MSI-3460

Challenger 3

Technical Manual

RICE LAKE ®
W E I G H I N G   S Y S T E M S

Contents

*Technical training seminars are available through Rice Lake Weighing Systems. Course descriptions and dates can be viewed at **www.ricelake.com/training** or obtained by calling 715-234-9171 and asking for the training department.*

1.0 Introduction

The *MSI-3460 Challenger 3* is a combination of the sound and proven mechanical design of the industry standard Challenger with today's most advanced electronics. It provides a superb feature set unmatched by any scale in its class or price range. The multi-purpose hanging scale is ideal for situations in which headroom is at a minimum. The *MSI-3460* is versatile, reliable, accurate, and easy to operate. The *MSI-3460* is designed to meet or exceed the requirements of all regulatory agencies. RF remote control and remote display options are available to further enhance the safety and usability of the *MSI-3460*.

Manuals and additional resources are available from the Rice Lake Weighing Systems website at **www.ricelake.com**

Warranty information can be found on the website at **www.ricelake.com/warranties**

1.1 Features

- Meets or exceeds U.S. and international safety and environmental standards
- Provides up to 50 hours of weighing time when utilizing the automatic sleep mode
- Automatic power off conserves battery life by turning off after sensing no activity during set amount of time
- Automatic sleep mode preserves the battery life by dimming the LED display after a set number of minutes of no activity
- Rugged construction throughout. Buttons are sealed and rated for over one million operations
- Precise high resolution (2500 division standard and up to 10,000 possible) 24 bit A/D conversion coupled with advanced RISC micro controller provides world class features and accuracy
- Five large, 1.5" (38 mm) LED digits for clear weight reading from a distance
- Easy digital calibration assures reliable, repeatable measurements. Calibration can be performed without test weights using C-Cal technology
- Selectable for lb/kg unless prohibited by Legal for Trade regulations
- Automatic or manual weight totalization for loading operations
- Easily customized for special applications
- High-speed PEAK mode for wire and rope stress analysis
- Three setpoints can be set for any in-range weight for operator alerts or process control
- ScaleCore™ technology provides quick and easy software updates and backup for calibration and setup
- Two service counters ensure load train safety by warning the user to perform a load train safety check when the lift count gets high or the scale has been overloaded repeatedly

1.2 Options

- RF remote controller
- RF modem for connectivity to MSI-8000 RF or MSI-8004 HD Remote Display and/or remote receiver Model MSI-7000/1 RF Receiver and Remote Scoreboard
- MSI-8000 RF Display
- MSI-8004 HD Remote Display
- 85-265 VAC input power
- Audible alarm (triggered by setpoint 1)

1.3 FCC Compliance

United States

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

Canada

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Class A prescites dans le Règlement sur le brouillage radioélectrique edicté par le ministère des Communications du Canada.

1.4 Safety

Safety Signal Definitions:

⚠ **DANGER**	*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.*
⚠ **WARNING**	*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.*
⚠ **CAUTION**	*Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury.*
IMPORTANT	*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.

⚠ **WARNING**

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 the scale if any of the components of the load train are cracked, deformed, or show signs of fatigue.

Do not exceed the rated load limit of the scale, rigging elements, or the lifting structure.

Do not allow multi-point contact with the hook, shackle, or lifting eye of the scale.

Do not allow high torque on the scale unless it is specifically designed for high torque.

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

Do not use improperly rated or sized shackles. Use only MSI recommended shackles.

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-3460. Any repairs are to be performed by qualified service personnel only.

Close proximity to audible alarm for sustained periods of time could be hazardous. Hearing protection may be required

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1.5 MSI-3460 Front Panel

Figure 1-1. MSI-3460 Front Panel

Keys

| Item No.	Key/LED	Description
1	POWER	Turns the unit on and off; When the indicator is in setup mode, cancels action and returns to prior level without saving
2	ZERO	Used to zero out residual weight on the scale; In setup mode, stores changes and returns to the prior level
3	TARE	Removes weight of containers, trucks, or carriers and places the scale in the Net weight mode functions as tare in, tare out; To view gross weight without resetting the tare value, program the **USER** key as **NET/GROSS**
4	F USER	Programmable to user-selectable functions (Section 4.0 on page 9); Defaulted is **TEST**

Table 1-1. Key Descriptions

Annunciators

Item No.	Key/LED	Description
5	MOTION	Indicates the weight has not settled within the stable window; When lit, scale will not zero, tare or total
6	SETPOINTS	User-programmable setpoints for early overload warnings; Blue LED - Setpoint 1 and 2 Red LED - Setpoint 3
7	→0←	Center-of-Zero – Indicates the weight is within 1/4 d of zero
8	ACK	Acknowledge LEDs are used to provide feedback to the operator; • Blue LED - Incoming remote commands have been received; • Red LED - Lights momentarily when enabled; Lights to acknowledge *Auto-Total* operation
9	RF	Indicates carrier detect for RF remote display equipped unit; An illuminated LED indicates the MSI-3460 and remote display are linked; On units equipped with the RF remote control, the LED is illuminated for a half second when a remote command is received
10	LO BATT	Displays when approximately 10% of battery life remains, blinks when automatic shutdown is imminent
11	X1000	Used with *TOTAL* LED, allows accumulation of weight beyond the five digit display capacity
12	TOTAL	Indicates scale is displaying the Total weight; This is a temporary display lasting less than five seconds
13	GROSS	Indicates the scale is in the Gross weight mode; All hook weight is displayed minus any zero offset
14	NET	Indicates the scale is in Net weight mode; A tare weight is subtracted from the gross weight
15	PEAK	Indicates the scale is in peak hold mode
16	kg	Indicates weight display is in kilograms
17	lb	Indicates weight display is in pounds
18	-----	5-Digit 1.5"/3.8 mm high brightness LED weight display
19	-----	Light sensor for auto brightness control
20	-----	Calibration button under wire seal-able calibration port

Table 1-2. Annunciator Descriptions

2.0   Operation

The following sections describe the basic operation of the MSI-3460.

> **Note**
> *If a function key does not work as expected, it is probably not set up to support the key.*
>
> *For example, if the Function Key is set for TOTAL, the TOTAL mode must also be set up in the Setup Menu.*

2.1   Power

To turn on the power, press ⏻. The following displays in order:
POWER

- LED lights all segments at full brightness as a display test
- Display brightness changes to the setting determined in the display menu
- Software version number displays
- The unit enters *Weigh* mode

2.2   Zero

Press ◈ to take out small deviations in zero when the scale is unloaded. For zeroing (taring) package or pallet weights,
ZERO
see . The zero key can be used in *GROSS* or *NET* mode.

> **Note**
> *The backup memory in the unit stores the zero reading and retains it even if the power fails.*
>
> *Zeroing while in net mode will zero the gross weight causing the display to show a negative tare value.*
>
> *The scale must be stable within the stable window.*
>
> *The unit will only zero if MOTION annunciator is off and there has been no activity for two seconds.*
>
> *The scale will accept a zero setting over the full range of the scale (NTEP and other Legal for Trade models may have a limited zero range).*
>
> *Zero settings above 4% of full scale will subtract from the overall capacity of the unit.*
>
> *Example: If 100 lb on a 1000 lb scale is zeroed, the overall capacity of the scale will reduce to 900 lb, plus the allowed over-range amount.*

2.3   Tare

Tare is used to zero out a known weight, such as a packing container or pallet, and display a *NET* weight. The *TARE* function is defined as a *Tare-In* or *Tare-Out* operation.

To tare the scale:

1. Hang the empty container from the scale.

2. Press [⚖ TARE] to enter a tare value. The MSI-3460 stores the current weight as a tare value and subtracts the value of the container from the gross weight. *0* displays and the weight mode changes to *NET*.

3. Add the product to the packing container. The *NET* weight is displayed.

2.3.1   View Tare

To view the gross weight without clearing the tare value:

1. Program [F USER] to the *NET/GROSS* function (Section 4.2 on page 10).

2. Press [F USER], to toggle between net and gross values. This will only work if a tare value has been established.

> **Note** *The backup memory in the MSI-3460 stores the Tare reading and can restore it even if power fails.*
> *Only positive gross weight readings can be tared. The motion annunciator must be off, indicating weight reading is stable. Setting or changing the tare has no effect on the gross zero setting. Taring will reduce the apparent over range of the scale. The RF Remote Control has a Net/Gross permanently available.*
> *Example: Taring a 100 lb container on a 1000 lb scale, the scale will overload at a net weight of 900 lb (1000-100) plus any additional allowed overload (usually 4% or 9d).*

2.3.2   Clear Tare

To clear a saved tare value, press [⚖ TARE]. The *GROSS* weight displays.

3.0   Installation

The MSI-3460 installs easily by hanging it on a crane using properly sized rigging (hooks, shackles, slings).

⚠ **WARNING** *Refer to the Crane Scale Safety and Periodic Maintenance Manual (PN 153105) for safe loading and rigging guidelines when installing the model MSI-3460.*

Regular maintenance inspections of the lifting system should be performed to ensure safety. Pay particular attention for signs of stress on any element in the load train.

