

LOAD SENSE

WLS-LC Wireless Load Sensor

& WLS-HR Handheld Receiver

User Manual



While every precaution has been exercised in the compilation of this document to ensure the accuracy of its contents, Sensor Technology Ltd, assumes no responsibility for any errors or omissions. Additionally, no liability is assumed for any damages that may result from the use of the information contained in this document.

Copyright

Copyright ©2006 - 2012 Sensor Technology Ltd. All rights Reserved.

Copying or reproducing of all or any part of the contents of this manual is strictly prohibited without the express permission of Sensor Technology.

Trademarks

Windows® is a registered trademark of Microsoft Corporation.

FCC Warning Statement

- This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
 - (1) This device may not cause harmful interference, and
 - (2) This device must accept any interference received, including interference that may cause undesired operation.
- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

English

"Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication."

"This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device."

French

"Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada.

Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante."

"Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement."

Table Of Contents

Load Sensor

Getting Started

Introduction	4
Unpacking the STLC	4

Operation

Powering the STLC	5
Using the STLC	5
USB cable connected	5
Charging	6
Checking if sensor is on/off while charging	6
Switching sensor on/off while charging	6
Safety instructions	7
Calibration	7

Computer Software	8
------------------------------------	---

Handheld Receiver

Getting Started

Introduction	18
Unpacking the Receiver	18
Handheld Receiver Layout	19
Screen Layout.	20

Operation

Powering / Charging the receiver	20
Using the receiver	20
Display Mode	21
Normal Mode	21
Tare Mode	21
Peak Mode	22
Peak and tare Mode	22
Menus	23

Load Sensor

Getting Started

Introduction

The wireless LoadSense Load Sensor is a strain gauge based stainless steel tension type sensor with the capability of wirelessly transmitting its data to one of many compatible readouts and displays or recording the data locally to its inbuilt 32MBit memory which can hold up to 17 hours of data which can then be transferred to a PC via its USB cable. The Load cell transmits using the worldwide licence free frequency of 2.4Ghz on two built in patch antennas.

The LoadSense Load Sensor is compatible with our handheld display which can read several devices at the same time, (see data sheet WLS3262R for more details), a stand alone receiver box which is used to just output the data via RS232/RS422, (see data sheet WLS3627R for more details), the Sensor Display which can be cabin mounted and displays the current load (see data sheet WLS3794R for more details) or if used with our touch screen display it can be used for very advanced features using our software for GPS track guidance as well as more advanced load and fire fighting.

Unpacking the STLC

The following standard components are included:

- 1 x STLC
- 1 x User Manual.
- 1 x Software USB drive

The following items may also be included:

- Mains USB charger / data lead
- Shackles

Operation

Powering the STLC

The STLC is powered by an internal 3.6V 2200mAH Li-ion battery which can be charged via a 11-28 V DC input. To power the STLC the push switch needs to be depressed for 1 second.

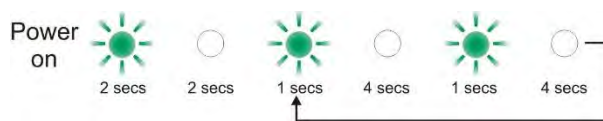
Using the STLC

Switching On and LED flash sequences

To switch on the load cell, press and hold the push switch for 1 second, on release the LED will illuminate for 2 seconds.

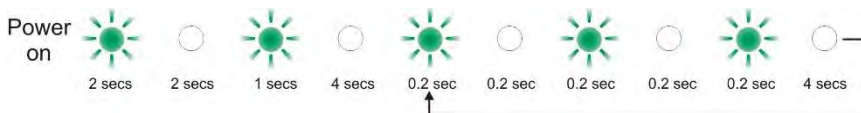
During Normal Operation

Once the load cell has been switched on, the LED will illuminate for 1 second every 4 seconds. This sequence will continue to loop until the Load Sensor is switched off or a warning occurs during normal operation.



Warning occurs during normal operation.

If a warning condition occurs during normal operation, the LED will flash three times in the 1 second on period to indicate a warning condition. If the warning clears it will go back to the normal operation flash sequence. If the warning still remains connect the Load Sensor to the LoadSense tool program to check the error.



Switching Off and LED flash sequences

To turn off the Load Sensor, Press and hold the push switch for 1 second, the LED will do the following sequence to show it has switched off.

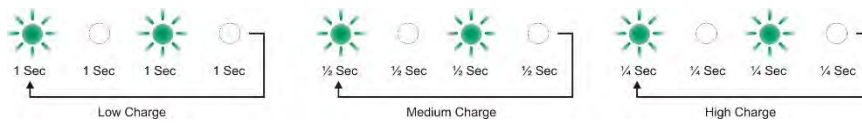


USB cable connected

When the USB cable is plugged in, the Load Sensor will power on but the logging function will be disabled. The LED will stay a solid green and the push switch is disabled. It will stay in this state even when charging. To see the status of the Load Sensor, it will need to be connected to LoadSense tool software.

