

# MSI-8000HD

*RF Indicator*

## Technical Manual



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## 1.0 Introduction

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The *MSI-8000HD RF Indicator* is a combination of the sound and proven mechanical design of the industry standard, with today's most advanced electronics. It provides a superb feature set unmatched by any scale in its class or price range. The *MSI-8000HD* is versatile, reliable, accurate and easy to operate. RF remote control and remote display options are available to further enhance the safety and usability of the *MSI-8000HD*.



Manuals can viewed or downloaded from the Rice Lake Weighing Systems website at [www.ricelake.com](http://www.ricelake.com)

Warranty information can be found on the website at [www.ricelake.com/warranties](http://www.ricelake.com/warranties)

### 1.1 Features

- Meets or exceeds U.S. and international safety and environmental standards
- No license required. Meets U.S./International RF transmission laws
- Rechargeable Lithium Polymer battery provides up to 36 hours operation when fully charged.
- Automatic Power Off conserves battery life by turning off after sensing no activity during set amount of time
- The enclosure is IP68/NEMA Type 4 for outdoor use
- The enclosure is built with rugged construction throughout with shock cushioning on the corners
- Six, 1" (31 mm), LCD digits for clear load readings
- Selectable units for kg/lb/Tons (US Short)/Metric Tons/kiloNewtons
- Automatic or manual weight totalization for loading operations
- Eight setpoints can be set for in-range load/weight value for operator alerts or process control
- ScaleCore technology provides quick and easy firmware updates and calibration/setup backup
- Optional hard-wired link for applications where RF is not allowed



## 1.2 Safety

### Safety Signal Definitions:



Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. Includes hazards that are exposed when guards are removed.



Indicates a potentially hazardous situation that, if not avoided, could result in serious injury or death. Includes hazards that are exposed when guards are removed.



Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury.



Indicates information about procedures that, if not observed, could result in damage to equipment or corruption to and loss of data.

### General Safety



Do not operate or work on this equipment unless this manual has been read and all instructions are understood. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Rice Lake Weighing Systems dealer for replacement manuals.



*Failure to heed could result in serious injury or death.*

*Do not allow minors (children) or inexperienced persons to operate this unit.*

*Do not stand near the load being lifted as it is a potential falling hazard. Keep a safe distance.*

*Do not use for purposes other than weight taking or dynamic load monitoring.*

*Do not use any load bearing component that is worn beyond 5% of the original dimension.*

*Do not use any associated lifting product if any of the load bearing components are cracked, deformed or show signs of fatigue.*

*Do not exceed the rated load limit of the associated Scale/Dynamometer unit, rigging elements or the lifting structure.*

*Do not allow multi-point contact with the hook, shackle or lifting eye of the associated Scale/Dynamometer unit.*

*Do not allow high torque on the Scale/Dynamometer unless it is specifically designed for high torque.*

*Do not make alterations or modifications to the unit or associated load bearing devices.*

*Do not remove or obscure warning labels.*

*For guidelines on the safe rigging and loading of overhead scales and dynamometers, read the MSI Crane Scale Safety and Periodic Maintenance Manual, PN 153105.*

*Keep hands, feet and loose clothing away from moving parts.*

*There are no user serviceable parts within the MSI-8000HD. Any repairs are to be performed by qualified service personnel only.*



## 1.3 Front Panel Description

The *MSI-8000HD* front panel, keys and annunciators, are described in Table 1-1.



Figure 1-1. MSI-8000HD Front Panel=

Item No.	Description
1	<b>Function 1 Key</b> – programmable to user selectable functions, see <a href="#">Section 4.2 on page 10</a> . Default is <i>Off</i> . Functions as the <b>Enter/Select</b> key when in the setup menus.
2	<b>Function 2 Key</b> – programmable to user selectable functions, see <a href="#">Section 4.2 on page 10</a> . Default is <i>Off</i> . Functions as the <b>Scroll</b> key in the setup menus.
3	<b>Function 3 Key</b> – pre-programmed to <b>Print</b> and cannot be changed. See <a href="#">Section 6.2 on page 23</a>
4	<b>Center of Zero</b> – indicates that the scale is zeroed.
5	<b>Standstill</b> – indicates that the load has settled with in the motion window (usually $\pm 1d$ ). When this symbol is off, the scale will not zero, tare or totalize.
6	<b>LED Functions</b> – Indicates the current displayed function. Example, if F1 blinks, the peak hold reading is captured. If F2 blinks, the Display and Function Test reading is captured.
7	<b>Total</b> – indicates the RF Linked Device is displaying the total accumulated weight. This is a temporary display lasting less than 5 seconds. <b>Peak</b> – indicates the RF Linked Device is in the peak hold mode. <b>Net</b> – indicates the RF Linked Device is in the Net load mode. A tare weight is subtracted from the gross load. <b>Metric Ton</b> – in conjunction with the Ton annunciator, indicates the RF Linked Device is displaying Metric Tons. <b>Ton</b> – illuminated, indicates the RF Linked Device is displaying in U.S. Short Tons (1 ton = 2000 lb.). When illuminated with M the RF Linked Device is displaying in Metric Tons (1 metric ton = 1000 kg) <b>Kilonewtons</b> – indicates load display is in kilonewtons. <b>Kilograms</b> – indicates load display is in kilograms. <b>Pound</b> – indicates load display is in pounds.
8	<b>Setpoints</b> – user programmable setpoints for overload warnings. Setpoints 1 and 2 are red high brightness LEDs
9	<b>Multiple sensors</b> – number lit indicates the sensor displayed. If more than one number is lit, sensors are being summed. <i>Example: if both numbers 1 and 2 are lit, then the weight displayed equals the sum of sensor 1 and sensor 2.</i>
10	<b>Display digits</b> – six 1.22" (31 mm) sunlight visible LCDs
11	<b>Power Key</b> – turns indicator on and off When the indicator is in setup mode, cancels action and returns to prior level without saving
12	<b>Zero Key</b> – zero any residual load on the scale In setup mode, stores changes and returns to the prior level
13	<b>Tare Key</b> – removes current load value, puts system in <i>Net</i> weight mode
14	<b>Low Battery</b> – indicates battery power is low

Table 1-1. Keypad Functions

## 1.4 System Configurations

The *MSI-8000HD RF Indicator* models and part numbers are listed below.

Part No	Description	Notes
<b>Non RF Versions</b>		
158427	MSI-8000H, 85-265VAC, 2 A/D Inputs	Common non-RF version
158428	MSI-8000HD, INT Lithium Ion Battery Powered, 2 A/D Inputs	Tote handle included. Requires a charger.
160478	MSI-8000HD, 7-36VDC Non-isolated, 2 A/D Inputs	Best for external 12V-24V SLA batteries
159380	MSI-8000HD, 9-36VDC Isolated, 2 A/D Inputs	Industrial power systems 12VDC-24VDC
159381	MSI-8000HD, 18-72VDC Isolated, 2 A/D Inputs	Hi-V forklifts 24VDC-72VDC
<b>RF Versions</b>		
158425	MSI-8000HDRF digital weight indicator, 2 A/D inputs, RF out, AC powered	Common RF version
158426	MSI-8000HDdigital weight indicator, 2 A/D inputs, RF out, battery powered	Tote handle included. Requires a charger.
160478	MSI-8000HD digital weight indicator, 2 A/D inputs,	Best for external 12V-24V SLA batteries
159378	MSI-8000HD-2, 9-36VDC Isolated, RF, 2 A/D inputs	Industrial power systems 12VDC-24VDC
158379	MSI-8000HD-2, 18-72VDC Isolated, RF, 2 A/D inputs	Hi-V forklifts 24VDC-72VDC

Table 1-2. System Configurations

## 1.5 Options

Part No.	Description	Notes
155173	Option kit, tilt stand 8000HD	
155193	Option kit, Ethernet (Hard Wired)	RJ-45 cable (not included).
162160	Option kit, Wi-Fi 8000HD, 802.11b	Requires an external coax cable for externally mounted antenna. (not included)
162161	Option kit, Wi-Fi 8000HD-1 802.11b	Uses top TNC connector for antenna.
158779	Option kit, 2 coil relays, 250VAC / 30VDC 4A	Includes 4m cable
158780	Option kit, 2 SS relays 60VPK 2.7A (AC OR DC)	Includes 4m cable
158781	Option kit, 2 SS relays 200VPK 0.4A (AC OR DC)	Includes 4m cable
155352	Option kit, custom relays and fuses	Allows other SSR options and combination of relay types.
149549	8000 battery charger, U.S. plug	—
149550	8000 universal battery charger, International plugs	Comes with plugs for U.S., Europe, UK, Aus, China
182223	8000 battery vehicle charger	Plugs into the 12VDC or 24VDC cigarette lighter outlet
162178	Option kit, remote standard antenna	Allows remoting the standard antenna included in all RF 8000HDs.
--	Option Kit, Extended Relay	Allows for up to eight relays; see <a href="#">Section 6.7.2 on page 31</a>
139310	Antenna kit, corner reflector, 9dBi with 3m coax	Intended for directional wall or mast mounting (up to 2" Ø). Beamwidth: 75° Elevation, 65° Azimuth
139311	Antenna kit, corner reflector, 12dBi with 3m coax	Intended for directional wall or mast mounting (up to 2" Ø). Beamwidth: 50° Elevation, 36° Azimuth
139312	Antenna kit, YAGI, 15dBi with 3m coax	Highly directional wall or mast mounting (up to 2" Ø). Beamwidth: 30° Elevation, 34° Azimuth
139313	Antenna kit, vehicle mount, 5dBi with 5m coax	Omnidirectional. Mounts in 3/4" Hole.
	Lithium Ion battery, internal with external charger	—
	Lithium Ion battery, internal with 90-264 VAC combination	—
	Ethernet, 100baseT hardwired	—
	Relay, one 1 form	—
	Audible alarm	Not compatible with battery versions
	4 channel/sensor inputs	—
	Angle bracket	for desktop and wall mounting
	Wireless computer interfaces <ul style="list-style-type: none"> <li>• USB</li> <li>• Serial RS-232</li> <li>• Serial RS-485</li> <li>• Ethernet bridge</li> <li>• WiFi Ethernet</li> </ul>	Used to interface with remote scoreboard displays, networks or directly into a computer using USB.

Table 1-3. Available Options



## 2.0 Operation

The following sections describe the basic operation of the *MSI-8000HD RF Indicator*.

### 2.1 Power

Power the indicator On/Off by pressing .

### 2.2 Zero

The zero key sets the zero reading of the scale to remove small deviations in zero when the unit is unloaded. See [Section 2.3](#) for zeroing (taring) a package, rigging or pallet weights.

- When using multiple scales, ensure the scale to be zeroed is displayed.
- Zero works in Gross or Net mode.
- Zeroing while in Net mode will zero the gross load causing the display to show a negative tare value.
- The scale must be stable within the motion window and  is lit before it will zero. The scale will remember that it has a zero request for two seconds. If a motion clears in that time, it will zero.
- The scale will accept a zero setting over the full range of the scale. Zero settings above 4% of full scale will subtract from the overall capacity of the scale.

*Example:*

*If 100 lb is zeroed on a 1000 lb scale/Dyna-Link, the overall capacity of the scale/Dyna-Link will reduce to 900 lb plus the allowed over-range amount.*

Press . The weight must be stable within the motion window for the zero function to work.

### 2.3 Tare

Tare is used to zero out a known weight such as rigging, a container or pallet and display the load in *Net* weight.

The backup memory in the unit stores the tare reading, and can restore it even if power fails.

#### 2.3.1 Tare and Display the Net Load

1. Load the weight that needs to be tared onto the scale.
2. Press . The weight display changes to 0 and *Net* is displayed.

#### 2.3.2 To Clear the Tare and Revert to Gross Load

Press . *Net* turns off indicating the unit is in gross mode.

- Only positive gross load readings can be tared.
- Setting or changing the tare has no effect on the gross zero setting.
- Taring will reduce the apparent over range of the scale.

