Instruction Manual • February 2004

milltronics

BW100

SIEMENS

Safety Guidelines

Warning notices must be observed to ensure personal safety as well as that of others, and to protect the product and the connected equipment. These warning notices are accompanied by a clarification of the level of caution to be observed.

Qualified Personnel

This device/system may only be set up and operated in conjunction with this manual. Qualified personnel are only authorized to install and operate this equipment in accordance with established safety practices and standards.

Warning: This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.

Note: Always use product in accordance with specifications.

Contact SMPI Technical Publications at the following address:

Technical Publications
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Table of Contents

Milltronics BW100

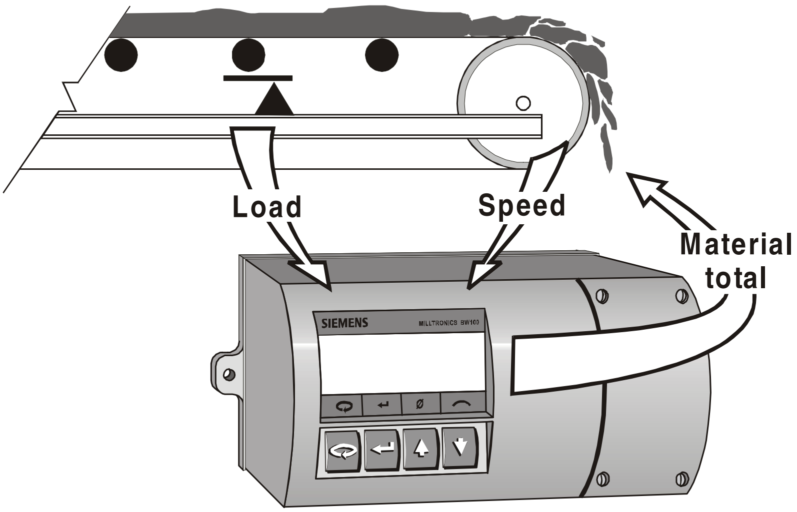
> **Note:** The Milltronics BW100 is to be used only in the manner outlined in this instruction manual.

The Milltronics BW100 is an economical integrator for use with belt scales. The speed and load signals from the conveyor and scale, are processed to derive rate of material flow and totalization.

The primary values of speed and load, and the derived values of rate and total are available for display on the local LCD, or as output in the form of analog mA, alarm relay and remote totalization. BW100 supports Milltronics proprietary bipolar current loop for long distance communication to PLC or computer. It is also compatible with Milltronics Dolphin interface for remote display, programming and software upgrading.

Milltronics BW100 Features

- multi-field LCD display
- two remote totalizer contacts
- current loop for communications
- Dolphin compatibility
- programmable relay
- isolated mA output
- rate linearization
- local keypad
- Auto Zero



Safety Notes

Special attention must be paid to warnings and notes highlighted from the rest of the text by grey boxes.

WARNING means that failure to observe the necessary precautions can result in death, serious injury, and/or considerable material damage.

Note: means important information about the product or that part of the operating manual.

The Manual

It is essential to refer to thismanual for proper installation and operation of your BW100 belt scale integrator. As the BW100 must be connected to a belt scale, and optionally a speed sensor, refer to their manuals as well.

The manual is designed to help you get the most out of your BW100, and it provides information on the following

- How to install the unit
- How to program the unit
- How to operate the keypad and read the display
- How to do an initial Start Up
- How to optimize and maintain accurate operation of the unit
- Outline diagrams
- Wiring diagrams
- Parameter values
- Parameter uses
- Modbus register mapping
- Modem configuration

Note: The Milltronics BW100 is to be used only in the manner outlined in this instruction manual.

If you have any questions, comments, or suggestions about the manual contents, please email us at techpubs@siemens-milltronics.com.

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Specifications

Power

• standard:	100/115/200/230 Vac ± 15%, 50/60 Hz, 15VA
• optional:	10 - 15 V dc, 15 W
	18 - 30 V dc, 15 W

Application

- compatible with Siemens Milltronics belt scales or equivalent

Accuracy

- 0.1% of full scale

Resolution

- 0.02% of full scale

Environmental

• location:	indoor / outdoor
• altitude:	2000 m max
• ambient temperature:	-20 to 50 °C (-5 to 122 °F)
• relative humidity:	suitable for outdoor
• installation category:	II
• pollution degree:	4

Enclosure

- polypropylene alloy
- Type 4X / NEMA 4X / IP 65
- sealed electronics compartment
- integral junction box with termination block for 0.2 - 4 mm solid or 0.2 - 2.5 mm stranded (12 - 24 AWG)

Programming

- via local 4 member keypad with silicone boot and/or Dolphin interface

Display

- 38 x 100 mm (1.5 x 4") multi-field liquid crystal display

Memory

- program stored in non-volatile FLASH memory, upgradable via Dolphin interface
- parameters stored in non-volatile EEPROM

Inputs

• load cell:	0 - 45 mV dc per load cell
• speed sensor:	pulse train: 0-5 V low, 5-15 V high, 1 to 2000 Hz, or open collector switch or relay dry contact
• auto zero:	dry contact from external device

Outputs

• analog:	- optically isolated 0/4 - 20 mA - 750 Ω max loading
• resolution:	- 0.1% of 20 mA
• load cell:	- 10 Vdc compensated for strain gauge type, 2 cells max
• speed sensor:	- 12 Vdc, 50 mA max excitation
• remote totalizer 1:	- contact closure 32 - 288 ms duration - open collector switch rated 30 Vdc, 100 mA max
• remote totalizer 2:	- contact closure 32 - 288 ms duration - open collector switch rated 240 Vac/dc, 100 mA max
• relay output:	programmable function 1 form **C** SPDT relay contact rated 5 A at 250 Vac, non-inductive

Communications

- Dolphin compatible
- proprietary bipolar current loop

Cable/Separation:

• one load cell/LVDT:	
non-sensing:	Belden 8404, 4 wire shielded, 20 AWG or equivalent, 150 m (500 ft.) max.
sensing:	Belden 9260, 6 wire shielded, 20 AWG or equivalent, 300 m (1000 ft.) max.
• two load cells:	
non-sensing:	Belden 9260, 6 wire shielded, 20 AWG or equivalent, 150 m (500 ft.) max.
sensing:	Belden 8418, 8 wire shielded, 20 AWG or equivalent, 300 m (1000 ft.) max.
• speed sensor	Belden 8770, 3 wire shielded, 18 AWG or equivalent, 300 m (1000 ft.) max.
• auto zero:	Belden 8760, 1 pair, twisted/shielded, 18 AWG, 300 m (1000 ft.) max.
• remote total:	Belden 8760, 1 pair, twisted/shielded, 18 AWG, 300 m (1000 ft.) max.

• analog output:	Belden 8760, 1 pair, twisted/shielded, 18 AWG or equivalent
• bipolar current:	Belden 9552, 2 pair, twisted/shielded, 18
• (comm. port)	AWG, 3000 m (10,000 ft.) max. loop
• remote total	Belden 8760, 1 pair, twisted/shielded, 18AWG,
• t1 (dc)	300 m (1000 ft.) max.

Options:

• Speed Sensor:	- Siemens Milltronics MD-36 series, or equivalent
• Dolphin:	- Milltronics Windows based software interface and infrared ComVerter link

Approvals:

- CE*, CSA $_{NRTL/C}$

*EMC performance available upon request

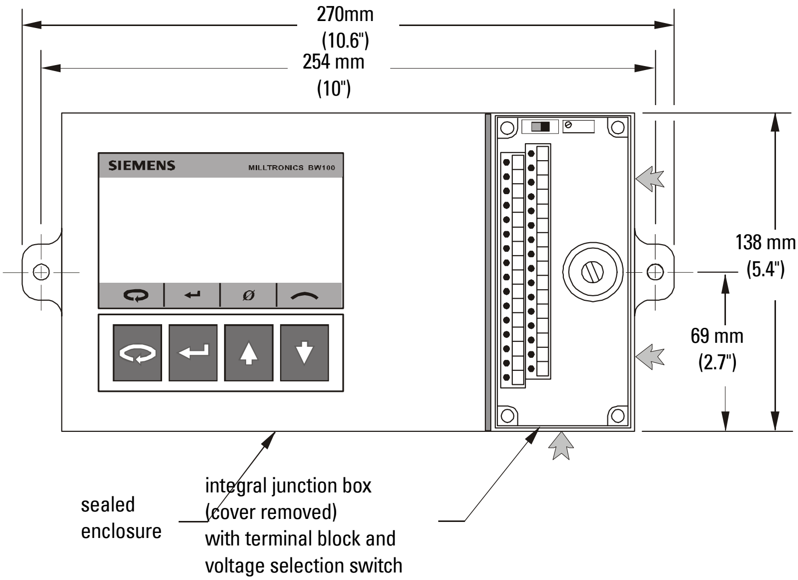
Specifications

Installation

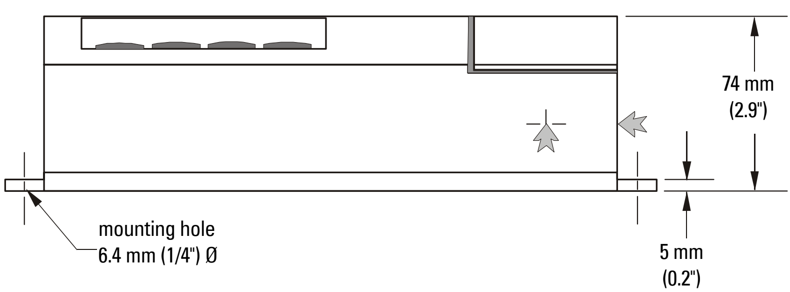
Notes:

- Installation shall only be performed by qualified personnel and in accordance with local governing regulations.
- This product is susceptible to electrostatic shock. Follow proper grounding procedures.

Dimensions



Conduit entry area. Recommend drilling the enclosure with a hole saw and the use of suitable cable glands to maintain ingress rating.