Charging

To recharge the Load sensor the charger lead needs to be supplied with 7-28 V DC. When the Load Sensor is charging the LED will flash on & off at the same rate, the faster the flash occurs the more charged the Load Sensor is.



Checking if the Load Sensor is ON or OFF while charging

When the Load Sensor is charging you can do a quick press (less than a second) on the switch, this will then tell you if the Load Sensor is switched on or off. Depending on its state it will do the following LED flash sequence.

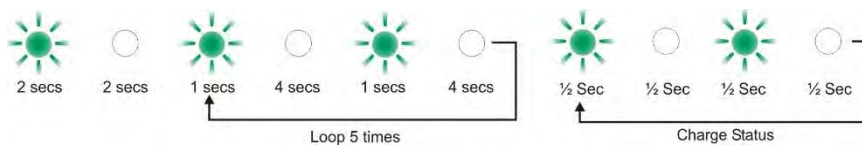
Load Sensor Off

After the press on the switch the LED will go off for 4 seconds then continue with the charge flash sequence:



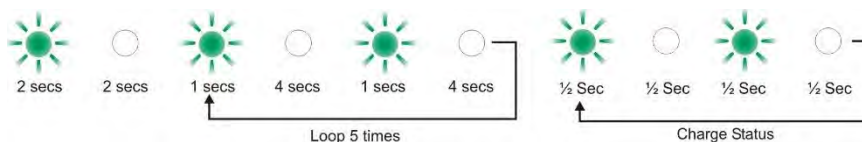
Load Sensor On

After the press of the switch, the LED will stay on for 2 seconds, off for 2 seconds then go into its normal operating LED sequence for 5 loops. If a warning occurs during this time the LED will flash its warning sequence as described above. The LED will then go back to the charging status flash.

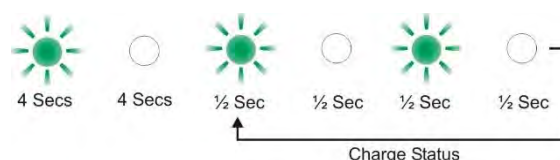


Switching the Load Sensor ON or OFF while charging

To turn the Load Sensor on while it is charging, press the push switch for 1 second. The LED will do the following sequence when powered on.



To switch off the Load Sensor while charging press the push switch for 1 second. The LED will do the following sequence to show it has turned off.



Safety Instructions

Only use Green Pin shackles to EN13889 and with a pin diameter of 28mm with this Load Cell. It is essential that a pin secured with a nut and split pin is used. Whilst the Load Cell is capable of withstanding a maximum of 500Nm of torque, for swinging/rotating loads use a suitably rated swivel connection between the load and the Load Cell to minimise any torque being transmitted through it.

Calibration

Yearly calibration is recommended. Return to Sensor Technology Ltd as no user calibration facility is provided.

Computer software

LoadSense Tool

Introduction

The LoadSense Tool software is a configuration, diagnostic and data download tool for our range of LoadSense and Helinav LoadMaster load sensor products.

Installation

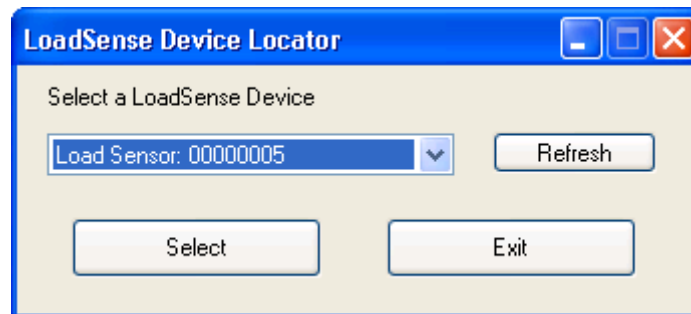
Software can be installed from the included software CD.

Running

Before running the software connect the load sensor to a PC using the supplied USB cable.

To run the software, click on the “LoadSense Tool” shortcut in the Windows start menu (Start > Programs > Sensor Technology > LoadSense Tool).