Use the appropriate interface hardware for the capacity and design of the scale.

- Rice Lake Weighing Systems can supply the *MSI-3460* with oversize lifting eyes or shackle interfaces if the interface hardware does not fit properly.
- Install the scale using adaptive rigging if the crane hook is too large to fit in the lifting eye with single point interface.
- If multiple attachments are needed, use a shackle or ring to attach the multiple lines to keep a single point attachment to the scale.

IMPORTANT *Using an oversize shackle or hook to interface with the MSI-3460 can cause off center loading and stress points that will reduce the life of the lifting eye or hook.*

Single point attachments are necessary to ensure the safety and accuracy of the scale system.

3.1   Unpacking

Ensure that all assembly parts are accounted for when unpacking the scale from the shipping container. Check the scale for any visible damage and immediately report any damage to the shipper. Rice Lake Weighing Systems recommends using the original shipping container when shipping or transporting the *MSI-3460*.

3.2   Assembly
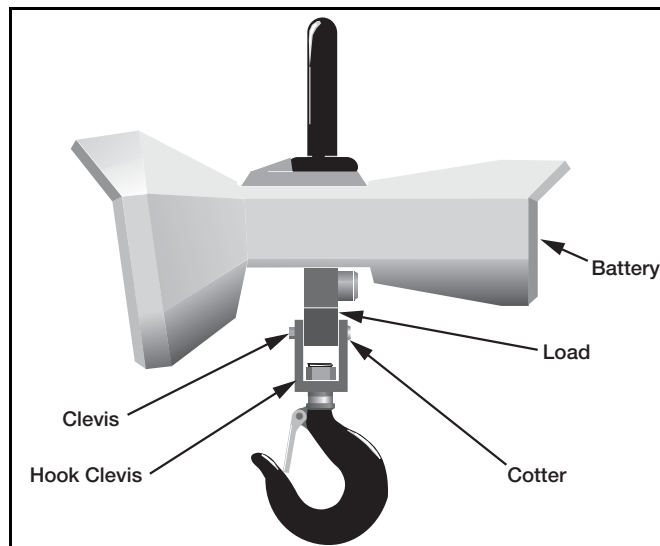
Figure 3-1. MSI-3460 Assembly

1. Slide the hook clevis over the load cell with the open end of the hook toward front of the scale.
2. Align the holes of clevis and load cell.
3. Slide the clevis pin through the clevis and load cell holes.
4. Lock the clevis pin in place with a cotter pin. Bend the cotter pin.

⚠ **WARNING** *The scale will be unsafe for use if the clevis pin is not properly secured with the cotter pin.*

5. Slide the battery pack into the battery compartment. The battery will automatically engage with its connectors.
6. Secure the battery pack by turning the two locking fasteners on the access door clockwise 1/4 turn.

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3.3 Battery Pack

The MSI-3460 is powered by a 6 V rechargeable battery. The battery door is part of the battery pack.

Scale operates for up to 50 hours before requiring recharging, using the battery life conserving modes included in the scale.

- Auto Off – Turns the scale off after a set amount of time of no scale activity (Section 4.3 on page 12)
- Sleep mode – Dims the display after a set amount of time of no scale activity (Section 4.4 on page 12)
- Display Intensity – LED intensity can be lowered to save battery power (Section 4.5 on page 13)
- Battery Life – When set to long, the system is placed into a sleep state for several seconds at a time if there is no change in weight (Section 4.10 on page 16)

Charging time for a completely discharged battery is up to eight hours. A spare battery pack is recommended to keep the MSI-3460 in continuous operation.
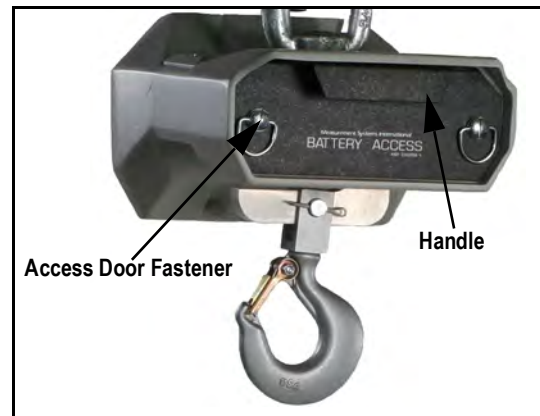
Figure 3-2. Battery Pack Removal

To Remove the Battery Pack

1. Turn the two fasteners on the access door counter-clockwise a 1/4 turn.
2. Grasp the handle and pull the battery pack straight out. The battery will disengage from its connectors.

📝 **Note**   *Store the batteries between -4–122°F (-20–50°C) to obtain maximum service life. Stored batteries should be recharged every three months. Battery is fully charged when status indicator on the charger is flashing.*

3.4   Battery Charger

The charger is a three-stage float charger that can be left on the battery indefinitely. It has a dual color LED to indicate the charging state:

RED – Fast charge mode

GREEN – Charged or float charge

Charge the Battery

1. Remove the battery from the scale.

2. Plug the battery charger into an AC power receptacle. The input voltage is universal from 115/230 VAC, 50/60 Hz. If the power input plug doesn't match, contact Rice Lake Weighing Systems for information on international plugs.

3. Slide the battery charger connector plate over the top of the battery until the battery terminals mate with the charger connectors, as viewed through the two observation holes.

4. Six to eight hours is required to recharge a fully discharged battery. Partially discharged batteries finish the charge faster.
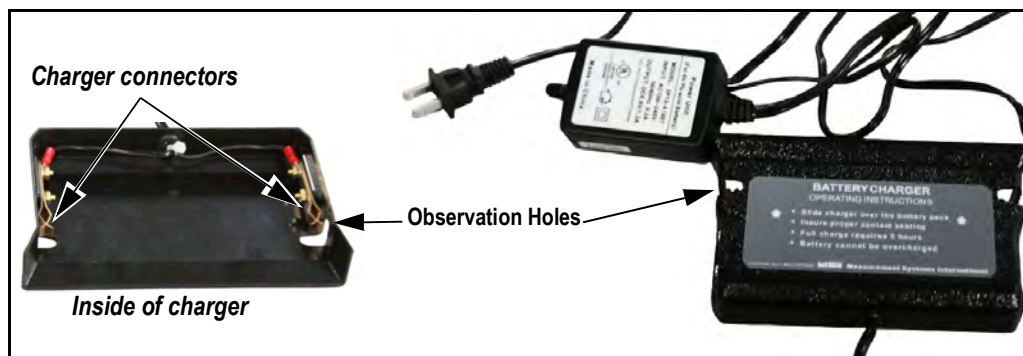
Figure 3-3. Battery Charger

Note   *To obtain maximum service life from the batteries, the manufacturer suggests recharging after each 20 hours of use. Continuous deep discharging reduces the maximum battery life cycle estimated at 2000 cycles.*

A second battery is recommended to enable continuous scale use. Keep one on the charger while the other is in service.

4.0   Setup

The following keys can be used when navigating through the menus while setting up the MSI-3460.

- **(POWER)** exits setup without saving changes; *CAncEL* displays briefly and unit enters *Weigh* mode
- **(TARE)** functions as the **Enter/Select** key
- **(F USER)** functions as the **Scroll** key
- To enter a decimal point, press **(POWER)** while the digit is blinking
- Press **(ZERO)** to save and go back one level; Press it again to return to *Weigh* mode, *StorE* displays briefly
- To change/correct a digit, press **(ZERO)** to step back one digit and use **(TARE)** and **(F USER)** to change the digit

4.1   Setup Menu
To enter into the MSI-3460 *Setup* menu, press **(POWER)** and **(F USER)** simultaneously.

Parameters	Choices	Description
FUnc1 FUnc2	OFF	Function User Key 1 – User definable key that can be programmed to one of several functions
		Function User Key 2 – User definable key that can be programmed to one of several functions; Available if an RF remote is used
	tESt	Test Display – Section 4.2.1 on page 10
	totAL	Total – Section 4.2.2 on page 11
	u-ttL	View Total – Function always available on the RF Remote (Section 4.2.3 on page 11)
	nEtGr	Net/Gross – Function always available on the RF Remote (Section 4.2.4 on page 11)
	P-HLd	Peak Hold – Section 4.2.5 on page 11; Function not available or non-functional in OIML R76 or NTEP HB44 modes
	Unit	Units – See Section 4.2.6 on page 11; Function not available or non-functional in OIML R76 & 1Unit modes
	Print	Print – Section 4.2.7 on page 11
A-OFF	OFF 15 30 45 60	Auto Off Time – Prolongs the battery life of the scale by turning power off after the set time (in minutes) that the scale is not in use (Section 4.3 on page 12)
SLEEP	OFF 5 15 30	Sleep – Time (in minutes) before unit will enter sleep mode (Section 4.4 on page 12)
diSPL	LO-1 LO-2 Hi-1 Hi-2 Auto	LED Display Intensity – Used to set the display brightness (Section 4.5 on page 13)
StPt 1-8	OFF GrEAt LESS	Setpoint 1 to 8 – Used for warnings or process control (Section 4.6 on page 13)
totAL	OFF ttLOn A.LoAd A.LASt A.HiGH	Total Mode – Accumulation of multiple weighments (Section 4.7 on page 14)
FiLtr	OFF LO Hi-1	Weight Filter – Allows the scale to adjust to situations where there may be movement (Section 4.8 on page 15)
Unit	Lb HG	Weight Units – Toggle units between pounds and kilograms; Function not available or non-functional in OIML R76 & 1Unit modes (Section 4.9 on page 16)
b.LiFE	StAnd LonG	Battery Life – Sets the options for standard or extended battery life (Section 4.10 on page 16)

