect to the benchmark:

$$L = HI + C$$

The long side of the R.45.TC/R.45.TC.PRO body should be parallel with the dipper arm and the switchpad oriented to the bottom. After mounting, there is no need to Measure the Setup Length or 'ZERO' the setup.

## 2.3 Compensation Range

When using tilt compensation, the maximum allowed swing of the dipper from the vertical position is dependent on the Setup Length:

Setup Length (m)	Tilt Compensation Range (Degrees)
0.25	±42
0.5	±31
0.75	±26
1.0	±23
1.25	±20
1.5	±19
1.75	±17
2.0	±16
2.25	±15
2.5	±14

If the dipper arm is tilted more than the compensation range whilst the R.45.TC/R.45.TC.PRO is receiving a laser beam, the indication LEDs and buzzer will flash/buzz at a slower frequency to alert the user.

## 2.4 Accuracy (Centre Band)

The R.45.TC/R.45.TC.PRO has three different accuracy or centre band settings - Fine, Normal and Wide. Each setting is indicated by briefly flashing a different LED cluster pattern as shown in the table below. The current selection is shown on power up at the end of the power up sequence or when changing the centre band.

To change the centre band, press and hold the Accuracy Switch (8) until the new setting's LED cluster pattern lights up. Repeat multiple times as needed to step through Fine→Normal→Wide and back again.

SETTING	LED Cluster Pattern	ACCURACY
Fine	Green	+/- 4mm
Normal	Red & Orange	+/- 8mm
Wide	Red, Orange & Green	+/- 12mm

## 2.5 Buzzer

To turn the buzzer on or off, press and hold the On/Off switch (10) until a single or double beep is heard - single beep indicates buzzer on, double beep indicates buzzer off.

## 2.6 LED Brightness

To increase or decrease the brightness of the LEDs, press and hold the Accuracy switch (8) in the same manner as when changing the accuracy setting.

When the LED cluster pattern of the new accuracy setting lights up, keep holding the Accuracy switch (8) and press and release the On/Off switch (10). With each press and release of the On/Off switch (10) while the Accuracy switch (8) is held, the brightness level will change to the next setting. Three different brightness settings are available. Note that after changing the brightness level in this manner, the accuracy setting will also have changed - revert back to the desired accuracy using the Accuracy switch (8).

## 2.7 Low Battery Warning

If low battery is detected, the power-on LED will flash at a fast rate (not to be confused with the slower flashing rate indicating compensation mode is switched on). If a laser beam is on the receiving area at the time of low battery, the flashing frequency of the indication LEDs will slow and the buzzer will turn off to preserve power.

## 2.8 Replacing the Batteries

To replace the batteries:

1. Unscrew the battery cap (12).
2. Remove old batteries.
3. Replace with 4 new C size alkaline batteries.
4. Replace and tighten the battery cap.

## 2.9 Powering via external power supply

The R.45.TC.PRO can also be powered with 12-24 V DC external power supply (Figure 2.9.1).

