

PRODUCT MANUAL

SMARTRACK® GLOBAL

Software Version 5.3.2.77

Part No. 16423 | 16424



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FCC Compliance

Contains **FCC ID: CCAM19Z10070T6**. This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

General Safety Warnings

Personal Safety

- Everyone is responsible for safety.
- The installer/service personnel should be trained and authorised to complete the required work.
- Ensure that the machine is safely isolated during installation and testing to protect all personnel.
- Complete all required risk assessments and job safety analysis (JSA) before commencing work.
- Observe all site specific and machine OEM procedures regarding the following:
 - working at heights
 - working in heat
 - working in confined spaces
 - all other site-specific occupational health and safety (OH&S) procedures

Machine

- Carry out all pre-start operations as per site and machine OEM procedures.
- Ensure the machine is safely isolated during installation and testing to protect the machine and other equipment in the area.
- Do not operate any machine with a known fault and report all findings to the supervisor in writing.
- Test and operate machine as per machine OEM and site procedures.
- Read and understand machine and site specific operational and testing instructions.

Product

Before applying power to the equipment, the user/repairer/ installer must read all product instructions. If in doubt, seek assistance.

- Ensure electrical connections are made as per RCT's recommendations. Test circuits prior to connecting power to any component.
- The equipment contains no user serviceable parts inside. Return the unit to RCT for repairs.
- Retain product and installation instructions for future use.
- Ensure that RCT's recommended service procedures are included in the machine's service routine.
- Observe all machine, site and RCT product warnings.
- Follow all machine, site and RCT product operating procedures at all times.

The application of safety should not be limited to the above recommendations.

Product Overview

SmarTrack® Global (the system) is a versatile Fleet Management System (FMS) that sends machine telemetry data, via cellular or Wi-Fi, to the cloud for safe and secure storage.

The industrial market has evolved; so too has SmarTrack. Our telematics unit, part number 16423 (Cellular) and 16424 (Wi-Fi), has enhanced electrical interoperability to remain a truly universal product. From its capability to work with multiple languages both at the device and web portal, to be a very simple system to install supporting several configurable I/O methods including VDI 4458 (CANbus), SmarTrack has every machine application covered.

SmarTrack Global version 2 has been re-designed to meet demanding industry in electrical robustness and be truly a global product. From its capability to work with multiple different languages both at the device and web portal, to be a very simple system to install supporting several configurable I/O methods and CANbus*, SmarTrack Global has every machine application covered.

Our intuitive web portal provides the means for users to remotely and securely login to look at real-time data from the systems in the field. The portal is not only a modern web reporting tool but is the backbone of configuring the system to allow some fundamental features to be managed, such as adding operators to be able to access a machine via the systems on-board keypad and card reader, or creating and configuring daily machine pre-operational checklist, plus much more.

The system can be purchased as a universal kit allowing it to be installed to almost any machine.

Features

- **Operator Display** – Colour with multiple function buttons connected via a small diameter 4-pin cable to main controller, this makes running the cable easy. RAM system mounting for flexible mounting options. On-board buzzer.
- **Controller** – Multi-voltage 12-48 Vdc, communication method cellular or Wi-Fi, CANbus, multiple I/O.
- **Access Control** – Keypad and RFID (swipe card, standard as part of the operator display).
- **Pre Operation Checklists** – Fully configurable via web portal, configurable to run at up to three nominated shift start times and set to run for an operator change. Questions can be randomised.
- **Out of Service (OOS)** – The out-of-service feature of SmarTrack is a better way to manage machine breakdown and service events without the need of paper tags. Scheduled out of service can be managed on the machine, or from anywhere in the world through the SmarTrack website. Unscheduled events such as machine breakdown, checklist issues, and machine impacts can be managed easily and with accurate records of when and who is responsible.
- **Impact sensor** – The impact sensor recognises an impact and its severity by constantly analysing events and comparing them to an inbuilt 'impact signature'.
- **Seat** – Monitors operator presence and can be configured to generate alerts and violation reports should an operator vacate during machine operation.
- **Seat Buckle** – Monitors seat belt buckle and can be configured to generate alerts and violation reports if the buckle is ejected during machine operation.
- **Speed** – If wired, can monitor speed, display speed on operator display, display alerts to operator and report upon violations.
- **Load Weight** – If wired or pressure transducer installed, can act as a weight indicator *not a scale*, show weight on operator display, show load weight violation alerts to operator. Can report and alert on violations.
- **Activation Output** – Always wired to a circuit to prohibit machine activation. Activates after successful operator access and pre-start checklist. Typically wired in series with machine key switch circuit to control the operation on/off.
- **Auxiliary Output** – Dry contacts that are activated by critical events.
- **GPS Zoning** – If configured, the zoning output wire will activate (switch to 12 V) when in a fast zone. This wire can be used to trigger an RCT speed limiter, OEM speed limiter (seek advice from OEM) or other device.
- **Excess Idle** – Triggers alerts when a machine is in use but inactive for a period of time. Excess idle events can be used to trigger automatic logoff of the operator.

Installation Guide

Recommended Workflow

Step	Description
1.	Mount all components as outlined.
2.	Make the battery connections via the rated fuse (refer to Figure 10).
3.	Make the ignition connection.
4.	Break the OEM ignition circuit and connect the activation/run relay circuit in series (brown, brown/black).
5.	(Optional) Break the crank circuit and insert relay in series (refer to Figure 13).
6.	Connect at least one work input (refer to table on page 15).
7.	Make the other connections to the seat, seat buckle, GPS Zoning and weight if these are in use.
8.	Connect the impact sensor.
9.	Connect the display.
10.	Connect the bypass switch.

Caution

- Disconnect the battery before commencing any work.
- Ensure best practice wiring methods are used especially when splicing wires—always splice/solder and heat shrink or tape all wiring connections.
- Do not make poor wiring connections by twisting wires together.
- Do not use 'snap locks' to splice wires.

Controller Installation

The SmarTrack® Global controller can be installed in a horizontal or vertical position under the instrument panel or in a convenient location allowing the loom to reach desired connection points.

- The controller can be mounted via two 6 mm diameter holes with centres being 102 mm apart.
- Careful consideration should be given to the location of these holes before drilling to ensure adequate accessibility to the electrical connections located on the controller.
- Do not mount the controller on or near any source of heat, vibration, or electrical interference such as a motor or engine. Do not mount the controller opposite an exhaust or muffler system.

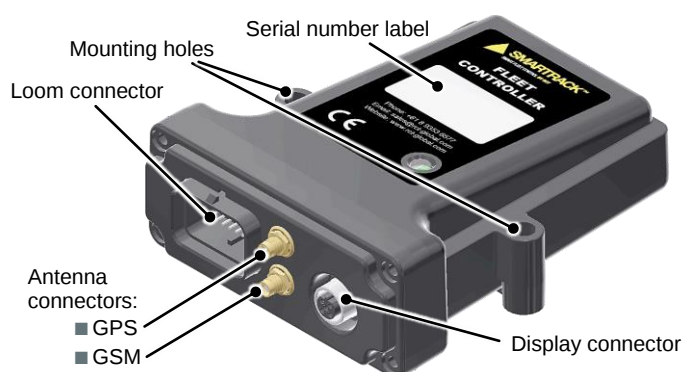


Figure 1 Controller

Display Installation

The recommended location for the display unit is in the operator's cabin in clear view and within easy reach of the operator. Proximity to the operator is important, as the display unit requires input from the operator for several functions.

- Fit the RAM mount to the rear of the display unit using the supplied screws.
- Mount the RAM base to a rigid surface and attach the display unit using the supplied RAM arm.
- Secure the loom using cable ties, avoiding any pinch points and sharp bends. Coil excess length and secure with cable ties—do not bunch up. Hand-tighten only the connector—DO NOT apply excessive force and ensure that there is no cross-threading.

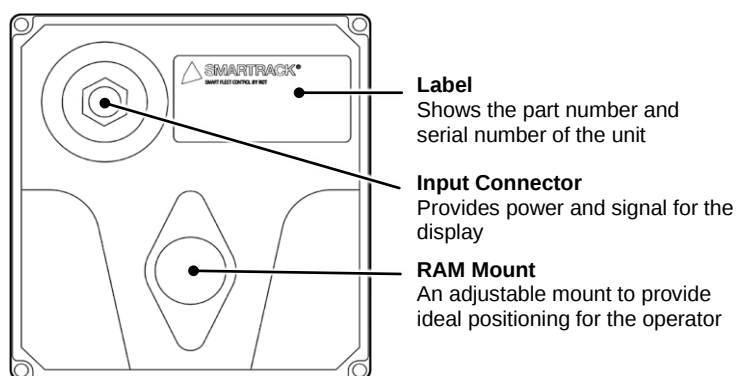


Figure 2 Display unit

Impact Sensor Installation

The impact sensor can be mounted in any orientation, including upside down and sideways. The location needs to be chosen carefully following the below steps and always in a repeatable location for same machine types.

- Locate a flat surface that is part of the machine's main chassis. This surface needs to be rigid and ideally the thickest part of the machine chassis. The location needs to be away from sources of heat.
- Check there is accessibility to the electrical connector of the sensor.
- Clean the surface with the provided wipe to ensure it is free from grease and oil.
- Stick the sensor to the flat and clean surface using the attached double-sided adhesive and make the electrical connection.

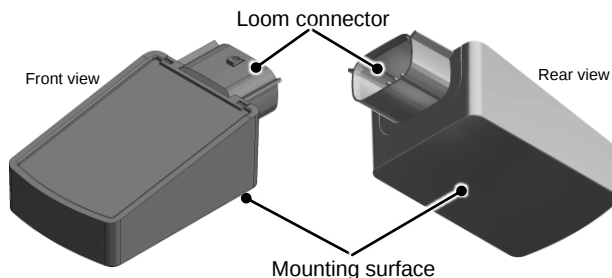


Figure 3 Impact sensor

Antenna Installation

The antenna should be installed on a horizontal plane with the adhesive side facing the ground, ideally on top of the machine and clear of electrical devices such as flashing lights.

- The body or panels of the machine should not obscure the antenna.
- The antenna must not be closer than one metre (~3 ft. 4 in) to the 16423 or 16424 controller.
- The antenna cables should be carefully routed to avoid sharp bends and pinching.
- Any excess antenna cable should be coiled up (no less than 100 mm [4 in] in diameter) and secured at least one metre (~3 ft. 4 in) or more away from the controller, where possible.
- The cables should be secured using cable ties.

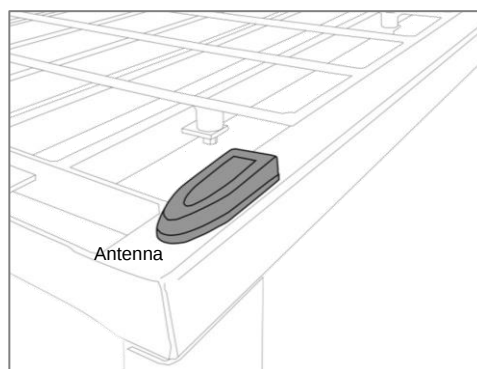
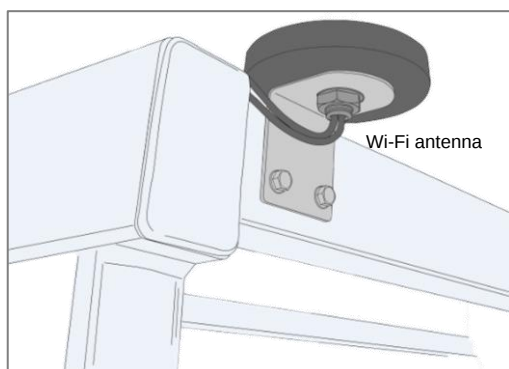


Figure 4 Typical antenna installation

- The antenna connectors are different so take care to mate the correct plug.
- Tighten using an SMA finger wrench (RCT part number 10472). Do not over-tighten - FINGER TIGHT ONLY.

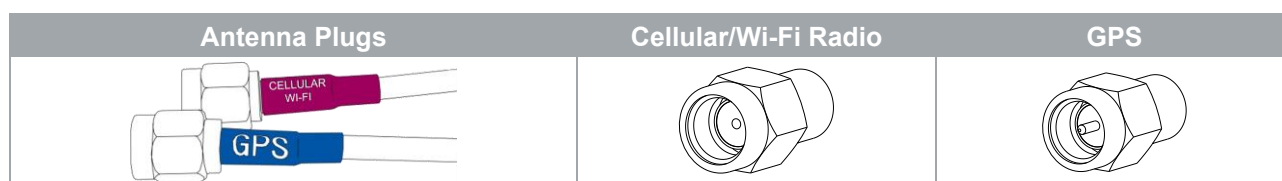


Figure 5 - Antenna lead plug identification

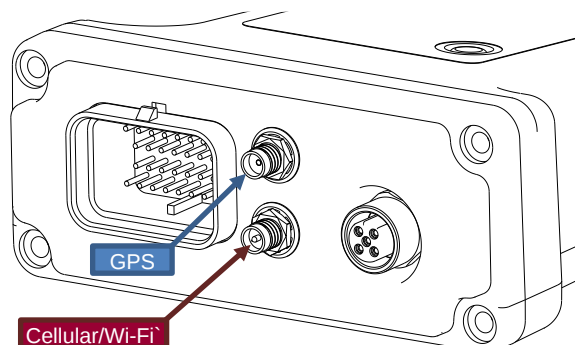


Figure 6 Identification of antenna lead connections on fleet controller

Bypass Key Installation

In the event of an emergency, the fleet control bypass key may be used to start the machine without entering an access code or using a swipe card. The machine will be operating but no trip data will be stored or transmitted, as the unit has not been signed on. This feature is designed as a temporary override function and is not intended to be used in normal operating conditions.

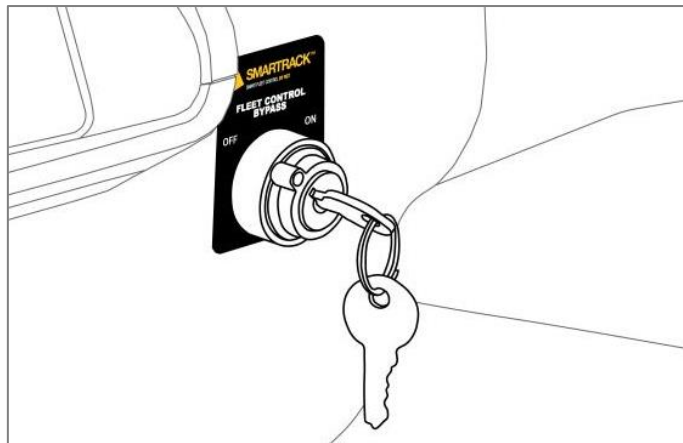


Figure 7 Typical bypass key installation

The bypass key should be mounted in an accessible location within the operators compartment area. This will allow for ease of use should the need arise.

Use a 7/8" (23 mm) hole saw to cut a suitable hole for the bypass switch.



Figure 8 Hole saw

The bypass switch can be mounted on material from one to six mm thick.

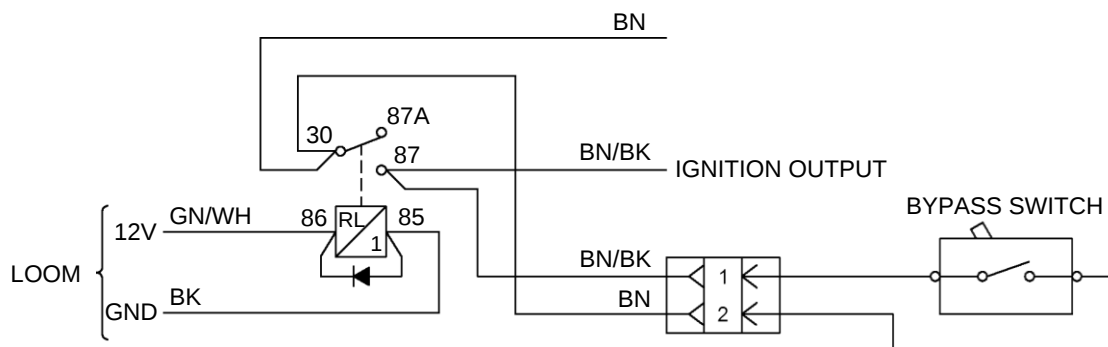


Figure 9 Bypass switch wiring

Loom Installation

Refer to the wiring table in Figure 10 drawing 735g as a guide to the connection of the control unit.

It is recommended that the wiring loom is installed alongside OEM engine wiring, ensuring that it is secured at regular intervals. This will provide protection from heat and abrasion, and any other damage that may occur with extended machine operation.

When securing the loom to the OEM engine wiring, ensure that the loom is away from moving machine parts that could lead to loom damage and avoid proximity to sources of high current and/or high voltage.

Note

The wiring loom comes pre-installed with 12-volt relays—do not replace them with higher voltage types. There is no need to change the relays if the system voltage is over 12 volts as they are driven by a regulated 12-volt source. If a faulty relay is detected, replace it with another 12-volt relay of the same specifications.

