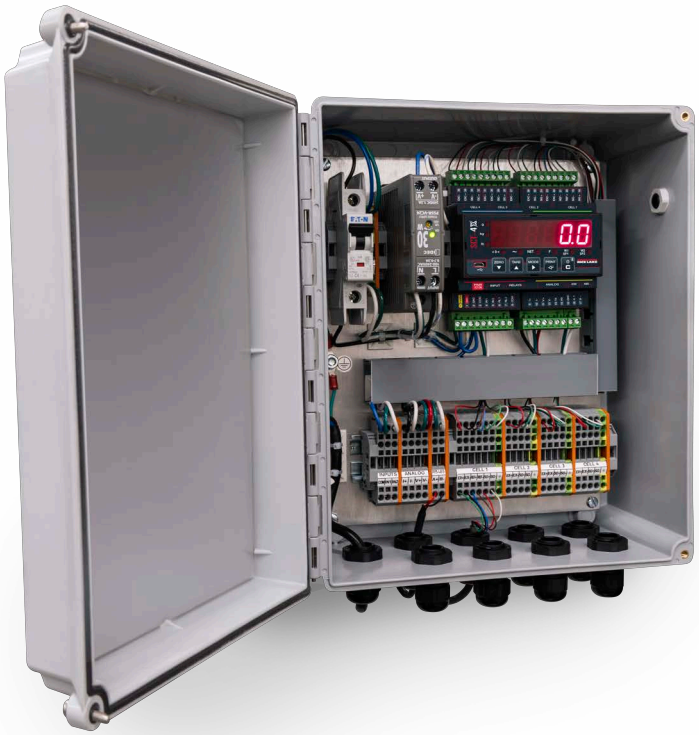
SCT-4XD

Belt Scale Integrator

Technical Manual



RICE LAKE®
WEIGHING SYSTEMS

March 10, 2025

PN 227386 Rev B

All information contained within this publication is, to the best of our knowledge, complete and accurate at the time of publication. Rice Lake Weighing Systems reserves the right to make changes to the technology, features, specifications and design of the equipment without notice.

The most current version of this publication, software, firmware and all other product updates can be found on our website:

www.ricelake.com

Revision History

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

Revision	Date	Description
A	July 30, 2024	Initial release; Firmware 1.24.00
B	March 10, 2025	Established revision history

Table i. Revision Letter History

Contents

Rice Lake continually offers web-based video training on a growing selection of product-related topics at no cost. Visit www.ricelake.com/webinars

1.0 Introduction

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

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

1.1 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.

Some procedures described in this manual require work inside the enclosure. These procedures are to be performed by qualified service personnel only.

Take all necessary safety precautions when installing the weigh frame, including wearing safety shoes, protective eye wear, and using the proper tools.

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

Do not approach a running conveyor from underneath.

Do not bend over a running conveyor.

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

Do not operate without all shields and guards in place.

Do not jump on the scale.

Do not use for purposes other then weight taking.

Do not place fingers into slots or possible pinch points.

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

Do not use this product if any of the components are cracked.

Do not exceed the rated load limit of the unit.

Do not make alterations or modifications to the unit.

Do not remove or obscure warning labels.

Do not use near water.

1.2 Disposal

Product Disposal

The product must be brought to appropriate separate waste collection centers at the end of its life cycle.

Proper separate collection to recycle the product helps prevent possible negative effects on the environment and to health, and promotes the recycling of the materials. Users who dispose of the product illegally shall face administrative sanctions as provided by law.

1.3 FCC Compliance

United States

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

Canada

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

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

1.4 Definitions

1.4.1 Idlers Distance (Weigh Length)

Figure 1-1. Complete Conveyor on Load Receptor

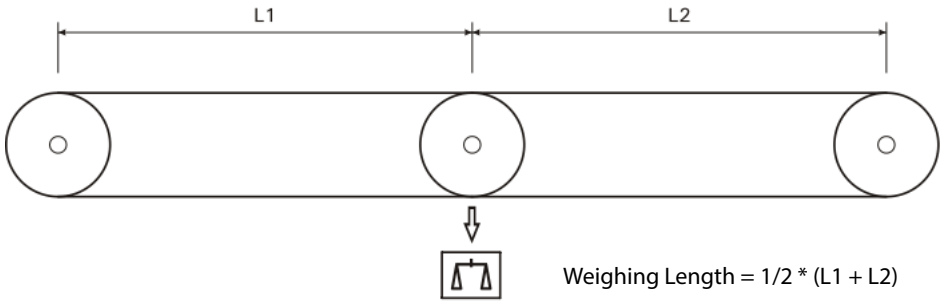


Figure 1-2. Conveyor with One Roller on Load Receptor

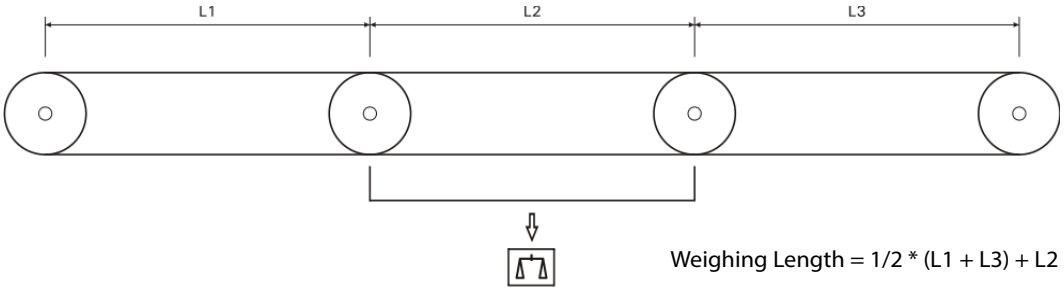


Figure 1-3. Conveyor with Two Adjacent Rollers on Load Receptor

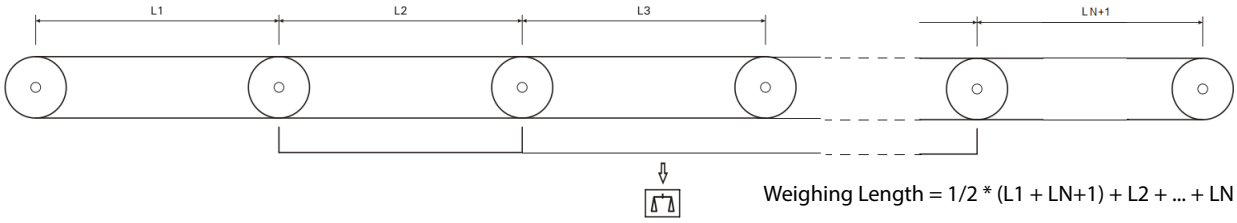


Figure 1-4. Conveyor with Many Adjacent Rollers on Load Receptor

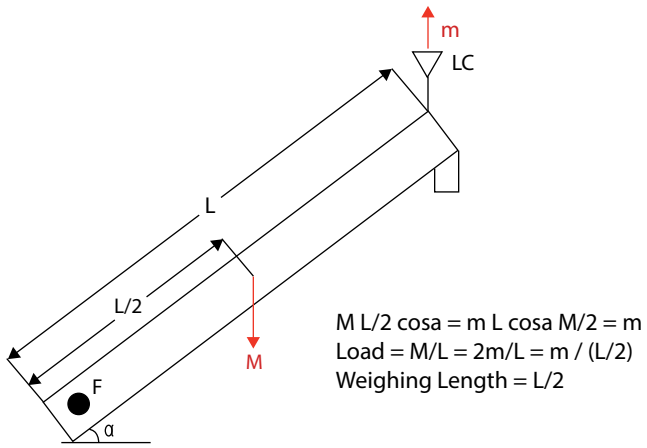


Figure 1-5. Screw Feeder - Full Tube with Fulcrum and Load Cell at the Extreme Ends of the Tube

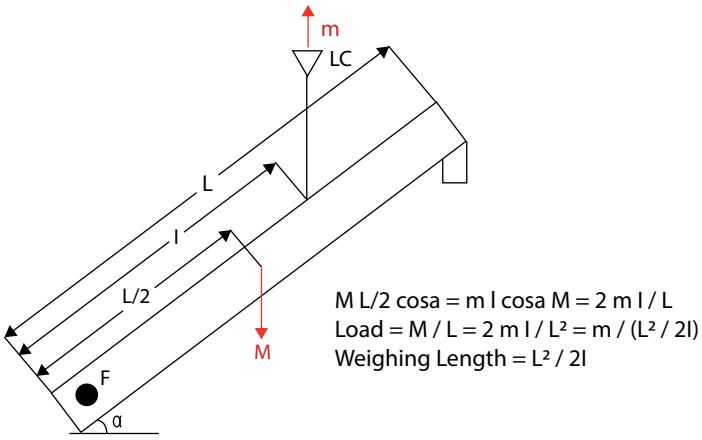


Figure 1-6. Screw Feeder - Full Tube with Fulcrum and Load Cell Midway on the Tube

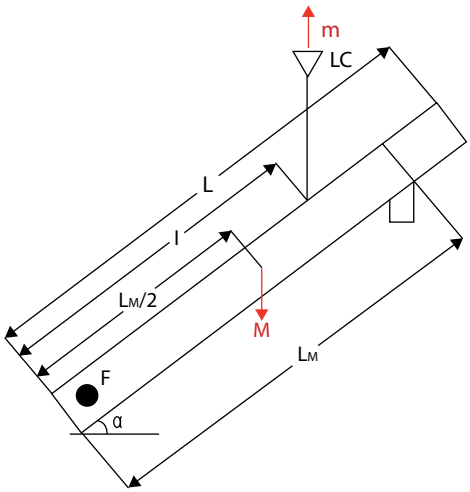


Figure 1-7. Screw Feeder - Partially Full tube with Fulcrum and Load Cell Midway on the Tube

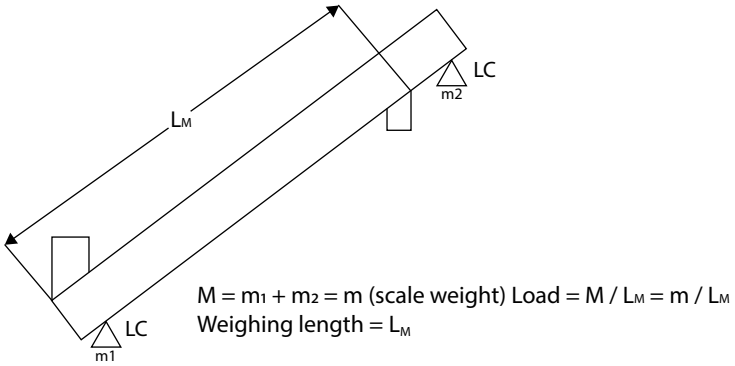


Figure 1-8. Weighed Partially Full Tube without Fulcrum

1.4.2 Length per Encoder Pulse Belt

With every encoder roller of D diameter turn, there are N pulses. The length per pulse is:

$$LPP = \pi D / N$$

Screw Feeder

With every screw turn with P_t pitch, there are N pulses. The length per pulse is:

$$LPP = P_t / N$$

In calculation:

N = *Pulses/Turn*

P_t / π = *Diameter of Encoder Roller*

1.4.3 Belt Ratio

Belt ratio = (Pivot to LC distance) / (Pivot to idler distance) * 1 / cos(Belt angle)

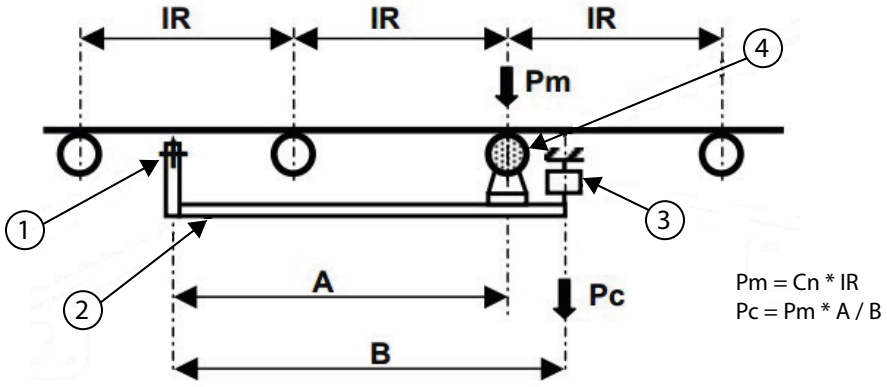


Figure 1-9. Belt Ratio

No.	Belt Parts
1	Pivot
2	Lever
3	Load Cell
4	Weighed Idler

Table 1-1. Belt Parts

1.4.4 Zero

Load cell signal used as reference to calculate the weight on the cell. It is composed of:

zero = (static zero) + (zero belt) + (automatic zero belt)

- static zero: signal with belt structure on load cell and empty and stopped belt
- zero belt: average difference of load cell signal from static zero during the belt zero procedure After the zero belt procedure is executed the automatic zero belt is set equal to zero
- automatic zero belt: average difference of load cell signal from (static zero) + (zero belt) during the automatic zero belt procedure

1.4.5 Equations

Belt factor = 1 / (Idler distance) * (Belt ratio)

Belt load = ((LC signal) – zero) / (Max LC signal) * (LC capacity) * (Belt factor) * (Correction factor)

Belt speed = (Encoder frequency) * (length per pulse)

Add to total on every encoder pulse = (Belt load) * (Length per pulse)

Flow rate = (Belt load) * (Belt speed) * (Flow correction)

2.0 Installation

Figure 2-1 shows the wiring diagram for the SCT-4XD factory installed in an enclosure.