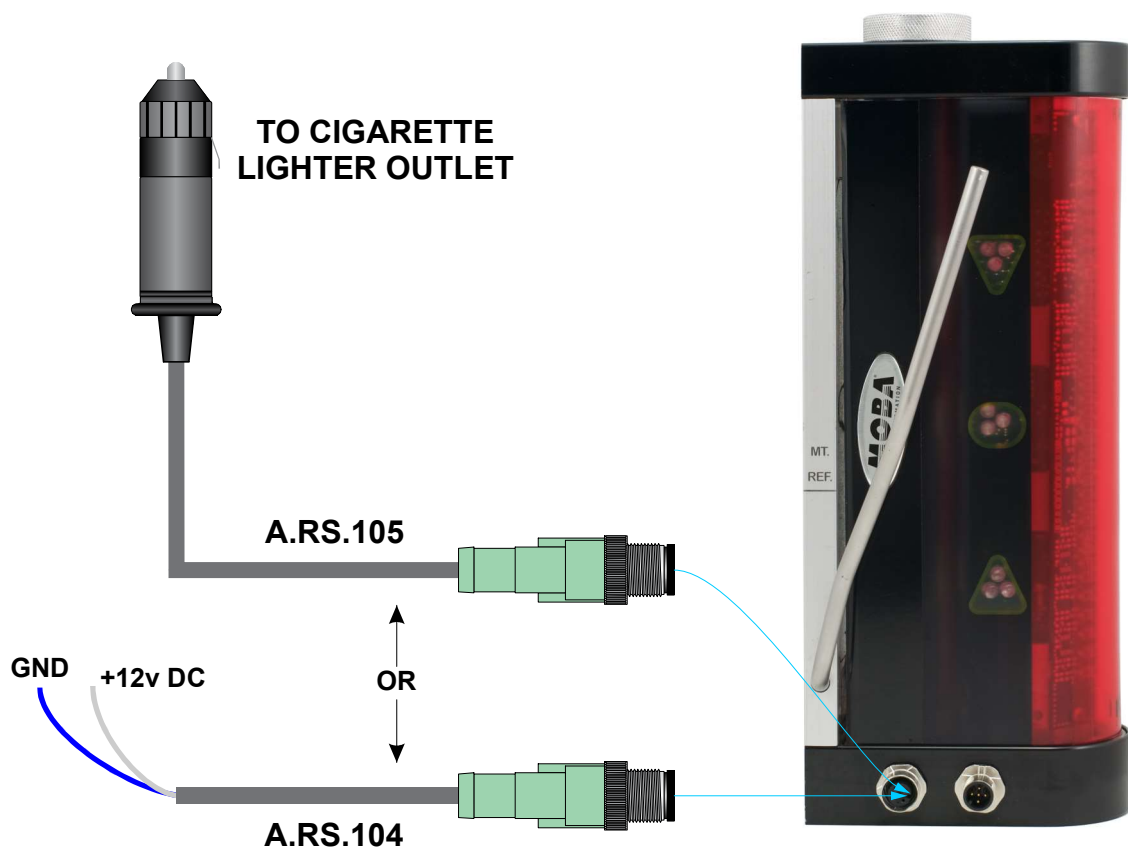
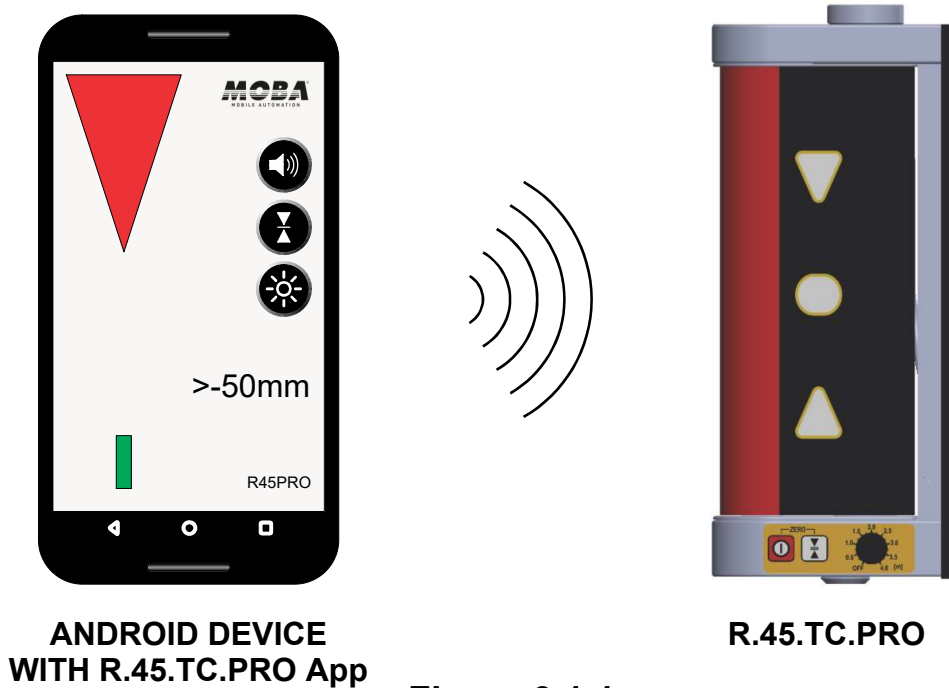


Figure 2.9.1

### 3. USING THE R.45.TC.PRO WITH ANDROID DEVICES

The R.45.TC.PRO can communicate via BT with an Android based device via the R.45.TC.PRO App.

#### 3.1 Connecting the unit to an Android device



**Figure 3.1.1**

1. Download the MOBA R.45.TC.PRO.APP to the Android device from Google Play or from MOBA downloads page at [moba-automation.com.au/downloads](http://moba-automation.com.au/downloads) or by contacting MOBA Australia. Please note the app is available only for Android devices.
2. Ensure the R.45.TC.PRO is in close proximity to the Android device.
3. Press and hold the On/Off switch (10) on the R.45.TC.PRO for 20 seconds until the sounding of 2 long beeps. This will put the unit into pairing mode.
4. Go into the Android device's BT setup, switch on the BT setting and select scan for devices. The name R45PRO will appear in the found devices list. Select pair with this device and enter 1234 when prompted for a password.
5. Open the R.45.TC.PRO App. At the bottom right hand side "R45PRO" will appear to indicate the unit is connected. If the words "NOT CONNECTED" appear repeat the above steps.