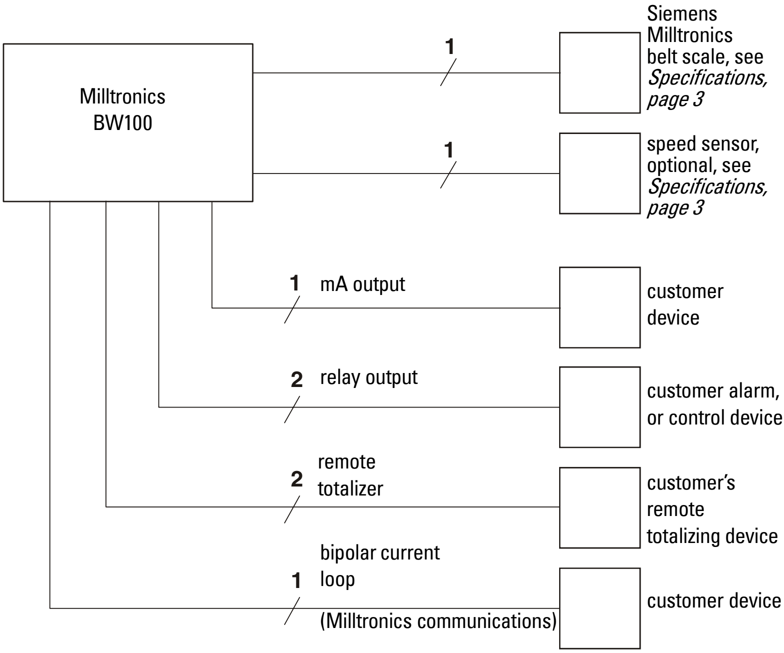


Note: Non metallic enclosure does not provide grounding between connections. Use grounding type bushings and jumpers.

Interconnection

Note: Wiring may be run via common conduit. However these may not be run in the same conduit as high voltage contact or power wiring.

System Diagram

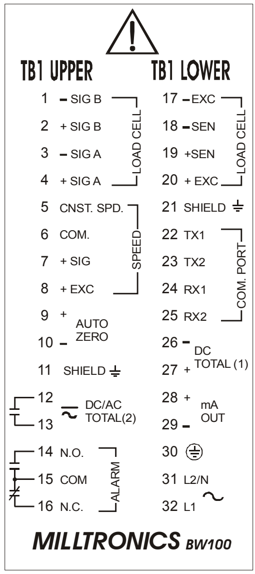


Note: Typical system capability. Not all components or their maximum quantity may be required.

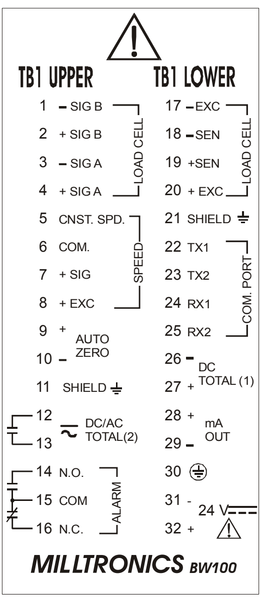
Installation

Terminal Block Layout

ac supply



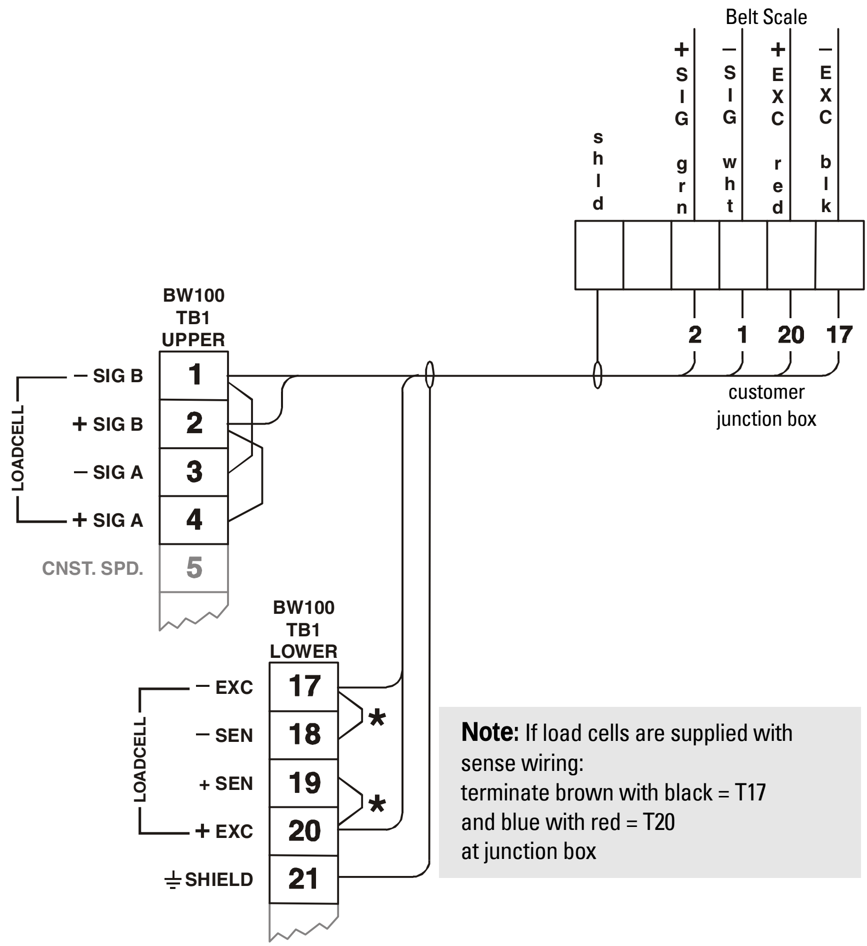
dc supply



All field wiring must have insulation suitable for at least 250 V.

dc terminals shall be supplied from a SELV source in accordance with IEC-1010-1 Annex H.

Load Cell - Single



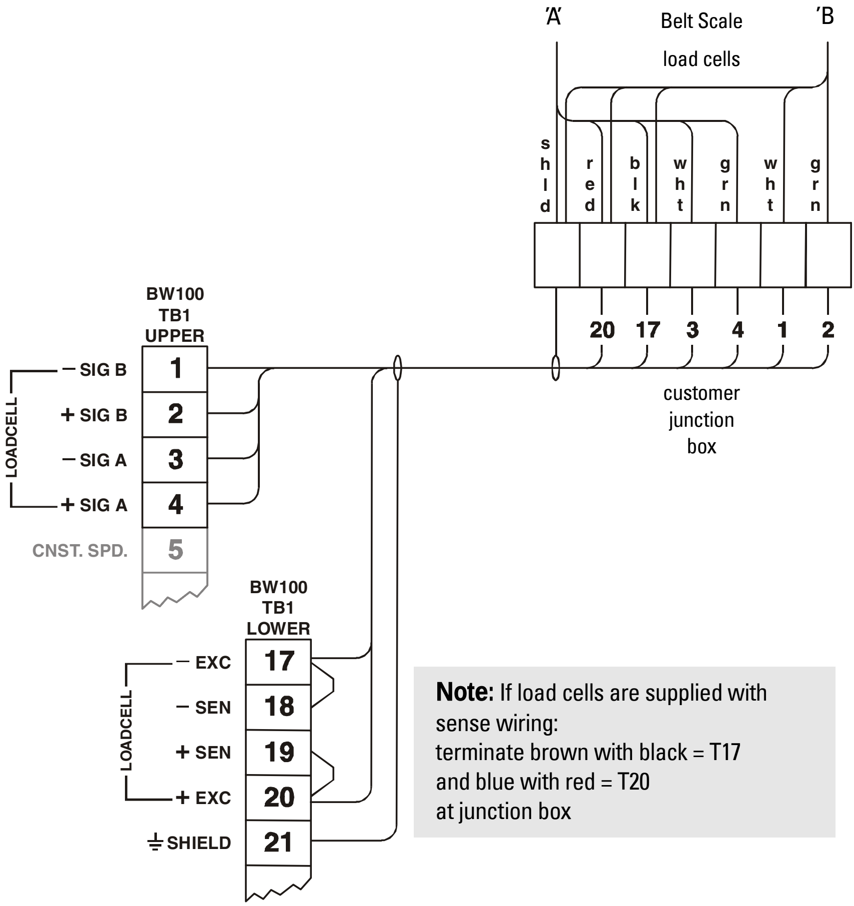
Note: If load cells are supplied with sense wiring:
terminate brown with black = T17
and blue with red = T20
at junction box

Where separation between the BW100 and belt scale exceeds 150 m (500 ft.):

1. remove the jumpers BW100 TB1 – 17/18 and TB1 19/20
2. run additional conductors from:
   BW100 TB1 – 18 to scale '– EXC'
   BW100 TB1 – 19 to scale '+ EXC'

If the load cell wiring colours vary from those shown, or if extra wires are provided, consult Siemens Milltronics.

Load Cell - Dual



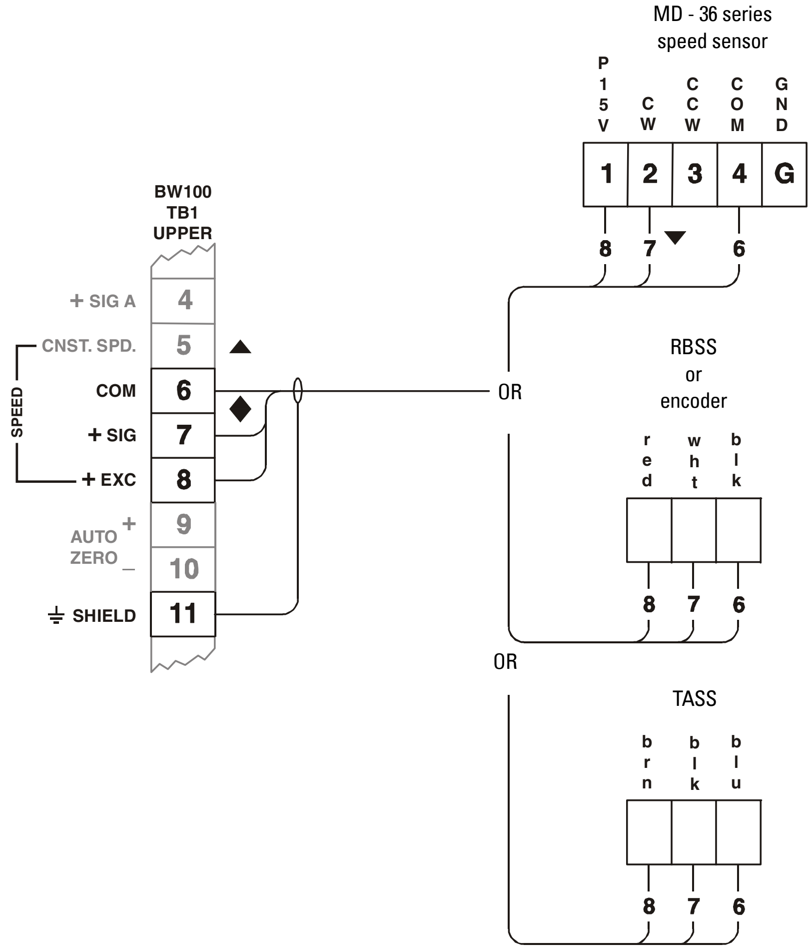
Note: If load cells are supplied with sense wiring:
terminate brown with black = T17
and blue with red = T20
at junction box

Where separation between the BW100 and belt scale exceeds 150 m (500 ft.):

1. remove the jumpers BW100 TB1 – 17/18 and TB1 19/20
2. run additional conductors from:
   BW100 TB1 – 18 to scale '– EXC'
   BW100 TB1 – 19 to scale '+ EXC'

If the load cell wiring colours vary from those shown, or if extra wires are provided, consult Siemens Milltronics.