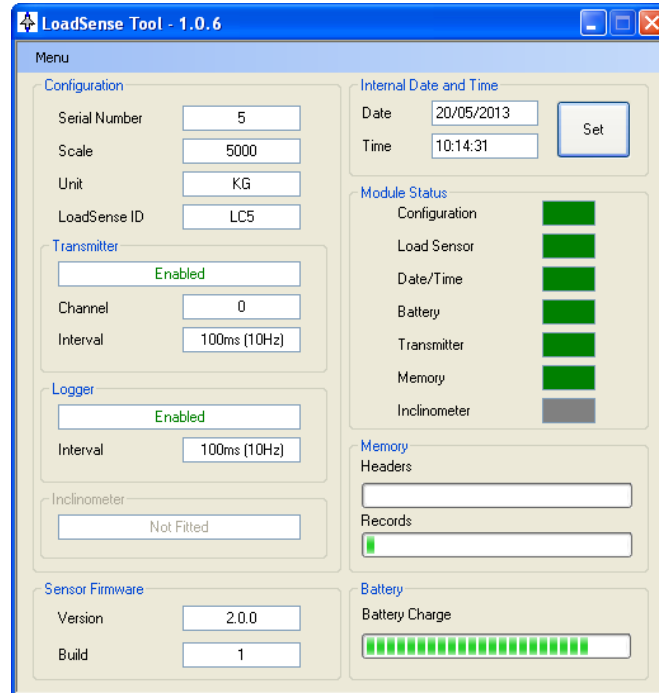
Once clicked a “LoadSense Device Locator” dialog box will be displayed, the purpose of this is to identify a load sensor for use with the software.



From the combo box select the load sensor that you want to use with the software and click “Select”. If the load sensor is not listed check the connections and click “Refresh”.

LoadSense Tool – Main Page

The LoadSense Tool main page summarises the sensors configuration and current status.



Configuration

The configuration section of the screen summarises the sensors build and runtime configuration.

- Serial Number – Factory programmed serial number.
- Scale – Calibrated full scale.
- Unit – Scale unit.
- LoadSense ID – Configurable sensor identifier, used to identify different wireless sensors. The ID is a friendly alternative to the serial number.

- Transmitter – Data transmission module.
 - Status – Module status (Not fitted/Disabled/Enabled)
 - Channel – Wireless transmission channel.
 - Interval – Data transmission frequency.

- Logger – Internal data logging module.
 - Status – Module status (Not fitted/Disabled/Enabled)
 - Interval – Data record frequency.

- Inclinator – Load sensor angle capture module
 - Status – Module status (Not fitted/Disabled/Enabled)

Sensor Firmware

The Sensor Firmware section shows the version and build of the connected sensors firmware.

Internal Date and Time

The load sensor has an internal real time clock which tracks the date and time. The real time clock is used for logging data and operation scheduling.

The date and time boxes show the current load sensor time, update the date and time from the PC clock by pressing the “Set” button.

Module Status

The Module Status section shows the status of the internal modules.

Modules can have one of three states:



Module OK



Module Fault



Module Disabled

- Configuration – Internal factory and user configuration integrity.
- Load Sensor – Capture system status. If an error occurs in the Load Sensor module check the sensor loading and hook up.
- Date/Time – Real time clock status. Indicates if the real time clock has been set following reset.
- Battery – Internal battery status.
- Transmitter – Device transceiver status.
- Memory – Log memory status.
- Inclinator – Inclinator module status.

Memory

The memory section shows how much of the internal memory has been used.

Battery

The load sensor has a sophisticated battery monitoring capability which tracks the battery status. The battery charge bar indicates the charge status.

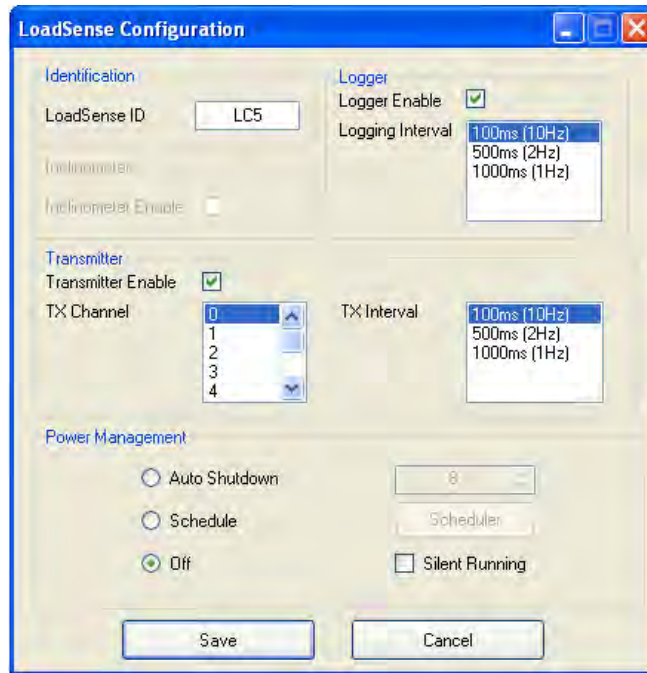
Menu

There are two menu options available:

- Configuration – Configure the load sensors operational parameters.
- Data Logging – Download and erase data from the load sensors internal memory.

LoadSense Configuration

The configuration options alter the way the load sensor operates.



Identification

Load sensors are identified by serial number and ID.

- LoadSense ID – An identifier used to identify individual load sensors.

Inclinometer

The load sensor has an internal inclinometer which can measure tilt angles.

- Inclinometer Enable - Enable the Inclinometer module. Once enabled the inclinometer data will be transmitted as part of each data packet or logged to memory.