Table 4-1. Setup Menu Parameters

4.2   Set Function Key

The MSI-3460 has one user definable key [F USER] on the front panel that can be programmed to one of several functions. To set the function key use the following steps:

1. Press [⏻ POWER] and [F USER] simultaneously. *FUnc1* displays.

2. Press [F USER]. The current user key function displays.

3. Press [F USER] to scroll through the available functions.

4. Press [⇨ TARE] when the desired function is displayed. *FUnc2* displays.

5. Press [◈ ZERO]. *StorE* displays briefly and exits *Setup* mode.

4.2.1   Test

The *TEST* function will automatically scroll through the following:

*   Lights all LEDs at once
*   Displays *SoFt* followed by the software version number
*   Displays *bAtt* followed by the battery voltage
*   Displays *d. tESt* followed by the display counting from 00000–99999
*   Displays *C-CAL* followed by the C-CAL value

Other internal tests are performed and if any test fails, an error code displays. See Section 8.1 on page 33 for the troubleshooting guide.

To run a *TEST*:

1. Program the [F USER] to *tESt* (Section 4.2).

2. Press [F USER] to start the test. It runs through the complete test and returns to *Weigh* mode.

Single Step Through Test Procedure

1. Press [F USER] within two seconds of test start to enable a single step mode.

2. Press [F USER] to scroll through the available test functions.

3. Press [⇨ TARE] to start or display the individual tests.

4. Press [◈ ZERO] to exit individual tests.

5. Press [◈ ZERO] to exit from the test function.

4.2.2 Total

Program the [F / USER] to *totAL* (Section 4.2 on page 10).

The function that will be performed when pressing [F / USER], will need to be set in Section 4.7 on page 14. If nothing has been set, nothing will happen when [F / USER] is pressed.

> **Note** *The Total mode must be programmed from the Setup Menus before the USER key will function.*

4.2.3 View Total

1. Program the [F / USER] to *u-ttL* (Section 4.2 on page 10).

2. Press [F / USER] to activate the total weight display followed by the number of samples.

3. With the Total weight displayed, press [◊ / ZERO] to clear.

4.2.4 Net / Gross

Switches the display between net and gross modes. Net weight is defined as gross weight minus a tare weight.

To switch between *Net* mode and *Gross* mode:

1. Program the [F / USER] to *nEtGr* (Section 4.2 on page 10).

2. Press [F / USER] to toggle between net and gross values. This will only work if a tare value 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.

OIML Legal for Trade units only: The **NET/GROSS** key is a temporary action only. The gross weight is displayed for two seconds and then the display returns to the *Net* mode. The only way to return to permanent gross readings is to clear the tare (Section 2.3.2 on page 5).

4.2.5 Peak Hold

Peak hold only updates the display when a higher weight reading is established.

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

Peak hold is cleared and re-enabled with the [F / USER], that has been set to *P-HLd*. See Section 4.2 on page 10).

Peak hold is not available on NTEP or OIML Legal for Trade certified scales.

4.2.6 Units

Units can be changed in two ways.

• To use the [F / USER], program it to *Unit* (Section 4.2 on page 10).
• Change the units with the setup menu (Section 4.9 on page 16).

> **Note** *Unit switching is not available on OIML certified Legal for Trade scales.*

4.2.7 Print

If the print option is installed, this menu choice will appear. See Section 6.1 on page 24 for print setup information.

4.3 Auto- Off

The *Auto-Off* feature prolongs the battery life by automatically powering off the unit if no buttons are pressed and there is no change in the load exceeding 10 d for the time period, in minutes, set by the user. When a button is pressed or the detected load is in motion exceeding 10 d, the time limit is reset.

When disabled, the unit will only turn off by pressing ⏻ **POWER**, or if the battery dies. To set the *Auto-Off* function:

1. Press ⏻ **POWER** and F **USER** simultaneously. *FUnc 1* displays.

2. Press F **USER** to scroll to *A-OFF*.

3. Press ⏏ **TARE**. The current auto off time displays.

4. Press F **USER** to scroll through the available times.

5. Press ⏏ **TARE** when the desired time is displayed. *SLEEP* displays.

6. Press ⏺ **ZERO** to exit setup and store the settings.

4.4 Sleep

The *Sleep* parameter reduces power consumption by automatically turning off the display during periods of inactivity, in minutes, set by the user. The green acknowledge annunciator blinks at one second intervals to indicate the unit is in the sleep mode. To wake the unit up, a button must be pushed (front panel or RF remote) or the weight must change by 5 d or more.

> 📝 **Note** | *Sleep must be set to less time than the Auto-Off timer.*

1. Press ⏻ **POWER** and F **USER** simultaneously. *FUnc 1* displays.

2. Press F **USER** to scroll to the *SLEEP* function.

3. Press ⏏ **TARE**. The current sleep time is displayed.

4. Press F **USER** to scroll through the available times.

5. Press ⏏ **TARE** when the desired time is displayed.

6. Press ⏺ **ZERO** to exit setup and store the settings.

4.5   Display Brightness

The *Display* setup menu is used to set the display brightness. There are four fixed brightness settings and one automatic light sensing brightness setting.

Auto setting automatically detects the ambient light and adjusts the brightness of the display accordingly.

There are four fixed brightness settings, *LO-1*, *LO-2*, *HI-1* and *HI-2*. Lower brightness settings increase battery life.

1. Press ⏻ **POWER** and **F USER** simultaneously. *FUnc 1* displays.

2. Press **F USER** to scroll to the *d ISPL*.

3. Press **TARE**. The current setting displays.

4. Press **F USER** to scroll through the available settings.

📝 **Note** | *The display brightness changes when each setting is displayed.*

5. Press **TARE** when the desired setting is displayed. *SEPE 1* displays.

6. Press **ZERO** to exit setup and store the settings.

4.6   Setpoints

The MSI-3460 supports eight setpoints. There are three LED outputs that are triggered by the first three setpoints. Setpoints 4 through 8 do not trigger an indication on the MSI-3460, but can be set to control relays or trigger indications that are sent to other peripheral devices either through RS-232 or wireless communication. It comes standard with LED outputs for a triggered set point.
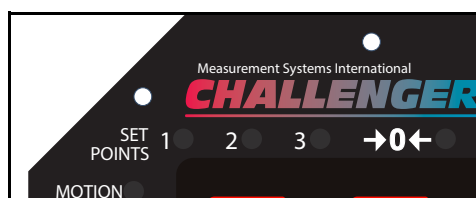

Figure 4-1. Setpoint LEDs

The MSI-3460 has an audible output option that is triggered by Setpoint 1. Contact Rice Lake Weighing Systems for other setpoint output options.

Setpoint	Description
Setpoint Mode	
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
Setpoint Weight Type	
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 ⏻ **POWER** and **F USER** simultaneously. *FUnc 1* displays.

2. Press **F USER** to scroll to the desired setpoint (*StPt 1 - 8*).

3. Press ⊕ **TARE**. The current setpoint mode is displayed.

4. Press **F USER** to scroll to the setpoint mode desired.

5. Press ⊕ **TARE**. The current setpoint weight type is displayed.

6. Press **F USER** to scroll to the desired weight type.

7. Press ⊕ **TARE**. The current setpoint weight value is displayed.

8. Press **F USER** to scroll the numbers and ⊕ **TARE** to enter each digit.

9. When the correct value is displayed, press ⊕ **TARE**. The next setup menu item is displays.

> **Note** *To enter a decimal point, press* ⏻ **POWER** *while the digit is blinking. To correct a digit, press* ◈ **ZERO** *to step back.*

10. Press ◈ **ZERO** to exit setup and store the settings.

4.7 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; 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 ≥1% of full scale above *GROSS ZERO* or *NET ZERO* before it can be totaled.

Manual Total

Manual Total (*ttL On*) 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 the **F USER** to *totAL* (Section 4.2 on page 10).

2. With the weight to be added on the scale, press **F USER**. 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 Step 1 and Step 2 until all weight samples have been added.

> **Note** *Total Mode will not function while the scale is in motion, ensure MOTION annunciator is off. 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.*
>
> **F USER** *functions as View Total only until the 1% threshold is exceeded to allow the addition to the total value.*

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Auto Total

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

Program the [F] **USER** to *AUTO TOTAL*, it functions as *Auto Total On*/*Auto Total Off* (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. H iGH	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 [⏻] **POWER** and [F] **USER** simultaneously. FUnc l displays.

