MSI-7300

Dyna-Link 2 Tension Dynamometer

Technical Manual

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W E I G H I N G   S Y S T E M S

Revision History

This section tracks and describes manual revisions for awareness of major updates.

Revision	Date	Description
F	February 29, 2024	Established revision history • Troubleshooting issue added • Clarification of audible alarm added

Table i. Revision Letter History

Contents

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1.0   Introduction

This manual is intended for use by qualified technicians responsible for setting up and operating the MSI-7300 Dyna-Link 2 Tension Dynamometer

Manuals are available from Rice Lake Weighing Systems at **www.ricelake.com/manuals**

Warranty information is available at **www.ricelake.com/warranties**

1.1   Features

- Automatic power off
- IP65/NEMA Type 4 for outdoor use.
- LCD display:
  - 50,000 lb and lower - Five-digits, 1.22" (31 mm)
  - 100,000 lb and highter - Six-digits, 1" (26 mm)
- Selectable kg/lb/tons (U.S. Short)/metric tons/kilo-newtons.
- Automatic or manual weight totalization
- Hi speed peak mode
- Two setpoints
- Two service counters

1.2   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.

1.3 Safety

Safety 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 on, under or near the load being lifted as it is a potential falling hazard. Keep a safe distance.

Do not use for purposes other then 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 dynamometer 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 dynamometer, rigging elements or the lifting structure.

Do not allow multi-point contact with the shackles of the dynamometer unit.

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

Do not make alterations or modifications to the dynamometer or the shackles.

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

Do not remove or obscure warning labels. Replace labels when worn. Contact MSI for replacement labels.

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

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

There are no user serviceable parts within the Dyna-Link 2. Repairs must be performed by qualified service personnel only.
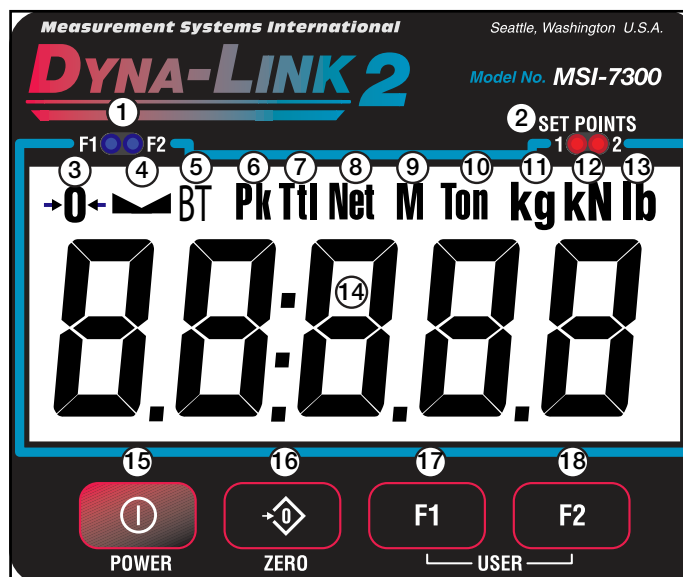
1.4   Display

Figure 1-1. Dyna-Link 2 Front Panel

1.4.1   Keys

Item No.	Key	Description
15		Power – Turns the Dyna-Link 2 on and off. In setup mode, it returns the unit to tension display without saving settings
16		Zero – Used to zero out residual tension on the link; In setup mode, it saves settings and drops back one menu level
17	F1	F1 – Programmable to user functions (Section 4.2 on page 13)
18	F2	F2 – Programmable to user functions (Section 4.2 on page 13)

Table 1-1. Key Descriptions

1.4.2   Annunciators

Item No.	Description
1	F1 and F2 LEDs – Indicates the function of the associated F-key is active; *Example: In **Peak Hold** mode the associated LED will blink whenever a new peak reading is captured.*
2	Setpoints – User programmable setpoints for early overload warnings
3	Center-of-Zero – Indicates the tension is within 1/4 d of zero
4	Standstill – Indicates the tension force has settled within the motion window (usually ±1d)
5	Low Battery – Displays when approximately 10% of battery life remains and blinks when automatic shutdown is imminent
6	Peak – Indicates **Peak Hold** mode
7	Total – Displays the total accumulated weight for less than five seconds
8	Net – Indicates the unit is in the net tension mode (Gross - Tare = Net)
9	Metric Ton – In conjunction with the ton annunciator, indicates the unit is displaying metric tons; When used with the total display, it is used for X1000 to allow accumulation of weight beyond the five digit display capacity; It is also used with the service counters when the number of lifts exceeds five digits
10	Ton – Illuminated alone, indicates the unit is displaying in U.S. short tons (1 ton = 2000 lb); When illuminated along with the metric ton, the unit is displaying in metric tons (1 metric ton = 1000 kg)
11	Kilogram– Indicates the tension display is in kilograms
12	Kilonewton – Indicates the tension display is in kilonewtons
13	Pound Key – Indicates the tension display is in pounds
14	Five digit 1.22 in (31mm), sunlight visible, LCD Tension Display; Units with maximum capacity of 100,000 lb and up come with a six digit 1 in (26 mm) display

Table 1-2. Annunciator Descriptions

2.0   Operation

This section includes the basic operation of the Dyna-Link 2.

2.1   Power

Turn on the Dyna-Link 2 by pressing [⓪]. The LCD displays all segments for a display test and the software version number will briefly display. When *0* displays, the unit is ready for use.

2.2   Zero

Press [-◇-] to remove small deviations in zero when the Dyna-Link 2 is unloaded. See for zeroing (taring) package or pallet weights.

- Zero works in *GROSS* or *NET* modes.
- Zeroing while in *NET* mode will zero the gross tension causing the display to show the negative tare value.
- The Dyna-Link 2 must be stable within the motion window. The unit will not zero until ◣ ◢ displays. The unit holds a zero request for two seconds. If the motion clears in that time, the unit will zero.
- The unit will accept a zero setting over the full range of the Dyna-Link 2. Zero settings above 4% of full capacity will be subtracted from the overall capacity.
  > *Example: If 100 lb is zeroed on a 1000 lb Dyna-Link 2, the overall capacity will reduce to 900 lb plus the allowed over-range amount.*

> **NOTE: The tension reading must be stable within the motion window for the zero function to work.**
>
> **The backup memory stores the zero reading in the event of power failure.**

2.3   Tare

2.3.1   Tare and Display the Net Tension
1. Program an F-key to tare ().
2. Press the Tare F-key. *0* displays and the tension mode changes to *NET Tension*.

The tension reading must be stable within the motion window for the tare function to work. The backup memory stores the tare reading in the event of a power failure.

2.3.2   Clear the Tare and Revert to GROSS Tension
Press the Tare F-key. The NET annunciator turns off. The absence of the NET annunciator is the only indication the Dyna-Link 2 is in the *GROSS Tension* mode.

> **NOTE: To view GROSS tension without clearing the tare value, program the remaining F-Key to the function NET/GROSS.**

- Only positive gross tension readings can be tared
- The tension/force reading must be stable and ◣ ◢ must be on
- Setting or changing the tare has no effect on the gross zero setting
- The Dyna-Link 2 stores the tare value in non-volatile memory and is restored when power is cycled
- Taring will reduce the apparent over range of the Dyna-Link 2
  > *Example: When taring 100 pounds of rigging on a 1000 lb Dyna-Link 2, the unit will overload at a net tension of 900 lb (1000-100) plus any additional allowed overload (usually about 4% or 9d).*

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3.0   Installation

3.1   Unpacking

When unpacking the Dyna-Link 2 from the shipping container, ensure that all assembly parts are accounted for.

Check for any visible damage and immediately report any damage to Rice Lake Weighing Systems and the shipper. Retain the original shipping container for future shipping or transporting of the unit.

3.2   Assembly

Two cotter pins and two batteries are included with the Dyna-Link 2, also required for installation are shackles and pins, they can be supplied by the customer or they can be ordered from Rice Lake Weighing Systems.

1. Slide top shackle over load cell and insert the pin.
2. Screw the shackle nut onto the pin.

📝 *NOTE: It is not necessary to tighten the nut too tight. Ensure the nut is down far enough to expose the cotter pin hole.*

3. Lock the shackle pin in place with the supplied cotter pin and bend the cotter pin.
4. Repeat Step 2–Step 3 for the bottom shackle.
5. Remove the battery access port cover.
6. Insert the two batteries, positive end first, into the battery shaft.
7. Reinstall the battery access port cover.