Speed Sensor



▼ Connect the BW100 TB1 – 7 to the MD - 36 series speed sensor terminal:

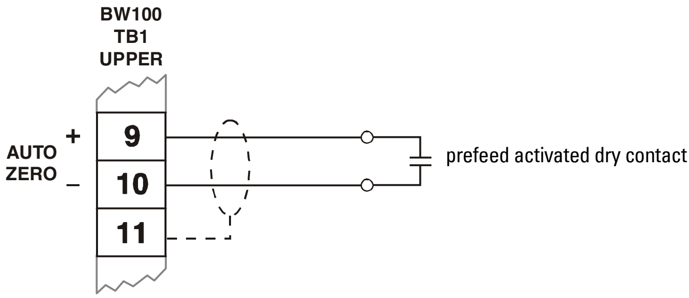
- '2' for clockwise speed sensor shaft rotation
- '3' for counter-clockwise speed sensor shaft rotation.

MD shaft rotation is viewed from the front cover side of the MD enclosure.

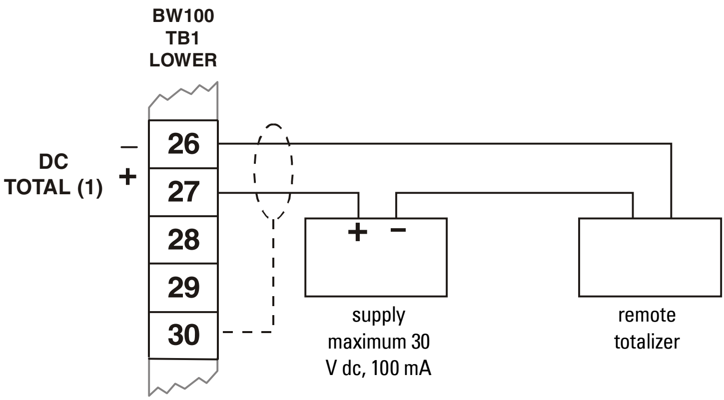
▲ If a speed sensor is not used, a jumper must be connected across the BW100 TB1 – 5 / 6. If a speed sensor is used, insure that the jumper is removed.

◆ Input device in the form of open collector transistor or dry contact across TB1 – 6 / 7 will also serve as a suitable speed signal.

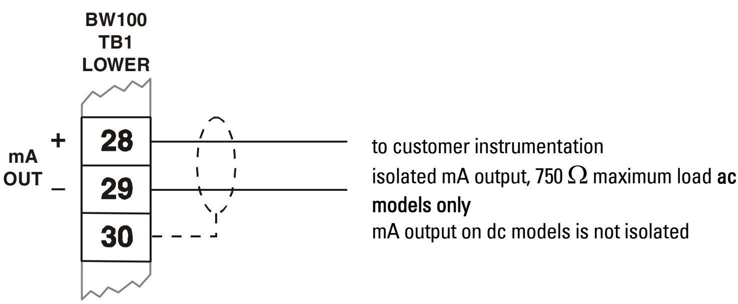
Auto Zero



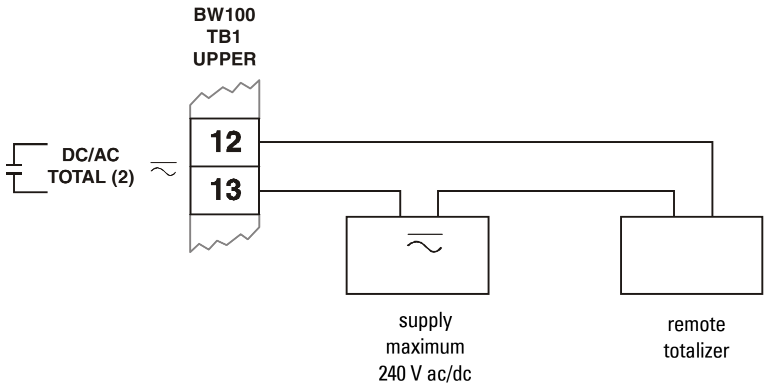
Remote Totalizer 1



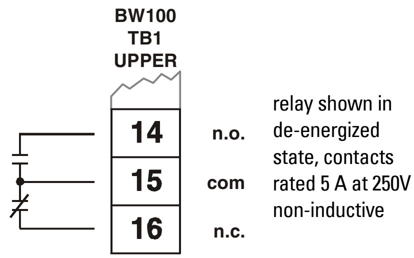
Analog Output



Remote Totalizer 2

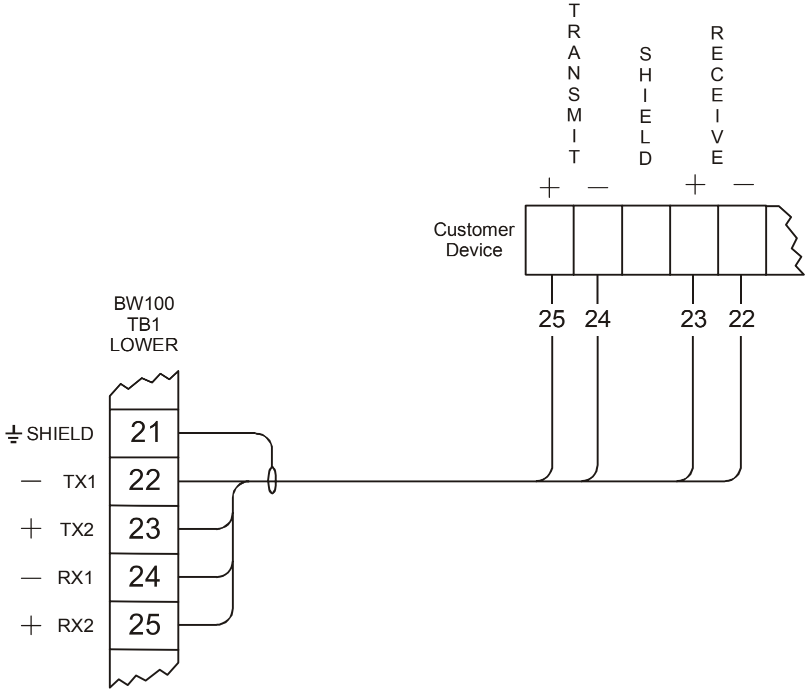


Relay Output



Communication

Bipolar Current Loop



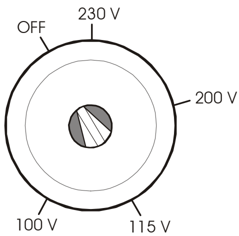
Connect shield at one device only, e.g. BW100 TB1 - 21

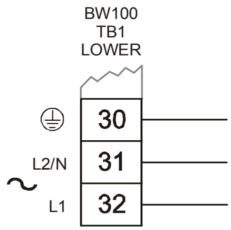
Maximum loop length 3000 m (10,000 ft.)

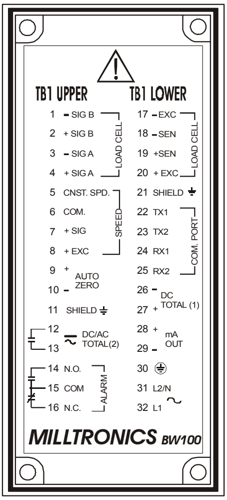
Installation

Power Connections

AC Power

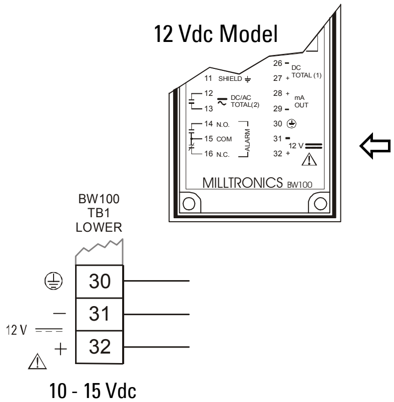


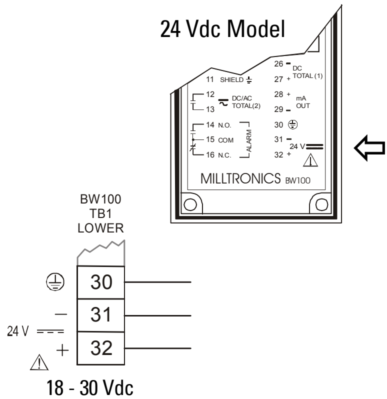




Note: The equipment must be protected by a 15 A fuse or a circuit breaker in the building installation.
A circuit breaker or switch in the building installation, marked as the disconnect switch, shall be in close proximity to the equipment and within easy reach of the operator.

