

USER MANUAL

CONTROL PANEL

MODELS:

- DU03.CAN
- DU03.DC



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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August 2026

Stock number: OM.DUO3

Document number: 010-31-000-17-100-01

Firmware version: 7.02



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.



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1. 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
All cords and cables	Dead on arrival only, must be returned within 7 days of receipt
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 authorise 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.

2. Safety Information

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



Read and understand the manual before use or installation. Only trained and authorised personnel should install, configure, or operate this system.



Hydraulic systems operate under high pressure. Hydraulic oil injection can cause serious injury. Always depressurise the system before servicing or disconnecting any hydraulic components.

Moving machine parts can cause crushing or entanglement injuries. Keep clear of the blade, linkages, and all moving hydraulic components during operation.

Automatic blade control may cause unexpected machine movement. Ensure the area is clear of personnel and obstacles before enabling automatic mode.

Risk of unintended machine movement during installation or calibration. Secure the machine, engage parking brakes, and isolate controls where possible before starting setup or adjustments.



Electrical hazards may be present. Ensure correct wiring, secure connections, and protection from moisture or damage to avoid short circuits or system failure.



Rotating laser signals require clear line-of-sight. Obstructions or reflections may cause incorrect readings leading to unintended blade movement.

Wear appropriate personal protective equipment (PPE). This includes safety boots, high-visibility clothing, gloves, and eye protection as required.



Regularly inspect hoses, cables, and fittings. Damage or wear can lead to system failure, hydraulic leaks, or loss of control.

3. Product Overview

3.1 Product Description & Variants

The DUO3 is a control panel for automatic blade control in earthmoving, land levelling, and agricultural applications. It uses input from compatible sensors, such as laser, slope, and ultrasonic sensors, to control hydraulic valves and position the blade.

The system supports up to four hydraulic valves. Two are typically used for left and right blade control, with two available for auxiliary functions such as rotation or side shift. Supported valve types include on/off, voltage proportional, current proportional, and direct-connect systems used on John Deere and CASE machines.

The DUO3 also supports electric masts, wired remotes, and joysticks. System information is displayed on a high-contrast LCD screen, with five front-panel LED indicators for each side providing additional operating feedback. The DUO3 control panel is available in 2 variants:

Variant	Model Number	Description
Standard	DUO3.CAN	Connects directly to solenoid valves and drives them using electrical signals. Compatible with voltage proportional, current proportional and On/Off (Bang-Bang) valves.
Direct Connect	DUO3.DC	Connects to a machine's Electronic Control Unit (ECU), which then manages the hydraulic valves, ramp rates, and machine safety functions. This output type is commonly used with electronically controlled SCV remote circuits on John Deere and CASE tractors. Before purchasing or installing, contact MOBA or a local authorised dealer to confirm compatibility and obtain the correct machine-specific installation instructions. Incorrect connection may result in damage to the machine's electrical system.

NOTE: This manual uses the term DUO3 as shorthand for both of the above variants. However, the DUO3.DC variant does not support auxiliary hydraulic valves. References in this manual to the direct driving of valves, whether through descriptions of cable wiring to different valve types or otherwise, apply only to the DUO3.CAN variant.

3.2 Main Features of the Control Panel

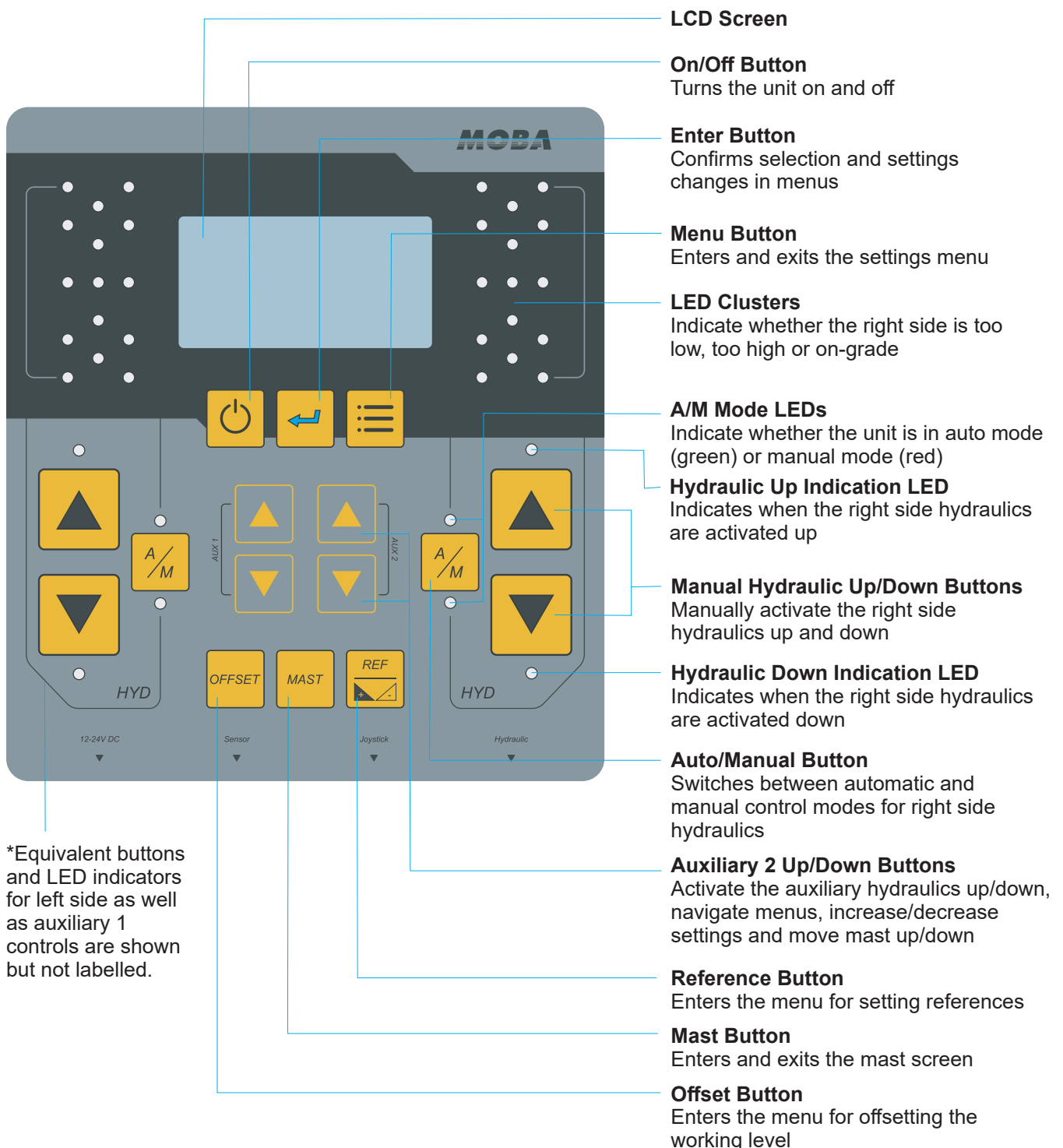


3.3 Switchpad & LCD Display

The DUO3 switchpad provides all the controls required to operate the system. It includes integrated LED display clusters that indicate important functions and status of the system.

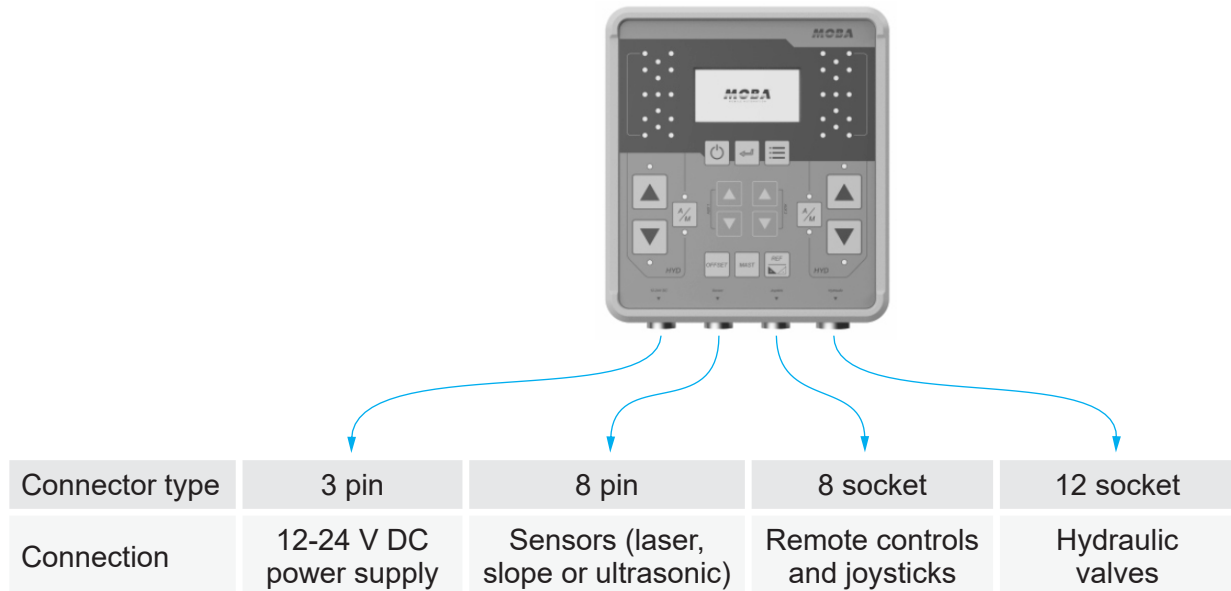
The LCD screen offers a clear, user-friendly overview of the information needed to operate the panel, as well as access to settings and parameters for easy adjustment.

This section provides a general overview of the switchpad and LCD, while later chapters in this manual offer more detailed information based on the types of sensors used and the specific workflows required.



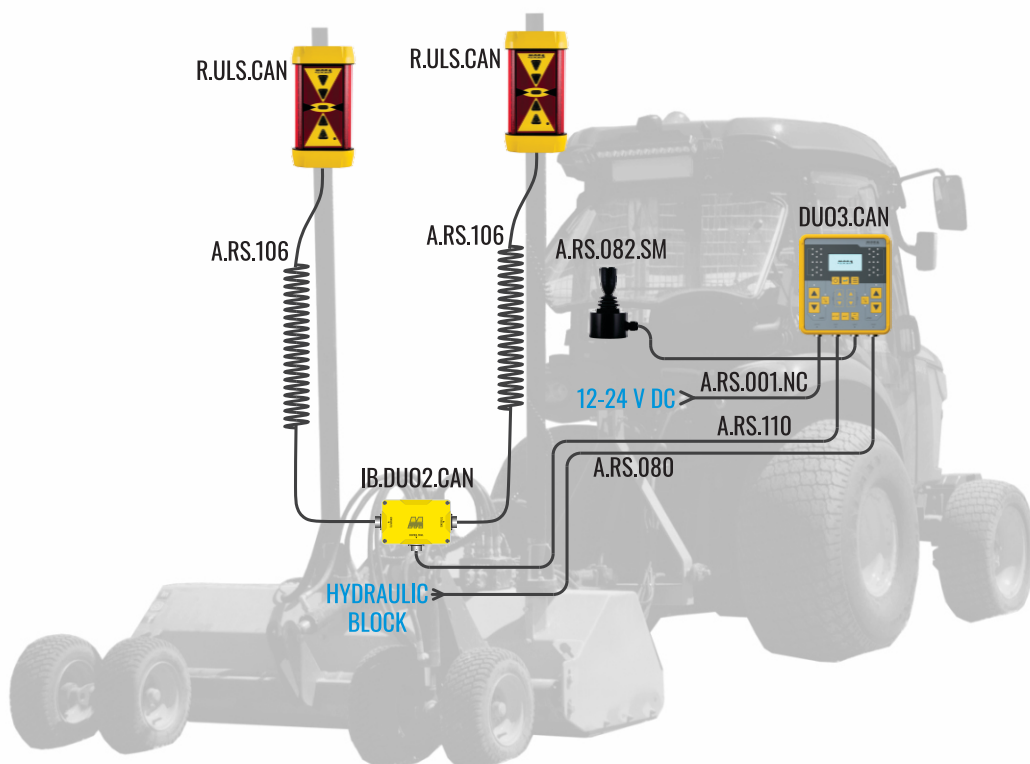
3.4 Control Panel Connections

The DUO3 control panel is connected to a power source, sensors, accessories and the hydraulic valves via 4 military-style connectors located on the underside of the unit as shown below.



3.5 Basic Set-Up

The diagram below shows an example of a basic set-up on a tow-behind blade with 2 laser sensors and an optional proportional joystick. Chapter 4 of this user manual has detailed instructions on how to install and wire the control panel while Chapter 10 has more examples of typical installations on different machine and blade types.



3.6 System Components

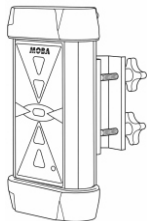
3.6.1 Control Panel



DUO3.CAN / DUO3.DC Control Panel

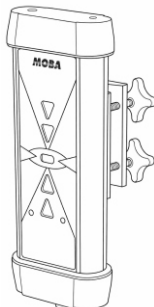
- Receives and processes inputs from sensors and accessories
- Drives and controls hydraulic valves (indirectly for DUO3.DC variant)
- Contains all controls and displays required for operation of the control system

3.6.2 Sensors



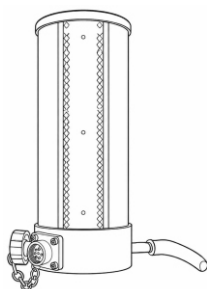
R.ULS.CAN Laser Receiver

- Works with common red or infrared rotating lasers
- 360° beam reception angle
- 700 m working range*
- 196 mm beam reception area
- ± 2 mm accuracy



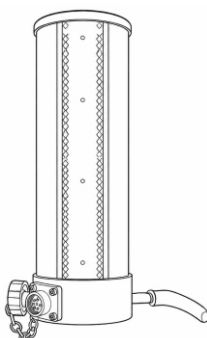
R.ULS.MM.CAN millimetre Laser Receiver

- Works with common red or infrared rotating lasers
- 360° beam reception angle
- 300 m working range*
- 256 mm beam reception area
- ± 2 mm accuracy
- ± 100 mm offset ability in 1 mm increments



MOB.1252 LS2000 Laser Receiver

- Works with common red or infrared rotating lasers
- 360° beam reception angle
- 300 m working range*
- 220 mm beam reception area
- ± 1 mm accuracy

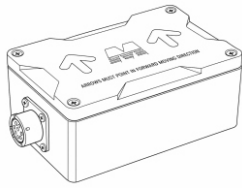


MOB.098 LS3000 millimetre Laser Receiver

- Works with common red or infrared rotating lasers
- 360° beam reception angle
- 300 m working range*
- 280 mm beam reception area
- ± 1 mm accuracy
- ± 240 mm offset ability in 1 mm increments

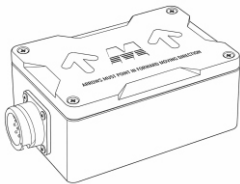
* range dependent on laser transmitter, tested with 5mW rotating laser.

3.6.2 Sensors - Continued



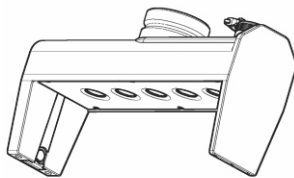
UG.000.CAN Slope Sensor

- Maintains any slope or level reference
- 60% / 30° range
- Integrates with R.ULS.CAN & R.ULS.MM.CAN laser receivers



UG.001 Slope Sensor

- Maintains any slope or level reference
- 60% / 30° range
- Integrates with LS2000 & LS3000 laser receivers



MOB.007 Sonic-Ski® Plus Ultrasonic Sensor

- Maintains reference from curb or string
- 25 cm - 150 cm working range

3.6.3 Joysticks and Remote Controls



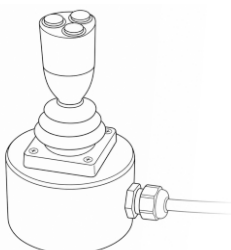
A.RS.076 Remote Control

- Corded remote control
- Allows switching between Auto and Manual modes and manual activation/override for both left and right sides



A.RS.052 Remote Control

- Corded remote control
- Allows switching between Auto and Manual modes and manual activation/override for single side



A.RS.082 Proportional Joystick

- Corded proportional joystick
- Allows switching between Auto and Manual modes
- Allows proportional manual activation/override
- 4 variants available to suit specific machines - refer to Chapter 9 of this manual

3.6.3 Joysticks and Remote Controls - Continued



A.RS.089 REMOTE SWITCH MASTER A/M - 3M

- Corded remote control - 3 metre
- Switches between auto and manual modes



A.RS.119 REMOTE CORD DUAL SIDE UP/DOWN MASTER A/M - 3.5M

- Remote control cord - 3.5 metre
- Allows switching between auto and manual modes and manual activation/override of left and right side hydraulic valves
- Cord only - appropriate switches must be supplied and installed by customer



A.RS.145 REMOTE SWITCH SGL A/M HYD LEVER MOUNT - 2M

- Corded remote control - 2 metre
- Allows switching between auto and manual modes
- For mounting to hydraulic lever



A.RS.118 REMOTE CORD SGL SIDE A/M UP/DOWN AND MAST OFFSET - 3M

- Remote control cord - 3 metre
- Allows invoking of electric mast relative offsets, switching between auto and manual modes, and manual activation/override for left side
- Cord only - appropriate switches must be supplied and installed by customer



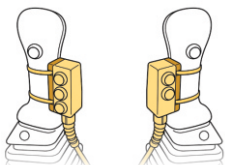
A.RS.131 REMOTE CORD CTRL PNL TO SKID STEER 14POL - 10M

- 10 metre cord for connecting to machine's 14 pol connector
- Allows switching between auto and manual modes and manual activation/override for both sides



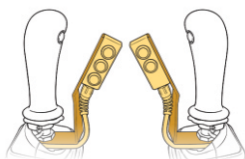
A.RS.139 REMOTE CORD DUAL SIDE UP/DOWN MASTER A/M & AUX - 3.5M

- Corded remote control - 3.5 metre
- Allows switching between auto and manual modes and manual activation/override of left and right side hydraulic valves
- Cord only - appropriate switches must be supplied and installed by customer



A.RS.142.5BK 5-BUTTON KIT FOR RECEIVING SYSTEMS

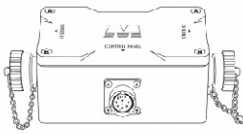
- Designed to mount to machine's joysticks either via straps or via metal brackets
- Allows switching between auto and manual modes, manual activation/override of left and right hydraulic valves and activation of auxiliary hydraulic functions
- See chapter 9 for more information



A.RS.146 INTERFACE CORD IB.DUO2.14PJOY TO SKID STEER 14POL - 3.5M

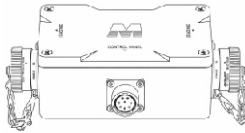
- 3.5 metre joystick cord with 14 pol plug
- Allows switching between auto and manual modes and manual activation/override of left and right hydraulic valves
- Also available without the 14 pol plug; part number: A.RS.146.NC

3.6.4 Junction and Breakaway Boxes



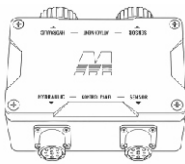
IB.DUO2.CAN Junction Box for CAN Sensors

- Allows connecting 2 sensors to DUO3 control panel
- Used with R.ULS.CAN & R.ULS.MM.CAN laser sensors and UG.000.CAN slope sensor



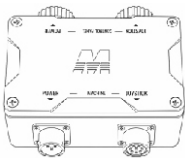
IB.DUO2.MOB Junction Box for MOBA AG Sensors

- Allows connecting 2 sensors to DUO3 control panel
- Used with MOB.098 & MOB.1252 laser receivers, UG.001 slope sensor and MOB.007 ultrasonic sensor



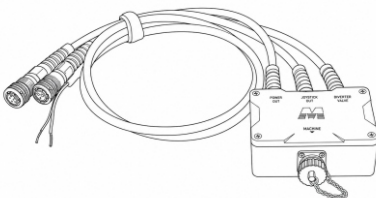
IB.DUO2.HYD Breakaway Box - Hydraulic

- Allows quick decoupling of attachment-mounted components from the machine via 2 bayonet connectors
- Used for systems with in-cab mounted control panel



IB.DUO2.JOY Breakaway Box - Joystick

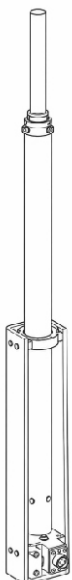
- Allows quick decoupling of attachment-mounted components from the machine via 2 bayonet connectors
- Used for systems with the optional proportional joystick and out-of-cab mounted control panel



IB.DUO2.14PJOY Junction Box For Machine 14POL

- Allows quick decoupling of attachment-mounted components from the machine via the machine's 14 pol connector
- Enables operation of auxiliary valve from machine's joystick
- Used for out-of-cab systems requiring a single cable back to the machine for joystick signals and power via the machine's 14 pol connector.

3.6.5 Electric Mast



ME.18.CAN.C Electric Mast with CAN Control and Cradle

- Electric telescoping mast for use with laser sensors
- Allows offsetting working level directly from the control panel or remote/joystick in 1 mm increments
- 1,000 mm telescoping range

3.6.6 Cords

The following cords are available from MOBA and authorised distributors for use with the DUO3 control panel. These cords are designed to support a range of machine and attachment configurations.

For assistance selecting the correct cord, contact the MOBA sales team for guidance on the most suitable part for your machine.

Power Cords	
A.RS.001	POWER CORD FOR CTRL PNL 6M 3SCKT - CLIPS
A.RS.001.NC	POWER CORD FOR CTRL PNL 6M 3SCKT - BARE WIRE
A.RS.001.NC.3M	POWER CORD FOR CTRL PNL 3M 3SCKT - BARE WIRE
Sensor Cords	
A.RS.106	SENSOR CORD CAN CURLY 8.5M 8SCKT - 8PIN
A.RS.107	SENSOR CORD CAN 10M 8SCKT - 8PIN
A.RS.110	SENSOR CORD CAN 5M 8SCKT - 8PIN
A.RS.111	SENSOR CORD CAN 2.5M 8SCKT - 8PIN
A.RS.130	SENSOR CORD CAN LEFT TERMINATED 10M 8SCKT - 8PIN
A.RS.135	SENSOR CORD CAN 1M 8SCKT - 8PIN
MOB.025 ¹	COIL CABLE - 6M CONNECTION JUN
Hydraulic Cords	
A.RS.080	HYDRAULIC CORD 5M 12PIN - BARE WIRE
A.RS.080.1m3	HYDRAULIC CORD 1.3M 12PIN - BARE WIRE
A.RS.096	HYDRAULIC INTERFACE CORD 5M 12PIN - 12PIN
A.RS.127	HYDRAULIC INTERFACE CORD 10M 12PIN - 12PIN
A.RS.140 ²	HYDRAULIC CORD DC DUAL PNL (DEERE) 5.5M 12PIN - 10PIN APTIV
A.RS.116 ²	HYDRAULIC CORD DC DUAL PNL (CASE) 5.5M 12PIN - 6PIN DEUTSCH
Joystick Extension Cords	
A.RS.098	JOYSTICK INTERFACE CORD 3M 8PIN-8PIN
A.RS.099	JOYSTICK EXTENSION CORD 5M 8SCKT-8PIN

¹ for use with MOB.098, MOB.1252, UG.001 and MOB.007 sensors.