Transmitter

The load sensor has an internal 2.4GHz transceiver which can wirelessly transmit data.

- Transmitter Enable – Enable data transmission.
- TX Channel – The transmit channel sets the load sensors transmission frequency.
- TX Interval – The TX interval controls the time between data transmissions. Three options are available, 100ms (10Hz), 500ms (2Hz) and 1000ms (1Hz).

Logger

The load sensor has an internal 32mbit memory which can be configured to record data from the load sensor and inclinometer.

- Logger Enable – Enables the log to flash functionality of the load sensor.
- Logging Interval – The logging Interval sets the time between each data point written to memory.

The table below shows the interval options available and the maximum record durations for each.

Logging Interval	Time (HH::MM::SS)	
	Load	Load/Inclinometer
10Hz	TBA	TBA
2Hz	TBA	TBA
1Hz	TBA	TBA

Power Management

The load sensor incorporates a number of power management features to help reduce power consumption.

- Auto Shutdown – The auto shutdown feature when selected will automatically shutdown the load sensor after a defined number of hours. Select the number hours from the selection box.
- Schedule – The schedule feature when selected will automatically switch on and switch off the load sensor in accordance with a user specified schedule. The user can specify a schedule by using the scheduler. For information on configuring the schedule refer to the scheduler section.
- Off – No power management modes active.

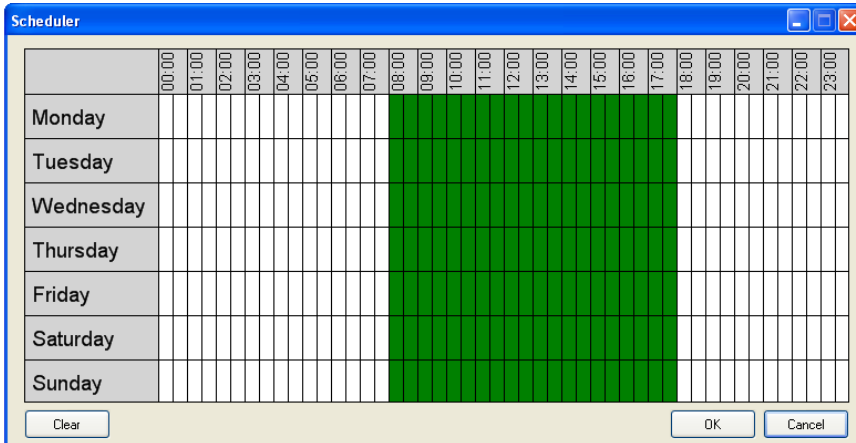
- Silent Running – When enabled silent running mode will disable the load sensors led after 5 status cycles. When silent running is active a quick press of the load sensor switch will indicate the current status. If an error condition occurs during operation the led will come out of silent running and show status. The Silent running feature can be used in conjunction with any of the other power management modes.

Saving

Once the settings have been changed click “Save”, the settings will then be written to the load sensors internal memory. The main page will be updated to reflect the changes.

Scheduler

The scheduler allows the user to configure an automatic power on and power off schedule. The schedule is a weekly program which can be programmed in 30 minute slots.



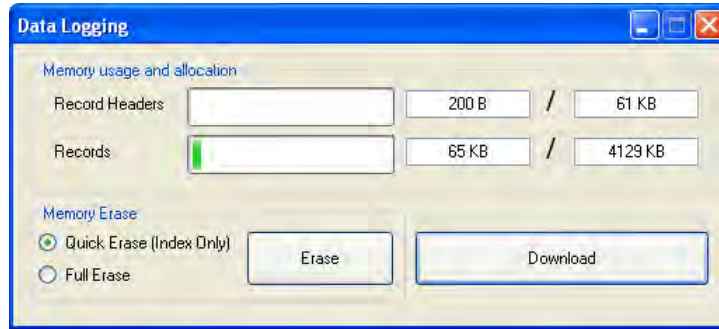
To create a schedule left click or left click and drag on the scheduler cells. Clicking on an individual cell with either mouse button will toggle its state.

A selection rectangle will be created if the mouse is moved while a mouse button is held; when the mouse button is released any cells covered by the selection rectangle will be set if the left mouse button is used or cleared if the right mouse button is used.

All cells coloured green are on periods, while the white cells are off periods. In the example above the load sensor has been scheduled to run daily between the hours of 08:00 and 18:00

Data Logging

The data logging section allows the user to manage the load sensors internal 32mbit memory. The user can download, export and erase stored data.



The internal memory is split into 3 sections, index, headers and records.

Index – The index stores the number of records saved.

Headers – The headers section records each session start (load sensor switch on).