Diagrams

SmarTrack® Global Version 2 External Wiring (735g)

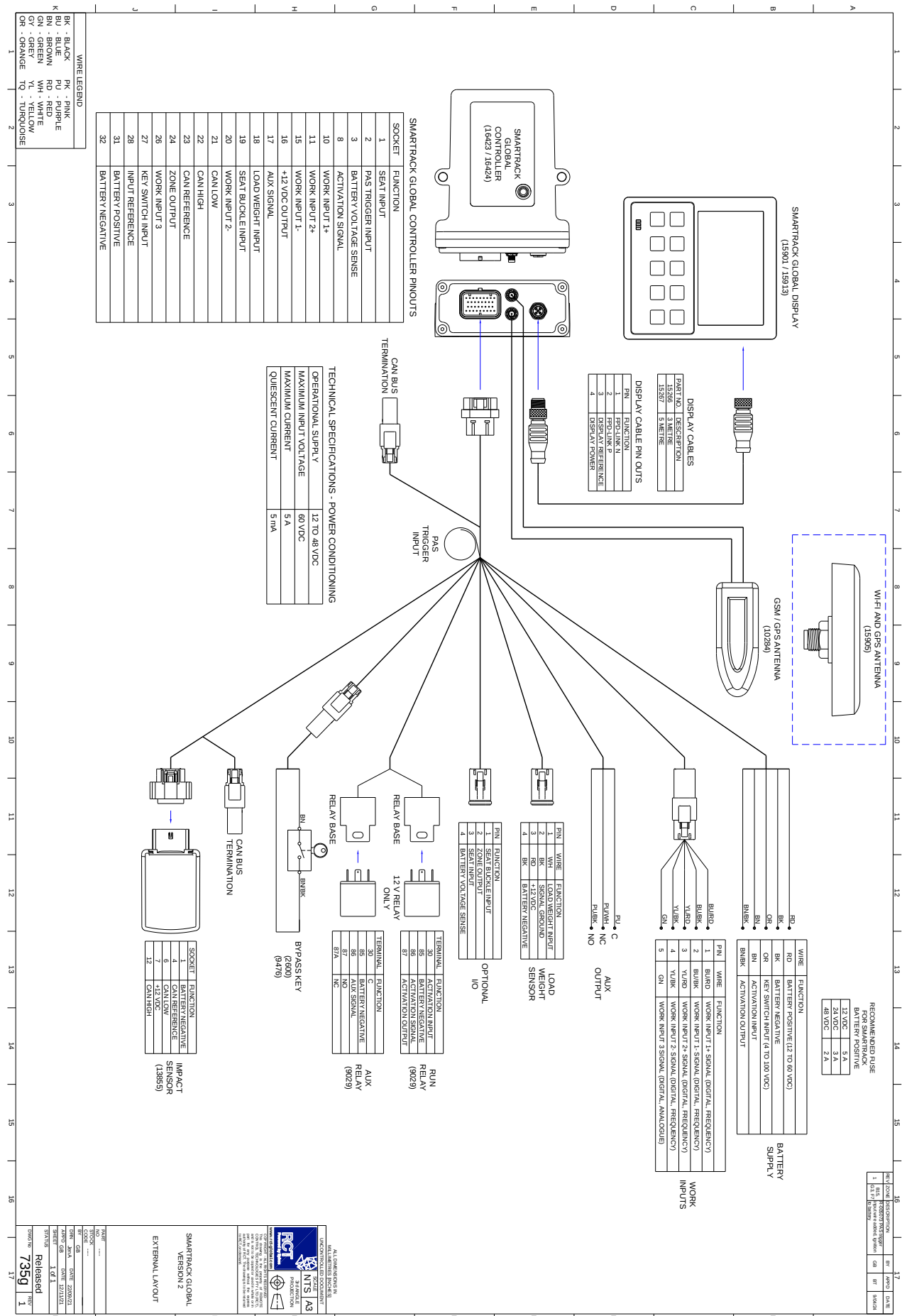


Figure 10 Drawing 735g – SmarTrack Global version 2 wiring

Notes

Wiring diagram for the SmartTronix 2.0 CAN controller. The diagram shows the connection of various inputs and outputs to the controller. Inputs include CAN BUS, BATTERY +12V, CAN REFERENCE, CAN LOW, CAN HIGH, LOAD WEIGHT INPUT, SEAT INPUT 1, SEAT INPUT 2, SEAT INPUT 3, WORK INPUT 1, WORK INPUT 2, WORK INPUT 3, SEAT BUCKLE INPUT, ZONE OUTPUT, SEAT INPUT, BATTERY VOLTAGE SENSE, and BATTERY SUPPLY. Outputs include SEAT INPUT 1, SEAT INPUT 2, SEAT INPUT 3, WORK INPUT 1, WORK INPUT 2, WORK INPUT 3, SEAT BUCKLE INPUT, ZONE OUTPUT, SEAT INPUT, BATTERY VOLTAGE SENSE, and BATTERY SUPPLY. The diagram also shows the connection of the controller to the CAN BUS and BATTERY +12V. The controller is labeled 'SMARTTRONIX 2.0 CAN CONTROLLER'.

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Notes

General Wiring Connection Overview

Note

Seek OEM support for specific wiring method locations.

Wire Colour	Function	Additional Information
Red	Battery positive	Connect to a fused constant B+ source close to the battery. DO NOT CONNECT TO A SWITCHED CIRCUIT.
Black	Battery negative	Connect to a B- battery negative (not chassis) source close to the battery.
Orange	Key switch input	Connect to a fused key switch or activation source (as described below). This acts as a system wake/sleep.
Brown	Activation input (max 10A)	Cut the ignition circuit and join the wire from the ignition switch to here. Refer to Figure 12 - Figure 13.
Brown/Black	Activation output (max 10A)	Cut the ignition circuit and join the wire going to the machine circuitry here. Refer to Figure 12 - Figure 13
Blue/Red	Work Input1	Digital & frequency (At least one work input must be connected)
Yellow/Red	Work Input2	Digital & frequency
Green	Work Input3	Analogue and digital
Purple	Auxiliary output	Refer to Figure 23
Green/Red	Seat belt & buckle	Optional
Grey	Seat	Optional
White	Weight	Optional
Grey/Black	Zone output	Optional
Red/Black	Battery voltage sense	Optional

Constant Supply Connection

Caution

The constant battery supply voltage cannot exceed 60 Vdc. The constant battery supply voltage will need to be connected to a dc-dc converter if installed on a machine with a battery that is a higher voltage than 48 Vdc. E.g. a lithium-ion 80 Vdc battery-powered machine will require a dc-dc converter to reduce the constant battery supply voltage. Refer to the maximum input voltage table on page 17.

The SmarTrack system requires a constant power and ground source. The controller requires a positive voltage connection greater than 12 Vdc and no greater than 60 Vdc.

Ignition Supply Connection

⚠ Caution

The ignition input cannot exceed 100 Vdc. Refer to the maximum input voltage table on page 17.

The SmarTrack® system supports latching and momentary activation inputs to wake the system for use. Latching inputs typically utilise a key switch or ignition switch. Momentary inputs can also be used to wake the SmarTrack system, such as from a horn, seat or dead man switch. These need to be a rising positive voltage greater than four volts. A falling signal to ground will not work.

Connect the ORANGE key switch input wire to the key switch as shown, or other 'wake' source. By default, the system is configured for a momentary rising positive signal but will accept a latching rising positive signal. This ensures that the system will start on initial installation. Reconfiguration can take place during the installation and commissioning wizard.

Typical Key Switch Configuration for a Battery-electric-powered Machine

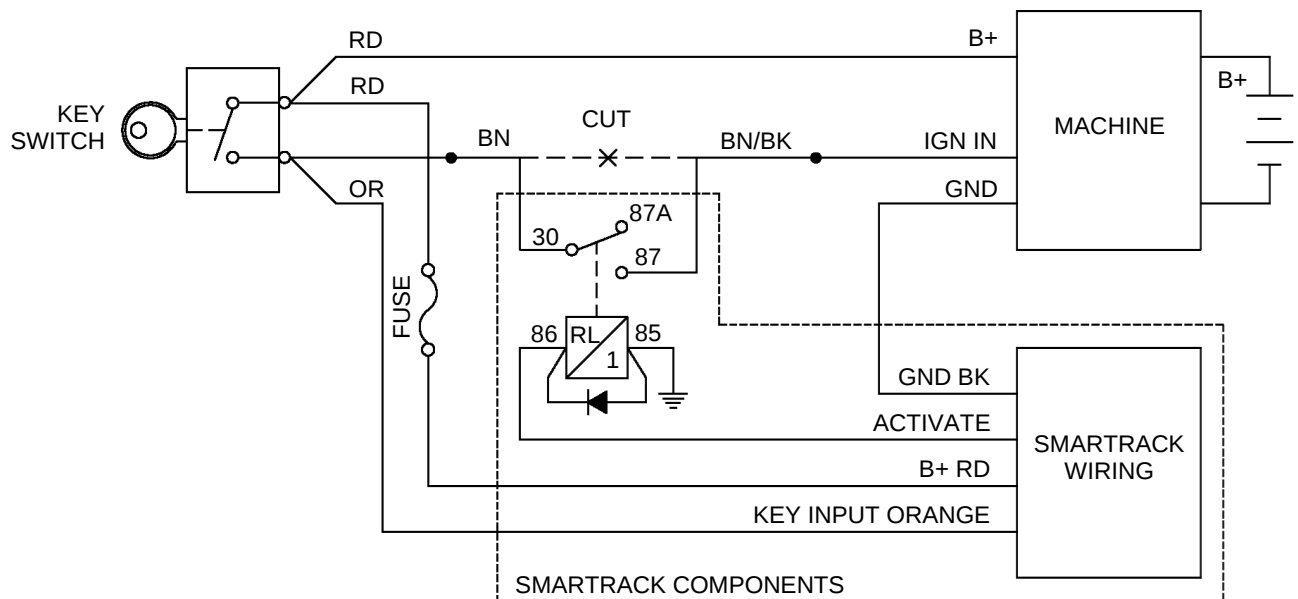


Figure 12 Typical battery electric power wiring

Typical Key Switch Configuration for an Internal-combustion-powered Machine

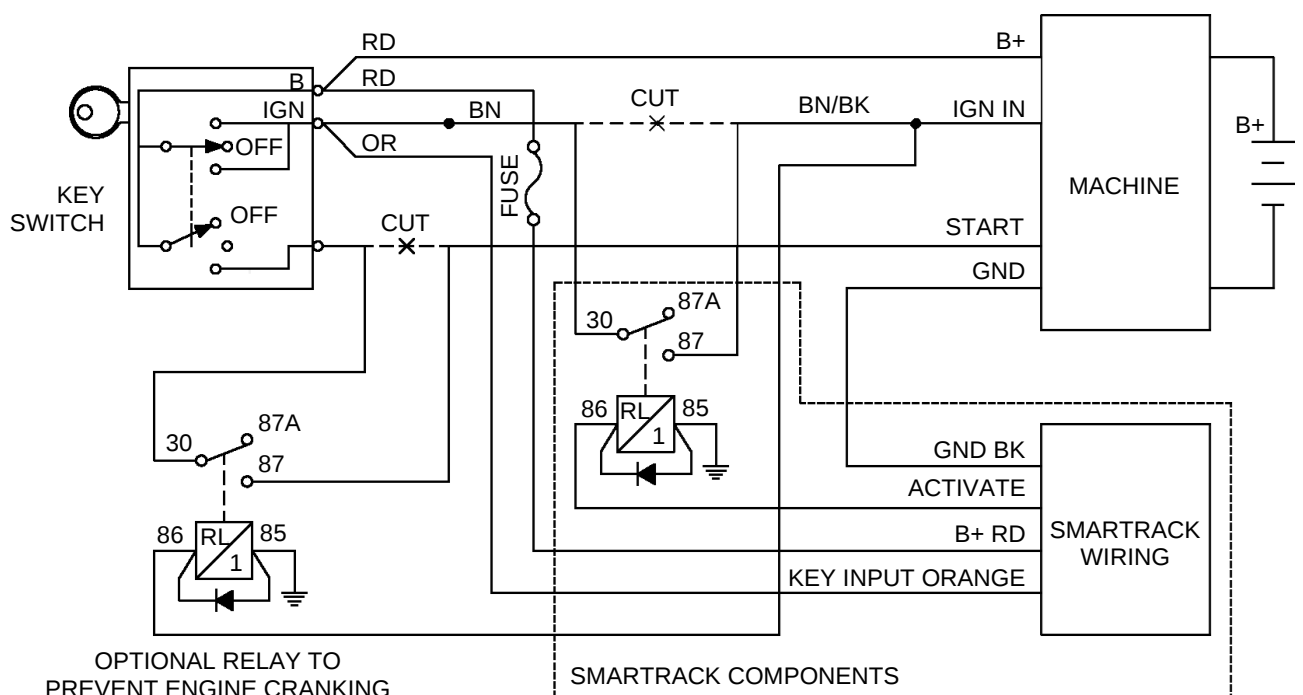


Figure 13 Typical internal combustion power wiring

Work Inputs

Connection of at least one work input is required for utilisation data to be reported. Without a work input, the data will show the machine as idle 100 percent of the time

There are three work signal inputs, some of which are associated with specific features of SmarTrack®.

Function of Work Inputs

Work Inputs	Meaning / Function	IC Pickup Example	Be Pickup Example	Reports On
Work1 (Pin 1 & 2)	Detects Activity / Movement	FWD Solenoid	Speed Sensor	Utilisation
Work2 (Pin 3 & 4)	Detects Activity / Movement	REV Solenoid	Hyd Motor Sensor	Utilisation
Work3 (Pin 5 & Gnd return)	Detects Activity / Movement	Optional	Optional	Utilisation

Caution

The work inputs cannot exceed certain voltages for each input. Refer to maximum input table on page 17.

Caution

Any contact of the 'Signal Ground' wire of the load weight sensor to a positive source will cause irreparable damage to the device.

	Work1	Work2	Work3
Digital Trigger Threshold	1.5 or 4 V min	1.5 or 4 V min	4 V min
Absolute Maximum Voltage	60 Vdc	60 Vdc	60 Vdc
Analogue Measurement Range	—	—	0 to 10 V
Frequency Measurement Range	0 to 10 KHz, 1.5 or 4 Vpp min 	0 to 10 KHz, 1.5 or 4 Vpp min 	N/A

Maximum Input Voltage

WIRE / INPUT						
Constant Supply Wire (Red)	Ignition Input (Orange)	Work Input 1 (Blue/Red)	Work Input 2 (Yellow/Red)	Work Input 3 (Green)	Seat Input (Grey)	Seat Belt Input (Green/Red)
Absolute Maximum Voltage						
60 Vdc	100 Vdc	60 Vdc	60 Vdc	60 Vdc	60 Vdc	60 Vdc

Diagrams

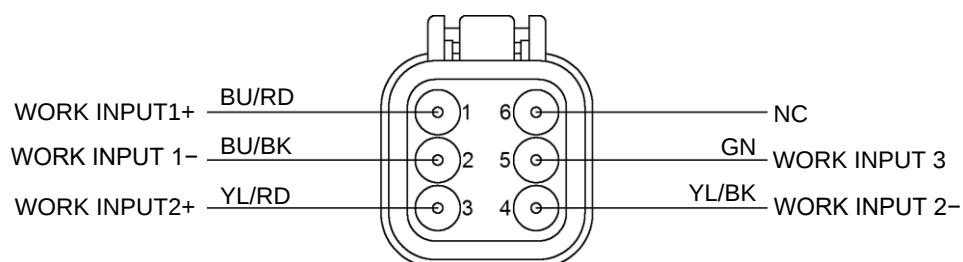
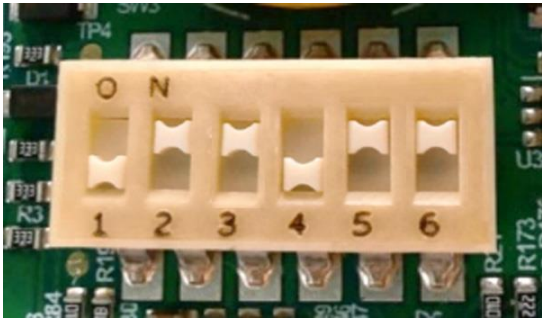


Figure 14 Work input plug and wiring (back view) – loom 16622

DIP Switch Setting for Work Inputs



Default Setting: 1.5 V threshold ground non-isolated for Work 1 and 2.

Note

The correct DIP switch configuration is crucial for accurate work input data capture and subsequent utilisation reporting. Incorrect settings will lead to inaccurate reporting.

Four applicable combinations for each work input:

	GND Isolated 1.5 V Threshold	GND Return 1.5 V Threshold	GND Isolated 4 V Threshold	GND Return 4 V Threshold (as 11505)	DO NOT mix 1 & 2, or 4 & 5 switches together
Work 1					
Work 2					

Switch	Description	Default	Description
1	Work 1 Input 4 V Threshold	OFF	When set to ON, input threshold is 4 V; switch #2 should be OFF.
2	Work 1 Input 1.5 V Threshold	ON	When set to ON, input threshold is 1.5 V; switch #1 should be OFF.
3	Work 1 Input Ground Isolation	ON	When set to ON, this references the input to battery negative When set to OFF, Work Input 1 is ground isolated
4	Work 2 Input 4 V Threshold	OFF	When set to ON, input threshold is 4 V; switch #5 should be OFF.
5	Work 2 Input 1.5 V Threshold	ON	When set to ON, input threshold is 1.5 V; switch #4 should be OFF.
6	Work 2 Input Ground Isolation	ON	When set to ON, this references the input to battery negative When set to OFF, Work Input 2 is ground isolated

When utilising a frequency source for work input, including the speedometer, it is crucial to identify the signal type and have the capability to measure its voltage. The following are typical:

- A three-wire sensor is categorised as a ‘Hall effect type’ with power, signal ground, and signal output. This sensor generates a consistent digital square wave signal, featuring a fixed amplitude while varying only in frequency.
- A two-wire sensor is known as a ‘Reluctor type’ which produces a sine wave signal and generates ac voltage. The amplitude and frequency of this signal will vary as the speed increases. At lower speeds, the amplitude can be quite small, typically starting at 20 to 50 mV and reaching 200 to 400 mV at full speed.

Here are the recommended DIP switch settings for the controller:

No.	Wave Form / Vp-p	Settings
1.	Square wave >1.5 Vp-p	Set DIP switch for 1.5 V threshold (default) Connect to Work 1 or 2 input and check if isolated ground is required.
2.	Square wave >5 Vp-p	Set DIP switch for 4 V threshold Connect to Work 1 or 2 input and check if isolated ground is required.
3.	Square wave <1.5 Vp-p	Set DIP switch for 1.5 V threshold (default) Set ground isolation to OFF (default) Use 11621 signal amplifier between signal and Work 1 or 2 input.
4.	Sine wave / 2-wire sensor	Set DIP switch for 1.5 V threshold (default) Set ground isolation to OFF (default) Use 11621 signal amplifier between signal and Work 1 or 2 input.

When dealing with signal frequency inputs below 1.5 Vpp, particularly those in sine wave format, it is recommended to use a signal amplifier isolated filter, part number 11621. The signal amplifier isolated filter features an isolated negative sense input, providing immunity from common ground-related noise.