⚠️ *WARNING: The Dyna-Link 2 load train is unsafe for use if the shackle pins are not properly secured with cotter pins.*

3.3   Battery Replacement

Disposable Batteries

The BT annunciator displays when the battery is getting low. When the BT annunciator starts to blink, the batteries are close to being completely drained. For maximum life, use the batteries until the system shuts off.

📝 *NOTE: After replacing the batteries, the battery cap should be tightened using a screwdriver to ensure a proper seal and not just tightened by hand.*

Rechargeable Batteries

When using Nickel-Metal-Hydride (NiMH) cells, it is recommended that the cells are recharged immediately after the BT annunciator starts to blink. Do not allow the batteries to discharge completely as this may compromise the recharge life of the battery.

NiMH Cells in C and D sizes have a lower capacity then the Alkaline C and D sizes. Rice Lake Weighing Systems recommends having two sets of NiMH batteries, so one set can be charging while the other is in use.

ⓘ *IMPORTANT: NiMH D cells are often repackaged C cells. Therefore there is no increase in battery life for Dyna-Links large enough for D cells.*

The use of NiCad batteries is not recommended.

If the Dyna-Link 2 will not be used for an extended period, the batteries should be removed. A small current is used when powered off which will discharge the batteries in about six months.

4.0 Setup

This section describes parameter settings on the Dyna-Link 2.
Use the following keys for navigating through the menus when setting up the Dyna-Link 2.

1. Press ⓘ and F2 simultaneously to enter setup menu.
2. Press F2 to scroll through the parameters or settings.
3. Press F1 to enter a selected parameter or to save a selection and return to previous menu.
4. Press ◈ to save a selection and return to previous menu or to the *Weigh* mode.
5. Press ⓘ to cancel and return to *Weigh* mode.

4.1 Setup Menu

To enter the set up menu, press ⓘ and F2 at the same time.

Parameter	Settings	Description
Func 1 Func2		F1 key – Configurable to listed parameters; Default is peak hold; In menu mode, functions as the enter/select key
		F2 key – Configurable to listed parameters; Default is display and function test; In menu mode, functions as the scroll key
	OFF	The F-Key is disabled
	tESt	Test – Runs an LCD test (Section 4.2.2 on page 13)
	totAL	Total – Accumulation of multiple weighments (Section 4.2.3 on page 13)
	u-ttL	View Total – Activates total weight display followed by the number of samples; With total displayed, press **ZERO** to clear
	nEtGr	Net/Gross – Switches the display between Net and Gross modes (Section 4.2.4 on page 13)
	tArE	Tare - Zeros out a known weight (rigging, a packing container or pallet) (Section 4.2.5 on page 14)
	P-HLd	Peak Hold – Automatically updates the display when a higher peak weight reading is established (Section 4.2.6 on page 14)
	2Unit	2 Units – Toggles the force units between pounds and kilograms (Section 4.2.7 on page 14)
	5Unit	5 Units – Scrolls through all available units: lb, kg, Tons (US Short), Metric Tons and kiloNewtons (Section 4.2.7 on page 14)
	HirES	Hi Res – Makes the MSI-8000 RF Remote Display more sensitive to motion and movement resulting in a less stable display
	Print	Print – Outputs a configured text string to the RS-232 port (Section 4.2.9 on page 15)
A-OFF	OFF 15 30 45 60	Auto Off – Sets the amount of standstill time before the Dyna-Link 2 automatically turns off (Section 4.3 on page 15)
StPt 1-8	GrEAt	Greater Than – Triggers when the tension exceeds the set value (Section 4.4 on page 15)
	LESS	Less Than – Triggers when the tension is less than the set value
	OFF	Off – Disables the setpoint parameter
totAL	OFF	Total Accumulation - Sets the choice for weight accumulation for a single scale; Disabled when set to off (Section 4.5 on page 16)
	ttLOn	Total On – A manual choice for accumulation (Section 4.5 on page 16)
	A. LoAd A. LASt H. HiGH	Auto Total – Settings for automatic accumulations (Section 4.5 on page 16)
FiLtEr	OFF LO Hr1 Hr2	Weight Filter – Allows the scale to adjust to situations where there may be movement (Section 4.6 on page 17)
Unit	lb kg Ton MTon kN	Weight Units – Sets the weight units displayed (Section 4.7 on page 18)
b.LiFE	StAnd LonG	Battery Life – Sets the options for standard or extended battery life (Section 4.8 on page 18)

Table 4-1. Setup Menu Parameters

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4.2   Function Keys

There are two function keys, **F1** and **F2** on the front panel of the Dyna-Link 2. These keys can be programmed to several different functions. See Table 4-1 on page 12 for available functions.

To assign the F-keys:

1. Press **⏻** and **F2** simultaneously to enter parameter setup menu. *FUnc 1* displays.

    To set *FUnc2* press **F2** again.

2. Press **F1** to enter F-key set up.

3. Press **F2** to scroll through the settings.

4. Press **F1** to select the desired choice and return to the parameter menu.

5. Press **⊸◈** to save. *StorE* displays briefly and the Dyna-Link 2 returns to the *Weigh* mode.

📝 *NOTE: This procedure also assigns the* **F1** *and* **F2** *on the optional RF remote display.*

4.2.1   Off

When the F-Key parameter is set to *OFF*, there is no user key function assigned and the F-Key is disabled.

4.2.2   Test

Set an F-Key as test (Section 4.2 on page 13). To run a test, press the Test F-Key and 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 Test F-key and then immediately press the **F2** key to stop the auto scroll.

2. Press **F2** to scroll through each step and press **F1** to view the step value.

Internal tests are also performed and if any test fails, an error code displays. See Section 8.1.1 on page 36 for a description of all error codes. Press **⊸◈** to stop the test at any time.

4.2.3   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 (Section 4.2).

3. Press Total F-key to perform the total function that was set in Section 4.5 on page 16.

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

4.2.4   NET/GROSS

Press the NET/GROSS F-key to switch between gross and net mode. The NET/GROSS F-key only functions if a tare value has been established. The operator can switch back to gross from net without clearing the tare value. Only clearing the tare, or setting a new tare, will change the tare value held in memory.

4.2.5   Tare

Press the Tare F-key to tare out a known force, only positive and negative deviations from the tared force display.

In force measurement applications, tare is useful as a way to display differential force. It also increases accuracy as any initial error is removed leaving only slope error.

In scale applications, tare is typically used to zero out a known weight such as rigging, a packing container or pallet.

Once zeroed, the load displays in NET tension/weight. To use tare, set an F-key to the TARE function.

- A tare value is entered by pressing the Tare F-key.
- The tare function in the Dyna-Link 2 is defined as a tare-in/tare-out operation.
- The first press of the Tare F-key stores the current tension/weight as a tare value. The Dyna-Link 2 subtracts the tare value from the gross tension and changes the display to NET mode.
- The next press of the Tare F-key will clear the tare value and revert the display to GROSS mode.
- The optional RF remote display has a TARE key permanently available.

4.2.6   Peak Hold

The Peak Hold function uses a high speed mode of the A/D converter allowing it to capture transient tensions at a far higher rate than typical dynamometers.

- Peak hold is cleared and enabled with the PeakHold F-key.
- When a new peak is detected, the F-key LED will flash three times.
- The accuracy of the system in *Peak Hold* mode 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 materials and fall tests. Common tests include Overall Breaking Strain (OB€), Breaking Force, and Cycled Breaking Strain.*

Capture Peak Force

1. Program an F-key to PeakHold (Section 4.2 on page 13).
2. Prepare the test stand and test a sample.
3. Press ⬚-◈ to zero out any residual strain on the link.
4. Press the PeakHold F-key. The Pk annunciator displays.

> 📝 **NOTE: A small jump in the reading may occur depending on the stability of the test stand.**

5. Apply the test force. The PeakHold F-key LED will blink tree times for each peak it detects.
6. Remove the test force and record the peak value.
7. Press the PeakHold F-key to clear the peak value.
8. To run a new test, confirm Pk is not displayed. Repeat Step 1–Step 6.