*Example:*

*When taring 100 lb of rigging on a 1000 lb scale, the scale will overload at a net load of 900 lb (1000-100) plus any additional allowed overload (usually about 4% or 9 d).*

To view the gross load without clearing the tare value, a F-key can be programmed *Net/Gross*. See [Section 4.2](#) on page 10.

## 3.0 Installation

### 3.1 Unpacking

When unpacking the *MSI-8000HD*, ensure that all parts are accounted for and check for any visible damage. If any parts were damaged in shipment, notify Rice Lake Weighing Systems and the shipper immediately. If the *MSI-8000HD* must be returned, it must be properly packed with sufficient packing materials. When possible, retain the original carton when shipping the unit back.

### 3.2 Getting Started

The *MSI-8000HD* is most often shipped pre-configured with another MSI RF device. If the *MSI-8000HD* is purchased separately, or is to be used with a different system, then the RF transceivers will have to be paired. Follow the RF Setup Procedure in Section 6.3 on page 25.

Once the RF setup is complete for the *MSI-8000HD*, the system will automatically connect with a scale/Dyna-Link. It is recommended to do a site survey to identify operating range and usability of the RF Link. Position the scale/Dyna-Link at an average operational height, and then try the link at various positions and distances. The range may vary by the rotation of the scale/Dyna-Link. The range may vary by the rotation of the scale/Dyna-Link, as well as the site and installation variables.

#### Battery Charging

For indicators with an optional battery, fully charge the battery by plugging the charger into the charge port. Depending on the discharge level of the battery this can take up to six hours.



Figure 3-1. Battery Charger

### 3.3 Opening the Enclosure

The indicator enclosure must be opened to connect the scale load cell cable and other interface connections.



**WARNING** Before opening the unit, ensure the power cord is disconnected from the power outlet.

1. Disconnect the power to the indicator.
2. Place the indicator face down on an anti-static work mat.
3. Remove the screws that secure the backplate to the enclosure.
4. Lift the backplate away to access the boards and set it aside.

### 3.4 Wiring

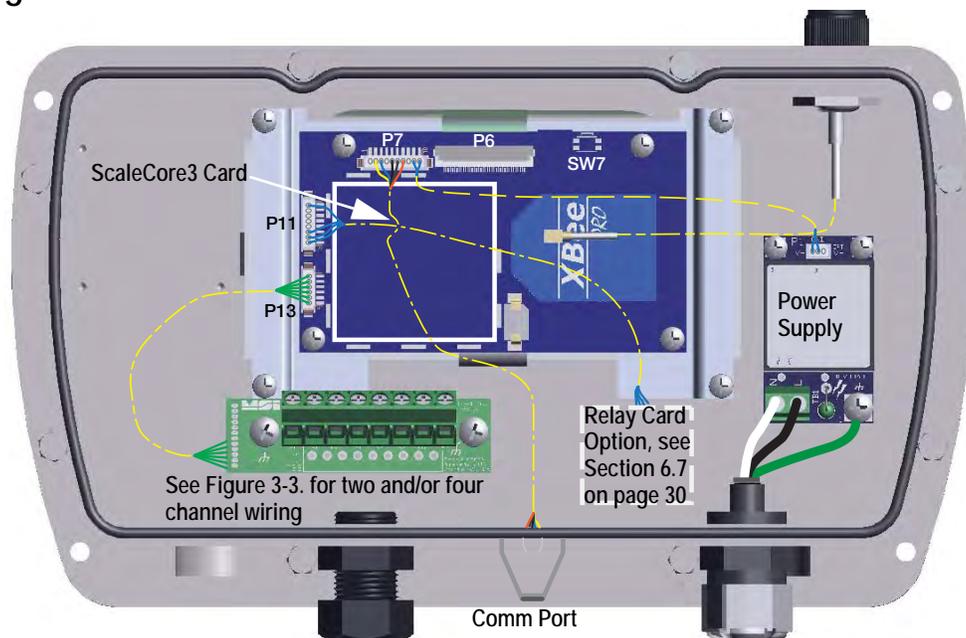


Figure 3-2. Inside of Enclosure

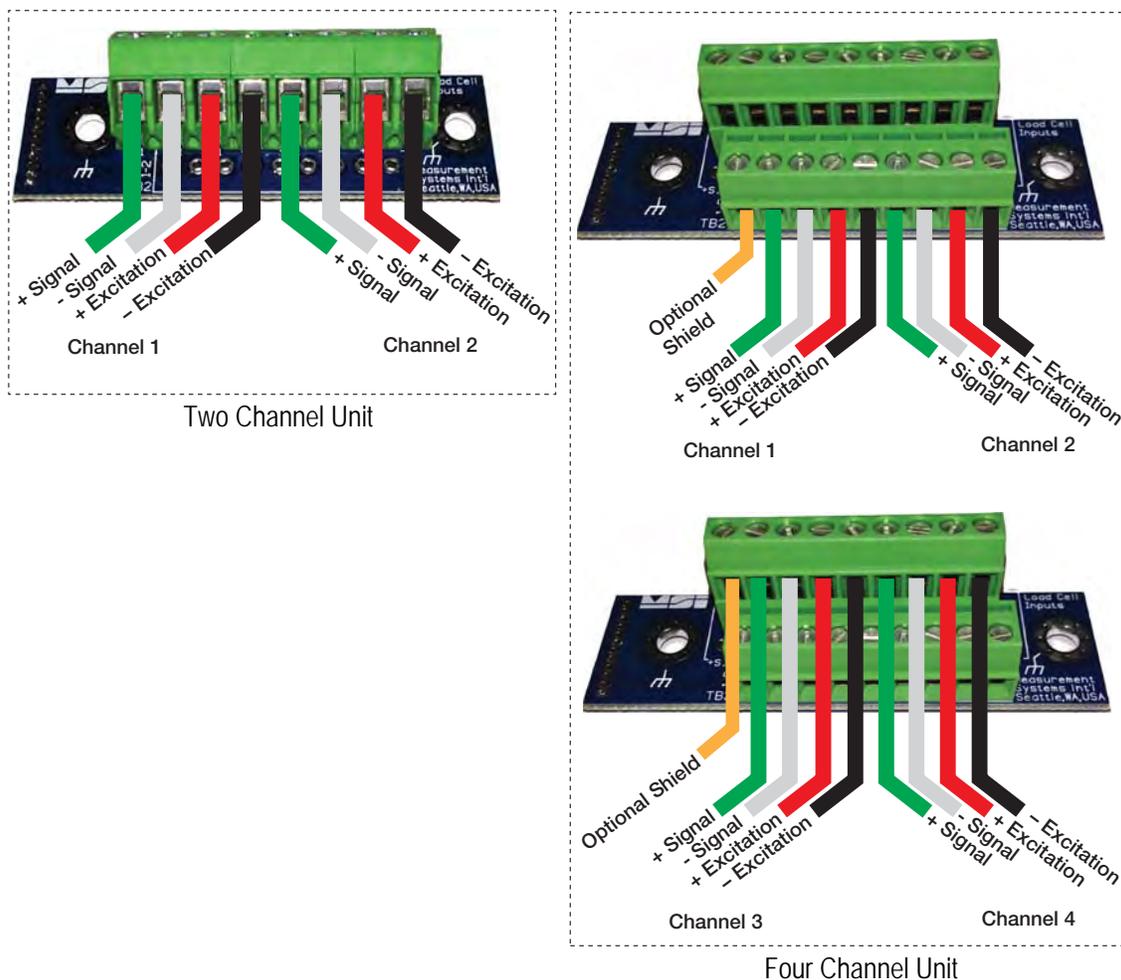


Figure 3-3. Wiring Diagram

## 3.5 Mounting the MSI-8000HD

The *MSI-8000HD* can be mounted directly to a wall or panel using the four holes in the corners of the unit or by using an optional tilt stand, can be mounted to a wall or counter top.

### 3.5.1 Mounting with Tilt Stand

A tilt stand is shipped with the *MSI-8000HD* for mounting. It can be mounted on a desk, counter or table. It can also be mounted to a wall or panel and the *MSI-8000HD* can be rotated for easy viewing.

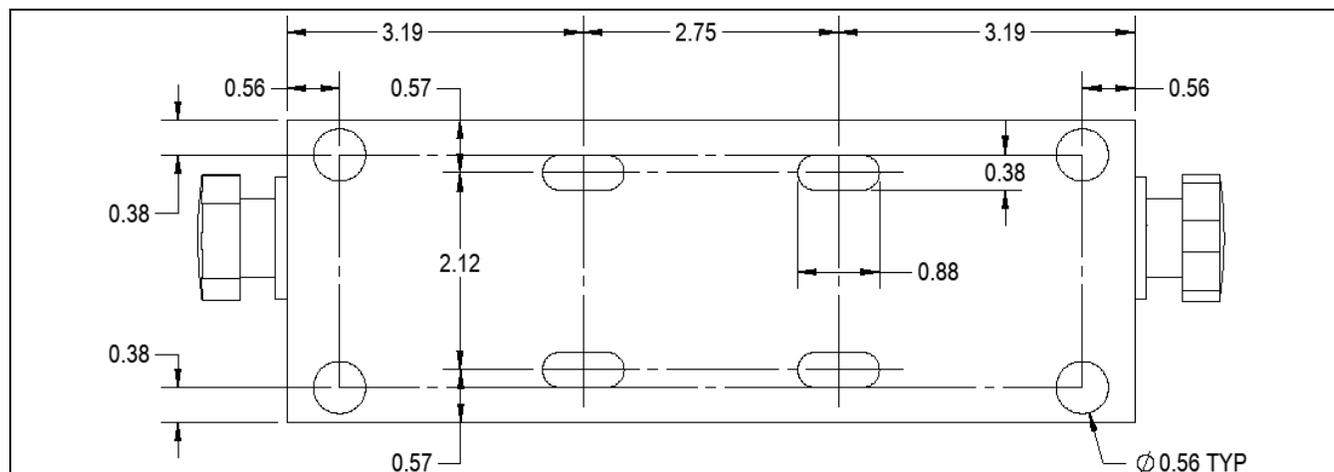


Figure 3-4. Tilt Stand – Bottom Dimensions

To secure to one of the options above:

1. Using the tilt stand, mark holes as needed.
2. Drill the holes for the hardware being used.
3. Secure the tilt stand to the surface. If mounting to a wall or panel, ensure it is mounted horizontally.
4. Install the *MSI-8000HD* into the tilt stand at an angle that will allow easy viewing.

### 3.5.2 Direct Mounting

The *MSI-8000HD* can be mounted directly to a wall or panel using the four holes in the corners of the unit.

1. Hold the remote display against the wall or panel where it is to be mounted.
2. Mark the hole location. This can also be done by measuring according to the dimensions in [Figure 3-5](#).
3. Drill the holes as needed.
4. Align the unit with the holes and secure with the appropriate hardware.

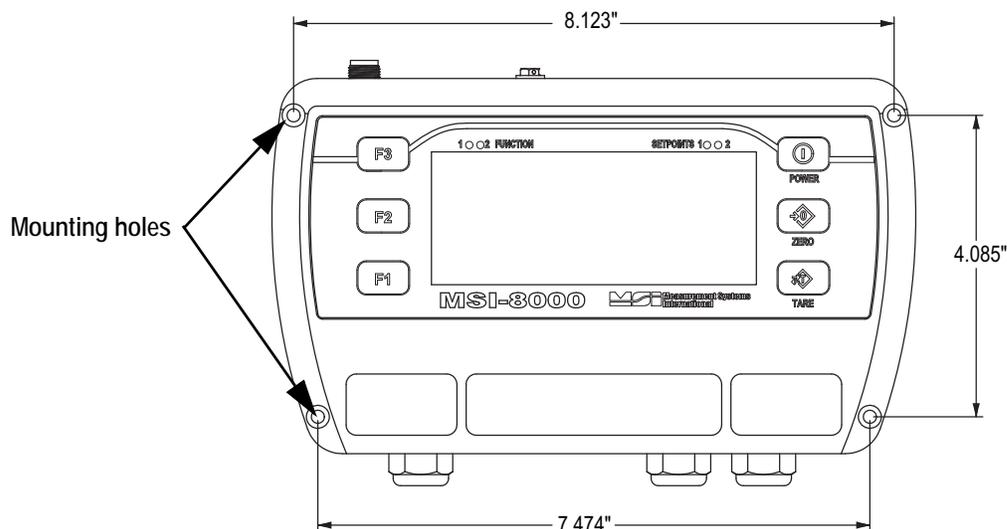


Figure 3-5. Mounting Hole Dimensions

## 4.0 Setup

The front panel keys will work, as shown below, when navigating through the menus during set up.