Once the App is connected it will start to mirror the receiver's height information. If this does not happen, close the app and re-open it. If setup fails, switch off the R.45.TC.PRO, shut down the app and unpair the Android device from the R.45.TC.PRO. Then repeat steps 2-5.

### 3.2 Using the Android App

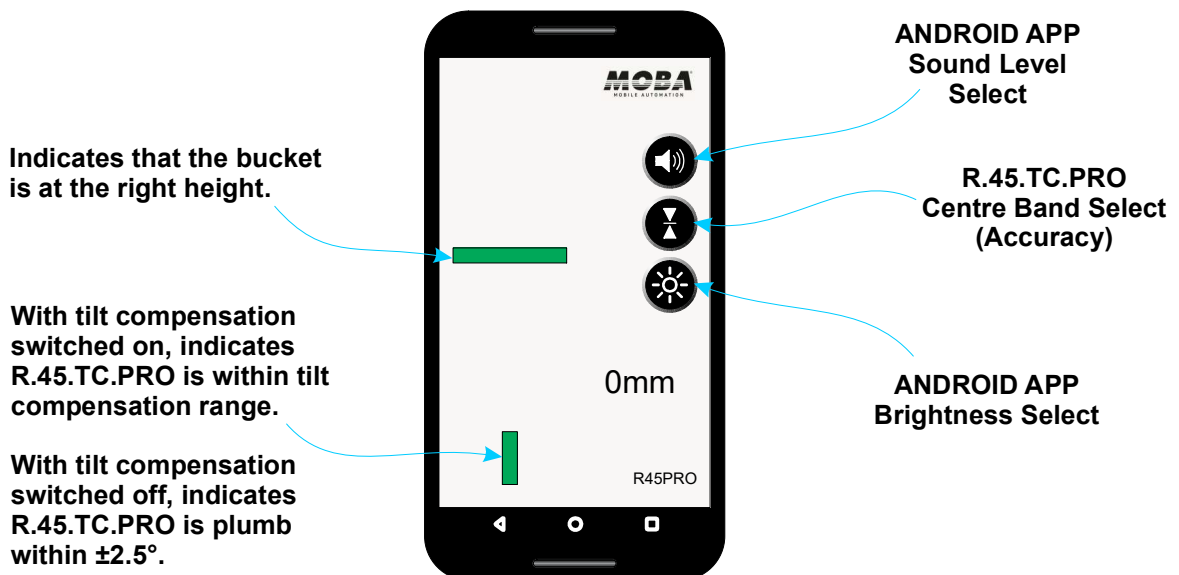
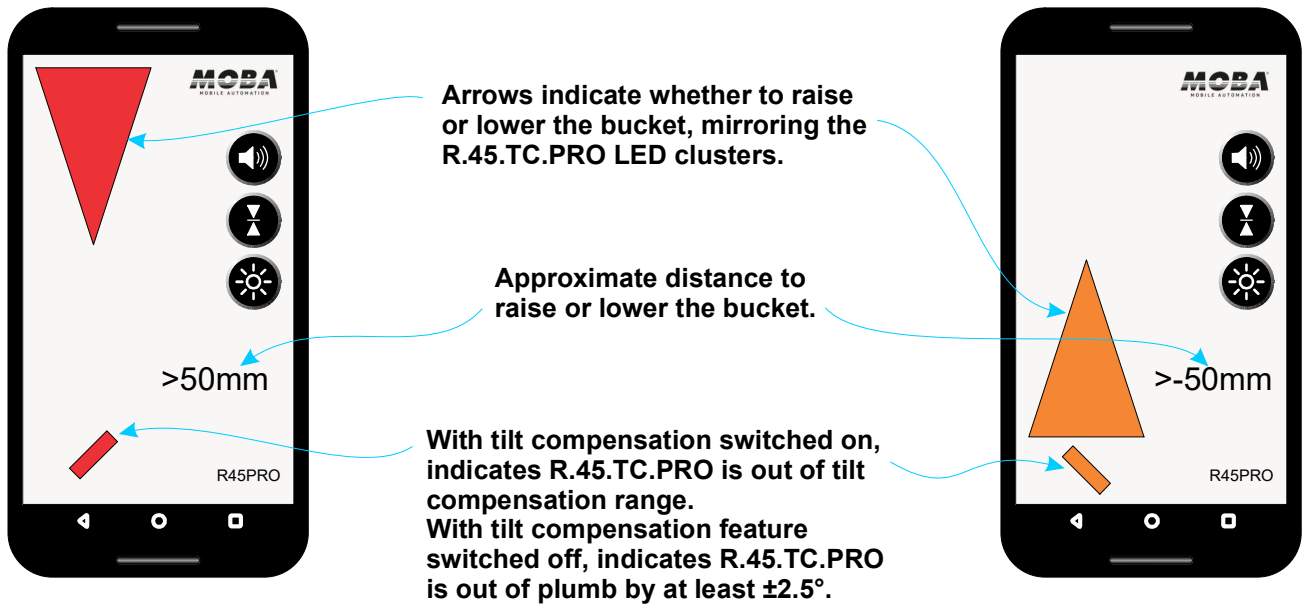
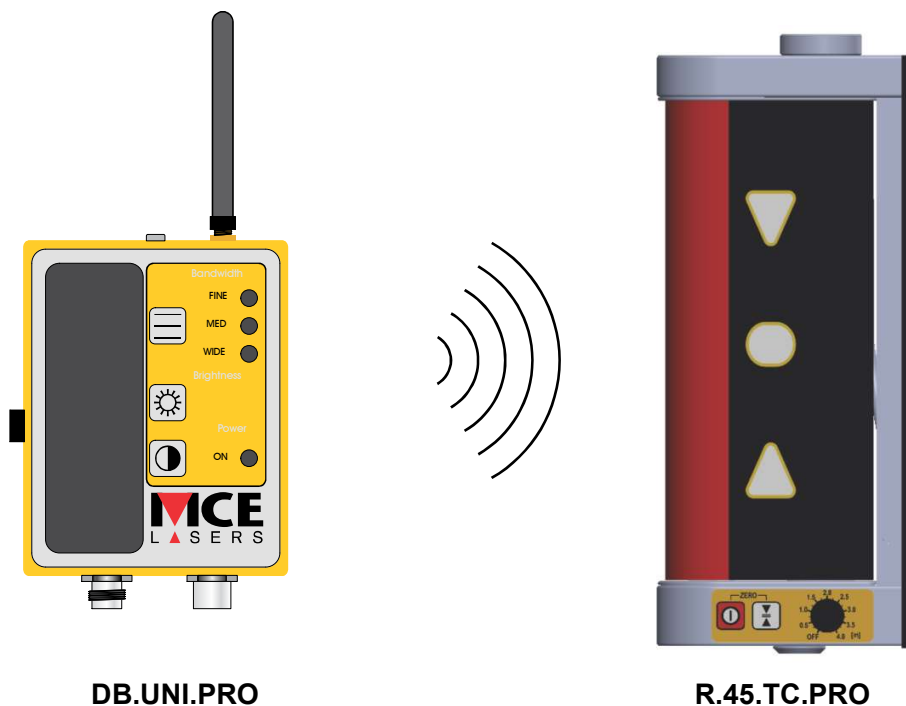