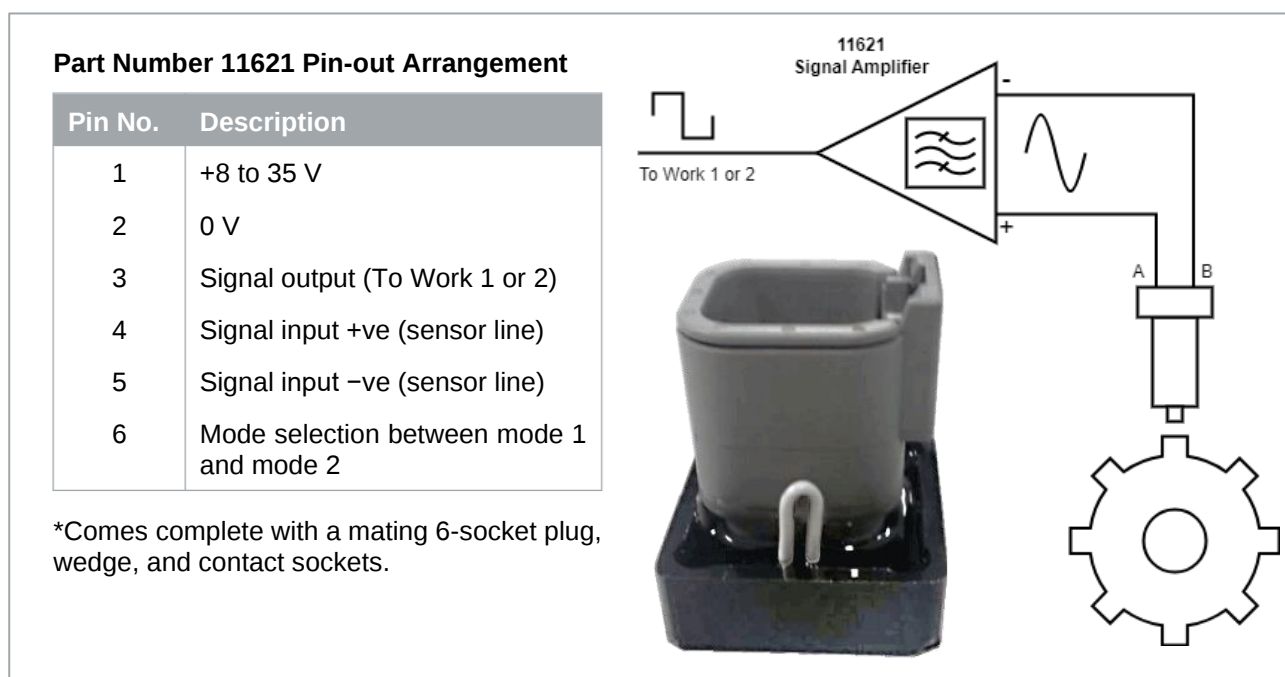


Figure 15 Pin-out arrangement for signal amplifier isolated filter, part number 11621

Ground Referenced Work Input Signals

Sensors or signals that are ground referenced typically have a single wire for the signal, and that wire may be part of a shielded cable to provide better noise immunity for the signal. SmarTrack® requires only a single connection to a ground referenced signal, such as the Work 1 Input +VE wire.

The Work 1 Input ground isolation switch must be set to the ON position (default) to enable the Work 1 input to sense ground referenced signals. This allows the SmarTrack input to measure the signal voltage referenced to the battery negative/ground. The signal peak-to-peak voltage must be above the threshold setting (1.5 V or 4 V) for the signal to be detected.

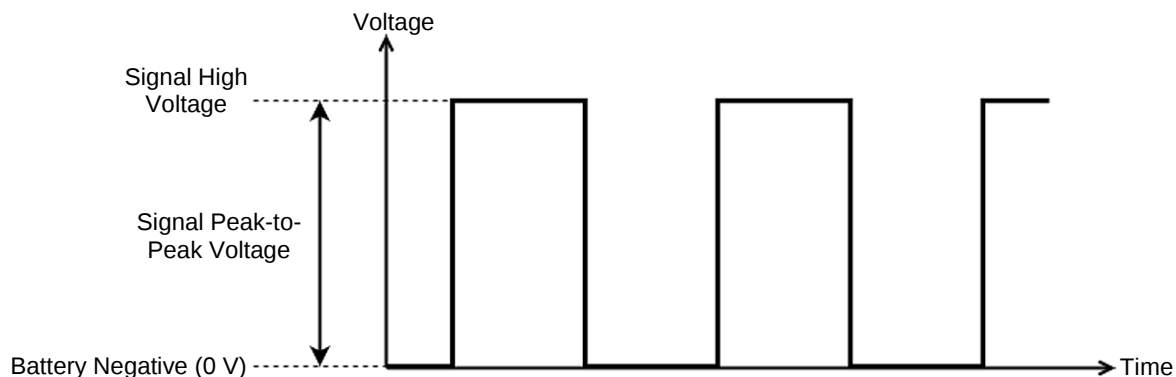


Figure 16 Example—ground referenced signal where the signal voltage rises from the battery negative (ground / 0 V)

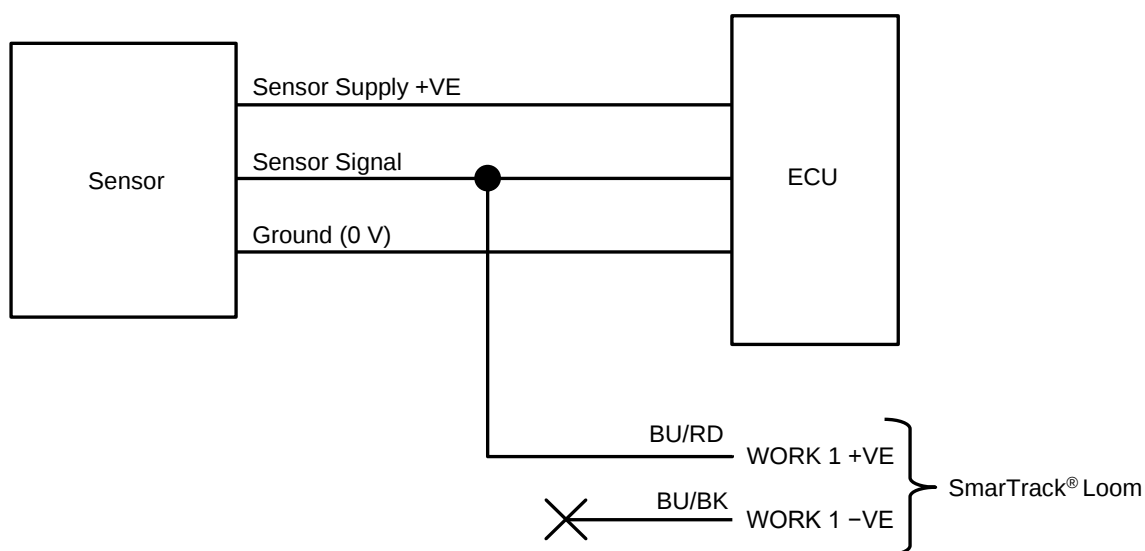


Figure 17 Example—ground referenced sensor connected to SmarTrack Work 1 input

Ground Isolated Work Input Signals

Differential / 2 Wire and fault tolerant signals may not be ground referenced as they reference each other, as such the voltage of the signal can be 'floating' above the battery negative (ground). SmarTrack® requires 2 connections to such signals such as the Work 1 Input +VE plus Work 1 Input -VE.

The Work 1 Input ground isolation switch must be set to the OFF position to enable the Work 1 input to sense ground isolated signals. This allows the SmarTrack input to measure the signal voltage referenced to the opposing signal voltage. The signal peak-to-peak voltage must be above the threshold setting (1.5 V or 4 V) for the signal to be detected.

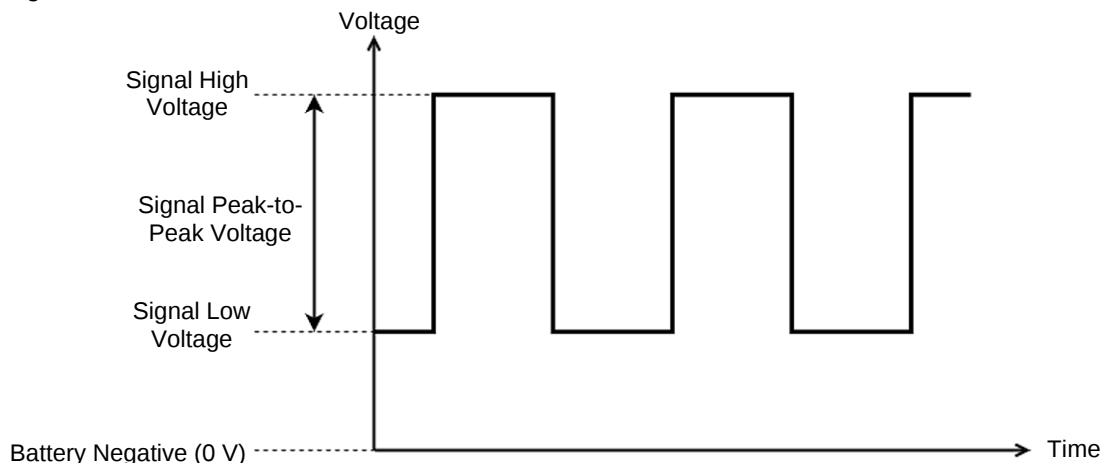


Figure 18 Example—ground isolated signal where the signal sits above the battery negative (ground / 0 V)

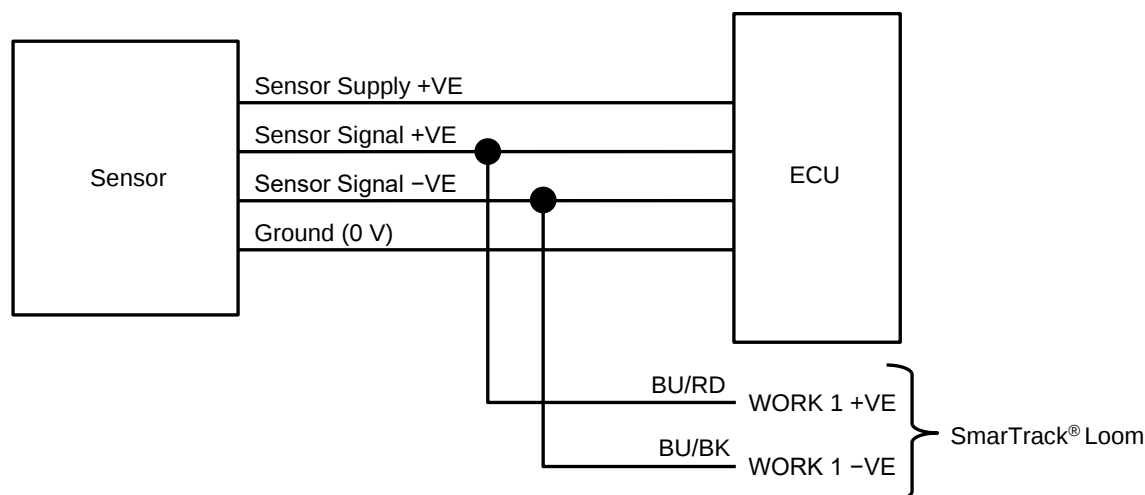


Figure 19 Example—differential sensor connected to SmarTrack Work 1 input

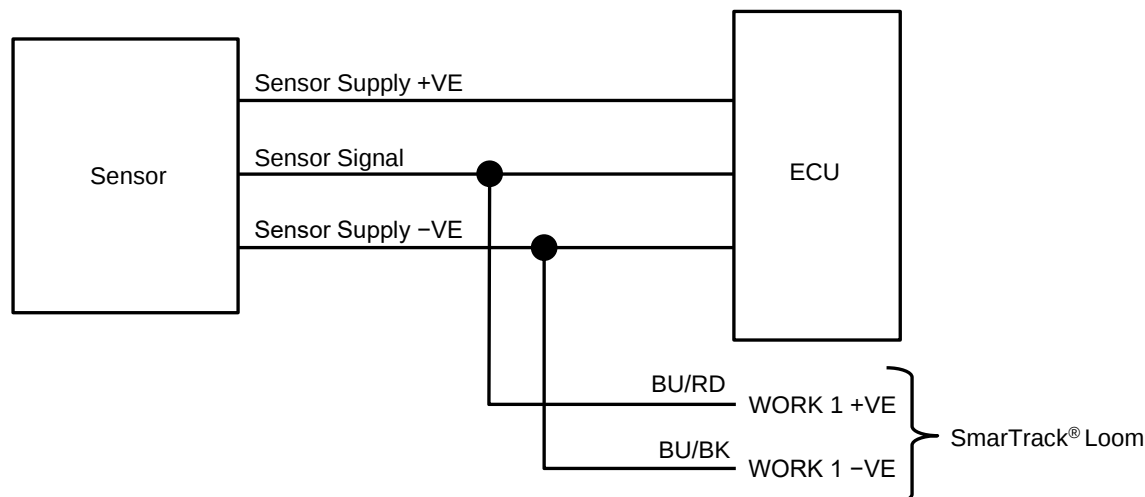


Figure 20 Example—fault tolerant sensor with sensor raised ECU supply ground and connected to SmarTrack Work 1 Input

Signal Peak-to-Peak Voltage

The peak-to-peak voltage of the signal is important, if this is below the threshold setting of the SmarTrack® input then the signal will not be detected. By default, the input threshold of SmarTrack Work 1 and Work 2 inputs are set to 1.5 V (default).

For signals which have a peak-to-peak voltage of 5V or above there is the option to configure SmarTrack for a 4 V threshold. Changing from the default would only be required if the signal has noise or transients present that exceed the 1.5 V threshold causing SmarTrack to false trigger.

Ground isolated signals the peak-to-peak voltage is from the isolated ground or between the differential signals. The signal voltage cannot be measured from the battery negative/ground as this will yield an incorrect value.

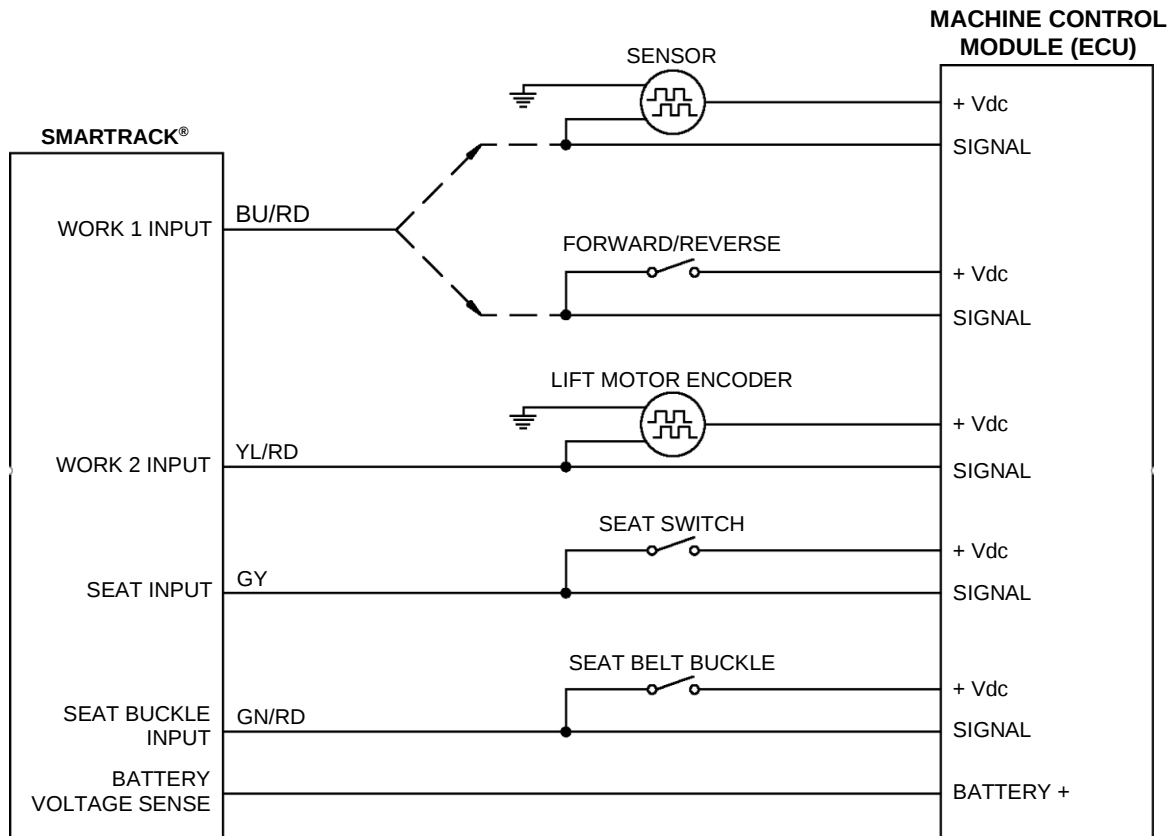


Figure 21 Example of machine connections

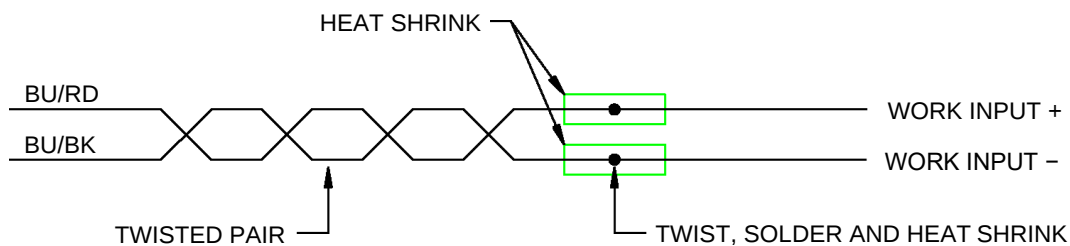


Figure 22 Recommended sensor cable connection

To reduce the chances of electromagnetic interference affecting the input, it is recommended to use twisted pair cable to connect to a frequency or analogue source.

- Joins should be soldered and insulated with heat shrink tubing
- Signal cables should be kept clear of high-energy sources such as motor drive lines etc.

Auxiliary Output

The Auxiliary Output function can be configured through the web portal to enable on specific events, such as:

- Critical Impact
- Excess Idle
- Critical Checklist Questions

The relay has voltage free contacts that can be wired up to interrupt circuits on the machine or activate accessories fitted to the machine.

Specifications

Input Type:	Dry contact, changeover relay.
Maximum Contact Current:	10 A

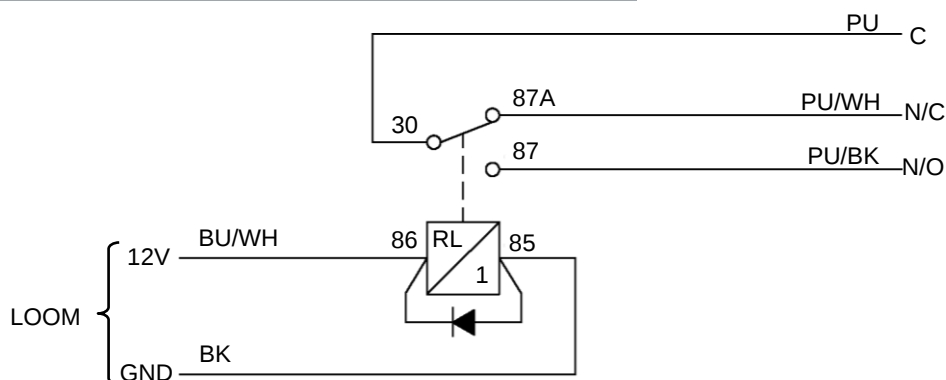


Figure 23 Auxiliary output circuit configuration

⚠ Caution – the Auxiliary Output is not Safety Rated

You (the user) must conduct a risk assessment to determine if your application of the Auxiliary output function may lead to operating the machine that may have an impact on the following:

- the safety of machine operators and other personnel in the vicinity of the machine,
- the performance of the machine,
- the probability of causing damage to the machine and its loads.