DC Power



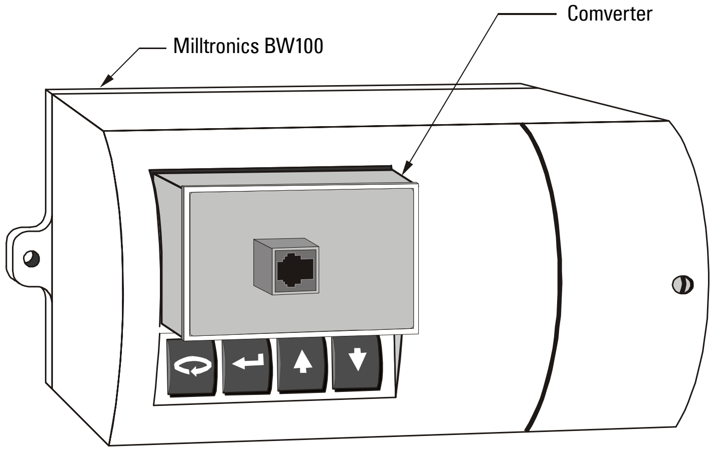


⇦ dc model indicated on lid nameplate.

dc terminals shall be supplied from an SELV source in accordance with IEC-1010-1 Annex H.

Comverter

Optional Dolphin Interface



Refer to Dolphin instruction manual for interconnection details.

Units Sticker

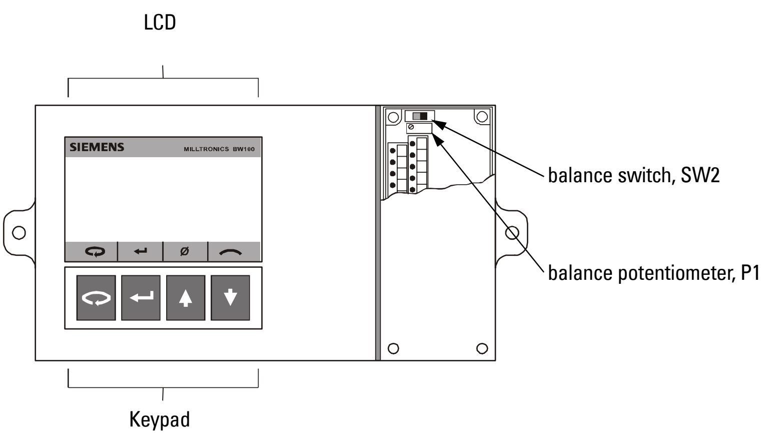
Remove the appropriate units sticker from the sheet supplied, and affix to your BW100 as shown.

Start Up

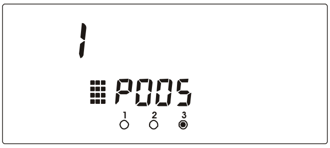
> **Note:** For successful start up, ensure that all related system components such as belt scale and speed sensor are properly installed and connected.

Orientation

Display and Keypad

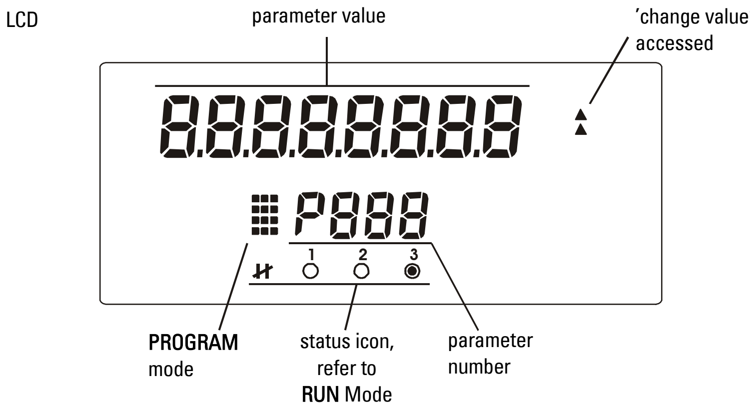


The BW100 operates under two modes: RUN and PROGRAM. When the unit is initially powered, it starts in the PROGRAM mode.



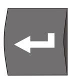
If the PROGRAM mode is idle, it reverts to the run mode after 10 minutes.

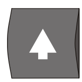
PROGRAM Mode

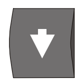


KeyPad

 access **RUN** mode

 alternates **PROGRAM** mode between **select parameter** and **change value**

 scroll up

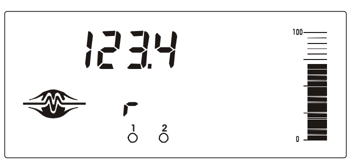
 scroll down

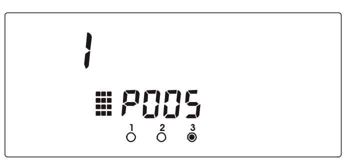
Maneuvering

To Select a Parameter:

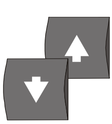
if not in the **PROGRAM** mode

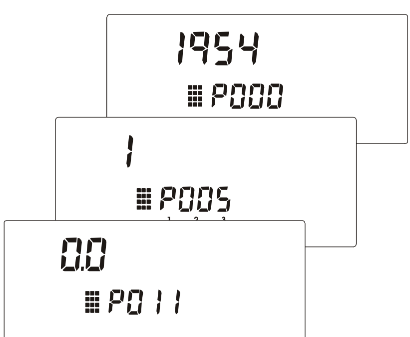
from the **RUN** mode 





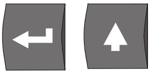
if in the **PROGRAM** mode



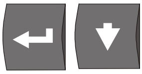


Start Up

Speed Scroll

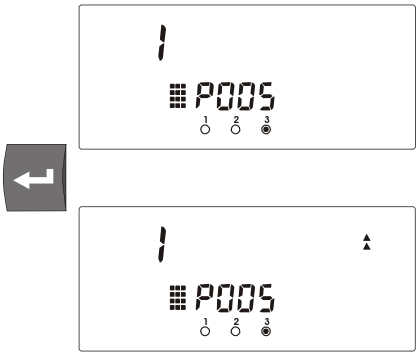


OR



To speed scroll up or down press the up or down key and hold, then press the ENTER key and hold. Release to stop.

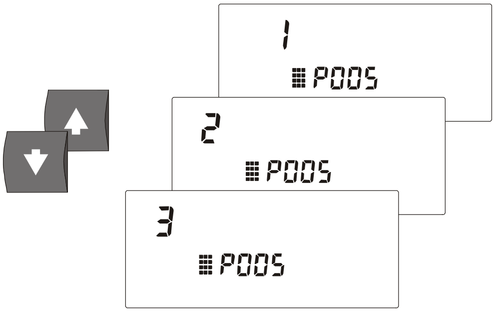
To Change a Parameter Value:



select parameter,
e.g. P005 = 1

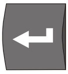
initiate change function

security must be disabled

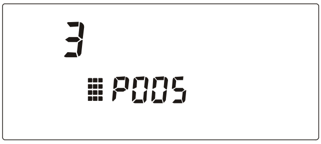


increase or decrease
to the desired value.

if no response,
security not disabled



must be pressed to
save change



save and return to select
parameter function,

e.g. P005 = 3

Start Up

Express:

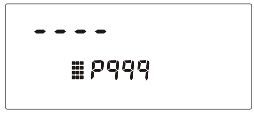
Parameter

to jump back to P005

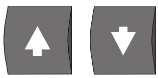
or

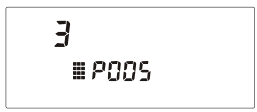
Value

to jump to the factory setting



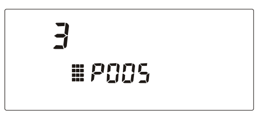
e.g. P999



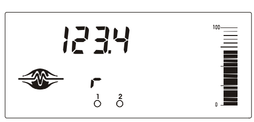


jump back to P005

To Access RUN Mode:



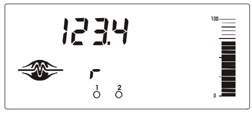
e.g. from the PROGRAM mode, P005



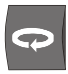
exit and return to **RUN** mode

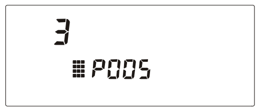
To Access the PROGRAM Mode:

from the run mode



e.g. rate display





last parameter from previous PROGRAM session e.g. P005

Master Reset

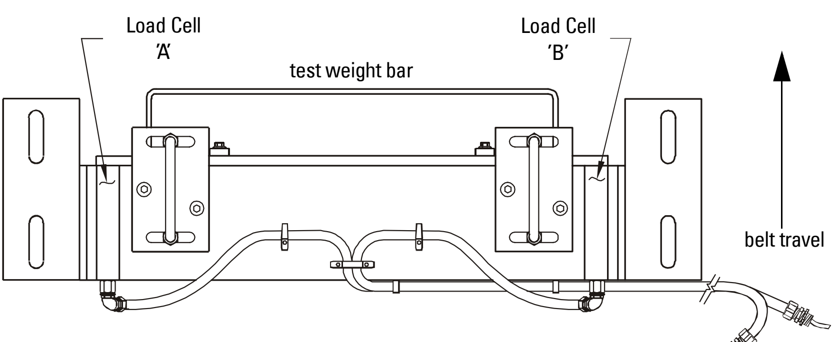
Prior to programming, balancing and calibration, a master reset of the BW100 should be done.

Refer to *Parameter P999* on page 64.

Load Cell Balancing

If you are operating a two load cell belt scale, it is recommended that the load cells be balanced electronically prior to initial programming and calibration, or after either or both load cells have been reinstalled or replaced.