- Press  to enter or select a parameter.
- Press  to scroll through the parameters.
- To enter a decimal point, press  while the digit is blinking.
- Press  to save and go back one level or to weigh mode. Store displays briefly.
- If a wrong value is entered, press  to step back one digit and press  to change the digit.
- Press  to exit without saving changes.

### 4.1 Setup Menu

To enter the setup menu, press the  and  at the same time.

Parameters	Choices	Description
Func1 Func2		Function key 1 – Configurable to listed parameters; Default <b>OFF</b>
		Function key 2 – Configurable to listed parameters; Default <b>OFF</b>
	Off	No function is assigned. The F-Key is disabled.
	tEst	Test – runs an LCD test. See <a href="#">Section 4.2.1</a> .
	totAl	Total – accumulates multiple weighments. See <a href="#">Section 4.2.2</a> .
	v-ttl	View total – activates the total weight display followed by the number of samples. See <a href="#">Section 4.2.2</a> .
	nEtGr	Net/Gross – toggles between Net and Gross modes. See <a href="#">Section 4.2.4</a> .
	P-HLd	Peak Hold – automatically updates the display when a higher peak weight reading is established. See <a href="#">Section 4.2.5</a> .
	2Unit	2 Units – switches the force units between pounds and kilograms. See <a href="#">Section 4.2.6</a> .
	5Unit	5 Units – scrolls through all available units: lb, kg, Tons (US Short), Metric Tons, and kiloNewtons. See <a href="#">Section 4.2.6</a> .
	HirEs	Hi Res – makes the indicator more sensitive to motion and movement resulting in a less stable display. See <a href="#">Section 4.2.7</a> .
	Print	Print – outputs a configured text string to the RS-232 port on the base of the Dyna-Link. See <a href="#">Section 4.2.8</a> .
	tArE	Tare – not used, <i>MSI-8000HD</i> has a dedicated tare key
	Scan	Scan – displays connected scan channels in order.
Add.Ld	Add Loads – changes the summing mode See Section 4.2.10 on page 12.	
A-OFF	Off 15 30 45 60	Auto Off – prolongs the battery life of the scale by turning power off after the set time (in minutes) that the scale is not in use. See Section 4.3 on page 12.
StPt1-8	GrEat	Greater Than – setpoint will trigger when the tension exceeds the value.
	LESS	Less Than – setpoint will trigger when the tension is less than the value.
	OFF	Off - the setpoint parameter is disabled.

Table 4-1. Setup Menu Parameter Descriptions

Parameters	Choices	Description
Output		Relay Output – dependant on the application being used
	Latch	Latch – if power is lost, the relay retains it's settings
	Coil	Coil – needs power to remain position
b.life	Stand LonG	Battery Life – sets the options for standard or extended battery life. See
Stand	indUs Hb-44 r-76 1Unit	Standards – sets the industry standard to be used.
Total	Off	Total Accumulation - sets the choice for weight accumulation for a single scale. See Section 4.2.2 on page 11. When set to off, it's disabled.
	ttlOn	Total On - Is a manual choice for accumulation. See Section 4.2.2 on page 11.
	A. Load A. LAST H. HIGH	Auto Total - Choices for setting automatic accumulations.
Filter	Off LO H r1 H r2	Weight Filter – allows the scale to adjust to situations where there may be movement
Unit	lb kg Ton Mton kN	Weight Units – toggle units between pounds and kilograms

Table 4-1. Setup Menu Parameter Descriptions (Continued)

## 4.2 Function Keys

There are two programmable function keys on the *MSI-8000HD*, F1 and F2.

- Function key setup is independent of the connected scale function keys.
-  and  are standard on the *MSI-8000HD* and do not need to be programmed.
- If a function key does not work, the connected Scale/Dyna-Link may not be set up to support the key.

*Example: If the Function key is set for TOTAL, then TOTAL mode setup in the Setup Menu must also be set up for the target scale.*

To set a function key use the following steps:

1. Press  and  at the same time, Func1 will display.
2. Press  to scroll to the function key to be programmed.
3. Press . The currently saved parameter will display.
4. Press  to scroll through the choices.
5. Press  to select the desired choice.
6. Press  to save and exit.

### 4.2.1 Test

To run a test, press the F-key that has been programmed to *Test*. The display will automatically scroll through the following:

- Light all LCD segments and the LEDs
- SoFt followed by the version number
- bAtt followed by the battery level in volts
- d.tESt followed by counting from 00000 to 99999
- C-CAL followed by the c-cal value

The test can be single stepped by:

1. Press the F-key set to test, immediately press  to stop the auto scroll.
2. Use  to scroll through the steps and  to view the step value.
3. Press  to abort the test at any time.

Internal tests are also performed, if any test fails, an error code is displayed. See Section 7.2 on page 36 for a description of all error codes.

### 4.2.2 Total

1. Ensure the total mode has been programmed in the setup menu. If this has not been setup the F-Key assigned to *TOTAL* will not work.
2. Program an F-key to Total. See Section 4.2 on page 10.
3. Press Fx-Total to perform the total function that was set in Section 4.6 on page 14.



*This feature should not be confused with the ttl.rd (Total Remote Devices) function, which will add weight from two or more load sensors.*

### 4.2.3 View Total

Displays the total weight followed by the number of samples.

1. Program an F-key to View Total. See Section 4.2 on page 10.
2. Press Fx-View Total to view the total on scale and the number of samples.

### 4.2.4 Net/Gross

1. Program an F-key to Net/Gross. See Section 4.2 on page 10.
2. Press Fx-Net/Gross to switch between gross and net mode (gross minus tare). Fx-Net/Gross only functions if a tare has been established.

The operator can switch back to gross from net without clearing the tare value. Only clearing or setting a new tare will change the tare value held before switching into gross mode.

### 4.2.5 Peak Hold

Peak hold uses a high speed mode of the A/D converter allowing it to capture transient loads at a far higher rate than typical scales.

- Peak Hold is cleared and enabled by pressing Fx-Peak Hold.
- When a new peak is detected, the Fx-Peak Hold LED will flash three times.
- The accuracy of the system in peak hold is slightly reduced to 0.2% of capacity + 5d.
- The filter setting is turned off while in peak hold mode to ensure the fastest acquisition rate.

*Example*

*The Peak Hold function is useful in Dynamic and Fall tests. Common tests include Overall Breaking Strain (OBE), Breaking Force, and Cycled Breaking Strain.*

## Capture Peak Force

1. Program an F-key to **Peak Hold**, (see Section 4.2 on page 10).
2. Prepare the stand test and test sample.
3. Press .
4. Press **FX-Peak Hold**, confirm that Pk is lit on the display.



**Note** *A small jump in the reading may occur depending on the stability of the test device.*

5. Apply the test weight. The **FX-Peak Hold** LED will blink three times when a new peak ID is detected.
6. Remove the weight and the peak value will be recorded.
7. To run a new test, press **FX-Peak Hold** to clear the peak value. Repeat steps 3 to 6.

### 4.2.6 2Unit/5Unit

Program an F-key to either **2-UNIT** or **5-UNIT**. See Section 4.2 on page 10.

Press the **2-UNIT F-key** to switch the force units between lb and kg.

Press the **5-UNIT F-key** to scroll through all available units: lb, kg, tons (U.S. short), metric tons, and kilonewtons.

### 4.2.7 High Resolution



**Note** *Only available with the MSI-7300 Dyna-Link (refer to the Dyna-Link manual PN 152160).*

*Program an F-key to Hi-Res, (see Section 4.2 on page 10).*

When set to **on**, the filter is automatically set to the Hi-1 setting (if Hi-2 is already set, then the filter is not changed). This will have a small effect on settling time. When set to **off**, the filter setting resets to the previous filter setting.

Pressing **Fx-Hi-Res** places the display into a temporary high resolution mode. This mode continues until **Fx-Hi-Res** is pressed again, or power is cycled. While in the Hi-Res mode the appropriate **Fx-Hi-Res** LED will blink continuously at a slow rate.

Hi-Res mode does not increase the accuracy, but allows for smaller weight incrementation to be displayed.

Use  or  to zero out any initial error.

### 4.2.8 Print

The Print function is set to F3 on the *MSI-8000HD*, so there is no need to program F1 or F2 to Print. Then pushing F1 or F2 on the scale will cause the Communications Port on the Remote to output the selected data string.

If an F-Key is programmed as Print and the Print Setup is configured as continuous, then the **F3-Print** key is used for Start Print/ Stop Print. See Section 6.2 on page 23 for more details on data output.

### 4.2.9 Scan

Scan each channel to switch scales to view weights. See Section 6.4.2 on page 27.

### 4.2.10 Add Load

Turns on the summing of channels. See Section 6.4.3 on page 27.

## 4.3 Auto-Off

The Auto-Off feature prolongs the battery life by powering off the unit when not in use. When a button is pressed or the detected load is in motion exceeding 10d, the time limit is reset. When disabled, the unit will remain on and only turn off when the power key is pressed or the battery dies.

Use the following steps to set the Auto-Off function:

1. Press hold  and , **Func1** will display.



2. Press  to scroll to **A-OFF**.
3. Press . The currently saved parameter is displayed.
4. Press  to scroll through the choices.
5. Press  to select the desired choice.
6. Press  to save and exit.

## 4.4 Setpoints

The *MSI-8000HD* supports eight setpoints. Common uses of set points are for warnings or process control. The unit comes standard with two red LED outputs that are triggered by either setpoint 1 or 2. There is an audible output option that is triggered by setpoint 1.

Setpoints 3 through 8 do not trigger an indication on the *MSI-8000HD*, but can be set to control relays and sent to other peripheral devices either through RS-232 or wireless communication. These additional setpoints can then be used to control relays or trigger indications in the peripheral devices.

Contact Rice Lake Weighing Systems for other setpoint output options.

Setpoint	Description
<b>Setpoint Mode</b>	
Off	Setpoint is not activated
Great	Indicates the setpoint will trigger when the weight exceeds a set value
Less	Indicates the setpoint will trigger when the weight is less than a set value
<b>Setpoint Weight Type</b>	
netgr	responds to net or gross weight
Gross	responds to gross weight regardless of the display
total	responds to the totaled weight
t-cnt	responds to the total count (number of samples)
LFcnt	responds to the number of times the weight has exceeded 25% of capacity

Table 4-2. Available Setpoint Settings

To set the setpoint:

1. Press and hold  and . Func1 displays.
2. Press  to scroll to the desired setpoint (stpt1 - 8).
3. Press . The current setpoint mode is displayed.
4. Press  to scroll to the setpoint mode desired.
5. Press . The current setpoint weight type is displayed.
6. Press  to scroll to the desired weight type.
7. Press . The current setpoint weight value is displayed.

8. Press  to scroll the numbers and  to enter each digit.
9. When the correct value is displayed, press . The next setup menu item is displays.
10. Press  to exit setup and store the settings.



To enter a decimal point, press  while the digit is blinking. To correct a digit, press  to step back.

## 4.5 Output

Relay output allows the selection of Latch or Coil relays.

- Latch relays retain position even if the power fails,
- Coil relays reset when power fails.

