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DL-2110

Linear Net Weight Filler

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WARNING

ALTERING EQUIPMENT WITHOUT FACTORY APPROVAL COULD VOID ALL WARRANTIES.

Limited Warranty: Metro Weighing & Automation, d/b/a Dura-Pack Inc. warrants that the material handling system equipment and software will perform substantially in accordance with the specifications contained in the purchase order for the equipment for a period of one year from the date installation is completed and will be free from defects in materials and workmanship under normal use and service for the same one year period. To the maximum extent provided by law, all other warranties, including any and all implied warranties of fitness and/or merchantability, are disclaimed in their entirety. There are no warranties which extend beyond the description on the face hereof.

Customer Remedies: Any and all liability of Metro Weighing & Automation, d/b/a Dura-Pack, Inc., and the customer's exclusive remedy shall be, at the option of Metro Weighing & Automation, either:

- (a) for Metro Weighing & Automation to remove the material handling system equipment and software, and to refund the purchase price paid; or
- (b) for Metro Weighing & Automation to repair or replace any equipment or software that does not meet Metro Weighing & Automation's Limited Warranty and is removed or retrieved by Metro Weighing & Automation.

Any replacement of material handling system equipment or software will be warranted according to the terms of the Limited Warranty described above for the remainder of the original Limited Warranty period or thirty days, whichever is longer.

Warranties and Remedies Void: The Limited Warranty provided herein is void and the customer is not entitled to any remedy from Metro Weighing & Automation if the failure of the material handling system equipment and/or software is caused by misuse, accident, abuse, or misapplication.

No Other Warranties: To the maximum extent permitted by applicable law, Metro Weighing & Automation, d/b/a Dura-Pack, Inc., hereby disclaims all other warranties not contained herein, whether expressed or implied, including, but not limited to the implied warranty of merchantability, implied warranty of fitness for a particular purpose or use, and any express warranties not contained in writing signed by both parties hereto.

No Liability for Consequential Damages: To the maximum extent permitted by law, in no event shall Metro Weighing & Automation, d/b/a Dura-Pack, Inc., or its suppliers, be liable for any special, incidental, indirect, or consequential damages whatsoever, including but not limited to damages for loss of business profits, business interruption, loss of business information, or any other pecuniary loss, arising out of the use or inability to use the material handling system, its equipment and/or software, even if Metro Weighing & Automation, d/b/a Dura-Pack, Inc., has been advised of the possibility of such damages.

Limitation on Other Damages: The customer acknowledges that this is not a contract for consumer goods or services, and further acknowledges that the remedies provided herein are the sole and exclusive remedies available to the customer in the event of any breach or default of Metro Weighing & Automation and/or of any defect or failure of the material handling system equipment and/or software. Damage claims against Metro Weighing & Automation, d/b/a Dura Pack, Inc., are limited to the return to the customer of monies actually paid to Metro Weighing & Automation, d/b/a Dura Pack, Inc., for goods or services.

To the extent permitted by applicable law, in no event shall Metro Weighing & Automation or the customer have any liability to each other or to any third party for any incidental, consequential, special, punitive, speculative, or exemplary damages occasioned under this agreement and/or based upon a claim of tort (including, but not limited to negligence, warranty, or strict liability), for any cause whatsoever, including without limitation, damages for loss of income, profits, or use, business interruption, loss of goodwill, or damages to persons or property, irrespective of whether either party has advance notice of the possibility of such damages.

Governing Law: The parties hereby acknowledge and agree that this Agreement and all provisions hereto are to be governed, interpreted, and enforced in accordance with the laws of the State of Michigan.

Venue & Jurisdiction: In the event of a dispute regarding matters governed by this Agreement, both parties agree to submit the dispute to binding arbitration pursuant to the rules of the American Arbitration Association or its equivalent. The decision of the arbitrator shall be final and shall have the effect of a judicial determination and be certifiable to an appropriate court of records and judgment. The Arbitrator is expressly authorized to issue preliminary and permanent injunctive relief where appropriate. The sole and exclusive venue for an Arbitration proceeding instituted against Metro Weighing & Automation, d/b/a Dura Pack, Inc. shall be the Detroit, Michigan metropolitan area. The sole and exclusive venue for an Arbitration proceeding instituted by Metro Weighing & Automation, d/b/a Dura Pack, Inc., against the customer shall be the metropolitan area of the customer's registered address or principal place of business. Each party shall bear its own attorney fees and the arbitration costs shall be borne equally by both parties. Regardless of venue, any dispute shall be adjudicated or arbitrated in accordance with the rules of the American Arbitration Association and Michigan law, where applicable.