Figure 3.2.1

## 4. USING THE R.45.TC.PRO WITH DB.UNI.PRO

The R.45.TC.PRO can communicate with the DB.UNI.PRO display panel via either BT or wired CAN connection.

### 4.1 Connecting to DB.UNI.PRO display panel via BT



**Figure 4.1.1**

1. Ensure the R.45.TC.PRO and DB.UNI.PRO are in close proximity to each other.
2. Switch on both the R.45.TC.PRO and DB.UNI.PRO display panel.

The DB.UNI.PRO will automatically pair with the R.45.TC.PRO and start to mirror its LED clusters. If the two do not establish communication, switch both off and on again. See section 4.2 if this does not work.



## 4.2 Configuring BT on DB.UNI.PRO

The DB.UNI.PRO is normally paired with the R.45.TC.PRO from factory. However in cases where the two are bought separately or if the two are not communicating, the DB.UNI.PRO may need to be configured using the following steps.

1. Ensure the DB.UNI.PRO and R.45.TC.PRO are in close proximity to each other.
2. Switch on the R.45.TC.PRO, switch off the DB.UNI.PRO.
3. Press and hold the On/Off button on the DB.UNI.PRO for 10 seconds until a second beep sounds.

A progressive LED arrow bar indication will begin to flash to indicate the DB.UNI.PRO is in BT configure mode. After a short period, two LED straight bars will appear and flash in alternate sequence to show the BT is being setup and that the instrument is in search mode. Finally two LED straight bars will flash together on the DB.UNI.PRO to show the BT is setup and an active device has been found and is in progress of pairing. After a short period, the DB.UNI.PRO will start to communicate with the R.45.TC.PRO.

If the setup fails at any stage an X will flash on the DB.UNI.PRO. Repeat the above steps. If setup fails again, switch off the DB.UNI.PRO and then press and hold the On/Off button (10) on the R.45.TC.PRO for 20 secs until 2 long beeps sound. Repeat step 3.

**Note:** These settings will be saved and not required to be repeated once successfully setup.

### 4.3 Connecting DB.UNI.PRO via wired CAN connection

1. Using the supplied CAN cable, connect between the male connector of the DB.UNI.PRO and the female connector of the R.45.TC.PRO.
2. Using the supplied power cable, connect the '12-24V DC' female connector of the DB.UNI.PRO to an external 12-24V DC power supply, such as a car or excavator battery.
3. Press the On/Off button on the DB.UNI.PRO to switch both units on.