² for use with the DUO3.DC variant only

4. Installation

This chapter provides instructions on how to install and connect the DUO3 control panel and the input sensors.

4.1 Mechanical Installation



Always ensure that mechanical installation is carried out by qualified and competent personnel.

Take care when welding, cutting, or grinding near hydraulic lines and components. Welding can damage the machine's electrical system, so ensure it is properly isolated before commencing any welding work.

4.1.1 Mounting the Control Panel

The DUO3 Control Panel can be installed either inside the machine cabin (in-cab configuration) or directly on the attachment (out-of-cab configuration). For in-cab installations, the control panel should be mounted within comfortable reach of the operator and positioned as close as practical to the operator's natural line of sight, while ensuring it does not obstruct visibility during machine operation.

For out-of-cab installations, the control panel should be mounted on the attachment in a location that allows the operator to clearly view the LCD display and LED status indicators from the cabin.

Optional RAM mounting kits and magnetic mounting solutions are available from MOBA Australia.

The control panel is mounted via a C-size RAM ball mount (RAM-202U) which is secured to the back of the control panel via 4 x M5 screws.

Using the optional RAM mount kit:

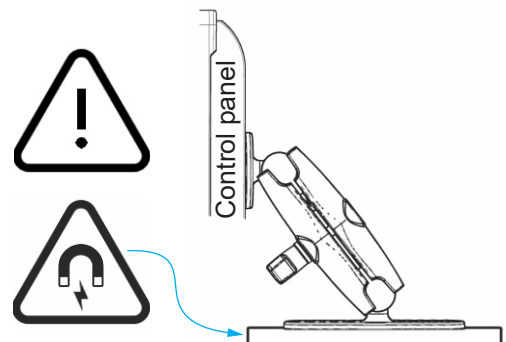
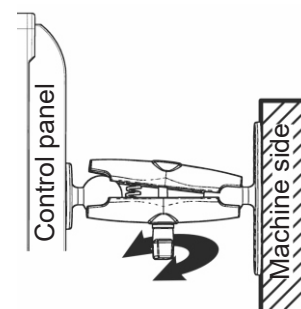
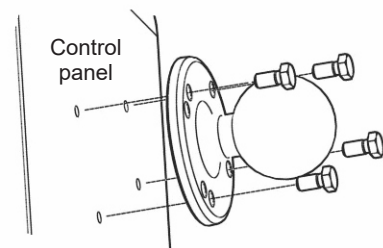
- Attach the RAM mount square plate to the machine using appropriate screws or bolts
- Loosen the RAM arm clamping screw then insert the RAM ball on the back of the control panel into the arm
- Adjust the angle of the control panel as required then tighten the arm clamping screw

Using the optional magnetic mount kit:

- Remove the plastic protective plate from the magnetic mount (A.RAM.020) then attach to the machine.

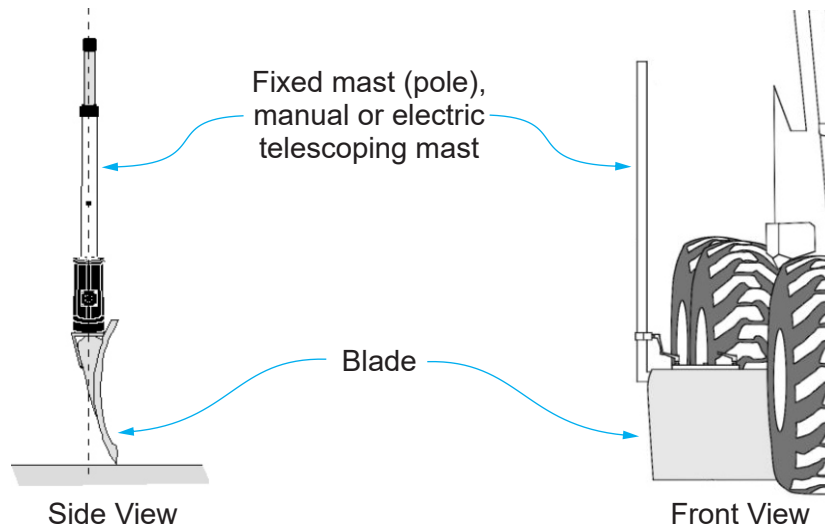
NOTE: Be extremely careful of strong magnets!

- Loosen the RAM arm clamping screw then insert the RAM ball on the back of the control panel into the arm
- Adjust the angle of the control panel as required then tighten the arm clamping screw



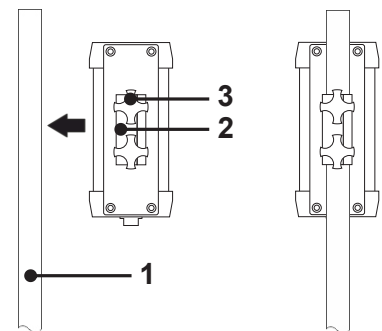
4.1.2 Installing Laser Receivers

The laser receiver should be mounted to the blade using a fixed mast (pole), manual telescopic mast or an electric telescopic mast. The mast diameter should be 35 - 52 mm if using R.ULS.CAN / R.ULS.MM.CAN laser receivers or 30 - 46 mm if using LS2000 / LS3000 laser receivers. The mast should be vertical and ideally long enough to make sure the laser receiver is not obstructed by the machine's cabin from any angle.



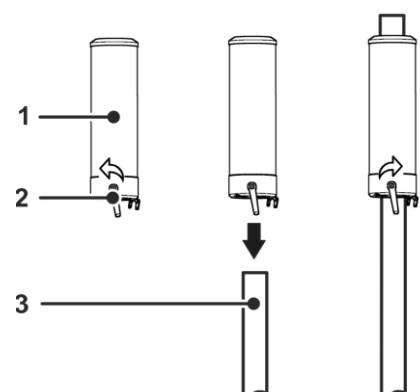
4.1.2.1 Mounting R.ULS.CAN/R.ULS.MM.CAN Laser Receivers

- Loosen both mounting knobs (3)
- Place the unit such that the mounting bracket C-channel (2) is around the mast/pole (1)
- Tighten both mounting knobs (3)



4.1.2.2 Mounting LS2000/LS3000 Laser Receivers

- Loosen the mounting clamp (2)
- Slide the laser receiver (1) over the top of the mast tube (3)
- Tighten the mounting clamp (2)

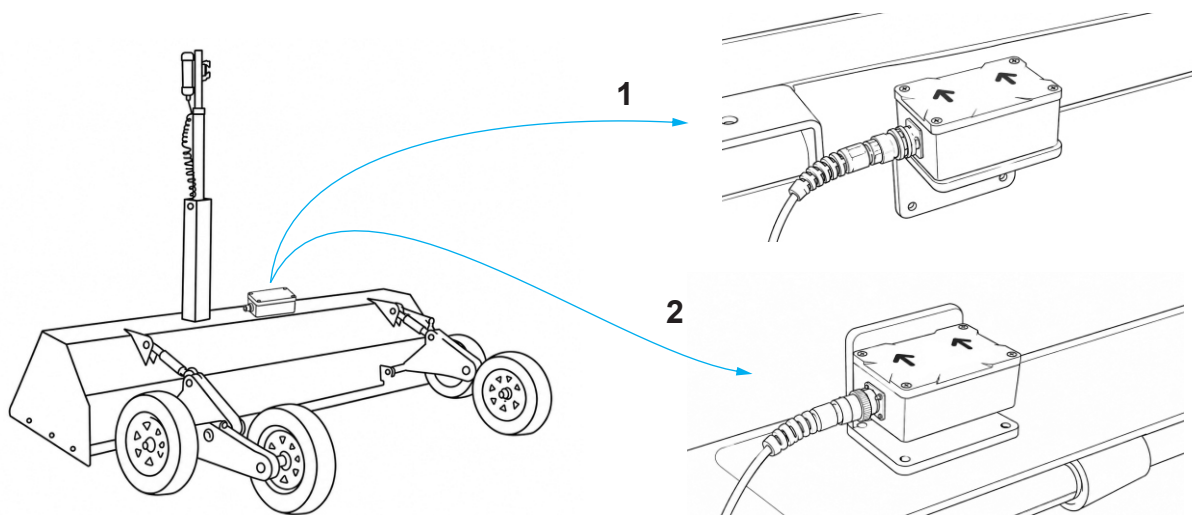


4.1.3 Installing the Slope Sensor



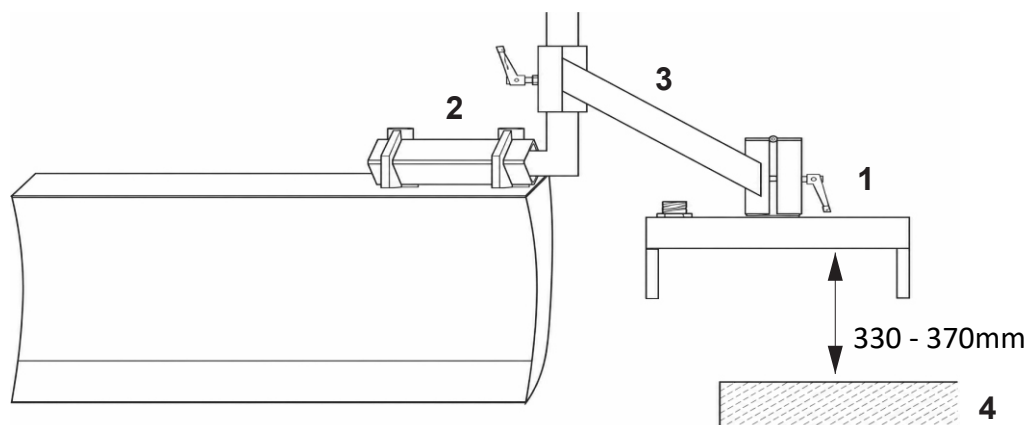
After mounting the slope sensor, calibrate it using the procedure outlined in section 7.4.1 of this manual. Failure to calibrate the sensor after mounting may result in incorrect reading of the slope of the blade.

- The slope sensor can be attached to the blade via the bottom side (1) or the front side (2) of its housing as shown.
- The slope sensor housing has 2 x M6 mounting holes spaced 80 mm on each face to allow mounting
- The sensor must be mounted such that the two arrows on the sensor are pointing in the forward moving direction of the machine
- A range of weld-on brackets are available from MOBA



4.1.4 Installing the Sonic-Ski® Plus Ultrasonic Sensor

The MOB.007 sonic sensor (1) is typically mounted to the blade using the A.ME.15 mast weld-on bracket (2) and the MOB.236 Sensor Bracket Kit (3). For best results, mount the sensor approximately 330 - 370 mm from the ground or curb line (4).

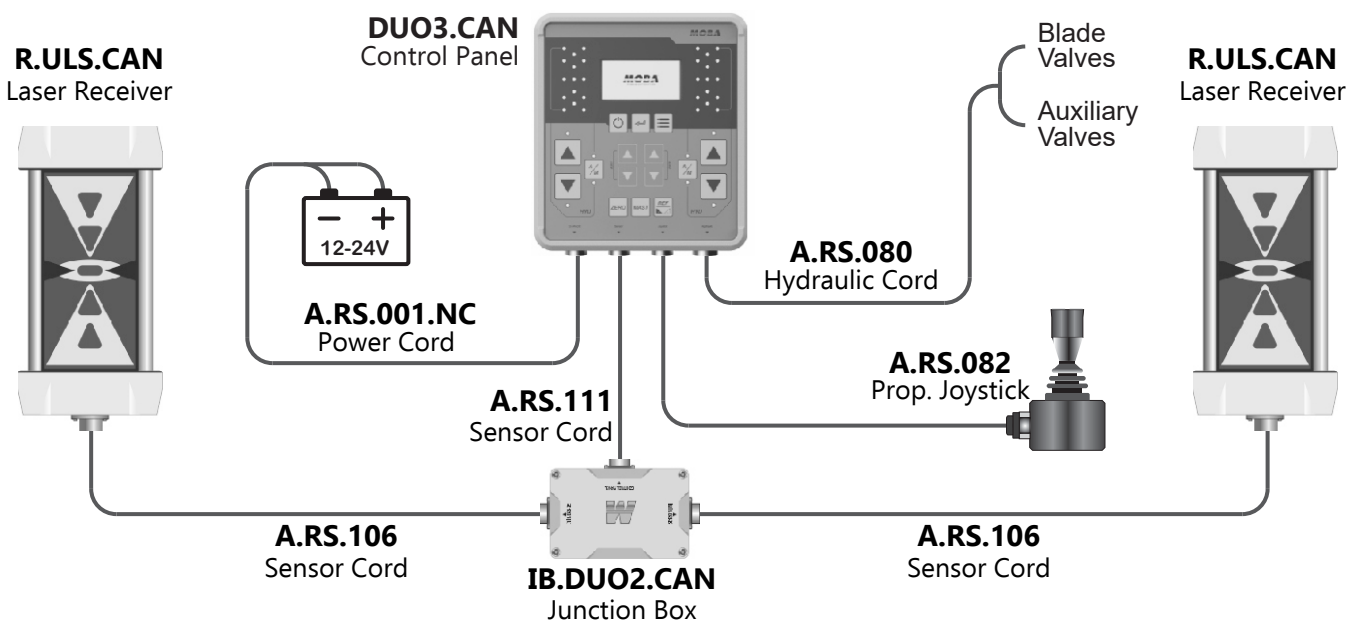


4.2 Wiring and Electrical Connections

The DUO3 control panel can be configured and wired in a number of different configurations to suit various machines and workflows. The set-up diagram below refers to a typical system in order to illustrate how to connect the unit. Chapter 10 has a number of different configurations that may be better suited to your application.

4.2.1 Typical System

The set-up diagram below shows a typical wiring diagram for a system with 2 laser receivers.

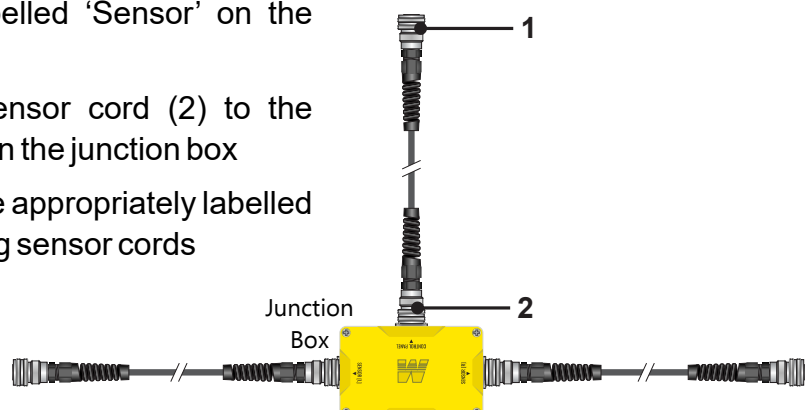


4.2.2 Connecting Sensors

Sensors are typically connected to the DUO3 control panel via a junction box. Please see section 3.6.4 for a list of available junction boxes and compatible sensors and section 3.6.6 for a list of available sensor cord options.

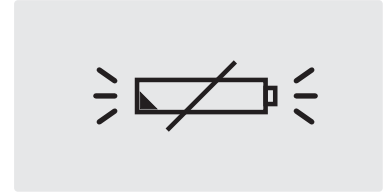
Connecting sensors:

- Connect the 8-socket military-style connector (1) on the sensor cord to the connector labelled 'Sensor' on the control panel
- Connect the other end of the sensor cord (2) to the connector labelled 'Control Panel' on the junction box
- Connect left and right sensors to the appropriately labelled connectors on the junction box using sensor cords



4.2.3 Connecting Power Supply

- The external power supply must be rated 12 - 24 V DC
- Only use power cords supplied by MOBA; see section 3.6.6 of this manual for a list of power cord options
- If the input voltage drops below the level required to operate the unit, a low battery symbol will appear on the LCD briefly, before the unit automatically shuts down



To connect the control panel to the power supply:

- Connect the 3-pin military style connector (1) on the power cord to the connector labelled 12-24V DC on the control panel
- Wire the other end of the power cord (2) to the machine's battery:
 - Power cords with bare wires: wire as per table below
 - Power cords with battery clips: red clip to positive battery terminal; black clip to negative battery terminal



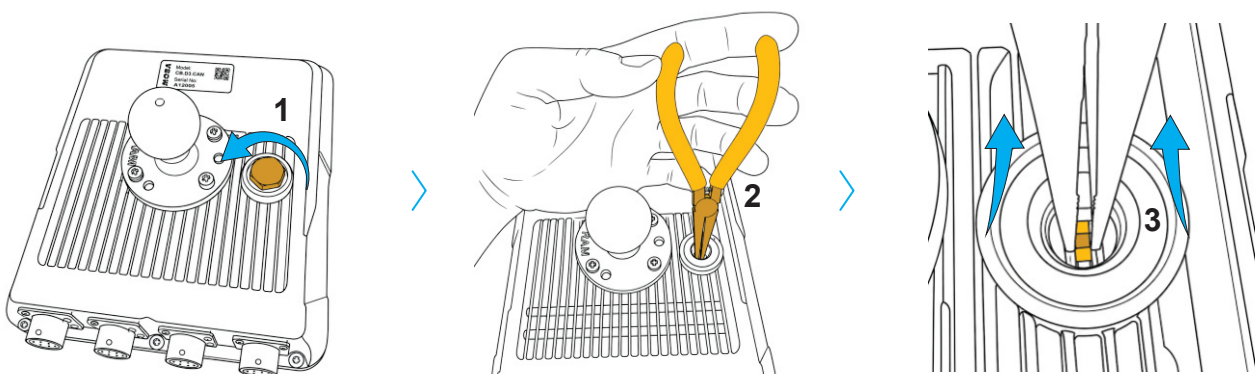
Wire Colour	Wire Signal
Brown	Positive (+)
Blue	Negative (-)
Yellow/Green	Not used

4.2.3.1 Replacing On-Board Fuse

The DUO3 is fitted with an internal fast-acting fuse to protect the unit's electronic circuitry from current spikes. The fuse is located beneath the pressure relief valve on the rear of the unit. A spare fuse, part number P.COMP.047 is supplied along with this manual.

Follow the steps below to replace the fuse:

- Using a 16 mm socket, unscrew and remove the relief valve (1) from the rear of the unit.
- Using small long-nose pliers or tweezers (2), carefully grip the fuse (3) and pull it straight out of its holder, away from the control panel.
- Install the new fuse (3), then re-fit the relief valve and tighten it to 0.8 Nm.



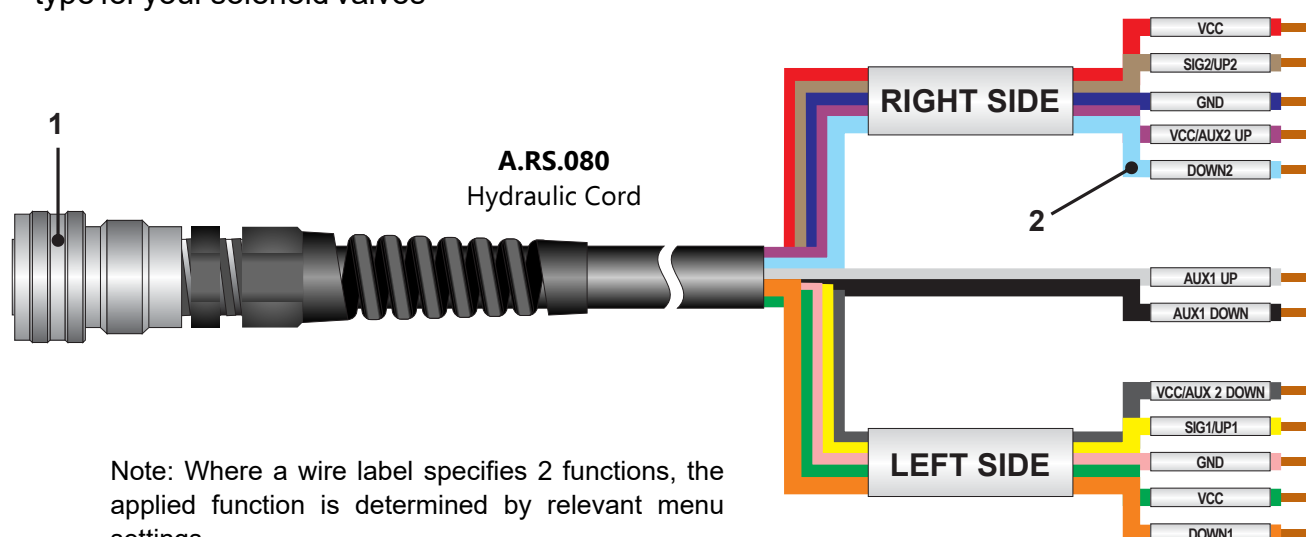
4.2.4 Hydraulic Connections

The DUO3 control panel can drive most commercially available solenoid valves, including popular brands such as Danfoss, Eaton-Vickers, Rexroth and others. It has four different types of hydraulic output drive signal available, suitable for different types of valves as explained in the following paragraphs.

The hydraulic cord supplied with the system will typically be terminated with the appropriate connectors either by MOBA or by your local dealer. In the event that the hydraulic cord was not terminated before supply, the information below can be used to connect appropriate type of connectors.

4.2.4.1 Hydraulic Cord Pin-Outs

- Connect the 12-pin military-style connector from the hydraulic cord to the connector labelled 'Hydraulics' on the control panel
- Wire the other end of the cord according to the below information to an appropriate connector type for your solenoid valves



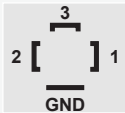
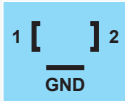
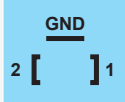
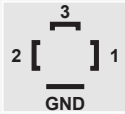
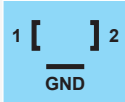
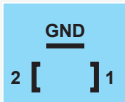
Wire Colour	Wire Label	Group
GREY	VCC/AUX2 DOWN	LEFT SIDE
YELLOW	SIG1/UP1	
PINK	GND	
GREEN	VCC	
ORANGE	DOWN1	
BLACK	AUX1 DOWN	
WHITE	AUX1 UP	
RED	VCC	RIGHT SIDE
BROWN	SIG2/UP2	
BLUE	GND	
PURPLE	VCC/AUX2 UP	
AQUA	DOWN 2	

4.2.4.2 Typical Hydraulic Cable Connections

Below are examples of how to connect common solenoid valve brands with CETOP-style (DIN 43650 Form A) connectors.

In cases where valve pins are not numbered, use the position of the straight pin relative to the other pins as shown in the pin layout to determine which pin is which.