Optional I/O Connector

The optional input/output connector provides optional extra inputs and outputs to expand the fleet management system functionality.

	Seat	Seat Buckle
Digital Trigger Threshold	4 V	4 V
Digital Bias	5 mA	-
Absolute Maximum Voltage	60 Vdc	60 Vdc
Analogue Measurement Range	0 to 10 V	-

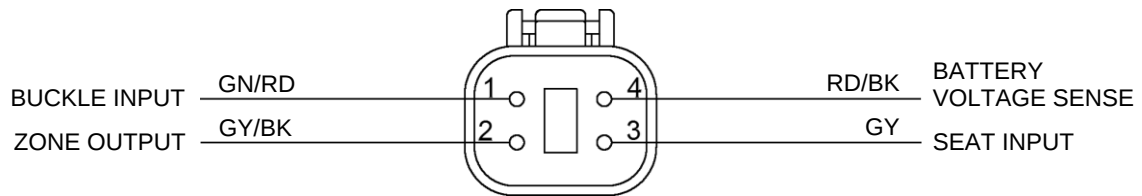


Figure 24 Optional I/O connector pinout (front view)

Buckle Input

This input is used to detect the connection of a seat belt buckle. The input requires a rising positive voltage above four volts to activate.

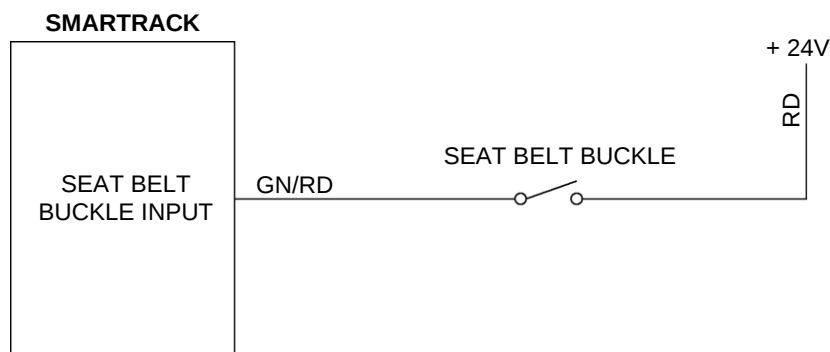


Figure 25 Typical seat belt buckle wiring

Examples of the seat belt buckle connection where the input to the buckle switch is a positive voltage. The buckle switch can be N/O or N/C type.

Battery Voltage Sense

On installations where the machine battery voltage is greater than 48 V, SmarTrack® needs to be powered through a voltage reduction device such as a dc-dc converter. In this configuration, SmarTrack input voltage is constant and lower than the actual battery voltage. If the onboard voltage monitoring is used, the reported voltage will not represent the actual machine battery voltage.

SmarTrack has an external battery voltage monitoring input that allows the monitoring of the actual battery voltage. The battery voltage input is wired directly to the machine battery positive terminal. SmarTrack is configured to use the external input as the battery voltage source.

Note

If an isolated dc-dc converter is used, you must connect the battery negative to the dc-dc output negative. Without this connection, the SmarTrack has no reference to the battery negative and the voltage monitoring will not work.

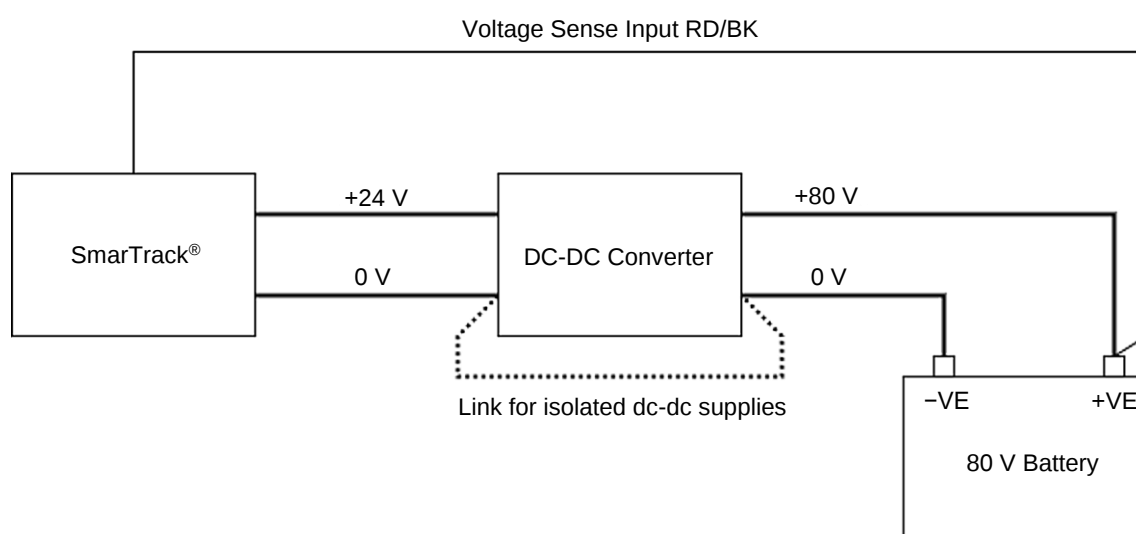


Figure 26 Example—connection of the battery voltage sense input to a machine battery

Seat Input

The seat input is to detect the presence of an operator and provide alerts should the operator vacate from the seat during operation. The seat input can be used to monitor a dead man circuit on machines without a seat to detect operator presence. The input is highly configurable having both digital and analogue modes, with software selectable bias voltage to allow operation with dry contact switches. The analogue mode is suitable for operator presence using variable resistance circuits.

Correct Setting of the Input Bias

Circuit Type	Mode	Pull Up	Pull Down
Active Circuit	Digital	x	x
Dry Contact – Positive Source	Digital	x	✓
Dry Contact – Negative Source	Digital	✓	x
Potentiometer	Analogue	x	x

Input Specifications

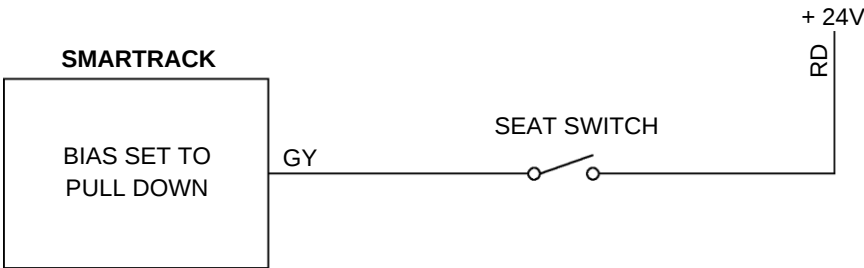


Figure 27 Dry contact seat switch with positive source

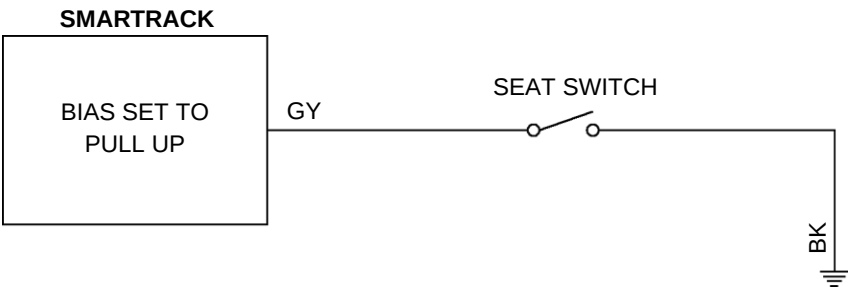


Figure 28 Dry contact seat switch with negative source

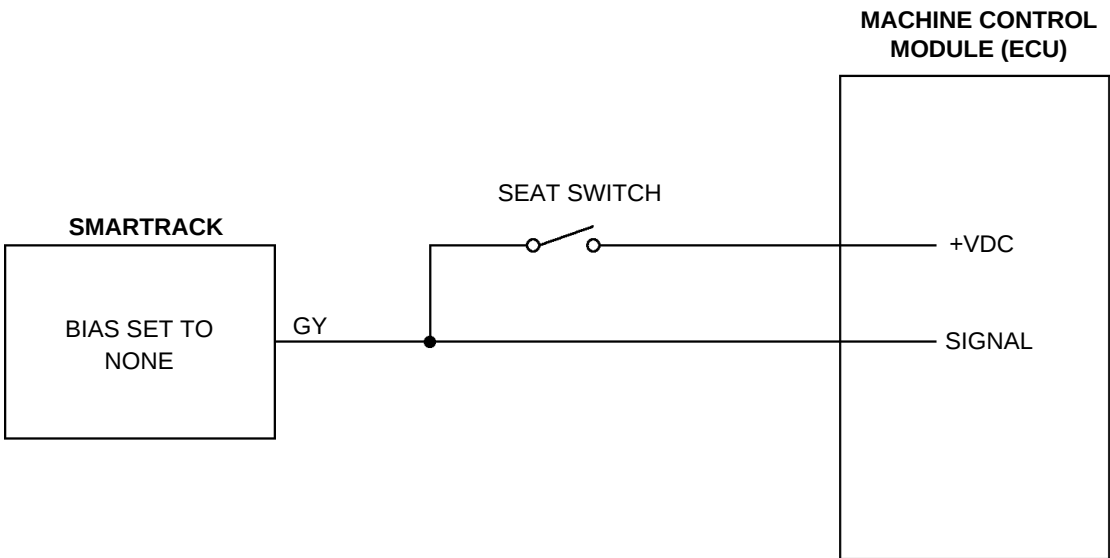


Figure 29 Seat switch connection with ECU source

Weight Sensor Input

SmarTrack® weight uses the input from a pressure sensor (optional extra) which is fitted to a test port on the hydraulic line feeding the lift cylinder. The pressure from the load is converted into a weight reading which can be recorded on the SmarTrack system.

The SmarTrack system should work with any pressure sensor which outputs a voltage within a range of 0 to 10 Vdc.

Note

RCT recommends using the SmarTrack Global weight kit, part number 15917.

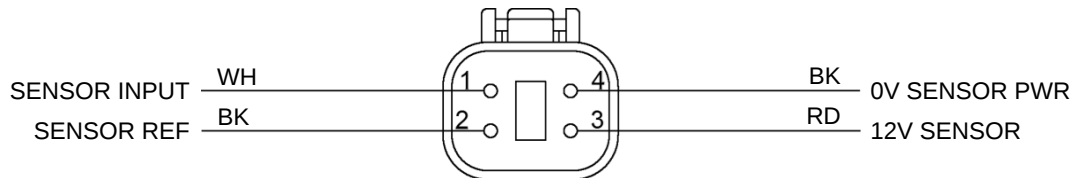


Figure 30 Weight sensor connector pinout (front view)

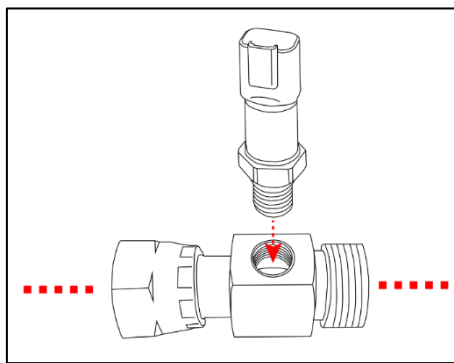


Figure 31 Using a test port adapter to fit the sensor into the lift line

Input Specifications

Input Type:	Analogue only; digital turns off the feature
Analogue Measurement Range:	0 to 10 V
Absolute Maximum Voltage:	60 Vdc

Recommended Pressure Sensor

Model:	Sensor, Pressure 0 to 250 Bar, part number 11504
Connector:	Deutsch ST04-4P
Maximum Pressure:	250 Bar
Port:	1/8 NPT
Output:	0 to 5 V
Cable:	Connection cable, sensor to loom 2 m, part number 15915

Zone Output

When the machine is outside and GPS is available, the zone output can be used to influence the speed of the machine through defined zone regions drawn on a map through the web portal. The zone output is either high (12 V) or low (0 V) and requires the output to be connected to another device able to adjust the machine speed or an input on the machine that can limit the speed.

Output Specifications

Output Type:	Digital only
Output Voltage:	12 V
Maximum Output Current:	200 mA

Commissioning Guide

Installation and Commissioning Wizard

The installation and commissioning wizard has been designed to test all functions of SmarTrack® before the machine is delivered to site for the operators to use. This procedure assists with the installation and commissioning wizard.

A subscription is needed to activate the fleet controller. If there is no subscription on completing the wizard, you will see a 'subscription expired' page—you can sign-on with only the commissioning pin. When a subscription is established, all site settings and information will be downloaded to the fleet controller and operator(s) are now able to sign-on. (See *Subscriptions* on page 52 for more information.)

Legend

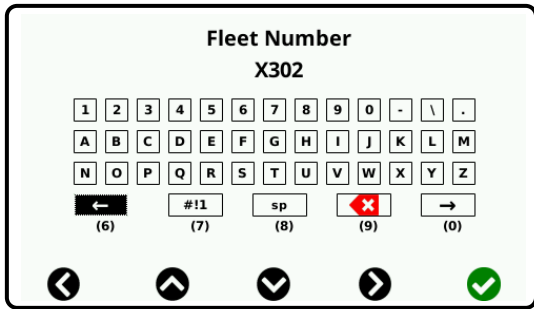
	Critical information that MUST be read and understood prior to commencement or damage could occur.
	Visual inspection required as part of the step.
	Wait out the specified time for action to occur before proceeding to the next step.

Menu Navigation Keys

Symbol	Description
	Up Scroll up the page/settings
	Down Move the cursor down. Scroll down the page/settings
	Go back to previous menu
	Continue to next menu
	Accept settings
	Cancel settings change and go back
	Settings Modify settings for a feature

Onscreen Keyboard

Symbol	Description
	Navigation key Up Use to select characters
	Navigation key Down Use to select characters
	Navigation key Left Use to select characters
	Navigation key Right Use to select characters
	Action Use to select a letter, digit, symbol, space, backspace, previous page, or next page
	Back to Previous Menu
	Toggle Keyboard Characters Lower case, upper case and number/symbols
	Space Key
	Backspace To delete characters
	Finish Keyboard Entry and proceed

No.	Description	Operator Screen
1.	Example of the onscreen keyboard used to enter the fleet number.	

I&C Process Steps

Step	Task
1	Language Selection
2	Communications Check and Updates
3	Machine Type and Ignition Wiring Method
4	Output Testing
5	Input Testing
6	Load Capacity
7	GNSS Testing
8	Card Reader and Impact Testing
9	Test Review
10	Fleet Number Entry/Edit
11	Installation and Commissioning Completion

Input Testing

Status	Description
Status: 0	Red Status 0 The input is inactive (OFF).
Status: 1	Green Status 1 The input is active (ON).
Status: 1 (164Hz)	Frequency When the input mode is set to frequency, the frequency on the input will be displayed in hertz. The status colour will be red or green based on settings around frequency threshold and mode.
Status: 1 (1.4V)	Analogue voltage When the input mode is set to analogue, the value of the input voltage on the input will be displayed in volts. The maximum voltage read is 10 V and any voltage above this will be displayed as 10 V. The status colour will be red or green based on settings around voltage threshold and mode.
Tested: ✖	Not Tested Indicates the input status has not changed. The system will not function as expected if a change in input state cannot be detected.
Tested: ✔	Tested The system has successfully detected an input status change.
	On This indicates that a function is active. Pressing the function key will toggle the state.
	Off This indicates that a function is inactive. Pressing the function key will toggle the state.

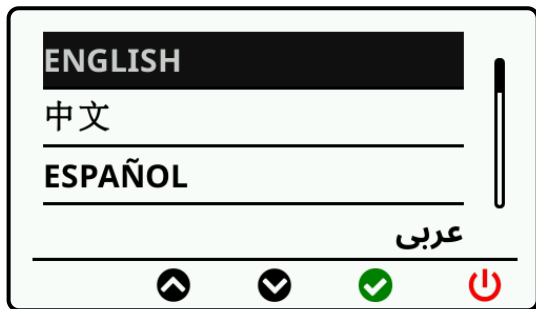
Each input has a 'type' selection, a 'mode' selection, and some have a 'bias' selection.

Type	Threshold	Description
Digital Voltage	1.5 V or 4 V	The system will trigger on voltage signal based on the threshold level.
Analogue Voltage	Adjustable 0.5 - 9.5 V	The system will trigger on voltages within the analogue range based on the threshold setting.
Frequency	Adjustable 2 - 9999 Hz, 1.5 or 4 V _{pp} min	The system will trigger on frequency signals based on the threshold setting. Signals must meet the minimum peak-to-peak voltage level.

Mode	Description
Active High	The input status is active (Green) when the input is ABOVE the threshold setting.
Active Low	The input status is active (Green) when the input is BELOW the threshold setting.

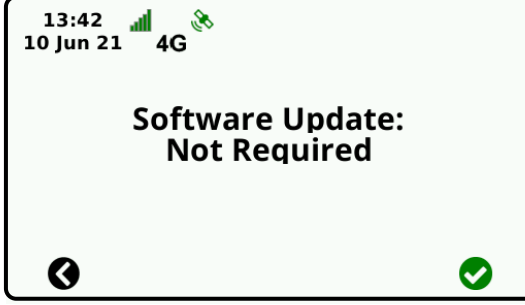
Bias	Description
Off	Normal input function.
PullUp	For use with dry contacts switching to 0 V (battery negative), refer to Figure 28.
PullDown	For use with dry contacts switching to positive voltage (>4 V), refer to Figure 27.