Once the units are powered on, the DB.UNI.PRO will automatically start displaying the receiver's height information.

#### Cable Options:

##### CAN Cables (DB.UNI.PRO to R.45.TC.PRO)

A.RS.103, 7.5m

A.RS.102, 5m

##### Power Cables

A.RS.104, 5m, Free Wires

A.RS.105, 5m, Cigarette Lighter

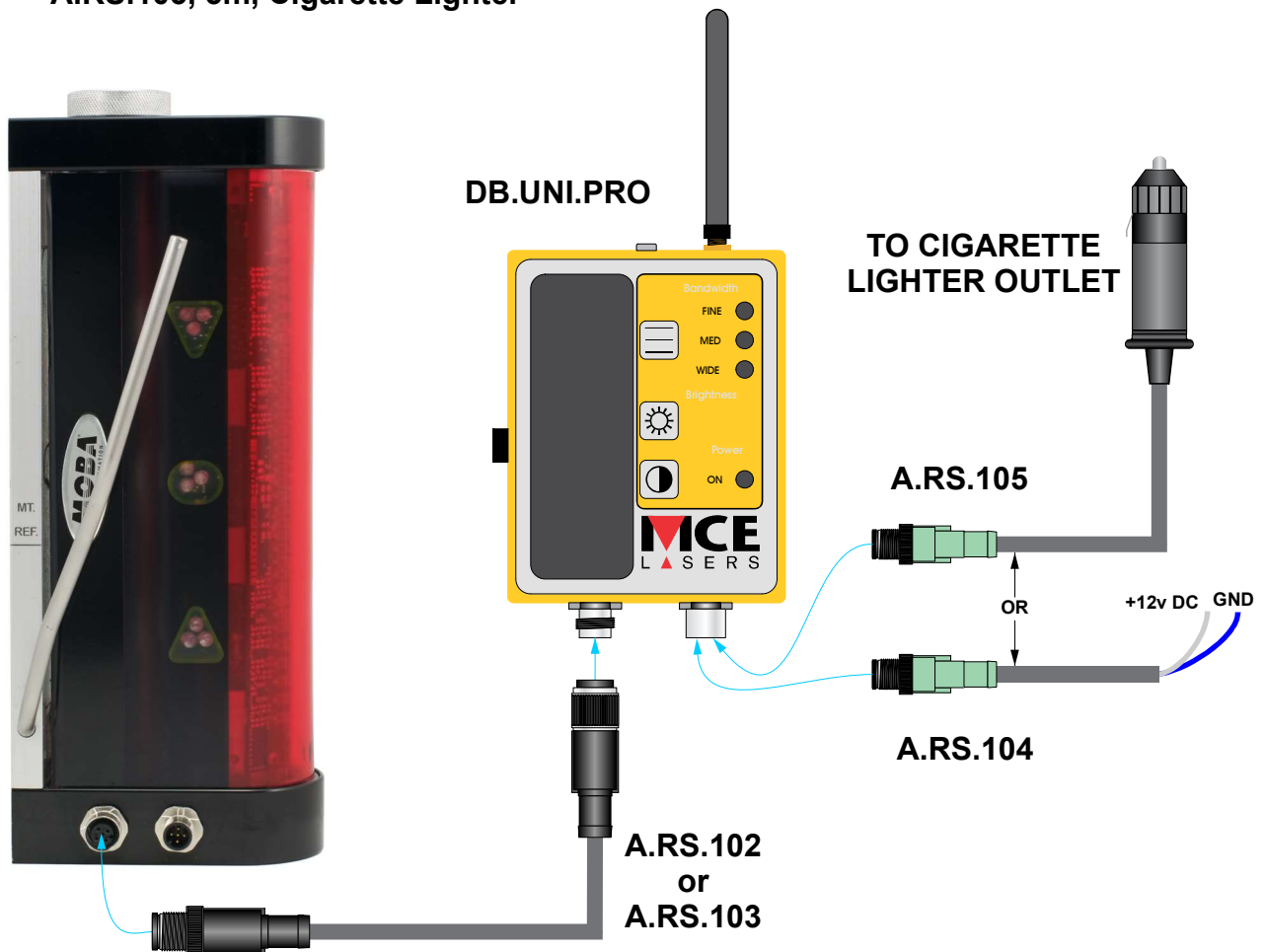
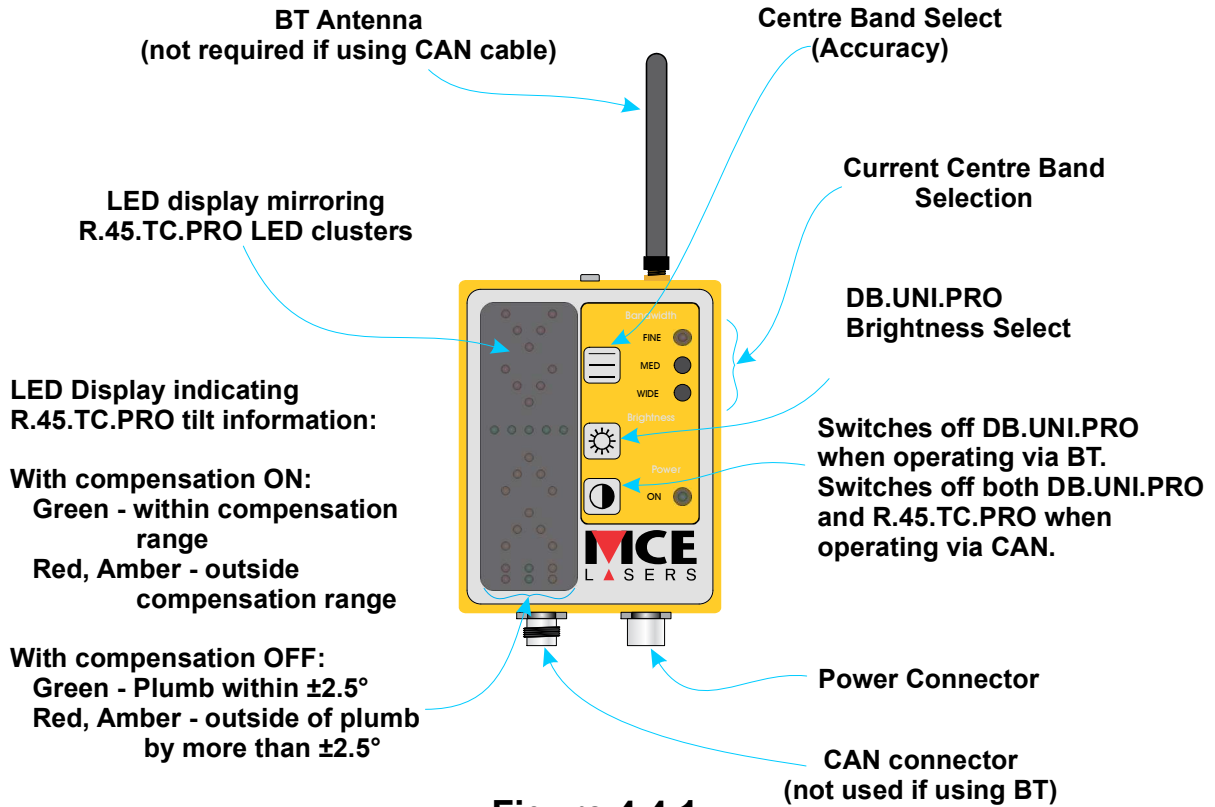