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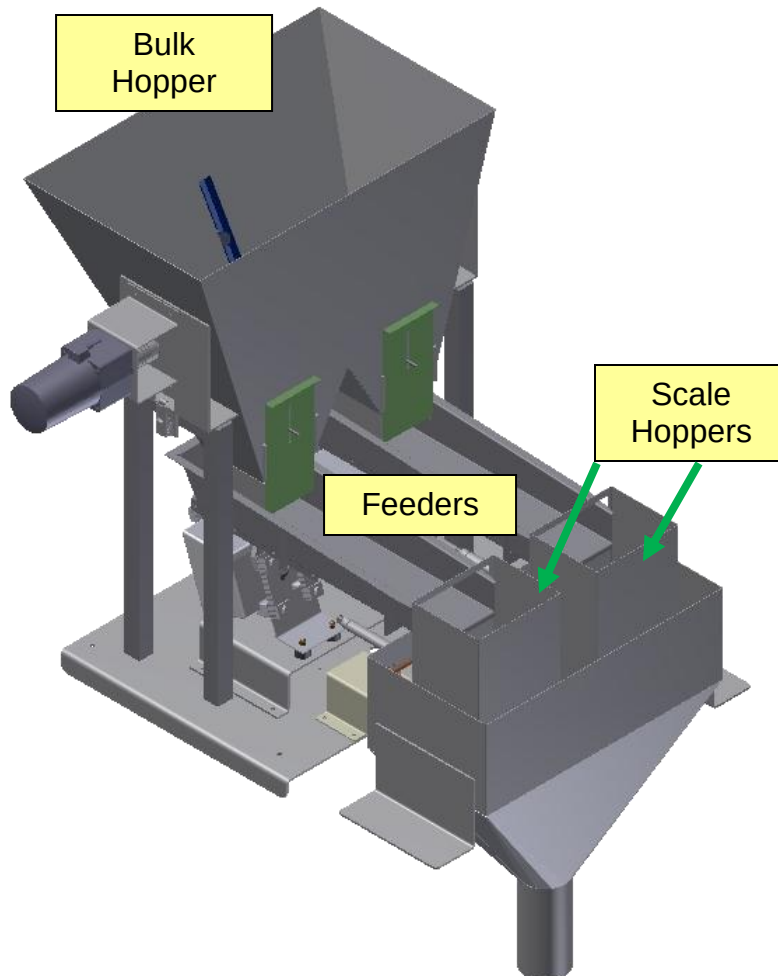
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Electrical Drawings

The DL-21B is a Linear Net Weight Filler designed to run a large array of products. All filling parameters are adjustable via the friendly 6" touch-screen interface.

Main Components



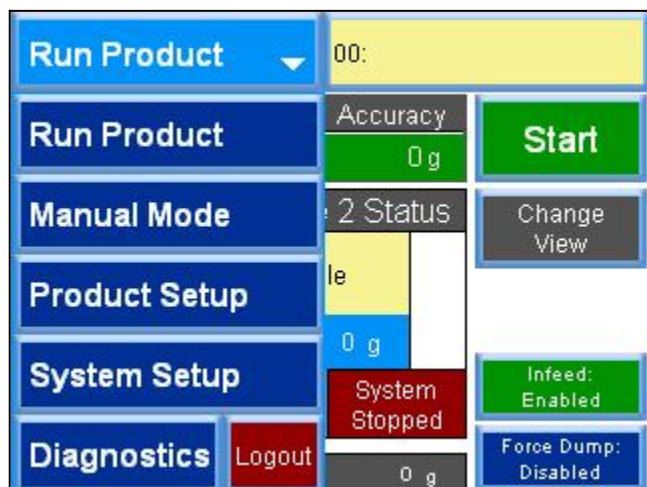
Bulk Hopper: Provides holding area for the product before it is weighed. An optional level sensor can be provided to prevent *over-filling* from in-feed equipment. The opening of the Bulk Hopper is limited by adjustable doors to control the level of product in the Feeders. An optional agitator can be provided to promote product flow.

Feeders: Fills product into the Scale Hopper. The amplitude of the feeder is adjustable to allow precise control and product flow.

Scale Hopper: Weighs the product and discharges it into the funnel below. The scale hopper is held in place with a bracket, and is simply snapped on/off for cleaning.

Warning: The Scale Hopper rests on a sensitive Load Cell. Be careful when removing and replacing the Scale Hopper, as excessive force can damage the Load Cell.