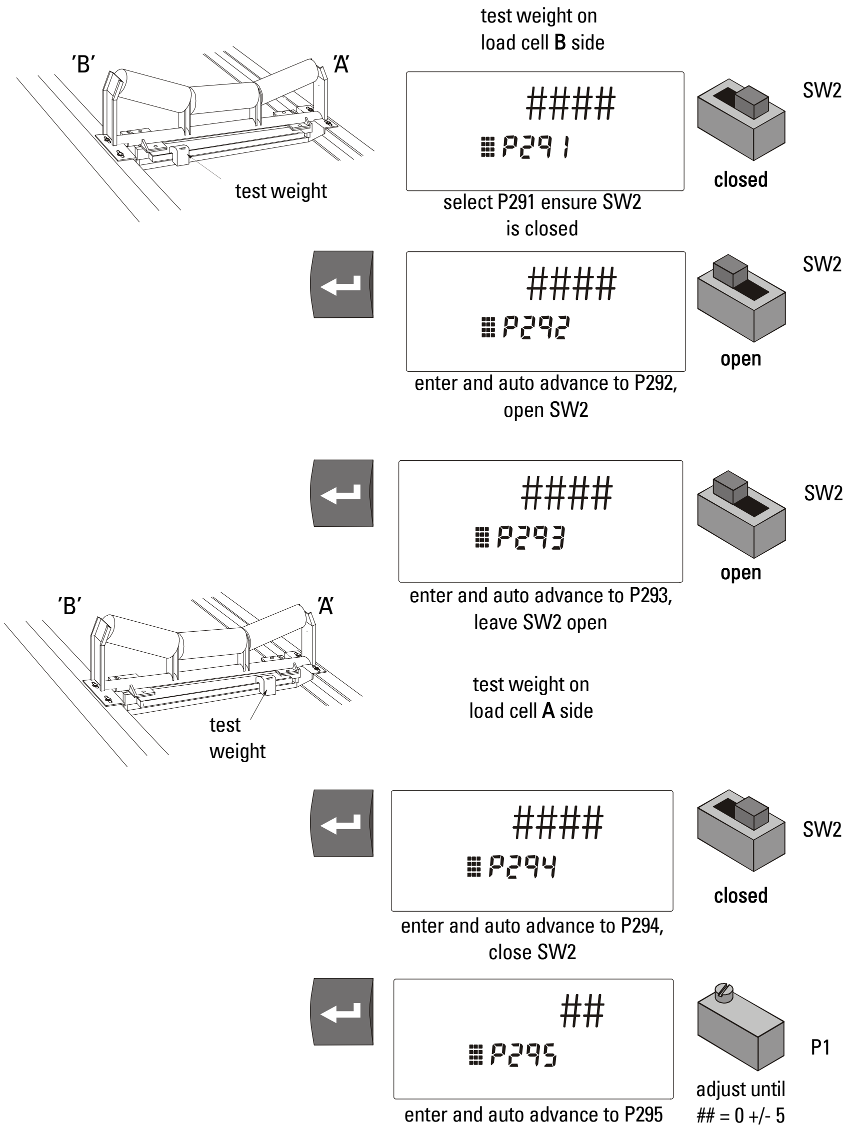
Note: Unbalanced load cells adversely affect the performance of your belt conveyor weighing system.



typical dual load cell scale

With the conveyor stopped and locked out, lift the belt off the weighing idlers.

Place the BW100 into the **PROGRAM** mode at P291.



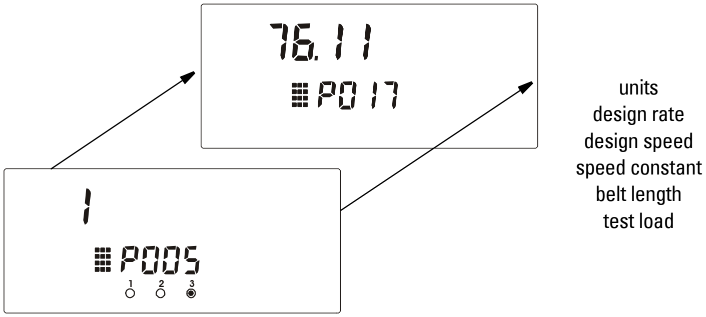
Remove the test weight, insure that the BW100 SW2 is in 'close' position and that P1 is left as set.

> **Note:** Performing a balance procedure requires a subsequent zero and span recalibration.

Quick Start

Quick Start parameters (P005 to P017) must be programmed for all applications.

Record parameter in Program Record on page 70.

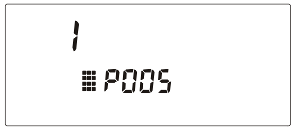


Upon completion of Quick Start programming, a Zero and Span calibration are required for successful entry into the RUN mode.

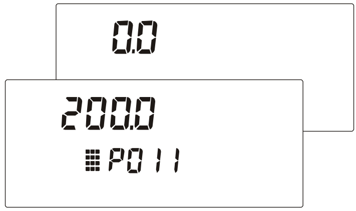
Start Up

Program P005 - P017

refer to *Maneuvering* on page 18 for parameter selection and changing values.

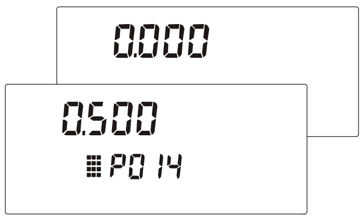


program mode P005, units
e.g. 1, t/h



P011, design rate *
e.g. 200 t/h

* from design data sheet, if provided

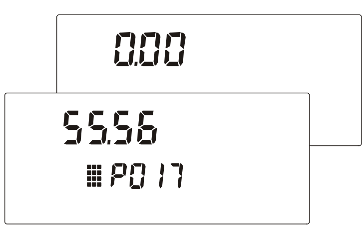


P014, design speed *
e.g. 0.5 m/s

▲ for constant speed applications, TB1 - 5/6 jumpered, value is locked at 100.

P015, speed constant * ▲
e.g. 100.3 pulse / m

P016, belt length
e.g. 65.72 m

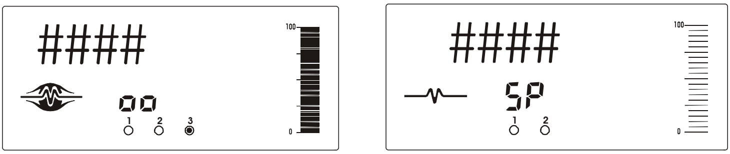


P017, test load *
e.g. 55.56 Kg / m

Examples are typical

Test load value should be less than design load (P952). If not, contact Siemens or their agent.

Calibration Note: The duration of Zero and Span Calibration is dependent upon speed (P014), length (P016) and revolutions (P360) of belt.

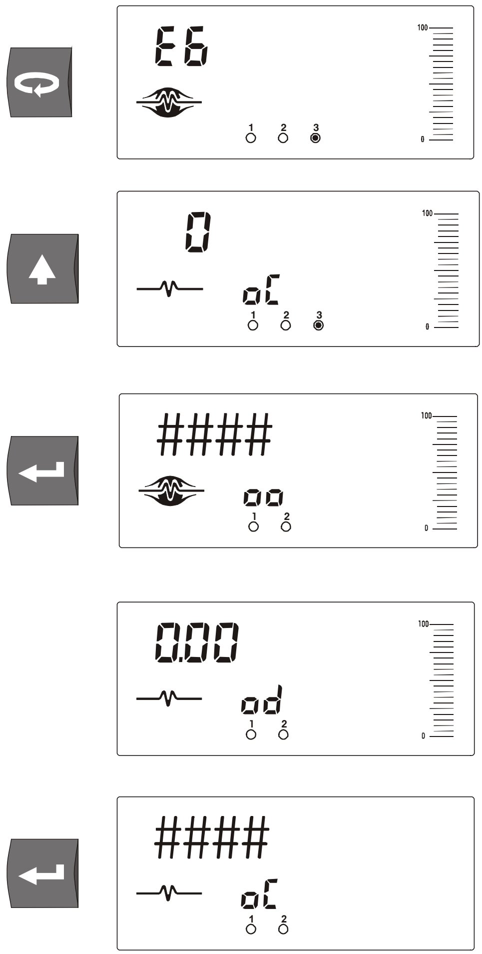


Note: To cancel a Zero or Span calibration in progress, press 

Start Up

Zero Calibration

Note: Run the conveyor for several minutes to warm up the belt and insure that it is empty. Test weights are not used during a zero calibration.



zero calibration required

initial zero count

zero calculation,
frequency count displayed

zero deviation calculated,
initial deviation = 0

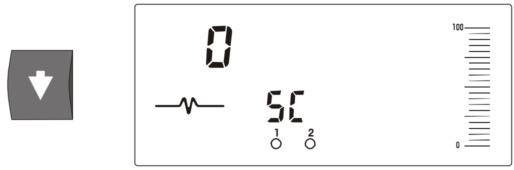
zero deviation accepted,
initial zero count = ###
Record this value for future reference

Perform Span Calibration,
see next page

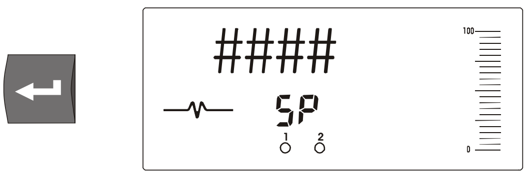
Start Up

Span Calibration

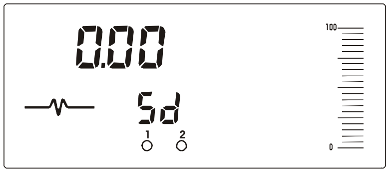
Run the conveyor until the belt is empty and stop it. Suspend the test weight from the scale per its instruction manual. Run the conveyor belt empty.



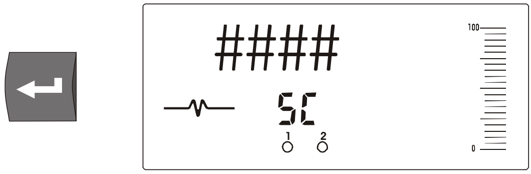
initial span count



span calculation, frequency count displayed

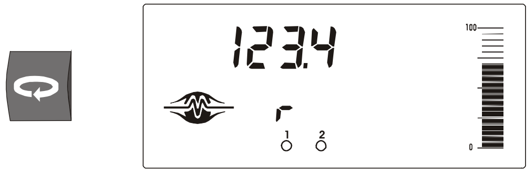


span deviation calculated
initial deviation = 0



span deviation accepted
initial span count = ####
Record this value for future reference

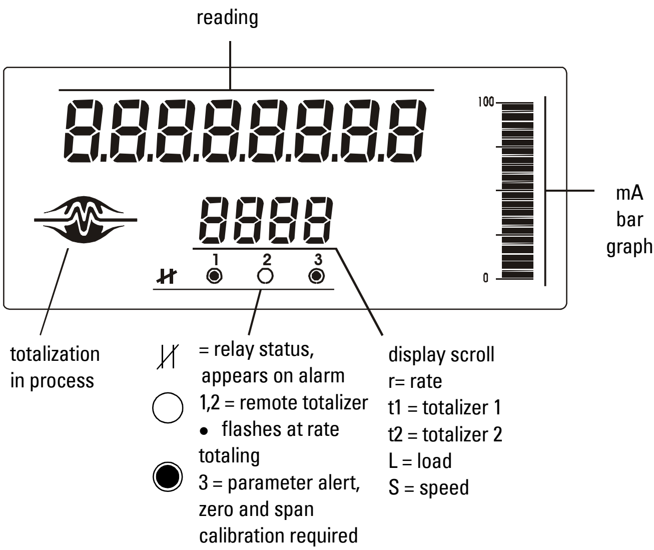
Remove the test weight when the Span calibration is complete.