Language Selection

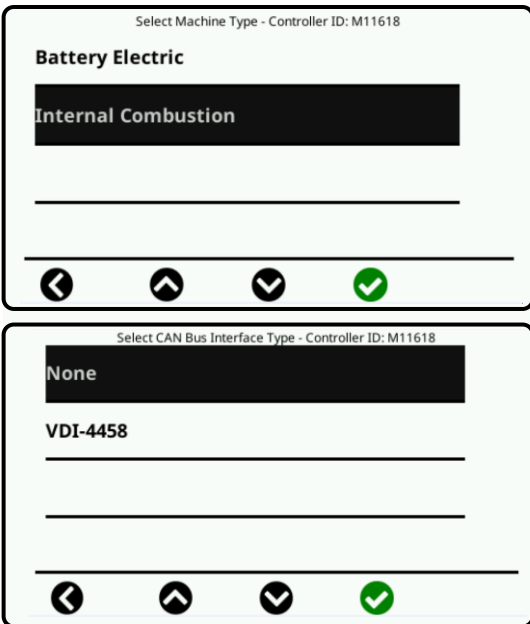
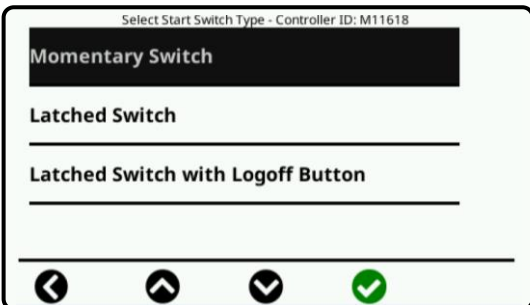
1.	Select the language you wish to use while completing the commissioning wizard. Note This language selection is only for the commissioning wizard. The operator language is controlled from the web portal.	
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Communications Check and Updates

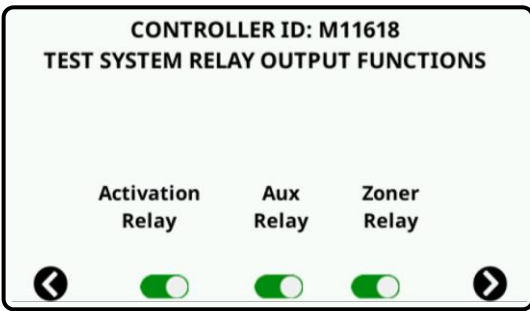
The wizard will check the network connection between the machine and the SmarTrack® server. The settings here are not to be changed unless you have been instructed otherwise. The following are the communication check and updates for the 4G version. (For Wi-Fi version, see *Appendix, 'Communications Check for Wi-Fi Versions'* on page 56.)

2. Communications Settings Screen Note  Do NOT change these settings unless you have been instructed otherwise. Press the  button to go to the next screen.	 Communications Settings Serial: 09553 Ver: 5.3.2.77 ST Modem: EG25 ICCID: 8944500602199988998 RAT: AUTO APN: nextm2m SERVER: SMARTRACK_AU   
3. The system will check for the latest software updates and automatically download the new software, if available.  Wait for the download progress bar to finish.	 13:41 10 Jun 21 4G Software Update: Please Wait   13:41 10 Jun 21 4G Software Update: Downloading Please Wait   34%
On successful download, press the  button to reboot and apply the new software. Redo steps 1 to 3. If there is no new update, the screen will display 'Software Update: Not Required'. Press the  button to continue to the next process. Note If this screen does not change after two minutes, reboot the system by first disconnecting and then reconnecting the battery power. When complete, restart the process from step 1.	 13:42 10 Jun 21 4G Software Update: Download Successful Press key to reboot   13:42 10 Jun 21 4G Software Update: Not Required  

Machine Type and Ignition Wiring Method

4.	Select the machine type from the list and continue. Note The VDI 4458 / CAN bus interface is reserved for special applications. If you select this, follow the installation guide, 'M1298.pdf – SmarTrack® Global VDI 4458'.	
5.	Activation Type Select the appropriate activation type to suit the machine configuration. ■ Momentary Switch Momentary switch activation with on-screen logoff button . <i>Example: Activate from OEM momentary ignition button, horn, or seat switch.</i> ■ Latched Switch Key switch activation (standard). <i>Example: OEM ignition switch.</i> ■ Latched Switch with Logoff Button Key switch activation with on-screen logoff button . <i>Example: For Turret trucks (VNA), this is a special mode that is not commonly used and requires specific wiring for operation. In this mode, the machine stays powered on using the key switch, and the on-screen log off key is used for operator logoff. This mode prevents the machine from performing continuous calibrations during the ignition cycle.</i>	

Output Testing

6.	System Relay Testing This will allow the testing of the system relay circuits. Both the activation and auxiliary relay circuits can be tested. Note The testing of the activation relay will apply power to the machine. Ensure the machine is safe to operate and you are prepared.	
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Input Testing

7. Work Input Testing

! Important

At least one work input **MUST** be configured to ensure SmarTrack® can function correctly and provide minimum data recording for the customer. Always wire and configure at least one work input.

It is critical for SmarTrack to correctly detect the presence of a work input. The work input data is used to generate utilisation reports, so incorrect configuration will result in incorrect reporting.

The input settings must be correctly configured to match the input type. Once set, the machine should be operated, and the status checked against the operation. When the status is green, the machine should be working; and when red, the machine should be idle/inactive.

If the status is green when idle and red when working, the mode should be changed—Active High to Active Low or Active Low to Active High.

The tested status will show a green tick when the input has transitioned between working and idle; a red cross indicates SmarTrack has not detected a change to the input which indicates an incorrect setting, incompatible input type, or wiring issue.

Other Inputs

Inputs other than the work inputs need to be tested if they have been connected, and they should be tested for correct operation.

The input should be configured to match the input type and the input operated to verify correct function.

Input Testing

Input3: WORK1 Status: 0
Tested: ✖

Type: DIGITAL VOLTAGE
Mode: ACTIVE HIGH

⏪
🔴
⚙️
⏩

Input Testing

Input3: WORK1 Status: 1
Tested: ✔

Type: DIGITAL VOLTAGE
Mode: ACTIVE HIGH

⏪
🟢
⚙️
⏩

Load Capacity

8. Truck Capacity Setting for the Weight Feature

If the weight feature is not in use, then the setting of this value is not required (leave as default). This setting determines the thresholds for load detection and weight violations.

The value entered should be the load capacity of the machine as indicated on the load weight plate at a load centre typical for use in the machine's application.

Set Truck Load Capacity

Capacity

0 1 0 0 0 kg

⏪
⏴
✔
⏵
✔

GNSS Testing

9. Check if the GPS (GNSS) is getting satellite reception. If it is unable to get a fix on any satellite, check the antenna connection.

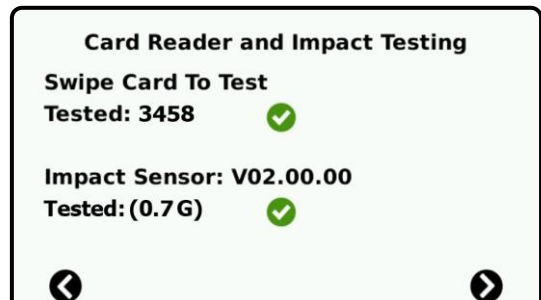
Press the ⏴ button continue.

GNSS Testing

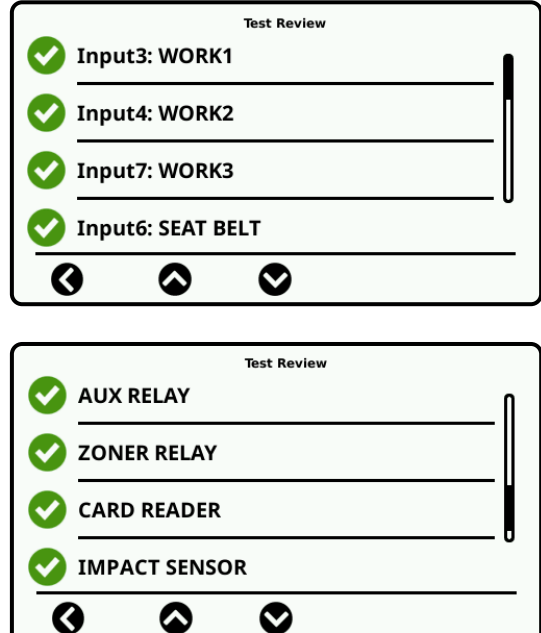
Satellites Seen: 22
Satellites Used: 10
Fix: 3D
HDOP: 0.97 (Excellent)
Test: ✔

⏪
⏩

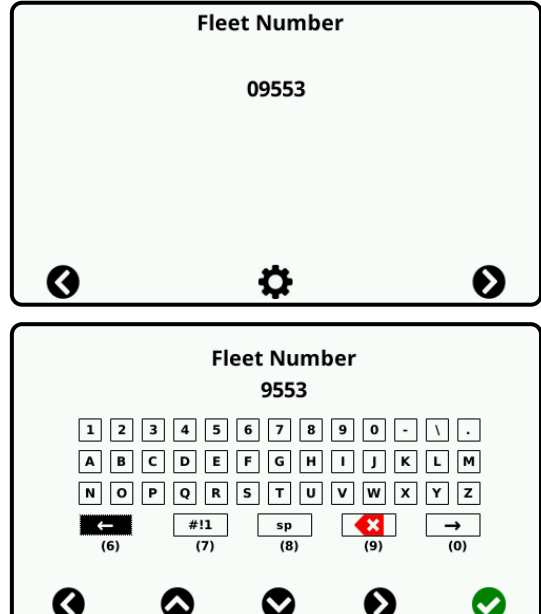
Testing Access Control and Impact Sensor

10.	Hold an access card to the display to test the swipe card function. The code from the card will be displayed. The impact sensor testing checks connectivity and functionality. Make sure the sensor is installed on the rigid structure of the vehicle. Test the sensor by hitting or tapping the body with wood and it should register impact readings in Gs.	
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Test Review

11.	Make sure all tests are ticked  unless they are disabled or deliberately untested. If an option is disabled, it will be shown as a red circle with a line through it . Press the  button to scroll down the list. Press the  button to exit to the next page.	
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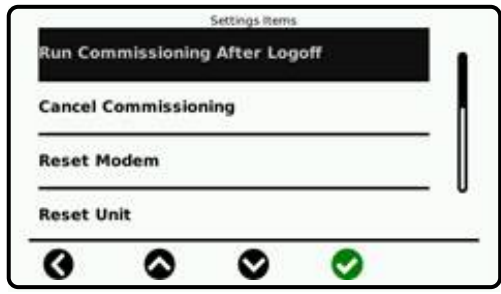
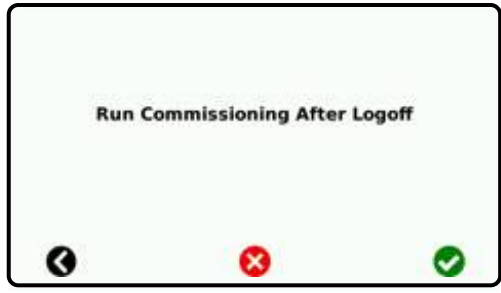
Fleet Number Entry

12.	By default, the fleet number is the same as the controller serial number. ■ Press the  button to accept the default fleet number and continue to completion, or ■ Press the  button to change the default fleet number. Edit the fleet number using the onscreen keyboard. (Use the navigation buttons to move the cursor to the character or key you want and press the  button to enter the character.) When done, press the (0) or  key. Press the  button to continue.	
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Installation and Commissioning Completion

13.	When the wizard has completed its run, the following will happen: - The SmarTrack® server will be contacted—a blue light will appear on the display. - The SmarTrack server will be updated with the values that were gathered during commissioning—the blue light will turn into a flashing white light.	13:54 10 Jun 21 4G Please Wait While Contacting Server 13:54 10 Jun 21 4G Server Connected Please Wait 13:54 10 Jun 21 4G Updating Server Please Wait 13:54 10 Jun 21 4G Server Updated Process Complete ✓															
14.	The message 'IDENTIFY OPERATOR' will appear on the display while the white light is flashing—this reading and writing activity to and from the server (downloads operators list, checklist, and configurations set by your administrator on the web portal.  Wait for the white light to stop flashing.	13:59 10 Jun 21 4G IDENTIFY OPERATOR															
15.	Once the flashing white light is off (and changes to a flashing yellow light), you can log into the unit, enter the operator PIN, or use the swipe card. Once logged in, the flashing yellow light changes to a flashing green light. Note During operation, the blue to white light will intermittently come on to indicate a Tx/Rx activity to/from the server; for example, a report being made on the SmarTrack server (impact, bypass, SMS, etc.) Congratulations! The installation is now completed.	<table border="1"> <thead> <tr> <th colspan="3">Display's LED color code</th></tr> </thead> <tbody> <tr> <td>Connecting to Server</td><td></td><td>Steady Blue</td></tr> <tr> <td>Transmitting/Receiving</td><td></td><td>Flashing white</td></tr> <tr> <td>Waiting for Operator Login</td><td></td><td>Flashing Yellow</td></tr> <tr> <td>In Operation</td><td></td><td>Flashing Green</td></tr> </tbody> </table>	Display's LED color code			Connecting to Server		Steady Blue	Transmitting/Receiving		Flashing white	Waiting for Operator Login		Flashing Yellow	In Operation		Flashing Green
Display's LED color code																	
Connecting to Server		Steady Blue															
Transmitting/Receiving		Flashing white															
Waiting for Operator Login		Flashing Yellow															
In Operation		Flashing Green															

If you need to run the wizard again, proceed with the following steps.

1.	Sign on with the technician or commissioning card/pin and use the menu cycle key  if required so you can access the settings menu  .	
2.	Select Actions and press the  .	
3.	Select Run Commissioning After Logoff and press the  .	
4.	Press the  button to confirm the action.	
5.	Log off the SmarTrack® system or simply power-cycle the system and the commissioning wizard will run automatically.	

Pedestrian Alert

This input is a digital voltage input to optionally connect to the AusProTec™ Pedestrian Alert System (PAS), such as part number 16947. By connecting this input there are additional visual alerts and alarms when a pedestrian has been detected by the system. In addition to these operator alerts, email alerts and reporting are available via the SmarTrack web portal.

Installation

For installation of the pedestrian alert camera system, please follow the instructions included in the kit.

If the wiring loom does not have a 'PAS Trigger' wire, the connection of the pedestrian alert camera to SmarTrack requires the installation of a pre-terminated (APN 17210) wire into the SmarTrack controller 34-way connector (Pin 2). Please follow the instructions provided with the 17210 wire carefully to ensure the wire is correctly installed into the connector.

Commissioning

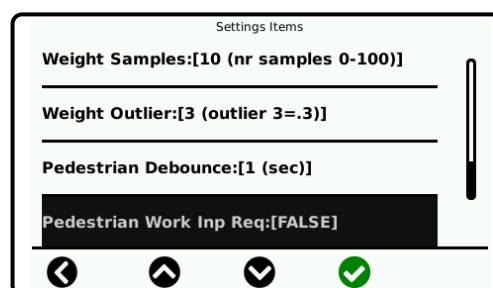
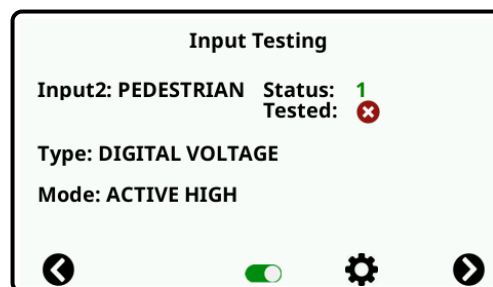
The installation and commissioning wizard must be run to enable and configure the pedestrian alert system on SmarTrack. The pedestrian alert input requires enabling and the settings checked to ensure it is set for digital voltage and active high mode.

Note

The PAS default is active high when it detects a person, but this can be configured via the PAS settings to be active low when it detects a person.

Testing of the input requires the pedestrian alert camera to be functional, when the camera system detects a person the input status will change to 1 (from 0).

The pedestrian alert input functional status can be checked through the settings menu (technician level access required). This can be performed if the SmarTrack installation has been previously commissioned, and you want to check the current pedestrian settings prior to running the commissioning wizard again.



Web Portal Setup

Enabling the pedestrian alert input will not result in the functioning alerts on the operator display unless the feature is first enabled through the web portal for the category the machine.

On the ribbon bar, select **ADMINISTRATION → Pedestrian Alert**. The current categories for the site will be displayed along with the status of the pedestrian alert for each of those categories.

Enabled Status

- ✗—The feature is disabled
- ✓—The feature is enabled

Simultaneous Work Input Required

- ✗—Pedestrian alerts will be triggered whenever the camera system detects a person.
- ✓—Pedestrian alerts will be triggered by the camera system only when the machine is working, that is, an active work input

By selecting  you can enable, disable, and edit the settings for the feature of that category.

Alert Delay

This delay (in seconds) will delay the triggering of the alert on the SmarTrack system. This can be used to limit the alerts to long encounters with pedestrians and not alert or report to brief encounters.

PEDESTRIAN ALERT CONFIGURATION			
	Category	Enabled	Simultaneous work input required
	MACHINE	✗	✗
	REACH TRUCK	✓	✓
	DIESEL/LPG FORKLIFT TRUCK	✗	✗

MODIFY PEDESTRIAN ALERT CONFIGURATION

PEDESTRIAN ALERT CONFIGURATION : REACH TRUCK

☒ Alert Delay (seconds)

1

☒ Simultaneous work input required

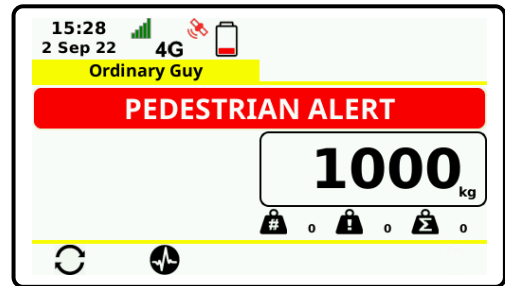


Operator Alert

When configured and enabled, the pedestrian alert on SmarTrack will provide additional alerts to the operator. The display will show the alert and the alarm will beep until the camera system no longer detects the hazard.

Note

The PAS display alert has the highest priority over any other system message including impact alert.



When the alert is triggered, the SmarTrack system will report the event. These events can be used to send an email alert and provide reporting on events based on operators and machines.