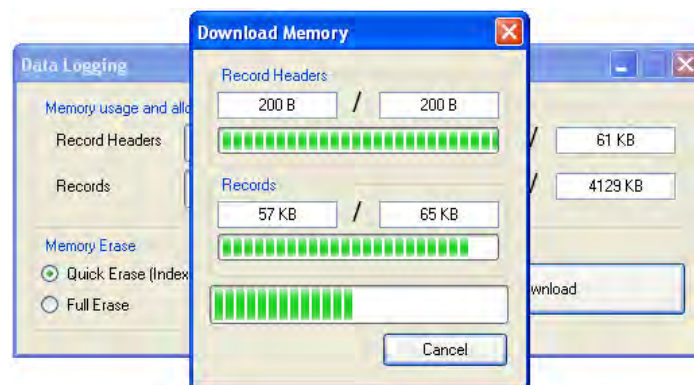
Records – The records section stores each individual record.

Memory usage and allocation

The memory usage and allocation section shows the internal memory usage, both as a percentage and actual size.

Download

To download data click “Download”. Once clicked a “Download Memory” progress window will appear and relay download progress. The download time will vary depending on memory usage. A full memory can take up to 5 minutes to download.



If you wish to cancel a download click “Cancel” or close the window.

Once a download has completed successfully a “Downloaded Data” window will be displayed. The “Downloaded Data” window will show a summary of each record set.

Record Set	Date	Time	Records	Interval	Data Mode
<input type="checkbox"/> 1	11/12/2012	18:00	512	100ms (10Hz)	Load/Inclinometer
<input type="checkbox"/> 2	11/12/2012	18:00	260	100ms (10Hz)	Load/Inclinometer
<input type="checkbox"/> 3	11/12/2012	18:00	1417	100ms (10Hz)	Load
<input type="checkbox"/> 4	17/05/2013	19:42	1570	100ms (10Hz)	Load
<input type="checkbox"/> 5	17/05/2013	19:46	699	100ms (10Hz)	Load
<input type="checkbox"/> 6	17/05/2013	19:47	21	100ms (10Hz)	Load
<input type="checkbox"/> 7	17/05/2013	19:47	76	100ms (10Hz)	Load
<input type="checkbox"/> 8	17/05/2013	19:47	272	100ms (10Hz)	Load
<input type="checkbox"/> 9	17/05/2013	19:48	7092	100ms (10Hz)	Load
<input type="checkbox"/> 10	19/05/2013	15:05	3437	100ms (10Hz)	Load

Include summary header

Save Selected Save All Close

Below is a description of the table headers:

- Record Set – Reference given to each record set.
- Date – Record set start date.
- Timer – Record set start time.
- Records – Number of records in record set.
- Interval – Data record interval.
- Data Mode – Data recorded.

Exporting Data

To export data to a CSV (comma separated value) file, click either “Save Selected” or “Save All”. To include a summary header before each record set, set the “Include summary header” checkbox. If the “Include summary header” checkbox is cleared, data in the file will be continuous.

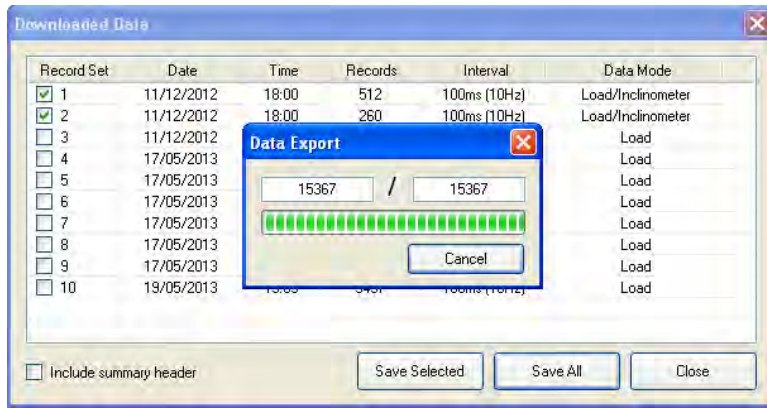
- Save Selected - The “Save Selected” option will export a subset of the downloaded data. Record sets are selected for export by setting the checkbox of the required record sets.

Record Set	Date	Time	Records
<input checked="" type="checkbox"/> 1	11/12/2012	18:00	512
<input checked="" type="checkbox"/> 2	11/12/2012	18:00	260
<input type="checkbox"/> 3	11/12/2012	18:00	1417

- Save All - The “Save All” option will export all downloaded data to file.

Once “Save Selected” or “Save All” is clicked a “Save As” dialog box will be displayed, select a file location and file name and click “Save”.

Once a file location and name have been selected a “Data Export” progress window will appear and relay export progress.



If you wish to cancel a data export click “Cancel” or close the window.