2. Press [F] **USER** to scroll to totAL.

3. Press [⇶] **TARE**. The currently saved total mode displays.

4. Press [F] **USER** to scroll through the choices.

5. With choice displayed, press [⇶] **TARE** to select. F iLtr displays.

6. Press [◈] **ZERO** to exit setup and store the settings.

4.8 Filter Setup

Changing the filter settings allows the scale to adjust to situations where there is a lot a movement in the structure. If the reading is not stable, it can often be improved by increasing the filter setting. Settling time will be longer as the filter setting is increased. However, the MSI-3460 employs algorithms that speed up large weight changes while still controlling vibration even with high filter settings.

Use the following steps to set up filtering.

1. Press [⏻] **POWER** and [F] **USER** simultaneously. FUnc l displays.

2. Press [F] **USER** to scroll to F iLtEr.

3. Press [⇶] **TARE**. The currently saved total mode displays.

4. Press [F] **USER** to scroll through the choices.

5. With choice displayed, press [⇶] **TARE** to select. Un it displays.

6. Press [◈] **ZERO** to save and exit to *Weigh* mode.

4.9 Unit

1. Press [POWER] and [F USER] simultaneously. *Func 1* displays.

2. Press [F USER] to scroll to *Unit*.

3. Press [TARE] *Unit* displays with lb or kg the display area.

4. Press [F USER] to toggle between lb and kg.

5. With the desired choice displayed, press [TARE] to select.

6. Press [→◊] to save and exit to ***Weigh*** mode.

4.10 Battery Life

Select either Standard (*StAnd*) or Long (*LonG*) battery life.

In Long battery life mode, the system is placed into a sleep state for several seconds at a time if there is no change in weight. This disables the display in order to reduce power consumption and increase battery life. After several seconds, the MSI-3460 will wake up to check for any changes in weight. If there is a change in weight, the unit will stay awake. The unit will also stay awake if it is in configuration mode.

Although long battery life mode can significantly increase battery life, performance of the scale is better in standard battery life mode.

1. Press [POWER] and [F USER] simultaneously. *Func 1* displays.

2. Press [F USER] to scroll to *b. LiFE*.

3. Press [TARE]. The currently saved battery life displays.

4. Press [F USER] to toggle between the choices.

5. With choice displayed, press [TARE] to select. *Func 1* displays.

6. Press [→◊] to save and exit to ***Weigh*** mode.

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5.0   Calibration

The MSI-3460 is calibrated using standard 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 scale.

Although a single span point is usually adequate for rated accuracy, the MSI-3460 supports multi-point calibration with up to four span points plus zero.

When adequate test weights are not available, the unit can be calibrated using a calculated Constant Calibration (C-Cal). To use, a previously generated C-Cal number must be known. Rice Lake Weighing Systems supplies replacement load cells with the C-Cal value stamped on the serial number label.

There are three kinds of calibration:

- **Standard Calibration** – Used for maintenance and routine calibration
- **Initial Calibration** – Used to set up both the capacity and resolution (***d***) of the scale; It differs from Standard Calibration only in the initial steps; The initial calibration is performed after a calibration reset which completely erases the calibration and setup memory
- **C-Cal** – If the last calculated C-Cal value is known, the MSI-3460 can be calibrated without weights

5.1   Calibration Switch Access

Use the following steps to access the calibration switch on the MSI-3460 if calibrating the unit using either the standard calibration or the C-Cal calibration.

1. Remove the hex seal screw from the MSI-3460.

Figure 5-1. Calibration Button Seal Screw

2. Using a small non-conductive tool, press the calibration button located behind the hex seal screw. CAL displays.
3. Replace screw when calibration and setup is complete.

5.2 Standard Calibration

Use the following steps to calibrate the MSI-3460 using the standard calibration procedure.

1. Place the MSI-3460 into calibration mode (Section 5.1 on page 17).

2. Press ⊕ (TARE). *Unɫd* displays. Ensure there is no load on the scale.

3. Press ⊕ (TARE). *0* displays briefly. If the scale is in range *PASS* is displayed, then *LoAd1* displays.

4. Load the scale with a test weight (for a single span point calibration, a test weight of more than 20% of capacity or more is recommended).

5. Press ⊕ (TARE). Current capacity flashes on the display. If loading the scale with capacity weight, continue to Step 8.

6. Press F (USER) if using a calibration weight other than capacity. The far left digit of the display blinks indicating a number should be entered.

7. Press F (USER) to scroll through the numbers and ⊕ (TARE) to enter each digit.

8. Press ⊕ (TARE) to save the weight entry. If the cal value is within limits, *PASS* displays briefly, then *LoAd2*.

9. Press ⊕ (TARE) if more cal points are desired or ⊖ (ZERO) if a single point cal is needed.

10. Load the scale with the next test weight and press ⊕ (TARE) if the weight value is acceptable.

11. Press F (USER) to scroll through digit choices and press ⊕ (TARE) to enter the calibration weight value.

12. Press ⊕ (TARE) again to complete the calibration span point. If the cal value is within limits, *PASS* displays briefly, then *LoAd3* or *LoAd4* displays.

13. Press ⊕ (TARE) to enter additional span point or ⊖ (ZERO) if finished. *CAL d* displays to indicate success.

14. Press ⊕ (TARE) and the display flashes *C-CAL* followed by the *C-CAL* number.

15. Press ⊖ (ZERO) to store the calibration. *SEtUP* displays.

16. Press ⊖ (ZERO) to exit and return to *Weigh* mode.

> **Note** *If the scale is being used as a Legal-for-Trade device, place a lead-wire seal through the cal screw over to the adjacent screw.*

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5.3   Initial Calibration

Use this procedure only if the capacity and count-by (*d*) needs to be modified. The initial steps of the initial calibration will totally erase user setup as well as any previous calibration.

Use the following steps to calibrate using the initial calibration procedure.

1. Turn the MSI-3460 off.

2. Remove the hex seal screw covering the calibration button (Section 5.1 on page 17).

3. Press the ***Cal*** switch and [POWER] simultaneously. *rESEt* displays.

4. Press [TARE] to reset the calibration constants. *SUrE?* displays.

5. Press [TARE] to reset. *CAL* displays.

6. Press [TARE]. *Unit* displays.

7. Press [TARE]. *Unit* will begin flashing.

8. Press [F USER] to select lb or kg; when the LED is lit by the correct unit, press [TARE]. *CAP* displays.

9. Press [TARE]. A capacity of 10000 is the initial value and should not be set any higher than load cell rated capacity.

10. Press [F USER] to scroll through the numbers and press [TARE] to set the number.

11. With the correct number displayed, press [TARE]. *d* displays.

12. Press [TARE]. The current scale divisions displays.

13. Press [F USER] to scroll through the available scale divisions.

14. When the desired value displays, press [TARE]. *UnLd* displays, follow the standard calibration procedure in Section 5.2 on page 18 (starting with Step 2) to complete calibration.

5.4   Guidelines for Capacity and Resolution

Crane scales are subject to forces that regular floor scales do not see. Bridge cranes, hoist cranes and mobile cranes lack rigidity and tend to bounce or swing when loads are lifted. Rice Lake Weighing Systems recommends that resolution be kept in the 1:2000 to 1:3000 range. Some improvement in stability can be achieved by increasing the filtering. If the MSI-3460 display is unstable, it is recommended that the resolution be reduced and/or filtering increased.

Due to Legal for Trade requirements and general scale design criteria, the weight must be stable for **ZERO**, **TARE**, and **TOTAL** to work.

To improve stability:

   • Increase the filtering, at the risk of increasing settling time
   • Increase the **d** (reduce resolution)
   • Increase the stable window

Note *The MSI-3460 defaults to ±1d as a stable window. It can be changed at Rice Lake Weighing Systems to a higher value if desired. Often ±3d is selected for bridge cranes as these tend to have a lot of bounce to them. This will carry an accuracy penalty, adding ±3 d to the total accuracy of the scale, if the zero or tare operation happens to capture the weight in a valley or peak.*

Setting capacity is dictated primarily by the capability of the load cell. Many different capacities of the MSI-3460 are offered.

⚠ WARNING *Never set the capacity of the scale higher than the rating of the load cell.*

Due to excellent linearity of the MSI S-Beam load cell, it is acceptable to set lower capacities to better match the crane that the MSI-3460 is used on.

Example: if the hoist is rated for 9000 lb, then use a 10000 lb weight and reset the capacity to 9000 lb.

Use the Initial Calibration procedure for this calibration. De-rating as much as 50% of the capacity is usually acceptable, but the scale may be less stable if the **d** is decreased.

Due to kg to lb conversions, the capacity of all MSI-3460 systems is rated approximately 20% higher than the rated capacity in pounds. This is to allow the kg capacity to be exactly 1/2 the number of the pound capacity.