Only the left side connections are shown, the right side is connected similarly with corresponding right side wires.

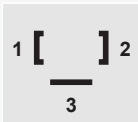
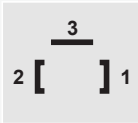
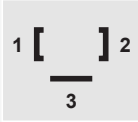
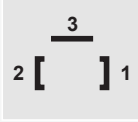
Hydraulic Output Type	Example Valves	Valve Connector Pin Layout	Connections to A.RS.080 (Wire Colour - Wire Label)
Voltage Proportional (V[O])	Danfoss PVG series with PVE actuator		PIN 1: Green – VCC PIN 2: Yellow – SIG1/UP1 PIN 3: Not Connected GND: Pink - GND
Current Proportional (I[O]) or On/Off Low Side	- Eaton-Vickers KDG4V series (Current Proportional output) - Rexroth 4WE6 (On/Off Low Side output) - Eaton-Vickers DG4V series (On/Off Low Side output).	Up Coil 	PIN 1: Grey – VCC PIN 2: Yellow – SIG1/UP1 GND: Pink - GND (Optional) *Solenoid coil is non-polarised. Grey and yellow may be swapped.
	Note: The Rexroth 4WE6 and Eaton-Vickers DG4V can also be driven with On/Off High Side output if wired as shown in On/Off High Side below	Down Coil 	PIN 1: Green – VCC PIN 2: Orange – DOWN1 GND: Not Connected *Solenoid coil is non-polarised. Green and orange may be swapped.
On/Off High Side	Danfoss On/Off with PVEO actuator		PIN 1: Orange – DOWN1 PIN 2: Yellow – SIG1/UP1 PIN 3: Not Connected GND – Pink - GND
	- Rexroth 4WE6 series - Eaton - Vickers DG4V series	Up Coil 	PIN 1: Pink – GND PIN 2: Yellow – SIG1/UP1 GND - Pink-GND (Optional) *Solenoid coil is non-polarised. Pink (pin 1) and yellow may be swapped.
	Note: The Rexroth 4WE6 and Eaton - Vickers DG4V can also be driven with On/Off Low Side output if wired as shown in On/Off Low Side above.	Down Coil 	PIN 1: Pink – GND PIN 2: Orange – DOWN1 GND: Not Connected *Solenoid coil is non-polarised. Pink and orange may be swapped.

4.2.4.3 Typical Auxiliary Hydraulic Connections

The DUO3 can drive two additional On/Off valves, which can be used for auxiliary functions such as raising and lowering a wheel on a skid steer attachment.

These hydraulic outputs can be activated using the Auxiliary Up/Down buttons on the control panel or via a corded remote or joystick. Auxiliary 1 Up can also be set to automatically activate whenever the main hydraulic output is activated, for cases where a diverter valve must be driven.

The table below shows how to connect these valves using the bare wires of the A.RS.080 cable, assuming CETOP-style (DIN 43650 Form A) connectors.

Channel	Valve Pin Layout	Connections of A.RS.080 Bare Wires (Wire colour - Wire Label)
AUX 1	Up Coil 	PIN 1: White - AUX1 UP PIN 2: Pink – GND PIN 3: Not Connected
	Down Coil 	PIN 1: Black - AUX1 DOWN PIN 2: Pink – GND PIN 3: Not Connected
AUX 2	Up Coil 	PIN 1: Violet - AUX2 UP PIN 2: Blue – GND PIN 3: Not Connected
	Down Coil 	PIN 1: Grey - AUX2 DOWN PIN 2: Blue – GND PIN 3: Not Connected

5. Hydraulic Signal Calibration

The DUO3 controls the blade by sending appropriate electric signals to the blade's hydraulic valves in order to actuate the valves and move the blade in the desired direction.

Overall performance of the system is influenced by several factors, including the make and type of solenoid valves, the efficiency of the machine's hydraulic system, and the geometry and kinematics of the blade's moving components.

The DUO3 offers a range of adjustable hydraulic signal settings that can be fine-tuned to achieve optimal levelling performance for a specific blade. This chapter of the manual outlines the calibration process for all settings to ensure the blade operates at its best.

If a system was installed by MOBA Australia or an authorised dealer, all calibration and settings adjustments will have already been completed, and the steps described in this chapter can be skipped.

5.1 Valve Types

The DUO3 can drive most commercially available solenoid valves, including popular brands such as Danfoss, Eaton-Vickers, Rexroth and others. It has four different types of hydraulic output drive signal available, suitable for different types of valves as explained in the following table.

Valve Type	Solenoid Valves That Can Be Driven	Description	DUO3 Menu Selection
Voltage Proportional	Danfoss PVG series with PVE actuator	This output is a ratiometric voltage signal, not intended to drive a solenoid directly. Mainly used with Danfoss Proportional Valves which have the PVE actuator incorporated, but other valves with similar actuator can also be driven. Valve spool stroke is proportional to the voltage signal.	V[O]
Current Proportional	- Eaton-Vickers KDG4V series - Rexroth 4WRAB6	This current output can be up to 3A and can directly drive a proportional solenoid. Valve spool stroke is proportional to the current amplitude.	I[O]
ON/OFF Low Side	- Eaton-Vickers DG4V series - Rexroth 4WE6	This current output can be up to 3A and can directly drive an On/Off solenoid. The 'Low Side' refers to the activation method which is done by switching to ground. Valve spool stroke is either maximum (solenoid active) or neutral (solenoid inactive).	ON/OFF (Low Side)
ON/OFF High Side	- Danfoss ON/OFF with PVEO actuator - Eaton-Vickers DG4V series - Rexroth 4WE6	This current output can be up to 3A and can directly drive an On/Off solenoid. The 'High Side' refers to the activation method which is done by switching the positive voltage supply. Valve spool stroke is either maximum (solenoid active) or neutral (solenoid inactive).	ON/OFF (High Side)

5.2 Setting the Valve Type



Always ensure all persons are well clear of the machine's blade and other moving parts when turning on the control panel. Turning the control panel on may result in sudden movement of the blade and blade components.

To set the valve type for the left side of the controller:



Turn the unit on by pressing the On/Off button.



Press the Menu button to enter the settings menu.



Press the Enter button to enter the Left Side settings sub-menu then again to enter the Hydraulic Settings sub-menu. The currently selected valve type will be displayed in square brackets.

```
Left Side
Right Side
Accessory Sensors
Joystick Type
Display Settings
Advanced Settings
Exit
```



```
Left Side
Hydraulic Settings
Sensor Settings
Disable sensor
Exit
```



```
Hydraulic - Left
Type [V0]
General Settings
Calibration
Advanced Settings
Copy to Right
Exit
```



Press the Enter button to enter the valve type sub-menu.

```
Hydraulic - Left
Type [V0]
General Settings
Calibration
Advanced Settings
Copy to Right
Exit
```



```
Hydraulic - Left
►Proportional (V0)
Proportional (IO)
On/Off (Low Side)
On/Off (High Side)
Exit
```



Use the Auxiliary Up/Down buttons to select the desired valve type (please refer to the previous section on valve types) and then press Enter button to set the valve type into memory. The set valve type will be indicated with an arrow.



```
Hydraulic - Left
►Proportional (V0)
Proportional (IO)
On/Off (Low Side)
On/Off (High Side)
Exit
```



```
Hydraulic - Left
►Proportional (V0)
Proportional (IO)
►On/Off (Low Side)
On/Off (High Side)
Exit
```



```
Hydraulic - Left
Proportional (V0)
Proportional (IO)
►On/Off (Low Side)
On/Off (High Side)
Exit
```



Press the Menu button to exit the settings menu and return to the main screen.

Repeat the above steps but select Right Side to also set the valve type for the right side.

NOTE: While it is not common, some agricultural attachments use 2 different types of valves on the same blade to control elevation and slope respectively.

5.3 Hydraulic Response Settings

The DUO3 outputs valve control signals to operate the valves that control blade movement. These signals can be finely adjusted using a range of settings to optimise blade speed and accuracy.

An interactive calibration program is included and should be run for all new installations. This process configures the system for proper operation - refer to Section 5.4 for step-by-step instructions.

Overall system performance can vary between different machines due to factors such as hydraulic oil pressure, blade or bucket size, valve type and manufacturer, sensors connected and the desired operating speed. As a result, there is no single set of universal settings. The following pages describe the function of each setting and provide guidance on how to fine-tune each one for optimal hydraulic performance.

5.3.1 Adjusting the Hydraulic Response Settings

To adjust hydraulic output settings:



Turn the unit on and press the Menu button to enter the main menu.



Press the Enter button to enter the Left Side settings sub-menu then again to enter the Hydraulic Settings sub-menu.

```
Left Side
Right Side
Accessory Sensors
Joystick Type
Display Settings
Advanced Settings
Exit
```



```
Left Side
Hydraulic Settings
Sensor Settings
Disable sensor
Exit
```



Use the Auxiliary Up/Down buttons and the Enter button to select and enter general settings.



```
Hydraulic - Left
Type [V0]
General Settings
Calibration
Advanced Settings
Copy to Right
Exit
```



```
(IO) General Settings
Min Up      = 10.0%
Min Down    = 10.0%
Max Up      = 100.0%
Max Down    = 100.0%
Dither (mA) = 150
Dither (Hz) = 300
```



Use the Auxiliary Up/Down buttons to select the desired setting then press the Enter button. The setting will start to flash, indicating editing mode.

```
(IO) General Settings
Min Up      = 10.0%
Min Down    = 10.0%
Max Up      = 100.0%
Max Down    = 100.0%
Dither (mA) = 150
Dither (Hz) = 300
```



```
(IO) General Settings
Min Up      = 10.0%
Min Down    = 10.0%
Max Up      = 100.0%
Max Down    = 100.0%
Dither (mA) = 150
Dither (Hz) = 300
```

Use the Auxiliary Up/Down buttons to adjust the value and then press the Enter button to store it into memory and exit editing mode.



Repeat the above procedure to edit other settings and the settings for the right side. Once finished, press the Menu button to exit the settings menu and return to the main screen.

5.3.2 Hydraulic Settings for Voltage Proportional [VO] Valves

(VO) General Settings	
Min Up	= 10.0%
Min Down	= 10.0%
Max Up	= 100.0%
Max Down	= 100.0%
Direction	= Normal
Max Speed Up	= 50.0%

Setting	Possible Values (Typical Values)	Description
Min Up	5.0 - 95.0% (5.0 - 35.0%)	The minimum signal applied to move the blade or bucket upward, shown as a percentage. It is applied in auto hydraulic mode when the input from the connected sensor is just below the "ON TARGET" (green) band. If set too high, the blade or bucket may overshoot the target when making small upward adjustments. If set too low, small upward adjustments may not produce any blade/bucket movement. The Min Up value cannot be set higher than the Max Up value.
Min Down	5.0 - 95.0% (20.0 - 35.0%)	The minimum signal applied to move the blade or bucket downward, shown as a percentage. It is applied in auto hydraulic mode when the input from the connected sensor is just above the "ON TARGET" (green) band. If set too high, the blade or bucket may overshoot the target when making small downward adjustments. If set too low, small downward adjustments may not produce any blade/bucket movement. The Min Down value cannot be set higher than the Max Down value.
Max Up	5.0 - 100.0% (30.0 - 50.0%)	The maximum signal applied to move the blade or bucket upward, shown as a percentage. It is applied in auto hydraulic mode when the input from the connected sensor falls below the "ON TARGET" (green) band by an amount equal to or greater than the sensor's proportional range. If set too high, the blade or bucket may move too quickly and overshoot the target. If set too low, upward movement may be too slow. The Max Up value cannot be set lower than the Min Up value.
Max Down	5.0 - 100.0% (40.0 - 60.0%)	The maximum signal applied to move the blade or bucket downward, shown as a percentage. It is applied in auto hydraulic mode when the input from the connected sensor falls above the "ON TARGET" (green) band by an amount equal to or greater than the sensor's proportional range. If set too high, the blade or bucket may move too quickly and overshoot the target. If set too low, downward movement may be too slow. The Max Down value cannot be set lower than the Min Down value.
Direction	Normal / Reverse (Normal)	When Reverse is enabled, the DUO3 swaps the up and down hydraulic output signals. Used in cases where the normal setup produces movement in the opposite to expected direction (e.g. if pressing the up hydraulic button produces down movement) and it is not possible or desirable to swap the electrical or hydraulic connections.
Man Speed Up	5.0 - 100.0% (75.0 - 100.0%)	This setting controls the speed of movement in the upward direction when operating in manual mode and using the control panel switchpad or a joystick/remote to move the blade/bucket.
Man Speed Dn	5 - 100.0% (75.0 - 100.0%)	This setting controls the speed of movement in the downward direction when operating in manual mode and using the control panel switchpad or a joystick/remote to move the blade/bucket.

5.3.3 Hydraulic Settings for Current Proportional [IO] Valves

(IO) General Settings		
Min Up	=	10.0%
Min Down	=	10.0%
Max Up	=	100.0%
Max Down	=	100.0%
Dither (mA)	=	150
Dither (Hz)	=	300

Setting	Possible Values (Typical Values)	Description
Min Up	5.0 - 95.0% (15.0 - 35.0%)	The minimum signal applied to move the blade or bucket upward, shown as a percentage. It is applied in auto hydraulic mode when the input from the connected sensor is just below the "ON TARGET" (green) band. If set too high, the blade or bucket may overshoot the target when making small upward adjustments. If set too low, small upward adjustments may not produce any blade/bucket movement. The Min Up value cannot be set higher than the Max Up value.
Min Down	5.0 - 95.0% (15.0 - 35.0%)	The minimum signal applied to move the blade or bucket downward, shown as a percentage. It is applied in auto hydraulic mode when the input from the connected sensor is just above the "ON TARGET" (green) band. If set too high, the blade or bucket may overshoot the target when making small downward adjustments. If set too low, small downward adjustments may not produce any blade/bucket movement. The Min Down value cannot be set higher than the Max Down value.
Max Up	5.0 - 100.0% (40.0 - 60.0%)	The maximum signal applied to move the blade or bucket upward, shown as a percentage. It is applied in auto hydraulic mode when the input from the connected sensor falls below the "ON TARGET" (green) band by an amount equal to or greater than the sensor's proportional range. If set too high, the blade or bucket may move too quickly and overshoot the target. If set too low, upward movement may be too slow. The Max Up value cannot be set lower than the Min Up value.
Max Down	5.0 - 100.0% (40.0 - 60.0%)	The maximum signal applied to move the blade or bucket downward, shown as a percentage. It is applied in auto hydraulic mode when the input from the connected sensor falls above the "ON TARGET" (green) band by an amount equal to or greater than the sensor's proportional range. If set too high, the blade or bucket may move too quickly and overshoot the target. If set too low, downward movement may be too slow. The Max Down value cannot be set lower than the Min Down value.
Dither (mA)	0 - 800 mA (300 - 400 mA)	Dither superimposes a small oscillating signal at a defined amplitude and frequency onto the valve control signal. This helps reduce stiction and improves the valve's response to small adjustments. Use this setting to adjust the amplitude of the dither signal in accordance with the valve manufacturer's specifications.
Dither (Hz)	0 - 5000 Hz (100 - 150 Hz)	Use this setting to adjust the frequency of the dither signal in accordance with the valve manufacturer's specifications.
Direction	Normal / Reverse (Normal)	When Reverse is enabled, the DUO3 swaps the up and down hydraulic output signals. Used in cases where the normal setup produces movement in the opposite to expected direction (e.g. if pressing the up hydraulic button produces down movement) and it is not possible or desirable to swap the electrical or hydraulic connections.
Man Speed Up	5.0 - 100.0% (75.0 - 100.0%)	This setting controls the speed of movement in the upward direction when operating in manual mode and using the control panel switchpad or a joystick/remote to move the blade/bucket.
Man Speed Dn	5.0 - 100.0% (75.0 - 100.0%)	This setting controls the speed of movement in the downward direction when operating in manual mode and using the control panel switchpad or a joystick/remote to move the blade/bucket.

5.3.4 Hydraulic Settings for On/Off Valves

On/off valves provide less control over blade or bucket movement than proportional valves because they do not allow continuously variable valve positioning. To provide finer control of movement, the DUO3 can pulse the on/off hydraulic output at adjustable frequencies and pulse widths. Alternatively, the output can remain continuously on when activated.

(On/Off) (Low) Settings		
F- Sampling	=	4.0Hz
Min Pulse Up	=	50ms
Min Pulse Dn	=	50ms
Max Pulse Up	=	250ms
Max Pulse Dn	=	250ms
Max Up	=	100%

Setting	Possible Values (Typical Values)	Description
F-Sampling	1.0 - 16.0 Hz (4.0 - 12.0 Hz)	Determines frequency of the pulsing hydraulic signal. A higher number gives more rapid bursts of adjustment. A lower number gives slower bursts of adjustment. The inverse of this setting provides an upper bound for the Min and Max Pulse settings. For example, if F-Sampling is set to 8 Hz, the Max Pulse settings cannot be set larger than 125ms (1/8).
Min Pulse Up	15 ms - $\frac{1}{F\text{-Sampling}}$ (20 - 40 ms)	The duration of the up pulse in milliseconds when the signal from the sensor is just below the 'ON TARGET' (green) band. If set too low, the bucket or blade may not move at all when small adjustment is required. If set too high, the bucket or blade may overshoot the target. It cannot be set larger than Max Pulse Up.
Min Pulse Down	15 ms - $\frac{1}{F\text{-Sampling}}$ (20 - 40 ms)	The duration of the down pulse in milliseconds when the signal from the sensor is just above the 'ON TARGET' (green) band. If set too low, the bucket or blade may not move at all when small adjustment is required. If set too high, the bucket or blade may overshoot the target. It cannot be set larger than Max Pulse Down.
Max Pulse Up	15 ms - $\frac{1}{F\text{-Sampling}}$ (80 - 100% of max)	The duration of the up pulse in milliseconds when the signal from the sensor is below the 'ON TARGET' (green) band by an amount that is greater than or equal to the proportional range of the sensor. If set too high, the bucket or blade may move too fast and overshoot the target. If set too low, movement may be too slow. If the value is set equal to $1/(F\text{-Sampling})$, the signal becomes continuous at sensor values equal to or greater than the sensor proportional range. It cannot be set smaller than Min Pulse Up.
Max Pulse Down	15 ms - $\frac{1}{F\text{-Sampling}}$ (80 - 100% of max)	The duration of the down pulse in milliseconds when the signal from the sensor is above the 'ON TARGET' (green) band by an amount that is greater than or equal to the proportional range of the sensor. If set too high, the bucket or blade may move too fast and overshoot the target. If set too low, movement may be too slow. If the value is set equal to $1/(F\text{-Sampling})$, the signal becomes continuous at sensor values equal to or greater than the sensor proportional range. It cannot be set smaller than Min Pulse Down.
Max Up	10.0 - 100.0%	By default, the valve current is determined by the solenoid coil resistance and the supply voltage, which is normally matched to the valve's rated voltage. The Max Up setting can be used to limit the current in applications where the supply voltage exceeds the valve's rated voltage. The setting is expressed as a percentage of the 3 A maximum output. The appropriate value should be selected in accordance with the valve manufacturer's specified operating current.
Max Down	10.0 - 100.0%	As above but for down direction.
Direction	Normal / Reverse (Normal)	When Reverse is enabled, the DUO3 swaps the up and down hydraulic output signals. Used in cases where the normal setup produces movement in the opposite to expected direction (e.g. if pressing the up hydraulic button produces down movement) and it is not possible or desirable to swap the electrical or hydraulic connections.

Note: To achieve continuous hydraulic output (no pulsing), set Min Pulse Up = Max Pulse Up = Min Pulse Down = Max Pulse Down = $1/(F\text{-Sampling})$.

5.4 Hydraulics Calibration

The optimum minimum and maximum hydraulic signals vary depending on several factors and can differ between machine - attachment combinations. To achieve the best performance in a new installation, the simplest approach is to use the built-in calibration program described in the following section. The procedure applies to all three types of hydraulic output. For DUO3.DC, the procedure should be performed with V[O] selected as the valve type.

It is recommended to complete the minimum signal calibration first followed by the maximum.

5.4.1 Minimum Signal Calibration

During the minimum signal calibration program, the DUO3 will alternate the minimum signal in the up and down directions allowing the user to fine-tune the signal until the desired amount of blade movement is observed. The up and down arrows on the display will indicate when the system is applying the signal in the corresponding direction.

To perform the minimum signal calibration:



Use the machine's hydraulic levers, DUO3 switchpad or corded remote/joystick to position the blade approximately in the middle of the available movement



Turn the unit on and press the Menu button to enter the main menu



Press the Enter button to enter the Left Side settings sub-menu then again to enter the Hydraulic Settings sub-menu.

```
Left Side
Right Side
Accessory Sensors
Joystick Type
Display Settings
Advanced Settings
Exit
```



```
Left Side
Hydraulic Settings
Sensor Settings
Disable sensor
Exit
```



Use Auxiliary Up/Down buttons and the Enter button to select and enter Calibration menu and then Min Test menu.



```
Hydraulic - Left
Type [V0]
General Settings
Calibration
Advanced Settings
Copy to Right
Exit
```



```
Calibration - Left
Min Test
Max Test
Exit
```



```
MIN Pulse Test - Left
UP % DOWN %
↑ 5.0 5.0 ↓
```

Use the Auxiliary 1 and 2 Up/Down buttons to dial in 5.0% for both the UP and DOWN directions as the starting point (15ms for on/off valves).

Use the Auxiliary 1 Up button to slowly increase the UP signal until you see a small (1mm - 2mm) movement in the blade when the system applies the UP signal.

Use the Auxiliary 2 Up button to slowly increase the DOWN signal until you see a small (1mm - 2mm) down movement in the blade when the system applies the DOWN signal.

Use the Auxiliary Up/Down buttons to carefully adjust the UP and DOWN minimum signals until the movements are symmetrical.

Press the Menu button to save the settings and exit the menu.

5.4.2 Maximum Signal Calibration

During the maximum signal calibration program, the DUO3 will alternate the maximum signal in the up and down directions allowing the user to fine-tune the signal until the desired amount of blade movement is observed. The up and down arrows on the display will indicate when the system is applying the signal in the corresponding direction.

To perform the maximum signal calibration:



Use the machine's hydraulic levers, DUO3 switchpad or corded remote/joystick to position the blade approximately in the middle of the available movement.



Turn the unit on and press the Menu button to enter the main menu.



Press the Enter button to enter the Left Side settings sub-menu then again to enter the Hydraulic Settings sub-menu.

```
Left Side
Right Side
Accessory Sensors
Joystick Type
Display Settings
Advanced Settings
Exit
```



```
Left Side
Hydraulic Settings
Sensor Settings
Disable sensor
Exit
```



Use Auxiliary Up/Down buttons and the Enter button to select and enter calibration menu and then Max Test menu.



```
Hydraulic - Left
Type [V0]
General Settings
Calibration
Advanced Settings
Copy to Right
Exit
```



```
Calibration - Left
Min Test
Max Test
Exit
```



```
MAX Pulse Test - Left
UP %   DOWN %
↑ 15.0 15.0 ↓
```

Use the Auxiliary 1 and 2 Up/Down buttons to adjust values so they are 5% higher than Min Up and Min Down values determined earlier, as the starting point.