Two data export samples have been included below:

Data Sample (Summary Header: Enabled)

Record Set,Date,Time,Records,Interval,Mode
 1,11/12/2012,18:00,512,100ms (10Hz),Load/Inclinometer

Record Set,Date,Time,ms Offset,Load,X-Axis,Y-Axis

1,11/12/2012,18:00:10,0,000.500,000.011,000.022
 1,11/12/2012,18:00:10,100,000.500,000.011,000.022
 1,11/12/2012,18:00:10,200,000.500,000.011,000.022
 1,11/12/2012,18:00:10,300,000.500,000.011,000.022
 1,11/12/2012,18:00:10,400,000.500,000.011,000.022
 1,11/12/2012,18:00:10,500,000.500,000.011,000.022

Data Sample (Summary Header: Disabled)

Record Set,Date,Time,ms Offset,Load,X-Axis,Y-Axis

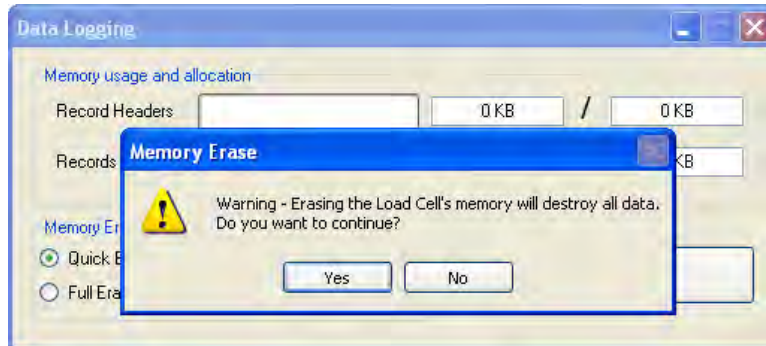
1,11/12/2012,18:00:10,0,000.500,000.011,000.022
 1,11/12/2012,18:00:10,100,000.500,000.011,000.022
 1,11/12/2012,18:00:10,200,000.500,000.011,000.022
 1,11/12/2012,18:00:10,300,000.500,000.011,000.022
 1,11/12/2012,18:00:10,400,000.500,000.011,000.022
 1,11/12/2012,18:00:10,500,000.500,000.011,000.022

Memory Erase

To erase the load sensors internal memory select either “Quick Erase” or “Full Erase” then click “Erase”.

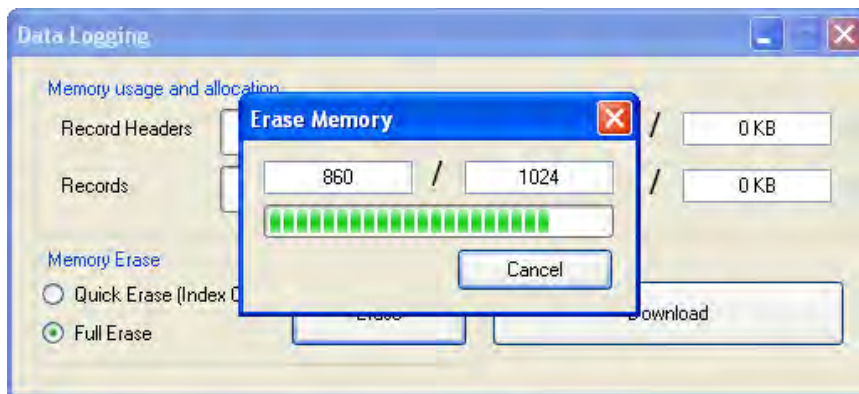
- Quick Erase – “Quick Erase” will erase only the index section of the load sensors memory, rendering all other data invalid.
- Full Erase – “Full Erase” will erase all internal memory blocks, but will take a few minutes.

Once “Erase” is clicked a warning message will be displayed.



WARNING – Erasing the memory will irrecoverably destroy all data.

If you are happy to continue click “Yes”, an “Erase Memory” progress will appear and relay memory erase progress.



If you wish to cancel a memory erase click “Cancel” or close the window.

Handheld Receiver

Getting Started

Introduction

The wireless LoadSense HandHeld Receiver is used in conjunction with the wireless Load Sensor. It provides the user with an easy way to receive and view data from the Load Sensor.

Our range of Load Sensors up to 10 tonnes are shown in datasheet HLM3599R.

Using the 2.4GHz licence free band to receive the Load Sensor signal, it can display the load value in several views which are user selectable. It also allows the user to tare off any equipment weight to display just the load value of the cargo.