4.2.7   2-Units/ 5-Units

Program an F-key to either 2-UNIT or 5-UNIT (Section 4.2 on page 13).

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.

4.2.8   Hi-Res

Program an F-key to Hi-Res (Section 4.2 on page 13).

Press the HiRes F-key to display the high resolution mode. The display will stay in high resolution mode until the HiRes F-key is pressed again, or the power is cycled. While in the hi-res mode, the appropriate HiRes F-key LED will blink continuously at a slow rate.

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

Use Tare or ⬚-◈ to zero out any initial error. Hi-Res mode will make the Dyna-Link 2 more sensitive to motion and movement resulting in a less stable display. When Hi-Res is 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 Hi-Res is turned off, the filter setting resets to the previous filter setting.

4.2.9 Print

Program an F-key to Print ().

Press the Print F-key to output a configured text string to the RS-232 port on the base of the unit.

If a Print F-key is programmed and the print setup is configured as continuous, then the Print F-key is used for Start Print/Stop Print. See for more details on data output.

The print function is always available on the optional RF remote display, so it is not necessary to program a Print F-key if print outputs will be triggered from the remote.

If the RF remote display option is installed, the Dyna-Link 2 built in comm port is used only for hard-wire connections to the RF remote display or firmware updates.

4.3 Auto Off

The Auto Off feature prolongs the life of the battery by turning the power off when the Dyna-Link 2 is not in use. Any key press or detected tension in motion exceeding 10d, resets the time limit and the unit remains on.

When set to *OFF*, the Dyna-Link 2 will only turn off by pressing [ⓞ] or if the battery is depleted.

Use the following steps to set the Auto Off function:

1. Press [ⓞ] and [**F2**] simultaneously to enter setup menu. *FUnc 1* displays.

2. Press [**F2**] to scroll to *A-OFF*.

3. Press [**F1**]. The current auto off setting displays.

4. Press [**F2**] to scroll to the desired time.

5. Press [**F1**]. *SEPE 1* displays.

6. Press [◈] to save and return to the *Weigh* mode.

4.4 Setpoints

The Dyna-Link 2 supports two setpoints. Common uses of set points are for warnings or process control. The unit comes standard with two red LED outputs for a triggered set point. There is an audible alarm option that is triggered by setpoint 1.

NOTE: Setpoints 3-8 are only for use with remote displays thats support eight setpoints.

NOTE: Audible alarm is not available with MSI-7300RF or MSI-7300WiFi

Parameter	Description
OFF	Setpoint is not set
GrEAt	Greater Than – will trigger the setpoint when the tension exceeds the value
LESS	Less Than – will trigger the setpoint when the tension is less then the value
Selections for Greater Than and Less Than	
nEtGr	Net/Gross – responds to the tension on the display, net or gross weight
GroSS	Gross – responds to gross tension regardless of the display mode
totAL	Total – responds to the totaled weight
t-cnt	Total Count – responds to the total count (number of samples)
LFcnt	Lift Counter – counts the total number of lifts where the weight exceeded capacity by more than 25%

Table 4-2. Setpoint Parameters

To setup a setpoint:

1. Press ⓞ and F2 simultaneously to enter setup menu. *FUnc 1* displays.

2. Press F2 to scroll to *SEPt 1-8*.

3. Press F1 . The current setting displays.

4. Press F2 to scroll to the desired setpoint mode (Table 4-2).

5. Press F1 to enter the *Setpoint* mode.

6. Press F2 to scroll to the type of tension or weight value the setpoint should be assigned.

7. Press F1 to enter the tension or weight value.

8. Enter the number by:
   - Pressing F2 to move the cursor position and change the number
   - With the desired number displayed, press F1 to save the number
   - Press F2 to move the cursor to the next position
   - To enter a decimal point, press ⓞ , the decimal point will be entered after last number displayed
   - To correct a number, press ⟜◈ to go back to numbered that needs to be corrected

9. When the weight displays, press F1 to save and return to previous menu.

10. Press ⟜◈ to save and return to the *Weigh* mode.

4.5   Total

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 ≥1% of full scale above Gross Zero or Net Zero before it can be totaled.

Manual Total

Manual Total (*ttLOn*) 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 (Section 4.2 on page 13).

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 displays for five seconds and the number of samples displays 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 ◣ ◢ 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 (Section 4.2 on page 13).

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

To set total Mode:

1. Press [⏻] and [F2] simultaneously to enter setup menu. *FUnc 1* displays.

2. Press [F2] to scroll to Total.

3. Press [F1] to enter the total mode. The current total mode displays.

4. Press [F2] to scroll through the available parameters.

5. When the desired setting displays, press [F1]. *F iLtr* displays

6. Press [⊹⊚] to save and return to the *Weigh* mode.

Reset Total Load

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

4.6 Filter

Changing the filter settings allows the Dyna-Link 2 to adjust to situations where there is a lot of movement in the lift or the crane 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. The Dyna-Link 2 employs algorithms that speed up large tension changes while still controlling vibration even with higher filter settings.

Parameter	Description
OFF	Disables filtering function
Lo	Low Filter
H i- 1	High Filter
H i- 2	Very High Filter

Table 4-4. Filter Parameters

To set the filter mode:

1. Press [⏻] and [F2] simultaneously to enter setup menu. *FUnc 1* displays.

2. Press [F2] to scroll to *F iLtr*.

3. Press [F1]. The current filter mode displays.

4. Press [F2] to scroll through the available filters.

5. When the desired filter is displayed, press [F1]. *Un it* displays.

6. Press [⊹⊚] to save and return to the *Weigh* mode.

4.7   Units

Units can be changed in two ways:

- Program an F-key to *2Unit* or *5Unit*
- Change the units with the setup menu using the following procedure

Units	
lb	Pounds
kg	Kilograms
Ton	Short Tons
MTons	Metric Tons
kN	KiloNewtons

Table 4-5. Units

Change the units with the setup menu:

1. Press ⓞ and F2 simultaneously to enter setup menu. *Func 1* displays.

2. Press F2 to scroll to *Unit*.

3. Press F1 . The current unit displays above the word *Unit*.

4. Press F2 to scroll through the units.

5. When the desired unit is displayed, press F1 . *bLiFE* displays.

6. Press ◈ to save and return to the *Weigh* mode.

To set the accessible units available by an F-key, set as 2Unit (lb/kg) or 5Unit (lb/kg/short tons/metric tons/kilonewton) (Section 4.2 on page 13).

NOTE: If the Dyna-Link 2 Calibration was originally in tons or metric tons, the 2Unit setting will switch from tons to metric tons instead of lb/kg.

4.8   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 tension. This disables the display in order to reduce power consumption and increase battery life. After several seconds, the MSI-8000 RF Remote Display will wake up to check for any changes in tension. If there is a change in tension, the unit will stay awake. The unit will also stay awake if it is in configuration mode.

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5.0   Calibration

The Dyna-Link 2 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 500kg test weight to calibrate a 5000kg capacity unit.

The Dyna-Link 2 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 Dyna-Link 2 can be calibrated using a Constant Calibration (C-Cal).

To use C-Cal, the factory generated C-Cal number must be known.

There are three types of calibration:

- Standard calibration is used for maintenance and routine calibration (Section 5.1 on page 20).
- Initial calibration is used to setup both the capacity and resolution (d) of the Dyna-Link 2. It differs from standard calibration only in the initial steps. Initial calibration is performed after a calibration reset which completely erases the calibration and parameter settings.
- C-Cal can be used if C-Cal values are known, the Dyna-Link 2 can be calibrated without weights.

The calibration menu contains three items: Cal, C-Cal, and Setup. The following procedures start with entering into the Cal menu, or for an initial calibration, resetting the Dyna-Link 2 and then going to the Cal menu.