Use the Auxiliary 1 Up button to slowly increase the UP signal until you see a 50mm - 80mm up movement in the blade when the system applies the UP signal.

Use the Auxiliary 2 Up button to slowly increase the DOWN signal until you see a 50mm - 80mm down movement in the blade when the system applies the DOWN signal.

Use the Auxiliary Up/Down buttons to carefully adjust the UP and DOWN maximum signals until the movements are symmetrical.



Press the Menu button to save the settings and exit the menu.

NOTES:

During the test the hydraulic cylinder may end up moving to the limit in one direction. Manually move the cylinder back to the middle of its working range before continuing with the test.

The above two sections should be repeated to complete the minimum and maximum signal calibration for the right side.

5.4.3 Fine-Tuning Hydraulics Signal in Auto Mode

After completing the hydraulic signal calibration described in the previous two sections, verify the system response using a laser transmitter. This procedure confirms correct operation and allows fine adjustments to be made for optimal performance.

First check the minimum signal calibration:



Set up a rotating laser transmitter at a height that allows the blade to move up to 100 mm above and below the on-target level. Allow the transmitter to self-level. A transmitter speed of 1,000 RPM is recommended, although any speed above 600 RPM may be used.



Set both sides of the DUO3 to automatic control and allow the system to bring the blade to target.

Switch the right side to manual mode by pressing the Right Side A/M button, leaving only the left side in automatic control.



Press the Hydraulic Up button to raise the left side to just outside the sensor deadband such that both the green and inner red LED clusters are flashing, then release the button and allow the DUO3 to return the blade to grade. The blade should return smoothly without stalling, hunting, or overshooting.

If the blade stalls, responds too slowly, or does not consistently return to grade, the minimum signal may be too low. If the blade jumps, overshoots, or becomes unstable, the minimum signal may be too high.

Adjust the Min Down value as described in Section 5.3.1, then repeat the verification until the blade returns to grade consistently.

Once the downward response is correct, repeat the process for the up direction and adjust the Min Up value as required.

After both directions on the left side are fine-tuned, repeat the same process for the right side.

Then check the maximum signal calibration:

To check and adjust the maximum signal calibration, follow the same process used for minimum signal calibration.

When checking the maximum signal response, manually move the blade further from grade, approximately 40mm – 80 mm, before allowing the DUO3 to return it to the on-grade position.

If the blade returns to grade too slowly or lacks speed, the maximum signal may be too low. If the blade moves aggressively, overshoots the target, or oscillates before settling, the maximum signal may be too high.

Adjust the Max Up and Max Down values as described in Section 5.3.1, then repeat the verification until the blade consistently returns to grade with a fast, smooth, and stable response.

Finally check both sides together in automatic mode:

Set both sides to automatic control using the A/M buttons and let the DUO3 bring both sides to on-grade.

Manually move each side by 5mm - 20mm in both the up and down directions and let the DUO3 bring it back on grade. Repeat for larger movements of 40mm - 80mm. Then try moving both sides up and down together in the same and opposing directions.

In each case, the blade should return to grade quickly and smoothly without excessive overshoot, or oscillation.

NOTE: In addition to the hydraulic settings discussed on the previous pages, the Proportional Range setting under Sensor Settings has a significant effect on overall system performance. Together with the Min and Max hydraulic settings, it determines the gradient of the hydraulic response and therefore the overall movement speed.

Proportional Range can be used as the primary control for adjusting movement speed, providing a quicker method than adjusting the individual Max hydraulic settings. Refer to chapter 7.1.2 for an explanation of this setting.

Additionally, depending on the operator's working style and required level of accuracy, it may be necessary to adjust the sensor accuracy through the Deadband setting to achieve the best balance between speed and grading accuracy. Refer to chapter 7.1.1 for an explanation on how to adjust this setting.

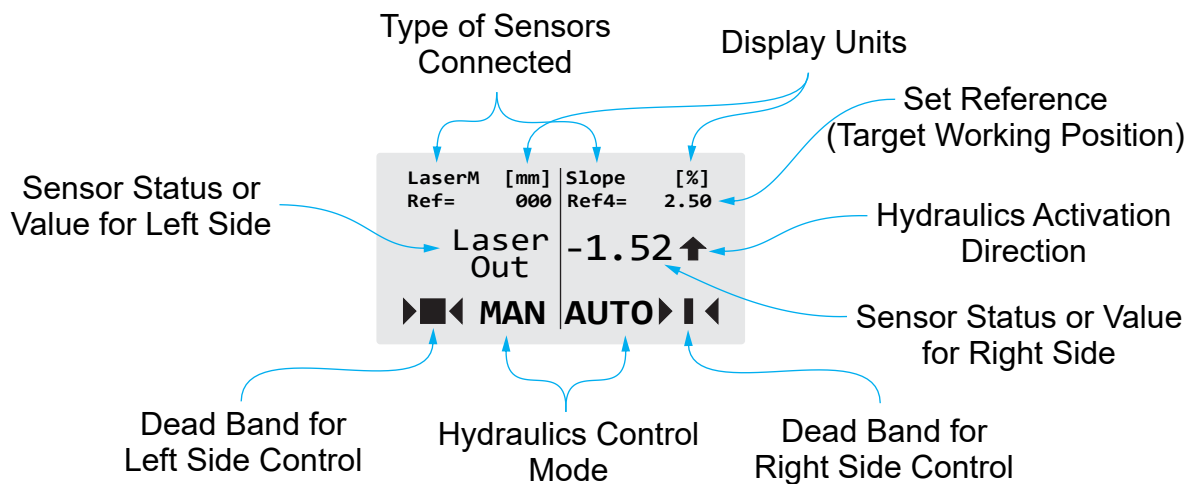
It is important to understand that achieving very fast speeds while maintaining 1 - 2 mm accuracy is generally not possible.

6. Working with the Panel

6.1 Working Screen

The working screen is divided into left and right side sections. Information and settings related to each side are shown separately on the left or right side of the screen.

The example below shows a working screen when using an R.ULS.MM.CAN laser sensor and a UG.000.CAN slope sensor.

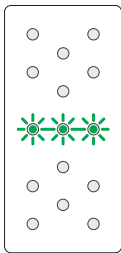


6.2 LED Indicators

The DUO3 control panel has in-built colour-coded LED clusters which, during normal operation, show the position of the blade with respect to the target working level. The LED clusters on the left and right side of the unit show the position of the left and right side of the blade respectively.

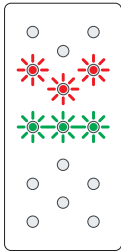


6.2.1 Normal Operation



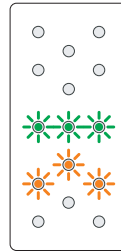
Green bar flashing rapidly

Blade is on target



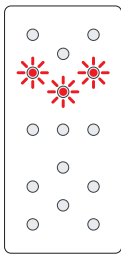
Inner red arrow and green bar flashing rapidly

Very small upward deviation from target



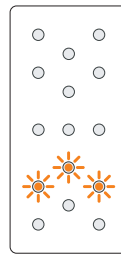
Inner amber arrow and green bar flashing rapidly

Very small downward deviation from target



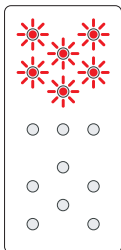
Inner red arrow flashing rapidly

Small upward deviation from target



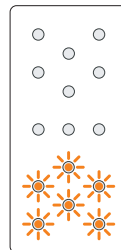
Inner amber arrow flashing rapidly

Small downward deviation from target



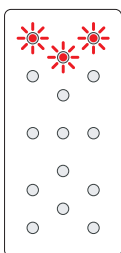
Both red arrows flashing rapidly

Medium upward deviation from target



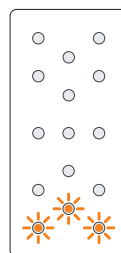
Both amber arrows flashing rapidly

Medium downward deviation from target



Top red arrow flashing rapidly

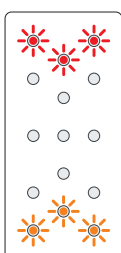
Large upward deviation from target



Bottom amber arrow flashing rapidly

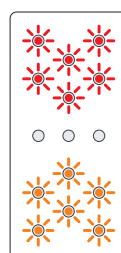
Large downward deviation from target

6.2.2 Error States



Top red arrow or bottom amber arrow flashing slowly

Indicates the last deviation before the laser beam was lost by the receiver



Both red arrows and both amber arrows flashing slowly

Communication with the sensor has been lost - check cable connections.

6.3 Setting Hydraulics Control Mode



WARNING: Extreme care should be exercised when switching the DUO3 to automatic control mode for the first time in an unfamiliar setup. The mounting of the sensors might be such that, in attempting to achieve on-grade position, the blade forcefully digs into the ground; or the hydraulic settings might cause the blade to oscillate and/or considerably overshoot the on-grade position. Always make sure any persons are well clear of the blade when switching to automatic mode.

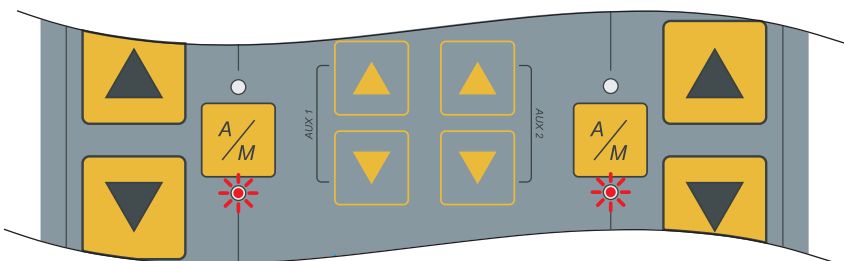


The DUO3 always starts in manual mode on power-up. To switch between the two modes of operation press the A/M button for the corresponding side. Refer to Chapter 9 for instructions on how to change the mode using a specific joystick or remote control accessory.

Manual Mode

When the unit is in manual mode the red LED below the A/M button will be on and the word MAN will appear on the LCD.

When the unit is in manual mode, blade movement is only possible via buttons on the control panel or via a joystick/remote control.

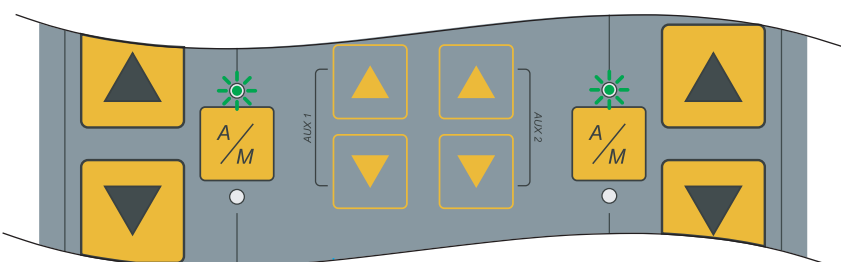


LaserM	[mm]	LaserM	[mm]
Ref=	000	Ref=	000
-080		-080	
▶ ◀MAN		MAN▶ ◀	

When the unit is in manual mode the red LED below the A/M button will be on and the word MAN will appear on the LCD.

Automatic Mode

In automatic mode the unit will automatically drive the hydraulics to attempt to bring the blade to the on-grade position as guided by connected sensors. The user can manually override the automatic operation temporarily using the Hydraulic Up/Down buttons on the switchpad or the joystick/remote control. The unit will return to automatic mode as soon as manual operation is released.



LaserM	[mm]	LaserM	[mm]
Ref=	000	Ref=	000
↑-080		-080↑	
▶ ◀AUTO		AUTO▶ ◀	

When the unit is in auto mode the green LED above the A/M button will be on and the word AUTO will appear on the LCD.

6.4 Manually Moving the Blade



Regardless of whether the DUO3 is operating in manual or automatic mode, the blade can always be moved manually by operating the Hydraulic Up/Down buttons for the corresponding side of the blade. The corresponding LED above/below the button will light up to indicate the command has been actioned.



Refer to Chapter 9 for instructions on how to move the blade manually using a specific joystick or remote control accessory.

6.5 Setting Auxiliary Buttons Function



During normal operation the Auxiliary Up/Down buttons on the switchpad can be used to drive the auxiliary hydraulics up and down or to increase/decrease the value of the reference (target) value. To select which function the Auxiliary buttons take, follow these steps:



Press the Menu Button to access the main menu, then use the Auxiliary Up/Down buttons to select Advanced Settings and press the Enter button to bring up the advanced settings submenu.



Left Side
Right Side
Accessory Sensors
Joystick Type
Display Settings
Advanced Settings
Exit



Left Side
Right Side
Accessory Sensors
Joystick Type
Display Settings
Advanced Settings
Exit



Set Default
Slope Side = [None]
Side Mini Stick
Aux Keys = Reference
Ref Edit = Unlocked
Hydraulic = Unlocked
Auto/Man = Unlocked



Use the Auxiliary Up/Down buttons to select the Aux Keys option then press the Enter button to toggle between Auxiliary and Reference. Once the desired option is selected press the Menu button to exit the menu and return to the main working screen.



Set Default
Slope Side = [None]
Side Mini Stick
Aux Keys = Reference
Ref Edit = Unlocked
Hydraulic = Unlocked
Auto/Man = Unlocked



Set Default
Slope Side = [None]
Side Mini Stick
Aux Keys = Auxiliary
Ref Edit = Unlocked
Hydraulic = Unlocked
Auto/Man = Unlocked



LaserM [mm]	LaserM [mm]
Ref= 000	Ref= 000
-080	-080
▶◀◀ MAN	MAN ▶▶▶



NOTE: From the main working screen, holding the Enter button pressed for 3 seconds acts as a shortcut for the above process to allow easy toggling between functions. When actioned this way, a short message, 'Aux Keys = Reference' or 'Aux Keys = Auxiliary' will appear briefly on the screen.

6.6 Auxiliary Control

The DUO3 can drive two additional On/Off valves, which can be used for auxiliary functions such as raising and lowering a wheel on a skid steer attachment.

These hydraulic outputs can be activated using the Auxiliary Up/Down buttons on the control panel or via a corded remote or joystick. Auxiliary 1 Up can also be set to automatically activate whenever the main hydraulic output is activated, for cases where a diverter valve must be driven.

To enable operation of the auxiliary controls using the Auxiliary Up/Down buttons, follow the instructions in Section 6.5.

6.6.1 Enabling Auxiliary 2 Output

The Auxiliary 2 output is disabled by default to ensure compatibility with certain legacy systems. Follow these steps to enable the output:

 Press the Menu button to access the main menu, then use the Auxiliary Up/Down buttons to select Advanced Settings and press the Enter button to bring up the advanced settings submenu.

Left Side

Right Side

Accessory Sensors

Joystick Type

Display Settings

Advanced Settings

Exit

>

Left Side

Right Side

Accessory Sensors

Joystick Type

Display Settings

Advanced Settings

Exit

>

Set Default

Slope Side = [None]

Side Mini Stick

Aux Keys = Reference

Ref Edit = Unlocked

Hydraulic = Unlocked

Auto/Man = Unlocked

 Use the Auxiliary Up/Down buttons to select the Auxiliary 2 setting and press the Enter button to switch Auxiliary 2 to On. Then press the Menu button to exit the main menu.

Aux Keys = Reference

Ref Edit = Unlocked

Hydraulic = Unlocked

Auto/Man = Unlocked

Mast = Unlocked

Aux <-x-> Hydraulic

Auxiliary 2 = Off

>

Aux Keys = Reference

Ref Edit = Unlocked

Hydraulic = Unlocked

Auto/Man = Unlocked

Mast = Unlocked

Aux <-x-> Hydraulic

Auxiliary 2 = On



WARNING: The Auxiliary 2 = On/Off setting changes the function of the associated output pins. When Auxiliary 2 is enabled, these pins provide the Auxiliary 2 Up/Down outputs. When Auxiliary 2 is disabled, the pins provide the 12–24 V DC supply voltage.

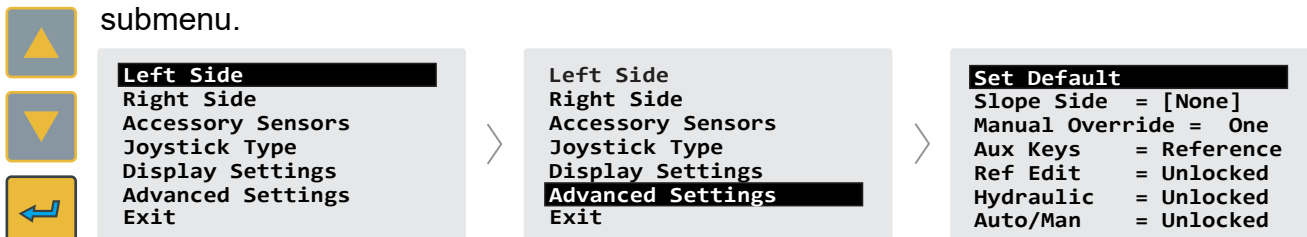
If an auxiliary valve remains connected to these pins when Auxiliary 2 is disabled, the supply voltage will be applied to the valve and may cause sudden or unexpected movement of the connected function.

To prevent inadvertent operation, the DUO3 displays a warning that must be acknowledged before Auxiliary 2 can be disabled. Always make sure all persons are well clear of the blade and any moving parts before changing settings.

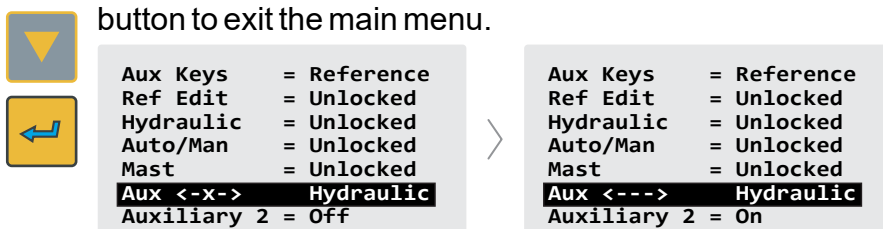
6.6.2 Coupling Auxiliary 1 with Main Hydraulics

Certain hydraulic systems require operation of a diverter valve every time one of the main hydraulic valves is activated. For this purpose, the DUO3 offers the ability to couple the Auxiliary 1 Up signal with the main hydraulics by following these steps:

-  Press the Menu button to access the main menu, then use the Auxiliary Up/Down buttons to select Advanced Settings and press the Enter button to bring up the advanced settings submenu.



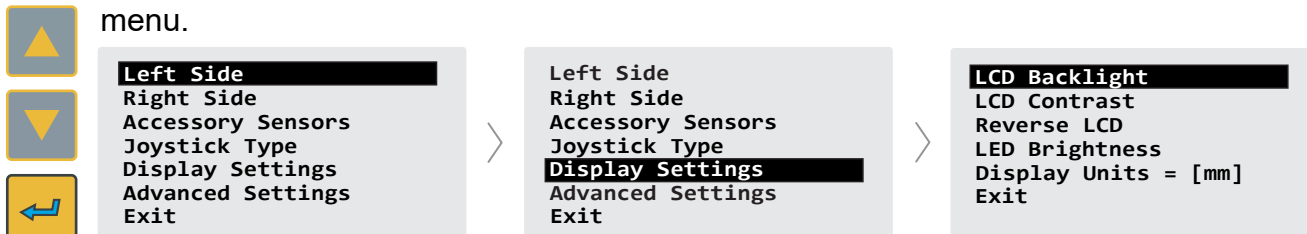
-  Use the Auxiliary Up/Down buttons to select the Aux <-X-> setting and press the Enter button to enable this function. The line will change to Aux <--->. Then press the Menu button to exit the main menu.



6.7 Display Settings

Various settings for the LCD display and the LED clusters on the DUO3 can be adjusted through the display settings sub-menu. To enter the sub-menu:

-  Press the Menu button to access the main menu, then use the Auxiliary Up/Down buttons to select Display Settings and press the Enter button to bring up the Display Settings submenu.



-  Once the desired settings have been updated, press the Menu button again to exit the settings menu.

See next page for descriptions of what each setting does and how to change it.

6.7.1 LCD Backlight

```
Light Off/[On]/Auto
Brightness
Exit
```

These settings control the LCD backlight and the brightness.

Select the Light option and then press the Enter button to select from three available settings:

- [Off] - always off
- [On] - always on
- [Auto] - turns off automatically 20 seconds after the last button press

Select Brightness and press the Enter button, then use the Auxiliary Up/Down buttons to select among 4 levels of brightness.

6.7.2 LCD Contrast

```
LCD Backlight
LCD Contrast = 23
Reverse LCD
LED Brightness
Display Units = [mm]
Exit
```

This setting controls the contrast for the LCD screen.

Press the Enter button then use the Auxiliary Up/Down buttons to select the desired contrast level.

6.7.3 Reverse LCD

```
LCD Backlight
LCD Contrast = 23
Reverse LCD
LED Brightness
Display Units = [mm]
Exit
```

Allows the user to reverse the colours of the LCD, particularly useful if operating the unit at night.

Press the Enter button to change between regular and reversed display.

6.7.4 LED Brightness

```
LCD Backlight
LCD Contrast = 23
Reverse LCD
LED Brightness = 02
Display Units = [mm]
Exit
```

Changes the brightness of the LED display clusters on the front switchpad, particularly useful if operating at night or in very bright sunlight.

Press the Enter button then use the Auxiliary Up/Down buttons to select the desired LED brightness level.

6.7.5 Display Units

```
LCD Backlight
LCD Contrast = 23
Reverse LCD
LED Brightness = 02
Display Units = [mm]
Exit
```

Allows the user to select between metric and imperial units.

Press the Enter button to select from three available options:

- [mm] - millimetres
- [ft] - imperial feet (0.000)
- [in] - imperial inches (0.00)

6.8 Advanced Settings



Press the Menu button then use the Auxiliary Up/Down and Enter buttons to select and enter the Advanced Settings sub-menu. Use the information in this chapter to adjust advanced settings and press the Menu button to exit the settings menu.



LaserM [mm]	LaserM [mm]
Ref= 000	Ref= 000
-080	-080
▶ ◀ MAN	MAN ▶ ◀



```

Left Side
Right Side
Accessory Sensors
Joystick Type
Display Settings
Advanced Settings
Exit
  
```



Set Default	
Slope Side	= [None]
Manual Override	= One
Aux Keys	= Reference
Ref Edit	= Unlocked
Hydraulic	= Unlocked
Auto/Man	= Unlocked

6.8.1 Set Default

This function will reset all of the configurable settings, except for the hydraulic settings, to factory defaults. Use this function only when all settings that are required for the specific combination of machine, attachment and DUO3 accessories are known.

6.8.2 Slope Side Selection

Depending on the hydraulic configuration, the left and right control channels may control either height or inclination.