Main Menu



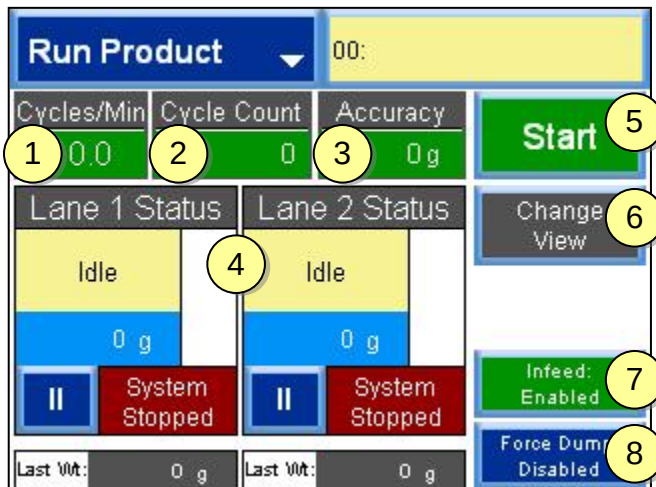
When the system is first powered on, the **Run Product** screen will be displayed. The **Main Menu** can be displayed by touching the blue area in the upper-left corner of the screen.

Menu Options:

1. **Run Product:** Allows the system to be Start/Stopped, and displays run-time information.
2. **Manual Mode:** Provides manual controls for the Feeders and Scale Hopper. This screen also displays the scale weight, and allows the scale to be zeroed.
3. **Product Setup:** Provides access to settings that are saved & recalled with the current product.
4. **System Setup:** Contains system-wide settings that are not tied to a particular product.
5. **Diagnostics:** Displays PLC diagnostic information.
6. **Login/Logout:** The **Product Setup**, **System Setup**, and other features of the system can be password-protected with two separate levels of security. This button provides access to password-protected features.

Run Product

Allows you to Start/Stop the system. Useful run-time information is also displayed on this screen.



1) **Cycles/Min:** Displays the current production rate. This value uses an average of the last 10 cycle times.

2) **Cycle Count:** Displays the number of cycles since the counter was last reset. Touching the value will reset the count.

3) **Accuracy:** Displays the average fill accuracy of the system. This value uses an average of the last 10 cycles.

4) **Scale Status:** Displays the current status of each lane.

5) **Start / Stop:** Press to Start/Stop the system.

6) **Change View:** Cycles between the **Scale Status** view (default), the **Scale Timing** view, and the **Cycle History** view.

7) **Infeed Enabled/Disabled:** Enables or disables the infeed conveyor to feed parts into the Bulk Hopper.

8) **Force Dump:** When enabled, the system will discharge product as soon as it's ready. When disabled, the system will wait for the 'OK to Dump' signal (from the footswitch or other connected packaging equipment).

Note: This button will only appear if a Level 2 password is entered.

Product Selection

1	Product 1	  
2	Product 2	
3	Product 3	
4	Product 4	
5	Product 5	
OK Cancel		

The Product Selection screen can be accessed by touching the current product in the top-right corner of the screen.

A scrollable list will be displayed with the available products. Simply select a product by touching it, and press OK to load the selected product into the system.

Manual Mode

Manual Mode ▼		Bulk Low 00:	
Lane 1		Lane 2	
Open Hopper	Zero Scale	Open Hopper	Zero Scale
Gross Wt: 0 g	Net Wt: 0 g	Gross Wt: 0 g	Net Wt: 0 g
Feeder Speed 0%	Turn On	Feeder Speed 0%	Turn On
Run Infeed: Off	Agitator Speed 0% Turn On	Dump Complete Signal: Off	

This screen allows the Feeder and Scale Hopper to be controlled manually. This is also where the scale can be zeroed, and the Gross and Net weights can be monitored.

Note: The Zero Scale button will only be displayed if a valid password has been entered via the Login button on the Main Menu.

Product Setup

Provides access to product-related settings. Up to 50 different product recipes can be saved in the system. The settings can be modified while the system is running, and the Level 1 password must be entered to change values on this screen.

Pressing the **Rename** button will change the name of the current recipe. Pressing the **Copy To** button will copy the current recipe to the specified recipe number.

