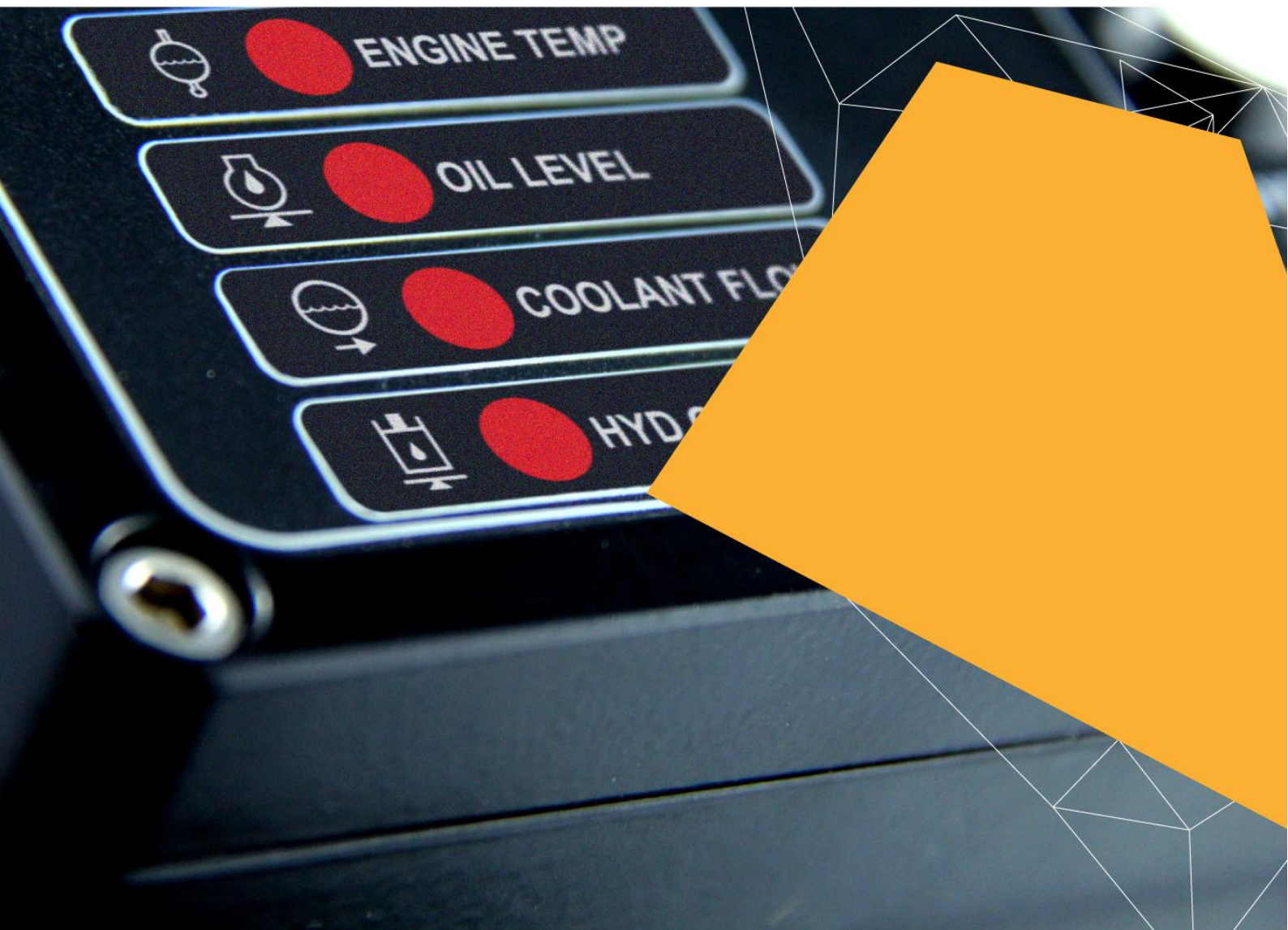


# PRODUCT MANUAL

## INCLINE ALARM SHUTDOWN SYSTEM 35 DEGREE DETECT

Part No. 1800



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## General Safety Warnings

### Personal Safety

- Everyone is responsible for safety.
- The installer/service personnel should be trained and authorized 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 time.

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

## Product Overview



**Figure 1 Muirhead® Incline Alarm Shutdown 35-Degree Detect Controller**

The Muirhead® Incline Alarm Shutdown 35 Degree Detect controller, part number 1801, is a safety device to alert operators that the machine they are controlling has reached a preset angle that may be unsafe for continued operation.

### Features and Functions

- Visual and audible warnings.
- Configurable warning periods.
- Compatible with energised to run and energised-to-stop machines.
- Senses angles greater than  $35^{\circ} \pm 10^{\circ}$  in all directions.
- Incorporates an override facility which enables the operator to override the system once the engine has shut down due to an over inclined state.