Parameter	Selections	Description
CAL		Standard and initial calibration parameter (Section 5.1 on page 20 and Section 5.2 on page 21)
C-CAL		C-Cal parameter (Section 5.3 on page 23)
SETUP		See Section 5.4.1 on page 24 and Section 5.4.2 on page 25
SETUP Sub-menu		
StAnd	Industrial Standard Settings	
	Industrial indu5	The common setting for the MSI-8000 RF Remote Display; With the Industrial standard, the unit has 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
AutoO	On OFF	Auto Zero Maintenance
O.P-uP	On OFF	Set to On will cause the Dyna-Link 2 to 0 when it is powered on; Default is OFF

Table 5-1. Calibration Menu

5.1   Standard Calibration

1. Press [-◇-] and [F2] simultaneously to enter the calibration menu. `CAL` displays.

2. Press [F1] to start calibration. `UnLd` displays.

3. Remove all weight from the scale.

    📝 *NOTE: Bottom fittings can be left on the link as long as they are always part of the load train.*

4. Press [F1] to set zero calibration point. If zero is in range, `PASS` displays momentarily then `LoAd1` is displayed.

    📝 *NOTE: If the calibration point is not within the limits, the display will read FAIL and the procedure will need to be repeated.*

5. Load the link with a test weight. For highest accuracy, a test weight of 10% or more of capacity is recommended.

6. Press [F1], the capacity flashes on the display.

7. To use a weight different of capacity, enter the number by:

    • Pressing [F2] to move the cursor position and change the number

    • With the desired number displayed, press [F1] to save the number

    • Press [F2] to move the cursor to the next position

    • To enter a decimal point, press [⓪], the decimal point will be entered after last number displayed

    • To correct a number, press [-◇-] to go back to numbered that needs to be corrected

8. When the weight is displayed, press [F1] to save. `PASS` displays momentarily and then `LoAd2` displays.

    📝 *NOTE: If the Cal Value is not within the limits, the display will read FAIL and the procedure will need to be repeated.*

9. If more calibration points are desired (up to three) press [F2] and repeat Step 6–Step 8.

10. Press [-◇-] to store calibration constants. `CALPd` will be displayed.

11. Press [F1], the `C-CAL` number displays, note for future reference.

12. Press [-◇-] to exit calibration. `SEtUP` is displayed.

13. Press [-◇-] to return to *Weigh* mode.

    📝 *NOTE: To cancel and return to Weigh mode during calibration, press [⓪]. The previous calibration will be reset.*

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5.2 Initial Calibration

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

1. Press ◈ and **F1** simultaneously. *rE5Et* flashes on the display.

2. Press **F1** . *5urE?* displays.

3. Press **F1** to reset all calibration settings. *CAL* displays.

📝 *NOTE: To cancel the reset and return to the CAL menu, press ⓘ .*

4. Press **F1** to start initial calibration. *Un it* displays.

5. Press **F1** . Use **F2** to scroll to the desired unit.

6. Press **F1** . *CAP* displays.

7. Press **F1** . The current capacity is displayed.

8. Enter a different capacity by:

   • Pressing **F2** to move the cursor position and change the number

   • With the desired number displayed, press **F1** to save the number

   • Press **F2** to move the cursor to the next position

   • To enter a decimal point, press ⓘ , the decimal point will be entered after last number displayed

   • To correct a number, press ◈ to go back to the number that needs to be corrected

9. Press **F1** . *d* displays. The current scale division size is displayed.

10. Press **F2** to scroll through options until the desired division size is displayed.

📝 *NOTE: The first selection is the standard division for the current capacity. Setting the division to a size that results in a total resolution higher than 1:5000 is not recommended for stability reasons.*

11. Press **F1** . *UnLd* displays.

12. Follow the Standard Calibration procedure to complete calibration ().

📝 *NOTE: For large capacity Dyna-Link 2's, enter the capacity in weight X1000 and push ⓘ twice.*

X1000 mode is indicated by the M annunciator during data entry.

For the 100,000 lb unit, enter 100 and press ⓘ twice so the M annunciator is on.

5.2.1   Guidelines for Capacity and Resolution

The Dyna-Link 2 is subject to forces that static scales do not experience. Many bridge cranes, hoist cranes, and mobile cranes lack rigidity and tend to bounce or swing when loads are lifted. For this reason, MSI recommends that resolution is kept in the 1:2000 to 1:3000 range. Some improvement in stability can be achieved by increasing the filtering. Never program resolution that is far greater than needed. The resolution should never be set higher than 1:5000 due to temperature and noise considerations common to all strain gage based load cells.

If the Dyna-Link 2 display does not stabilize, reduce the resolution and increase the filtering.

The tension must be stable for certain features to work:

- ZERO tension must be stable to be zeroed
- TARE tension must be stable to be tared
- TOTAL tension must be stable to be added to the total registers

One way to improve the stability is to increase the filtering, at the risk of increasing settling time.

The other is to increase the 'd' (reduce resolution).

The third way is to increase the motion window. The Dyna-Link 2 defaults to ±1d as a motion window. It can be changed at MSI to a higher value if desired. Often ±3 d is chosen for bridge cranes as these tend to have a lot of bounce to them. This of course carries an accuracy penalty adding ±3 d to the total accuracy of the Dyna-Link 2 if the zero or tare operation happens to capture the tension in a valley or peak.

Setting capacity is dictated primarily by the capability of the load cell. The Dyna-Link 2 is available in a variety of capacities. Never set the capacity of the Dyna-Link 2 higher than the rating of the load cell. Due to the excellent linearity of the Link load cell, it is acceptable to set lower capacities to better match the crane the Dyna-Link 2 is used on. For example, if the hoist is rated for 9000 lb, a 10000 lb capacity Dyna-Link 2 can be used and the capacity reset to 9000 lb so that the Dyna-Link 2 will indicate overload at 9000 lb instead of 100000 lb. Derating as much as 50% of the capacity is usually acceptable, but the Dyna-Link 2 may be less stable if the 'd' is decreased (resolution increased).

NOTE: The capacity of all the Dyna-Link 2 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 pounds capacity.

5.3 C-Cal Calibration

When adequate test weights are not available, the Dyna-Link 2 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 is required. Replacement load cells for the Dyna-Link 2 have the C-Cal value stamped on the serial number label. When a calibration is performed with test weights, a new C-Cal is generated.

IMPORTANT: The C-Cal number must be known prior to starting this procedure. For a Dyna-Link 2, with its original load cell, this number is printed on the Calibration Record, the serial number tag. C-Calibration reduces slightly the absolute accuracy of the system and is intended for non-critical use only. For highest accuracy, calibrate the Dyna-Link 2 with precision test weights.

1. Press [-◈-] and [F2] simultaneously to enter the calibration menu. *CAL* is displayed.

2. Press [F2] to *C-CAL*.

3. Press [F1] to start the *C-CAL* calibration procedure. *UnLd* displays.

NOTE: Bottom fittings on the link can be left on as long as they are always part of the load train.

4. Remove all weight from the scale.

5. Press [F1] to set the zero calibration point. If the zero is in range, *PASS* is displayed, followed by *C-CAL*.

6. Press [F1], the last known *C-CAL* value is displayed.

7. Press [F1] if the display *C-CAL* value is correct go to Step 8.
   If value is not correct, enter the *C-CAL* value as follows:

   • Press [F2] to move the cursor position and change the number

   • With the desired number displayed, press [F1] to save the number

   • Press [F2] to move the cursor to the next position

   • To enter a decimal point, press [ⓘ], the decimal point will be entered after last number displayed

   • To correct a number, press [-◈-] to go back to numbered that needs to be corrected

8. Press [F1] when the *C-CAL* value is correct. If the *C-CAL* value is within acceptable range, *PASS* is displayed briefly, followed by *CAL d*.

NOTE: Multiple C-CAL span points are possible when using the ScaleCore Connect program.

9. Press [-◈-] twice to exit and save the new *C-CAL* calibration. *StorE* displays briefly and the Dyna-Link 2 returns to the **Weigh** mode.

5.4 Calibration Setup Menu

The calibration setup menu contains the ***Standard*** menu and the ***Auto Zero Maintenance*** menu. Additional menus display depending on the main setup menu when Legal-for-Trade settings are used.

Parameter	Selections	Description
5tAnd	Industrial Standard Settings	
	Industrial INDus	The common setting for the MSI-8000 RF Remote Display; With the Industrial standard, the unit has 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
Auto0	On OFF	Auto Zero Maintenance
0.p-up	On OFF	Set to On will cause the Dyna-Link 2 to 0 when it is powered on; Default is OFF

Table 5-2. Setup Sub-menu

5.4.1 Standard Menu

See the following information to set up a Legal-for-Trade standard setting.