The settings are described in detail below:

Filling Parameters

Setting	Description	Typical Value
Target	Specifies the desired target weight.	N/A
Cutoff	The percentage of the Target value at which the system will switch from the Fast speed to the Slow speed.	60-75%
Fast Speed	The initial speed to run the Feeder. The Feeder will run at the Fast Speed until the Cutoff is met	75-100%
Slow Speed	Speed to run the Feeder while slow filling. The Feeder will run at this speed until the Target is met.	30-40%
Select Unit	Displays a screen to select the unit of measure to use.	N/A

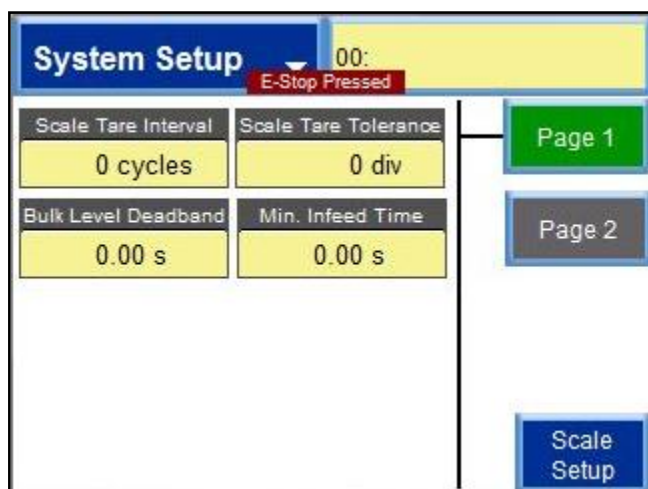
Timing Parameters

Setting	Description	Typical Value
Dribble Time	After the Target Weight is reached, the system pauses to capture a Stable Weight. If after capturing a Stable Weight, the current weight is below the target weight, the system will pulse the Feeder on for a short period of time, and capture another Stable Weight. This value specifies the length of time to pulse the Feeder on.	0.5 – 0.75 s
Discharge Time	The amount of time to energize the Scale Hopper open cylinder while discharging product.	0.40 – 2.0 s
Min Stable Time	After the Feeder is turned off, the system pauses to capture a Stable Weight. The system must wait long enough for the product to finish free-falling into the Scale Hopper. This timer specifies the length of time to wait.	0.5 – 0.75 s
Hopper Close Time	Time to allow the Scale Hopper doors to close before turning on the Feeder to fill more product.	0.0 – 0.5 s

Holding Hopper/Gate

Setting	Description	Typical Value
Discharge Time	The amount of time to energize the Holding Hopper open cylinder while discharging product.	0.40 – 2.0 s
Open Delay	The amount of time after product is discharged from the Scale Hopper, before the Holding Hopper can discharge. This provides enough time for the product to reach the Holding Hopper.	0.5 – 2.0 s
Funnel Vibrator	Enables/Disables the vibrator on the funnel.	Disabled
Refill Delay	The amount of time after the Holding Hopper opens, before product can be released again from the Scale Hopper.	0.1 – 2.0 s
Hopper/Gate Mode	If set to 'Dust Cut-Off', product will not accumulate on the Holding Hopper between cycles. In this mode, the door will open/close and merely act as a dust cut-off to catch residual product. This can be useful to prevent bridging. If set to 'Queue Product', product will accumulate on the Holding Hopper. This minimizes free-fall and increases throughput. This is the optimal setting when running the system.	Queue Product

System Setup



This screen displays timers and settings that impact the entire system. The Level 2 password must be entered to gain access to this screen. Settings are described in detail below.

System Settings – Page 1

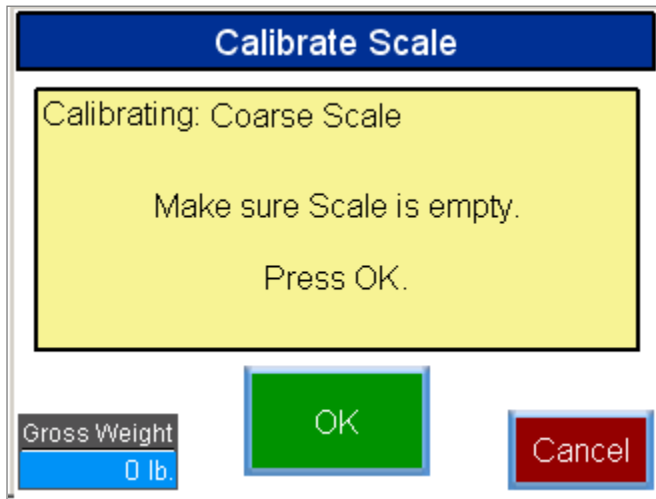
Setting	Description	Typical Value
Scale Tare Interval	Specifies how often (in machine cycles) to tare the Scale Hopper. This is useful to counteract both natural scale drift and product build-up.	10 - 100
Scale Tare Tolerance	The maximum amount the Scale Hopper can be off zero when capturing a new Tare weight. If this value is exceeded, the system will display an alarm.	10 – 50 div.
Bulk Level Deadband	The amount of time to wait after the Bulk Level sensor toggles on before turning off the infeed equipment. This keeps the infeed equipment from cycling on and off too often.	0.25-3.0 s
Min. Infeed Time	The minimum amount of time to turn on the Infeed conveyor when the bulk level sensor calls for more product.	1.0-5.0 s
Low Level Pause Tm	Maximum time the Bulk Hopper level can be low before pausing the system. Set this value to 0 to disable this behavior.	0