Figure 4.3.1

## 4.4 Using the DB.UNI.PRO Display Panel



**Figure 4.4.1**

The receiver's centreband can be changed via the Centre Band Select button on the DB.UNI.PRO. The current centreband selection is shown via the lit LED next to one of 'FINE', 'NORMAL', or 'WIDE'.

The DB.UNI.PRO's LED brightness level can be changed via the Brightness Select button. One of five brightness levels can be selected.

## 5. Connecting to MOBA XSITE 2D Machine Control System

1. Disconnect the CAN cable between the stick and bucket G2 sensors, on the excavator.
2. Mount the R.45.TC.PRO on the stick between stick and bucket G2 sensors (Figure 5.1).
3. Connect the R.45.TC.PRO to the stick and bucket G2 sensors using the supplied CAN cables.
4. Follow the normal calibration procedure in the MOBA XSite manual.

Please contact MOBA Australia for more detailed instructions.

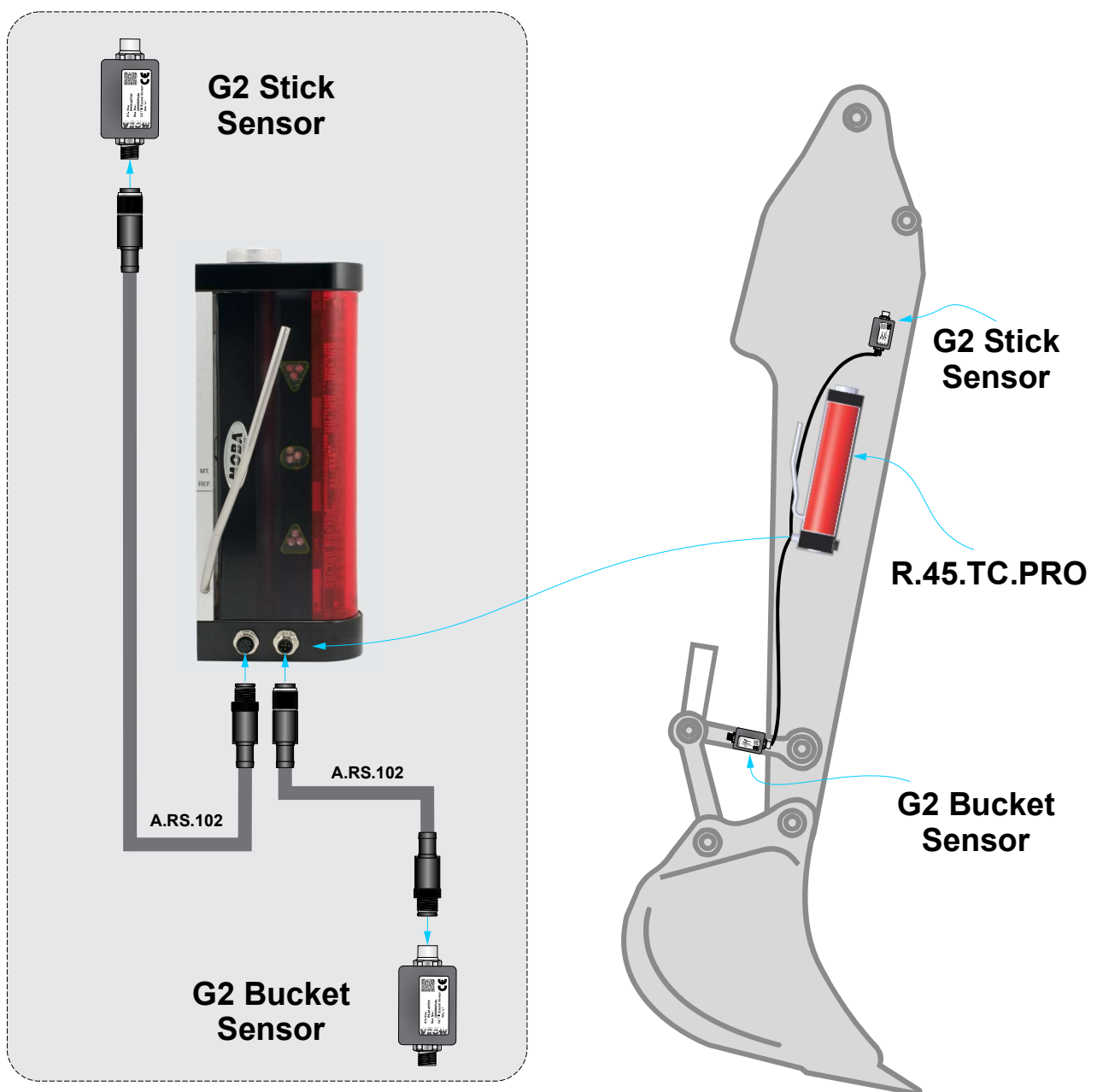


Figure 5.1

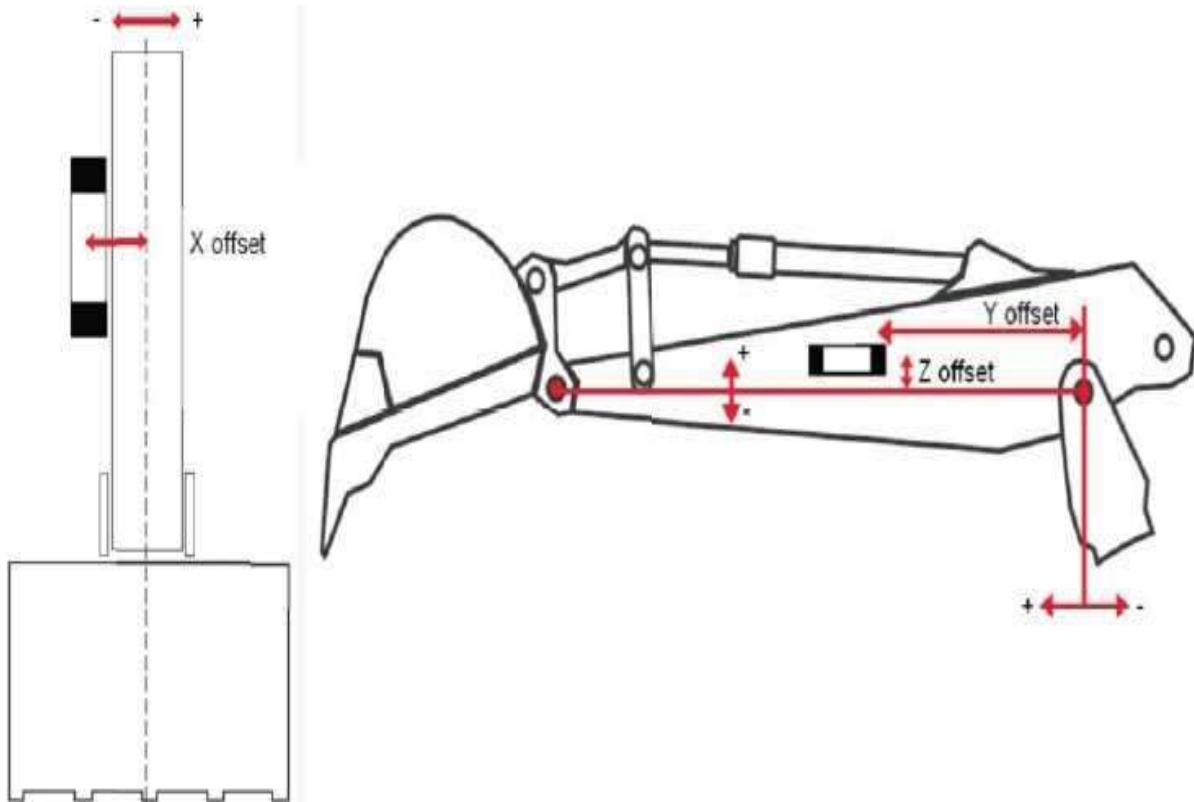
**Notes:**

X offset is measured from the centre line of the laser receiver to the centre line of the stick. X offset can be calculated by measuring the thickness of the stick, dividing the measure by two and adding 100mm to the value. Value is negative, because the laser receiver is mounted on the left side of the stick (Figure 5.2).

Y offset is measured from the stick/boom pin to the top of the laser receiver. Add 95mm to the value (Figure 5.2).

If the Laser receiver is not mounted on the line between the bucket pin and the stick pin, Z offset has to be measured from the pin line to the centre line of the laser receiver. Value is positive, if the laser receiver is above the boom line.

Refer to the MOBA XSITE manual on how to use the system as a whole.



**Figure 5.2**

## 6. TECHNICAL SPECIFICATIONS

	R.45.TC	R.45.TC.PRO	DB.UNI.PRO
Receiver Area Length	190mm	190mm	N/A
Receiving Range (Radius) <sup>1</sup>	600m	600m	N/A
Max Centre Band Resolution	+/- 4mm	+/- 4mm	N/A
Compensation Range <sup>2</sup>	Up to 42°	Up to 42°	N/A