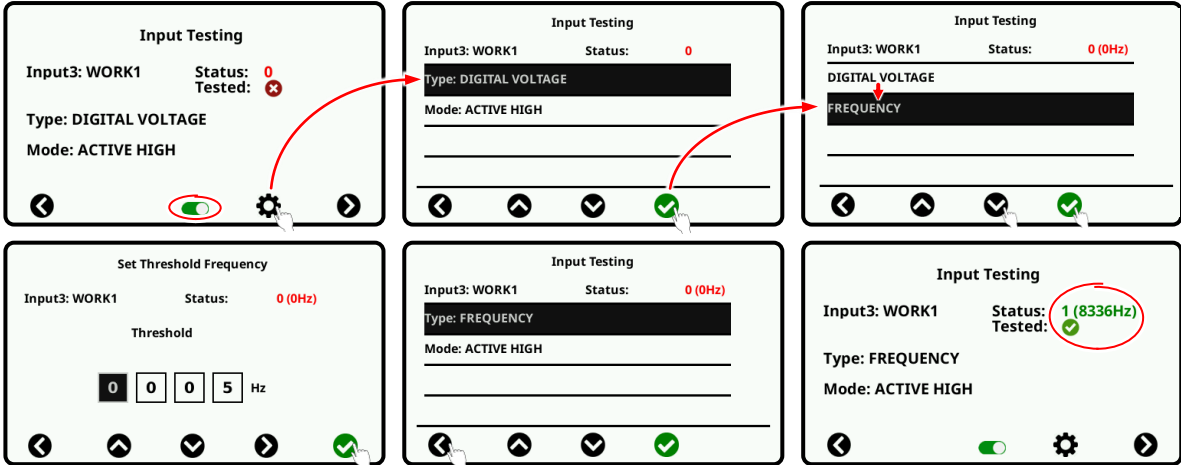
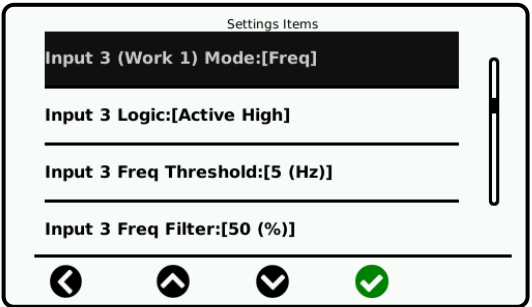
Speed Testing and Calibration

Symbol	Description
	Speedometer Displays the machine speed
	Speed Violation Alert Machine has exceeded the set overspeed limit

Speed calibration and the visibility of the on-screen speedometer can only be completed if the input has been configured correctly and the speed feature is enabled. In either case, the speedometer will not appear if the configuration is wrong.

How to Configure Work1 (Input3) Correctly

Configure **Work1** to **Frequency** input. This can be done in three ways.

1.	Run the wizard again. Enable and configure the input (during Input3: WORK1 input testing, select the settings icon (⚙️), select Type, and change DIGITAL VOLTAGE to FREQUENCY then back twice to WORK1 Input Testing, Default Threshold is 5 Hz). This is the preferred method as it correctly saves your changes to the web portal. 	
2.	Contact customer service to enable Work1 as Frequency input via the web portal (Frequency, Active High).	
3.	Check the input configuration via the display by going through Settings>Inputs>Input3 (Work1) Mode and check or change to 'Frequency'. This setting can be overridden by the web portal setting upon resync. We recommend that you perform step 1 again.	

How to Configure the Speed Feature Correctly on the Web Portal

1. Enable the **Speed** feature on the web portal via the **Administration page—Speed** and select the category where the machine belongs to, for example, **FN9553** belongs to the **DIESEL/LPG FORKLIFT** category of the machine and will utilise the speed feature.

SPEED CONFIGURATION

Category	Speed
DIESEL/LPG FORKLIFT	✗
MACHINE	✓
ORDER PICKER	✗
PALLET STACKER	✗

MODIFY CURRENT SPEED SETTINGS

SPEED CONFIGURATION: **DIESEL/LPG FORKLIFT**

☒ Speed

Alert Delay (seconds): 2

Speed Limit: 24 kph

SAVE

SPEED CONFIGURATION

Category	Speed
DIESEL/LPG FORKLIFT	✓
MACHINE	✓
ORDER PICKER	✗
PALLET STACKER	✗

MACHINE MANAGEMENT

Actions	Fleet Number	Serial#	Machine Serial#	Machine Hours	Category
	FN-6673	6673	Machine 6673	3.127	PALLET STACKER
	FN-9202	9202	Machine 9202	44.186	ORDER PICKER
	FN-9553	9553	Machine 9553	87.447	DIESEL/LPG FORKLIFT

Alert Delay (seconds): This is the amount of time before a speed violation alert is triggered.

Speed Limit: This is the maximum speed set before a speed violation will be triggered—used in conjunction with the alert delay to prevent a false alert.

2. Alternatively, the speed feature can be enabled via Fleet Controller>Feature Enable>Speed=Off/On. This method is temporary as any changes made at the website may override this feature and turn off the speedometer.

Features

Seat = On

Seat Belt = On

Speed = On

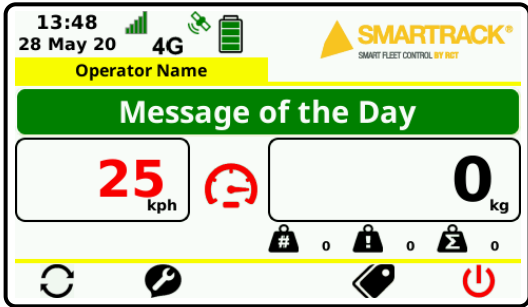
Weight = On

3. Once everything is configured on the web portal, it is now ready to send the configuration to the fleet controller.
Turn ignition to off (allow the screen to go black) and then on. The fleet controller will check for task and will download the updated configuration.
Wait for the flashing white (slightly pink) LED to extinguish—this indicates that the download has completed.

Display's LED color code

Connecting to Server		Steady Blue
Transmitting/ Receiving		Flashing white

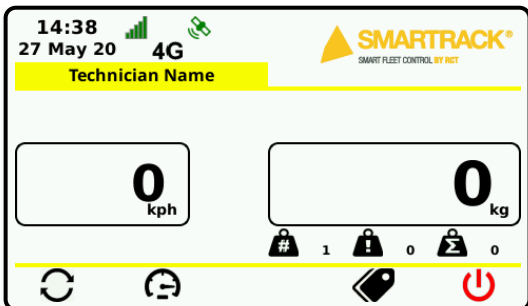
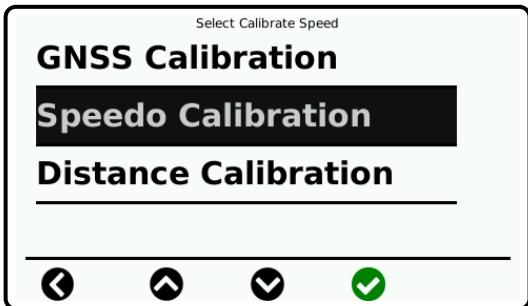
Speed Violation Warning

1.	Speed Violation Warning on the Operator Screen	
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Speed Calibration

Symbol	Description
	Calibration Speed Used to calibrate speed

You can access the speed calibration menu by pressing the button below the calibration speed  icon.

1.	Speed Calibration This is accessed from the main screen. If not visible, the menu cycle key can be used to cycle through the available menus.	
2.	Calibration Menu Options Speed calibration can be completed by using one of three methods.	

GNSS Calibration

Speed can be calibrated using the global navigation satellite system (GNSS is often referred to as GPS). This feature will only work with a good GNSS signal—this is shown by a green GPS status  icon.

GNSS calibration is the best option when a clear and open outdoor area is available.

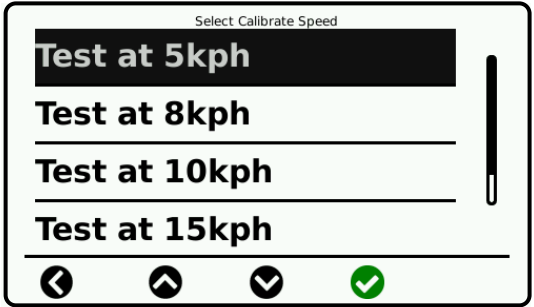
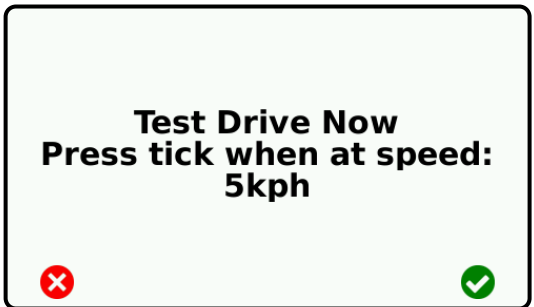
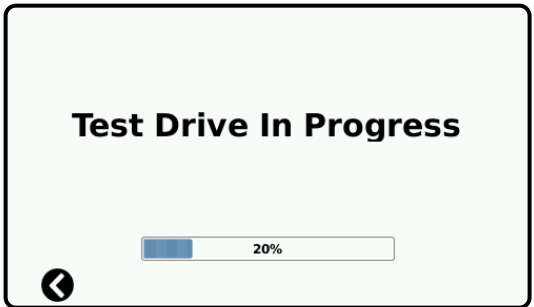
GNSS speed calibration needs to be performed outdoors in an area with clear visibility to the sky. Proximity to buildings can affect the accuracy of the GPS during calibration.

1.	Begin Calibration Drive the machine at the highest possible safe speed and hold this during the calibration process. Press the  button to commence the calibration.	Test Drive Now Press tick when ready 
2.	Calibration in Progress Maintain a consistent speed during the calibration process.	Test Drive In Progress  30%
3.	Calibration Complete	Calibration Complete 

Speedometer (Speedo) Calibration

Speedometer calibration is the best option when the machine has an existing speedometer and there is sufficient space to perform the calibration.

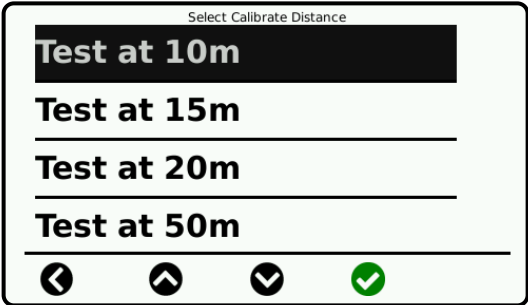
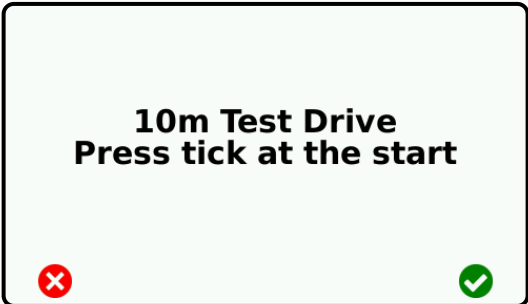
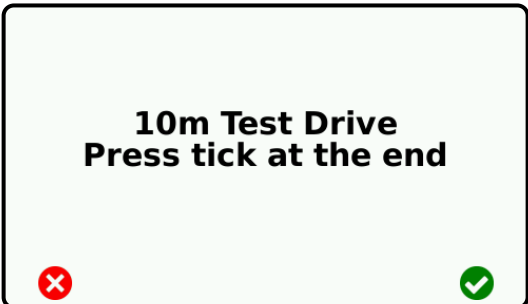
Calibration is performed by driving at a constant speed as indicated by the speedometer on the machine. To perform this calibration, you will require enough distance to maintain the test speed before and during the calibration period (approximate five seconds)

1.	Calibration Speed Options Select the speed at which you want to test the machine.	
2.	Begin Calibration Operate the machine to the selected speed in the previous page and press the  button when ready.	
3.	Calibration in Progress Maintain this speed until the calibration is completed.	
4.	Calibration Complete	

Distance Calibration

Distance calibration is the best option when there is limited space and calibration must be performed inside a building.

Speed can be calibrated by driving a known distance. The operator is required to press a key on the display at the start and end of this distance, typically indicated by placing markers on the ground. This method of calibration can be performed at low speeds over short distances ideal for calibration inside buildings.

1.	Calibration Distance Options Select the distance over which the calibration will be performed. This must be the same distance marked on the floor to indicate the start and stop points.	
2.	Begin Calibration Operate the machine and get it moving at a steady pace; then press the  button when it crosses the start point.	
3.	End Calibration Keep the machine moving at a steady pace and press the  button again when it crosses the stop point.	
4.	Calibration Complete	

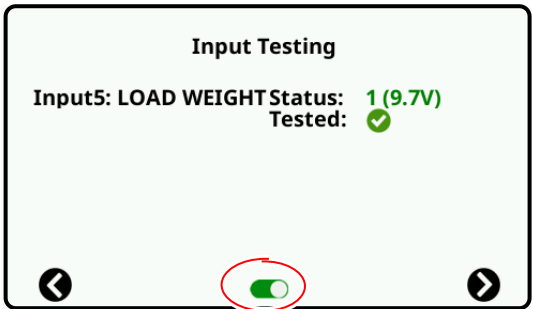
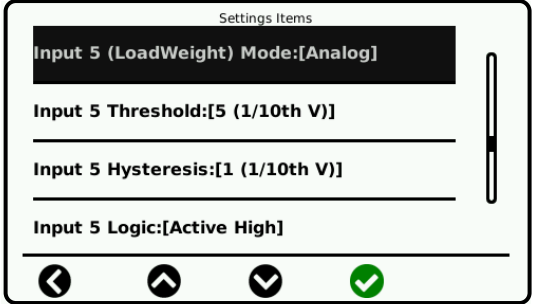
Weight Testing and Calibration

The weight scales are a standard feature of SmarTrack® Global; however, there is a requirement to install the additional pressure sensor to the hydraulic lift line.

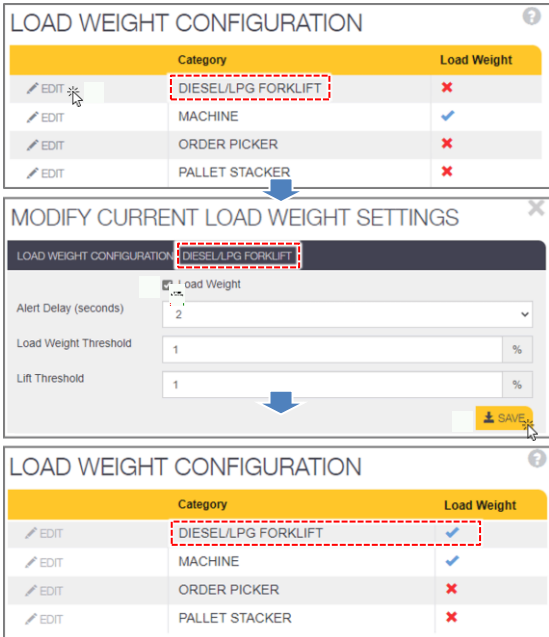
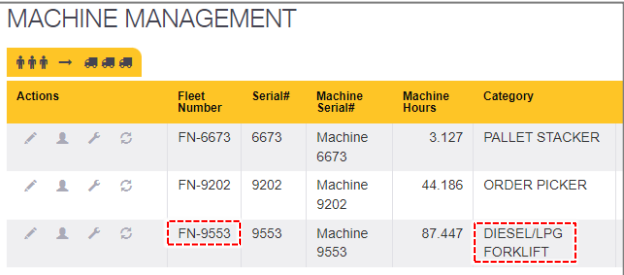
Weight calibration and the visibility of the on-screen load display can only be completed if the input has been configured correctly and the load weight is enabled. In either case, the load display will not appear if the configuration is wrong.

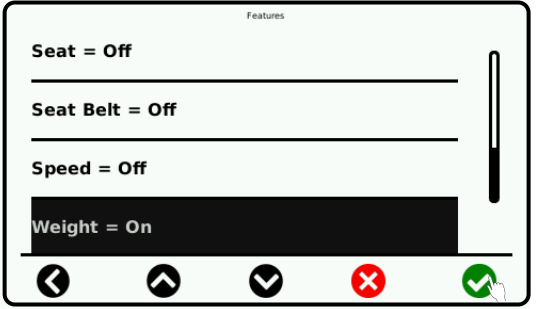
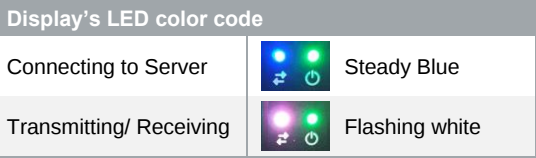
How to Configure Load Weight (Input5) Correctly

Enable **Load Weight** input. This can be done in three ways.

1.	Run the wizard again and enable (button 3) the input. This is the preferred method as it correctly saves your changes to the web portal.	
2.	Contact customer service to enable Load Weight input via the web portal (Analogue, Active High).	
3.	Check the input configuration via the display by going through Settings>Inputs>Input5 (Load Weight) Mode and check or change to 'Analog'. This setting can be overridden by the web portal setting upon resync. We recommend that you perform step 1 again.	

How to Configure the Load Weight Feature Correctly on the Web Portal

1.	Enable the Load Weight feature on the web portal via the Administration page—Load Weight and select the category where the machine belongs to, for example, FN9553 belongs to the DIESEL/LPG FORKLIFT category of the machine and will utilise the load weight feature.  	
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2.	Alternatively, the load weight feature can be enabled via Fleet Controller>Feature Enable>Weight=Off/On. This method is temporary as any changes made at the website may override this feature and turn the load display off.	
3.	Once everything is configured on the web portal, it is now ready to send the configuration to the fleet controller. Turn ignition to off (allow the screen to go black) and then on. The fleet controller will check for task and will download the updated configuration. Wait for the flashing white (slightly pink) LED to extinguish—this indicates that the download has completed.	

Alert Delay

A time delay, in seconds, applies to both the load and load weight violation trip points—this is the amount of time the load or load weight violation must be present before a trigger occurs. This is used to filter out load bounce and mast stage transitions from triggering events such as load weight violation. The default time delay is two seconds.

Load Weight Threshold

SmarTrack uses the load weight violation trigger to send alerts and provide operator warnings when a load weight violation (overload) is detected.

The load weight threshold is selected as a percentage of the machine capacity (set through the installation wizard) to determine when the alert is triggered. The default setting is one percent; for example, for a forklift with a 2500 kg capacity, the violation would trigger at 2525 kg and the alert released at 2475 kg.

This value should be set and used in conjunction with the trigger delay to prevent false alerts.