1. Press ⊸◈ and **F2** simultaneously to enter the calibration menu. CAL is displayed.

2. Press **F2** to scroll to Setup.

3. Press **F1** . 5tAnd is displayed.

4. Press **F1** . The current standard setting is displayed.

5. Press **F2** to scroll to the desired standard.

6. Press **F1** to select the desired standard.

7. Press ⊸◈ twice to store all changes and exit setup. 5torE displays briefly and returns to the ***Weigh*** mode.

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5.4.2 Auto Zero Maintenance (AZM)

The Dyna-Link 2 employs an auto zeroing maintenance mechanism to adjust the zero reading to the center-of-zero, which is defined as the tension reading is within 1/4 d of zero. AZM continuously adjusts zero to maintain center-of-zero. It is recommended that AZM is set to on to maintain the highest accuracy. There are circumstances when the AZM should be turned off; for example, when minor variations of tension occur while picking up Dyna-Link 2 attachments and the variations fall within the AZM capture window. The AZM capture window (usually 1 d) and capture time (usually eight seconds) can be adjusted by MSI to meet custom requirements.

1. Press [⊘] and [F2] simultaneously to enter the calibration menu. CAL is displayed.

2. Press [F2] to scroll to SETUP.

3. Press [F1]. STAnd displays.

4. Press [F2] to scroll to AutoO.

5. Press [F1]. The current setting displays.

6. Press [F2] to scroll to On or OFF.

7. Press [F1] to select desired setting. STAnd displays.

8. Press [⊘] twice to store settings. StorE displays briefly and the Dyna-Link 2 returns to the *Weigh* mode.

5.4.3 Zero on Power-up (0.P-UP)

Set to on to perform a zero each time the Dyna-Link 2 is time the powered on.

1. Press [⊘] and [F2] simultaneously to enter the calibration menu. CAL is displayed.

2. Press [F2] to scroll to SETUP.

3. Press [F1]. STAnd displays.

4. Press [F2] to scroll to 0.P-UP.

5. Press [F1]. The current setting displays.

6. Press [F2] to scroll to On or OFF.

7. Press [F1] to select desired setting. STAnd displays.

8. Press [⊘] twice to store settings. StorE displays briefly and the Dyna-Link 2 returns to the *Weigh* mode.

6.0   Communications

The Dyna-Link 2 can communicate with peripheral devices using RS-232 or 802.15.4 wireless. Only one communications type can exist at a time. The RS-232 port located on the bottom side of the Dyna-Link 2 can be used for setup and calibration using a computer and the ScaleCore Connect Software or for connection to a printer.

📝 *NOTE: Download the ScaleCore Connect application from www.ricelake.com.*

Parameter	Choices	Description
		Print Setup (Section 6.3 on page 29)
Print	*StrnG*	Setup Strings – Enter a print string number 1 = Current Wt (Wt-Unit-Mode Ã) 2 = Net Wt (Wt-Unit-Net Ã) 3 = Gross Wt (Wt-Unit-Grs Ã) 4 = Tare Wt (Wt-Unit-Tare Ã) 5 = Total Wt (Wt-Unit-Total Ã) 6 = Total Count (#Samples-TCNT Ã) 7 = Current Wt (no units or mode Ã) 8 = Reserved 9 = CR-LF (Ã)
	Cntrl	Print Control – Select from parameters: *OFF* – Disables printing *USEr* – Press the assigned F-Key and one transmission of the selected string type is output *LoAd* – When the tension on the link is stable, one transmission will output; The tension must return to zero to enable another print to output *Cont* – Program the interval in seconds up to 65535 seconds
	rAtE	Output Rate Network ID – Print string output rate, enter a number between 0-65635 seconds; Setting the interval to 0 will set an interval as fast as the system can go
rF		**Radio Frequency Setup (Section 6.4 on page 30)**
	On. OFF	Enable RF – Affects continuous mode only, select On or Off
	Sc id	ScaleCore ID – Range 1-254 (0-3); ScaleCore ID is the ID in the network
	ChnL	RF Channel – Range 12-23
	nEt id	Network ID – Range 0-99999
	StrEn	RF Network – Number of entry screens

Table 6-1. Communication Menu

1. To enter the communication menu on the Dyna-Link 2 press [F1] and [F2] simultaneously

2. Press [F2] to scroll through the parameters or settings.

3. Press [F1] to enter a parameter or save a selection and return to previous menu.

4. Press [⟶◈] to save a selection and return to previous menu.

5. Press [①] to cancel and return to *Weigh* mode.

6. Press [⟶◈] to save. *StorE* displays briefly and the Dyna-Link 2 returns to the *Weigh* mode.

6.1   Printer

The RS-232 comm port is capable of outputting tension data. All the weight modes the Dyna-Link 2 can measure are available in user formatted form. The control mode program is what causes the Dyna-Link 2 to print.

6.1.1   Standard Print Strings

The following commands can be used to format gross, net and other print formats.

Command	Description
<T>	Tension Data with sign if necessary
<U>	Units
<M>	Tension mode (lb/kg), which for 1 is either net or gross
<CRLF>	Carriage return line feed
<SP>	Space

Table 6-2. Print Commands

String No.	Print String	Description
1	Current Tension	Fixed output length: 16. Leading zeros suppressed except for the least significant digit (LSD); <TTTTTTT><SP><UU><SP><MMMMM><CRLF>
2	Net Tension	Fixed output length:16. Leading zeros suppressed except for the LSD; <TTTTTTT><SP><UU><SP><NET><SP><SP><CRLF>
3	Gross Tension	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>
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 6-3. Print Strings

In the string number entry screen, combinations of the standard print strings may be entered. For example, to get a NET, GROSS and TARE, printout with a space between records, enter *2349*.

Using the ScaleCore Connect, custom output strings are possible.

📝 *NOTE: Download the ScaleCore Connect application from www.ricelake.com.*

The serial output is configured as 9600 baud, Xon/Xoff handshaking, no hardware handshaking, 1 stop bit, no parity.

Other baud rates are available by special order.

6.1.2   Printer Output Setup

1. Press [F1] and [F2] simultaneously. Pr int displays.

2. Press [F1]. $5tr n5$ displays.

3. Press [F1]. The current print mode format number displays.

4. Set up a print format with one or more of the numbers of the data type required (Table 6-3 on page 27).

   • Pressing [F2] to scroll to the desired number

   • Press [F1] to save the number

   • Repeat until all desired numbers have been entered

5. Press [F1]. $Cntrl$ displays.

6. Press [F1] to enter print control. The last saved control mode displays.

7. Press [F2] until the desired print control mode displays.

8. Press [F1]. $rAtE$ displays. If print control mode is set to $Cont$, continue to Step 9.

   • If set to OFF, $LoAd$ or $USEr$, continue to Step 12.

9. Press [F1]. The current print weight displays.

10. Enter the desired print rate.

   • Press [F2] to move the cursor position and change the number

   • With the desired number displayed, press [F1] to save the number

   • Press [F2] to move the cursor to the next position

   • To correct a number, press [⊸◈] to go back to numbered that needs to be corrected

11. When the desired number displays, press [F1]. $5tr$ $in9$ displays.

12. Press [⊸◈] twice to return to *Weigh* mode.

6.2   RF Option

The RF options are easily connected and commonly used for gathering weight data after the initial setup of the unit. For RF operation, the Dyna-Link 2 uses an 802.15.4 transceiver to communicate with the MSI-8000/8000HD RF Remote Display.

802.15.4 wireless:

   • Operates in the 2.4 GHz ISM band and does not require the end user to obtain a license

   • Can coexist with other 2.4 GHz systems, if caution is taken to isolate antennas at least 10' (3 m) from the Crane Scales MSI-8000/8000HD and MSI-8004HD equipment

MSI-8000/8000HD based RF systems are peer to peer. For multiple scale connections, the MSI-8000/8000HD acts as the network coordinator.

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6.3   Comm Port Hardware

The Dyna-Link 2 RS-232 comm port is used for software updates, connecting to a remote display, and for connecting to any RS-232 device.