# Operation and Use

This product has been designed to warn mobile machinery operators that their machine is operating on a dangerous incline. If the machine exceeds the maximum allowable incline (set to approximately 35 degrees  $\pm$  10 degrees in all directions) the operator will be alerted via audible and visual warning for a preset time. This warning period is switch selectable between 5, 6, 15, and 25 seconds. After a further seven seconds, the engine will be shut down.

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## Note

If you wish to skip the shutdown sequence, and shutdown instantly when the key is turned off, connect the red wire, from pin 1, to the ignition terminal (parallel to the orange from pin 2).

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## Override Operation

The system has an override switch incorporated to enable the operator to override the system once the engine has shut down due to an over-inclined state.

## Installation Guide

1. Mount the controller in suitable location in or near the cabin.
2. The unit **MUST BE INSTALLED WITH THE LID FACING DOWN** in the horizontal position and with the machine parked on level ground.
3. Run and secure the wiring along existing looms to the controller. Mount the audible warning alarm in a suitable position on the instrument panel. The override switch is optional. If used, it must be easily accessible to the operator.

## Wiring Connections

No.	Colour	Description
1	Red	Connect to the permanent battery supply at the key switch (energised-to-stop machines). Connect to the ignition terminal at the key switch (energised to run machines). If you wish to skip the shutdown sequence and shutdown instantly when the key is turned off, connect this wire to the ignition terminal (regardless of the machine being ETS or ETR).
2	Orange	Disconnect the existing ignition (OEM) wires from the ignition terminal at the key switch and connect the orange wire to the ignition terminal of the key switch.
3	Yellow/Blue	Connect to the (OEM) ignition wires once disconnected from the ignition terminal at the key switch.
4	Purple (Caterpillar only)	Only to be used on machines using the C terminal at the key switch for auxiliary control after shutdown, e.g., Caterpillar. Disconnect the existing (OEM) wire no. 326 from the C terminal at the key switch and connect to the purple wire from the control unit.
5	Red/White	Connect to the energised-to-stop solenoid or (OEM) wire-to-stop solenoid (see note 1).
6	Orange	Connect to the system override switch.
7	Orange/Blue	Connect to the system override switch.
8	Yellow	Connect to the +ve terminals of the warning alarm and LED.
9	Black	Connect to the -ve terminals of the warning alarm and LED.
10	Black	Earth.
11	Not used	Not Used.
12	Not used	Not Used.

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## Note

Energised to stop machines will use either Pin 4 or Pin 5 but not both.