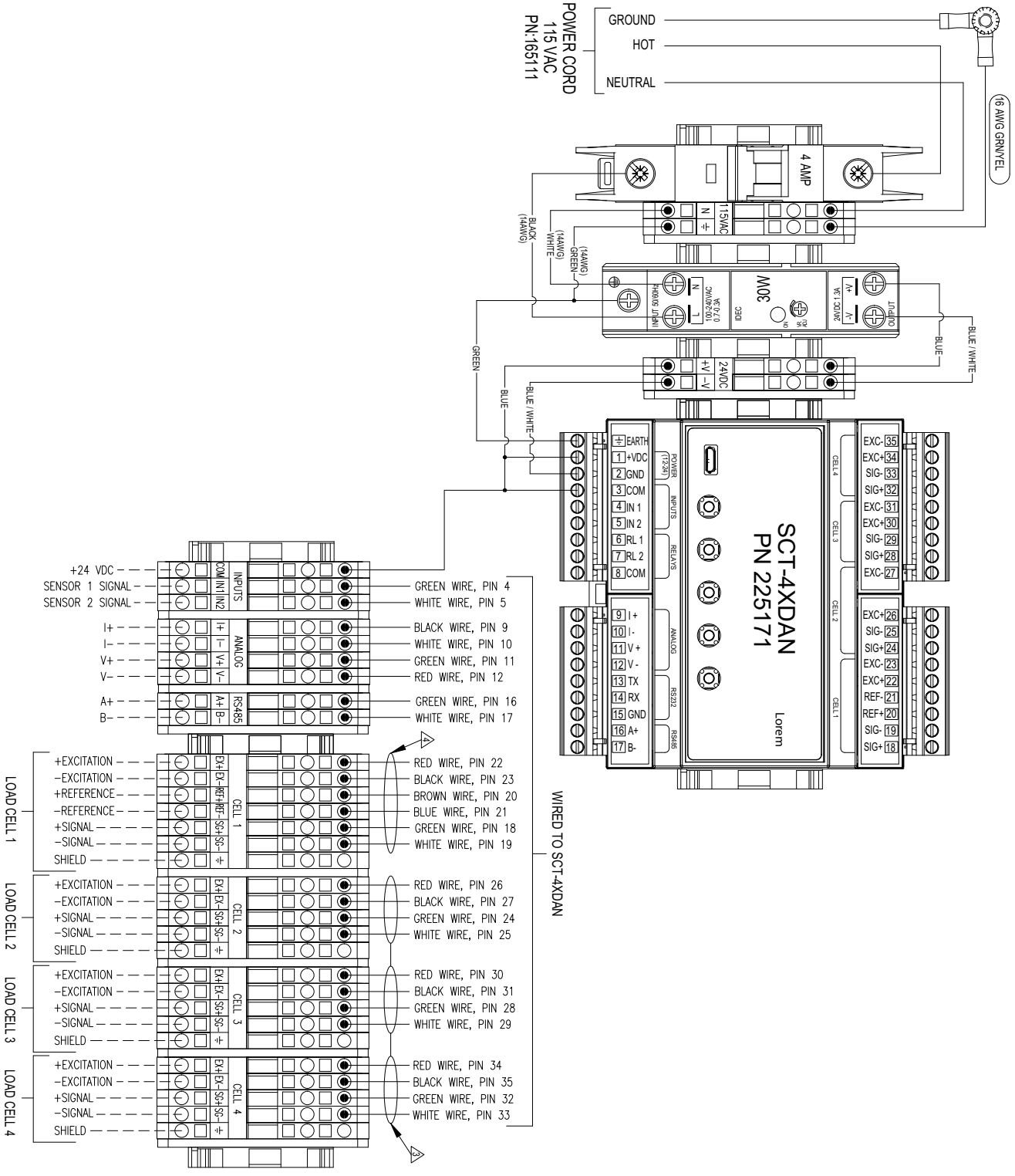
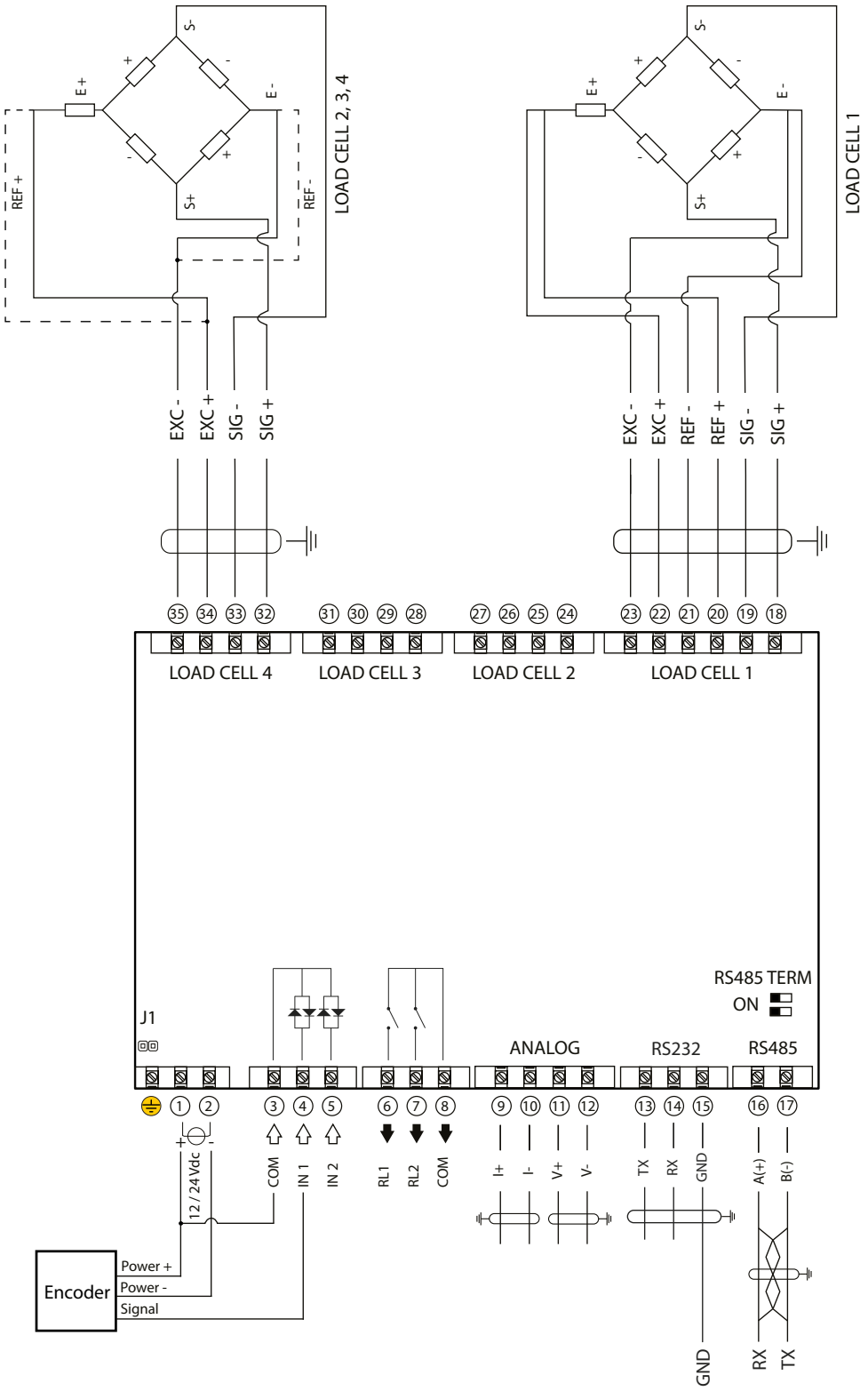


Figure 2-1. SCT-4XD Wiring Diagram

2.1 Electrical Schema



See Section 6.1 on page 33

Figure 2-2. SCT-4XD Electrical Schema

2.2 Key Functions

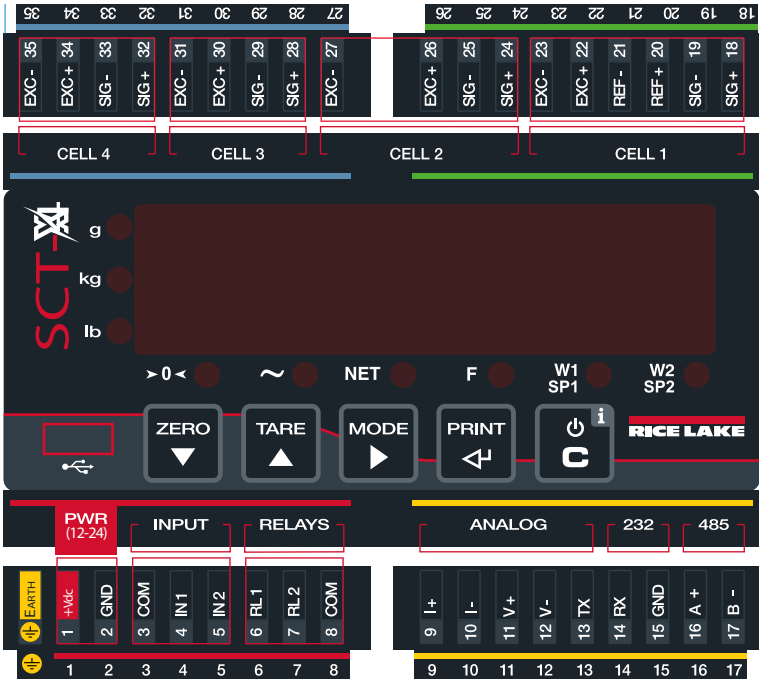


Figure 2-3. SCT-4XD Display

Configuration Menu	
▼	Decreases digit Scrolls down
▲	Increases digit Scrolls up
▶	Selects digit to modify
↵	Enters a step Confirms
⊂	Clears Exits a step (no save)

Weighing Mode	
▶	Toggles between belt scale data
↵	Long Press: Accesses user menu
⊂	ON Standby

Table 2-1. Key Functions

2.3 Indicator Light Descriptions

Icon	Description
~	Zero or span calibration in process
W1 SP1	Digital output 1 is active
W2 SP2	Digital output 2 is active

Table 2-2. Indicator Light Descriptions

3.0 Setup

3.1 Main Menu

To enter the main menu, hold the **TARE** key on power up until in1.SEt appears.