Unpacking

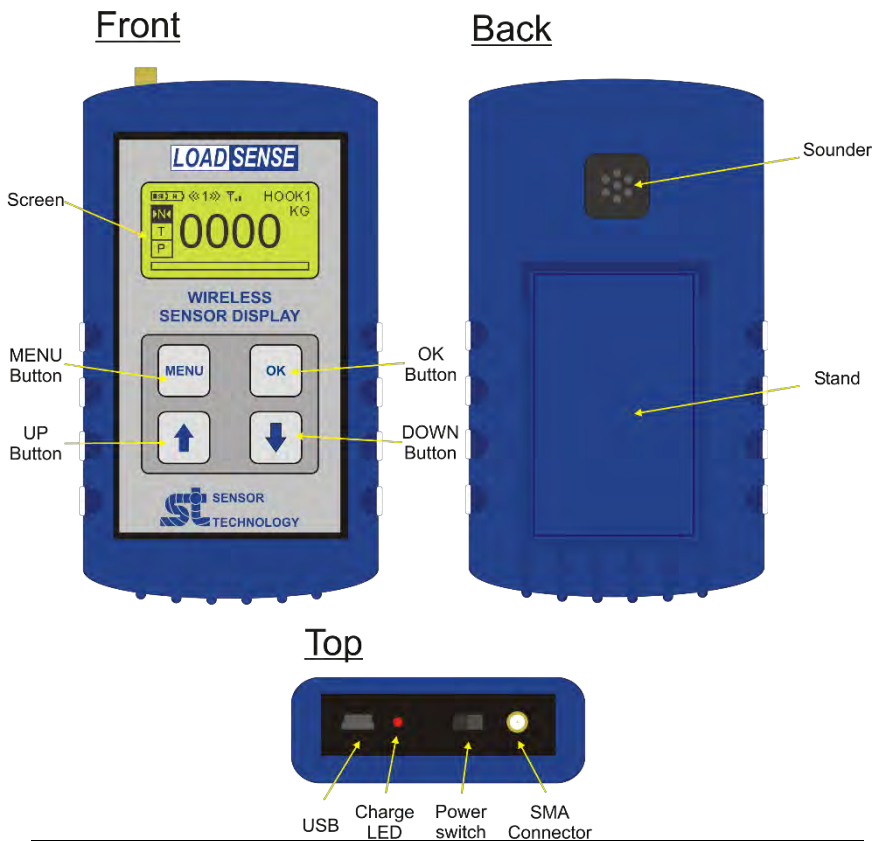
The following standard components are included:

- 1 x LoadSense Handheld Receiver
- 1 x 2.4GHz antenna
- 1 x User manual

The following optional items may also be included:

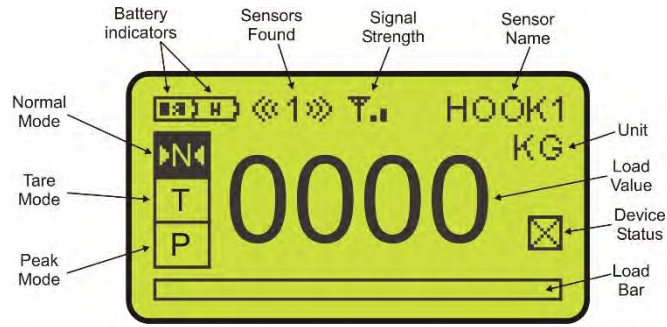
- 1 x USB cable

Handheld Receiver Layout



Item	Description
MENU Button	Press to enter Menus
UP Button	Use to scroll through options
DOWN Button	Use to scroll through options
OK Button	Use to select option
Power Switch	Toggle switch to turn display on and off
SMA connector	SMA connector for aerial
Charge LED	Indicates when the receiver is charging
USB	Used for charging and connecting to PC
Sounder	Audio warning for limits
Stand	Pull out stand for desk use

Screen Layout



Item	Description
Normal Mode	Main screen is displaying Normal Mode
Tare Mode	Main screen is displaying Tare Mode
Peak Mode	Main screen is displaying Peak Mode
Battery Indicators	Visual indication of battery remaining for Display and Sensor
Sensor Found	Displays how many sensors have been found in range
Signal Strength	How strong the signal is from selected sensor
Sensor Name	Displays the name of the selected sensor
Unit	Indicates which unit the display is showing load in
Load Bar	Scaled from 0 to full scale, fills to displays load*. <i>*Depends on mode</i>

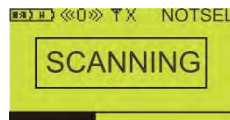
Operation

Powering / charging the display

To charge the receiver, plug in the USB cable to the receiver and connect to a PC or mains socket adaptor. The receiver will still charge if the power switch is in the off position. If the battery has charge the display does not need to be connected to a power supply and will run for approximately 50 hours if fully charged.

Using the Receiver

When you first power on the display it will start to scan for a sensor.



If the receiver fails to find a sensor, please check that the load sensor is powered on, the aerial is connected and the display is within range of the sensor. There are four push buttons on the receiver front panel which are used to navigate the menus and set up functions.



Once in the menus, use the up and down arrows to scroll through the options and use the enter button to select / enable the option.

Display Mode

There are three different modes the receiver can operate in, Normal, Tare and Peak. The Tare and Peak mode can be used at the same time. From the main screen use the UP and DOWN buttons to scroll between the options. As you scroll between them a marker will show which option you are on. To select a mode press the OK button.



The current mode being used will be coloured black.