System Settings – Page 2

Setting	Description	Typical Value
Min A/D Count	The minimum raw Scale Analog to Digital converter count to prevent a scale alarm. Scale A/D values below this usually indicate the load cell is disconnected or damaged.	1 - 10
Min A/D Cal Span	The minimum Scale Analog to Digital converter count calibration span. Prevents calibration errors due to not placing the test weight on the scale during the Calibration routine.	50,000
Password Level 1	Changes the password required to modify values on the Product Setup screen.	N/A
Password Level 2	Changes the password required to modify values on the System Setup screen.	N/A

Calibrate Scale

The '**Calibrate Lane X**' buttons on Page 2 of the System Settings are used to calibrate each scale. The calibration process is described below:



Press Calibrate button. After the **Calibrate** button is displayed, the **Calibrate Scale** screen will be displayed. This screen will walk you through the steps of capturing a new Zero weight, placing a calibration weight on the scale, and applying the new calibration information. Press the **OK** button after each step. The **Cancel** button can be pressed at any time to abort calibration.

Note: Once Calibration is started, the current calibration information is erased. If Cancel is pressed before completion, the scale MUST be calibrated again before running the system.

Scale Setup

◀ 0 ▶			Custom Unit Setup		
Capacity	Count By	Decimal Places	Unit Name		
0	0	0			
Cal Weight	Sample Readout		Unit Suffix		
0.0 g	0				
Stable Weight:	Tolerance	Count	Conversion Factor		
	0.0	0	0.000000		
Cal Stable Weight:	Tolerance	Count			
	0.0	0			
			Calibrate OK		

The Scale Setup screen is used for initial setup of the Scale, and the settings here should only be modified by a qualified technician. These values are preset at the factory and should rarely (if ever) be modified.

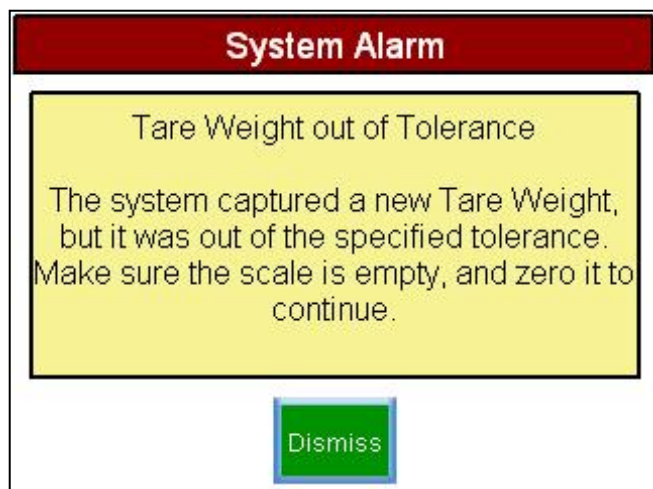
Diagnostics

Diagnostics		Bulk Low 00:
Inputs	Outputs	
OK to Dump [I:0/0]	Hopper Door #1 [O:0/2]	Lane 1 A/D Count 0
Hopper Full [I:0/6]	Hopper Door #2 [O:0/3]	Lane 2 A/D Count 0
	Dump Complete [O:0/4]	Lane 1 Feeder 0
	Infeed Run [O:0/5]	Lane 2 Feeder 0
	Agitator Run [O:0/6]	Agitator Analog 0

Displays the status of the PLC Inputs and Outputs.

This screen is useful for troubleshooting.

System Alarms



If the system encounters a problem, the **System Alarm** screen will be displayed. This screen will display a message detailing the alarm. Touching the **Dismiss** button will reset the alarm and close the **System Alarm** screen.

Possible alarms are summarized in the table below:

Alarm	Corrective Action
Tare Weight out of Tolerance	Verify the Scale Hopper is completely empty, and that nothing is touching or binding against the Scale Hopper. Zero the scale from the Manual Mode screen. Verify that the Scale Tare Tolerance found under System Setup is set to a reasonable value.
Scale Comm Error	The PLC can no longer communicate with the A/D module. Verify all wiring between the PLC communication port and the A/D module.
Load Cell Error	The output from the Load Cell is incorrect. This is typically due to a bad Load Cell, but can also occur if the Load Cell is not wired correctly. Verify the Load Cell is wired correctly, and replace the Load Cell if necessary.