Figure 3-1. SCT-4XD Main Menu

Parameter	Description
in1.SEt	Initial settings (see Section 3.2)
GEn.PAr	General parameters (see Section 3.3 on page 17)
bLt.PAr	Belt parameters (see Section 3.4 on page 19)
CAL ib	Calibration settings (see Section 4.0 on page 23)
ALArMS	Alarm settings (see Section 5.1 on page 29)
CoMMun	Communication settings (see Section 6.0 on page 33)
dEFAu	Default settings (see Section 3.5 on page 21)
d iAG	Diagnostics (see Section 5.6 on page 32)

Table 3-1. SCT-4XD Main Menu Parameters

3.2 Initial Settings

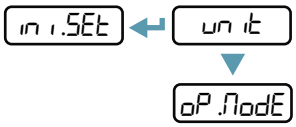


Figure 3-2. Initial Settings Menu

Parameter	Description	Default
un it	Unit system: Selects the unit system for weight, flow-rate and length. After selection, dF.UALP displays and prompts to set default values for select parameters. If confirmed, the following values are set: • Max belt speed - 200 ft/min (1 m/s) • Weigh length - 48 in (1000 mm) • Belt length - 500 ft (10 m)	**Metric**, US
oP.ModE	Operating mode: Selects operating mode.	**Belt**, Bulkslide

Table 3-2. Initial Settings Parameters

If operating mode is changed, the following parameters are reset:

Belt to Bulkslide	
Cell capacity	20 kg
Encoder	Disabled
Input 1	If equal to Encoder, changed to None
Input 2	If equal to Encoder, changed to None
Fixed speed	3 m/s
Belt zero time	5 seconds
Idlers distance	1000 mm
Pivot to load cell distance	0 mm
Pivot to idler distance	0 mm
Serial	
Inclinometer	Disabled
Belt angle	0 degrees
Test weight	0
Test weight delay	0

Bulkslide to Belt	
Cell capacity	200 kg
Encoder	Enabled
Input 1	Encoder
Belt zero time	60 seconds

Table 3-3. Operating Mode Parameter Changes

3.3 General Parameters

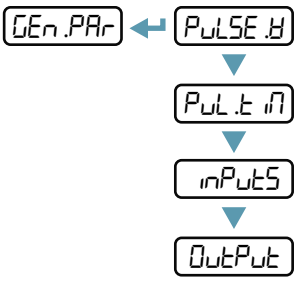


Figure 3-3. General Parameters Menu

Parameter	Description	Default
PuLSE .W	Pulse weight: Defines how much totalized weight each pulse output represents. Value is under configured decimals and units of tot .rES (see Table 3-9 on page 19)	**0** 0-999999
PuL .t in	Pulse time width: Defines the length of time the digitizer pulse output is activated. If value is equal to 0.0s, the following occurs: • The output is switched on when pulse weight is added to the totals • The output is switched off after half of pulse weight is added to the totals.	**0.0s** 0.0s - 25.5s
inPutS	Inputs configuration: Functions to link to the digital 2 inputs. Values: None, Zero key, Tare key, Mode key, Print key, C key, Off instrument, Keyboard lock, Run, Off track, Clear P.T., Zero belt, Extern alarm, Test weight, Encoder	**Encoder**
OutPut	Outputs configuration: Selects the NO/NC configuration and functions to link to digital outputs. Values: None, Run, Off track, Alarm, Lock, PUlse, Belt speed > 0, Zero belt active, Flow in dead band, Test weight, Air purge	
Air .PrG	See Section 3.4 on page 19	

Table 3-4. General Parameters

3.3.1 Analog Output Parameters

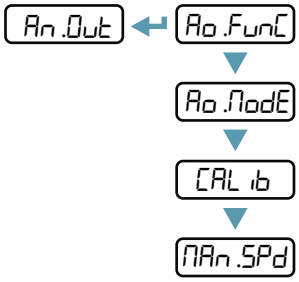


Figure 3-4. Analog Output Menu

Parameter	Description	Default
Ao.FunC	Analog output function: Displays analog output operative mode. Proportional to flow-rate, load or speed.	**FLOW-RATE** LOAD SPEED
Ao.ModE	Analog output mode: Automatically sets mode for minimum and maximum value.	**4 20 mA** 0 20 mA 2 10 V 0 10 V
CAL ib	Analog output calibration (see Section 3.3.1.1)	
MAn.SPd	Not used.	

Table 3-5. Analog Output Parameters

3.3.1.1 Analog Output Calibration Parameters

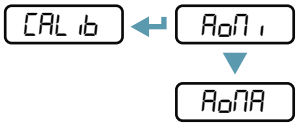


Figure 3-5. Analog Output Calibration Menu

Parameter	Description	Default
AoM1	Minimum analog output signal: Signal level transmitted when Flow-Rate, Load or Speed is set to zero.	**12506** 0-65535
AoMA	Maximum analog output signal: Signal level transmitted when Flow-Rate, Load or Speed meet their configured maximum value.	**57970** 0-65535

Table 3-6. Analog Output Calibration Parameters

3.3.2 Air Purge Parameters

Not visible in belt operating mode.

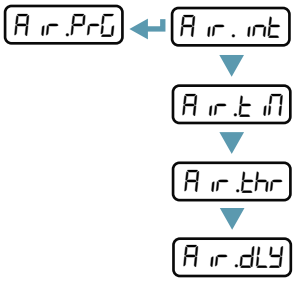


Figure 3-6. Air Purge Menu

Parameter	Description	Default
AIr.int	Air purge interval: Air is managed every set number of minutes.	**20** 0-255
AIr.tIn	Air purge time: Air purge enabled for set number of seconds.	**5** 0-255
AIr.thr	Air purge max flow threshold: Air purge is enabled only if the flow-rate remains below set threshold for the set delay time.	**4** 0-max flow-rate
AIr.dLY	Air purge delay: Air purge is enabled only if the flow-rate remains below set max flow threshold for the time.	**2** 0-255

Table 3-7. Air Purge Parameters

3.4 Belt Parameters

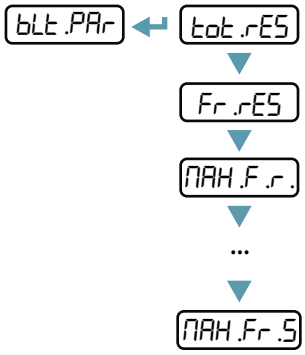


Table 3-8. Belt Parameters Menu

Parameter	Description	Default
tot.res	Total resolution Values: 0.1 kg (lb), 0.2 kg (lb), 0.5 kg (lb), 1 kg (lb), 2 kg (lb), 5 kg (lb), 0.01 t (tn), 0.02 t (tn), 0.05 t (tn), 0.1 t (tn), 0.2 t (tn), 0.5 t (tn), 1 t (tn), 2 t (tn), 5 t (tn)	**0.01 t**
Fr.res	Flow-rate resolution: Displayed in kg/lb.	**0.1 kg/lb** 1, 0.01, 0.1, 1
MAX.F.r	Maximum flow-rate: Used by the Analog Output as the reference max value for Flow Rate. Displayed in tons.	**200 t** 0-65535
Ld.res	Load resolution	**1.000** 100000 1.0 1.00 1.000
MAX.Ld	Maximum load: Used by the Analog Output as reference value for Maximum Load. Displayed in kg/m and lb/ft.	**10 kg/m** 0-60000
EnCodr	Encoder enable: Measures belt speed Not visible if operating mode is set to Bulkslide. When enabled, ensure Input 1 function is set to Encoder.	**NO (Bulkslide)** **YES (Belt)**
LEn.P.P	Length per pulse: Defines the distance between each encoder pulse (see Section 1.4.2 on page 10) Not visible if Encoder is not enabled. Metric - 0.01 mm US - 0.0001 in	**3.14 mm** 0-999999
EnCod.2	Encoder 2 enable: Measures belt speed Not visible if operating mode is set to Bulkslide. When enabled, ensure Input 2 function is set to Encoder.	**NO** YES
MAX.SPd	Max belt speed: Used by the Analog Output as reference value for Maximum Belt Speed.	**1 m/s / 200 ft/ min** 0-655.35
dEAd.bd	Dead band: Flow-rate band in which the totals are not increased. The value is in percentage of the maximum flow-rate. When the flow-rate is lower than this step value percentage of the maximum flow-rate, the totals are not increased.	**2.0%** 0-99.9%
F.r.d.b.	Show flow-rate in dead band: Option to see what the current flow rate is when in dead band state. If set to NO, the current flow rate inside the dead band is shown as 0.	**NO** YES
tot.nEG	Totalize in negative: Enables the totals decrement when the flow-rate is negative and the value is greater than the dead band percentage of the maximum flow-rate.	**NO** YES
FLt.PAr	Filter parameters (see Section 3.4.1)	
St.totS	Store totals in non volatile memory: Total values are stored every 5 seconds to avoid to performance degradation. Storing values in permanent memory takes a few decimals of second. When storing is enabled, the amount of time for the indicator to answer to Modbus/ASCII requests is longer when total values are stored in permanent memory. If set to NO, total values are lost when the indicator is powered off. If set to YES, total values are stored in permanent memory and restored when indicator cycles power.	**YES** NO
MAX.Fr.S	Max flow-rate to store totals: Totals are stored if value is zero or if current flow-rate is less or equal to set percentage of max flow-rate. Not visible if St.totS is set to NO.	**0.0%** 0-100.0%

Table 3-9. Belt Parameters

3.4.1 Filter Parameters

Sets the flow-rate and load filter parameters.

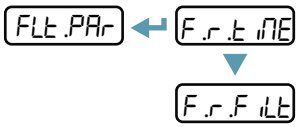


Table 3-10. Filter Parameters Menu

Parameter	Description	Default
F .r .t iNE	Flow filtering time: Interval time in seconds.	**5** 1-50
F .r .F iLt	Hourly flow filter	
	N.WIN	**20** 1-32
	N.MED	**20** 1-N.WIN
	N.PIT	**0** 0-(N.WIN - 2)

Table 3-11. Filter Parameters

3.5 Default

Confirmation prompt displays (dEFAuP) before returning device to factory settings.