Hardware	Description
Connector	M12 industrial IP67 rated; An adapter cable (PN 503363) is required to connect the Dyna-Link 2 to a computer; This adapter cable converts the Dyna-Link 2 connector to a standard D9 serial connector
Data Configuration	The data output is fixed at 8-1-N
Baud Rate	Programmable for 300 to 230.4k baud in eight steps; The bootloader for updating software is always 38.4k baud
Handshaking	No hardware handshaking is supported XON/XOFF software handshaking is always on

Table 6-4. Comm Port Hardware

NOTE: It may be necessary to disconnect the shield drain wire at the D-9 connector frame to prevent ground loops. Ground loops can cause unstable readings. In extreme cases it may be necessary to use an opto-isolated RS-232 interface.
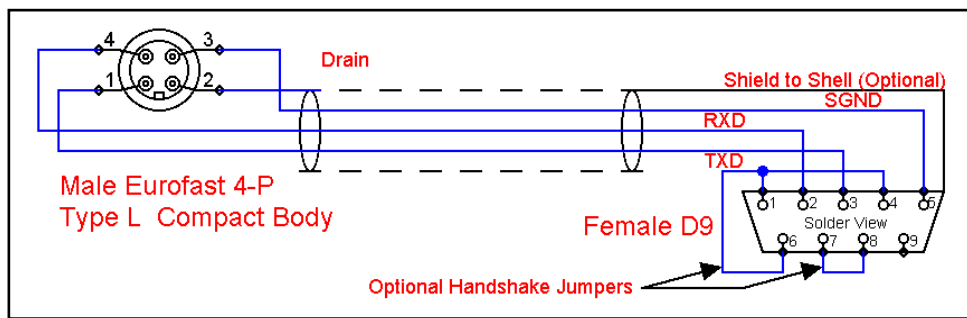
Figure 6-1. Serial Cable Schematic, DCE Configuration for Connecting to a Computer
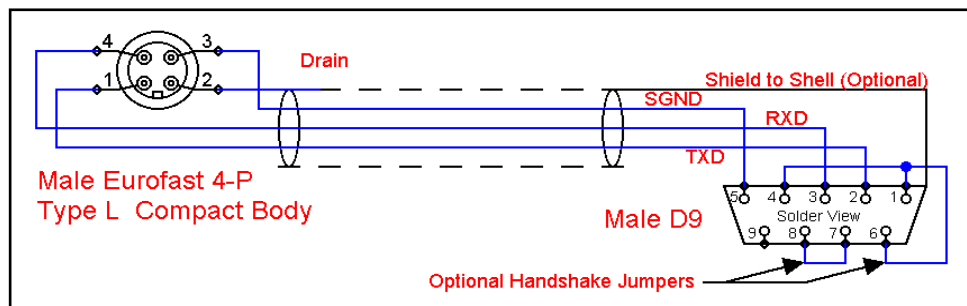
Figure 6-2. Serial Cable Schematic, DTE Configuration for Connecting Directly to a DCE Printer

6.4   802.15.4 RF Network Setup

When equipped with the 802.15.4 option, the Dyna-Link 2 can connect with an MSI-8000/8000HD Remote Display or an 802.15.4 modem. The unit uses three numbers to connect to an 802.15.4 piconet:

- **ScaleCore ID** – 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.

- **RF Channel** – establishes the base network, all interconnected devices must match. This number must be in the range of 12-23.

- **Network ID** – This is a 64-bit number that all interconnected devices must match. The Dyna-Link 2 limits this number to a max of 5 digits for a range of 0 - 99999. Do not use a small number here to help avoid other 802.15.4 networks that default to a network ID of 0.

- **RF Strength** – Transmission strength can be set from 0 to 4, default is 1. The settings effect the transmission range with zero is lowest power level and four is the highest. Power 4 will use the battery life quicker, so use the lowest number possible for reliable transmission. If maximum range is needed set the strength to four.

- **Hold** – 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.

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.

NOTE: Transmission strength should be set to the lowest setting possible to achieve the transmission required. Both scale/Dyna-Link and compatible MSI RF Remote Display should be set at the same transmission strength setting.

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

Table 6-5. Transmission Strength Settings

6.4.1   RF Network Setup

1. Press **F1** and **F2** simultaneously. *Print* displays.

2. Press **F2** . *rF* displays.

3. Press **F1** . *OnOFF* displays.

4. Press **F1** to enter the ON/OFF setting.

5. Press **F2** to scroll to the desired setting.

6. Press **F1** . *SC id* displays.

7. Press **F1** . The current SCID number displays.

8. Press **F2** to scroll through the numbers and press **F1** to select the desired number.

NOTE: Any value of SCID from 1 - 254 is acceptable. For remote displays the value, Rice Lake Weighing Systems recommends a value from 0-3.

If a wrong value is input, press ⌖ *to step back one digit and reenter the number.*

9. When the desired number displays, press **F1** . *ChnL* displays.

10. Press **F1** . The current channel displays.

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11. Press **F2** to scroll through the numbers and press **F1** to select the desired number.

> *NOTE: Recommended RF Channel number range from 12-23.*
>
> *If a wrong value is input, press* [⊸⊚] *to step back one digit and reenter the number.*

12. When the desired number displays, press **F1** to save. nEt id displays.

13. Press **F1** . The current network ID.

14. Press **F2** to scroll through the numbers and press **F1** to select the desired number.

> *NOTE: Any network ID numbers from 0-99999 is acceptable. Rice Lake Weighing Systems recommends a value of at least four digits to ensure that the system will not conflict with other 802.11.4 networks.*

If a wrong value is input, press [⊸⊚] *to step back one digit and reenter the number.*

15. When the desired number displays, press **F1** to save. StrEn displays.

16. Press **F1** . The transmission strength displays.

17. Press **F2** to scroll through the numbers and press **F1** to select the desired number.

> *NOTE: Transmission strength range is 0-4. When setting transmission strength, use the lowest setting possible to achieve the transmission required. Both the Dyna-Link 2 and the 8000 should be set at the same transmission strength.*

18. When the desired number displays, press **F1** . OnOFF displays.

19. Press [⊸⊚] twice to store settings and return to *Weigh* mode.

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 **F1** and **F2** simultaneously. Print displays.

2. Press **F2** . rF displays.

3. Press **F1** . OnOFF displays.

4. Press **F1** to enter On/OFF setting.

5. Press **F1** to select On

6. Press **F2** to scroll to Hold

7. Press **F1** . On/OFF displays.

8. Press **F1** to enter the On/OFF setting.

9. Press **F1** to select On.

10. Press zero twice to store settings and return to Weigh mode

6.5   Setup Multiple Sensor Network

MSI-8000/8000HD/8004HD Remote Display can monitor up to four load sensors. Sensors can be read individually, in pairs or summed.
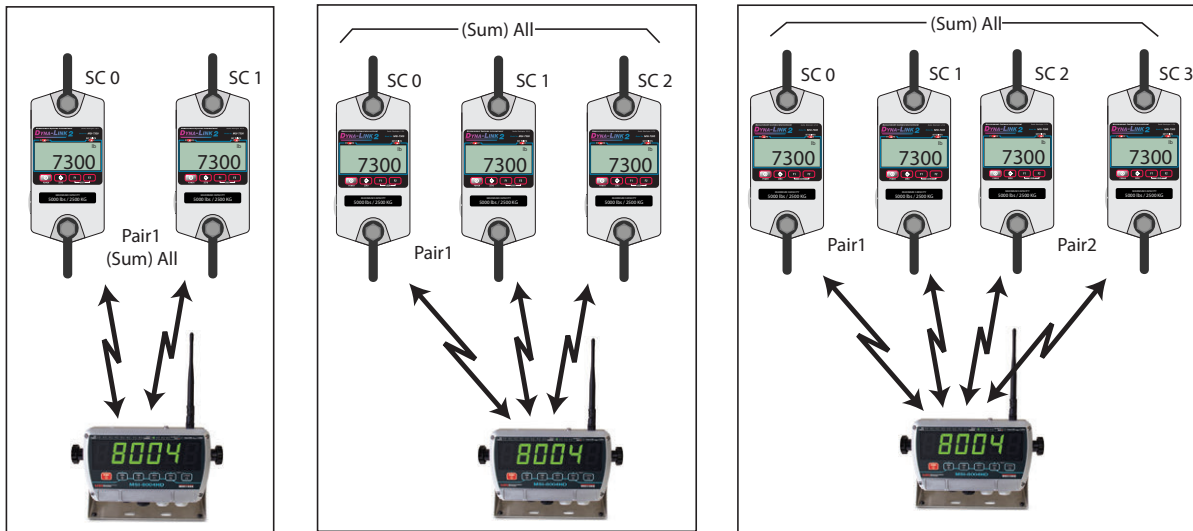
Figure 6-3. Multiple Sensor Network

Each sensor has a unique ScaleCore ID (SCID). The IDs must be consecutive, starting with 0. This is set in the sensor setup, not in the MSI-8000/8000HD/8004HD. See the MSI-8000 Technical Manual (PN 133063) and the MSI-8000HD Technical Manual (PN 159007) for more information.