The Slope Side Selection setting determines which control channel is given priority when both sides require correction. Correct selection can improve levelling stability and reduce unwanted movement or oscillation caused by interaction between the two control functions.

For Height–Inclination or Inclination–Height configurations, select the side controlling the primary levelling function, typically the height-controlled side.

NOTE: Where possible, position the height sensor above the inclination pivot axis to minimise interaction between height and inclination control.

Setting	Used When
[None]	This is the default factory setting and is suitable for most hydraulic configurations.
[L First]	Used when movement of the left side has a greater effect on the right side than vice versa, typically with height on the left and inclination on the right side.
[R First]	Used when movement of the right side has a greater effect on the left side than vice versa, typically with height on the right and inclination on the left side.
[Left]	This is a small variation to the algorithm for [R First] above and should be tried if that option does not provide sufficient levelling performance.
[Right]	This is a small variation to the algorithm for [L First] above and should be tried if that option does not provide sufficient levelling performance.

6.8.3 Manual Override

For certain blade types, it may be desirable to configure how the system transitions from Auto to Manual mode when the operator makes a manual hydraulic adjustment. The Manual Override setting determines whether this transition affects both sides of the blade or only the side being adjusted.

- **Manual Override = One** (Decoupled): Only the side being manually adjusted will temporarily exit Auto mode and switch to Manual mode. The opposite side will remain in Auto mode. When the manual input is released, the adjusted side will automatically return to Auto mode.
- **Manual Override = Two** (Coupled): Both sides of the blade will temporarily exit Auto mode and switch to Manual mode when either side is manually adjusted. Once the manual input is released, both sides will automatically return to Auto mode.

This setting is particularly useful for lift and tilt attachments, helping to prevent unintended blade tilt during manual override operation.

6.8.4 Aux Keys

Assigns the function of the Auxiliary 1 and Auxiliary 2 Up/Down buttons to one of two operating modes:

- **Auxiliary** – the Up and Down buttons control the Auxiliary 1 and Auxiliary 2 hydraulic valves directly.
- **Reference** – the Up and Down buttons are used to increase or decrease Reference values for the left and right sides respectively.

6.8.5 Ref Edit

Enables locking of left and right Reference values so they remain synchronised. Two modes are available:

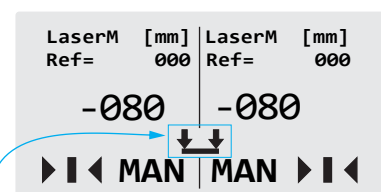
- Unlocked – The Reference value for each side can be adjusted independently.
- Locked – The Reference values for both sides are linked and always change together whenever either side is adjusted. This also applies when adjusting the References using stored values.

6.8.6 Hydraulic

Enables locking of manual hydraulic up and down activation with two selectable modes:

- Unlocked – left and right manual hydraulic controls operate independently of each other.
- Locked – left and right sides are linked, so operating either side manually will move both sides simultaneously.

A small icon is displayed on the working screen when hydraulic activation is locked.



6.8.7 Auto/Man

Enables locking of the control mode selection between automatic and manual operation. With the option selected, pressing the Enter button toggles between the two settings:

- Unlocked – The control mode can be selected independently for each side, allowing one side to operate in automatic while the other remains in manual mode.
- Locked – Both sides are linked and operate in the same mode. Switching between automatic and manual using the A/M button on either side will change the mode for both sides simultaneously.

6.8.8 Mast

Enables locking of mast movement for the left and right sides. With the option selected, pressing the Enter button toggles between the two settings:

- Unlocked – The mast for each side operates independently and can be moved separately.
- Locked – Mast movement is linked across both sides, so moving one side will move both simultaneously. This also applies when adjusting the mast via reference values or relative offsets.

6.8.9 Aux - Hydraulic

Enables coupling auxiliary 1 with main hydraulics activation for the purpose of driving an oil diverter valve. See section 6.6.2 of this chapter for more details about this function.

6.8.10 Auxiliary 2

Enables or disables the Auxiliary 2 output. Pressing the Enter button toggles between 2 available options:

- On - Auxiliary 2 is active
- Off - Auxiliary 2 is disabled

6.8.11 Rot Comp

Allows the use of a sensor for blade rotation compensation. Pressing the Enter button will toggle between three available modes:

- Disable - rotation compensation is disabled
- Sensor - uses input from rotation sensor
- Pot - uses input from joystick potentiometer

NOTE: This feature is used for compatibility with legacy systems and is no longer available.

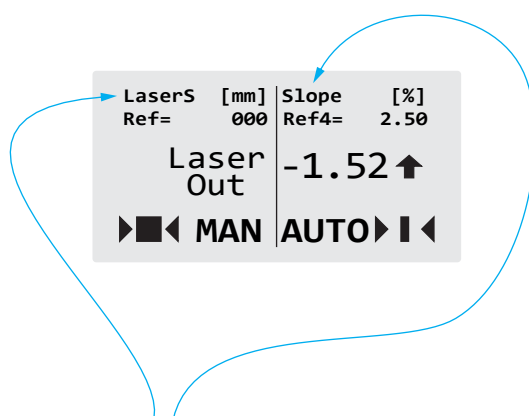
6.8.12 Disable Offset Menu

Enables and disables access to the Offset quick access menu from the DUO3 switchpad. Used to prevent accidental offsetting of the working level by the operator.

7. Working With Sensors

The DUO3 is compatible with a range of laser, slope and sonic sensors. The table below gives a brief overview of the available sensors and their features and the rest of this chapter covers the settings and options available when working with sensors.

The type of sensor connected to the control panel is indicated on the working screen of the LCD display as shown below.



Part No.	Type	Designation	Description
R.ULS.CAN ¹	Laser Receiver	LaserS	Standard laser receiver with up to 700 m working range.
R.ULS.MM.CAN ¹	Laser Receiver	LaserM	Laser receiver with millimetre accuracy and up to 300 m working range.
MOB.1252 ²	Laser Receiver	LS2000	Standard laser receiver with up to 300 m working range.
MOB.098	Laser Receiver	LS3000	Laser receiver with millimetre accuracy and up to 300 m working range.
UG.000.CAN	Slope Sensor	Slope	Slope sensor for use in conjunction with R.ULS.CAN or R.ULS.MM.CAN laser receivers.
UG.001	Slope Sensor	Slope	Slope sensor for use in conjunction with LS2000 or LS3000 laser receivers.
MOB.007	Sonic Sensor	Sonic	Ultrasonic sensor

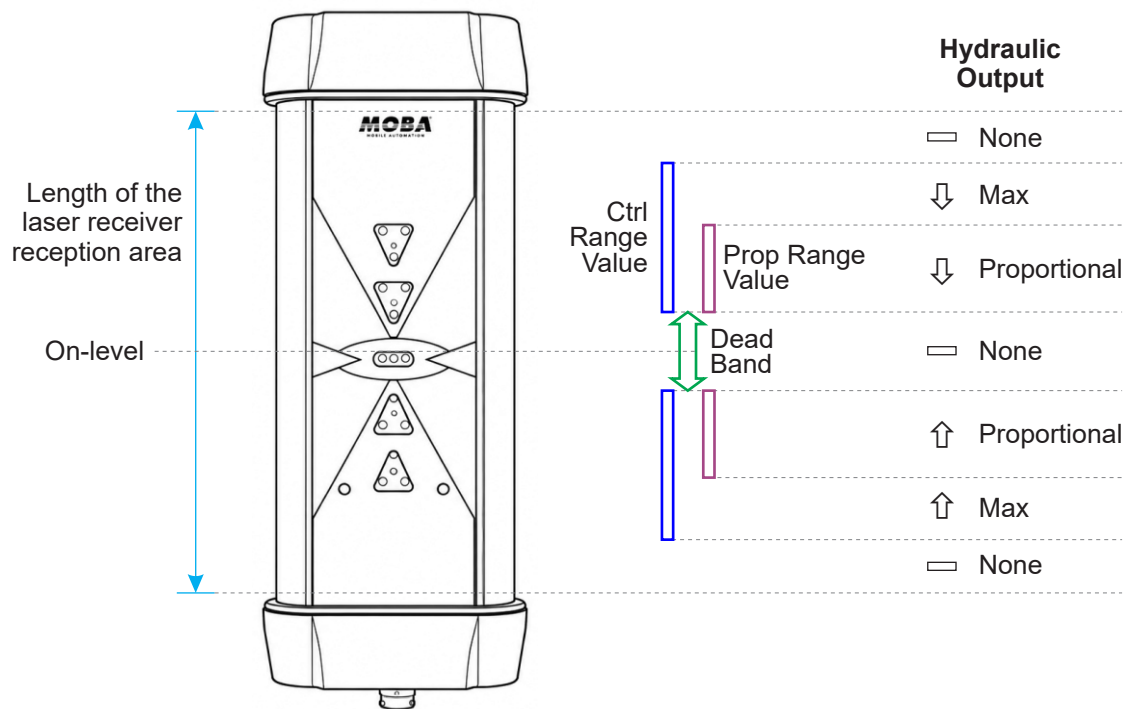
1. Not available in EU markets

2. Available only in EU markets

7.1 Dead-Band, Proportional Range & Control Range

The dead-band, proportional range and control range values are used to control speed and accuracy of the hydraulic response of the control panel. Depending on the particular application it may be advantageous to sacrifice accuracy in order to get a faster hydraulic response or vice versa.

The diagram below helps to illustrate these values and their purpose on a laser receiver however the same logic applies to slope and sonic sensors.



Dead-Band: When the sensor reading is within this range, the system considers the machine to be on target and hydraulic activation is stopped. Hydraulic operation resumes only when the sensor reading moves outside the dead-band range.

A larger dead-band can accommodate a faster hydraulic response, but reduces levelling accuracy and may be more suitable when rough levelling. A smaller dead-band improves levelling accuracy, but may require a slower hydraulic response and is more suitable for final passes over the work area.

Proportional Range: The hydraulic output will be varied proportionally when the sensor reading is within this range and will be applied maximally when outside this range.

This setting has a direct influence on the speed of the hydraulic response: decreasing the Proportional Range increases the response speed, while increasing the Proportional Range decreases it. A faster response can lead to overshoot and oscillation, while a slower response may reduce operating efficiency by requiring the machine to travel more slowly.

Control Range: When the sensor reading is outside of this range the hydraulic output will be stopped. This effectively reduces the length of the laser receiver reception area. This can be useful for reducing sudden hydraulic response when levelling an area with many sudden bumps and drops. The control range is set to off by default.

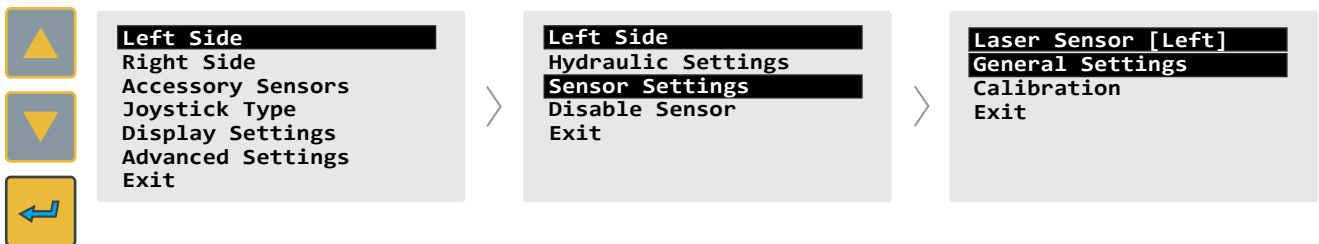
7.1.1 Adjusting the Dead-Band

The dead band range for compatible sensors in different display units is shown in the table below.

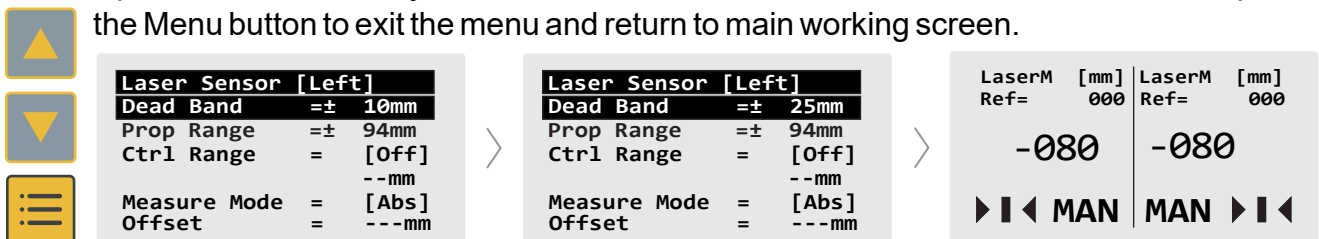
Laser & Sonic Sensors	[mm]	[in]	[ft]
R.ULS.CAN (LaserS)	±2 to ±30	±0.10 to ±1.20	±0.005 to ±0.100
R.ULS.MM.CAN (LaserM)	±1 to ±30	±0.05 to ±1.20	±0.005 to ±0.100
MOB.1252 (LS2000)	±1 to ±30	±0.05 to ±1.20	±0.005 to ±0.100
MOB.098 (LS3000)	±1 to ±30	±0.05 to ±1.20	±0.005 to ±0.100
MOB.007 (Sonic)	±1 to ±100	±0.05 to ±3.95	±0.005 to ±0.330
Slope Sensors	[%]		
UG.000.CAN / UG.001 (Slope)	±0.2 to ±10		

Adjusting the dead band:

 Press the Menu button to access the main menu, then use the Auxiliary Up/Down and Enter buttons to navigate to: Left or Right Side → Sensor Settings → General Settings.



 Press the Enter button to enable editing of the Dead Band value and use the Auxiliary Up/Down buttons to adjust the value. Press the Enter button to store the value and press the Menu button to exit the menu and return to main working screen.



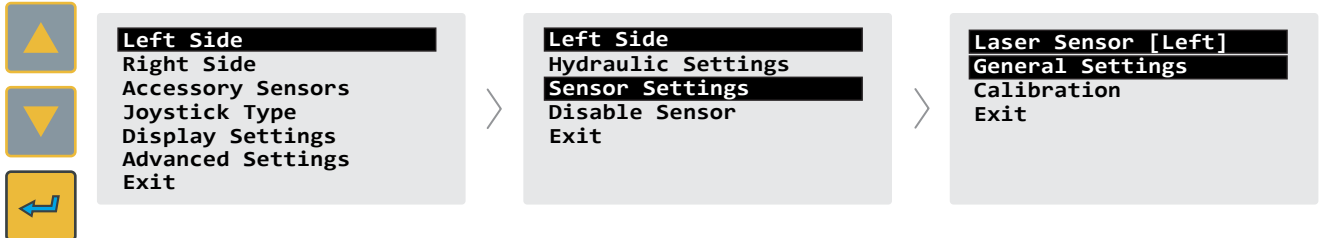
7.1.2 Adjusting the Proportional Range

The proportional range available for compatible sensors in different display units is shown in the table below.

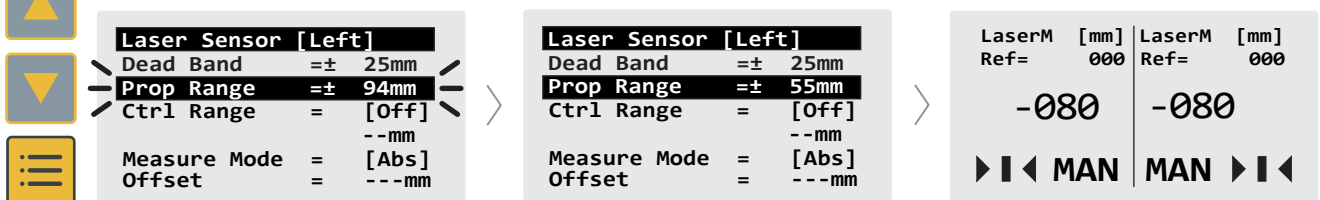
Laser & Sonic Sensors	[mm]	[in]	[ft]
R.ULS.CAN (LaserS)	±10 to ±98	±0.40 to ±3.85	±0.035 to ±0.320
R.ULS.MM.CAN (LaserM)	±10 to ±128	±0.40 to ±5.05	±0.035 to ±0.420
MOB.1252 (LS2000)	±10 to ±98	±0.40 to ±3.85	±0.035 to ±0.320
MOB.098 (LS3000)	±10 to ±150	±0.40 to ±5.90	±0.035 to ±0.490
MOB.007 (Sonic)	±10 to ±1500	±0.40 to ±59.05	±0.035 to ±4.920
Slope Sensors	[%]		
UG.000.CAN / UG.001 (Slope)	±0.4 to ±30.0		

Adjusting the proportional range:

Press the Menu button to access the main menu, then use the Auxiliary Up/Down and Enter buttons to navigate to: Left or Right Side → Sensor Settings → General Settings.



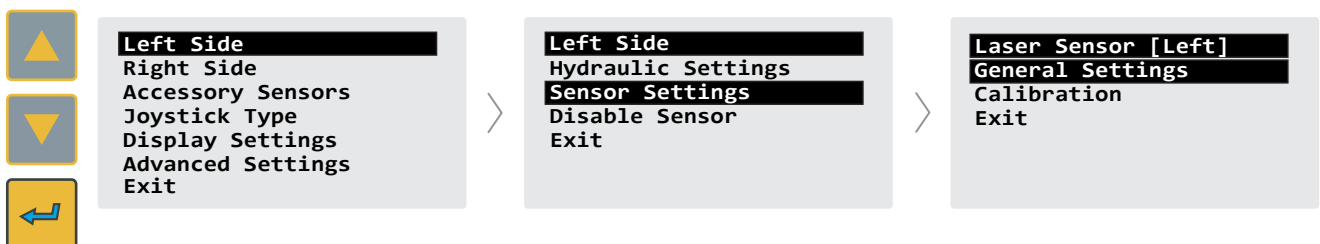
Use the Auxiliary Up/Down buttons to select Prop Range and press the Enter button to enable editing. Use the Auxiliary Up/Down buttons to adjust the value then press the Enter button to confirm and the Menu button to exit the menu.



7.1.3 Adjusting the Control Range

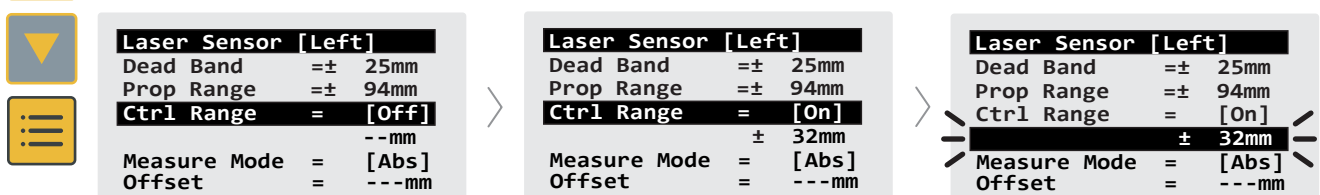
The control range feature is turned off by default. Follow the steps below to turn the feature on and set the desired range:

Press the Menu button to access the main menu, then use the Auxiliary Up/Down and Enter buttons to navigate to: Left or Right Side → Sensor Settings → General Settings.



Use the Auxiliary Up/Down buttons to select Ctrl Range and press the Enter button to turn the feature on. The line below the setting will start to flash indicating it is in editing mode.

Use the Auxiliary Up/Down buttons to adjust the value then press the Enter button to confirm and the Menu button to exit the menu.



7.2 Offset

The offset function allows the operator to set a new on-level position based on the current sensor reading. This feature can be used to set a known starting point on the worksite as the desired working height, or to offset the working height from a known starting point.

The offset functionality is available for the following sensors:

- R.ULS.MM.CAN (LaserM) laser receiver
- MOB.098 (LS3000) laser receiver
- MOB.007 (Sonic) ultrasonic sensor

7.2.1 Setting Known Starting Point as Working Height



Position the blade at the desired known starting point on the worksite such as a datum point, curb etc.



Press the Offset button on the switchpad to bring up the Offset menu. Note the menu will differ based on type of connected sensors.

Offset Both Sides
Offset Left Side
Offset Right Side
Clear All Offsets
Exit

< Both connected sensors
have offset feature

One connected sensor
has offset feature >

Offset Right Side
Clear All Offsets
Exit

Offset Both Sides: Applies an offset to both sides based on the current working height. Subsequent screens allow the offset to be the same, taken from one selected side, or different, taken individually from the working height of each side. Warning: Applying different offsets to the two sides may introduce a slope.

Offset Left Side: Applies the current working height of the left side as an offset to the left side

Offset Right Side: Applies the current working height of the right side as an offset to the right side



Use the Auxiliary Up/Down and the Enter buttons to select and execute the desired offset function. When an offset has been applied, the sensor readout value on the main working screen is shown in inverted colours to alert the operator there is an active offset.



Offset Both Sides
Offset Left Side
Offset Right Side
Clear All Offsets
Exit



LaserM	[mm]	LaserM	[mm]
Ref=	000	Ref=	000
-080		000	
MAN		MAN	



NOTE: Active offsets are stored in memory on power down. To prevent mistakes, the DUO3 will alert the operator on power-up and then give the option to clear or keep the offsets. Use the Auxiliary Up/Down buttons and the Enter button to select and execute the desired option.



Clear Active Offsets?
[Yes]
[No]



LaserM	[mm]	LaserM	[mm]
Ref=	000	Ref=	000
-080		-080	
MAN		MAN	

7.2.2 Entering Offset Value Directly

Sometimes it is useful to enter the exact offset value directly into the DUO3. Examples of this are:

- When working with an ultrasonic sensor starting from a known curb point and wanting to maintain a defined height difference from that curb point
- When rough levelling a worksite and wanting to drop the working level by certain height from the current level



Press the Menu button to access the main menu, then use the Auxiliary Up/Down and Enter buttons to navigate to: Left or Right Side → Sensor Settings → General Settings.



Left Side
Right Side
Accessory Sensors
Joystick Type
Display Settings
Advanced Settings
Exit



Left Side
Hydraulic Settings
Sensor Settings
Disable Sensor
Exit



Laser Sensor [Left]
General Settings
Calibration
Exit



Use the Auxiliary Up/Down buttons to select Measure Mode. If there is an active offset the setting will be on [Rel] - proceed to the next step. If there is no active offset this setting will be on [Abs] - press the Enter button to change it to [Rel].



Laser Sensor [Left]
Dead Band =± 25mm
Prop Range =± 94mm
Ctrl Range = [Off]
--mm
Measure Mode = [Abs]
Offset = ---mm



Laser Sensor [Left]
Dead Band =± 25mm
Prop Range =± 94mm
Ctrl Range = [Off]
--mm
Measure Mode = [Rel]
Offset = 0mm



Use the Auxiliary Up/Down buttons to select Offset and then the press the Enter button - the option will flash to indicate it is in editing mode. Use the Auxiliary Up/Down buttons to adjust to the required offset and then press the Enter button to store the value and press the Menu button to exit the menu and return to the working screen.