4.0 Calibration

4.1 Calibration Menu

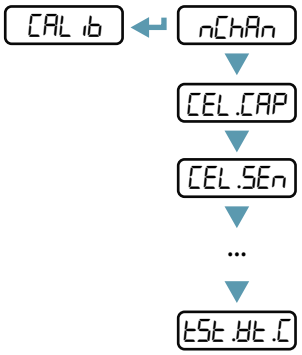


Figure 4-1. Calibration Menu

Parameter	Description	Default
nChAn	Number of load cells: Number of connected load cells	**1** 1-4
CEL.CAP	Load cell capacity: The total sum of the load cells capacities (in metric or US)	**Belt: 200** **Bulk: 20** 0-999999
CEL.SEn	Load cell sensitivity: The total sum of the load cells sensitivities in mV/V	**2 mV/V** 0.1-9.99999
ZEro	Zero scale (see Section 4.2 on page 24)	
LC.F iLt	Load cell filter (see Section 4.3 on page 25)	
bE i.LEn	Weigh length: Length of weighing section. Not visible in bulkslide mode. When value is changed, the belt factor is re-calculated. • Metric: 1 mm resolution US: 0.01 in resolution	**Metric: 1000** 0-65535 **US: 48.00** 0-655.35
P iUt.Lc	Pivot to load cell distance: Not visible in bulkslide mode. When value is changed, the belt factor is re-calculated. • Metric: 1 mm resolution • US: 0.01 in resolution	**0** Metric: 0-65535 US: 0-655.35
P iUt.id	Pivot to idler distance: Not visible in bulkslide mode. When value is changed, the belt factor is re-calculated. • Metric: 1 mm resolution • US: 0.01 in resolution	**0** Metric: 0-65535 US: 0-655.35
inCLin	Serial inclinometer: Not visible in bulkslide mode. Belt angle can be sent by a serial inclinometer connected to 232 or 485 port. The current supported inclinometer is the HPS-30-2-232 model by Level Developments. It has to send continuously a string of the form: +025.430<CR> Even dual axis inclinometer SOLAR-2, by Level Developments, is managed. Example string: +025.430,-012.220<CR> Only first part (x axle) is considered.	**NO**, 485, 232
AnGLE	Belt angle: Not visible in bulkslide mode. When value is changed, the belt factor is re-calculated.	**0** 0-60.0

Table 4-1. Calibration Parameters

Parameter	Description	Default
Cor.FAC	Correction factor: Displays current correction factor. Allows manual input of correction factor. ***NOTE: 0 value is equal to 1.000000.*** ***NOTE: For further instructions on manually calculating the Correction Factor, see Section 4.4.5 on page 28.***	**1** 0-9.999999
ZERO.tM	Belt zero time: Time duration of the zero belt procedure with fixed speed and without encoder measurement sensor. Not visible if Encoder is enabled.	**Belt: 60 sec** **Bulk: 5 sec** 0-600.00
bELt.Ln	Belt length: Total belt length used to calculate the number of pulses to read by the encoder during the zero belt procedure. Not visible if Encoder is disabled or in bulkslide mode.	**Metric: 10.0 m** **US: 500.0 ft** 0-6553.5
ZEr.rEV	Belt revolutions: Number of belt revolutions completed during the zero belt procedure. Not visible if Encoder is disabled or in bulkslide mode.	**1** 1-9
ZEr.rAn	Zero range: Percent range of maximum flow-rate the zero procedure will start. If the absolute value of the flow rate related to static zero is out of the set range, the zero procedure will not start.	**10%** 0-99.9%
AUto.Zr	Auto zero range: Percentage range of the maximum flow-rate the zero procedure will start. If the value is outside of the set range, the auto zero belt procedure stops. If the value exceeds the set range, the procedure is aborted. ***NOTE: 0% means auto zero procedure disabled.***	**10%** 0-99.9%
AUto.Z.L	Auto zero limit: Percentage range of the maximum flow-rate the auto zero procedure will start. If the value, calculated (static zero) + (zero belt), is outside of the set range, the auto zero belt procedure stops. If the average flow-rate, calculated (static zero) + (zero belt), is outside the set range at the end of an auto zero procedure, the auto zero component value is discarded. ***NOTE: 0% means no limit.***	**10%** 0-99.9%
tSt.Wt.C	Test weight calibration (see Section 4.4 on page 26)	

Table 4-1. Calibration Parameters (Continued)

4.2 Zero Scale

Load cell signal with the belt structure without material.

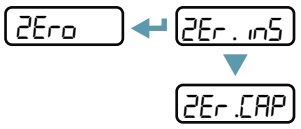


Figure 4-2. Zero Scale Menu

Parameter	Description	Default
ZEr.inS	Zero scale insertion: Direct insertion of dead load in mV/V.	**0** 0.1-9.99999
ZEr.CAP	Zero scale capture: Acquisition of dead load value. Belt must be empty and stationary. The stored value is the average value of 2 sec load cell signal sampling time. ***NOTE: Dynamic Zero is still needed to perform a calibration procedure (see Section 4.4.1 on page 26).***	**Belt: 200 kg** **Bulk: 20 kg** 0-999999

Table 4-2. Zero Scale Parameters

4.3 Load Cell Filter

Available Values	ADC Rate [Hz]				Win	Avg	Pit
	1 Channel	2 Channels	3 Channels	4 Channels			
F 1	5	3	3	3	32	16	0
F 2	10	5	5	5	32	16	0
F 3 (default)	20	10	10	10	12	4	0
F 4	40	19	17	17	10	8	0
F 5	80	34	30	30	16	8	0
F 6	160	59	46	46	24	16	2
F 7	325	91	103	103	24	8	0
F 8	650	205	0	0	32	16	0
F 9	1300	0	0	0	32	16	0
F 10	2600	0	0	0	32	16	0
Custom							

Table 4-3. Load Cell Filter Channel Values

Available Values	ADC Rate [Hz]	Win	Avg	Pit
F 1	6.5	32	16	0
F 2	12	32	16	0
F 3 (default)	25	12	4	0
F 4	50	10	8	0
F 5	100	16	8	0
F 6	200	24	16	2
F 7	400	24	8	0
F 8	800	32	16	0
F 9	1600	32	16	0
F 10	2400	32	16	0
F 11	4800	32	16	0
Custom				

Table 4-4. Load Cell Filter Values

4.4 Test Weight Calibration

Not visible in bulkslide mode.

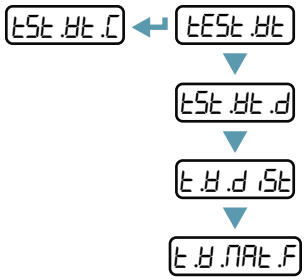


Figure 4-3. Test Weight Calibration Menu

Parameter	Description	Default
tESt .Wt	Test weight: Test weight used to calculate correction factor. • Metric: 0.01 kg resolution • US: 0.01 lb resolution	**0** 0-9999.99
tSt .Wt .d	Test weight delay: Interval time delay to allow the test mass to be positioned before the test weight procedure begins. If the value is 0 or no test weight output is configured, press any key to initiate a test weight procedure.	**0** 0-6553.5
t .W .d .St	Test weight distance: Not visible if the encoder is disabled. • Metric: 0.01 m resolution • US: 0.01 ft resolution	**0** 0-655.35
t .W .t .mE	Test weight time (in seconds): Not visible if the encoder is enabled.	**0** 0-6553.5
t .W .mAt .F	Test weight material factor:	**1** 0-9.999999

Table 4-5. Test Weight Calibration Parameters

4.4.1 Bulkslide Calibration Procedure

At a minimum, the following settings must be configured to the Bulkslide specifications before performing a calibration.

Initial Settings

- Select Metric or US
- Select Bulkslide

Calibration Parameters

- Capture Static Zero by entering or capturing Zero mV value (see Section 4.2 on page 24).
- Configure Loadcell Capacity
- Configure Loadcell Sensitivity

Save and Exit

- Press the **POWER** key to exit top level menu. Indicator prompts SAVEP
- Press the **PRINT** key to save changes.

Follow the instructions below to perform a Bulkslide calibration procedure:

1. Press and hold the **PRINT** key to access the User menu. ZEr .CAP displays.
2. Press the **PRINT** key to begin Dynamic Zero Capture with zero load. WAIt displays. When complete, the indicator automatically switches to normal operating mode and adjusts any displayed load to zero.
3. Press and hold the **PRINT** key to re-access the User menu.
4. Press the **TARE** key to scroll up to Clear Partial Total.
5. Press the **PRINT** key to enter Clear Partial Total.
6. Confirm with the **PRINT** key.
7. Perform at least three runs of the same amount of material through the Bulkslide (using the Partial Total to ensure repeatability).
8. Clear the Partial Total after each run using Step 3 through Step 6.
9. Record the weight of the material used in Step 7 by either pre-weighing or post-weighing it on a static scale.
10. Record the Partial Total Value from the SCT-4XD Partial Total.
11. Press and hold the **PRINT** key from normal operating mode to access the User menu.
12. Press the **TARE** key to scroll up to Correction Factor.
13. Press the **PRINT** key to enter Correction Factor.
14. Use one of the methods below to calculate the New Correction Factor:
    - Automatic Method: Use the do5 .CAL feature to enter the Partial Total and the Real Weight value. do5 .CAL will calculate and update the New Correction Factor automatically.
    - Manual Method: Calculate the New Correction Factor using the following equation.

      New Correction Factor = (Actual Weight of Material/Displayed Weight of Material) x previous Correction Factor
15. Use the **MODE** key to select the digit to change.
16. Use the **ZERO** and **TARE** keys to modify the selected digit.
17. Press the **PRINT** key to save the New Correction Factor.

4.4.2 Belt Scale Calibration Procedure

At a minimum, the following settings must be configured to the weigh frame and conveyor specifications before performing a calibration:

Initial Settings

- Select Metric or US

General Parameters

- Configure Encoder if present

Belt Parameters

- Enable Encoder if present
- Configure Encoder pulse length if encoder is used (see Section 1.4.2 on page 10)
- Configure Fixed Belt Speed if no encoder is used

Calibration Parameters

- Configure the number of loadcell channels
- Capture Static Zero by entering or capturing Zero mV value (see Section 4.2 on page 24)
- Configure Weigh Length (see Section 1.4.1 on page 8)
- Configure Loadcell Capacity
- Configure Loadcell sensitivity
- Configure Belt Length if encoder is used
- Configure Belt Zero Time if encoder is not used

- Under Test Weight Calibration:
    - Configure Test Weight Value
    - Configure Test Distance if encoder is used
    - Configure Test time if encoder is not used

Save and Exit

- Press the **POWER** key to exit top level menu. Indicator prompts SAVE?
- Press the **PRINT** key to save changes.

Follow the instructions below to perform a belt scale calibration procedure:

1. Press and hold the **PRINT** key to access the User menu. *ZEr.CAP* displays.
2. Press **PRINT** key to begin Dynamic Zero Capture with zero load. *WAIT* displays. When completed, the indicator automatically switches to normal operating mode and adjusts any displayed belt load to zero.
3. Press and hold the **PRINT** key to re-access the User menu.
4. Press the **TARE** key to scroll up to Test Weight Procedure.
5. Apply test weights to the scale.
6. With the belt running, press the **PRINT** key to begin the Test Weight Procedure. Configured test weight value displays.
7. If a temporary test weight change is required, use the **MODE** key to select the digit to change.
8. Use the **ZERO** and **TARE** keys to modify the selected digit.
9. Press the **PRINT** key to save the test weight value. Test Weight Capture initiates.
10. Indicator flashes the stability LED to indicate calibration process is running.
11. Indicator completes the Test Weight Capture, displays *Factor* briefly, and then displays the new calibrated correction factor.
12. Press the **PRINT** key. Indicator prompts MOd iFY?
13. Press the **PRINT** key to accept the new correction factor or the **POWER** key to discard the new correction factor.

4.4.3 Test Weight Procedure by Digital Input

Since there is no interaction with the user, a configured test weight is used to save a new correction factor. With encoder, the procedure lasts the amount of time required to run the belt for the inserted test distance. Without encoder, the procedure lasts for the inserted test time.

4.4.4 Calibration Equations

NOTE: Calibration is based on the Totalizer value, not on moment belt load.

- With encoder: calcon = Test weight / Weigh length * Test distance * Material factor
- Without encoder: calcon = Test weight / Weigh length * (TestTime * speed) * Material factor New correction factor= calcon / (Totalized quantity) * (old correction factor)
- Displayed error (procedure by function code) is in percentage: error = ((Totalized quantity) – calcon) / calcon * 100

4.4.5 New Correction Factor Equation

New Correction Factor = (Actual Weight of Material/Displayed Weight of Material) x previous Correction Factor

5.0 Operation

5.1 User Menu

Hold the **PRINT** key to access the user menu functions.

Item	Function
ZEr .CAP	Zero cell acquisition
F.r .d .b.	Show flow-rate in dead band
PuLSE .W	Pulse weight
doS .CAL	Correction factor computation confirming/inserting partial total and real total
Cor .FAC	Modify correction factor
F.r .Corr	(Not Used)
FACtor	Modify belt factor (on ModiF? message press ZERO key to calculate belt factor, press ENTER key to change the factor)
CLr .P.t.	Clear partial total. Ask confirm with message 0.P.t.? Num dosages in increased.
CLr .G.t.	Clear general total. Ask confirm with message 0.G.t.? Num dosages is cleared.
tSt .W .Pr	Test weight procedure (*)
CLoCK	Set date/time. Visible if clock board is recognized.
(*) Asks for test weight then procedure starts. While test is running, the motion LED flashes.	