7.0   Optional Rugged Remote

The MSI-7300 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-7300 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-7300	Description
POWER	⏻	Power
ZERO	→0→	Zero
TARE/F1	F1	Function 1
FCN/F2	F2	Function 2

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-7300 (Section 6.4.1 on page 30).

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 10).

This key is not programmable.

7.1.3 Programmable Function Keys

Tare/F1 and FCN/F2 (pictures of buttons) are programmable in the MSI-7300. Function 1 is defaulted to Peak hold and Function 2 is defaulted to Test in the MSI-7300. See Section 4.2 on page 13 to configure the MSI-7300 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.

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8.0   Maintenance

ⓘ **IMPORTANT:** *Do not use solvents or aggressive substances to clean the indicator. Do not submerge.*

8.1   Troubleshooting

Problem	Possible Cause	Solution
Display is blank when **Power** key is pressed	Discharged battery	Replace cells, or if using NiMH, recharge
	Defective battery	Replace
	Corroded battery or battery contacts	Clean contacts
	Defective switch or circuit board	Requires authorized service
Display turns on and turns off when Power key is pressed	Power button is being held too long	Press the power button quickly; do not hold
	Defective switch or circuit board	Requires authorized service
Display does not function properly or front panel keys do not function normally or Dyna-Link 2 will not turn off	Improperly loaded software	Reinstall software
	Faulty circuit board	Requires authorized service
	Loose connectors	Requires authorized service
Dyna-Link 2 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 Dyna-Link 2
	Too much tension/load has been zeroed	Rezero the Dyna-Link 2
Display drifts	AZM (Auto0) is turned off	Turn AZM on
	Rapid temperature changes such as moving the Dyna-Link 2 from indoors to outdoors	Wait until the Dyna-Link 2 temperature has stabilized
Displayed tension shows larger error	Dyna-Link 2 not zeroed before load is lifted	Zero the Dyna-Link 2 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	Tension exceeds capacity	Immediately reduce tension
	Faulty load cell or wiring	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 continuously transmitting
Optional RF Remote display does not work	Units not mated	See Section 6.4 on page 30 for RF network information; See the relevant manual for specific information: MSI-8000 RF Remote Display Operation Manual (PN 133063), MSI-8000HD RF Remote Display Technical Manual (PN 159007), MSI-8004HD RF Remote Display Technical Manual (PN 182430)
Lo Batt is blinking	Battery is low	Replace (alkaline) or recharge batteries
Unit turns on, then immediately off	Battery is low	Replace (alkaline) or recharge batteries
Tension will not zero	System not stable	Wait for standstill annunciator to turn on
		Increase filtering for more stability
	Zero out of range	Zero range might be limited; Reduce the tension or use tare instead
Tension will not tare or total	System is not stable	Wait for standstill annunciator to turn on, or if in a mechanically noisy crane, increase filtering or reduce size of the Dyna-Link 2 increment d; It is also possible to increase the motion window; Contact Rice Lake Weighing Systems if there is a problem getting the Dyna-Link 2 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
	Tension must be stable	Increase filtering for more stability

Table 8-1. Troubleshooting

Problem	Possible Cause	Solution
Auto total does not work	Tension must be stable	Wait for standstill annunciator to turn on, or increase filtering for stability
	Tension thresholds not reached	Tension threshold must exceed 1% of capacity for autototal to work then must drop below 0.5% of capacity for additional weighments to register

Table 8-1. Troubleshooting (Continued)

8.1.1   Error Codes

The ScaleCore Processor in the unit detects errors and generates error codes to aid in troubleshooting.

Error Code	Definition	Comment
LcOFF	LC Disabled	A Load cell was not enabled
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	Tension/Weight exceeds set capacity +9 d or load cell is damaged or disconnected
Error ⟳ UndLd	Underloaded	Tension/weight is more than 20% negative or load cell is damaged or disconnected

Table 8-2. Error Codes

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 Dyna-Link 2 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 warn the user to inspect the load train after a number of overloads and 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 LFCnt when unit is powered on:

1. Press Tare F-key to display the 25% lift counter.

2. Press Tare F-key again to see the overload lift counter.

3. Press ⬦ to acknowledge the warning and return to standard scale operation.

📝 *NOTE: The warning message during power up will not display again for another 16383 lifts (or 1023 overloads).*

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To access the service counters:

1. Program an F-key to ŧ乇Sŧ ().

2. Press F-TEST.

3. Press **F1**. Test sequence including the following will begin.

- Lift Counter (ㄴ乇Ƈnŧ) – followed by number of lifts where the weight exceeded capacity by more than 25%.
- Overload Counter (ㄖㄴƇnŧ) – followed by number of lifts where the weight exceeded capacity.
- C-CAL value

Once the test is complete, the Dyna-Link 2 returns to the **Weigh** mode.

NOTE: Press **F2** *to stop the sequence, use* **F1** *and* **F2** *to view parameters.*

Press **◈** *to return to Weigh mode.*

8.3   Mechanical Dimensions
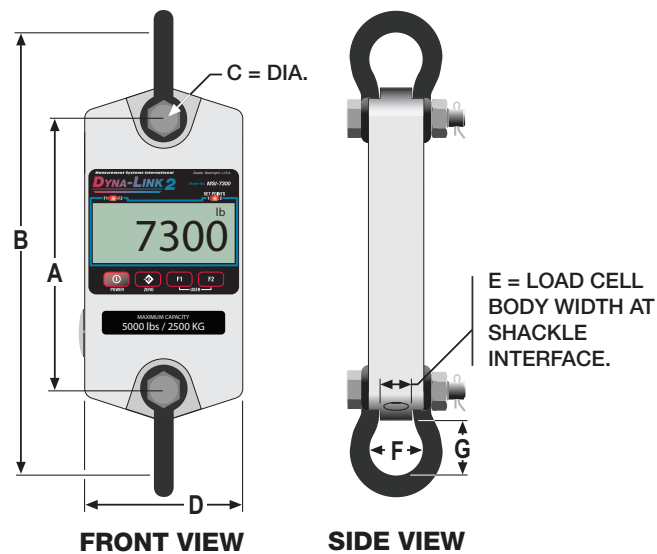
Figure 8-1. Mechanical Dimensions

Capacity	A	B	C	D	E	F	G	Approximate Shipping Weight	Shackle
1000 lb	8.0 in	13.53 in	.75 in	5 in	.99 in	1.69 in	1.75 in	4.4 lb	G-2130 3.25T
500 kg	203 mm	344 mm	19 mm	127 mm	25 mm	43 mm	44.4 mm	2.0 kg	
2500 lb	8.5 in	14.03 in	.75 in	5 in	.99 in	1.69 in	1.75 in	4.9 lb	G-2130 3.25T
1250 kg	216 mm	356 mm	19 mm	127 mm	25 mm	43 mm	44.4 mm	2.2 kg	
5000 lb	8.5 in	14.03 in	.75 in	5 in	.99 in	1.69 in	1.75 in	4.9 lb	G-2130 3.25T
2500 kg	216 mm	356 mm	19 mm	127 mm	25 mm	43 mm	44.4 mm	2.2 kg	
10,000 lb	8.5 in	16.14 in	1 in	5.50 in	1.35 in	2.28 in	2.34 in	7.3 lb	G-2130 6.5T
5000 kg	216 mm	410 mm	25 mm	140 mm	34 mm	58 mm	59.4 mm	3.3 kg	
25,000 lb	9.5 in	22.66 in	1.63 in	6.38 in	2.24 in	3.88 in	4.69 in	13 lb	G-2130 17T
12,500 kg	241 mm	576 mm	41 mm	162 mm	57 mm	99 mm	119 mm	5.9 kg	
50,000 lb	9.63 in	25.67 in	2 in	7.50 in	2.74 in	5.00 in	5.75 in	23 lb	G-2130 25T
25,000 kg	245 mm	652 mm	51 mm	191 mm	70 mm	127 mm	146 mm	10 kg	
100,000 lb	12 in	29.75 in	2.25 in	8.13 in	3.11 in	5.75 in	4.81 in	53 lb	G-2140 55T
50,000 kg	305 mm	756 mm	57 mm	207 mm	79 mm	146 mm	122 mm	24 kg	