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# Diagrams

## External Wiring for Energised-to-Stop Machines (195n)

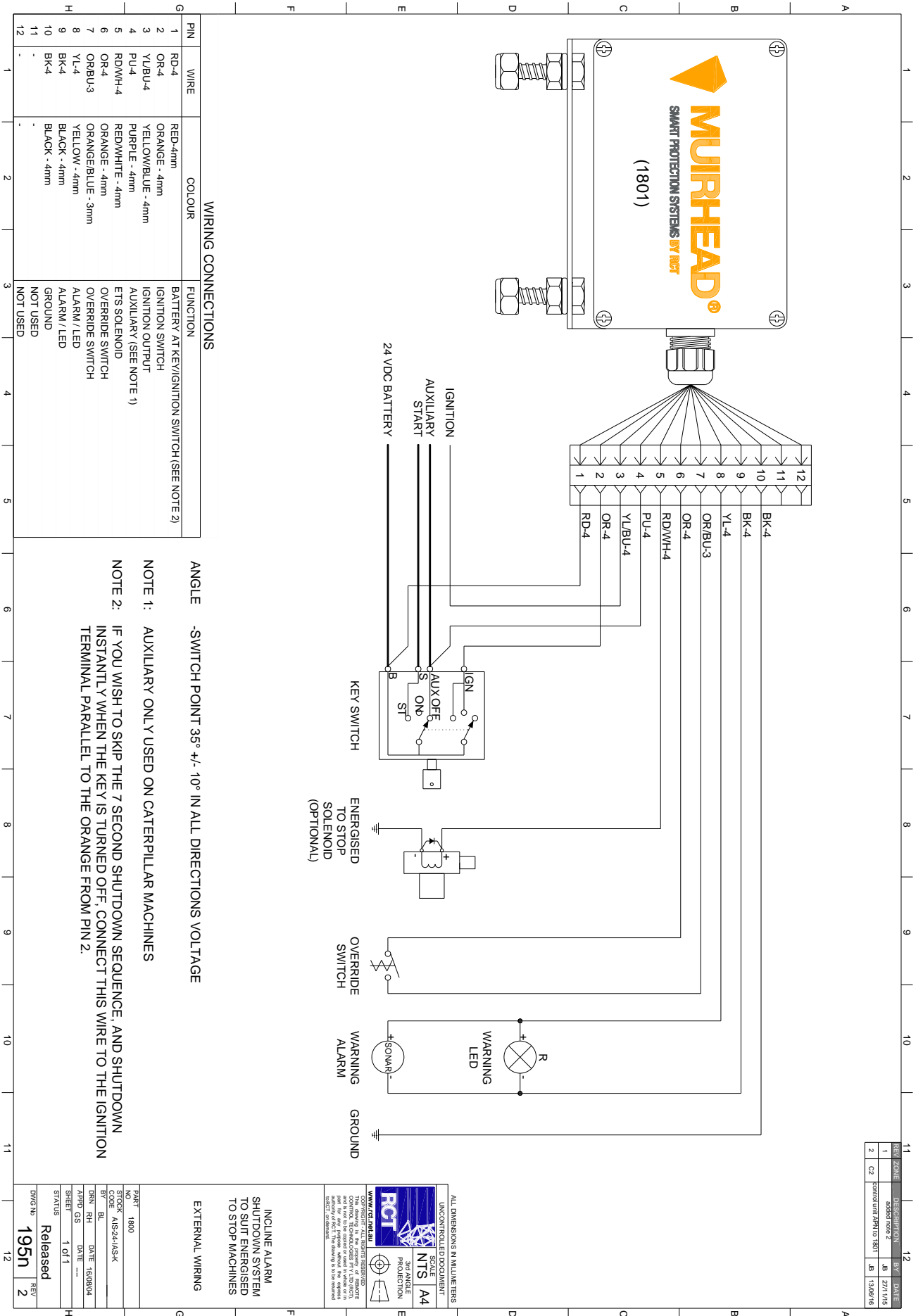



Figure 2 Drawing 195n – External wiring for energised-to-stop machines

REV	DATE	DESCRIPTION
1	27/11/15	Added note 2
2	13/06/16	Control Unit AMN to 1801

# Calibration

The shutdown delay time settings can be adjusted by using dip switches on the printed circuit board. The following table shows the settings.

SW1	SW2	Time
Off	Off	25 seconds
On	Off	15 seconds
Off	On	6 seconds
On	On	5 seconds

 Factory setting

## Service Information

### Service Schedule

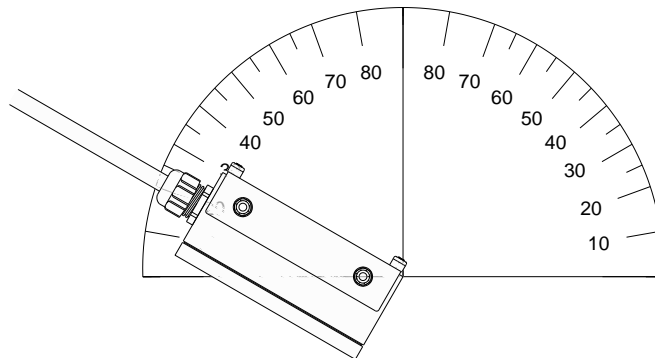
The manufacturer recommends that the following service procedure should be performed at each machine's scheduled service interval.

### Service Procedure

1. Perform a visual inspection; include the following:
  - a) Controller
  - b) Wiring connections and looms
  - c) Override switch
  - d) Audible and visual alarms
2. Perform a system test as per the following:

Observe normal safety precautions.

  - a) Unbolt the controller and hold in level position **WITH THE LID FACING DOWN**.
  - b) Start the engine. With the engine at idle, slowly tilt the controller in any direction.
  - c) When the unit reaches approximately 35 degrees  $\pm$  10 degrees, the alarm and LED should operate, and after a five-second delay, the engine should shut down and all ignition circuits should turn off.



**Figure 3 Tilting the controller to approximately 35°  $\pm$  10°**

### Override Test

- a) After the engine has shut down, hold the control unit over 30 degrees.
- b) Push and hold the override switch and restart the engine. The engine should run as normal.
- c) Release the override switch; the alarm and LED should operate, and after five seconds, the engine will shut down.
- d) Remount the control unit.

To inhibit the engine from shutting down, push and hold the override switch.