Table 5-1. User Menu Functions

5.2 Zero Belt Procedure

1. Press and hold the **ZERO** key to zero the belt from Normal Operation mode. Confirmation prompt displays (ZEro .bP).
2. Press the **PRINT** key to begin Zero Belt Procedure or the **POWER** key to cancel. The Zero LED will flash when performing the Zero Belt Procedure.

5.3 Run Input

Use Run Input for operations that should avoid totalizing unless the belt or conveyance equipment is running. To use this feature, the belt or conveyance controller needs to close a relay when running. If either input is configured to Run, the Operating logic is:

- Input Off - Flow Rate reads as Zero and Totalizing does not occur.
- Input On - Flow Rate reads according to the live Load and Totalizing occurs.

5.4 Available LED Data

On start-up, flow-rate data is displayed. Press the **MODE** key to display the following data:

Item	Description
FLoW.r	Flow-rate
LoAd	Load
SPEEd	Active encoder speed in 0.01 m/s (0.1 ft/min)
P.totAL	Partial total
G.totAL	General total

Table 5-2. Available LED Data

5.5 Alarm Settings

Figure 5-1. Alarm Settings Menu

Parameter	Description	Default
oFF.trK	Belt off track: A digital input must be configured with the off track function to use this alarm.	
	• Error enabled	**NO**, YES
	• Alarm delay: Alarm starts after set time beginning when the alarm condition started.	**0** 6553.5
	• Lock delay: Instrument enters locked state after set time since the alarm condition started. If value is set to zero, unit will never enter locked state.	**0** 65535.5
oUEr.Ld	Flow overload error	
	• Error enabled	**NO**, YES
	• Alarm delay	**0** 0-6553.5
	• Lock delay: Instrument enters locked state after set time since the alarm condition started. If value is set to zero, unit will never enter locked state.	**0** 0-65535.5
	• Flow overload % (r.F.oL)	**0** 0-99.9

Table 5-3. Alarm Setting Parameter

Parameter	Description	Default
FLoW .r	Flow rate error	
	• Error enabled	**NO**, YES
	• Alarm delay: Alarm starts after set time beginning when the alarm condition started.	**0** 0-6553.5
	• Lock delay: Instrument enters locked state after set time since the alarm condition started. If value is set to zero, unit will never enter locked state.	**0** 0-65535.5
	• Minimum flow-rate (Mın .F .r): The unit and decimals depend on the selected unit system and flow-rate resolution.	**0** 0-65535
	• Maximum flow-rate (MAH .F .r): The unit and decimals depend on the selected unit system and flow-rate resolution.	**0** 0-65535
WE ıght	Under/over-weight error	
	• Error enabled	**NO**, YES
	• Alarm delay: Alarm starts after set time beginning when the alarm condition started.	**0** 0-6553.5
	• Lock delay: Instrument enters locked state after set time since the alarm condition started. If value is set to zero, unit will never enter locked state.	**0** 0-65535.5
	• Minimum weight on load reciver (Mın .WE ı): Unit depends on the selected unit system (metric kg or US lb)	**0** 0-999999
	• Maximum weight on load receiver (MAH .WE ı): Unit depends on the selected unit system (metric kg or US lb)	**0** 0-999999
EHtErn	External alarm error: A digital input must be configured with the extern alarm function to use this alarm.	
	• Error enabled	**NO**, YES
	• Alarm delay: Alarm starts after set time beginning when the alarm condition started.	**0** 0-6553.5
	• Lock delay: Instrument enters locked state after set time since the alarm condition started. If value is set to zero, unit will never enter locked state.	**0** 0-65535.5
LC .oUEr	Load cell overload: Alarms when the weight on the load cell exceeds load cell capacity by 9 divisions.	

Table 5-3. Alarm Setting Parameter (Continued)

5.6 Diagnostics

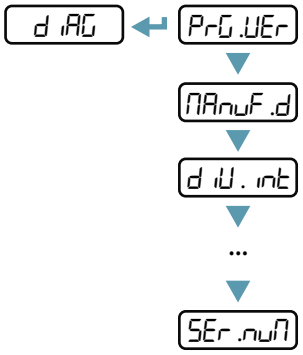


Figure 5-2. Diagnostics Menu

Parameter	Description
PrG.UEr	Program version: Displays application software release
MAnuF.d	Manufacture data: Displays internal library
diU.int	Division interval: The number of ADC counts per scale division. This determins the quality of the signal. The higher the value, the higher the signal interval per division
AdC.uU	Live A/D millivolt reading
AdC.Cnt	Live A/D counts
UE iGHt	Live scale weight
CAL.PtS	Calibration points: Displays calibration points, sample weights and ADC counts
diSPLA	Display: Tests all LED segments to verify functionality.
KEYb.	Key buttons: Tests all key inputs to verify functionality.
outPut	Outputs: Allows operator to select and activate each output to verify functionality.
inPutS	Inputs: Shows each input state to verify functionality.
SEr.nuM	Serial number

Table 5-4. Diagnostic Parameters

6.0 Communications

6.1 Serial Settings for 1280 Connection

- CoNNun. / SEr iAL / PC SEL = 485
- CoNNun. / SEr iAL / CoM.PC / PCNodE = Nodbus > Nod.Add: 1
- CoNNun. / SEr iAL / CoM.PC / bAud = 9600
- CoNNun. / SEr iAL / CoM.PC / PAr itY = None
- CoNNun. / SEr iAL / CoM.PC / b it = 8
- CoNNun. / SEr iAL / CoM.PC / StoP = 1

6.2 Analog Outputs

More repeater indicators are required to add analog outputs.

- To have analog outputs on flow, use the Cnt.FL.r protocol on an available serial port.
- To have analog outputs on load, use the Cnt.Lod protocol on an available serial port.
- To have analog outputs on speed, use the Cnt.SPd protocol on an available serial port.
- To have analog outputs on different data, use the ALL.CHt protocol on an available serial port.

Configure the following on the repeater when flow, load or speed data is transmitted by the belt indicator:

- F.NOdE / FunC = rEPE
- SEtuP / SEr iAL / PCSEL = 232 or 485 depending on the connection between the repeater and belt indicator
- SEtuP / SEr iAL / COM.PC
    - PCNOdE = U.rEPE
    - tErM = 10 (ASCII code of LF character)
    - UE i.PoS = 0
    - UE i.LEn = 8
    - Str.LEn = 13
    - dEc i = StrEAM
    - StAb and StA. int = 0 (they are used to stabilize LED)
    - trShLd = SEttr.Lo and tr.h i as lower and upper bounds for the repeated data and have under/over-load displayed as all lower/upper hyphens
    - AdJ.CEd = all values of the sub-menus can be left at 0
- SEtuP / An.Out
    - CAPAC = maximum value of the repeated data without decimals
    - NOdE = Ao YES
    - AoNAH = maximum analog output (related to CAPAC)
    - Ao2Er = analog output when repeated data is zero
    - AoN in = analog output lower bound
    - S iGn = PoS it
- Changes in U.rEPE settings only, example to repeat speed 1:
    - tErM = 10
    - UE i.PoS = 81
    - UE i.LEn = 8
    - Str.LEn = 135
    - dEc i = Stream

6.3 PC Port Modes

Item	Description	Sent data
cnt.FLr	Continuous flow-rate	20.0 t/h CR LF
cnt.Lod (1)	Continuous load	15.000 kg/m CR LF
cnt.SPd(2)	Continuous speed	1.26 m/s CR LF
ALL.EHt(1)(2)	Continuous µV channels, flow-rate, load, speed, totals	(*)
rEPE.6	Repeater 6	
ondE	On demand	
485	On demand with ID	
Modbus	Modbus RTU communication	
FLd.bus CdGtYHJ	Fieldbus communication (slim Fieldbus module required)	
(1) Load resolution depends on Ld.rES parameter (2) In US, unit speed has 1 decimal and unit is ft/m		

Table 6-1. PC Port Modes

(*) ALL.EXt sent data (in gray character locations):

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
C	H	4	,						2	5	2	u	V	,						2	5	1	u	V	,						2	5	3
34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67
u	V	,						2	4	9	u	V	,	F	R				9	0	.	5	8		t	/	h	,	L	D			
68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101
5	.	0	3	2	k	g	/		m	,	S	1					5	.	0	0		m	/	s	,	S	2					0	.
102	103	104	105	106	407	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135
0	0		m	/	s	,	P	T				5	2	.	4	8		t	,	G	T			7	8	4	.	9	2		t	CR	LF

NOTE: RALL command answer = same as ALL.EHt sent data.
If there are less than 4 channels configured, µV data of non-configured channels are sent with value of zero.

6.4 PRN Port Modes

Item	Description	Sent data
Pr-no	Do nothing	
tPr	To print on TPR printer	Now prints gross, tare, net.
cnt.FLr	Continuous flow-rate	20.0 t/h CR LF
cnt.Lod	Continuous load	15.000 kg/m CR LF
cnt.SPd	Continuous speed	1.26 m/s CR LF
ALL.EHt	Continuous µV channels, flow-rate, load, speed, totals	Same as PC port
rEPE.6	Repeater 6	

Table 6-2. PRN Port Modes

6.5 USB Communication

Item	Description	Sent data													
cnt.FL.r	Continuous flow-rate					2	0	.	0		t	/	h	CR	LF
cnt.Lod	Continuous load		1	5	.	0	0	0	k	g	/		m	CR	LF
cnt.SPd	Continuous speed					1	.	2	6		m	/	s	CR	LF
ALL.EHt	Continuous µV channels, flow-rate, load, speed, totals														
ondE	On demand														
485	On demand with ID														
Modbus	Modbus RTU communication														

Table 6-3. USB Communication

7.0 Fieldbus

7.1 Enable Protocol

To enable a bus, set:

- Serial
  - CONNun / SEr iAL / PCSEL = 485
  - CoM.Pc / PCMOdE = FLd.buS
    - buS.tYPE = selected bus, then insert bus parameters
    - t iM.OUt = allows to enable/disable continuous visualization of bus master time out
    - bAUd = set the communication baud-rate (use a baud less than 38400)
    - PAr itY = None
    - Word = 8
    - StoPb. = 1 bit

7.2 Fieldbus Parameters

Fieldbus	Parameters
Profibus	• Node.Id (0-126): node ID
Ethernet/IP, Profinet, Modbus TCP	• Aut.cfg: auto IP configuration (no/yes) • IP.Add: IP address • Net.msk: Subnet mask • Gat.way: Gateway
CANopen	• Nod.add (1-127): node address • Baud.r: baud-rate, values: 1MB, 800kB, 500kB, 250kB, 125kB, 100kB, 50kB, 20kB, 10kB
DeviceNet	• Mac.id (0-63): MAC ID • Baud.r: baud-rate, values: 500kB, 250kB, 125kB

Table 7-1. Fieldbus Parameters

7.3 Input Data

Register	Data
30001	Command Status Register (MSB), Current page (LSB)
30002	Belt Status Register
30003	Belt load (MSW) kg/m or lb/ft with 3 decimals.
30004	Belt load (LSW)
30005	Flow-rate
30006	Always zero
30007	Analog output percentage. 2 decimals.
30008	Partial Total (W2)
30009	Partial Total (W1)
30010	Partial Total (W0)
30011	General Total (W2)
30012	General Total (W1)
30013	General Total (W0)
30014	Input Status Register
30015	Output Status Register
30016	Other data

Table 7-2. Input Registers 30001 - 30016

7.4 Output Data

Register	Data
40001	Command Status Register (MSB), Current page (LSB)
40002	Belt Status Register
40003	Belt load (MSW) kg/m or lb/ft with 3 decimals.
40004	Belt load (LSW)
40005	Flow-rate
40006	Always zero
40007	Analog output percentage. 2 decimals.
40008	Partial Total (W2)
40009	Partial Total (W1)
40010	Partial Total (W0)
40011	General Total (W2)
40012	General Total (W1)
40013	General Total (W0)
40014	Input Status Register
40015	Output Status Register
40016	Other data

Table 7-3. Holding Registers 40001 - 40016

NOTE: The only difference is in the Command Register. When the external Fieldbus module is connected through a 485 line, the higher byte is set to 1 and the lower byte is written with the command sent to the device.