5.5   Constant Calibration (C-Cal)

When adequate test weights are not available, the MSI-3460 can be calibrated using a programmed constant calibration which is referred to as C-Cal. To use this, the C-Cal number must be known from a previous calibration. Rice Lake Weighing Systems supplies replacement load cells for the MSI-3460 with the C-Cal value stamped on the serial number label. When a calibration is performed with test weights, a new C-Cal is generated. C-Cal can be used when the electronics are replaced to get an approximate calibration that is suitable for non Legal for Trade applications.

IMPORTANT *The C-Cal number must be known prior to starting this procedure. For an MSI-3460 with its original load cell, Rice Lake prints this number on the calibration record, the serial number tag, and on the calibration log found inside the battery compartment.*

C-Cal can slightly reduce the absolute accuracy of the system if the electronics are replaced or a new load cell is installed and is intended for non-critical use only. Legal for Trade installations require that the MSI-3460 is calibrated using test weights. If a system was originally multi-point calibrated, the C-CAL calibration will erase the additional span points, as C-Cal is only a two point calibration (zero and span at 10% of capacity).

Use the following steps to perform a C-Cal calibration.

   1. Enter **Configuration** mode (). *CAL* displays.

   2. Press [F / USER] to scroll to *C-CAL*.

   3. Press [↷ / TARE]. *UnLd* displays. Ensure all weight has been removed from the scale.

   4. Press [↷ / TARE] to set the zero calibration point. A flashing *0* displays. If the zero is in range, the scale will display *PASS*, then displays *C-CAL*.

5. Press [TARE]. A flashing *0* displays.

6. Press [F USER] to enter the C-Cal value. The far left digit will flash indicating that number should be entered.

7. Press [F USER] to scroll through the numbers and [TARE] to enter each digit.

8. When correct number is displayed, press [TARE] to save. The display will read *PASS* followed by *CAL d*.

9. Press [ZERO] to exit **C-Cal Setup** menu.

10. Press [ZERO] to store the calibration and return to the weigh mode. *StorE* displays briefly.

5.6   Standard Menu

Selection	Description
Industrial (*indUS*)	This is the most common setting for the MSI-3460; With the Industrial standard, there is full range zero, access to units switching, filters, and peak hold
Handbook 44 (*Hb-44*)	Enables 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 calibration setup menu, so filters are only accessible through the calibration 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 4% (-1 to +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; Clear the Tare to display gross weight constantly; Other metrological aspects are changed to meet R-76 requirements; Only stable weights may be printed; Negative weight display is limited to -20d
1Unit (*1Unit*)	The 1unit standard is exactly the same as Industrial, except units switching is inhibited; This is useful for metric only countries; Another use of the 1Unit standard is to allow the scale to be calibrated in units other than lb or kg, since conversions are eliminated; Contact Rice Lake for more information on the standards settings

Table 5-1. Standard Menu Selections

Use the following steps to set up standard settings.

1. Enter **Configuration** mode (Section 5.1 on page 17). *CAL* displays.

2. Press [F USER]. to scroll to *SEtUP*.

3. Press [TARE]. *StAnd* displays.

4. Press [TARE]. The current standard setting is displayed.

5. Press [F USER] to scroll to the desired standard.

6. Press [TARE] to set the standard.

7. Press [ZERO]. *AUtoCAL* is displayed.

8. Press [ZERO] twice to exit setup and store all changes. *StorE* is displayed briefly, then the unit goes to **Weigh** mode.

5.7   Auto Zero Maintenance (AZM)

An auto zeroing maintenance mechanism is used to adjust the zero reading to the center-of-zero. The center-of-zero is defined as the weight reading within 1/4 d of zero. AZM continuously adjusts zero to maintain the center-of-zero. It is recommended that AZM is on to maintain the highest accuracy.

There are circumstances when it should be turned off. This can happen when minor variations of weight occur while picking up scale attachments and the variations fall within the AZM capture window. The AZM capture window (usually 1 d) and capture time (usually 8 seconds) can be adjusted by Rice Lake Weighing Systems to meet custom requirements.

The settings of AZM are dictated in Legal for Trade standards and cannot be adjusted.

Use the following steps to set up a Legal for Trade standard settings.

1. Enter *Configuration* mode (Section 5.1 on page 17). *CAL* displays.

2. Press **F USER** to scroll to *SEtUP*.

3. Press **TARE**. *StAnd* displays.

4. Press **F USER** to scroll to *AUtoO*.

5. Press **TARE**. The current setting is displayed.

6. Press **F USER** to toggle between *On* or *OFF*.

7. Press **TARE**. *0. P-UP* displays.

8. Press **ZERO** twice to save settings. *StorE* displays briefly and exits setup.

5.8   Zero Power Up (0.P-UP)

This feature will cause the unit to automatically zero after the unit is turned on. Default is *OFF*.

1. Enter *Configuration* mode (Section 5.1 on page 17). *CAL* displays.

2. Press **F USER** to scroll to *SEtUP*.

3. Press **TARE**. *StAnd* displays.

4. Press **F USER** to scroll to *0. P-UP*.

5. Press **TARE**. The current setting is displayed.

6. Press **F USER** to toggle between *On* or *OFF*.

7. When desired value is displayed, press **TARE**. *FiLtr* displays.

8. Press **ZERO** twice to save settings. *StorE* displays briefly and exits setup.

5.9 Filter

Changing the filter settings allows the scale to adjust to situations where there is a lot a movement in the structure. If the reading is not stable, it can often be improved by increasing the filter setting. Settling time will be longer as the filter setting is increased. However, the MSI-3460 employs algorithms that speed up large weight changes while still controlling vibration even with high filter settings. Selections are *OFF*, *LO* and *Hi-1*.

1. Enter *Configuration* mode (Section 5.1 on page 17). *CAL* displays.

2. Press [F USER] to scroll to *SEtUP*.

3. Press [⇄↑ TARE]. *StAnd* displays.

4. Press [F USER] to scroll to *Filtr*.

5. Press [⇄↑ TARE]. The current setting displays.

6. Press [F USER] to scroll to desired setting.

7. When desired value is displayed, press [⇄↑ TARE]. *StAnd* displays.

8. Press [⇄◇ ZERO] twice to save settings. *StorE* displays briefly and exits setup.

6.0   Communications

The MSI-3460 can communicate with peripheral devices using IEEE 802.15.4 Low Rate WPAN, or 802.11 Wi-Fi protocols, 'b', 'g' or 'n'. Only one communication type can exist at a time. Due to difficulties of dangling RS-232 cables from a hanging crane scale, the RF options are more commonly used. RS-232 is only used in rare specials

> **Note** *An RS-232 port located on the right side of the MSI-3460 is a non standard feature that may be included in special applications. It may be used for setup and calibration using a computer and the ScaleCore Connect software available on the Rice Lake website.*

RF Options

The 802.15.4 transceiver is used to communicate between the MSI-3460 and a MSI-8000 RF or MSI-8004HD Remote Display. The 802.15.4 transceiver is also capable of connecting to any supported device with an 802.15.4 Modem. 802.15.4 operates in the 2.4 GHz ISM band and does not require the end user to obtain a license. 802.15.4 can coexist with other 2.4 GHz systems if caution is taken to isolate antennas at least 10' (3 m) from the crane scales and if an MSI-8000 RF or MSI-8004HD Remote Display acts as the network coordinator.

The 802.11 Wi-Fi option communicates directly with a standard RF access point. This option is covered by the MSI Wi-Fi setup addendum (PN 182816). WiFi is used for special applications and is pre-configured before shipping.

6.1   Printer / Serial Output Setup

All RF linked device weight modes are available in user formatted form.

Communications port settings are independent of print settings in connected displays/indicators which only in the MSI-3460.

Parameters	Choices	Description
L ı5ᴛn	--	Listen – Connects with an RF remote
oUᴛ-P	Porᴛ.0 ᴦF	Output Port – Select output port for print
5ᴛᴦnG	--	Serial String – For use in printing (Section 6.1.1)
Cnᴛᴦᴌ	U5Eᴦ LoAd Conᴛ ınUoU5 OFF	Control – Print mode selected (Section 6.1.2 on page 25)
ᴦAᴛE	0-65535	Rate – Output rate in seconds, 0 is the fastest possible setting

Table 6-1. Print Parameters

> **Note** *RS-232 is not a standard feature but may be included in special applications. It is recommended that printing be done wirelessly using a MSI-8000HD or MSI-8004HD remote display. RS-232 communications port is capable of outputting load data.*

6.1.1   Standard Print Strings

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

Print String	Choices	Description
1	Current load	Fixed output length: 16. Leading zeros suppressed except for the least significant digit (LSD); <TTTTTTT><SP><UU**><**SP><MMMMM**><**CRLF>
2	Net load	Fixed output length:16. Leading zeros suppressed except for the LSD; <TTTTTTT><SP><UU><SP><NET><SP><SP><CRLF>
3	Gross load	Fixed output length: 16. Leading zeros suppressed except for the LSD. <TTTTTTT><SP><UU><SP>GROSS><CRLF>
4	Tare Weight	Fixed output length:16. Leading zeros suppressed except for the LSD; <TTTTTTT><SP><UU><SP>TARE><CRLF>
5	Total Weight	Fixed output length: 16. Leading zeros suppressed except for the LSD; <TTTTTTT><SP><UU><SP>TTL><CRLF>

Table 6-2. Standard Print Strings

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6	Number of Samples Totaled	Fixed output length: 16. Leading zeros suppressed except for the LSD; <SP><SP><SP><SP><SP><SP><SSSSSSS><SP><T-CNT>SP>CRLF>
7	Current Weight Mode	Net, Gross, Peak, etc; <SP><MMMMM>CRLF>
8/9	Carriage Return/Line Feed	Used to add a space between print records; <CRLF>

Table 6-2. Standard Print Strings (Continued)

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 software can also be used to create custom output strings with a combination of standard print string commands (Table 6-2). ScaleCore Connect can be downloaded from **www.ricelake.com**.