Table 8-3. Mechanical Dimensions

8.4 Standard Capacities and Resolution

⚠️ ***WARNING:*** *The Dyna-Link 2 has a safe mechanical overload of 200% of capacity. Overloads greater than 200% may result in physical damage to the link. The ultimate overload is rated to 500%-700% of capacity. At ultimate overload, structural failure and dropped loads may occur. Dropped loads may cause serious personal injury or death.*

📝 ***NOTE:*** *Short ton and metric ton resolutions are the same.*

Capacity	Std 'd'	Std Counts	HiRes 'd'	HiRes Counts	Ultimate Overload	Config
1000 lb 500 kg 0.5 Ton 4.9 kN	0.5 lb 0.2 kg 0.0002 T 0.002 kN	2000 2500 2500 2450	0.2 lb 0.1 kg 0.0001 T 0.001 kN	5000 5000 5000 4900	>>700%	Alum 2 C-Cells
2500 lb 1250 kg 1.25 ton 12.25 kN	1 lb 0.5 kg 0.0005 T 0.005 kN	2500 2500 2500 2450	0.5 lb 0.2 kg 0.0002 T 0.002 kN	5000 6250 5000 4900	700%	Alum 2 C-Cells
5000 lb 2500 kg 2.5 Ton 24.5 kN	2 lb 1 kg 0.001 T 0.01 kN	2500 2500 2500 2450	1 lb 0.5 kg 0.0005 T 0.005 kN	5000 5000 5000 4900	700%	Alum 2 C-Cells
10000 lb 5000 kg 5.0 Ton 4.9 kN	5 lb 2 kg 0.002 T 0.02 kN	2000 2500 2500 2450	2 lb 1 kg 0.001 T 0.01 kN	5000 5000 5000 4900	700%	Alum 2 C-Cells
25000 lb 12500 kg 12.5 Ton 122.5 kN	10 lb 5 kg 0.005 T 0.05 kN	2500 2500 2500 2450	5 lb 2 kg 0.002 T 0.02 kN	5000 6250 6250 6125	700%	Alum 2 D-Cells
50000 lb 25000 kg 25 Ton 245 kN	20 lb 10 kg 0.01 T 0.1 kN	2500 2500 2500 2450	10 lb 5 kg .005 T 0.05 kN	5000 5000 5000 4900	600%	Alum 2 D-Cells
100000 lb 50000 kg 50 Ton 490 kN	50 lb 20 kg 0.02 T 0.2 kN	2000 2500 2500 2450	20 lb 10 kg 0.01 T 0.1 kN	5000 5000 5000 4900	550%	Alum 2 D-Cells
120000 lb 60000 kg 60 Ton 588 kN	50 lb 20 kg 0.02 T 0.2 kN	2400 3000 3000 2940	20 lb 10 kg 0.01 T 0.1 kN	6000 6000 6000 5880	500%	Steel 2 D-Cells
180000 lb 90000 kg 90 Ton 882 kN	100 lb 50 kg 0.05 T 0.5 kN	1800 1800 1800 1764	50 lb 20 kg 0.02 T 0.2 kN	3600 3600 4500 4410	500%	Steel 2 D-Cells
260000 lb 130000 kg 130 Ton 1275 kN	100 lb 50 kg 0.05 T 0.5 kN	2600 2600 2600 2550	50 lb 20 kg 0.02 T 0.2 kN	5200 6500 6500 6375	500%	Steel 2 D-Cells
380000 lb 190000 kg 190 Ton 1863 kN	200 lb 100 kg 0.1 T 1 kN	1900 1900 1900 1863	100 lb 50 kg 0.05 T 0.5 kN	3800 3800 3800 3726	500%	Steel 2 D-Cells
550000 lb 225000 kg 225 Ton 2206 kN	200 lb 100 kg 0. 1 T 1 kN	2750 2250 2500 2206	100 lb 50 kg 0.05 T 0.5 kN	5500 4500 5000 4412	440%	Steel 3 D-Cells

Table 8-4. Standard Capacities and Resolutions

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8.5   Firmware Update Procedure

Updating firmware in the Dyna-Link 2 requires the following: a DCE serial cable (PN 139470), a computer with a terminal program, such as Tera Term Pro (recommended), and if the computer does not have standard RS-232 serial ports, then 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 service department and can be emailed on request. The firmware version displays when the Dyna-Link 2 is turned on in the form of 01-04 (individual unit version will vary). Most firmware updates do not require a recalibration. Consult the version release notes for confirmation.

1.   Setup 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 2 serial port using the DCE cable. Connect the D9 connector to a computer or USB adapter.
3.   (Optional) Test that there is a connection by typing {00FF01?}. If the connection is good the Dyna-Link 2 will respond with {000001r2;0;01E02;2011-07-08;11:05} or something similar.
4.   On the terminal keyboard, type {**ff0009=0199**}
5.   Change the terminal serial port to 38400 BAUD. Hit the q key to refresh the display. Cycle Power on Dyna-Link 2 by removing and reinstalling batteries. The following menu displays:

   MSI-8000 RF Remote Display SCALECORE 1 BOOT LOADER Ver. xx-xx(c) Date/Time

   (u)   Download and program application code
   (q)   Query app code info
   (g)   Execute app code
   (r)   Refresh

📝   **NOTE: Individual unit boot loader version may vary.**

6.   Type **u**

Terminal displays:

   Send File NOW, or press ^ to abort:

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

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

8.   After the file is received, terminal displays **Completed**. Then the boot menu displays again.

   MSI8000 SCALECORE2 BOOT LOADER Ver. Ver. xx-xx(c) Date/Time

   (u)   Download and program application code
   (q)   Query app code info
   (g)   Execute app code
   (r)   Refresh

9.   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 BOB742D (32b CRC must match)
   Received Signature BOB742D (32b CRC must match)
   Product ID 07   (Dyna-Link 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 and try again.

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

   MSI8000 SCALECORE2 BOOT LOADER Ver. xx-xx(c) Date/Time

   (u)   Download and program application code
          (individual unit boot loader version may vary)
   (q)   query app code info
   (g)   execute app code
   (r)   refresh

11.   Send a **g**. The Dyna-Link 2 will start.

9.0   Specifications

Accuracy

0.1% FS of rated capacity (up to 10,000 lb)
0.5% FS of rated capacity (120,000 lb and above)

Enclosure

NEMA Type 4, IP65, anodized corrosion-resistant finish

Material

2024 aircraft grade aluminum
Capacities above 100 K have zinc plated enclosures and 4340 load cell bodies

Design Overload

200% Safe/700% Ultimate* (except where noted)

Functions

On/Off, Zero, Hi-Speed Peak Hold, Setpoints, Total, Tare, Auto-Off, Motion Filter

Display

LCD display:
       50,000 lb and lower - Five-digits, 1.22 in (31 mm)
       100,000 lb and highter - Six-digits, 1 in (26 mm)

Displayable Units

Pounds, kilograms, kilonewtons, tons, metric tons

LED Annunciators

Function 1, Function 2, Setpoint 1, Setpoint 2

LCD Annunciators

Net, Center of Zero, Stable, Battery Test, Peak Hold, Total

Power

Two each C-cell alkaline batteries for capacities up to 10,000 lb; two each D-cell alkaline batteries for capacities 25,000 lb to 100,000 lb

Operating Time

From 150 to 300 hours in typical use depending on unit capacity and battery configuration.
Approximately 25 to 30 hours with optional RF modem link installed.

Operating Temperature

- 4°F to 140°F (-20°C to 60°C)

Filtering

OFF, LO, HI selectable

Data Output

Serial RS-232

Warranty

Two-year limited

NOTE: Dyna-Link 2 is designed to have a greater safety factor than the connecting shackles which have a typical ultimate safety factor of 600%.

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