### IMPORTANT

*In the event of a power failure, the Latch relay uses continuous battery power and will deplete the battery more quickly than the coil relay.*

## 4.6 Total Mode

For the accumulation of multiple weighments, the Total function uses the displayed load, so gross and net readings can be added into the same total.

There are four modes of totalizing, a manual and three auto modes.

All modes require that the weight on the scale return below 0.5% (relative to full scale) of **Gross Zero** or **Net Zero** before the next weighment can be added. Applied weight must be  $\geq 1\%$  of full scale above **Gross Zero** or **Net Zero** before it can be totaled.

### Manual Total

Manual Total (ttIO) adds a current weight to a previously accumulated value manually. To add weight to the total it must be greater than 1% of capacity and not yet totaled. This assures that a weight on the scale is only added to the total once.

1. Program a F-key to Total. See Section 4.2 on page 10.
2. With the weight to be added on the scale, press F-Total. The acknowledge LED blinks to indicate the weight was accepted and the **TOTAL** annunciator lights. Then the total weight is displayed for five seconds and the number of samples is displayed for two seconds.
3. Repeat steps 1 & 2 until all weight samples have been added.



*Total Mode will not function while the scale is in motion, ensure   is on. If the system fails to achieve stable readings, increase the filter setting or increase the size of the scale division (d) in the Init Cal procedure.*

*The F-Total functions as View Total only until the 1% threshold is exceeded to allow the addition to the total value.*

### Auto Total

This mode has three variations which are programmed in the Setup menu.

Program an F-key to **AUTO TOTAL**, it functions as **Auto Total On** / **Auto Total Off**. See Section 4.2 on page 10.

Setpoint	Description
A.Load	Auto Load – ensures any settled load above the Rise Above threshold will be automatically totaled. The scale must fall below the Drop Below threshold before the next total is allowed.
A.Last	Auto Last – takes the last settled weight to auto total with. The total occurs only once the scale goes below the threshold. This allows the load to be adjusted without a total occurring. Once the load is removed, the scale uses the last settled reading for total.
A.HIGH	Auto High – uses the highest settled reading. This is useful for loads that can't be removed all at once.

Table 4-3. Auto Load Selections



## Set Total Mode

1. Press  and  simultaneously. **Func1** will display.
2. Press  to scroll to **Total**.
3. Press . The currently saved total mode is displayed.
4. Press  to scroll through the choices.
5. With choice displayed, press  to select. **Filtr** will be displayed.
6. Press  to exit setup and store the settings.

## Reset Total Load

To reset the total load to zero, press **Fx-Total** again and while the total load is being displayed, quickly press .

## 4.7 Filter

The Filter settings are used to stabilize the weight in an unstable condition. Increasing the filter will improve the stability, however settling times will be longer. The *MSI-8000HD* employs algorithms that speed up large weight changes while still controlling vibration even with high filter settings.

Parameter	Description
Off	Disables filtering function
Lo	Low Filter
Hi-1	High Filter
Hi-2	Very High Filter

Table 4-4. Filter Parameters

Use the following steps to set up filtering.

1. Press  and  simultaneously. **Func1** displays.
2. Press  to scroll to **FILTR**.
3. Press . The currently saved filter value displays.
4. Press  to scroll through the values.
5. With choice displayed, press  to select. **Unit** displays.
6. Press  to save and exit to weighing mode.

## 4.8 Unit

1. Press  and  simultaneously. Func1 displays.
2. Press  to scroll to **Unit**.
3. Press  **Unit** displays with lb or kg in the lower right of the display area.
4. Press  to toggle between lb and kg.
5. With the desired choice displayed, press  to select.
6. Press  to save and exit to weighing mode.

## 5.0 Calibration

The *MSI-8000HD* is calibrated using standard precision test weights. It is required that the weight used is at least 10% of full capacity in order to achieve rated accuracy.

*Example:*

*Use at least a 500 kg test weight to calibrate a 5000 kg capacity unit. The MSI-8000HD RF Indicator supports load cell linearization with up to four span points that can be calibrated in any order. Usually only one cal span point is necessary and is sufficient to reach rated accuracy.*

When adequate test weights are not available, the *MSI-8000HD* can be calibrated using a constant calibration (C-Cal.) See Section 5.2.2.

### 5.1 Calibration Switch

To calibrate the *MSI-8000HD* indicator it must be put into the calibration mode.

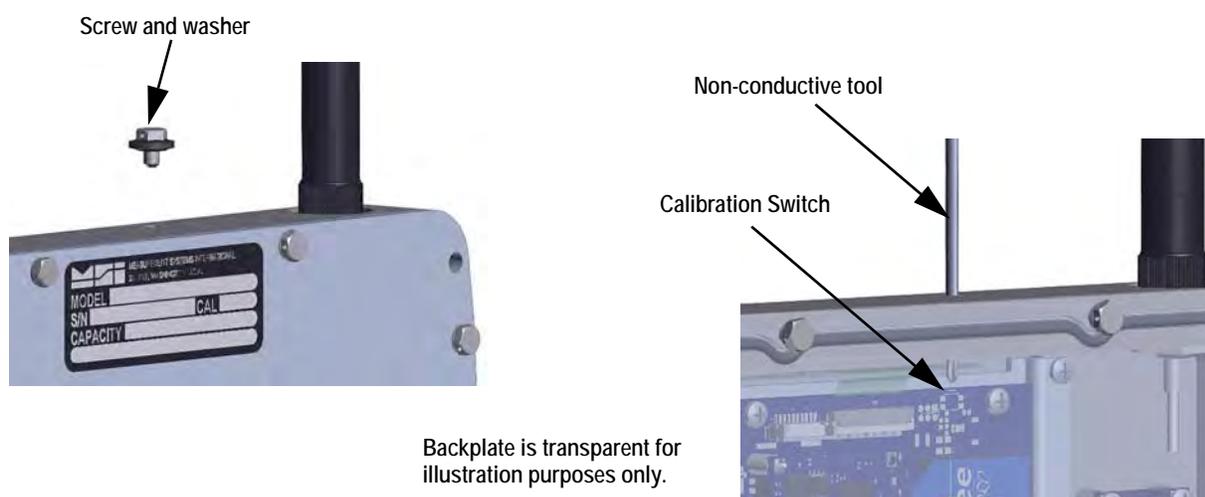


Figure 5-1. Press Configuration Switch

1. Remove screw and washer from the top of the unit.
2. Insert a small non-conductive tool into the hole far enough to press the switch. CAL is displayed.

#### IMPORTANT

*Caution should be used when pressing the configuration switch to avoid damage to the switch and other board components.*

### 5.2 Initial Calibration

Initial calibration is used to setup units, capacity and resolution (d) required for the load cell. Perform a calibration reset which deletes all calibration before initial calibration.

For multiple channel displays, program an *F-Key* to Scan. See Section 4.0 on page 9. Then press the programmed *F-Key* to scroll to the load cell to be calibrated.

#### IMPORTANT

*When a load cell is selected, if LCOFF displays, load cell is disabled. Pressing the calibration switch will enable the load cell.*



**Note** Load cells can also be enabled using the ScaleCore Connect, available on line at [www.ricelake.com](http://www.ricelake.com)

1. Press the calibration switch. See Section 5.1. CAL is displayed.
2. Press **F1**, Unit is displayed.

3. Press **F1**. The default units are displayed.
4. Press **F2** to scroll through the available units.
5. With desired unit displayed, press **F1** to select. **Cap** is displayed.
6. Press **F1**. The default capacity is displayed.
7. To enter a different capacity, press **F2**.
8. Press **F2** to scroll through numbers and **F1** to save the selected numbers.
9. When all numbers have been selected, press **F1** to store the number. **d** is displayed.
10. Press **F1**. The default display divisions are displayed.
11. Press **F2** to scroll through the available display divisions.
12. With desired display division displayed, press **F1** to select. **CaL** is displayed.
13. Proceed with the routine calibration, starting with step 2 of Section 5.2.1.

### 5.2.1 Routine Calibration

For maintenance and routine calibration use the following steps.

1. Press the configuration switch. **CAL** is displayed.
2. Press **F1**, **UnLd** displays.
3. Remove all weight from the scale.
4. Press **F1**, **□** flashes, **Pass** displays momentarily, then **Load1** displays.
5. Load the scale with a precision test weight, for best accuracy a test weight of 10% of capacity or more is recommended.
6. Press **F1**, the capacity of the scale flashes.
7. To enter a test weight other than the capacity, press **F2**.
8. Press **F2** to scroll through numbers and **F1** to save the selected numbers.
9. When all numbers have been selected, press **F1** to store the number. **d** displays. If cal value is within limits, **Pass** displays momentarily, then **Load2** displays.
10. Press **F1** to enter the second load.
11. Add load to scale and press **F1**.
12. Press **F1**, the current weight on the scale flashes.

13. Repeat steps 3 through 10, up to four loads.
14. When all loads are complete, press  to store the calibrations. CaL'd displays.
15. Press  to view the cal number. C-CaL flashes momentarily followed by the C-caL number, record the value, this number will be required if calibrating with C-CaL, see Section 5.2.2.
16. Press . Store displays momentarily, then SETUP displays.
17. Press  to exit calibration. Store displays momentarily, then the unit returns to weigh mode.

Repeat this procedure to calibrate all load cells connected to the *MSI-8000HD*.

### 5.2.2 C-Cal Calibration

When adequate test weights are not available, the scale can be calibrated using a cal number calibration which is referred to as C-Cal. To use C-Cal, a factory generated C-Cal number must be known. Rice Lake supplies replacement load cells with the C-Cal value stamped on the serial number label. When a calibration is preformed with test weights, a new C-Cal is generated.



Figure 5-2. Serial Number Label

The C-Cal number must be known prior to starting this procedure. Rice Lake prints this number on the Calibration Record, the serial number label. C-Cal reduces slightly the accuracy of the system and is intended for non-critical use only. For highest accuracy, calibrate with precision test weights.

1. Press the configuration switch, see Section 5.1. CAL is displayed.
2. Press  to scroll to C-CaL.
3. Press  , UnLd is displayed.
4. Remove all weight from the scale.
5. Press  ,  flashes and Pass will display momentarily. Then C-CaL is displayed.
6. Press  , the last known C-CaL is displayed.
7. To except the number press  and skip to Step 10. To enter a different C-CaL number, press .
8. Press  to scroll through numbers and  to save the selected numbers.
9. When the correct number is displayed, press  to store the number. Pass displays momentarily, then CaL'd.
10. Press . Store displays momentarily, then SETUP displays.
11. Press  to exit calibration. Store displays momentarily, then the unit returns to weigh mode.

## 5.3 Setup

Setup is used to set the desired Industry Standard and Auto Zero Maintenance (AZM).

1. Press the configuration switch, see Section 5.1. **CAL** is displayed.
2. Press  to scroll to **SEtUP**.
3. Press , **StAnd** displays.
4. Press , the current standard setting displays.
5. Press  to scroll through calibration standards selections. See Section 5.3.1 for details of the standards.
6. When desired option is displayed press . **Auto0** displays.
7. Press  to enter Auto Zero Maintenance.
8. Press  to toggle between **On/OFF**.
9. Press  to set on or off. **0.p-Up** displays.
10. Press  to enter zero on power-up.
11. Press  to toggle between **On/OFF**.
12. Press  to set on or off. **StAnd** displays.
13. Press  to return to **CAL**.
14. Press  again to exit calibration. **Store** displays momentarily, then the unit returns to weigh mode.

### 5.3.1 Standard Settings

Below are the four selections in the standards menu.