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

Table 6-3. Standard Print Strings Commands

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.

6.1.2   Control Modes

The user can select three control modes which are described in Table 6-4.

Mode	Description
USEr	Printing is controlled by the operator using [F] **USER**. if set to *Print* mode; If using a remote device, there may be a dedicated **PRINT** key (**F-key 3**) available
LoAd	One print occurs when a stable load is read. The scale must then return to near zero before another print will occur; ***Note: Other configurations of loads are available using the ScaleCore Connect software. It can be downloaded from*** www.ricelake.com
Cont inUoUS	The MSI-3460 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 6-4.   Control Modes

6.1.3 Printer Output Setup

Use the following steps to set up the printer output.

1. Press [TARE] and [F USER] at the same time. *Pr int* is displayed.

2. Press [TARE]. *L iStn* is displayed.

3. Press [TARE]. The current setting flashes.

4. Enter the number using [F USER] to scroll through numbers and [TARE] to set number.

5. Press [TARE]. *OUt-P* displays.

6. Press [TARE]. The current setting flashes.

7. Use [F USER] to toggle between *PortO* and *rF*.

8. When the desired setting is displayed, press [TARE]. *StrnG* displays.

9. Press [TARE] to enter.

10. Enter the number using [F USER] to scroll through numbers and [TARE] to set the string number desired.

11. When set, press [TARE] again. *cntrl* displays.

12. Press [TARE] to enter. Current setting flashes.

13. Press [F USER] to scroll through the settings.

14. When desired setting is displayed, press [TARE]. *rAtE* displays.

15. Press [TARE] to enter.

16. Enter the number using [F USER] to scroll through numbers and [TARE] to set number.

17. Press [TARE] again. *L iStEn* displays.

18. Press [ZERO] twice to save settings. *StorE* displays briefly and exits setup.

> **Note** *When entering numbers, pressing [ZERO] will step back a digit for corrections.*

6.2 RF Network Setup

The MSI-3460 uses 802.15.4 transceivers to communicate with an MSI-8000 or MSI-8004HD Remote Display or another supported device with an 802.15.4 Modem..

The MSI-3460 uses three numbers to establish a piconet. A piconet is a network that is created using a wireless connection. Table 6-5 lists out the elements used in setting up a piconet.

> **Note** *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.*

6.2.1 802.15.4 RF Network Setup

When equipped with the 802.15.4 option, the MSI-3460 can connect with an MSI-8000 or MSI-8004HD Remote Display or another supported device with an 802.15.4 Modem.

Choices	Parameters/Range	Description
On. OFF	On OFF	Enable RF – Affects continuous mode only
Sc id	0-254 20-30 [rEcoNNEndEd]	ScaleCore ID – Used to identify each ScaleCore device in a piconet, must not be duplicated within the same RF Channel *Note: For use with a MSI-8000/8000HD or MSI-8004HD remote display, The ScaleCore ID needs to be set to 0-3. ScaleCore ID corresponds to scale channels 1-4 on the paired remote display. SCID 0 = Channel 1, SCID 1= Channel 2, SCID 2 = Channel 3, and SCID 3 = Channel 4.*
Chnl	2-23	RF Channel – Establishes the base network that all interconnected devices must match, range 12-23
nEt id	0-99999	Network ID – A 64 bit number that all interconnected devices must match; The MSI-3460 limits this number to a max of 5 digits in a range of 0-99999 *Note: Do not use a small number here to help avoid other 802.15.4 networks that default to a Network ID of 0 Range 0-99999*
tYPE	2bEE OthEr	Connection Type – Type of card being used *Note: 2bEE refers to XBee 802.15.4 RF card; Both XBEE 2SC, XBee 3 and XBee 3-Pro use the 2bEE parameter*
Hold	On OFF	Setting Hold to On keep power to the radio even when the scale is turned off; This is required if the Rugged Remote or a remote display will be used to turn the MSI-3460 on; This causes some battery to drain when the scale is off; Hold should be set to off unless this is require in order to maximize battery life

Table 6-5. RF Menu Parameters

To configure RF Network:

1. Press the [TARE] and [F USER] keys at the same time. *Print* displays.

> **Note** *bUSY may flash momentarily before entering the communications menu.*

2. Press [F USER]. *rF* displays.

3. Press [TARE]. *On. OFF* displays.

4. Press [TARE] to enter parameter. The current value flashes.

5. Press [F USER] until *On* displays.

6. Press [TARE]. *Sc id* displays.

7. Press [TARE]. The current ID flashes. If SCID is correct, continue to .

8. Enter the ID using [F USER] to scroll through numbers and [TARE] to set number.

9. When ID is set, press [TARE] again. $ChnL$ displays.

10. Press [TARE]. The current channel flashes. If the channel number is correct continue to Step 12.

11. Enter the channel using [F USER] to scroll through numbers and [TARE] to set number.

12. When channel is set, press [TARE] again. nEt id displays.

13. Press [TARE]. The current net ID flashes. If the net ID is correct, continue to Step 15.

14. Enter the network ID using [F USER] to scroll through numbers and [TARE] to set number.

15. When the Net ID is set, press [TARE] again. $On.$ OFF displays.

16. Press [ZERO] twice to save and exit to *Weigh* mode.

Note *When entering numbers, pressing* [ZERO] *will step back a digit for corrections.*

6.2.2 Hold Feature

The hold feature is used to keep the modem on even when the display is off. It is used if desired with a rugged remote or a remote display.

To Enable it follow these steps:

1. Press [TARE] and [F USER] simultaneously. $Print$ displays.

2. Press [F USER]. rF displays.

3. Press [TARE]. $On.$ OFF displays.

4. Press [TARE] to enter $On.$ OFF.

5. Press [TARE] to select On.

6. Press [F USER] to scroll to $HoLd$.

7. Press [TARE] to enter the $HoLd$.

8. Press [TARE] to select On.

9. Press [ZERO] twice to store settings and return to Weigh mode.

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6.3 Radio Compliance

All radio options meet FCC and international radio compliance per the certification information listed in this section.

These modules may have additional international certifications that are not listed in this section.

Please contact Rice Lake Weighing Systems if you require operation in a jurisdiction that is not listed.

6.3.1 802.15.4 (XBee 3 and XBee 3-PRO)

FCC Statement

Contains FCC ID: MCQ-XBEE3

International Certifications

Canada: Radio Certificate Number: IC 1846A-XBEE3

Australia: RCM

Brazil: ANATEL 06329-18-01209

EU (XBee 3 only): Yes, when used with CE approved products

Japan (XBee 3 only): R210-119309

Mexico: IFETEL (IFT) RCPDIXB19-1820

South Korea (XBee 3 only): R-C DIG-XBEE3

6.3.2 802.15.4 (XBee 2SC)

FCC Statement

Contains FCC ID: MCQ-S2CTH

International Certifications

Canada: Radio Certificate Number: IC 1846A-S2CTH

Australia: RCM

Brazil: ANATEL 0616-15-1209

EU: Yes, when used with CE approved products

Japan: R210-105563

Mexico: IFETEL (IFT) RCPDIS219-1821-A1

South Korea: MSIP-CRM-DIG-XBee-S2C-TH

6.3.3 Wi-Fi

FCC Statement

Contains FCC ID: T9J-RN171

International Certifications

Canada: Radio Certificate Number: IC 6514A-RN171

Korea: Radio Certificate Number: KCC-CRI-029-RN-171

Europe: The product is compliant with the following standards and/or other normative documents:

- EN 300 328 : V1.8.1 (2012)
  This product is compliant with the following standards and/or other normative documents:
  Safety (article 3.1A) EN 60950-1:2006+A11:2009+A1:2010+A12:2011
  EMC (article 3.1b) EN 301 489-1 : V1.9.2 (2011) In accordance with the specific requirements of ETSI EN 301 489-17: V2.2.1 (2012)

6.3.4 Bluetooth

FCC Statement

Contains FCC ID: T9J-R41-1

International Certifications

Canada: Radio Certificate Number: IC 6514A-RN411

Europe: This product is compliant with the following standards and/or other normative documents:

- EN 300 328-1
- EN 300 328-2 2.4GHz

6.3.5 FHSS (Frequency Hopper Spread Spectrum)

FCC Statement

Contains FCC ID: HSW-DNT24

International Certifications

Canada: Radio Certificate Number: IC 4492A-DNT24

ETSI Certified

7.0   Optional Rugged Remote

The MSI-3460 with an installed RF modem can be controlled with an optional Rugged Remote (PN 173014). The Rugged Remote is a transmit only device that can be used to perform basic scale functions. The range may vary up to 100' or more depending on room conditions and line of sight.