7.5 Fieldbus Files

	Profibus	Ethernet/IP	Profinet
File Type	GSD	EDS	GSDML
File Name	GSD.V.2.gsd	DINI NIC 52-RE EIS V1.1.EDS	GSDML-V2.33-DINI V1.5-NIC 5X-RE PNS-20180206.xml
Device Name	DINIPB	DINI NIC 52-RE/EIS	dini.xxx
Mnft ID	0DE1	283	011E
Product ID	--	0x11E (283)	010°
Modules	IN/OUT: 32 Byte (32 word)	• Input (T➔O) • Output (O➔T) T = target O = originator	• 64byteinput • 64byteoutput
Qty	1	1	2
Description	32 input bytes + 32 output bytes	• 128 byte input area module • 128 byte output area module	• 64 byte module for the input area • 64 byte module for the output area

Table 7-4. Fieldbus File Information

	EtherCAT	CANopen	DeviceNET
File Type	ESI	EDS	EDS
File Name	Dini NIC 52-RE ECS V4.2.X.xml	DINI NIC 50-COS.eds	DINI-NIC 50-DNS.EDS
Device Name	DINI NIC 52-RE/ECS	DINI NIC 50-COS	DINI Slim-DeviceNet NIC 50-DNS
Mnft ID	0xE0000044	0x00000044	283
Product ID	0x00000033	1541540	35
Modules	• Input • Output	• Input • Output	• Input (Production) • Output (Consumption)
Qty	1	64	1
Description	• 200 byte module for the input area • 200 byte module for the output area	• 8 bytes modules for the input area (TXPDU). Min. 4 TXPDU (32 byte) • 8 bytes module for the output area (RXPDU). Min. 4 RXPDU (32 byte)	• 128 byte module for the input area • 32 byte module for the output area

Table 7-5. Fieldbus File Information

7.6 Messages

7.6.1 Profibus

Message	Meaning
Pb.in1	Displays on startup
Pb.OK	Initialization is successful
Pb.Err	Initialization is unsuccessful
Pb.COnn	Master device connected
Pb.d1SC	Master device disconnected

Table 7-6. Profibus Messages

7.6.2 Other Fieldbus

Message	Meaning
FbuS.Er	Displays when no connection is established after 30 sec from startup or after 3 sec since last received from module
FrHH.YY	Firmware version of the module hub
Fb.Conn	Initialized connection between module and scale
Fb.OK	Master Fieldbus connected
Fb.d isC	Master Fieldbus disconnected (time out error display disabled)
F.b.ErrCodE	Error state (see Table 7-8 on page 39)

Table 7-7. Messages for Other Fieldbus

7.6.3 Error Codes

Code	Meaning
1000	Fatal error in hub module
1001	Inconsistency between protocol type selected and the protocol type managed by the fieldbus module
1-18	Other fatal error in Fieldbus module
000001 and following	Unrecoverable error in Fieldbus module
000140	General network error
000141	Connection closed
000142	Time-out connection
000143	Isolated network
000144	Duplicated node
000145	Network cable disconnected
600078	Modbus TCP: Server closed the connection since no data was sent for more than 30 sec

Table 7-8. Error Codes

7.7 Ethernet Configuration

Setup the following items in CONNun / EtH.CFG :

- iP.tYPE (IP address type): select Static or Dynamic
- iP.Addr (IP address, only visible if static IP is selected): IP address configuration
- nEt.MSK (Subnet Mask, only visible if static IP is selected): subnet mask configuration
- EtH.COM (Com Port): choose a port connected to the module (232 or 485)
- SEnd.CF (Send Configuration): send configuration to the module and save

7.8 Symbols

All data is expressed in big-endian order.

Symbol	Meaning
MSW	Most significant word
LSW	Least significant word
Wx	Word rank in a multi-word string Example W2, W1, W0: W2 is the MSW, W0 is the LSW
MSB	Most significant byte
LSB	Least significant byte

Table 7-9. Symbol Meanings

7.9 Input Registers

Register	Data
30001	Command Status Register (MSB), Current page (LSB)
30002	Belt Status Register
30003	Belt load (MSW) kg/m or lb/ft with 3 decimals.
30004	Belt load (LSW)
30005	Flow-rate
30006	Always zero
30007	Analog output percentage. 2 decimals.
30008	Partial Total (W2)
30009	Partial Total (W1)
30010	Partial Total (W0)
30011	General Total (W2)
30012	General Total (W1)
30013	General Total (W0)
30014	Input Status Register
30015	Output Status Register
30016	Other data

Table 7-10. Input Registers (Page 0)

Register	Data
30001	Command Status Register (MSB), Current page (LSB)
30002	Target flow-rate (unit/decimals as in 3.3.2 - Flow-rate resolution)
30003	Scale capacity (MSW)
30004	Scale capacity (LSW) (unit as in 3.1.1 -Unit system, 3 decimals)
30005	Max flow-rate (unit/decimals)
30006	Min flow-rate (unit/decimals), dead band flow-rate
30007	Dosage time (MSW)
30008	Dosage time (LSW) (as set with function 307, 1/100 sec)
30009	Target batch weight (W2)
30010	Target batch weight (W1)
30011	Target batch weight (W0) (unit/decimals)
30012	Digital output function
30013	Digital output ON value (MSW)
30014	Digital output ON value (LSW)
30015	Digital output OFF value (MSW)
30016	Digital output OFF value (LSW)

Table 7-11. Input Registers (Page 1)

Register	Data
30001	Command Status Register (MSB), Current page (LSB)
30002	PID Kp (integer value with 2 decimals)
30003	PID Ki (integer value with 2 decimals)
30004	PID Kd (integer value with 2 decimals)
30005	PID action interval time (integer value in seconds with 1 decimal)
30006	Pulse weight (MSW)
30007	Pulse weight (LSW) (Rel. 3.07)
30008	
30009	
30010	
30011	
30012	
30013	
30014	
30015	
30016	

Table 7-12. Input Registers (Page 2)

Register	Data
30001	Command Status Register (MSB), Current page (LSB)
30002	Belt Status Register
30003	Belt load (MSW). Kg/m or lb/ft with Ld.Res decimals.
30004	Belt load (LSW).
30005	Flow-rate
30006	Speed encoder 2 (0.01m/s or 0.1ft/min) – CPWE Belt here has PID value
30007	Analog output percentage (2 decimals)
30008	Partial Total (W1)
30009	Partial Total (W0)
30010	General Total (W1)
30011	General Total (W0)
30012	Speed encoder 1 (0.01m/s or 0.1ft/min). Fixed speed if no encoder is used
30013	Inclination. ° with 1 decimal
30014	Input Status Register
30015	Output Status Register
30016	Other data

Table 7-13. Input Registers (Page 3)

Register	Data
30001	Command Status Register (MSB), Current page (LSB)
30002	Selected article index (65535, FFFF hex, if no article selected)
30003	PID start percentage value (2 decimals)
30004	Target flow-rate (setup decimals)
30005	Weight to dose (W1)
30006	Weight to dose (W0) (setup totals decimal and unit)
30007	Correction factor (W1)
30008	Correction factor (W0) (integer with 6 decimals)
30009	Total dosed weight (W1)
30010	Total dosed weight (W0) (setup totals decimal and unit)
30011	Total number of batchings (W1)
30012	Total number of batchings (W0)
30013	
30014	
30015	
30016	

Table 7-14. Input Registers (Page 4)

Register	Data
30001	Command Status Register (MSB), Current page (LSB)
30002	µV channel 1
30003	µV channel 2
30004	µV channel 3
30005	µV channel 4
30006	µV sum
30007	µV average
30008	Calibration status (Test weight procedure status)
30009	Calibration total (Totalized in the procedure, in totals resolution)
30010	Calibration error (0.01%)
30011	New correction factor (calculated at the end of the test procedure) (H)
30012	New correction factor (L)
30013	Percentage progress value for zero calibration
30014	Percentage progress value for test weight procedure
30015	
30016	

Table 7-15. Input Registers (Page 5)

Register	Data
30001	Command Status Register (MSB), Current page (LSB)
30002	Unit system (0: metrix, 1: US)
30003	Operative mode (0: belt, 1: bulkslide)
30004	Pulse weight (H)
30005	Pulse weight (L) (totals resolution)
30006	Pulse time width (0.1 sec)
30007	Bulkslide air purge interval (min)
30008	Bulkslide air purge time (sec)
30009	Bulkslide air purge max flow (unit, decimals flow-rate)
30010	Bulkslide air purge delay (sec)
30011	Analog output function (0: flow, 1: load, 2: speed)
30012	Analog output mode (0: 4-20mA, 1: 0-20mA, 2:2-10V, 3: 0-10V)
30013	Analog output min DAC value
30014	Analog output max DAC value
30015	Analog output manual belt speed (DAC)
30016	Load decimals (0÷3)

Table 7-16. Input Registers (Page 6) - Set with Command 24 (18hex)

Register	Data
30001	Command Status Register (MSB), Current page (LSB)
30002	Input 1 function
30003	Input 2 function
30004	Output 1 function
30005	Output 1 NO/NC (0: NO, 1: NC)
30006	Output 2 function
30007	Output 2 NO/NC
30008	Output 3 function (DGT1SX)
30009	Output 3 NO/NC (DGT1SX)
30010	Output 4 function (DGT1SX)
30011	Output 4 NO/NC (DGT1SX)
30012	
30013	
30014	
30015	
30016	

Table 7-17. Input Registers (Page 7) - Set with Command 25 (19hex)

Register	Data
30001	Command Status Register (MSB), Current page (LSB)
30002	Totals resolution
30003	Flow-rate resolution
30004	Max flow-rate (in flow-rate resolution)
30005	Max load (kg/m or lb/ft)
30006	Encoder 1 enable (0: disabled, 1: enabled)
30007	Length per pulse encoder 1 (0.01mm or 0.0001in)
30008	Encoder 2 enable
30009	Length per pulse encoder 2
30010	Fixed speed (0.01m/s, 0.1ft/min)
30011	Max belt speed (0.01m/s, 0.1ft/min)
30012	Encoders speed difference
30013	Dead band % (0.1%)
30014	Show flow-rate in dead band (0: no, 1: yes)
30015	Totalize with negative flow-rate (0: no, 1: yes)
30016	Store totals (b15=0: no, b15=1: yes). b14-b0: max flow % to store totals (0.1%)

Table 7-18. Input Registers (Page 8) - Set with Command 26 (1Ahex)

Register	Data
30001	Command Status Register (MSB), Current page (LSB)
30002	Flow-rate filter time (sec)
30003	Flow-rate filter Win
30004	Flow-rate filter Avg
30005	Flow-rate filter Pit
30006	Load cell filter index
30007	Load cell filter rate
30008	Load cell filter Win
30009	Load cell filter Avg
30010	Load cell filter Pit
30011	
30012	
30013	
30014	
30015	
30016	

Table 7-19. Input Registers (Page 9) - Set with Command 27 (1Bhex)