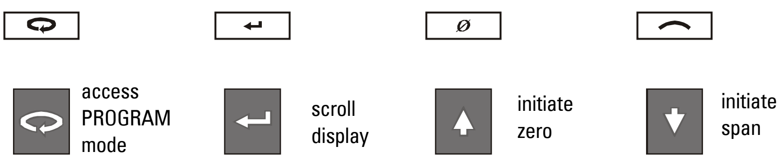
successful entry into run, display rate

RUN Mode

LCD



Keypad

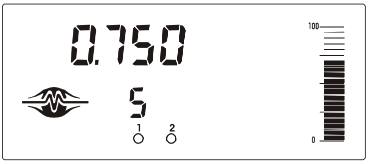


Belt Speed Compensation

In order to achieve optimum accuracy in the rate computation, the belt speed displayed must equal that of the actual belt speed. As the speeds are likely to differ, a belt speed compensation should be performed.

Run the conveyor with the belt empty.

View the belt speed



run mode /speed display, e.g. 0.750 m/s

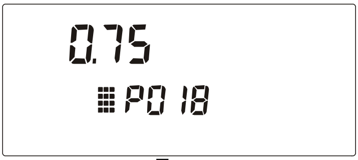
Stop the conveyor and measure a length of the belt; marking the forward end (start time) and the back end (stop time). Use the belt scale as the stationary reference.

Run the belt and measure the time for the belt length to pass over the scale.

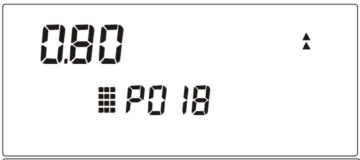
$$\text{speed} = \frac{\text{belt length}}{\text{time}} \qquad \frac{\text{m}}{\text{s}} \text{ or } \frac{\text{ft.}}{\text{min.}}$$

Refer to *Maneuvering* on page 18 for parameter selection and value change.

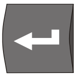
with conveyor running empty

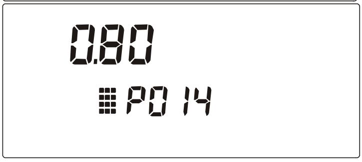


PROGRAM mode - assumed speede.g. 0.75 ms



enter calculated speed e.g. 0.8 m/s





jumps to P014 or P015 showing new value

If the BW100 constant speed input (TB1-5/6) is jumpered, the design speed (P014) is automatically adjusted.

If a speed sensor is connected, the speed constant (P015) is automatically adjusted.

The display speed (used in the rate computation) now equals the actual speed.

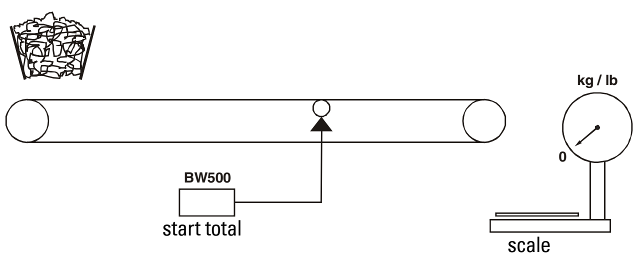
Record the new value in Appendices/Program Record.

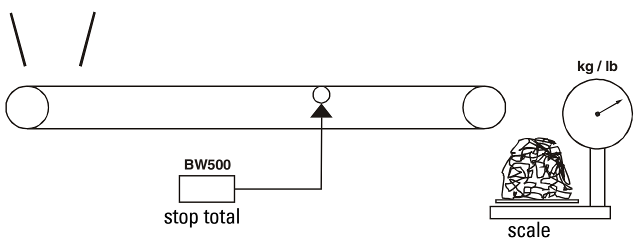
Material Tests

Perform material tests to verify the accuracy of the of the span calibration. If the material tests indicate a repeatable deviation exists, a manual span adjust (P019) is then performed. This procedure automatically alters the span calibration and adjusts the test load (P017) value, yielding more accurate span recalibrations.

Note: Test weights are NOT used during material tests.

1. Run the belt empty.
2. Perform a zero calibration.
3. Put the BW100 into **RUN** mode
4. Record the BW100 total as the start value _ _ _ _ _ _
5. Run material at a minimum of 50% of design rate over the belt scale for a minimum of 5 minutes.
6. Stop the material feed and run the conveyor empty.
7. Record the BW100 total as the stop value _ _ _ _ _ _
8. Subtract the start value from the stop value to determine the BW100 total
9. Weigh the material sample if not already known.





BW100 total = _ _ _ _ _ _ material sample weight = _ _ _ _ _ _

- Calculate the span adjust value:

$$\% \text{ span adjust} = \frac{\text{BW100 total - material sample weight}}{\text{material sample weight}} \times 100$$

If the span adjust value is within the accuracy requirements of the weighing system, the material test was successful and normal operation can be resumed.

If the span adjust value is not acceptable, repeat the material test to verify repeatability. If the result of the second material test differs considerably, consult Milltronics or its agent.

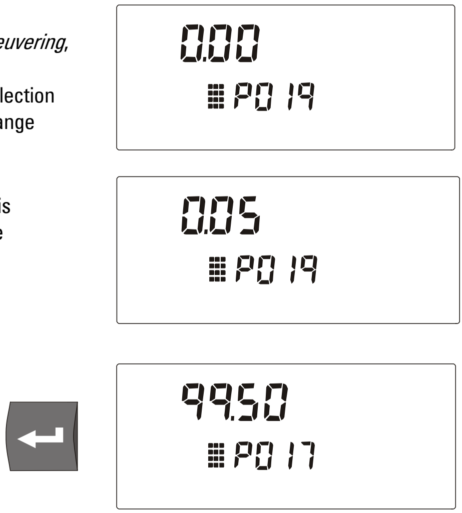
If the span adjust values are significant and repeatable, perform a manual span adjust:

refer to *Maneuvering*, page 18 for parameter selection and value change

PROGRAM mode, P019

if % span adjust is negative, be sure to enter as negative value

enter % span adjust, e.g. 0.05



jumps to P017 adjusted test load, e.g. 97.95

Verify the results of the span adjust by material test or return to normal operation

Design Changes

Where parameters have been changed with a resultant impact on the calibration or do not take effect until a recalibration is done, the parameter warning icon is displayed. In order to clear the icon, perform a zero and span recalibration after the reprogramming session is complete.

If significant changes have been made, an initial zero (P377) and/or initial span (P388) may be required.

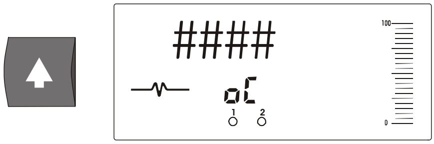
Recalibration

In order to maintain the accuracy of the weighing system, periodic zero and span recalibrations are required. Recalibration requirements are highly dependent upon the severity of the application. Perform frequent checks initially, then as time and experience dictate, the frequency of these checks may be reduced. Record deviations for reference.

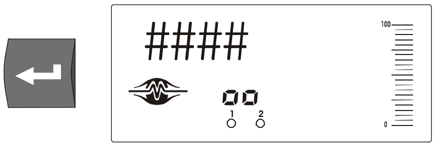
Routine Zero

Run the conveyor empty for several minutes to warm up the belt and insure that it is empty. Test weights are not used during a zero calibration.

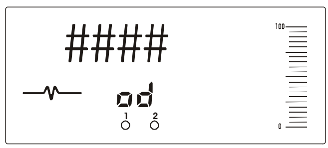
From the run mode



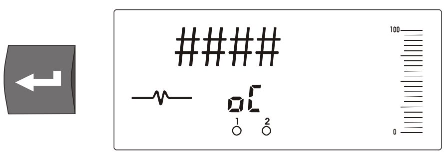
initiate zero calibration
current zero count = ####



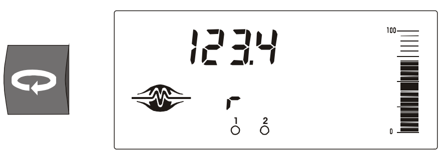
zero calculation,
load value displayed



zero deviation calculated



accept deviation
new zero count = ####



return to run mode

> **Note:** E3 is an indication that the mechanical system is errant. The use of P377, *initial zero*, should be used judiciously and only after a thorough mechanical investigation has been exercised.

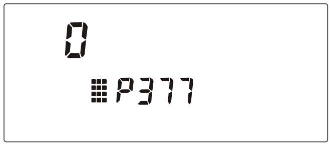
The cause of the increased deviation must be found and rectified. A zero recalibration as previously described can then be retried.

If the operator deems this deviation to be acceptable, set P377 to 1 to invoke an initial zero calibration. Further deviation limits are now based on this new initial zero.

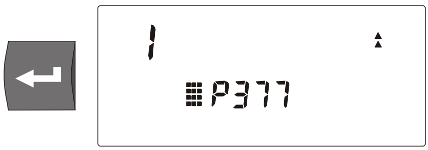
Initial Zero

Perform an initial zero if necessary when a **calibration is out of range** message is shown.

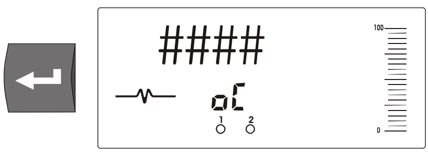
Refer to *Maneuvering* on page 18 for parameter selection and value change.