## Parts List

Part No.	Description	Quantity	
		Included Parts	Suggested Parts
1801	Control unit	1	1
1520	Override switch	1	-
3267	Override switch cover	1	-
1723	Warning alarm	1	-
9393	Warning LED	1	-
6896	Shutdown override label	1	-
9419	Incline warning label	1	-
0821	Blue spade terminals	2	-
0822	Yellow spade terminals	2	-
0824	4.2 mm eyelet terminal	2	-
0826	6.6 mm eyelet terminal	1	-

## Technical Specifications

<b>Dimensions, controller only:</b>	Length: 170 mm   Width: 55 mm   Height/Depth: 80 mm
<b>Dimensions, boxed for freight:</b>	Length: 220 mm   Width: 120 mm   Height/Depth: 120 mm
<b>Weight, controller only:</b>	0.35 kg
<b>Weight, including loom / packaging for freight:</b>	0.7 kg
<b>Input nominal voltage:</b>	24 Vdc
<b>Connection types:</b>	12-pin Deutsch connector
<b>Inputs:</b>	Ignition supply Battery supply Chassis ground
<b>Min &amp; max input voltage:</b>	16 to 32 V
<b>Enclosure type:</b>	ABS
<b>Environmental protection IP rating:</b>	IP65
<b>Programming/Adjustment:</b>	DIP switch on PCB

## Compliance and Standards

TBA

## Troubleshooting

Fault	Possible Causes
Device not working.	Check wiring and connections.
Intermittent fault.	Check wiring and connections.

## Glossary

<i>A</i>	Amp (Ampere)
<i>ac</i>	alternating current
<i>AMS</i>	Advanced Management System
<i>Aux</i>	Auxiliary Output
<i>CAN</i>	Controller Area Network
<i>CMIO</i>	ControlMaster® Input Output PCB
<i>CMR</i>	ControlMaster® Receiver
<i>CMT</i>	ControlMaster® Transmitter
<i>CM2200</i>	ControlMaster® 2200 Remote Set
<i>COMMS</i>	Communications
<i>CPU</i>	Central Processor Unit
<i>dc</i>	direct current
<i>E.G.</i>	For example
<i>ETR</i>	Energised To Run
<i>ETS</i>	Energised To Stop
<i>ESD</i>	Engine Shutdown
<i>FET</i>	Field Effect Transistor
<i>GND</i>	Ground
<i>H</i>	Hours
<i>HEX</i>	Hexadecimal Numbering System
<i>ID</i>	Identity
<i>i.e</i>	that is
<i>In</i>	Input
<i>IP</i>	Ingress Protection
<i>kg</i>	Kilogram
<i>Km/h</i>	Kilometres Per Hour
<i>LCD</i>	Liquid Crystal Display
<i>LED</i>	Light Emitting Diode
<i>LK</i>	Link
<i>M</i>	Minutes
<i>mA</i>	Milliamps
<i>MAX</i>	Maximum
<i>MCU</i>	Multi-Control Unit
<i>MFU</i>	Multi-Function Unit
<i>MHz</i>	Mega Hertz (million(s) cycles per second)

<i>MIN</i>	Minimum
<i>mm</i>	millimetres
<i>mW</i>	Milliwatts
<i>N/A</i>	Not Applicable
<i>N/C</i>	Normally Closed
<i>N/O</i>	Normally Open
<i>OEM</i>	Original Equipment Manufacturer
<i>O/P</i>	Outputs
<i>Out</i>	Output
<i>PB</i>	Push Button
<i>PC</i>	Personal Computer
<i>PCB</i>	Printed Circuit Board
<i>PIN</i>	Personal Identification Number
<i>PLC</i>	Programmable Logic Controller
<i>POT</i>	Potentiometer
<i>PPM</i>	Pulses Per Metre
<i>PWM</i>	Pulse Width Modulation
<i>PWR</i>	Power
<i>Rev</i>	Revision
<i>RF</i>	Radio Frequency
<i>RH</i>	Relative Humidity
<i>rpm</i>	Revolutions per minute
<i>RX</i>	Receiver
<i>RS232</i>	Recommended Standard (number 232) for serial data transfer
<i>SYS</i>	System
<i>TOV</i>	Text On Video
<i>TX</i>	Transmitter
<i>USB</i>	Universal Serial Bus
<i>V</i>	Volts
<i>°C</i>	Degrees Centigrade
<i>#</i>	Number
<i>&lt;</i>	Less Than
<i>&gt;</i>	Greater Than
<i>%</i>	Percentage

## Warranty

Please see the RCT standard warranty, available on our website - [www.rct-global.com](http://www.rct-global.com).

## Revision History

Rev	Date	By	Details of change
1.0	16/08/2004	-	Initial document draft and approval
2.0	27/11/2015	JB	Updated the following sections: <ul style="list-style-type: none"><li>- <i>Operation and Use</i></li><li>- <i>Calibration</i></li><li>- <i>Service Information</i></li></ul>
2.1	13/06/2016	JB	Updated <i>Overview</i> and <i>Parts List</i> sections. Updated drawing 195n
2.2	05/12/2018	CC	Updated manual format and added <i>Table of Figures</i> and <i>Revision History</i> sections.



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