Register	Data
30001	Command Status Register (MSB), Current page (LSB)
30002	Number of channels
30003	Load cell capacity (H)
30004	Load cell capacity (L) (0.001 kg/lb)
30005	Load cell sensitivity (H)
30006	Load cell sensitivity (L) (0.00001mV/V)
30007	Load cell zero mV/V (H)
30008	Load cell zero mV/V (L) (0.00001mV/V)
30009	Weigh length (mm, 0.01in)
30010	Pivot to load cell distance (mm, 0.01in)
30011	Pivot to idler distance (mm, 0.01in)
30012	Serial inclinometer
30013	Belt angle (0.1°)
30014	Correction factor (H)
30015	Correction factor (L) (0.000001)
30016	Zero belt time (0.01s)

Table 7-20. Input Registers (Page 10) - Set with Command 28 (1Chex)

Register	Data
30001	Command Status Register (MSB), Current page (LSB)
30002	Belt length (0.1 m/ft)
30003	Zero revolutions
30004	Zero range % (0.1%)
30005	Auto zero range % (0.1%)
30006	Auto zero limit % (0.1%)
30007	Test weight (H)
30008	Test weight (L) (0.01 kg/lb)
30009	Test weight delay (0.1s)
30010	Test weight distance (0.01 m/ft)
30011	Test weight time (0.1s)
30012	Test weight material factor (H)
30013	Test weight material factor (L) (0.000001)
30014	
30015	
30016	

Table 7-21. Input Registers (Page 11) - Set with Command 29 (1Dhex)

Register	Data
30001	Command Status Register (MSB), Current page (LSB)
30002	Error off-track enable
30003	Error off-track alarm time (0.1s)
30004	Error off-track lock time (0.1s)
30005	Error overload flow-rate enable
30006	Error overload flow-rate alarm time (0.1s)
30007	Error overload flow-rate lock time (0.1s)
30008	Overflow flow-rate % (0.1%)
30009	Error flow-rate enable
30010	Error flow-rate alarm time (0.1s)
30011	Error flow-rate lock time (0.1s)
30012	Min flow-rate (flow resolution)
30013	Max flow-rate (flow resolution)
30014	
30015	
30016	

Table 7-22. Input Registers (Page 12) - Set with Command 30 (1Ehex)

Register	Data
30001	Command Status Register (MSB), Current page (LSB)
30002	Error weight enable
30003	Error weight alarm time (0.1s)
30004	Error weight lock time (0.1s)
30005	Min weight (H)
30006	Min weight (L) (kg or lb)
30007	Max weight (H)
30008	Max weight (L) (kg or lb)
30009	Error external enable
30010	Error external alarm time (0.1s)
30011	Error external lock time (0.1s)
30012	Error load cell over-load enable
30013	Error load cell over-load alarm time (0.1s)
30014	Error load cell over-load lock time (0.1s)
30015	
30016	

Table 7-23. Input Registers (Page 13) - Set with Command 31 (1Fhex)

7.9.1 Command Status Register

B15-B12	B11-B8	B7-B0
Command Result	Number of executed commands	Current page
Result value	**Description**	
0	OK	
1	Not allowed command	
2	Wrong command data	
3	Unknown command	

Table 7-24. Command Status Registers

7.9.2 Belt Status Register

B15-B12	B11-B8	B7-B0
Belt State	Operation mode	Error code

Table 7-25. Belt Status Registers

7.9.2.1 Belt State

Value	State
0	ALARM
1	MANUAL (Input ON/OFF open)
2	WAIT (Input ENABLE closed)
3	PAUSE
4	(Unused)
5	RUN
6	START (batch start phase)
7	END BATCH (batch end phase)
8	LOCK
9	ZERO BELT underway
10	TEST WEIGHT procedure underway

Table 7-26. Belt State Values

7.9.2.2 Operation Mode

Value	Mode
0	Reader (PID not enabled)
1	Controller (PID enabled)

Table 7-27. Operation Mode Values

7.9.2.3 Error Codes

Value	Description	Enable Setup Item
0	NO ERROR	
1	OFF TRACK ALARM	OFF .trA
2	MIN FLOW RATE ALARM	FLOW .r.
3	MAX FLOW RATE ALARM	FLOW .r.
4	ZERO FLOW RATE	Set if no alarm is active, add total is enabled and flow is zero
5	WEIGHT ALARM	WE IGht
6	OFF TRACK LOCK	OFF .trA
7	MIN FLOW RATE LOCK	FLOW .r.
8	MAX FLOW RATE LOCK	FLOW .r.
9	DOSAGE WEIGHT LOCK	Not used
10	LOCK due to input ON/OFF or ENABLE open	Set for 1 second, then Belt state is changed to 1
11	WEIGHT LOCK	WE IGht
12	EXTERNAL ALARM	EHtErn
13	EXTERNAL ALARM LOCK	EHtErn
14	FLOW RATE LOCK	OVEr .Ld
15	LOAD CELL OVERLOAD ALARM	LC .OVEr
16	LOAD CELL OVERLOAD LOCK	LC .OVEr
17	FLOW RATE ALARM	OVEr .Ld

Table 7-28. Error Codes

Alarm Priority	Alarm
1	OFF .trA
2	WE IGht
3	FLOW .r
4	EHtErn
5	OVEr .Ld
6	LC .OVEr

Table 7-29. Alarm Priorities

7.9.3 Flow-Rate

Value with decimals and unit as set in flow-rate resolution (see Table 3-10 on page 20).

7.9.4 Analog Output Percentage

Integer with 1 decimal. Percentage of (Max value – Zero value).

7.9.5 Partial and general totals

Value with decimals and unit as set in total resolution (see Table 3-10 on page 20).

7.9.6 Input Status Register

Bit	Description	Bit meaning 01	
(LSB)			
0	Load Polarity	+	--
1	Weight stability	Unstable weight	Stable weight
2	Underload Condition	NO	YES
3	Overload Condition	NO	YES
4	Flow zero range	Out of zero range	In zero range
5	Totals unit of measure (lsb)		
6	Totals unit of measure (msb)		
7	Hourly Flow Polarity	+	--
(MSB)			
8	Flow-rate unit of measure (lsb)		
9	Flow-rate unit of measure (msb)		
10	Status of input IN 1	disabled	enabled
11	Status of input IN 2	disabled	enabled
12			
13			
14			
15			

Table 7-30. Input Status Registers

7.9.6.1 Totals Unit of Measure

Value	Unit
1	kg
2	t (tn in US system)
3	lb

Table 7-31. Totals Unit of Measure

7.9.6.2 Flow-rate unit of measure

Value	Unit
1	kg/h
2	t/h (tn/h in US system)
3	lb/h

Table 7-32. Flow-rate Unit of Measure

7.9.7 Output Status Register

Bit	Description	Bit Meaning 0	Bit Meaning 1
0	Digital Output 1 State	disabled	enabled
1	Digital Output 2 State	disabled	enabled
2	Digital Output 3 State (DGT1SX)	disabled	enabled
3	Digital Output 4 State (DGT1SX)	disabled	enabled
4			
5			
6			
7			

Table 7-33. Output Status Register - LSB

Bit	Description	Bit Meaning 0	Bit Meaning 1
8	Ch 1 error	NO	SI
9	Ch 2 error	NO	SI
10	Ch 3 error	NO	SI
11	Ch 4 error	NO	SI
12	Ch global error	NO	SI
13			
14			
15			

Table 7-34. Output Status Register - MSB

7.9.8 Other Data

B15-B8	B7-6	B4-5	B0-B3
Number of dosages	Active encoder	Flow-rate decimals	Totals decimal (rel. 3.07)

Table 7-35. Misc Data

- Active encoder is zero when no encoder is enabled.
- Active encoder is 1 if only the first encoder is enabled or if both encoders are enabled and the first one is the working encoder.
- Active encoder is 2 if two encoders are enabled and the second one is the working encoder.

7.9.9 Digital Output Function

B15-B8	B7-B0
Digital Output Index	Digital output function as set in outputs configuration (see Table 3-5 on page 17)

Table 7-36. Digital Output Function

7.9.10 Digital Output ON/OFF Value

Used only with digital output function Pulse weight. On and OFF values are set with the same value. Unit/decimals are as set in total resolution (see Table 3-10 on page 20)

7.9.10.1 Totals Resolution

Value	Resolution
0	0.1 kg (lb)
1	0.2 kg (lb)
2	0.5 kg (lb)
3	1 kg (lb)
4	2 kg (lb)
5	5 kg (lb)
6 (default)	0.01 t (tn)
7	0.02 t (tn)
8	0.05 t (tn)
9	0.1 t (tn)
10	0.2 t (tn)
11	0.5 t (tn)
12	1 t (tn)
13	2 t (tn)
14	5 t (tn)

Table 7-37. Totals Resolutions

7.9.10.2 Flow-Rate Resolution

Value	Resolution
0	1 kg/h (1 lb/h)
1	0.01 t/h (0.01 tn/h)
2 (default)	0.1 t/h (0.1 tn/h)
3	1 t/h (1 tn/h)

Table 7-38. Flow-Rate Resolutions

7.10 Holding Registers

Reading Holding Registers 40001-40016 is the same as reading Input Registers 30001-30016.

Holding Registers writing:

Register	Data
40001	Command Register
40002 and following ones	Used as command parameters

Table 7-39. Holding Registers

7.10.1 Available Commands

Command Value	Command Hex Value	Description
0	0	None
1	1	Not used
2	2	Start (clears PT in STOP status)
3	3	Pause batch/control
4	4	Stop (RUN or ENABLE input enabled)
5	5	Set flow-rate (remote flow percentage if remote setting enable)
6	6	Set dosage weight
7	7	Set dosage time
8	8	Print format
9	9	Reset general total
10	A	Set output (see Section 7.10.2.1 on page 53)
11	B	Store setup (If parameters changed restart indicator, command 34)
12	C	Change digital output index (Page 1 Input Registers) (see Section 7.10.2.2 on page 53)
13	D	Set digital output value (see Section 7.10.2.3 on page 53)
14	E	Change page - Page to set (0 to 2)
15	F	Zero belt function
16	10	Set PID Kp parameter
17	11	Set PID Ki parameter
18	12	Set PID Kd parameter
19	13	Set PID action interval time
20	14	Set digital input (see Section 7.10.2.4 on page 53)
21	15	Select article (from rel. 3.06)
22	16	Reset partial total
23	17	Set pulse weight (double word value) See Table 7-45 on page 53
24	18	Write settings 1 (page 6) (see Section 7.10.2.6 on page 54)
25	19	Write settings 2 (page 7)
26	1A	Write settings 3 (page 8)
27	1B	Write settings 4 (page 9)
28	1C	Write settings 5 (page 10)
29	1D	Write settings 6 (page 11)
30	1E	Write settings 7 (page 12)
31	1F	Write settings 8 (page 13)
32	20	Static zero
33	21	Test weight procedure
34	22	Restart indicator
35	23	Confirm test weight error and store new correction factor
36	24	Decline test weight error
37	25	Set Modbus RTU silence time in mins (5 / 200)

Table 7-40. Available Commands

7.10.2 Commands Parameters

7.10.2.1 Set Output

Register	Data
40002	Digital output setting state bit mask

Table 7-41. Set Output

Bit 0: Set digital output 1 state

...

Bit 15: Set digital output 16 state

Bit value = 0: Digital output OFF

Bit value = 1: Digital output ON

NOTE: Only digital outputs with function set to None can be switched on/off with this command.