Laser Sensor [Left]
Dead Band =± 25mm
Prop Range =± 94mm
Ctrl Range = [Off]
--mm
Measure Mode = [Rel]
Offset = 0mm



Laser Sensor [Left]
Dead Band =± 25mm
Prop Range =± 94mm
Ctrl Range = [Off]
--mm
Measure Mode = [Rel]
Offset = 0mm



Laser Sensor [Left]
Dead Band =± 25mm
Prop Range =± 94mm
Ctrl Range = [Off]
--mm
Measure Mode = [Rel]
Offset = 30mm

7.2.3 Clearing Offsets



The easiest way to clear offsets is by pressing the Offset button and then using the Auxiliary Up/Down buttons to select Clear All Offsets and pressing the Enter button to confirm. To clear individual left/right offsets follow the steps from section 7.2.2 above and change the Measure Mode setting to [Abs].



Offset Both Sides
Offset Left Side
Offset Right Side
Clear All Offsets
Exit



All Offsets Cleared

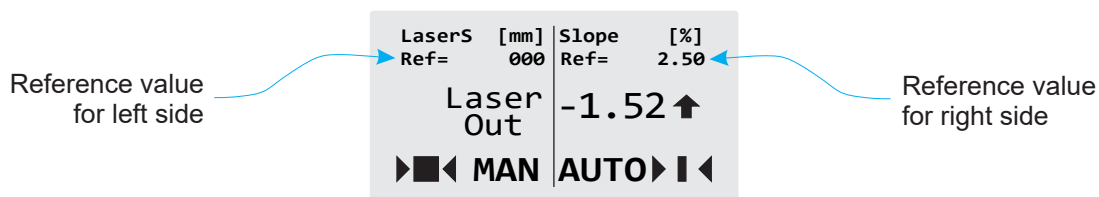


LaserM [mm]	LaserM [mm]
Ref= 000	Ref= 000
-080	-080
▶ ◀ MAN	MAN ▶ ◀

7.3 Reference Values

A Reference value defines the target position that the system will attempt to maintain during automatic operation. For height sensors, this represents the target working height; for slope sensors, it represents the target angle. The Reference menu, accessed by pressing the 'Ref' button, allows the operator to store up to four values, which can be easily recalled to set the target working height or slope.

The Reference feature is available on laser receivers: R.ULS.MM.CAN & MOB.098, slope sensors UG.000.CAN and UG.001 and ultrasonic sensor MOB.007.



NOTE: When a slope sensor is connected, the operation of the Ref button changes:

- Short press: negates the current reference value (see Section 7.4.2).
- Long press (approximately 2 seconds): opens the Reference Menu.

7.3.1 Increasing or Decreasing the Reference Value

The Auxiliary buttons can be used to adjust the current Reference Values during operation.

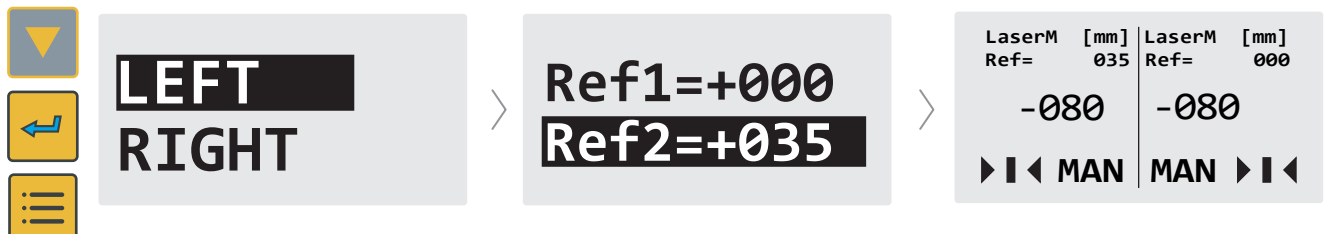
NOTE: Before the Auxiliary Up/Down buttons can be used to adjust the Reference Values, they must be assigned to this function as described in Section 6.5.

- Use the Auxiliary 1 Up/Down buttons to adjust the left side Reference and Auxiliary 2 Up/Down buttons to adjust the right side Reference. Each press of the button will increase or decrease the Reference by a minimum step for the selected measurement units, for example, 1mm, 0.05in or 0.01%.



7.3.2 Recalling a Stored Reference Value

- Press the Ref button to enter the Reference menu, then use Auxiliary Up/Down and Enter buttons to select the desired side. Use the Auxiliary Up/Down buttons to select the desired Reference value and then press the Menu button to recall that value and return to the main screen.



7.3.3 Adjusting Stored Reference Values



Press the Ref button to enter the Reference menu and use the Auxiliary Up/Down and Enter buttons to select the desired side, and the Auxiliary Up/Down buttons again to select the desired Reference value.



LaserM	[mm]	LaserM	[mm]
Ref=	000	Ref=	000
-080		-080	
▶ I ◀ MAN		MAN ▶ I ◀	



LEFT
RIGHT



Ref1=+000
Ref2=+035



Press the Enter button - the selected Reference value will flash to indicate it is in editing mode. Use the Auxiliary Up/Down buttons to adjust the value then press the Enter button to store the value. Use the Auxiliary Up/Down buttons to select Exit and press Enter to return to the main screen without recalling the Ref or press the Menu button while the Ref is selected to recall it and return to the main screen.



Ref1=+000
Ref2=+060



Ref1=+000
Ref2=+060



LaserM	[mm]	LaserM	[mm]
Ref=	060	Ref=	000
-080		-080	
▶ I ◀ MAN		MAN ▶ I ◀	

7.3.4 Storing Current Sensor Reading as a Reference Value

The DUO3 allows the operator to store the current sensor reading as one of the pre-set Reference values.



Press the Ref button to enter the Reference Menu then use the Auxiliary Up/Down and Enter buttons to select the desired side. Use the Auxiliary Up/Down buttons to select the Reference value to update.



LaserM	[mm]	LaserM	[mm]
Ref=	045	Ref=	000
-080		-080	
▶ I ◀ MAN		MAN ▶ I ◀	



LEFT
RIGHT



Ref1=+000
Ref2=+000



Press and hold the Enter button briefly until the current sensor reading is transferred to the highlighted Reference value. Use the Auxiliary Up/Down buttons to select Exit and press Enter to return to the main screen without recalling the Ref or press the Menu button while the Ref is selected to recall it and return to the main screen.



Ref1=+000
Ref2=+000



Ref1=+000
Ref2=-080



LaserM	[mm]	LaserM	[mm]
Ref=	-080	Ref=	000
-080		-080	
▶ I ◀ MAN		MAN ▶ I ◀	

7.4 Slope Sensor Operation

When using the slope sensor for the first time, or after it has been removed and remounted, it is essential to ensure that it is installed and calibrated correctly. The sensor must be mounted securely to prevent any movement during blade operation. To avoid the need for repeated calibration, it is recommended that the sensor remain permanently mounted whenever possible.

7.4.1 Calibrating the Slope Sensor



Manually operate the hydraulics to level the blade. Use an accurate spirit level to verify that it is horizontal.



Press the Menu button to access the main menu then, use the Auxiliary Up/Down buttons to navigate to the Sensor Settings for the slope sensor side.



LaserS	[mm]	Slope	[%]
Ref=	000	Ref=	2.50
Laser Out		-1.52	
MAN		MAN	

Left Side
Right Side
Accessory Sensors
Joystick Type
Display Settings
Advanced Settings
Exit

Right Side
Hydraulic Settings
Sensor Settings
Disable Sensor
Exit



Use the Auxiliary Up/Down and Enter buttons to select the Calibration option. On the next screen select [Yes] and press the Enter button. The system will perform calibration and display the message Calibration Done. Press the Menu button to exit the settings menu.

Slope Sensor [Right]
General Settings
Calibration
Exit

Are you sure you want to do calibration?	
[Yes]	
[No]	

Calibration Done

NOTE: If calibration is unsuccessful, the following message will be displayed: Calibration Failed. Check all connections and ensure that the sensor and blade are horizontal. Cycle the power, then repeat the calibration procedure.

7.4.2 Inverting the Reference Grade for Slope Sensor

The DUO3 allows the operator to invert the Reference Grade of the slope sensor with a single button press. This provides a quick way to reverse the working slope, for example, after performing a U-turn at the edge of the work area.



Press the Ref button once after performing a U-turn. The Reference Grade will be inverted from positive to negative or vice versa. The Ref value on the working screen will be highlighted with dark background to indicate it has been inverted. Press the Ref button again to revert back to the original value.

LaserS	[mm]	Slope	[%]
Ref=	000	Ref=	2.50
Laser Out		2.45	
MAN		MAN	

LaserS	[mm]	Slope	[%]
Ref=	000	Ref=	-2.50
Laser Out		2.45	
MAN		MAN	

LaserS	[mm]	Slope	[%]
Ref=	000	Ref=	2.50
Laser Out		2.45	
MAN		MAN	

7.5 Laser Receiver Operation

Many of the functions and features of laser receivers have been discussed in earlier sections of this chapter alongside other sensor types. This section focuses on the features and characteristics that are specific to laser receiver operation.

7.5.1 Sensitivity

The Sensitivity parameter determines how responsive the laser receiver is to incoming laser light. Increasing the sensitivity can extend the receiver's operating range; however, it may also increase the likelihood of false detections caused by reflected laser light from nearby surfaces.

The sensitivity can be adjusted from 1% (lowest sensitivity) to 100% (highest sensitivity). The factory default setting is 100%. This parameter is available only on the R.ULS.CAN and R.ULS.MM.CAN laser receiver models.

NOTE: The MOB.098 (LS3000) laser receiver dynamically adjusts sensitivity in order to detect and avoid reflections and double strikes.

To adjust sensitivity:

Press the Menu button to access the main menu, then use the Auxiliary and Enter buttons to navigate to Left or Right Side → Sensor Settings → Sensitivity.

Press the Enter button to enter editing mode, then use Auxiliary Up/Down buttons to adjust to the desired sensitivity. Press the Enter button again to exit editing mode and press the Menu button to exit to the working screen.

7.5.2 Filter Set

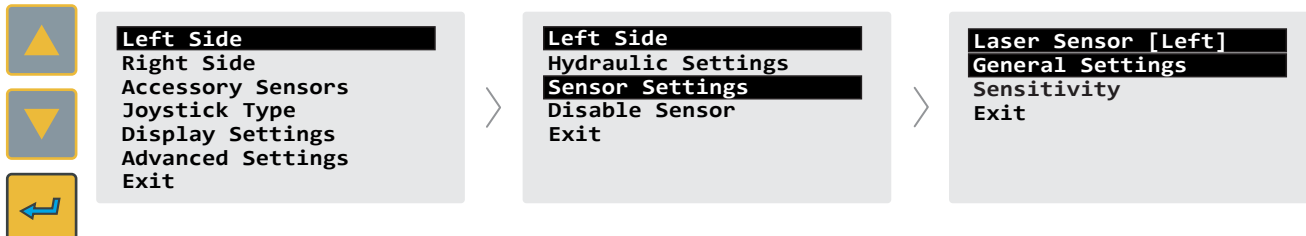
The Filter Set parameter controls whether the laser receiver applies averaging over successive measurements to improve detection accuracy. While this filtering can enhance measurement stability and precision, the additional processing time may result in a slower response to changes in the laser beam position.

Filter Set can be configured as either On or Off. The factory default setting is Off.

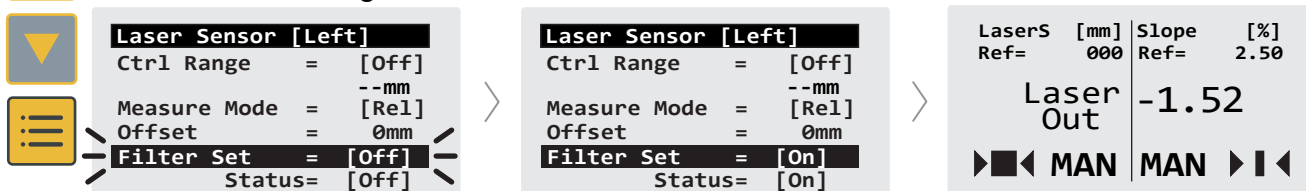
This parameter is available only on the R.ULS.CAN and R.ULS.MM.CAN laser receiver models.

To change Filter Set:

Press the Menu button to access the main menu, then use the Auxiliary Up/Down and Enter buttons to navigate to Left or Right Side → Sensor Settings → General Settings.



Use the Auxiliary Up/Down buttons to select the Filter Set option and press the Enter button to enter editing mode. Use the Auxiliary Up/Down buttons to switch between [On] and [Off] and then press the Enter button again to save the setting. Press the Menu button to exit to the working screen.



8. Electric Mast Operation

The telescopic electric mast allows the operator to adjust the height of the laser receiver(s) relative to the blade from within the cabin. Through the DUO3 controls, precise offset adjustments can be made with millimetre accuracy over the mast's full telescopic travel of 1,000 mm.



The Mast screen is used to operate the masts and view mast-related information. With masts connected, pressing the Mast button toggles between the Main working and Mast screens. It also changes the function of the Auxiliary buttons between mast operation and their assigned Reference or Auxiliary functions. A typical Mast screen is shown below.



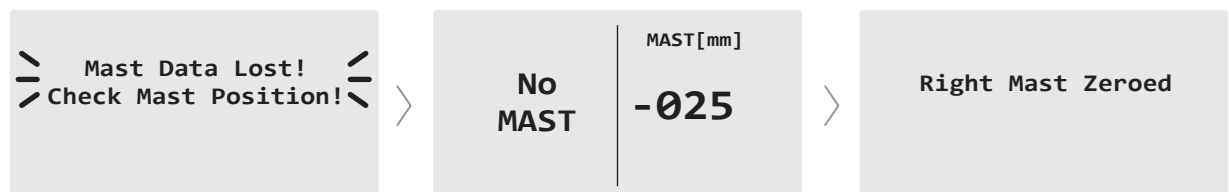
NOTE: Compatible DUO3 joysticks and remote controls may also be used to operate a mast. See Chapter 9 of this manual for details.

8.1 Resetting Mast Position After Power Loss

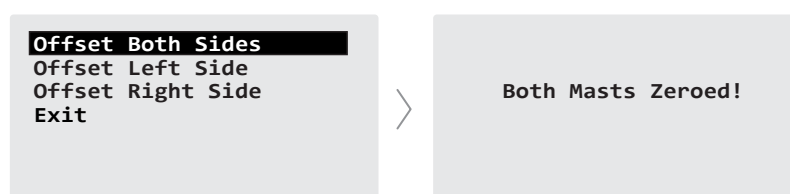
The DUO3 stores the mast position in memory during normal power-down and recalls it when the unit is powered up. If power is lost unexpectedly and the mast position is not saved, a warning message will be displayed when power is restored and the unit is switched on.



Press the Enter button to clear the warning message, then press the Mast button to open the Mast screen. Use the Auxiliary 1 Up/Down or Auxiliary 2 Up/Down buttons to move the left or right mast, respectively, to the 0 mm position indicated on the mast scale. Then press the Offset button to set this position as zero.



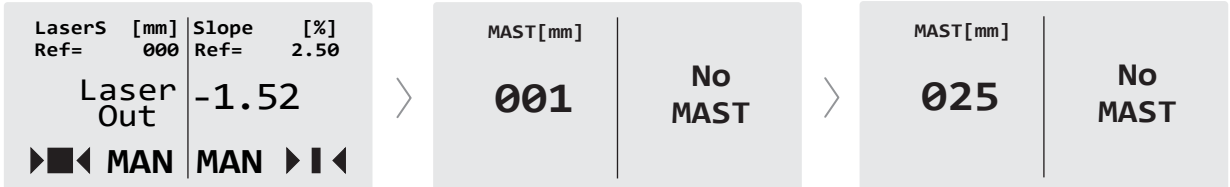
NOTE: If two masts are connected, the system will bring up a menu asking which mast(s) should be zeroed. Use the Auxiliary Up/Down buttons to select the desired option and then press the Enter button to execute.



8.2 Moving the Mast Using the Switchpad



Enter the Mast screen by pressing the Mast button, then use the Auxiliary 1 and 2 Up/Down buttons to move the left and right mast respectively. The display will update showing the current mast height. Press the Mast button again to exit to the Main working screen.



8.3 Moving the Mast Using References

The DUO3 can store up to four Reference positions per side in memory. These positions, labelled R1 through R4, can be recalled at any time to automatically move the mast to the corresponding preset height.

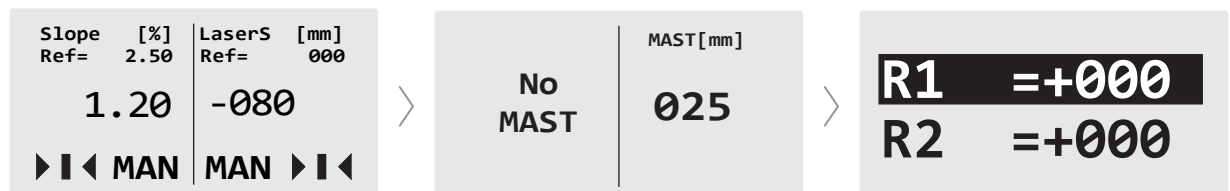
8.3.1 Storing Reference Values



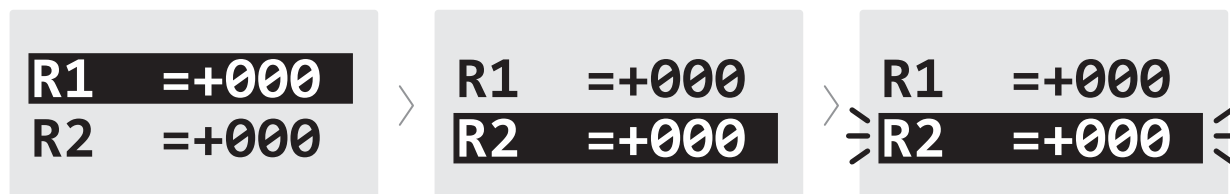
Press the Mast button to enter the mast screen, then press the Ref button to enter the Reference menu.



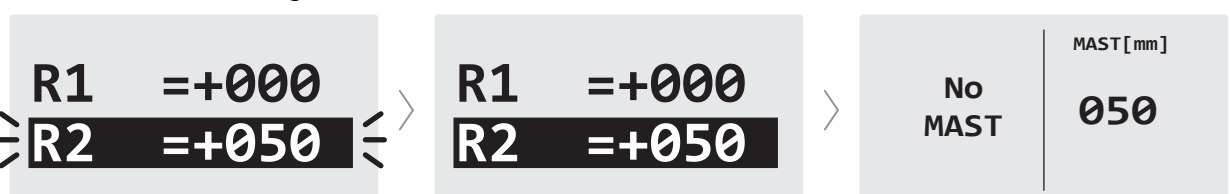
Note: If two masts are connected, when Ref button is pressed, an intermediary screen will appear allowing side selection.



Use the Auxiliary Up/Down buttons to select the desired Reference value (R1 through R4), then press the Enter button to enter edit mode.



Use the Auxiliary Up/Down buttons to adjust to the desired value, then press the Enter button to store the value. Press the Menu button to exit and move the mast to the selected Reference or alternatively select Exit and press the Enter button to exit the Reference Menu without moving the mast.



8.3.2 Invoking a Stored Reference Value



While in Mast screen, press the Ref button, then use the Auxiliary Up/Down buttons to select the desired Reference value (R1 through R4). Press the Menu button to move the mast to the selected reference value and return to the Mast screen.



R1 =+000 R2 =+050	R3 =+120 R4 =+075	No MAST MAST [mm] 075
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8.4 Moving the Mast Using Relative Offsets

The DUO3 allows two relative offset values per side to be stored and recalled to automatically raise or lower the mast by a preset amount. This enables quick, repeatable height adjustments for applications such as tiered base construction and cut-and-fill operations.

NOTE: Some joystick and remote control models allow the configured relative offsets to be applied directly from the joystick or remote control. Refer to Chapter 9 for more details.

8.4.1 Storing Relative Offset Values



The Relative Offsets are denoted as RO1 and RO2 in the Reference Menu. Follow the same process outlined in Section 8.3.1 to adjust and store their values. Unlike the four Reference Values in the same menu, pressing the Menu button while RO1 or RO2 is selected will not invoke the selected value; it will simply exit the Reference Menu. Refer to Section 8.4.2 for instructions on invoking RO1 and RO2.

No MAST MAST [mm] 025	R1 =+000 R2 =+000	RO1 =+010 RO2 =+150
---	------------------------------------	--------------------------------------

8.4.2 Moving the Mast in Increments of Relative Offset



+



While in the Mast screen, press and hold the Ref button, then while holding it down, press the Auxiliary Up/Down buttons of the relevant side to move the mast up or down by the RO1 increment. When the Ref button is released the mast will move.

NOTE: Press the Auxiliary Up/Down buttons up to 7 times to move the mast in multiple increments of RO1 once the Ref button is released.

No MAST MAST [mm] 025	No MAST MAST [mm] R01↑↑↑ 025	No MAST MAST [mm] 055
---	--	---



Use the Hydraulic Up/Down buttons of the relevant side instead of the Auxiliary Up/Down buttons in order to move the mast by the RO2 increment. NOTE: If RO1 and RO2 are entered as negative values, the mast will move in the opposite direction to the Up/Down button used.

8.5 Mast Search Function

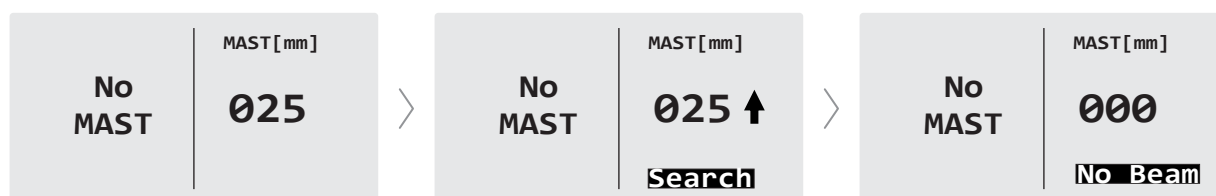
The DUO3 can automatically locate the laser beam by moving the mast up and down until the laser receiver detects the beam within its dead-band range. This function is particularly useful when surveying a worksite, as it enables the user to determine the relative heights of multiple points across the site in reference to a consistent laser plane.



+



While in the Mast screen, press and hold the Auxiliary Up button, then press the Mast button once and release the Auxiliary Up button. The mast will travel towards its top limit and then its bottom limit in search of the laser beam. It will automatically stop either when the laser hits the dead-band of the receiver (i.e. the sensor green LEDs are lit) or, having not found the beam, when it's at the bottom limit.



NOTE:

- Use Auxiliary 1 Up button to search using the mast connected to left side and Auxiliary 2 Up button to use the mast connected to the right side.
- The search function will not work if there was a sudden loss of power and the mast position was lost. The system will display a message 'Please Zero MAST'. In this case follow instructions in section 8.1 of this chapter to zero the mast position first.
- The search function will not work without a laser sensor connected. The laser sensor must be mounted to the mast.