■ Weight Violation Timeline

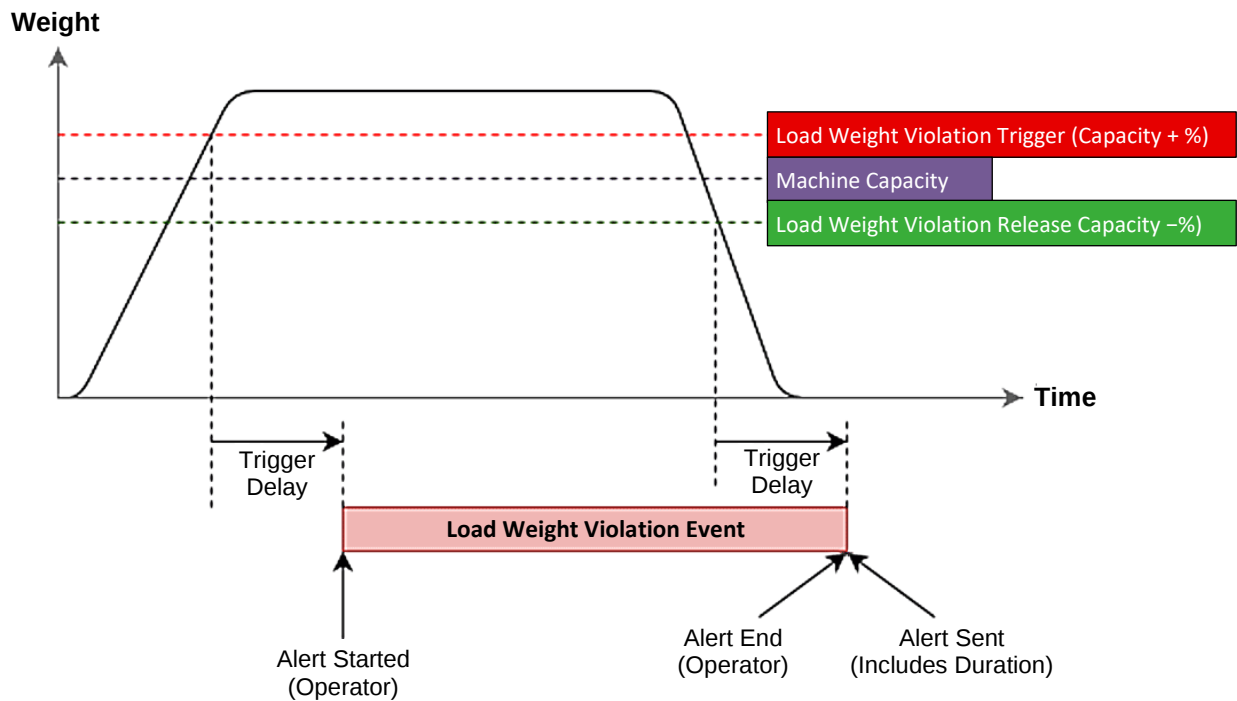


Figure 32 Load weight violation – timeline graph

Lift Threshold

The lift threshold is the minimum load weight required for SmarTrack® to register a load. SmarTrack uses this trigger point to determine if a load is present on the machine to record utilisation when carrying a load. This value also determines the trigger point for the operation of the load sum function.

The threshold is a percentage of the forklift capacity and defaults to one percent; for example, for a forklift with a 2500 kg capacity, the minimum load weight to register that there is a load present (load count) would be 25 kg. The weight needs to remain above that value for the trigger delay period to become valid.

Load Count Function Timeline

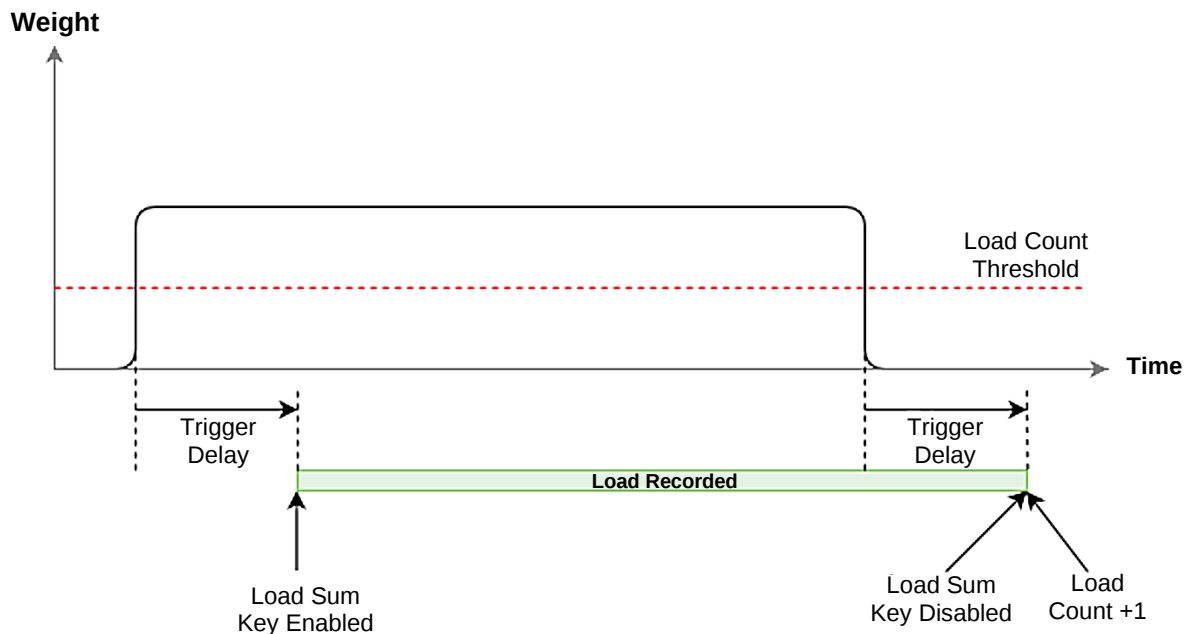


Figure 33 Load count function timeline graph

Calibration

The weight scale must be calibrated before it can be used. The calibration procedure involves the lifting of a known weight of between 25 to 50 percent of the capacity of the machine. The calibration can only be performed when signed in as a technician or through the commissioning code (555555). Ordinary operators and supervisors are not permitted to perform the calibration.

Procedure

A user with administration access must enable the weight feature through the web portal.

1. Select **Administration** from the ribbon bar and then select **Load Weight**.
2. Locate the category of machine you wish to edit and click the **Edit** button. Then, select **Load Weight** and **Save**.
3. Sign on the machine using a technician login or commissioning code.
If the weight function screen is not visible, use the menu select key to cycle through the menus .
4. Select the calibration key to start the calibration procedure .

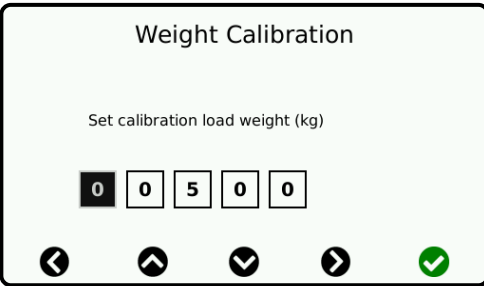
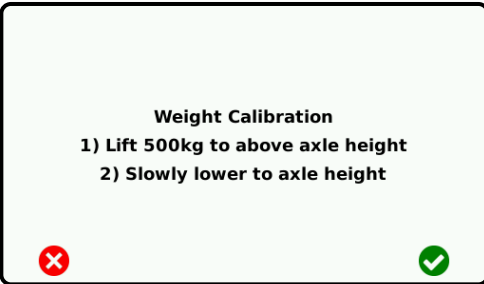
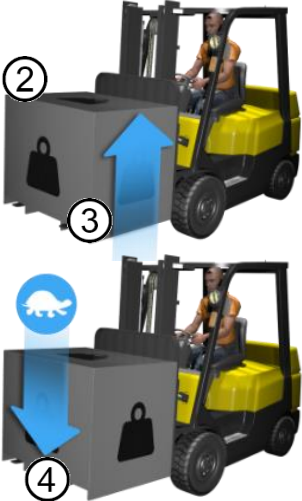
Before commencing, check the fork is on a level surface and that all calibration is performed with the mast vertical. To achieve good results, use a test weight of at least 25 percent of the rated machine capacity.

Set the Zero Reference

1.	Lift the carriage/tines above axle height by at least 100 mm. At this point, there should be no load on the machine.		
2.	Slowly lower the carriage to axle height with gentle movement of the lift lever. This is done to bleed off excess pressure in the hydraulic system from the lift motion.	Weight Calibration 1) Lift unloaded above axle height 2) Slowly lower to axle height  	
3.	Press the green tick  to allow the calibration to complete. During this time, the machine should be stationary, and the lifting controls must not be used.	Weight Calibration Unloaded Calibration in progress  41%	

During calibration you can return to the previous screen (cancel) by pressing the back key .

Set the Weight Calibration Reference

1.	Using the navigation keys on the display, select the weight of the test load being used for the calibration. When the correct weight has been dialled in, press the green tick ✓ to proceed.		
2.	Use the forklift to pick up the test weight. You can use the back key ⬅ to return to the previous screen at this point.		
3.	Lift the carriage/tines above axle height by at least 100 mm.		
4.	Slowly lower the carriage to axle height with a gentle movement of the lift lever. This is performed to bleed off excess pressure in the hydraulic system from the lift motion.		
5.	Press the green tick ✓ to allow the calibration to complete. During this time, the machine should be stationary, and the lifting controls must not be used. Once the calibration is completed, press the green tick ✓ to return to the main menu.		

During calibration you can return to the previous screen (cancel) by pressing the back key .

1. If there are no issues with the calibration, then the display will show the process as complete. Press the green tick  to continue.
2. If an error has been detected, you will be notified, and the calibration will need to be repeated.
3. If there are ongoing failures of calibration, please contact SmarTrack® Support.

Testing

RCT recommends the weight system be checked at this point by lifting other known loads and checking for repeatability.

Weight Feature Use

The weight of a load will be displayed live on the SmarTrack display. This weight is affected by forces acting on the hydraulic system when the machine is in use and is therefore at its best accuracy when the machine is stationary and the weight measurement process is followed (see below).

Weight Display

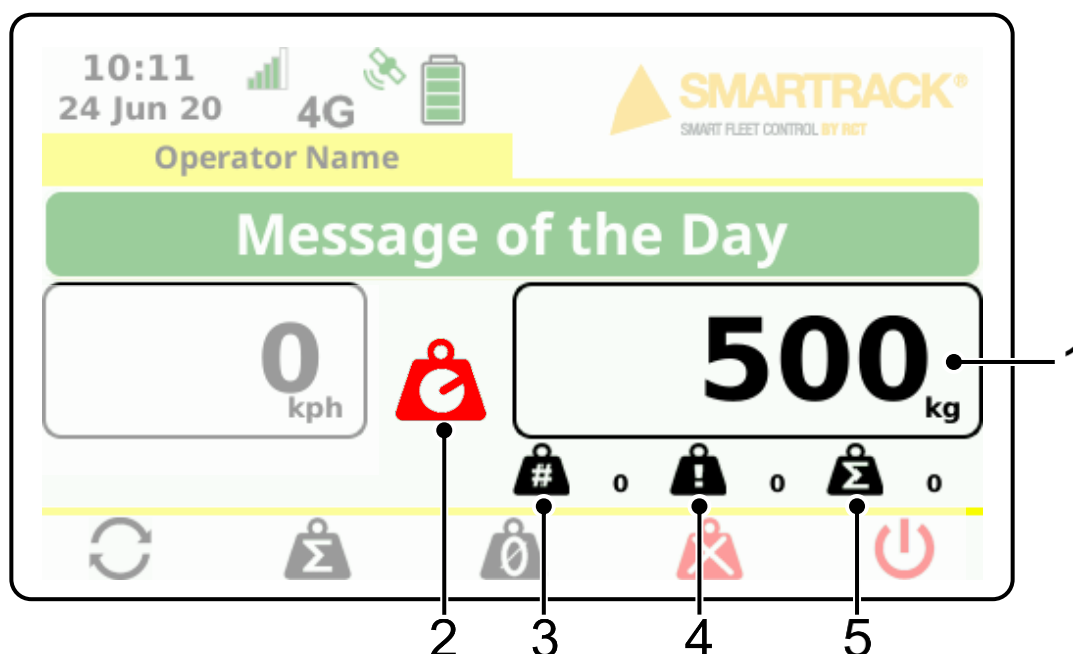


Figure 34 SmarTrack display showing load weight

■ Onscreen Icons

No.	Symbol	Description
1		Current Weight This displays the measured weight of the load in kilograms or pounds (site configuration). The display will show negative values when the weight present is below the zero tare point. It is important to ensure the system is at zero before a load is weighed.
2		Load Weight Violation Warning Displayed when the load weight violation threshold has been exceeded. This event is reported.
3		Lift Counter This is incremented by one when a load greater than the lift threshold is loaded and then unloaded.
4		Load Weight Violation Event Counter This is the total number of load weight violations recorded during the trip.
5		Load Sum Total This is the total of the weight summed by using the sum key to tally multiple loads.

■ Menu Function Keys

The SmarTrack® weight feature has several functions related to weight. These include a load sum, count clear, zero tare and load count. Load weight violation alerts are also available and are configured through the web portal.

All function keys are located on the bottom of the display and accessed by pressing the corresponding number key.



Figure 35 SmarTrack menu functions

Symbol	Description
	Load Sum Key This key is only visible/active when the load weight (displayed) is above the load threshold value This is used to tally the total weight of multiple loads, which is ideal to track the total weight moved or loaded. Follow the weighing procedure above to weigh the load. Press the sum key to add the displayed load weight to the Load Sum total When a Load Sum is added, the key is unavailable until the current load is removed and another load is picked up. This is designed to prevent accidental addition of a load weight multiple times.
	Tare/Zero This is used to tare/zero the scales to provide a better indication of the goods weight excluding the container or pallet holding the goods. Pressing this key will set the scale value to zero regardless of the weight indicated.
	Clear Totals This key will clear the sum total and reset lift count to zero. Use this key to reset the tally when the target weight has been reached.
	Calibrate Only available for technicians

Correct Measurement Process

To weigh a load correctly the machine and load must be still, on a level surface and the mast in a vertical position. Excess pressure must be bled from the lift system by slowly lowering the load prior to a weight measurement being made.

To take a weight measurement, RCT recommends following this procedure:

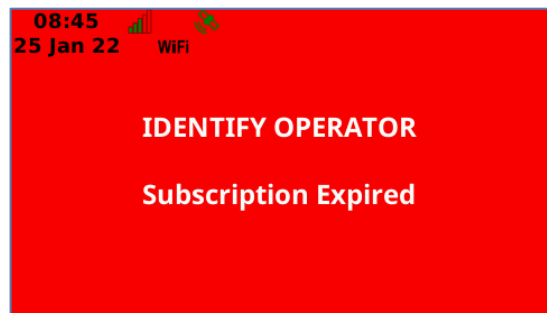
1.	Lift the load to 100 mm above the axle height. This is not critical but recommended to provide repeatable results.	
2.	Lower the load slowly and gently about 100 mm to axle height. Avoid fast or abrupt use of the lift control, as the objective is to remove any excess pressure from the lift system. The weight system will steady within a few seconds and the weight reading will represent the load on the machine.	
3.	Press the Load Sum key to add the measured load to the Sum Total .	

Subscriptions

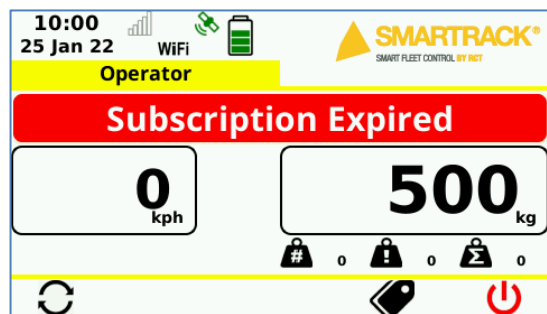
Active subscriptions are required to take full advantage of SmarTrack® on your machines.

When a subscription expires, operators can still sign on to operate; however, functionality is very limited with no operational data recorded and no data received from the SmarTrack server cloud.

The **Identify Operator** screen background turns red to indicate expiry.



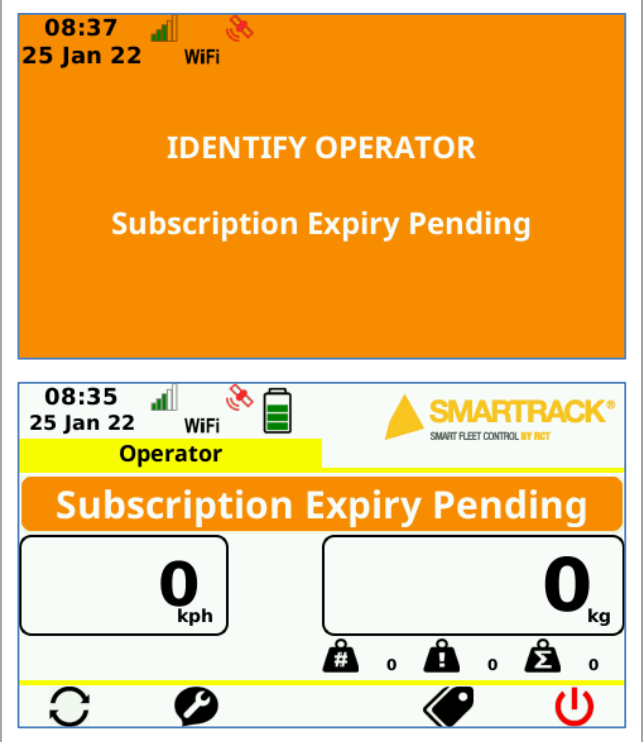
The **Subscription** status can be checked in the **Diagnostics** menu  under **Subscription** with supervisor level access.



Subscription Status

Status	Description
1. Active	The subscription has not expired and full SmarTrack functionality is available.
2. Expired	There is no active subscription, or the subscription is expired. SmarTrack functionality is limited.
3. Overridden	SmarTrack support has temporarily allowed full functionality after subscription expiry under special circumstances.

Description	Display Screen
1. Post-paid subscription has no expiry date.	
2. Prepaid has an expiry date.	

Description	Display Screen
3. If the Identify Operator screen background is amber, the subscription will expire within seven days. Operators can still sign on and use the machine with full functionality. Operational data is recorded and sent to the SmarTrack server cloud.	

For continued operation of SmarTrack® with full functionality and data recording, always ensure your subscriptions are renewed before the expiry date.

To renew or purchase subscriptions, contact SmarTrack sales.

Troubleshooting

Beep Codes and Flash Codes

The SmarTrack® Global Fleet Control system status is indicated by audible and visual signals. The following table shows the codes used to indicate the various states.