7.10.2.2 Change Digital Output Index

Register	Data
40002	Digital output index (1 - 16)

Table 7-42. Change Digital Output Index

7.10.2.3 Set Digital Output Value

Register	Data
40002	Digital output index
40003	ON value (MSW)
40004	ON value (LSW)
40005	OFF value (MSW)
40006	ON value (LSW)

Table 7-43. Set Digital Output Value

7.10.2.4 Set Digital Input

Register	Data
40002	Bitmap of inputs to activate/deactivate • To activate input, set bit to 1 • To deactive input, set bit to 0 B0: digital input 1 B1: digital input 2 B2: digital input 3 B3: digital input 4 B4: digital input 5 B5: digital input 6 B6: digital input 7 B7: digital input 8

Table 7-44. Set Digital Input

7.10.2.5 Set Pulse Weight

Register	Data
40002	Pulse weight (MSW)
40003	Pulse weight (LSW)

Table 7-45. Set Pulse Weight

7.10.2.6 Write Settings

Register	Data
40002	Setting parameters start
…	…
40016	Setting parameters end

Table 7-46. Write Settings

Example with page 6:

Register	Data
40001	24
40002	Unit system (0: metrix, 1: US)
40003	Operative mode (0: belt, 1: bulkslide)
40004	Pulse weight (H)
40005	Pulse weight (L)
40006	Pulse time width (0.1 sec)
40007	Bulkslide air purge interval (min)
40008	Bulkslide air purge time (sec)
40009	Bulkslide air purge max flow (unit, decimals flow-rate)
40010	Bulkslide air purge delay (sec)
40011	Analog output function (0: flow, 1: load, 2: speed)
40012	Analog output mode (0: 4-20mA, 1: 0-20mA, 2:2-10V, 3: 0-10V)
40013	Analog output min DAC value
40014	Analog output max DAC value
40015	Analog output manual belt speed (DAC)
40016	

Table 7-47. Page 6 Example

7.10.3 Status Holding Registers

Register	Data
40021	Belt Command Status Register
40022	Belt Status Register
40023	Belt load (MSW). Kg/m or lb/ft with Ld.Res decimals.
40024	Belt load (LSW).
40025	Flow-rate
40026	Speed encoder 2 (0.01m/s or 0.1ft/min) – Zero without 2nd encoder
40027	Analog output percentage (2 decimals)
40028	Partial Total (W1)
40029	Partial Total (W0)
40030	General Total (W1)
40031	General Total (W0)
40032	Speed encoder 1 (0.01m/s or 0.1ft/min). Fixed speed if no encoder is used
40033	Inclination. ° with 1 decimal
40034	Input Status Register
40035	Output Status Register
40036	Other data
40037	µV channel 1
40038	µV channel 2
40039	µV channel 3
40040	µV channel 4
40041	µV sum
40042	µV average
40043	Calibration status (Test weight procedure status)
40044	Calibration total (Totalized in the procedure, in totals resolution)
40045	Calibration error (0.01%)
40046	New correction factor (calculated at the end of the test procedure) (H)
40047	New correction factor (L)
40048	Percentage progress value for zero calibration
40049	Percentage progress value for test weight procedure

Table 7-48. Status Holding Registers

7.10.3.1 Belt Command Status Register

B15-B8	B7-B0
Command Result	Number of executed command values for module 16

Table 7-49. Belt Command Status Register

7.10.3.2 Command Result Values

Result Value	Description
0	OK
1	Command not allowed
2	Wrong command data
3	Unknown command

Table 7-50. Command Result Values

7.10.3.3 Belt Status Register

B15-B12	B11-B8	B7-B0
Belt State	Operation mode	Error code

Table 7-51. Belt Status Register

Value	State
0	ALARM
1	MANUAL (Input ON/OFF open)
2	WAIT (Input ENABLE closed)
3	PAUSE
4	(Unused)
5	RUN
6	START (batch start phase)
7	END BATCH (batch end phase)
8	LOCK
9	ZERO BELT underway
10	TEST WEIGHT procedure underway

Table 7-52. Belt State Values

Value	Mode
0	Reader (PID not enabled)
1	Controller (PID enabled)

Table 7-53. Operation Mode Values

Value	Description	Enable setup item
0	NO ERROR	
1	OFF TRACK ALARM	OFF .trA
2	MIN FLOW RATE ALARM	FLOW .r .
3	MAX FLOW RATE ALARM	FLOW .r .
4	ZERO FLOW RATE	Set if no alarm is active, add total is enabled and flow is zero
5	WEIGHT ALARM	WE IGht
6	OFF TRACK LOCK	OFF .trA
7	MIN FLOW RATE LOCK	FLOW .r .
8	MAX FLOW RATE LOCK	FLOW .r .
9	DOSAGE WEIGHT LOCK	Not used
10	LOCK due to input ON/OFF or ENABLE open	Set for 1 second, then Belt state is changed to 1
11	WEIGHT LOCK	WE IGht
12	EXTERNAL ALARM	EHtErn
13	EXTERNAL ALARM LOCK	EHtErn
14	FLOW RATE LOCK	OVEr .Ld
15	LOAD CELL OVERLOAD ALARM	LC .OVEr
16	LOAD CELL OVERLOAD LOCK	LC .OVEr
17	FLOW RATE ALARM	OVEr .Ld

Table 7-54. Error Code Values

Priority	Alarm
1	OFF .trA
2	WE IGht
3	FLOW .r
4	EHtErn
5	OVEr .Ld
6	LC .OVEr

Table 7-55. Alarm Priority

Priority	Alarm
0	Idle
1	Positioning
2	Start
3	Wait start belt
4	Wait belt regimen
5	Run
6	End
7	Ask to save test weight (if executed by keyboard and test weight value = 0)
8	Ask to set new factor (if executed by keyboard)
9	Waiting for confirm (if executed by remote command)
10	Confirm (temporary status to save data, then will switch to Idle status)

Table 7-56. Test Weight Procedure Status Priority

7.10.4 Setting Registers

Register	Data
48001	Unit system (0: metrix, 1: US)
48002	Operative mode (0: belt, 1: bulkslide)
48003	Pulse weight (H)
48004	Pulse weight (L) (totals resolution)
48005	Pulse time width (0.1 sec)
48006	Bulkslide air purge interval (min)
48007	Bulkslide air purge time (sec)
48008	Bulkslide air purge max flow (unit, decimals flow-rate)
48009	Bulkslide air purge delay (sec)
48010	Analog output function (0: flow, 1: load, 2: speed)
48011	Analog output mode (0: 4-20mA, 1: 0-20mA, 2:2-10V, 3: 0-10V)
48012	Analog output min DAC value
48013	Analog output max DAC value
48014	Analog output manual belt speed (DAC)
48015	Input 1 function
48016	Input 2 function
48017	Output 1 function
48018	Output 1 NO/NC (0: NO, 1: NC)
48019	Output 2 function
48020	Output 2 NO/NC
48021	Output 3 function (DGT1SX)
48022	Output 3 NO/NC (DGT1SX)
48023	Output 4 function (DGT1SX)
48024	Output 4 NO/NC (DGT1SX)
48025	Totals resolution
48026	Flow-rate resolution
48027	Max flow-rate (in flow-rate resolution)
48028	Max load (kg/m or lb/ft)
48029	Encoder 1 enable (0: disabled, 1: enabled)
48030	Length per pulse encoder 1 (0.01mm or 0.0001in)
48031	Encoder 2 enable
48034	Max belt speed (0.01m/s, 0.1ft/min)
48035	Encoders speed difference %
48036	Dead band % (0.1%)
48037	Show flow-rate in dead band (0: no, 1: yes)
48038	Totalize with negative flow-rate (0: no, 1: yes)
48039	Store totals (b15=0: no, b15=1: yes). b14-b0: max flow % to store totals (0.1%)
48040	Flow-rate filter time (set on indicator restart)
48041	Flow-rate filter Win
48042	Flow-rate filter Avg
48043	Flow-rate filter Pit
48044	Load cell filter index (set immediately if not custom filter)
48045	Load cell filter rate (set if custom filter is selected, enabled when pit is writte)
48046	Load cell filter Win (set if custom filter is selected, enabled when pit is writte)
48047	Load cell filter Avg (set if custom filter is selected, enabled when pit is writte)

Table 7-57. Setting Registers

Register	Data
48048	Load cell filter Pit (set if custom filter is selected, enabled when pit is writte)
48049	Number of channels (weight restarted)
48050	Load cell capacity (H)
48051	Load cell capacity (L) (0.001 kg/lb)
48052	Load cell sensitivity (H)
48053	Load cell sensitivity (L) (0.00001mV/V)
48054	Load cell zero mV/V (H)
48055	Load cell zero mV/V (L) (0.00001mV/V) (activate when this reg. is written)
48056	Weigh length (mm, 0.01in)
48057	Pivot to load cell distance (mm, 0.01in)
48058	Pivot to idler distance (mm, 0.01in)
48059	Serial inclinometer
48060	Belt angle (0.1°)
48061	Correction factor (H)
48062	Correction factor (L) (0.000001)
48063	Zero belt time (0.01s)
48064	Belt length (0.1 m/ft)
48065	Zero revolutions
48066	Zero range % (0.1%)
48067	Auto zero range % (0.1%)
48068	Auto zero limit % (0.1%)
48069	Test weight (H)
48070	Test weight (L) (0.01 kg/lb)
48071	Test weight delay (0.1s)
48072	Test weight distance (0.01 m/ft)
48073	Test weight time (0.1s)
48074	Test weight material factor (H)
48075	Test weight material factor (L) (0.000001)
48076	Error off-track enable
48077	Error off-track alarm time (0.1s)
48078	Error off-track lock time (0.1s)
48079	Error overload flow-rate enable
48080	Error overload flow-rate alarm time (0.1s)
48081	Error overload flow-rate lock time (0.1s)
48082	Overflow flow-rate % (0.1%)
48083	Error flow-rate enable
48084	Error flow-rate alarm time (0.1s)
48085	Error flow-rate lock time (0.1s)
48086	Min flow-rate (flow resolution)
48087	Max flow-rate (flow resolution)
48088	Error weight enable
48089	Error weight alarm time (0.1s)
48090	Error weight lock time (0.1s)
48091	Min weight (H)
48092	Min weight (L) (kg or lb)
48093	Max weight (H)
48094	Max weight (L) (kg or lb)

Table 7-57. Setting Registers (Continued)

Register	Data
48095	Error external enable
48096	Error external alarm time (0.1s)
48097	Error external lock time (0.1s)
48098	Error load cell over-load enable
48099	Error load cell over-load alarm time (0.1s)
48100	Error load cell over-load lock time (0.1s)
48101	Load decimals (0÷3)

Table 7-57. Setting Registers (Continued)

8.0 Specifications

Power
12 to 24 VDC

Power Consumption
5 W

Excitation Voltage
5 VDC, 120 mA (up to 16 × 350 ohm cells)

Analog Signal Input Range
±39 mV

Analog Signal Sensitivity
0.3 µV/graduation minimum

Sample Rate
Single-channel up to 2,600 Hz, software selectable
4 channels up to 100 Hz, software selectable

Analog Output (if equipped)
Opt. isolated, 16-bit
0 to 20 mA, 4 to 20 mA (maximum 350 ohm)
0 to 5 VDC, 0 to 10 VDC (minimum 10,000 ohm)

Digital I/O
Two inputs: 12/24 VDC, 1 kHz
Two outputs: 150 mA 48 VAC/150 mA 60 VDC

Communication Ports
(1) RS-485 half duplex, (1) RS-232 full duplex
1 USB Micro B connector (device)
for PC configuration

Pulse Input
Dual inputs for redundancy

Display
Six-digit 0.31 in (8 mm), red LED

Keys/Buttons
Flat membrane panel, tactile feel

Dimensions
Overall: 10.5 × 6.26 × 12.5 in (266 × 159 × 318 mm)

Mounting Tabs
8.0 × 13.12 in
(203 × 333 mm)

Weight
27 lb

Rating/Material
NEMA 4X (if using supplied enclosure)

Warranty
One-year limited

Approvals
CE-M EN 4550

RICE LAKE®
WEIGHING SYSTEMS

230 W. Coleman St. • Rice Lake, WI 54868 • USA USA: 800-472-6703 • International: +1-715-234-9171