Standard Type	Description
Industrial INDus	The common setting for the <i>MSI-8000HD RF Indicator</i> . With the Industrial standard, you have full range zero, access to units switching, filters, and peak hold.
Handbook 44 HB44	Sets the scale to enable only approved features per the NTEP HB-44 rules and regulations. Access is denied to Peak Hold, and the zero range may be limited. The Filter menu is moved to the Cal Setup Menu, so filters are only accessible through the Cal Seal.
R-76 R-76	Sets the scale to enable only approved features per OIML R-76. Only kg weight units are available. The zero range is limited to 5% (-2 +3% relative to Calibrate zero). Net/Gross function is temporary. once Net weight is established, pushing an F key set for Net/Gross will cause a maximum 5 second display of the Gross weight. The Tare must be cleared to display Gross weight constantly. Other meteorological aspects are changed to meet R-76 requirements.
One Unit 1 Unit	The one unit standard is exactly the same as Industrial, except unit switching is inhibited. This is useful for Metric only countries. Another use of the One Unit standard is to allow the scale to be calibrated in units other than lb or kg, since conversions are eliminated.

Table 5-1. Standard Settings Parameter

Contact Rice Lake Weighing Systems for more information on the standards settings.

## 5.4 Reset the Load Cell Calibration

To completely remove current calibration, a calibration reset must be performed.

1. Press the F-Key set to scan to scroll to load cell to reset.
2. Press and hold the calibration switch, then press . rESEt flashes.
3. Press , SurE flashes.
4. Press  to reset the calibration for current load cell. CaL displays.
5. Proceed with the Initial Calibration, Section 5.2.

**IMPORTANT**

Pressing  resets all indicator settings to the original factory settings. See Section 7.6 on page 39.



Press the  to cancel reset and return to the previous menu.



## 6.0 Communications Setup

The *MSI-8000HD* uses 802.15.4 transceivers to communicate.

802.15.4 operates in the 2.4GHz systems if:

- Antennas are isolated at least 10' (3 m) from the equipment.
- *MSI-8000HD* based RF systems are peer to peer. For multiple scale connections, the *MSI-8000HD* acts as the network coordinator.

The *MSI-8000HD* uses three numbers to establish a piconet. A piconet is a network that is created using a wireless Bluetooth connection. Table 6-1 lists out the three elements used in setting up a piconet. The *MSI-8000HD* ID is recommended to be in the range of 20-30.

Name	Description	Recommended Number Range
ScaleCore ID	This number is used to identify each device in a piconet. Its range is 0-254 and cannot be duplicated within the same RF channel.	20-30
RF Channel	This establishes the base network that all interconnected devices must match.	12-23
Network ID	This is a 64 bit number that all interconnected devices must match. Do not use a small number to avoid other 802.15.4 transceivers that default to a network ID of 0	Maximum of six digits with a range of 0-99999.
 Note	<i>For all devices that must interconnect, the RF channel and network ID must match. The ScaleCore ID must be unique. The Dyna-Link or crane scale that is the weight source should be set to a ScaleCore ID of 0. Then, if other source devices are added, they can be added in sequence.</i>	
 Note	<i>It is possible to have multiple separate MSI ScaleCore RF networks in the same location. Each device on the same network must be on the same channel, but for best performance, different ScaleCore networks should be on different RF channels.</i>	

Table 6-1. Piconet Setup Ranges

### 6.1 Communications Menu

To enter the *MSI-8000HD RF Indicator* communications menu, press  and  at the same time. Busy may flash momentarily before entering the communications menu.

Parameters	Choices	Description
Print	--	Print – prints a ticket if connected to a printer
rF	--	Radio Frequency, see
Add in9	tno.id	Total Loading - the total number of sensors ranging between 1-4. Default is 1
	add.id	Total Sensors ALL – sum of all remote devices Prirs – sum in pairs (requires four remotes) both – sum in pairs plus grand total vsedef – programmed using a computer program such as Scope off – summing is disabled

Table 6-2. Communications Menu Parameters

String No.	Format	Prints
1	Wt-Unit-Mode ↵	Current weight
2	Wt-Unit-Net ↵	Net weight
3	Wt-Unit-Grs ↵	Gross weight
4	Wt-Unit-Tare ↵	Tare weight
5	Wt-Unit-Total ↵	Total weight

Table 6-3. Print Strings



String No.	Format	Prints
6	#Samples-TCNT ↵	Total count
7	no units or mode ↵	Current weight
8	—	Reserved
9	↵	CR-LF

Table 6-3. Print Strings (Continued)



**Note** Transmission strength should be set to the lowest setting possible to achieve the transmission required. Both the scale/Dyna-Link and the 8000 should be set at the same transmission strength setting.

Setting	RF Power Level	Transmit Current	Note
0	10dBm	137mA	Lowest Transmission Power
1	12dBm	155mA	(default on 7300s and 8000s)
2	14dBm	170mA	—
3	16dBm	188mA	—
4	18dBm	215mA	—

Table 6-4. Transmission Strength Settings

## 6.2 Printer Setup

The RS-232 communications port is capable of outputting load data. All of the RF linked weight device weight modes are available in user formatted form. The control mode program is what controls the *MSI-8000HD* to print and is described in Section 6.2.1.

The communications port settings are independent of any print settings in connected scales. They reside only in the *MSI-8000HD*.

Choices	Description
LiStr	Print setup – select the channel the port will be used with. Options: 0,1, 2
OutPut	Port selection. Select the port to use for communication with the printer; Options Port 0, rF, Port 2
StrnG	String Setup – print string format number entry screen. See Table 6-3
Cntrl	Print Control Options: <b>USer, Load, Cont, Off</b> See Table 6-6.
rAte	Output Rate – print string output rate number entry screen. (0-65536 seconds)

Table 6-5. Print Setup Parameters

### 6.2.1 Control Modes

The user can select four control modes. They are described in Table 6-6.

Mode	Description
User	Printing is controlled by the operator pressing  .
Load	One print occurs when a stable load is read. The scale must return to near zero before another print occurs.  <b>Note</b> Other configurations of load are available using ScaleCore Connect. It can be downloaded from <a href="http://www.ricelake.com">www.ricelake.com</a>
Continuous	The unit will continuously output the data at a rate specified in the rate parameter (up to 65,535 seconds). Setting the interval to 0 will set an interval as fast as the system can go.
Off	Printing is disabled. Power consumption is lower with the print off.

Table 6-6. Control Modes



## 6.2.2 Standard Print Strings

Commands that can be used to format gross, net and print strings are shown below.

Command	Description
<T>	Load data
<U>	Units
<M>	Load mode (lb/kg)
<CRLF>	Carriage return line feed
<SP>	Space

Table 6-7. Standard Print Strings

1	Current load	Fixed output length: 16. Leading zeros suppressed except for the least significant digit (LSD). LOAD<TTTTTT><SP><UU><SP><MMMMM><CRLF>
2	Net load	Fixed output length:16. Leading zeros suppressed except for the LSD. <TTTTTT><SP><UU><SP>NET<SP><SP><CRLF>
3	Gross load	Fixed output length: 16. Leading zeros suppressed except for the LSD. <TTTTTT><SP><UU><SP>GROSS<CRLF>
4	Tare Weight	Fixed output length:16. Leading zeros suppressed except for the LSD. <TTTTTT><SP><UU><SP>TARE<CRLF>
5	Total Weight	Fixed output length: 16. Leading zeros suppressed except for the LSD. <TTTTTT><SP><UU><SP>TTL<CRLF>
6	Number of Samples Totaled	Fixed output length: 16. Leading zeros suppressed except for the LSD. <SP><SP><SP><SP><SP><SP><SSSSSS><SP><T-CNT>SP<CRLF>
7	Current Weight Mode	Net, Gross, Peak, etc <SP><MMMM>CRLF>
8/9	Carriage Return/ Line Feed	Used to add a space between print records. <CRLF>

Figure 6-1. Standard Print Strings

Combinations of the standard print strings can be entered in the string number entry screen.

*Example: To get a Net, Gross, Tare printout with a space between records, enter 2349.*

The ScaleCore Connect application can also be used for custom output strings, it can be downloaded from the Rice Lake website.

The serial output is configured as 9600 baud, Xon/Xoff handshaking, no hardware handshaking, 1 stop bit, no parity. Other baud rates are possible by special order only.

## 6.2.3 Printer Output Setup

Use the following steps to set up the printer string.

1. Press  and  at the same time. Print displays.
2. Press . Listnr displays.
3. Press  to scroll to StrnG displays.
4. Press . The current print string number is blinking.
5. Press  to scroll through the numbers and press  to save and move to the next number.

*Example: If Net, Gross and Tare are to be used for the print string, the entry required would be 2349. The 2 is net, 3 is Gross, 4 is tare and 9 inserts a space before the next print output.*

6. Once all numbers are set, press  to save the print mode. Cntrl displays.

7. Press . The current control mode displays.
8. Press  to scroll through the options.
9. When the desired control mode is displayed, press . rAtE displays.

 **Note** *If control mode has been set to continuous, proceed to Step 13.*

10. Press . The current print rate displays.
11. Press  to scroll through the numbers and press  to save and move to the next number.
12. When number is correct, press . Listnr displays.
13. Press . The current listener value displays.
14. Press  to scroll through the numbers and press  to save and move to the next number.
15. Once the desired value is displayed, press  to save. OutPut displays.
16. Press . The current output displays.
17. Press  to scroll through the options.
18. Once the desired output is displayed, press  to save. strnG displays.
19. Press  three times to exit, StorE displays briefly, then the unit returns to weigh mode.

### 6.3 RF Setup

Allows the setup of the Radio Frequency.

Parameters	Description
On.Off	Enable RF – On/Off, affects continuous mode only.
Scid	ScaleCore ID – range 1-254, (20-30)
Chnl	RF Channel – Range 12-23
nEtid	Network ID – Range 0-999999
StrEn	Transmission Strength – Range 0-4 See Table 6-4
tYpe	Allows the selection of radio card that is being used. For cards other than ZXee us the other selection. <i>0EtEr, 2bEE</i>
Hold	When set to On, the radio continues to use power. This will use the battery power faster. Default is set to OFF.

Table 6-8. RF Setup Parameters

Use the following steps to set up the RF menu parameters.

1. Press  and  at the same time, Print is displayed.
2. Press  to scroll to RF.

3. Press **F1**. On/Off displays.
4. Press **F1**. The currently saved parameter is displayed.
5. Press **F2** to toggle between on and off.
6. With **On** displayed, press **F1**. Scid (ScaleCore ID) displays. Off is only used when the *MSI-8000HD* is hardwired to a Dyna-Link.
7. Press **F1**. The current ScaleCore ID displays.
8. Press **F2** to scroll through the numbers and press **F1** to save and move to the next number.
9. When the desired value displays, press **F1**. Chnl displays.
10. Press **F1**. The current channel displays.
11. Press **F2** to scroll through the numbers and press **F1** to save and move to the next number.
12. When the desired value displays, press **F1** to store the number. netid displays.
13. Press **F1**. The current network ID displays.
14. Press **F2** to scroll through the numbers and press **F1** to save and move to the next number.

**Note**

*Rice Lake Weighing Systems recommends at least a four digit for the Network ID, to ensure there are no conflicts with any other 802.15.4 networks*

15. When number is correct, press **F1** to store the number. stren displays.
16. Press **F1**. The current strength displays.
17. Press **F2** to scroll through 0-4.
18. When the number is correct, press **F1**. type is displayed.
19. Press **F1**. The current type displays.
20. Press **F2** to scroll through values.
21. With selected value displayed, press **F1**. Hold is displayed.
22. Press **F1**. The current setting displays.
23. Press **F2** to toggle between on and off.



24. When the selection is correct, press  to store the number. On/Off displays.

25. Press  to save and exit the RF menu.

26. Press  to exit to the Communication menu.

## 6.4 AD Inputs

To set the *MSI-8000HD RF Indicator* up as a Remote display, please see the *MSI-8000HD Remote Display* manual, available at [www.ricelake.com](http://www.ricelake.com)

### 6.4.1 Set the Total Number of Load Cells

1. Press  and  at the same time. Print displays.

2. Press  to scroll to **Adding**.

3. Press . tmo.Ld displays.

4. Set the number of load cells attached (2-4) by pressing  to scroll through the numbers and press  to save and move to the next number. This number does not include the *MSI-8000HD* or modems.