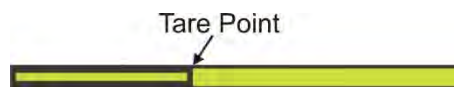
To turn off any of the modes, use the UP and DOWN buttons to highlight the N and press the OK button, or highlight the mode you wish to turn off and press and hold the OK button.

Normal Mode

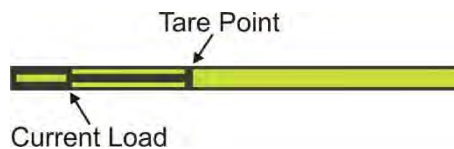
The receiver will show the load value as it is from the sensor. The load bar will also fill up. The Load bar is scaled to the full scale of the Load sensor so if half load is applied the bar will be half filled.

Tare Mode

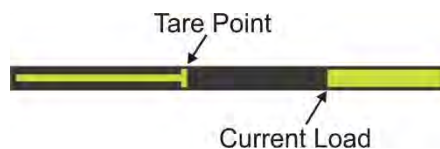
To tare off a load value, apply the load to be tared then using the UP and DOWN buttons highlight the tare mode icon and press the OK button. The Load value will now display 0000 and the Load Bar will look something like this.



If the load on the sensor drops below the tared value the Load value will read 0000 and the load bar will look something like this.



When load is applied and it takes the value above the tare point the display will show only the value of the additional load, **not** the combined load of the tare and additional load. This will be displayed on the Load Bar like this.

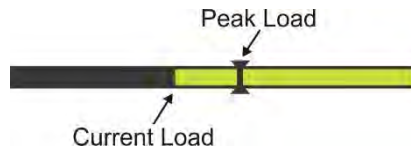


To set the tare again simply press the OK button with Tare Mode icon selected. To remove the tare either press and hold the OK button with Tare Mode icon selected or select normal mode icon and press OK.

Peak Mode

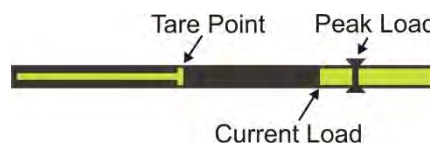
When using this mode the Load value displayed is the peak load. The value will only change if the load becomes greater than the peak. The Load Bar will show the peak load value and the current load.

To reset the peak value, press the OK button with the Peak mode icon highlighted.



Peak and Tare Mode

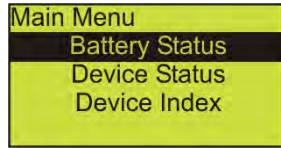
This is just a mixture of both of the above modes. The Load Value displays the peak load, not including the tared value, and the Load Bar will display Current, Peak and tare values.



Menus

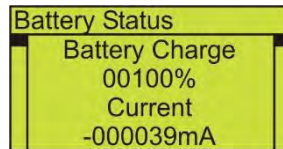
Main Menu

To access the Main Menu on the display, press the MENU button at any time, this will display the main menu screen.



From this menu use the UP and DOWN buttons to scroll through the options: Battery Status, Device Index, Settings and Exit. To select a sub menu click on the OK button.

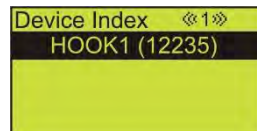
Battery Status



Selecting this from the main menu gives you a list of all the battery information. Use the UP and DOWN arrows to scroll through the information. To exit this menu either choose exit from the bottom of the list or press the MENU button.

Menu Item	Description
Battery Charge	Charge remaining as a %
Current	Displays current consumption
Voltage	Voltage of the battery in mV

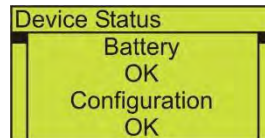
Device Index



This section allows you to select which load sensor you want the display to show. If there are multiple sensors, use the up and down arrows to scroll through them and select one with the OK button.

To exit this menu either select a sensor or press the MENU button.

Device Status



If the Device Status “X” appears on the main screen, a fault has occurred with the selected Load Sensor. This menu can be used to check what is causing the issue. Scroll through the list until you find a heading displaying “Fault”.

Menu Item	Status
Battery	OK, Fault, Not Fitted
Configuration	OK, Fault, Not Fitted
Clock	OK, Fault, Not Fitted
Inclinometer	OK, Fault, Not Fitted
Log Memory	OK, Fault, Not Fitted
Overscale	OK, Fault, Not Fitted
Strain Gauge	OK, Fault, Not Fitted

The status of each item will either display OK, Fault or Not Fitted. If the Display is not currently connected to a Load Sensor, the status of all the menu items will display “Not Selected”

Settings



Item	Description
Channel	Set which frequency channel you want to search for sensors on
Device Save	When enabled the display will be locked to the selected sensor
Filter	Applies an average of the selected value to the sensor data
Peak reset	Set the delay time the display holds the peak value on screen for
Units	Select which unit you wish the display to use
Restore Defaults	Set all settings back to factory default