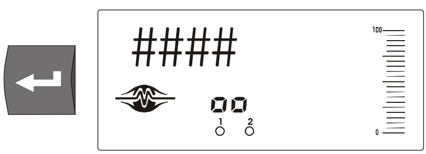
select P377



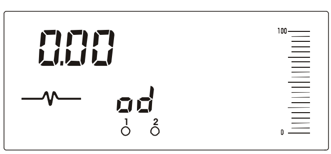
invoke initial zero, enter **1**



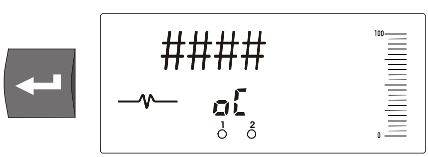
current zero count



zero calculation frequency count displayed



zero deviation



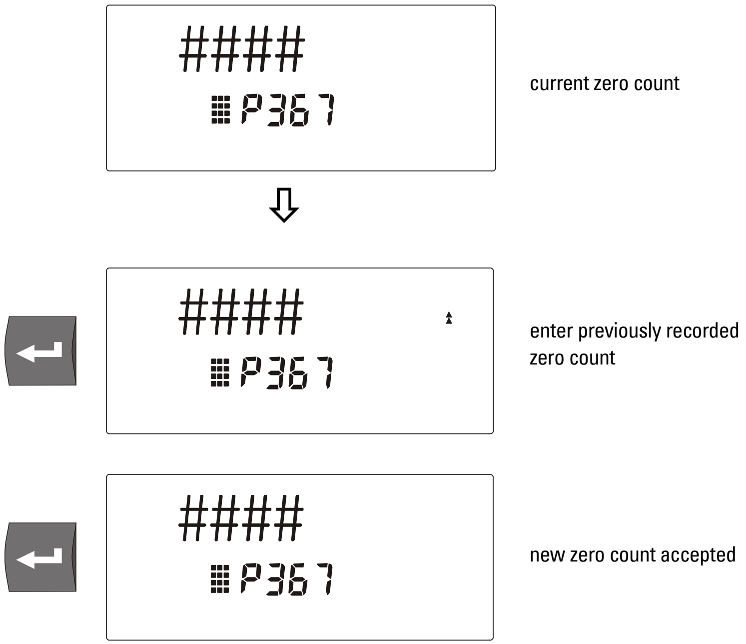
zero deviation accepted initial zero count = ####

Perform Initial Span

Direct Zero

Use direct zero entry (P367) when replacing software or hardware, if it is not convenient to perform an initial zero. A record of the last valid zero count is required.

Refer to *Maneuvering* on page 18 for parameter selection and value change.

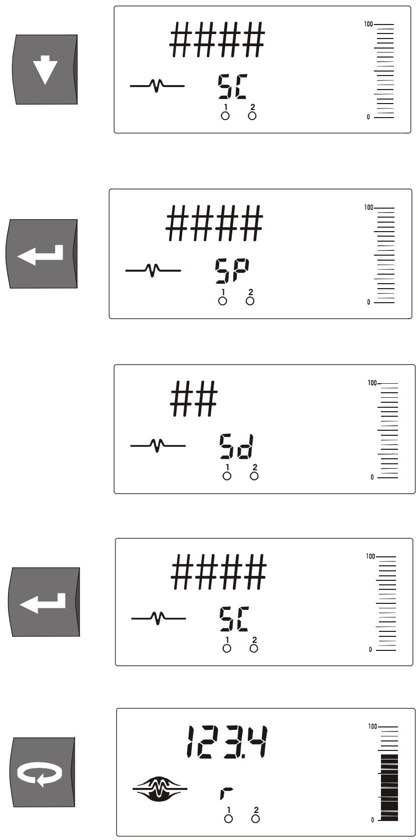


Routine Span

To perform a routine span recalibration, run the conveyor until the belt is empty and stop it. Suspend the test weights from the belt scale per its instruction manual.

Run the conveyor empty at maximum operating speed.

From the zero calibration



Initiate span calibration current span count = ####

span calculation, load value displayed

span deviation = ##

accept deviation new span count = ####

return to run mode

Notes:

- E6 is a reminder that a zero calibration is strongly suggested before a span calibration is initiated. Press ENTER to bypass this message.
- E4 is an indication that the mechanical system is errant. The use of P388, initial span, should be used judiciously and only after a thorough mechanical investigation has been exercised.

The cause of the increased deviation must be found and rectified. A span recalibration as previously described can then be retried.

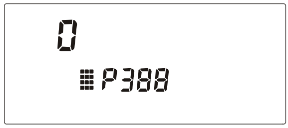
If the operator deems this deviation to be acceptable, set P388 to 1 to invoke an initial span calibration. Further deviations are now based on this new initial span.

Note: Remove the test weight when the span calibration is complete.

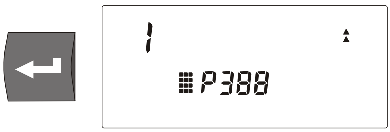
Initial Span

Note: Perform an initial span when a **calibration out of range** message appears.

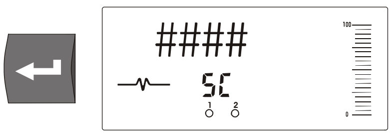
Refer to *Maneuvering* on page 18 for parameter selection and value change.



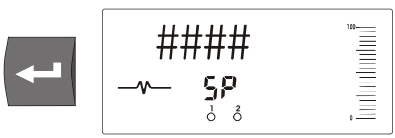
select P388



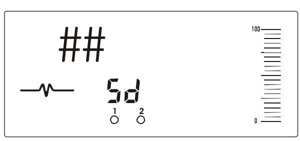
invoke initial span



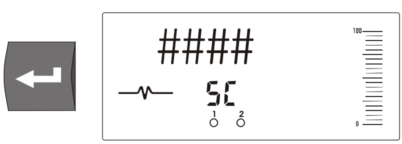
current span count = ####



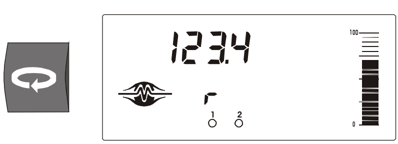
span calculation,
frequency count displayed



span deviation = ##



span deviation accepted
initial span count = ####

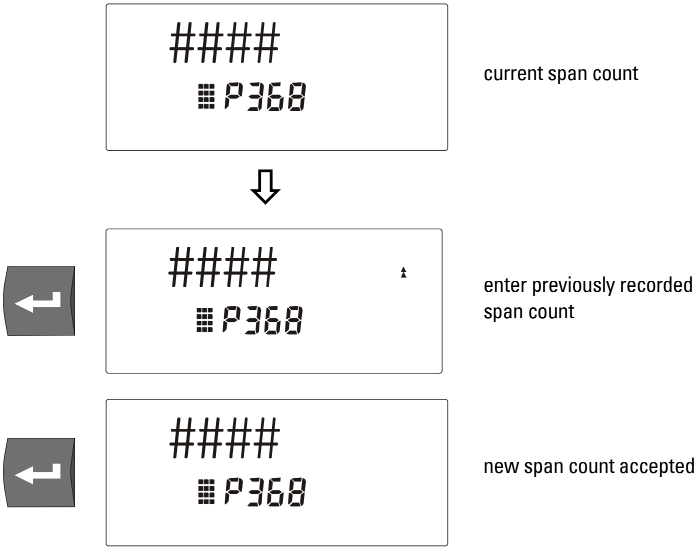


return to run mode

Direct Span

Direct span entry (P368) is intended for use when replacing software or hardware, and when it is not convenient to perform an initial span. A record of the last valid span count is required.

Refer to *Maneuvering* on page 18 for parameter selection and value change.



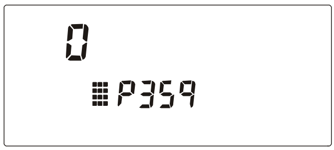
Factoring

In order to calculate the value of a new or unknown test weight to the current span, the factoring procedure is used.

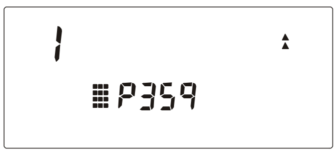
Note: For optimum accuracy in the factoring results, a routine zero calibration is recommended.

Refer to *Maneuvering* on page 18 for parameter selection and value change.

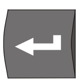
With the conveyor stopped and the belt empty:

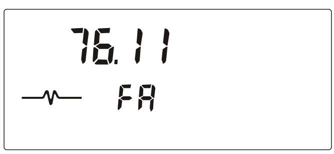


P359 selected



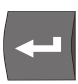
enter





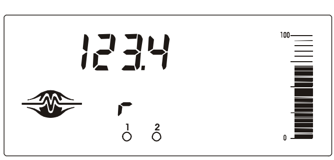
initiated Factoring,
current test load value
e.g. 76.11 kg / m

hang new test weight
onto belt scale, then
run the conveyor empty



dynamic test load value
e.g. 76.03 kg / m

jumps to P017
dynamic test load value
e.g. 76.03 kg / m



return to run mode

Linearization

Conveyor applications where the belt scale is poorly located, or where there is a high degree of variation in belt tension, typically cause the belt scale to report load non-linearly. The BW100 provides a linearizing function (P390 - P396) in order to correct for the deficiency in the weighing system and to provide an accurate report of the actual process.

To verify that the cause of the non-linearity is not mechanical:

1. Run the conveyor belt empty and stop it.
2. Suspend various test weights to the scale to verify mechanical linearity. If the load reported by the BW100 at these tests is non-linear, a mechanical problem is indicated. Refer to the belt scale manual in order to resolve the non-linearity by improved installation or repair.

If it is determined that the non-linearity is due to the weighing application, and not the actual belt scale, apply linearization by performing the following:

- zero calibration
- span calibration at 90 to 100% of design rate
- material tests at 90 to 100% of design rate
- manual span adjust if required
- material tests at 1 to 3 intermediary flow rates where compensation is required.

> **Notes:**
> - Compensation points must be at least 10% of the design load apart.
> - E8 message occurs if a point is less than 10% of full scale or if points are less than 10% apart.

- calculate the percentage compensation for each flow rate tested.

$$\% \text{ compensation} = \frac{\text{actual weight - totalized weight}}{\text{totalized weight}} \times 100$$

Where: actual weight = material test
totalized weight = BW100 total

Recalibration

Example:

A non-linearity with respect to the ideal response exists in a belt scale application with design rate of 200 t/h. It is decided to do material tests at 25, 50 and 75% of the design rate. After performing a zero and a span calibration at 100% of the design rate, followed by material tests and manual span adjust, three material tests were performed at 50, 100 and 150 t/h, as indicated by the BW100. The following data was tabulated. (This example is exaggerated for emphasis).