Display Interface Buzzer Codes

Beep Description	Duration	Name	Meaning
Two Short	2 x 200 ms	Sign in	Valid PIN/card entered – the system is logged in and vehicle can be started.
One Long	1 s	Sign out	The system is logged out and ignition turned off. Need to re-start vehicle for PIN/card to be entered.
One Long	1 s	Unknown Operator	An invalid PIN/card has been entered – the system will enter armed status
One Short	1 x 300 ms	Checklist Error	Answered question incorrectly
Three Short	3 x 500 ms every 10 s	Checklist Error	Answered critical question incorrectly. Beeping until ignition off.
Three Short	3 x 100 ms	SMS Message	SMS from server displayed
Three Short	3 x 100 ms	Checklist	Traction engaged during post start question
Three Short	3 x 100 ms	Post-start Checklist Incomplete	Post start questions are still being answered after timeout (60 s)
One Long	1 x 1000 ms every 10s	OOS Active on Sign-on	Operator signs screen (waiting for signon) and the unit is out-of-service
One Long	1 x 1000 ms	OOS Active on Sign-on	Operator signs on and the unit is out-of-service
One Long	1 x 1000 ms	Expired License	Operator signs on and their license has expired
Three Short	3 x 1000 ms every 15 s	Idle Time Warning	Machine has entered excess idle period
One Long	1 x 1000 ms every 30 s	Out-of-Service Question	Operator input required to select OOS reason.
One Long	1 x 2000 ms	Out-of-Service Question	OOS Dialog being shown due to CO impact
One Long	1 x 1000 ms every 10 s	Out-of-Service Bypass Question	Operator input required for OOS - Bypass question. Emergency use only.
One Long	1 x 1000 ms every 10 s	Checklist	Critical Failure in vehicle from Checklist questions answered. Beeping until ignition off.
One Long	1 x 1000 ms	Machine Bypass	Machine Bypass engaged.
One Long	1 x 1000 ms	Seat Belt	Seat belt has not been buckled while the machine gains traction. Once per minute
One Long	1 x 1000 ms	Seat Detection	Operator is not sitting on the seat when the machine has traction. Once per minute.
One Long	1 x 1000 ms	Speed Check	Speed exceeded. Once per minute.
One Long	1 x 1000 ms	Weight Check	Weight exceeded. Once per minute.
One Long	1 x 5000 ms	Low Battery Voltage	Vbatt is below the CRITLOW setting
One Short	1 x 500 ms	Card Read	Swipe card read valid
One Long	1 x 700 ms	Leaving Fast Zone	Geofence, moving from fast to slow zone
Two Short	2 x 100 ms	Entering Fast Zone	Geofencing, moving from slow to fast zone
One Short	1 x 300 ms	Checklist Failed	Checklist Failed

Fleet Controller LED Sequences

There is a circular shape LED at the bottom right of the display device.

Colour	Flash Rate	When Used
Blue	No flash	Attempting to connect to the server.
Yellow	500 ms on / 500 ms off	During Driver Sign on / PIN / Checklist entry
Green	100 ms on / 300 ms off	Operational state – IGN on, signed on and operating as normal.
Red	500 ms on / 500 ms off	When the unit is powering up and not ready to operate.
Red	3 x short flashes with a 5 s interval	In OFF-Idle power state - the unit is inactive and IGN is OFF.
White	100 ms on / 100 ms off	Connected to server, data being exchanged.
Red	No flash	Driver License expired, checklist fail or checklist not required.
Magenta	No flash	Software is booting.

Technical Specifications

To request a copy of any of the documents listed below, please email support@rct-global.com and specify which document(s) you require.

- TS0083 – SmarTrack® Global RFID Display
- TS0094 – 4.3-Inch HID Reader Display
- TS0121 – SmarTrack® Global Fleet Controller (16423, 16424)

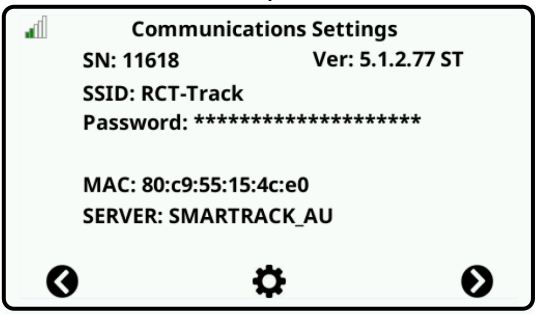
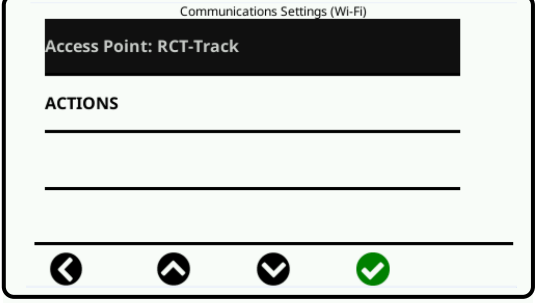
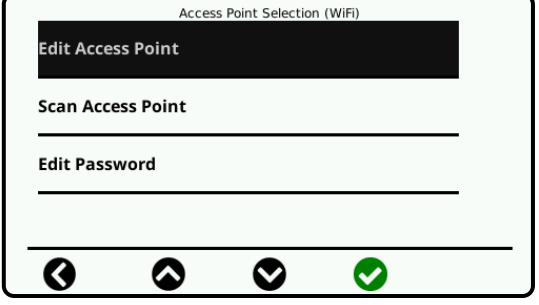
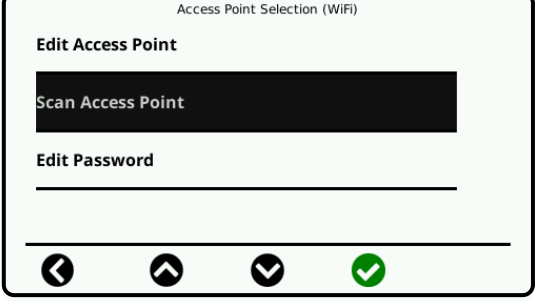
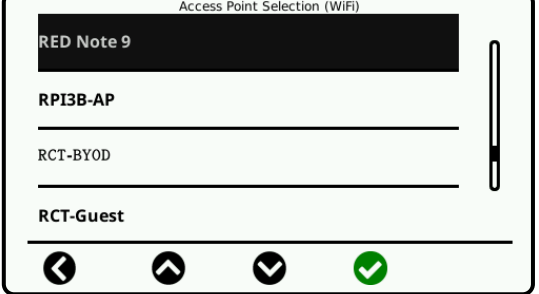
Spare Parts

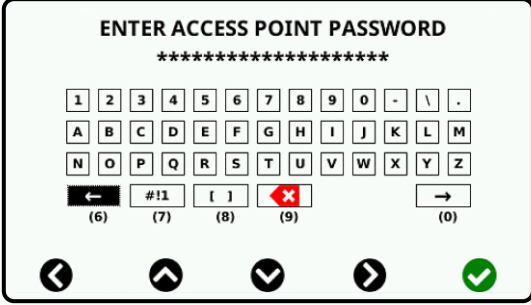
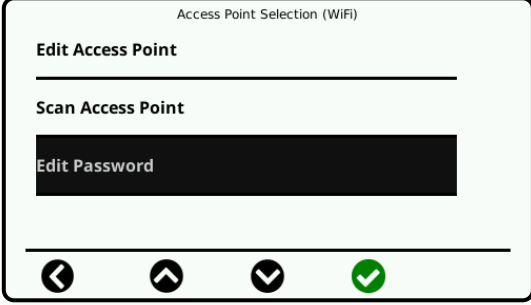
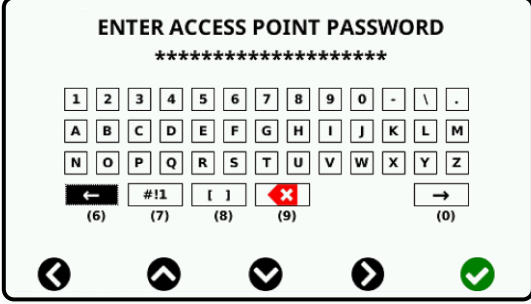
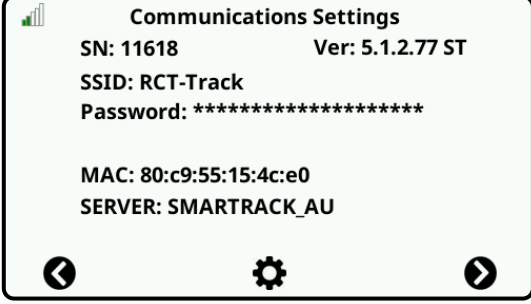
Refer to the SmarTrack Global Components Guide for a comprehensive list of all parts available. A link to download the guide can be found towards the bottom of the page below:

<https://rct-global.com/fleet-management/fleet-management-industrial/>

Appendix

Communications Check for Wi-Fi Versions

1. Communications Screen To connect to your Wi-Fi, you must change the SSID and password to your network credentials. Press the  button to edit the communications settings.	 The screen displays the following information: - SN: 11618 - Ver: 5.1.2.77 ST - SSID: RCT-Track - Password: ***** - MAC: 80:c9:55:15:4c:e0 - SERVER: SMARTRACK_AU Navigation icons: back, settings (gear), forward.
2. Setting the Access Point Press the  button to enter the Access Point (AP) setting.	 The screen shows the title "Communications Settings (Wi-Fi)" and the text "Access Point: RCT-Track". Below this is a section labeled "ACTIONS" with a list of options. The bottom navigation bar includes back, up, down, and a green checkmark icon.
3. If you know the SSID, select Edit Access Point and press the  button. Continue to step 6.	 The screen shows the title "Access Point Selection (WiFi)" and the text "Edit Access Point". Below this are input fields for "Scan Access Point" and "Edit Password". The bottom navigation bar includes back, up, down, and a green checkmark icon.
4. If you do not know the SSID, you can connect to another access point. Press the  button to scroll down to select Scan Access Point and press the  button.	 The screen shows the title "Access Point Selection (WiFi)" and the text "Edit Access Point". Below this are input fields for "Scan Access Point" and "Edit Password". The bottom navigation bar includes back, up, down, and a green checkmark icon.
5. Press the  or  buttons to scroll up or down the list to select the SSID you want. Press the  button to select your choice of access point. Continue to step 7.	 The screen shows the title "Access Point Selection (WiFi)" and the text "RED Note 9". Below this are input fields for "RPI3B-AP", "RCT-BYOD", and "RCT-Guest". The bottom navigation bar includes back, up, down, and a green checkmark icon.

6.	Enter the SSID using the onscreen keyboard. (Use the navigation buttons to move the cursor to the character or key you want and press the  button to enter the character.) When done, press the (0) or  key.	
7.	Entering the Password Go to the Access Point Selection screen. Press the  button to scroll down to select Edit Password and press the .	
8.	Enter the password using the onscreen keyboard. (Use the navigation buttons to move the cursor to the character or key you want and press the  button to enter the character.) When done, press the (0) or  key.	
9.	After entering the SSID and password, you will be returned to the Communications Settings screen. Press the  button. The system will check for the latest update. (Refer to step 3 of 'Communications Check and Updates', on page 31.)	

Requesting Support

To request support from RCT, send an email to support@rct-global.com containing the following information:

1. **Contact details:** Name and contact details of the person requesting support and/or the nominated person for RCT to communicate with when resolving the issue.
2. **Customer and site name:** The name of the company and site where the equipment is located.
3. **RCT system or product:** For example, Teleremote, MIC, speed limiter etc.
4. **Fleet and/or machine details:** The machine make, model, serial number, fleet number and any other relevant information.
5. **Priority:** Indicate a priority and the impact of the issue being experienced. For example, machine down, losing operational data, creating a safety issue, etc.
6. **Description:** Provide a full description of the issue being experienced. Supporting diagrams and drawings are welcome. Attachments are limited to 10 MB.

The support@rct-global.com e-mail address is linked to RCT's support ticketing system. Upon receipt of your email, a support ticket will be automatically generated, and a unique support number will be allocated to your request. You will receive an automatic reply confirming receipt of your email that will also contain your unique support ticket number.

Support tickets are triaged by RCT within two hours of receipt during normal working hours.

Glossary

Term	Description	Details
(I&C)	Installation & Commissioning Wizard	A tool used to configure and test the system after it has been installed
OEM	Original Equipment Manufacturer	Original Equipment Manufacturer
Impact sensor	impact sensor	Is a device which indicates whether a physical shock or impact has occurred. Also known as shock Sensor, shock detector and impact monitor
FMS	Fleet Management System	System for managing a fleet
Wi-Fi	Wi-Fi - wireless networking	Wireless data communications
SmarTrack® Global	SmarTrack® Global	New fleet management product range from RCT
Cellular	Cellular network	Also known as Mobile network, this can include 2g, 3g and 4g networks. As well as M2M, LTE-M and NB-IoT.
Cloud	Secure on demand data storage	Secure on demand data storage
Telemetry data	telemetry data	Telemetry is an automated communications process by which measurements and other data are collected at remote or inaccessible points and transmitted to receiving equipment for monitoring.
I/O	Inputs & Outputs.	The communication between an information processing system, such as the controller.
CANbus	Controller Area Network	vehicle bus standard designed to allow microcontrollers and devices to communicate with each other
Web portal	The SmarTrack® Global Website	SmarTrack Website that allows users to see data, set configuration settings, assign operators and checklists to machines.
Checklist	Pre-start checklist	This is referring to the on machine pre and post start checklist.
Plug & play	plug & play wiring	This is referring to looms and components that do not require any additional wire or modifications to be fitted to the machine
Operators	Machine operators	Person with the ability to operate the machine/ equipment. Also known as driver
Operator Display	SmarTrack® Global Operator Display	The SmarTrack Screen on the machine
Buzzer	Buzzer Alarm	Also known as an Alarm
Controller	SmarTrack® Global Controller	Formally known as the SmarTrack controller
Access Control	Access Control	The Pin code and swipe card system to allow the operator to access the machine
RFID	Radio-frequency identification	(RFID) uses electromagnetic fields to identify operator tags and cards
Swipe card	Operator card	Identification card using RFID to allow access to the machine
OOS	Out of Service	Out of Service feature that can be used to lock out the machine
Buckle	Seat Buckle	Also known as Seat Buckle
Speedlimiter	Speed limiting system	Technology used to control the max allowable speed
EMF	Electromagnetic fields	Electromagnetic fields
RFI	Radio-Frequency Interference	Also known as EMI Electromagnetic Interference
RAM mounts	Mounting equipment	The type of mounting equipment used with SmarTrack Global
Cable ties	Mounting equipment	also known as a hose tie, or zip tie, a type of fastener, for holding items together such as wires
SMA finger wrench	Tool	Tool used for the SMA antenna connection
N/O	Normally open	Switch contacts (circuit) are open by default
N/C	Normally closed	Switch contacts (circuit) are closed by default

Warranty

Please see the RCT standard warranty, available on our website - www.rct-global.com.

Revision History

Rev	Date	Rev By	App By	SW Ver	Details of change
1.0	24/07/2019	RhyG	RhyG		Initial document approval.
1.1	16/08/2019	Lesh	Lesh		Removed <i>Troubleshooting, Problem Solving and Diagnostics</i> .
1.2	03/09/2019	Lesh	Lesh		Updated <i>Installation Guide</i> .
1.3	29/01/2020 31/01/2020 26/02/2020 16/07/2020 09/11/2020	VV Lesh Lesh Lesh RSD	VV Lesh Lesh Lesh RSD		Updated <i>Product Overview, Beep Codes and Flash Codes, Specifications</i> . Updated <i>Technical Specifications</i> . Added <i>FCC Compliance</i> . Updated <i>Product Overview, Installation Guide, Technical Specifications</i> , added <i>Commissioning Guide</i> Updated <i>Installation Guide and Commissioning Guide</i> .
1.4	11/01/2021	Lesh	Lesh		Updated <i>drawings 652i & 652m</i> .
1.5	17/02/2021	RSD	RSD		Updated <i>Troubleshooting</i> .
1.6	22/02/2021 11/03/2021	Lesh Lesh	Lesh Lesh		Updated <i>Installation Guide</i> . Added <i>Recommended Work Flow</i> .
1.7	04/06/2021	RSD	RSD		Updated <i>Installation Guide, Commissioning Guide, and Speed Testing and Calibration</i> sections.
1.8	01/07/2021	RSD	RSD	5.x.2.27	Updated to software version 5.x.2.27 (<i>Commissioning Guide</i>).
1.9	14/07/2021 27/07/2021	RSD GB	RSD GB	5.x.2.27	Updated <i>Antenna Installation and Technical Specifications</i> . Updated <i>drawing 652m</i> .
2.0	19/08/2021	RSD	RSD	5.x.2.32	Updated <i>Commissioning Guide and Appendix</i> sections.
2.1	07/12/2021	GB	GB	5.x.2.32	Updated <i>Technical Specifications</i> list.
2.2	10/01/2022	RSD	RSD	5.x.2.38	Updated to software version 5.x.2.48.
2.3	28/02/2022	RSD	RSD	5.x.2.55	Updated to software version 5.x.2.55. Updated <i>Commissioning Guide</i> section. Added <i>Subscriptions</i> section.
2.4	11/04/2022	RSD	RSD	5.3.2.57	Updated to software version 5.3.2.57. Updated <i>Installation Guide, Commissioning Guide, Subscriptions & Troubleshooting</i> sections.
2.5	24/05/2022	RSD	RSD	5.3.2.57	Updated <i>Product Overview & Installation Guide</i> sections.
2.6	12/08/2022	Lesh	Lesh	5.3.2.57	Updated <i>Installation Guide</i> .
2.7	13/09/2022	MI	MI	5.3.2.57	Updated <i>Installation Guide</i> .
2.8	16/09/2022	Lesh	Lesh	5.3.2.57	Updated <i>Commissioning Guide</i>
2.9	6/10/2022	Lesh	Lesh	5.3.2.68	Updated to software version 5.3.2.68, updated <i>Subscriptions</i> .
3.0	17/05/2023	RSD	RSD	5.3.2.77	Updated to software version 5.3.2.77, updated <i>Commissioning Guide and Appendix</i> .
3.1	13/10/2023	RSD	RSD	5.3.2.77	Updated <i>Installation Guide</i> .
3.2	10/04/2024	GB	GB	5.3.2.77	Updated <i>Pedestrian Alert, Drawings 735g, 715a</i>
3.3	24/01/2025	GB RodW	BC	5.3.2.77	Updated <i>Installation Guide and Commissioning Guide</i> . Added <i>Requesting Support</i> section.
3.4	31/01/2025	MI	BT	5.3.2.77	Updated <i>Technical Specifications</i> section.
3.5	04/07/2025	RSD		5.3.2.7	Updated <i>Installation Guide and Commissioning Guide</i> .



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