The RF modem in the MSI-3460 must be configured to accept communication from the Rugged Remote, contact Rice Lake Weighing Systems for pairing requirements.

Note *A Rugged Remote is paired to an individual device and cannot be reprogrammed in the field.*

Figure 7-1. Rugged Remote

7.1   Operation

The Rugged Remote is paired to a single ScaleCore RF device and replicates the front panel buttons. Slight variations between each device's buttons will result in different operation in the Rugged Remote. See Table 7-1 for corresponding buttons for the Rugged Remote and the connected device.

Note *The Rugged Remote can only be paired to a single ScaleCore device. Reprogramming to configure communication to a different ScaleCore device can only be performed at the factory or with the purchase of additional RF modems.*

Rugged Remote	MSI-3460	Description
	POWER	Power
	ZERO	Zero
	TARE	Tare
	USER	Function

Table 7-1. Corresponding Buttons

7.1.1 Power

The Rugged Remote can be enabled to turn on and off the ScaleCore device it is paired remotely. The hold function must be enabled in the MSI-3460 (Section 6.2.2 on page 28).

Note	***The Hold feature causes the device's modem to stay on and continuously draw from the battery, even when the device is turned off, resulting in decreased battery life.***

7.1.2 Zero

Press [ZERO] to remove small deviations in zero when the Dyna-Link 2 is unloaded (Section 2.2 on page 4).

This key is not programmable.

7.1.3 Programmable Function Keys

[TARE/F1] and [FCN/F2] are programmable in the MSI-3460. [TARE/F1] is defaulted to Peak hold and [FCN/F2] is defaulted to Test in the MSI-3460. See Section 4.2 on page 10 to configure the MSI-3460 function keys for Rugged Remote operation.

7.2 Conflict and Jamming Considerations

It is important to understand that only one transmitter at a time can be activated within a reception area. While the transmitted signal consists of encoded digital data, only one carrier of any frequency can occupy airspace without conflict at any given time. This is not to say that there cannot be multiple remote controls for the unit, but rather that two cannot be used simultaneously.

7.3 FCC Compliance

The Rugged Remote has 802.15.4 certification (Section 6.3 on page 29).

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8.0   Maintenance

8.1   Troubleshooting

Problem	Possible Cause	Solution
Display is blank when **Power** key is pressed	Discharged battery	Recharge, allow at least four hours charge
	Defective battery	Replace
	Corroded battery or battery contacts	Clean contacts
	Defective switch or circuit board	Requires authorized service
Display does not function properly, front panel keys do not function normally, or scale will not turn off	Improperly updated software.	Reinstall software
	Faulty circuit board	Requires authorized service
	Loose connectors	Requires authorized service
Scale does not respond to weight changes	Out of calibration	Calibrate
	Faulty load cell	Replace
	Load cell connector	Check connector and wires
Display over ranges below 100% capacity	Tared weight is added to load to determine overload point	Return to **Gross Weight** mode
	Zero requires adjustment	Rezero the scale
	Too much weight has been zeroed	Rezero the scale
Display Drifts	**AZM** (Auto0) is turned off	Turn **AZM** on
	Rapid temperature changes such as moving the scale from indoors to outdoors	Wait until the scale temperature has stabilized
Displayed weight shows 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 not stable	Excessive vibration in crane system	Increase filtering or increase **d** in cal
	Excessive side loading	Improve load train symmetry
	Load cell faulty	Check LC connections
Display toggles between Error and Load	Weight exceeds capacity	Reduce weight immediately
	Faulty load cell or wiring	Check LC and LC wiring
Display toggles between Error and A2DLo	A/D is saturated negative	Check LC and LC wiring
Display toggles between Error and buttn	A key is stuck or is being held down	Check switches for damage
		Ensure that a remote is not transmitting continuously
Optional RF remote does not work	Units not mated	See Section 6.2 on page 27 for additional network setup information
Lo Batt is blinking	Battery is low	Recharge battery
Unit turns on, then immediately off	Battery is low	Recharge battery
Weight will not zero	System not stable	Wait for motion annunciator to turn off
		Increase filtering for more stability
	Zero out of range	LFT units have limited zero range; Reduce the weight or use tare instead
Weight will not tare or total	System is not stable	Wait for motion annunciator to turn off, or if in a mechanically noisy crane, increase the filtering or reduce the size of the scale increment **d**; The motion window can also be increased. Contact RLWS if there is a problem getting the MSI-3460 to zero, tare, or total due to stability issues
Setpoint lights blink	Setpoint is enabled and the trigger point has been reached	Disable setpoints if they are not needed
Manual total does not work	A function key is not set to Total	Set up Func1 or Func2 for Total
	Weight must be stable	Increase filtering for more stability
Auto total does not work	Weight must be stable	Wait for the motion light to go out, or increase filtering for more stability
	Weight thresholds not reached	Weight thresholds must exceed 1% of capacity for autototal to work; Then it must drop below 0.5% of capacity for additional weighments to register

Table 8-1. Troubleshooting

8.2 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.*

Service Counters are important safety warning features and can only be reset at the factory by certified Rice Lake personnel.

As part of the reset process, the service technician will perform a thorough load train inspection to ensure user safety and confirm that the product is ready to be returned for regular service.

See the Crane Scale Safety and Periodic Maintenance Manual (PN 153105) for proper loading techniques to improve the safety and longevity of your MSI Overhead Weighing Product. Download the Crane Scale Safety and Periodic Maintenance Manual (PN 153105) at www.ricelake.com.

The MSI-3460 maintains two service counters for safety.

- The first counter counts the number of times the scale has been overloaded.
- The second counter counts lifts above 25% of capacity.

These counters serve to warn the user to inspect the load train after a number of overloads, also when there is a chance of fatigue failure. The power up routine will be interrupted when the lift counter exceeds 16383 lifts or the overload counter exceeds 1023 overloads. If the screen displays $LFLnt$ when unit is powered on:

1. Press [TARE] to display the 25% lift counter.

2. Press [ZERO] again to see the overload lift counter.

3. Press [ZERO] to acknowledge the warning and return to standard scale operation.

Note *The power up warning message will not appear again for another 16383 lifts (or 1023 overloads).*

To Access the Service Counters

4. Program [F USER] to be TEST (Section 4.2 on page 10).

5. Press [F USER].

6. Within two seconds of pressing [F USER], press [TARE]. The display flashes $LFLnt$ (for Lift Counter) followed by the number of times the weight has exceeded 25% of capacity.

Note *Press [TARE] to step through the service counters.*

7. Press [F USER]. The display flashes $OLLnt$ (for Overload Counter) followed by the number of times the weight has exceeded capacity.

8. Press [F USER]. The display flashes $L-LAL$ followed by the C-Cal value.

9. Press [F USER]. Returns to standard *Weigh* mode.

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8.3 Software Update

For use with ScaleCore3 Printed Circuit Assembly (Circuit Board)

Equipment Requirements
- PC with terminal program
- Interface Cable PN: 503230-0001 (10') or -0002 (5')

Updating Process
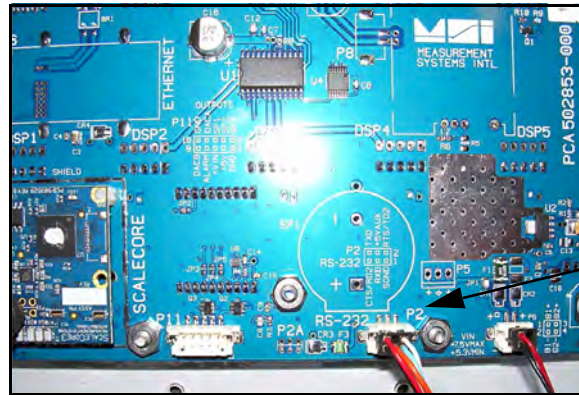1. Connect interface cable to P2.