9. Joystick and Remote Control Operation

The DUO3 supports a range of proportional joysticks and corded remote controls (optional accessories) to suit different machines, attachments, and operating requirements. To ensure all functions are mapped correctly, the appropriate accessory model number must be selected in the DUO3 settings menu.

In most cases, this configuration is completed by MOBA or a local dealer during system commissioning. If an accessory is installed after the initial system purchase, the model selection may need to be configured separately.

First, locate the model number on the accessory. It is printed on a silver label, as shown below:



Then select the correct model number in the DUO3 settings menu:

-  Press the Menu button to enter the settings menu, then use the Auxiliary Up/Down and Enter buttons to navigate to the Joystick Type. The following screen will show the currently selected joystick/remote model on the second line.



NOTE: The third line shows information required for compatibility with legacy systems.

LaserS [mm]	Slope [%]
Ref= 000	Ref= 2.50
Laser Out	-1.52
MAN	MAN

Left Side
Right Side
Accessory Sensors
Joystick Type
Display Settings
Advanced Settings
Exit

Joystick Type
A.RS.076
Prop Toggle Stick
Change Joystick Type
Exit



- Press the Enter button to bring up a list of all available joystick options, then use the Auxiliary Up/Down and Enter buttons to select and apply the option that matches the model number of the physical unit on hand.

NOTE: Some options will bring up a secondary menu with further options - refer to section of this chapter relevant to your specific model.

Joystick Type
A.RS.052
A.RS.076
A.RS.082.MM
A.RS.082.MMSC
A.RS.082.PM
A.RS.082.SM

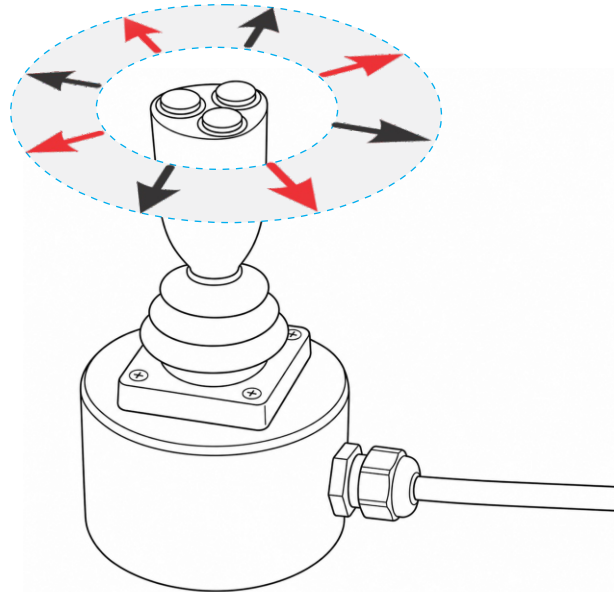
Joystick Type
A.RS.052
A.RS.076
A.RS.082.MM
A.RS.082.MMSC
A.RS.082.PM
A.RS.082.SM

A.RS.082.PM
Without Mast Offset
With Mast Offset
Exit

9.1 Proportional Joysticks

The A.RS.082 is a proportional joystick designed for use with attachments that utilise voltage-proportional or current-proportional valves. Hydraulic valve activation is directly proportional to joystick handle displacement, providing smooth and accurate control.

The joystick supports eight directional inputs and includes three thumb-operated push buttons on the top of the handle. The functions assigned to each direction and button vary according to the joystick model and configuration. Details of the available mappings are provided in the following sections of this chapter.



9.1.1 A.RS.082.MM - Joystick for Skid Steer W/ Multi-Mode

Typically used on skid-steers with lift-lift blades, this joystick allows the operator to control left and right side hydraulics independently as well as simultaneously.

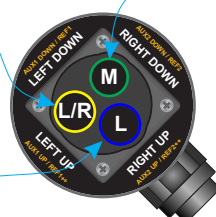
The A.RS.082.MM can be operated in three modes:

- Standard - lever is used to manually drive left and right side hydraulics
- Auxiliary - lever is used to operate auxiliary valves
- Reference - lever is used to increase and decrease Reference values (requires sensors that support Reference functionality, see section 7.3)

The buttons on top are used to switch between the three different modes and to switch between automatic and manual hydraulic control.

Switches both sides between automatic and manual hydraulic control

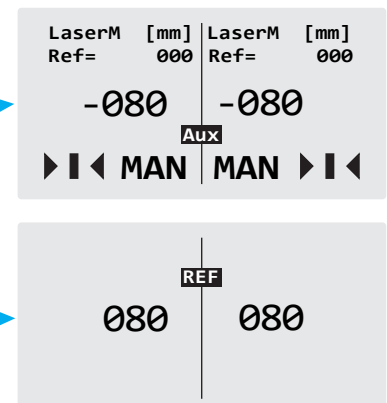
Switches left side between automatic and manual hydraulic control



Switches between 3 joystick modes:

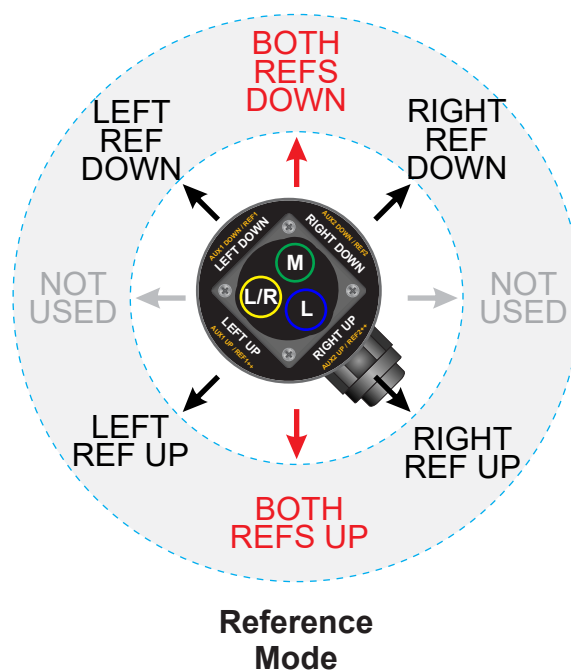
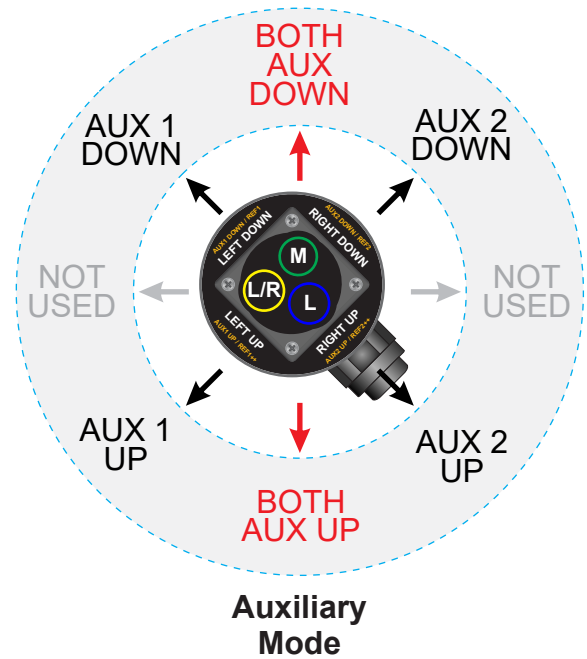
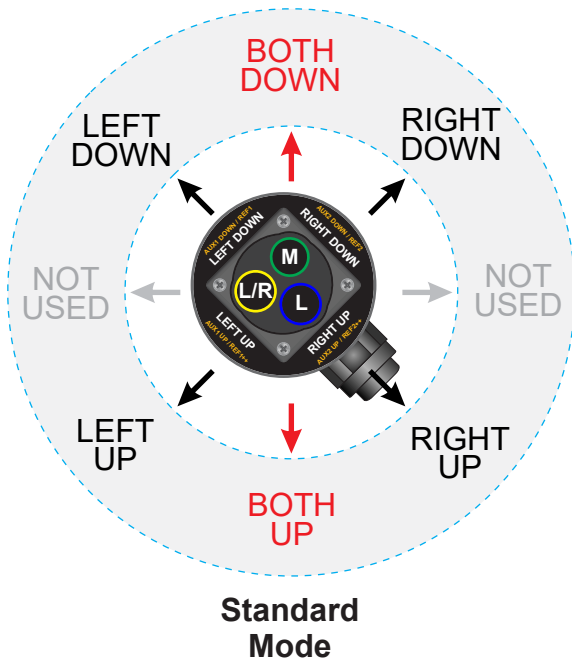
Press once to enter auxiliary mode - word AUX is displayed on LCD

Press and hold for 3 seconds to enter Reference mode



9.1.1 A.RS.082.MM - Continued

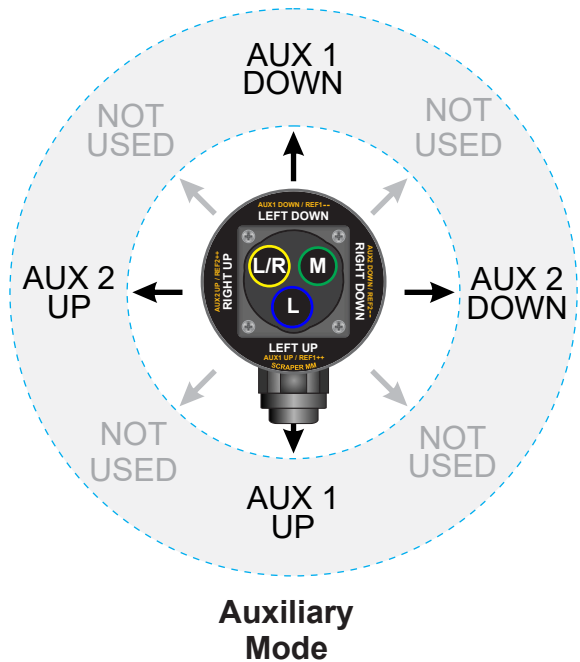
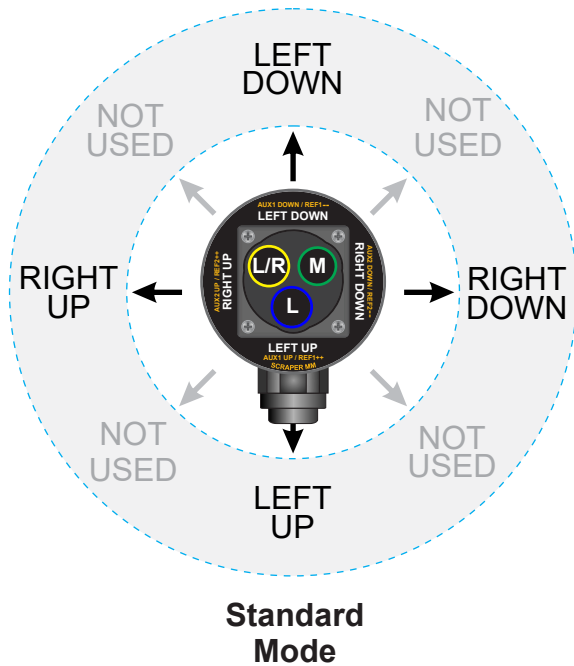
The diagrams below illustrate which functions are activated by each lever movement across all three joystick modes. Note the position of the cable gland, as it is used to correctly orient the joystick during installation or operation.



9.1.2 A.RS.082.MMSC - Joystick for Scraper W/ Multi-Mode

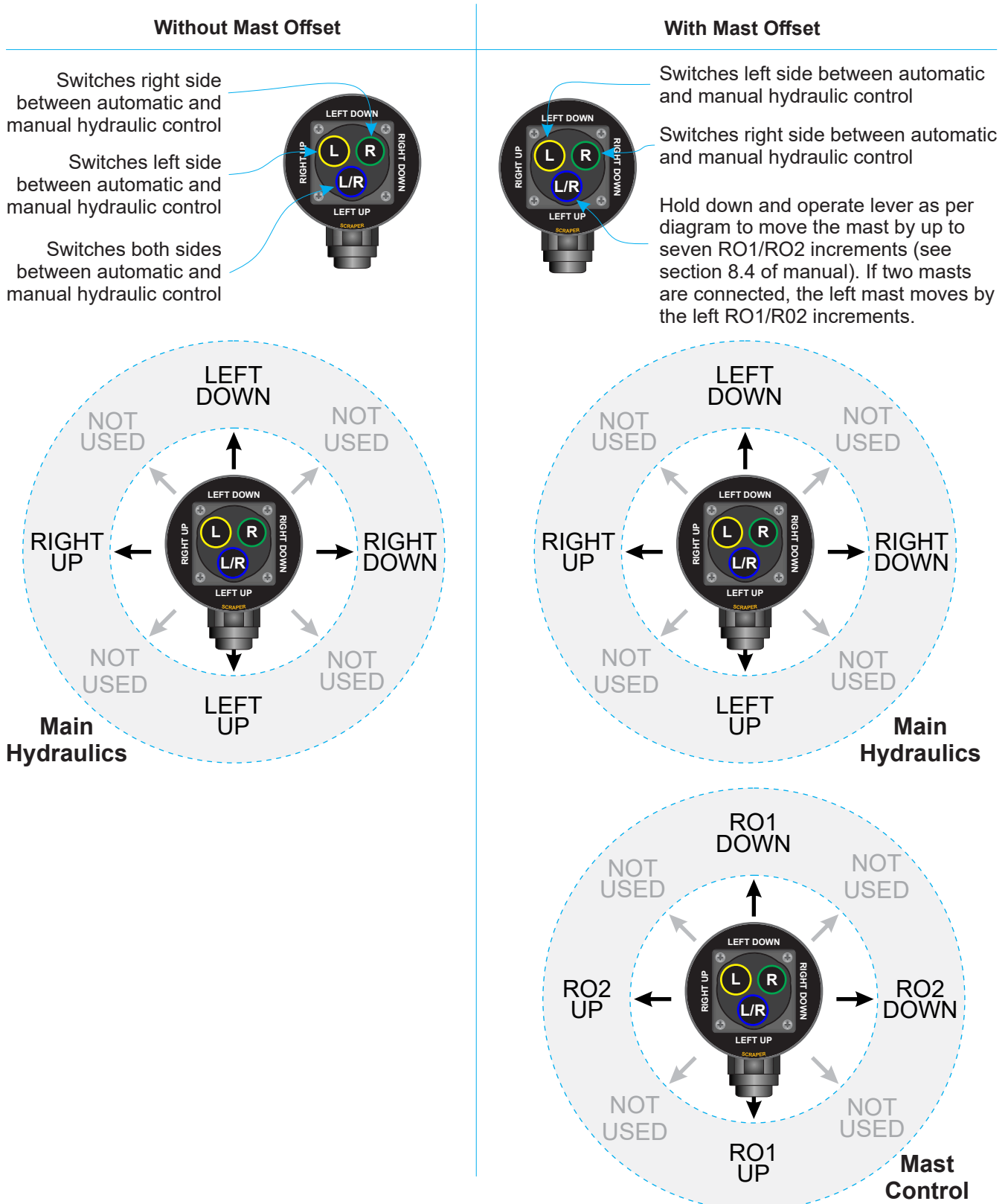
The A.RS.082.MMSC is typically used on scrapers or blades that are lift and tilt, and have auxiliary hydraulic functions.

This joystick variant shares the same three operating modes and top-button functionality as the A.RS.082.MM described in the previous section. However, the joystick lever movements are mapped differently in this variant, as shown in the diagrams below.



9.1.3 A.RS.082.PM - Joystick for Scraper

This joystick variant is typically used on scrapers or blades that are lift and tilt, without auxiliary hydraulic functions. It supports both mast-equipped and mast-less machine configurations. The desired operating mode is selected when configuring the joystick type in the DUO3 settings menu (see Chapter 9). The diagrams below show the corresponding joystick functions for each configuration.

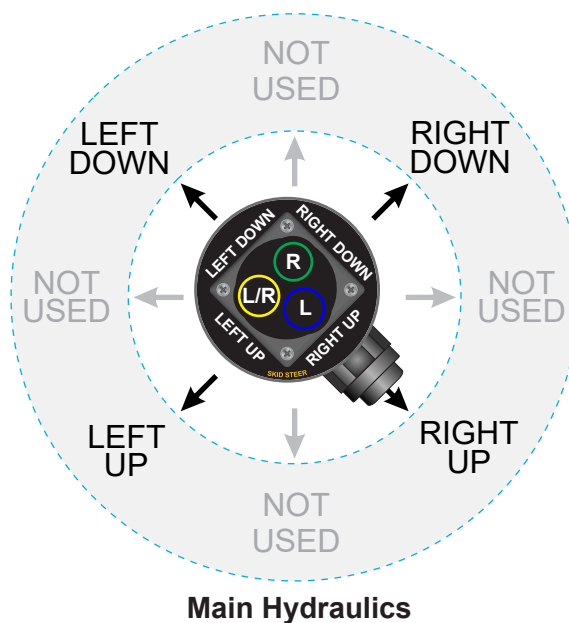
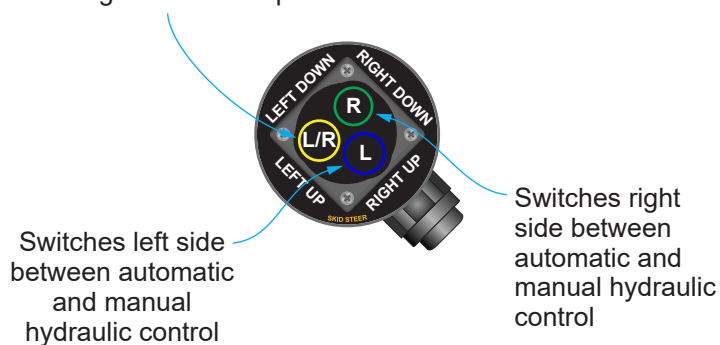


9.1.4 A.RS.082.SM - Joystick for Skid Steer

This joystick variant is typically used on lift and lift blades and can be used to manually drive the left and right side hydraulics and change from automatic to manual mode for each side or both at once. The unit also supports operation of a diverter valve via auxiliary 1 activation. This option can be selected when configuring the joystick type in the DUO3 settings menu by choosing 'With Aux' option after selecting the A.RS.082.SM as the joystick type (see Chapter 9).

When used 'Without Aux' it switches both sides between automatic and manual hydraulic control

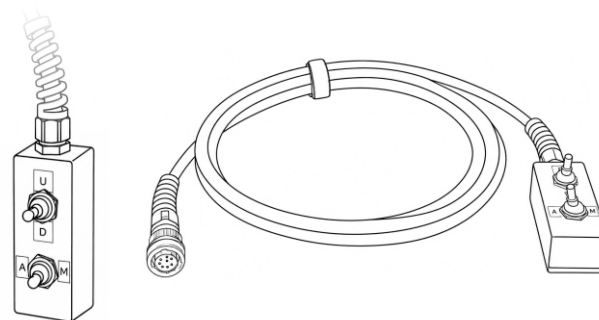
When used 'With Aux' it activates Auxiliary 1 in the up direction (used to drive oil diverter valve). Press and hold to continuously activate the diverter valve while moving the lever to operate the diverter function.



9.2 A.RS.052 - Remote Switch Sgl Side A/M Up/Down

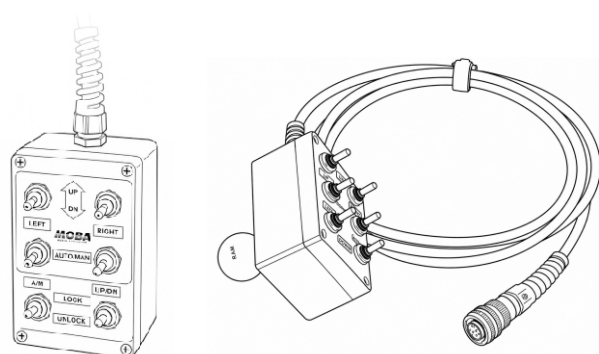
The A.RS.052 is a 3.5 m corded remote control designed primarily for use with tow-behind laser buckets. It enables the operator to select either automatic or manual hydraulic control and provides manual hydraulic activation and override via two toggle switches.

The remote is permanently assigned to control only the left-side hydraulics.



9.3 A.RS.076 - Remote Switch Dual Side A/M Up/Down

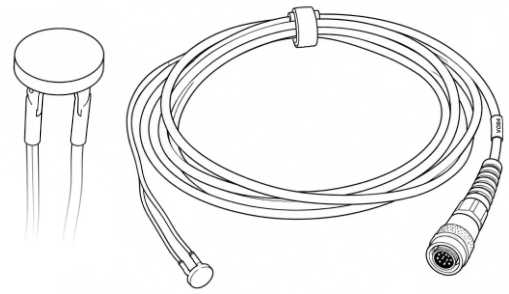
The A.RS.076 is a 1m corded remote control designed primarily for use with tow-behind laser buckets. It enables the operator to select either automatic or manual hydraulic control and provides manual hydraulic activation/override via two toggle switches, for both left side and right side hydraulics. The left and right hydraulic controls, including Auto/Manual mode selection, can be linked together.



9.4 A.RS.089 - Remote Switch Master Auto/Manual

The A.RS.089 is a push-button switch with a 3m cord which is used to switch between auto and manual hydraulic control mode for both left and right side at the same time.

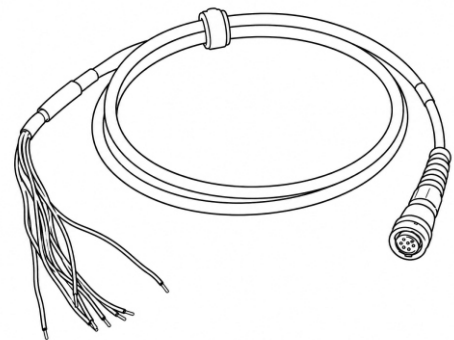
The switch can be mounted to a hydraulic lever or into the machine's dashboard.



9.5 A.RS.118 - Remote Cord Sgl Side A/M Up/Down and Mast Offset

The A.RS.118 is a 3m cord designed to allow switching between auto and manual modes and manual activation/override for the left side. At the same time it supports activating of two electric mast relative offsets for one side.

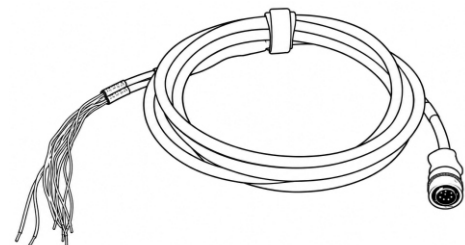
NOTE: This product does not include switches. Appropriate switches must be provided and installed by the customer. Please contact MOBA for wiring diagram.



9.6 A.RS.119 - Remote Cord Dual Side Up/Down Master A/M

The A.RS.119 is a 3.5m cord designed to allow switching between auto and manual modes and manual activation/override of left and right side hydraulics.

NOTE: This product does not include switches. Appropriate switches must be provided and installed by the customer. Please contact MOBA for wiring diagram.