5. When the number is correct, press . add.Ld displays.

6. Press . The current summing mode displays.

7. Press  to scroll to the desired summing mode. [Section 6.4.3](#).

8. Press  to save.

9. Press  twice to exit to the weighing mode.

### 6.4.2 Scan Weight Inputs

1. Program F1 to the *ScFn* function, and F2 to the **Add.Ld** function for summed sensor readings. See [Section 6.4.3](#).

2. The current channel is displayed, press  to change to the next channel. The scan channel number is displayed briefly, then the scan channel weight is displayed.

3. Press . In a two sensor system the scan returns to the first channel (0).

### 6.4.3 Load Totaling Settings

There are four different types of load totaling modes.

#### All

All channels are added together, press **Fx-Add.Ld** to view the sum of all sensors connected. Pressing **Fx-Add.Ld** again confirms that the summed channels are being displayed, by briefly displaying **add.Ld** (total remote sensor devices).



*If the sum is the only thing to be observed, disable the Scan function key using the function key setup menu (Section 4.2 on page 10).*



## Pairs

Used with four sensor systems, scrolling through the channels with **Fx-Add.Ld**, they will be presented as separate weights first and then as pairs. This display is preceded by the LCD message **Pair1** and **Pair2**.

## Both

This mode displays both the pair totals and the overall total. Each press of **Fx-Add.Ld** scrolls through the summed combinations. First **Pair1**, then **Pair2** then the sum of all connected sensors is displayed.

## Off

Sensor summing disabled. A function key set to **add.Ld** is unnecessary.

1. Program an F-key to the **ttl.rd** function. See Section 4.2 on page 10. The current channel is displayed.
2. Press **Fx-ttl.rd**. **Ad.All** is displayed briefly, then the summed total.
3. Continue pressing **Fx-ttl.rd** to view all enabled sum types.

## 6.5 Zero and Tare in Multiple Load Cell Systems

The channel that is displayed is considered the **Focus Channel**. Pressing  or  will only affect the displayed channel. When displaying summed channels, **ZERO** or **TARE** commands will be sent to all devices that contribute to the displayed weight.

### Example:

*If in the BOTH modes, and displaying pair 1 (sum of SC0 and SC1), pressing **ZERO** will zero only SC0 and SC1.*

*If displaying the grand total using the ALL mode, then pressing **ZERO** will zero all connected sensors.*

### Using the Tare function:

*If one device is tared in the individual display mode, the summed weight will be the sum of a Net and a Gross weight.*

*If **TARE** is pressed when displaying any of the summed modes, all devices that add to the current display are tared and placed in NET mode.*

## 6.6 Communications Port Hardware

The *MSI-8000HD RF Indicator* RS-232 communication port is used for software updates, connecting to a remote display and for connecting to any RS-232 device.

**Connector:** M12 industrial IP67 rated. An adapter cable (PN 150964) is required to connect the *MSI-8000HD RF Indicator* to a computer. This adapter cable converts the 8000 connector to a standard D9 serial connector. The 503489 cable can be converted to DTE by using a Null Modem adapter.

**Data Configuration:** The data output is fixed at 8-1-N.

**Baud Rate:** Programmable for 300 to 230.4 k baud in 8 steps. The bootloader for updating software is always 38.4 k baud

**Handshaking:** No hardware handshaking is supported. Xon/Xoff software handshaking is always on.

This configuration plugged into a standard DTE connector disables Comm Port 2. Turn Comm Port 2 off using the Comm Port menu.

An unterminated cable is available (PN 143348) for wiring your own connector to the M12 connector found on the *MSI-8000HD RF Indicator*.

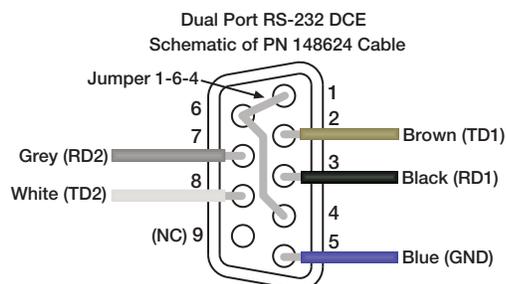


Figure 6-2. Standard Adapter Cable (PN 148624)

The following diagrams show how to wire standard D9 connectors to access Communications Port 1 or Communications Port 2.

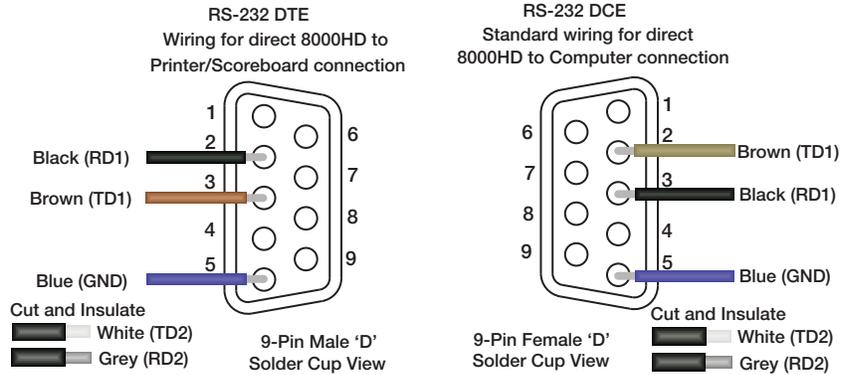


Figure 6-3. Communications Port 1 Wiring

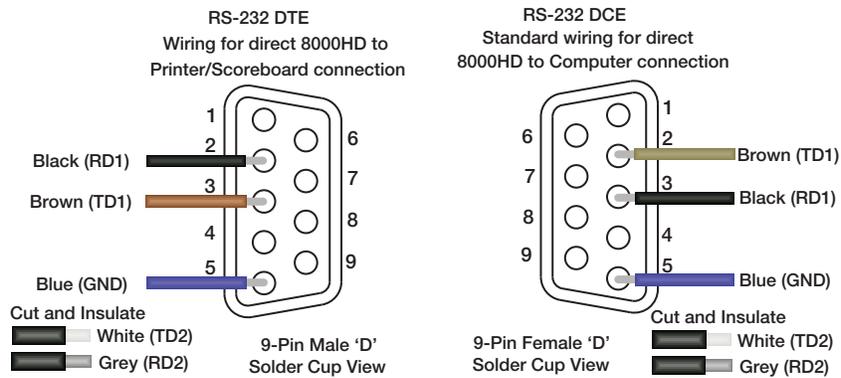


Figure 6-4. Communications Port 2 Wiring

Wiring the shield drain to the metal shell of the connector is recommended, however, in some circumstances it may be necessary to disconnect the shield drain wire at the connector frame to prevent ground loops which can cause unstable readings. In extreme cases it may be necessary to use an isolated RS-232 interface.

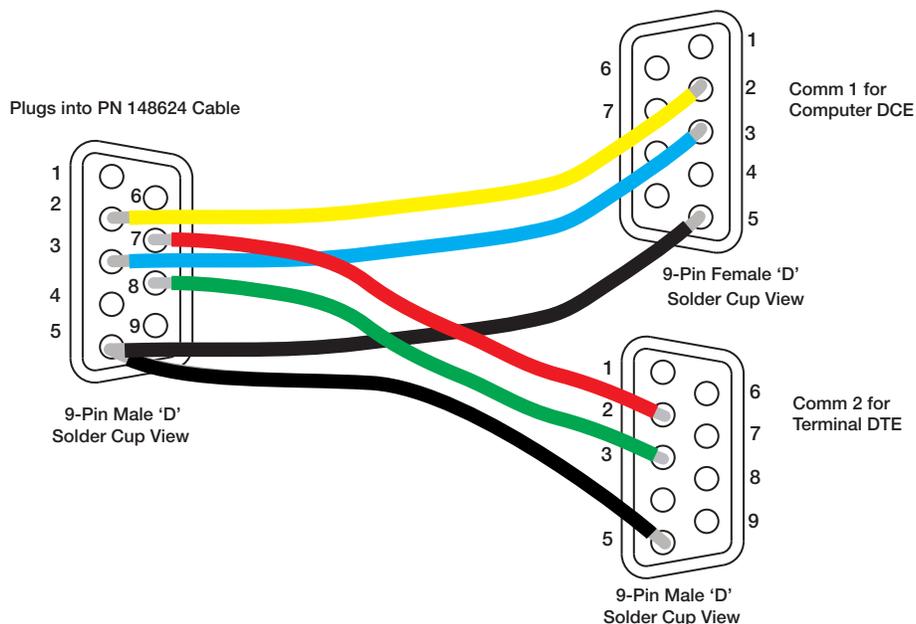


Figure 6-5. Connection with Y Adapter

## 6.7 Relays

The MSI-8000HD can be equipped with up to two relays for process control or safety systems.

Two independent relays are factory installed and are wired out to 4 pins on a M12 connector. The connecting cables are shown in the table below.

Part No.	Description
13287	PVC 4 m, rated to 250 VRMS, 4 A
	PVC 10 m, rated to 250 VRMS, 4 A
Alternately use a field wire-able connector	
156256	Straight for cable 4-6 mm OD
	Right angle for 4-6 mm
	Straight for cable 6-8 mm OD
	Right angle 6-8 mm OD

Table 6-9. Relay Connector Cable Part Numbers

### 6.7.1 Relay Options

Relays are normally open (1 Form A). Specifications are listed below.

Relay Type	Description
AC/DC coil relay	<ul style="list-style-type: none"> <li>AC/DC Coil Relay: 144520 PA1a-5V. 4A Fuse: 144307</li> <li>AC Rating: 250 VAC @ 4 A.(limited by connector/cordset rating to 4A continuous)</li> <li>DC Rating: 4 A @ 30 VDC, 0.4 A @ 100 VDC</li> <li>Best choice for 90% of applications.</li> </ul>
AC/DC SSR (solid state relay) - 60 V	<ul style="list-style-type: none"> <li>Better for battery powered units and mates well with 24VDC industrial power supplies</li> <li>AC/DC SSR 60 VPK, 2.7 A: 13178 AQZ202D. 2 A Fuse: 144319</li> </ul>
AC/DC SSR - 120 V	<ul style="list-style-type: none"> <li>For 115VAC operation when SSRs are preferred.</li> <li>AC/DC SSR 200 VPK. 0.9 A: 13180 AQZ207D. 0.75 A Fuse: 155221</li> </ul>
Other available relays	<ul style="list-style-type: none"> <li>AC/DC SSR 100 VPK, 2 A: 13179 AQZ205D. 1.5A Fuse: 155220</li> <li>AC/DC SSR 400 VPK, 0.45 A: 13181 AQZ204D. 0.375 A Fuse: 155222 (Use limited to 250 VRMS due to connector and Cordset limitations)</li> <li>DC Only SSRs</li> <li>DC SSR 60Vpk, 4A: 13182 AQZ102D. 3A Fuse: 155223</li> <li>DC SSR 200Vpk, 1.3A: 14566 AQZ107D. 1A Fuse: 160448</li> </ul> <p><b>Note</b> Normally open relays (1 Form A) can be made to function as normally closed (1 Form B) by programming the setpoint as a less than type. If the 8000HD is turned off or loses power, they will open.</p>
One 1 Form B closed SSR	<ul style="list-style-type: none"> <li>AC/DC SSR 400Vpk, 0.5A: 14628 AQZ404. 0.5A Fuse 144583 (Use limited to 250 VRMS due to connector and Cordset limitations).</li> </ul> <p>Requires a minor modification on the Relay board and can only be ordered by contacting Rice Lake Weighing Systems.</p> <p><b>Note:</b> When using DC only SSR's, the positive for Relay 1 is Pin 4 (black wire). The positive for Relay 2 is Pin 2 (white wire).</p>