Figure 8-1. Connecting Interface Cable

2. Power on the scale.
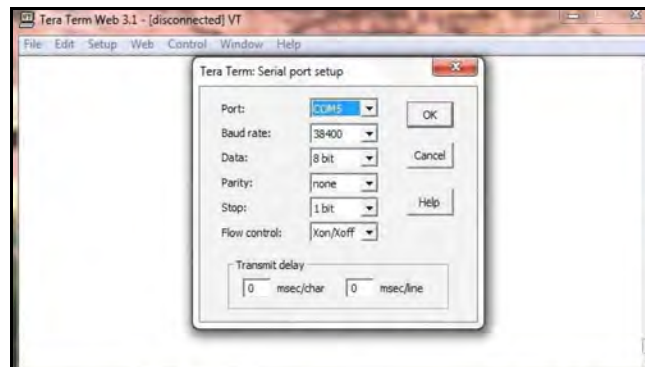3. Open the terminal program.

Figure 8-2. Serial Port Setup

4. Configure to the following:
   - Baud Rate: 38400
   - Data Bits: 8
   - Parity: None
   - Stop Bits: 1
   - Flow Control: XON/XOFF

5.   Type: {00FF09=0199}, then press **Enter**. This command accesses the boot-loader program within the ScaleCore. ᑈᒪᑌᖇᗗᑰ displays on the MSI-3460 and the ScaleCore Boot Loader menu appears on the terminal screen.

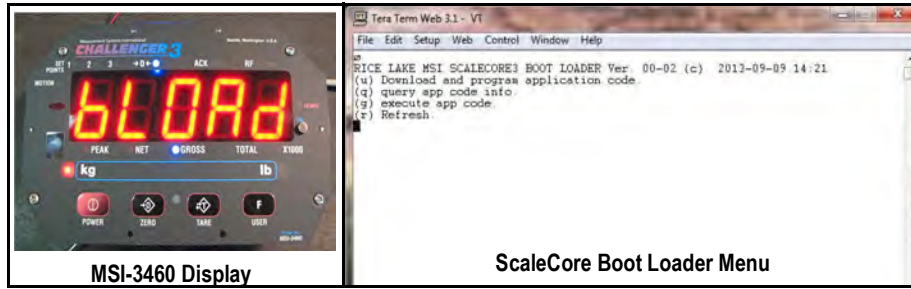**MSI-3460 Display**   **ScaleCore Boot Loader Menu**

Figure 8-3. Access Bootloader From ScaleCore

6.   Type u to download and program the application code. The boot loader program prompts to send the file.

7.   Select the file, then send. Wait for a complete file transfer.
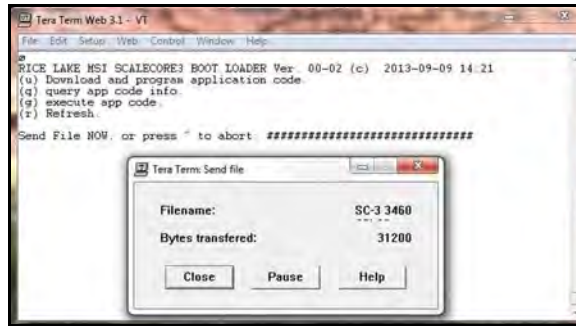
Figure 8-4. Send File

When complete, the boot loader menu appears on terminal screen.
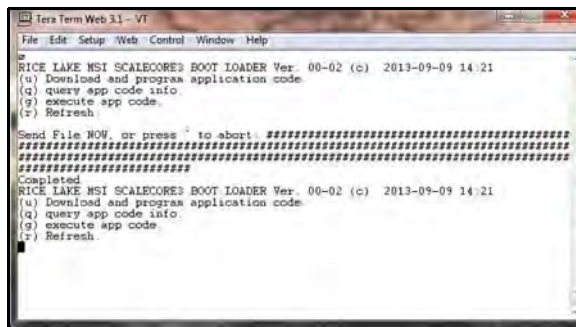
Figure 8-5. Bootloader Menu

8. Verify the Application Code Version, type q to query app code info.
    •   App Code Version: 03b03

Note	*Contact Rice Lake Weighing Systems for the current version.*

Figure 8-6. Query App Code Info

9. Type g to execute the application code, the MSI-3460 display will return to normal *Weigh* mode.

Figure 8-7. Normal Weigh Mode

8.4   MSI-3460 Challenger 3 Dimensions

Figure 8-8. MSI-3460 Challenger 3 Dimensions Figure

📝 **Note** | *15,000 lb (7,000 kg) unit comes standard with 12 ton top shackle.*

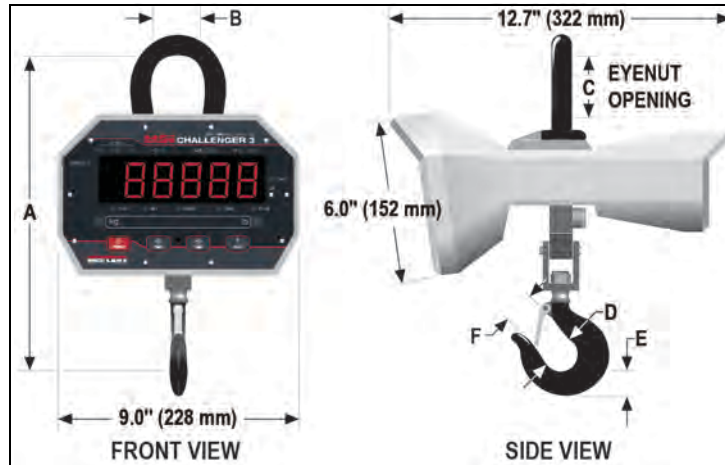| Capacity	Resolution	A	B	C	D	E	F	Approximate Shipping Weight
250 lb	0.1 lb	11.94"	2.0"	2.45"	1.63"	1.14"	1.16"	22 lb
125 kg	.05 kg	303 mm	51 mm	62 mm	41 mm	29 mm	29 mm	10 kg
500 lb	0.2 lb	11.94"	2.0"	2.45"	1.63"	1.14"	1.16"	22 lb
250 kg	0.1 kg	303 mm	51 mm	62 mm	41 mm	29 mm	29 mm	10 kg
1,000 lb	0.5 lb	11.94"	2.0"	2.45"	1.63"	1.14"	1.16"	22 lb
500 kg	0.2 kg	303 mm	51 mm	62 mm	41 mm	29 mm	29 mm	10 kg
2,000 lb	1.0 lb	11.94"	2.0"	2.45"	1.63"	1.14"	1.16"	22 lb
1,000 kg	0.5 kg	303 mm	51 mm	62 mm	41 mm	29 mm	29 mm	10 kg
5,000 lb	2.0 lb	16.67"	2.45"	3.40"	2.5"	1.81"	1.61"	39 lb
2,500 kg	1.0 kg	423 mm	62 mm	86 mm	64 mm	46 mm	41 mm	18 kg
10,000 lb	5.0 lb	16.67"	2.45"	3.40"	2.5"	1.81"	1.61"	39 lb
5,000 kg	2.0 kg	423 mm	62 mm	86 mm	64 mm	46 mm	41 mm	18 kg
15,000 lb	5.0 lb	16.67"	2.45"	3.40"	2.5"	1.81"	1.61"	39 lb
7,000 kg	2.0 kg	423 mm	62 mm	86 mm	64 mm	46 mm	41 mm	18 kg

Table 8-2. MSI-3460 Challenger 3 Dimensions

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9.0   Specifications

Accuracy

± (0.1% +1 d) of applied load

Capacity

Legal: 250 to 10,000 lb (125 to 5000 kg)
Industrial: 250 to 15,000 lb (125 to 7000 kg)

Resolution

2000 to 3750 d standard (Up to 10,000 d available)

Enclosure

NEMA Type 4, IP65, powder coated cast aluminum

Lifting Eye & Hook

Crosby® or equivalent with 360° non-bearing swivel hook

Design Overload

200% Safe / 500% Ultimate

Functions

Power
Turns unit ON or OFF
Zero
Zeros applied load up to 100% of capacity (limited range in NTEP/OIML configurations)
Tare
Tares applied load and displays weight in Net mode
User
Programmable as TEST, UNITS, NET/GROSS, TOTAL, PEAK HOLD & SETPOINTS

Display

5-digit, 1.5" (38 mm) LED with programmable brightness control

Displayable Units

Pounds or kilogram selectable

Annunciators

COZ, Net, Gross, Total, Peak, Low Battery, lb/kg,
Motion, Setpoints, ACK IN, ACK OUT, RF

Power

6 V rechargeable battery. 115/230 VAC battery charger is included

Operating Time

Up to 80 hours between charging with typical use. Less with optional RF Model

Operating Temperature

Legal: 14°F to 104°F (-10°C to 40°C)
Industrial: -10°F to 104°F (-40°C to 40°C)

Auto-Off Mode

Select for 15, 30, 45, 60 minutes or Off

Auto Sleep Mode

Power down during non-use and power up with weight change or any key

press

Service Counters

Counts number of lifts over percentage of capacity and lifts over capacity

Calibration

Digital

Filtering

OFF, LO, HI-1, HI-2 selectable

Warranty

One-year limited

Approvals

NTEP
CoC Number 86-021
Accuracy Class III; n_{max}: 2000 to 2500

Note *The MSI-3460 scale has a safe mechanical overload of 200%, and an ultimate overload of 500%. Overloads greater than 500% may result in structural failure and dropped loads.*
Dropped loads may cause serious personal injury or death.