Power Source	1 D size Alkaline	4 C size Alkaline or External 12-24 VDC	External 12-24 VDC
Operating Time	45 hours <sup>3</sup>	70 hours <sup>3</sup>	N/A
Water-proof <sup>4</sup> /Dust-proof	Yes/Yes	Yes/Yes	No/Yes
Dimensions (L X W X H)	390 X 69 X 117mm	296 X 90 X 116mm	120 X 95 X 35mm <sup>5</sup>
Weight	1.93kg	2.13kg	400gm
BT Connectivity	No	Yes	Yes
CAN Connectivity	No	Yes	Yes

**Table 6.1**

Specifications subject to change without further notice.

<sup>1</sup> Tested with VIS.2NA laser transmitter.

<sup>2</sup> Dependent on mounting distance from bucket pivot pin.

<sup>3</sup> With buzzer off and continuous laser beam reception.

<sup>4</sup> Submersed to 20cm.

<sup>5</sup> Excluding connectors, RAM mount ball and antenna.



# KONFORMITÄTSERKLÄRUNG

## Declaration of Conformity Déclaration de Conformité

This corresponds to EN ISO/IEC 17050-1

Wir / We / Nous

**MOBA Mobile Automation Australia PTY LTD**  
90 Willandra Drive, Epping 3076, Victoria, Australia.

*erklären in alleiniger Verantwortung, dass das Produkt  
declare under our sole responsibility that the product  
déclarons sous notre seule responsabilité que le produit*

### R.45.TC Laser receiver with tilt compensation

*auf das sich diese Erklärung bezieht, mit den folgenden Normen übereinstimmt  
to which this declaration relates is in conformity with the following standards  
auquel se réfère cette déclaration est conforme aux normes*

**ISO 13766-1:2018**

Verified Standards:

**EN 55022:2008-05**  
**EN 13309:2010, ISO 11452-3:2001**  
**EN 61000-6-2, EN 61000-4-2:2009**

*gemäß den Bestimmungen der Richtlinie  
following the provisions of Directive  
conformément aux dispositions de Directive*

**Directive 2014/30/EU of the European Parliament and of the Council C/2019/5759**

Date: **24.06.2021**

Signature and/or Company Seal:



Signed by:

**Daniel Ramondetta**  
Managing Director  
MOBA Mobile Automation Australia PTY LTD

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