Table 6-10. Relay Options



### 6.7.2 Extended Relay Kit – Optional

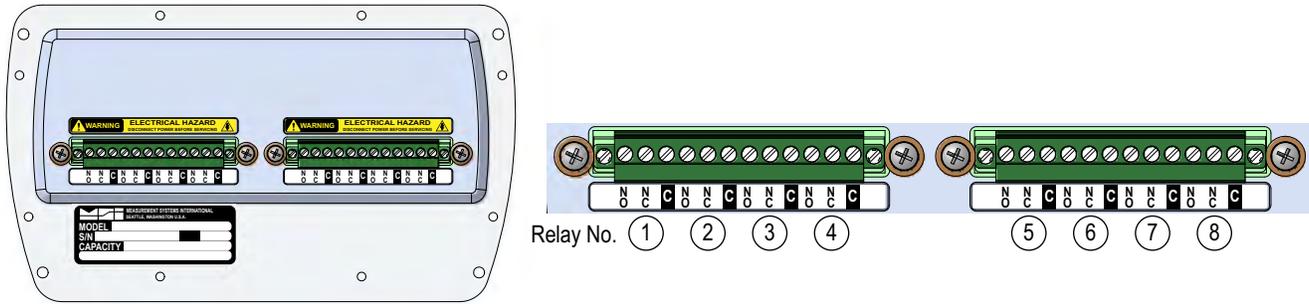


Figure 6-1. Extended Relay Kit:

Part No.	Description
172502	8-CH 0.9A 200VPK SSR FORM C
172501	8-CH 3A 60VPK SSR FORM C
172500	4-CH 3A 60VPK SSR FORM C
172498	8-CH 0.9A 200VPK SSR
172497	8-CH 3A 60VPK SSR
172495	8-CH 12A 5V RELAYS MOMENTARY
172494	4-CH 0.9A 200VPK AC/DC SSR
172493	4-CH 3A 60VPK AC/DC SSR
172492	4-CH 5V MOMENTARY
172490	4-CH 5V LATCHING RELAYS
171676	8-CH 12A RELAYS LATCHING

Table 6-11. Expanded Relay Option Kits

## 6.8 FCC Statement

Contains FCC ID: MCQ-PS2CTH

The *MSI-8000HD* complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

## 6.9 International RF Certifications

Canada Radio Certificate Number: IC 1846A-PS2CTH

Australia & New Zealand: DIGI-090F15C247

## 6.10 Antenna Options



**Note** To meet FCC licensing rules, use only antennas supplied or recommended by Rice Lake Weighing Systems.

Antenna placement is critical to problem-free use of the system.

- Ensure a relatively clear transmission path exists between the devices to be connected. Radio signals travel primarily by line of sight (LOS), obstructions between stations may degrade the system performance.
- When using the long range antenna, mount the antenna on an elevated structure to ensure there is a clear LOS transmission path. This ensures the antenna will clear surrounding obstructions. Do not provide a ground plane for the antenna.
- Fixed station locations often benefit from directional antennas when the location of the other components of the RF network are fixed and/or in the same direction. Never use a directional antenna on a mobile system.
- If using the standard antenna, ensure the antenna is not blocked by any metal. Transmission is good through most kinds of glass so mounting a meter next to a window will work fine. If there is no clear line of sight location to mount the receiving device, consider switching to the long range antenna so the antenna can be set up remotely.
- The standard and long range antennas are vertical plane devices. They should be vertical, pointing up or down, when high off the ground. Do not mount them sideways. The long range 9 dBi antenna is particularly sensitive to off axis mounting. Use a level to ensure the antenna is exactly 90° perpendicular to the earth.
- Do not mount an omni-directional antenna next to metallic or concrete surfaces. This can result in reflections and undesired RF characteristics. Use a corner reflector instead.
- After installation, seal the antenna connection with an adhesive heat shrink boot. Failure to seal the antenna may result in liquid destroying the antenna and device it's connected to.



*Rice Lake Weighing Systems does not recommend extending the coaxial cable beyond three meters.*

*At 2.4 GHz more loss will result from coax losses than are gained by raising the antenna. If the antenna must be extended, use a very low loss 50 ohm coax such as RG-214, RF-195, or other low loss varieties.*

*For very short extensions (<1m), cables made with RG-316 are suitable.*

### FCC STATEMENT

FCC ID: HSW-2450M

Note: This unit 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 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 their expense.



### 6.10.1 Standard Antenna

The standard antenna is an articulated 1/2 wave 2 dBi gain design with a standard TNC connector that mounts directly on the enclosure.

This antenna and coax connector, though resistant to water, is not water-proof. Seal the TNC base with an adhesive heat shrink boot if this antenna might be exposed to rain or other weather conditions where it could get wet.

This antenna must be vertically oriented and is suitable for most short to medium range applications.



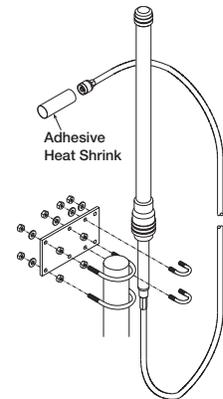
### 6.10.2 Long Range OMNI 9 dBi Antenna

This omni-directional high gain antenna is remotely mounted with a low loss coaxial cable and increases the range up to four times.

The antenna must be vertically mounted. The vertical Beamwidth (-3dB point) is 14 degrees.

This antenna is supplied with a 10 foot (3m) coax cable pre-attached. The 10-foot cable allows placement of the antenna above the unit for ease of clearing possible obstacles to data transmission.

It is also available with an N connector for applications requiring longer coax cable lengths.



### 6.10.3 Vehicle Mount Whip Antenna

The vehicle mount whip antenna mounts directly to the roof of mobile vehicles and is weatherproof.

This 5 dBi gain whip mounts in a 3/4" hole on the roof of the vehicle.

The mount includes 17' of low loss coax terminated in a TNC connector.



### 6.10.4 YAGI Antenna

For maximum range, a 14 dBi gain Yagi Antenna is available by special order. Please contact Rice Lake Weighing Systems for details.



### 6.10.5 Corner Reflector Antenna

Corner reflector antennas are often the best choice for a wall mounted antenna. Rice Lake Weighing Systems offers a 14 dBi and a 9 dBi corner reflector.



14 dBi Corner Reflector



9 dBi Corner Reflector

### 6.10.6 Patch Antenna

The patch antenna is for applications where the standard antenna is vulnerable to physical damage or outdoor applications.

The patch antenna is mildly directional which requires more care in antenna placement for long range applications. Patch antennas are available by special order only. Please contact Rice Lake Weighing Systems for details.

## 6.11 Direct Download into Excel Spreadsheet

Allows for direct download of data from the *MSI-8000HD* into Excel.

1. Hook the serial cable (PN 148624) from the RS-232 port at the bottom of the unit into the Able Cable (PN 119919).
2. Plug the USB connector on the Able Cable into a PC serial port
3. Open Excel Spreadsheet on the connected PC.



**Note** *Excel must be open and active on the screen for the data to download.*

4. Click a box on the opened excel spreadsheet. This is where the data will be recorded.
5. If in Continuous Mode, data will begin displaying when Able Cable is plugged in. If in User Mode, press F3 to Print for data to display.

For continuous data output, configure the *MSI-8000HD* as follows for printing:

1. Program Listener to 0.
2. Program Output to Port 0.
3. Program String to Output wanted Data.
4. Program Control to be outputted continuously.
5. Program the Data output Rate to output at interval needed for accurate data collection.

For output only when Print Key is pressed, configure the *MSI-8000HD* as follows for printing:

1. Program Listener to 0.
2. Program Output to Port 0.
3. Program String to Output wanted Data
4. Program Control to User.
5. Program the Data Output Rate to output at interval needed for accurate data collection.



**Note** *Custom Print Output strings are available when using the ScaleCore Configuration Management Program. See Section 5.8 of the User's Manual and the SCCMP programming guide for details.*

*The SCCMP Program is included on the CD ROM that is included with the MSI-8000HD when purchased from MSI/RLWS, or can be downloaded at [msiscales.com](http://msiscales.com).*

*The MSI-8000HD User's Guide is included on the CD ROM that is included with the MSI-8000HD when purchased from MSI/RLWS, or can be downloaded at [msiscales.com](http://msiscales.com).*



# 7.0 Troubleshooting and Maintenance

## 7.1 Troubleshooting

Problem	Possible Cause	Solution
Display is blank when the power button is pressed.	Discharged battery	Recharge
	Defective battery	Replace (factory replacement only)
	Defective switch or circuit board	Requires authorized service
Display does not function properly/ Front panel buttons do not function normally/ Scale/Dyna-Link will not turn off.	Improperly loaded software	Reinstall software
	Faulty circuit board	Requires authorized service
	Loose connectors	Requires authorized service
Scale/Dyna-Link does not respond to tension changes.	Out of calibration	Calibrate
	Faulty load cell	Replace
	Load cell connector	Check connector and wires
Display over ranges below 100% of capacity.	Tared tension is added to load to determine overload point	Return to gross tension mode
	Zero requires adjustment	Rezero the scale
	Too much tension/load has been zeroed	Rezero the scale
Display drifts	<b>AZM</b> (Auto0) is turned off	Turn <b>AZM</b> on
	Rapid temperature changes such as moving the scale from indoors to outdoors	Wait until the scale temperature has stabilized
Displayed tension shows a large error	Scale not zeroed before load is lifted	Zero the scale with no load attached
	lb/kg units causing confusion	Select proper units
	Requires recalibration	Recalibrate
Display reading is not stable	Excessive vibration	Increase filtering or increase <b>d</b> in <b>Cal</b>
	Excessive side loading	Improve load train symmetry
	Load cell faulty	Check load cell connections
Display toggles between Error and Load	Load exceeds capacity	Reduce tension immediately
	Faulty load cell or wiring	Check load cell and load cell wiring
Display toggles between Error and buttn	A key is stuck or is being held down	Check switches for damage
Weight is on the Scale/Dyna-Link, RF Remote Display does not match	Units not mated	See setting the RF Network address procedures
Lo Batt is blinking	Battery is low	Recharge Battery
Unit turns on, then immediately off	Battery is low	Recharge Battery
Load will not zero	System not stable	Wait for stable symbol  to turn on Increase filtering for more stability
	Zero out of range	Zero range might be limited. Reduce the tension or use Tare instead
Load will not tare or total	System not stable	Wait for the stable symbol  to turn on, or if in a mechanically noisy crane, increase the filtering or reduce the size of the scale increment <b>d</b> . It is also possible to increase the motion window. Contact MSI if there is a problem getting the MSI-8000HD to zero, tare, or total due to stability issues
Set point lights blink	Set point is enabled and the trigger point has been reached	Disable set points if they are not needed
Manual Total does not work	A function key is not set to <b>Total</b>	Set up Func1 or Func2 for <b>Total</b>
	Tension must be stable	Increase filtering for more stability

Table 7-1. Troubleshooting

Problem	Possible Cause	Solution
Auto Total does not work	Load must be stable	Wait for stable symbol  to turn on or increase filtering for more stability
	Load thresholds not reached	Weight must exceed 1% of capacity for autototal to work. Weight must drop below 0.5% of capacity for additional weighments to register.

Table 7-1. Troubleshooting (Continued)

## 7.2 Error Codes

The ScaleCore Processor in the *MSI-8000HD RF Indicator* detects errors and generates error codes to aid in troubleshooting.

Error Code	Definition	Comment
LcOFF	LC Disabled	A load cell was not enabled
LittL	Little	The value entered is not large enough.
2CAL	In Cal	The system is in calibration mode. Do not send commands unrelated to calibration
unCAL	Not Calibrated	System has not been calibrated
 Error LoAd	Overload	Load/Weight exceeds set capacity +9d, or load cell is damaged or disconnected.
 Error UndLd	Underloaded	Load/weight is more than 20% negative, or load cell is damaged or disconnected.

Table 7-2. Error Codes

## 7.3 Service Counters



### WARNING

Only a Rice Lake Weighing Systems factory representative can reset the service counters, as these are an important safety warning feature. A thorough load train inspection is necessary to ensure product safety.