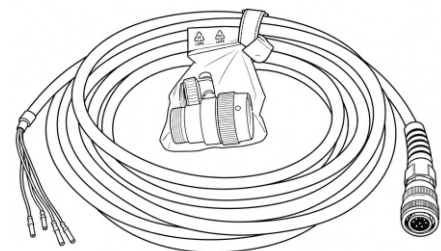


9.7 A.RS.131 / A.RS.131.NC - Remote Cord Ctrl Pnl to Skid Steer 14POL

The A.RS.131 is a 10m cord designed to connect to the machine's 14 pol connector. It allows switching between auto and manual modes, manual activation/override for both sides, and control of two auxiliary hydraulic functions via the machine's joystick buttons. The functions controlled from the 5 buttons are identical to MOBA's 5 Button Kit (A.RS.142.5BK) detailed in section 9.8.

NOTE: The wires are pre-crimped and a 14 pol plug is supplied loose with the cord. The customer must insert the pre-crimped wires into the plug according to the machine's connector pinout.

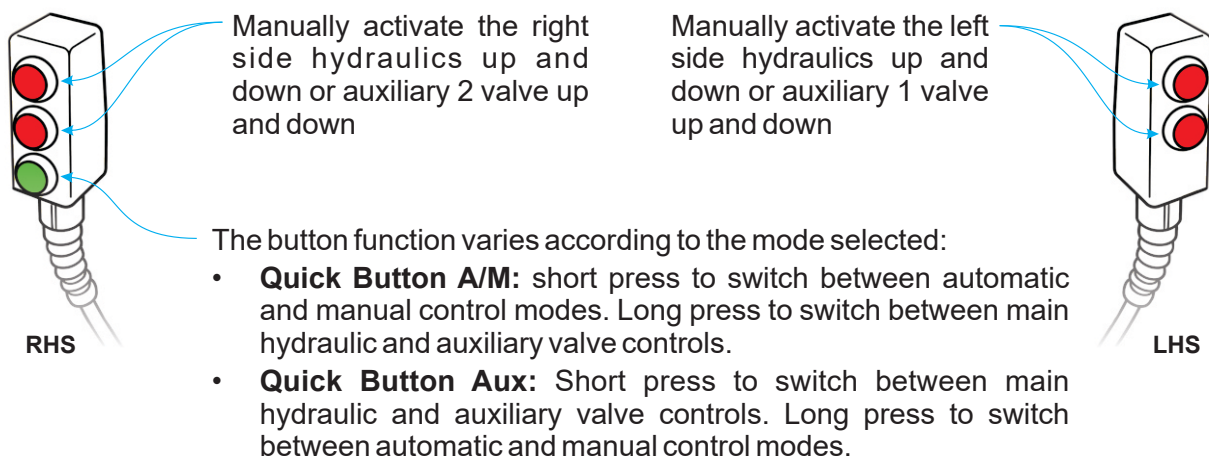
The A.RS.131.NC variant is supplied without the 14 pol plug or pre-crimped wires.



9.8 A.RS.142.5BK - 5-Button Kit for Receiving Systems

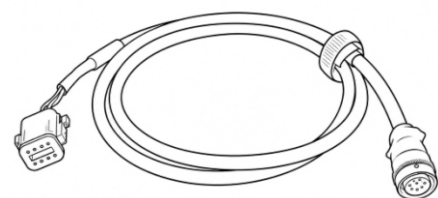
The 5-button kit is designed to mount directly to the machine's joysticks, either using straps or metal brackets attached to the joystick shafts. Parts for both mounting options are included in the kit.

The button kit allows the operator to manually activate/override the hydraulics, switch between automatic and manual control modes and operate the auxiliary hydraulic valves. When selecting the A.RS.142 as the joystick option in the DUO3 settings menu, the user will have two operating modes to select from. The modes change the operation of the A/M button as detailed below.

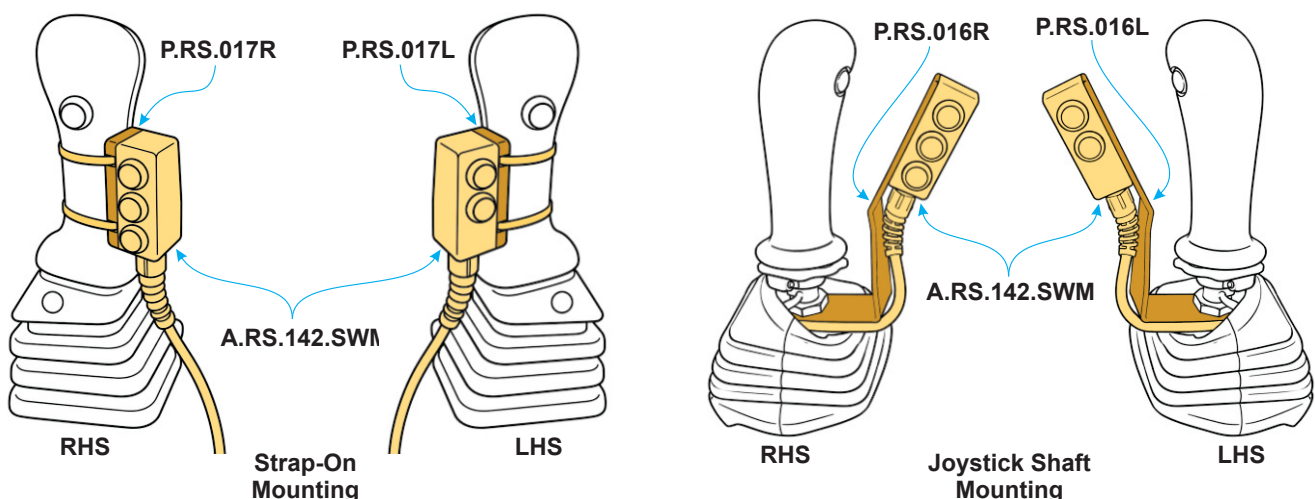


The 5-button kit contains:

- A.RS.042.SWM - 5-Button Switch Module
- A.RS.042 - Remote Cord for 5-Button Kit 2.5m
- P.RS.016L - Metal Bracket for 5-Button Kit LHS
- P.RS.016R - Metal Bracket for 5-Button Kit RHS
- P.RS.017L - Strap-On Adapter for 5-Button Kit LHS
- P.RS.017R - Strap-On Adapter for 5-Button Kit RHS
- Screws and cable ties



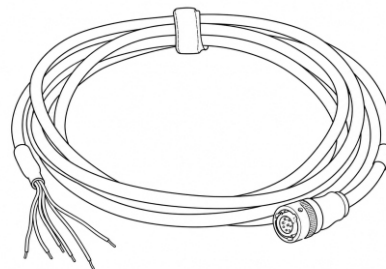
A.RS.042



9.9 A.RS.139 - Remote Cord Dual Side Up/Down Master A/M & Aux

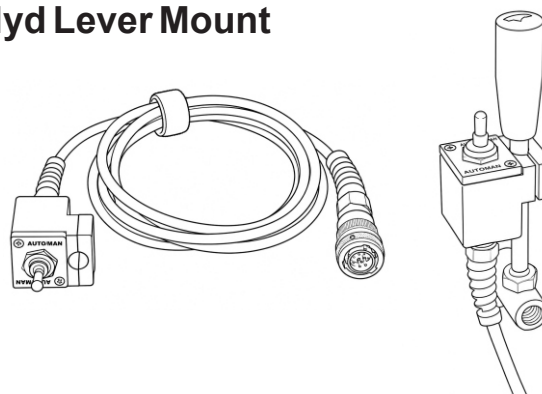
3.5m cord designed to allow switching between auto and manual modes, manual activation/override for both left and right side hydraulics and operation of two auxiliary valves.

NOTE: This product does not include switches. Appropriate switches must be provided and installed by the customer. Please contact MOBA for the wiring diagram.



9.10 A.RS.145 - Remote Switch Sgl A/M Hyd Lever Mount

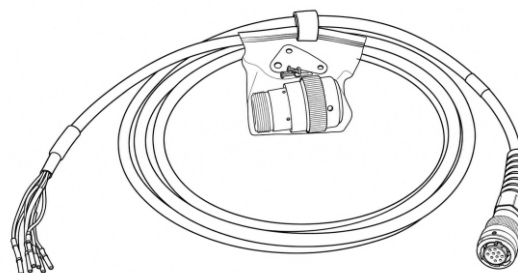
2m remote control which allows switching between auto and manual modes. The switching is done via a toggle switch mounted in an aluminium enclosure which is designed to be mounted to hydraulic levers. It includes adapter brackets to suit most common diameters of hydraulic levers.



9.11 A.RS.146 - Interface Cord IB.DUO2.14PJOY to Skid Steer 14POL

3.5m cord used with the IB.DUO2.14PJOY junction box for out-of-cab DUO3 mounting. Connects the machine's 14 pol connector to the junction box, providing power and joystick inputs for Auto/Manual selection, manual left/right hydraulic control and two auxiliary functions.

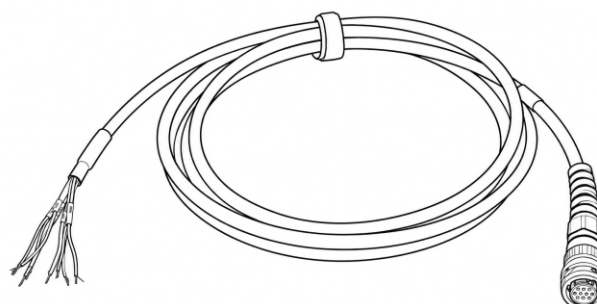
NOTE: The wires are pre-crimped and a 14 pol plug is supplied loose with the cord. The customer must insert the pre-crimped wires into the plug according to the machine's connector pinout.



9.12 A.RS.146.NC - Interface Cord IB.DUO2.14PJOY to Skid Steer 14POL

Similar to A.RS.146 above but supplied without the 14 pol plug and without pre-crimped wires.

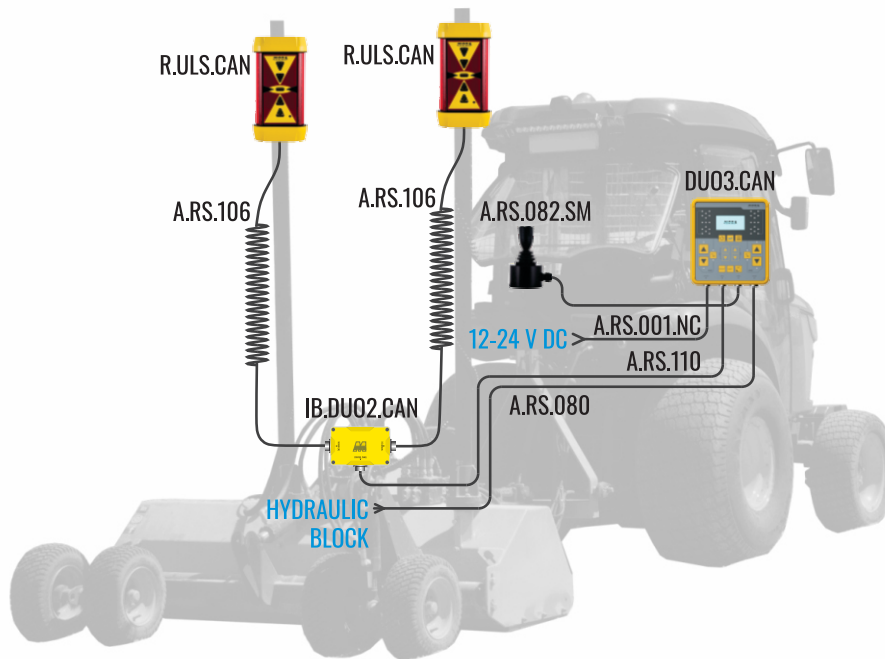
Select A.RS.146 from the joystick selection menu when using this cord.



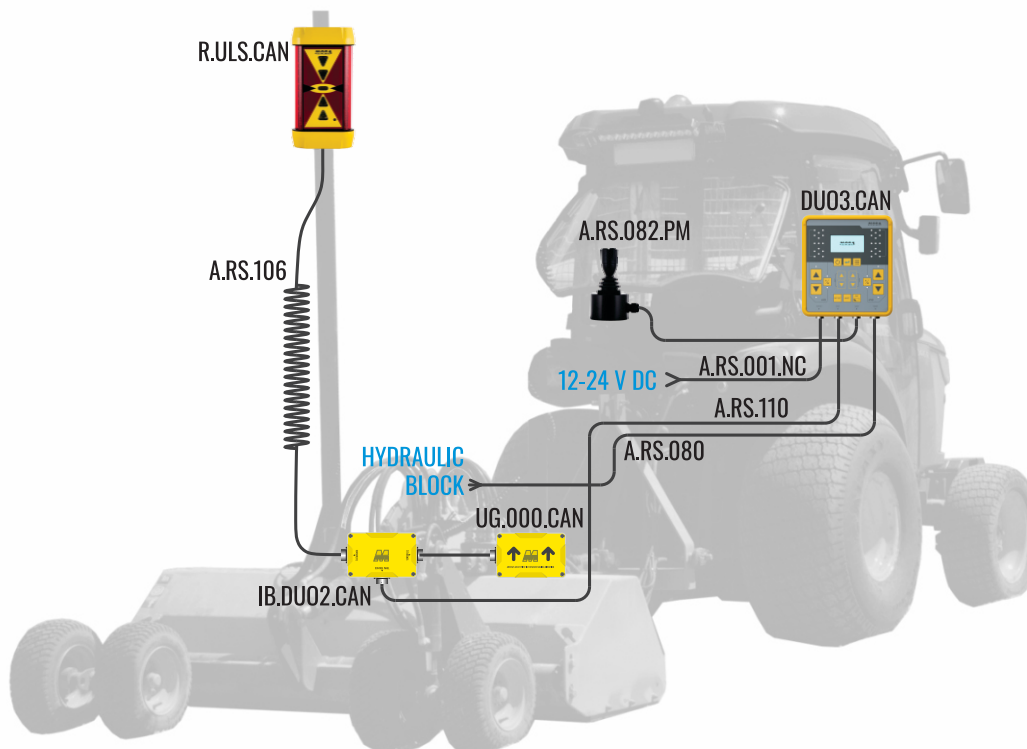
10. Typical Set-Ups

This section presents a range of common system configurations for different machines and attachment types. It is not feasible to include every possible combination. If a specific arrangement is not shown, contact MOBA for a tailored solution.

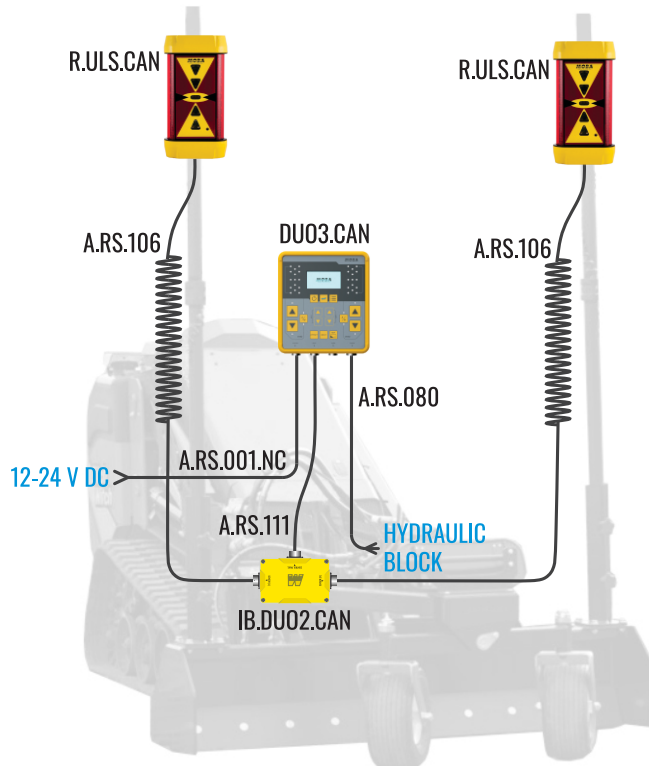
10.1 Tow-Behind Blade with 2 Laser Receivers



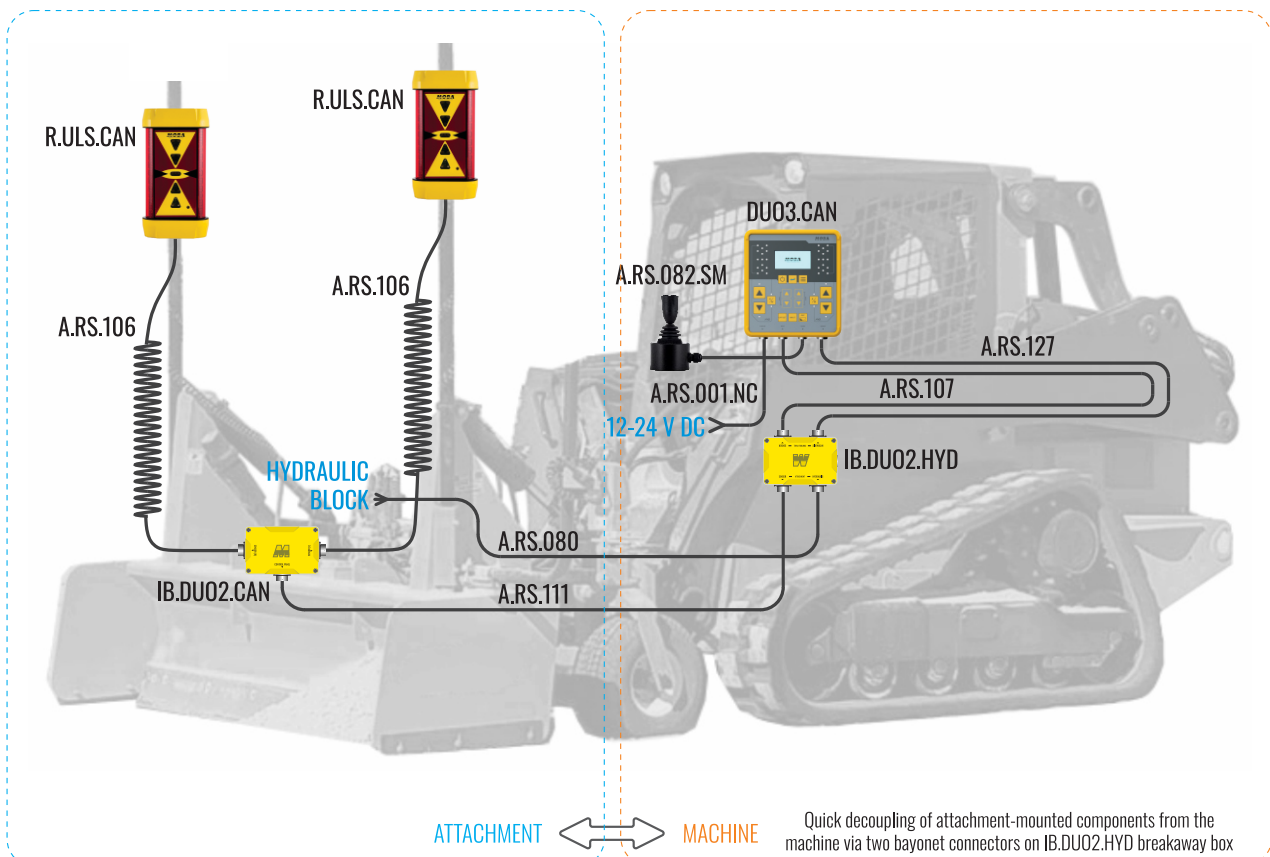
10.2 Tow-Behind Blade with Laser Receiver and Slope Sensor



10.3 Compact Skid Steer Loader with Box Blade

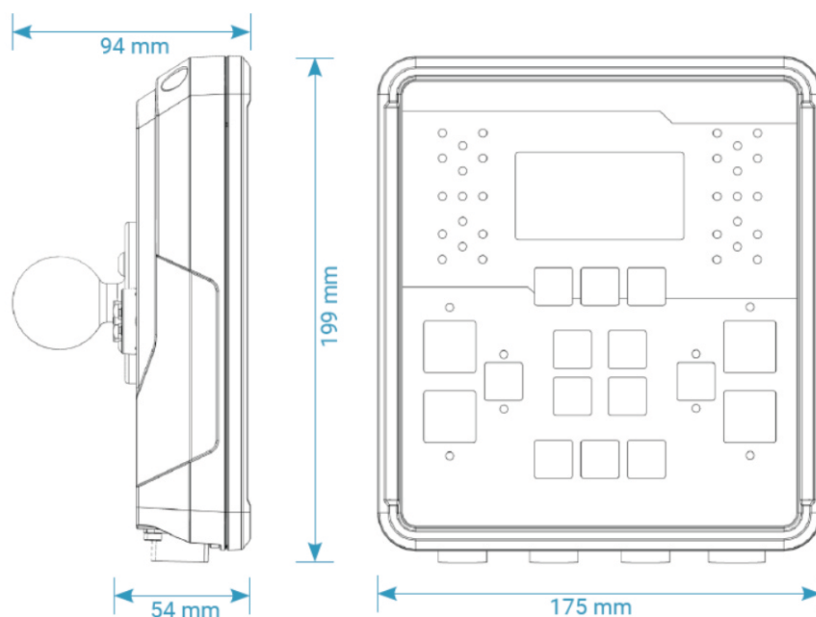


10.4 Front Mounted Blade with In-Cab Display & Breakaway



11. Specifications

Size w/o RAM ball (H x W x D)	199 x 175 x 54 mm
Size w/ RAM ball (H x W x D)	199 x 175 x 94 mm
Weight (including RAM ball)	1.3 kg
Display	128 x 64 dots white backlight LCD
Position indication	Built-in colour-coded LED clusters
Deadband (adjustable / accuracy, sensor dependent)	Laser: ± 1 to ± 30 mm / ± 0.05 to ± 1.20 in / ± 0.005 to 0.100 ft Sonic: ± 1 to ± 100 mm / ± 0.05 to ± 3.95 in / ± 0.005 to 0.330 ft Slope: ± 0.2 to $\pm 10\%$
Outputs	DUO3.CAN: 8 hydraulic output channels (left/right up/down and Auxiliary 1/2 up/down) DUO3.DC: 2 SCV control channels (left/right)
Valve drivers	DUO3.CAN: Voltage proportional (VO), current proportional (IO) and Bang-Bang (On/Off)
Proportional voltage output	DUO3.CAN: 5 - 100% of supply voltage (ratiometric voltage output), 150mA max DUO3.DC: 5 - 100% of SCV supply voltage (ratiometric voltage output), 150mA max
Proportional current output	DUO3.CAN: 150mA - 3A
On/Off output	DUO3.CAN: 3A
Hydraulic control	Automatic or manual via switchpad and/or joystick
Electric mast control	Yes, 2 masts
IP rating	65
Connectors	MIL-DTL-26482 Series I
External power supply	12 - 24 V DC



[illegible]