All Rice Lake RF linked scales/Dyna-Link 2 maintain two service counters for safety.

- The first counter (LFCnt) counts lifts above 25 percent of capacity.
- The second counter (OLCnt) counts the number of times the RF linked scale has been overloaded.

These counters warn the user to inspect the load train after a number of overloads or a long term frequency of high capacity lifts. Power up will be interrupted when the lift counter exceeds 16383 lifts or the overload counter exceeds 1023 overloads. Inspect the load train, then push any key to continue operation.

This feature is only available on *MSI-8000HD RF Indicator* Software release 2.00 and above. Service counters are available on the Scale/Dyna-Link front panel test function.

### 7.3.1 Access the Service Counters

Use the following steps to access the service counters.

1. Program an F-key to Test. See Section 4.2 on page 10.
2. Press Fx-Test and then immediately press F1.



### Note

F1 must be pressed, if the Test function is set to F1, it will need to be pressed twice.

- LFCnt will display briefly, followed by the number of lifts.
- OLCnt displays briefly, followed by the number of times the weight has exceeded capacity.
- After both counts have displayed, C-Cal and its value is displayed.
- The unit returns to the weighing mode.

Reference Rice Lake Weighing Systems' Crane Scale Safety and Periodic Maintenance Manual (PN 153105) for proper loading techniques to improve the safety and longevity of the crane scale or Dyna-Link. This publication is available at [www.ricelake.com](http://www.ricelake.com) and is included on the CD shipped with the *MSI-8000HD RF Indicator*.



## 7.4 Mechanical Dimensions

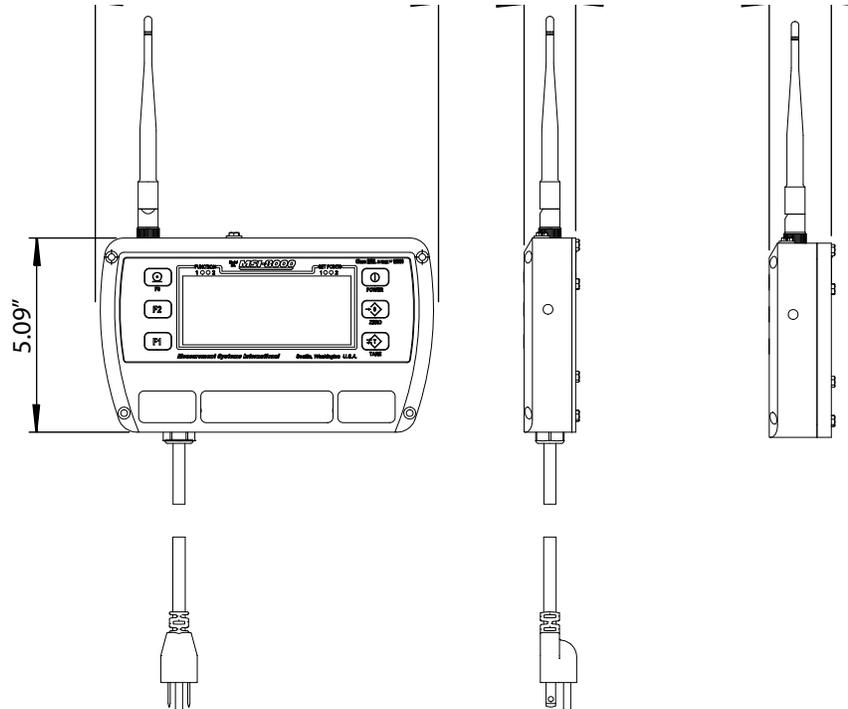


Figure 7-1. Dimensions – MSI-8000HD

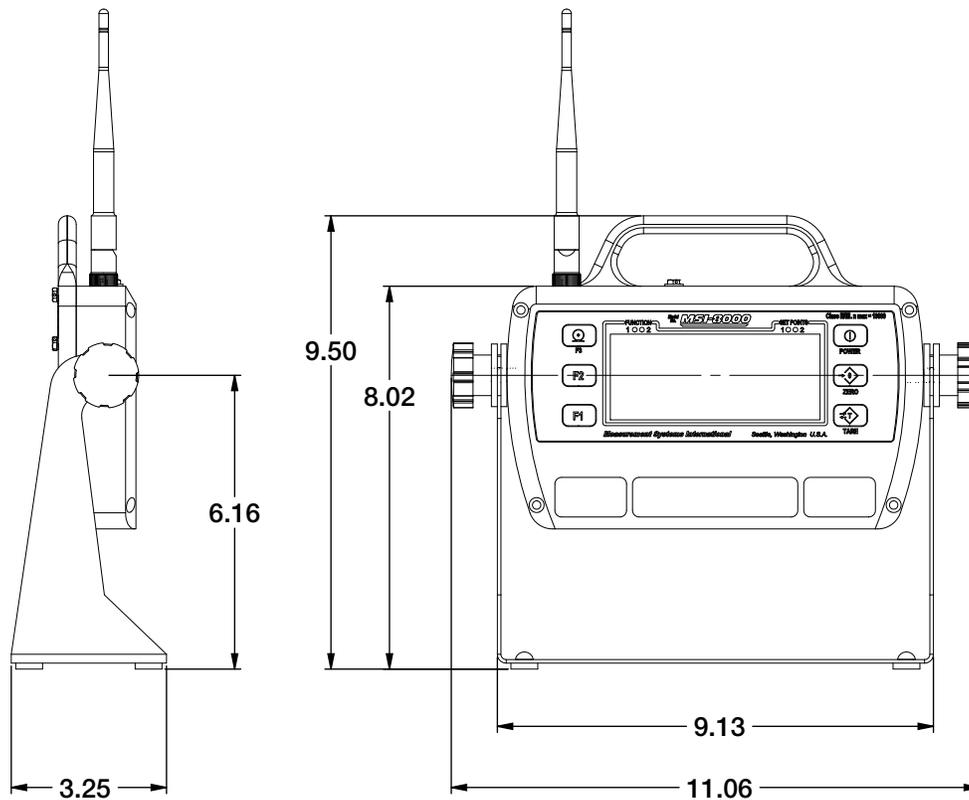


Figure 7-2. Dimensions – MSI-8000HD with Optional Tilt Stand

## 7.5 Firmware Update Procedure

Updating firmware in the *MSI-8000HD RF Indicator* requires the following:

- DCE serial cable (PN 150964, or build per DCE cable schematic on page 28).
- PC with a terminal program (Teraterm Pro recommended).
- If the PC does not have standard RS-232 serial ports use a USB to serial converter.

Make sure the driver for the USB converter is properly installed and that the Terminal program is set up for the proper comm port.

The latest firmware code is available from the Rice Lake Weighing Systems service department and can be emailed on request. The current firmware version on the *MSI-8000HD* is displayed it is powered on. Firmware updates do not require a recalibration of the connected scale. Consult the version release notes for information regarding the updated code.

1. Set up the terminal serial port to 8 data bits, no parity, 1 stop bit, 9600 BAUD, XON/XOFF (flow control).
2. Connect to the Dyna-Link serial port using the DCE cable. Connect the D9 connector to a PC or USB adapter.
3. (Optional Step) Test that there is a connection by typing {00FF01?}. If the connection is good the *MSI-8000HD* responds with {000001r2;0;01E02;2011-07-08;11:05} or a similar string.
4. On the terminal keyboard, type {ffff09=0199}
5. Change the terminal serial port to 38400 baud. Press the *r* key to refresh the display. The following menu should appear

*MSI-8000HD RF Indicator* SCALECORE2 BOOT LOADER Ver. 00-05 (c) 2012-05-02 10:55

- (u) Download and program application code  
(your bootloader version may vary)
- (q) query app code info
- (g) execute app code
- (r) refresh



**Note** *The bootloader version may vary.*

6. Type **u**

Terminal should display:

Send File NOW, or press ^ to abort:

7. Send the .prg file using the file send feature of your terminal program. The character "#" will tick away as the ScaleCore programs.

Send File NOW, or press ^to abort:#####

```
#####
#####
#####
#####
```

Completed

8. After file is received terminal should display *Completed*. Then the boot menu appears again.

*MSI-8000 RF Indicator* SCALECORE2 BOOT LOADER Ver. 00-05 (c) 2012-05-02 17:06

- (u) Download and program application code  
(your bootloader version may vary)
- (q) query app code info
- (g) execute app code
- (r) refresh



- Optional step: send **q** to check the program. The ScaleCore will respond with a message that details the 32b checksum, the product ID and version, and the Application Code version number in the following form:

```

Computed Signature 76F481D8  ────┐ 32b CRC must match (76F481D8 is an example only)
Received Signature 76F481D8  ────┘
Product ID 07  MSI-8000 product family
Product Version ID 00  Optional features code
App Code Version 01-04  Firmware version number
    
```

If the CRC Signature does not match, go back to step 4 and try again.

- Send an **r** to restore the boot menu.

MSI-8000 RF Indicator SCALECORE2 BOOT LOADER Ver. 00-05 (c) 2012-05-02 10:55

- (u) Download and program application code  
(your bootloader version may vary)
- (q) query app code info
- (g) execute app code
- (r) refresh

- Send a **g**. The *MSI-8000HD RF Indicator* should start.

## 7.6 Reset the Indicator

Resetting the indicator will change all settings back to the default factory settings.

- Press the calibration switch and  simultaneously. **Sure?** displays.
- Press  to reset the current indicator settings to the default factory settings. **CaL** will display.
- An initial calibration will need to be performed on the current load cell. See Section 5.2.

**IMPORTANT**

Pressing  will reset only the current load cell calibration settings. See Section 5.4 on page 21.



Press the  to cancel reset and return to the previous menu.

## 8.0 Specifications

Enclosure:	NEMA Type 4, IP68 milled anodized aluminum with O-ring gaskets
Keypad:	On/Off, Zero (100%), Tare, Print, and two user-defined keys for the following functions: peak hold, high resolution, total, view total, net/gross, units switching
Display:	6-digit 1.0" (25.4 mm) LCD
Units Displayed:	Pounds, kilograms, tons (U.S. short ton), metric tons, kilonewtons. Other units available with custom calibrations. Available units are determined by the RF linked scale/Dynalink
Power:	Legal: 90-264 VAC, 9-36 VDC Industrial: 90-267 VAC, 9-36 VDC, 18-72 VDC, 120-300 VDC Battery (optional), operated by a custom Lithium Polymer cell and is not user replaceable. The estimated number of charges is more than 300. Life is prolonged with frequent recharging and not allowing the deep discharging of the battery.
Operating Temp:	Legal Range: 14° F to 104° F (-10° C to 40° C) Industrial Range: -4° F to 140° F (-20° C to 60° C)
Operating Time:	Greater than 24 hours typical
RF Remote Channels:	Up to four remote sensors, monitored individually, in pairs, or sum all (non-A/D version only)
Auto Off Mode:	Prolongs battery life (optional) by turning off the power after 15, 30, 45 or 60 minutes (operator determined) if there is no weight activity.
Calibration:	The calibration parameters are not stored in the MSI-8000HD. It can be used to calibrate an RF connected scale.
Service Counters	A/D version only
A/D Inputs:	Two independent or summing load cell inputs
Excitation:	4.8 V current limited and over-voltage protected
Filtering:	Off, Low, Hi-1, Hi-2
RF Radio Link:	2.4 GHz 802.15.4
RF Effective Range:	Typically 100 or more feet (33 m)
Data I/O:	Dual RS-232 comm ports
Standard:	press button or automatic: TOTAL weight up to 99999 x 1000 units
Warranty:	One-year limited

### Approvals



NTEP COC #15-110  
Class: III/IIIL  $n_{max}$ : 10,000







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230 W. Coleman St. • Rice Lake, WI 54868 • USA

U.S. 800-472-6703 • Canada/Mexico 800-321-6703 • International 715-234-9171 • Europe +31 (0)26 472 1319