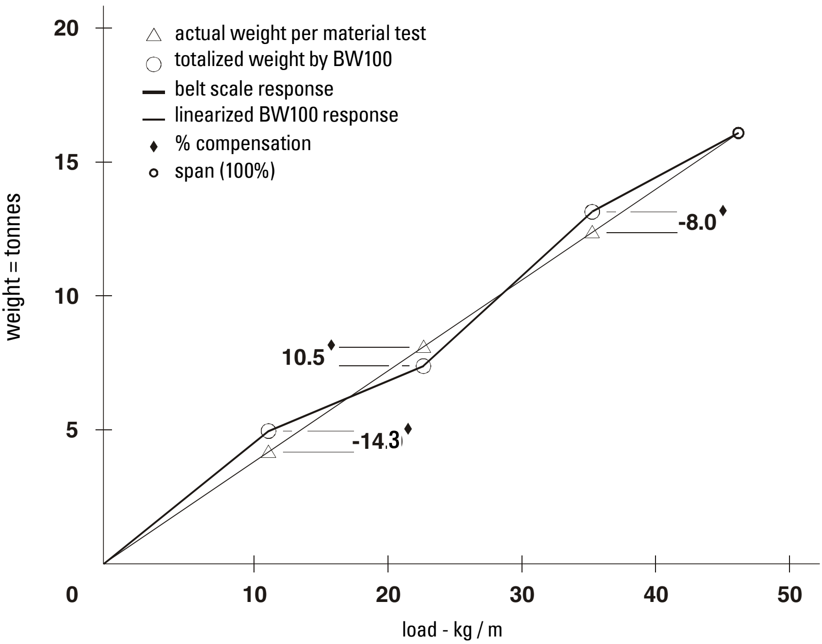
The material tests should be run at same belt speed, representative of normal operation; in this case 1.2 m/s. For each rate, record the corresponding load value by scrolling to the BW100 load display during running conditions or by calculation.

$$\text{load} = \frac{\text{rate}}{\text{speed}}$$

BW100 load kg/m	material test tonnes	BW100 total tonnes	compensation* %
11.6	4.2	4.9	-14.3
23.2	8.4	7.6	10.5
34.7	12.6	13.7	-8.0

*calculation example: $\% \text{ compensation} = \frac{4.2 - 4.9}{4.9} \times 100$

$= - 14.3$

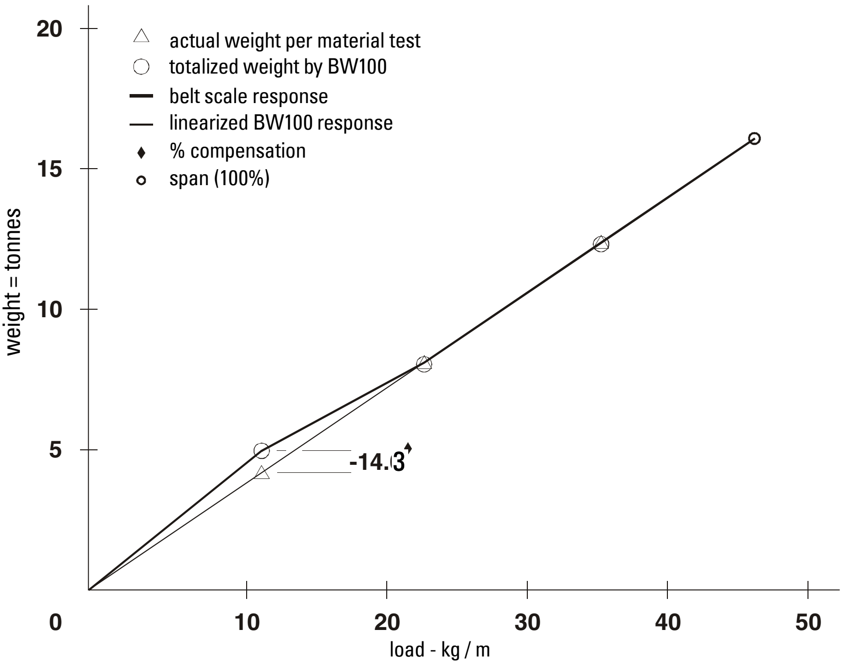


Program the BW100 as follows:

P390 = 1
P391 = 11.6
P392 = -14.3
P393 = 23.2
P394 = 10.5
P395 = 34.7
P396 = -8

Often only one point of compensation is required, usually at a low load value. In the prior example, if compensation was only required at 11.6 kg/m, the programming could be as follows. Compensation is optimized by establishing the next load value that agrees with the material test, hence where compensation is zero and entering it as the next compensation point.

P390 = 1
P391 = 11.6
P392 = -14.3
P393 = 23.2
P394 = 0
P395 = 34.7
P396 = 0



Recalibration

Operation

Load Sensing

In order for the BW100 to calculate rate and hence totalize material flow along the belt conveyor, a load signal representative of weight of material on the belt is required. The load signal is provided by the belt scale. The BW100 is compatible with belt scales fitted with one or two strain gauge type load cells.

Refer to *Specifications* on page 3 and *Installation/Load Cell* on page 6 for belt scale requirements and connection.

Speed Sensing

In order for the BW100 to calculate rate and hence totalize material flow along the belt conveyor, a speed signal representative of belt speed is required. In constant speed applications (no speed sensor), the BW100 can be programmed to provide an internal speed signal. This is achieved by entering the design speed (P014) and providing a jumper across speed input terminals (TB1-5/6). Speed constant (P015) defaults to 100.

For optimum accuracy of the weighing system, both constant and variable speed applications, a speed sensor is required. Again, the design speed and speed constants need to be programmed, however the jumper across the speed input has to be removed and the speed sensor connected.

Refer to *Specifications* on page 3 and *Installation/Speed Sensor* on page 6 for speed sensor requirements and connection.

Modes of Operation

RUN is the normal or reference mode of operation. It continuously processes the load signal from the belt scale to produce internal load and rate signals, which are in turn used as the basis for totalization, mA output and relay control. The RUN display is programmed (P081) to scroll through rate, totalization, load and speed; either manually by pressing the ENTER key, or automatically. A bar graph is continuously displayed. It is proportional to the analog output as programmed (see *Analog Output* on page 43).

From the RUN mode, access to the PROGRAM mode on and zero and span calibration is made.

The PROGRAM mode allows viewing and, with security permission (P000), changing parameter values. During PROGRAM, RUN mode functions are still active, i.e.: rate, relay, analog output and totalization. Error interrupts are suppressed and the bar graph is disabled.

If the PROGRAM mode is left idle for a period of ten minutes, it automatically reverts to the RUN mode.

Damping

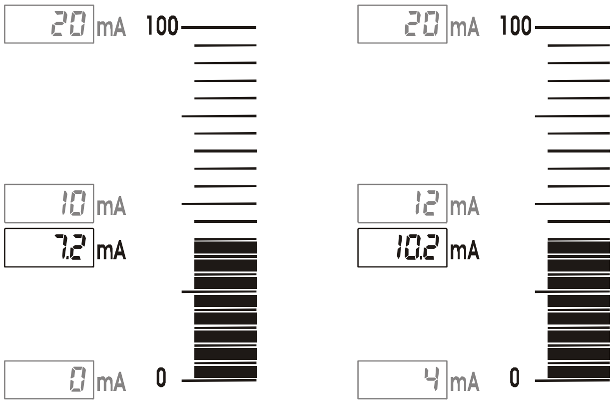
Damping (P080) controls the speed at which the displayed readings and output functions respond to changes in their respective input function; load, speed and the internal rate signals. Changes in the displayed rate of material flow, material loading and belt speed are controlled by the damping. Relay alarm functions based on input functions of flow, load and speed, respond to the damped value.

If the specific mA output damping parameter (P220) is enabled (value other than 0), then the damping (P080) as it pertains to the mA function is overridden, and the output value and bar graph respond independently at the specified mA output damping rate (P220).

Analog Output

The BW100 provides one isolated analog output. The output can be assigned (P201) to represent rate, load or speed. The output range can be set to 0 - 20 mA or 4 - 20 mA (P200). The 0 or 4 mA value corresponds to empty or zero condition, whereas the 20 mA value corresponds to the associated design value: rate (P011), load (P952) or speed (P014). The analog output can be limited for over range levels of 0 mA minimum and 22 mA maximum (P212 and P213 respectively). The output 4 and 20 mA levels can also be trimmed (P214 and P215 respectively) to agree with a millammeter or other external mA input device.

The BW100 LCD provides a bar graph as a function of analog output. It displays the mA value as percentage of the mA range.



The mA output value can be tested using parameter P911. Refer to *Parameter P911* on page 62.

Relay Output

The BW100 offers one single pole double throw (SPDT) relay that can be assigned (P100) to one of the following alarm functions:

- rate: relay alarms on high and/or low material flow rate.
- auto zero: relay alarms when an attempted auto zero calibration reports an out of range condition (E9).
- speed: relay alarms on high and/or low belt speed.
- load: relay alarms on high and or low belt load.
- error: relay alarms on any error condition as it is reported.

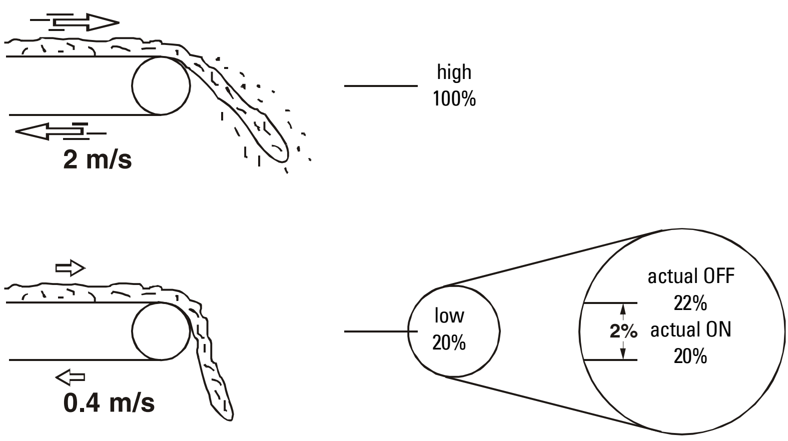
- Refer to *Troubleshooting*, page 65.

Except for alarm on 'auto zero' and 'error', the high and low alarm setpoints (P101 and P102 respectively) are required and must be entered in the appropriate units.

The on / off actuation at both setpoints is buffered by the damping (P080) and the programmable dead band (P117), to prevent relay chatter due to fluctuations. The relay is normally energized; i.e. the normally closed (n.c.) contact held open. Upon an alarm condition, the relay is de-energized and the alarm icon on the BW100 display appears. Once in alarm, the relay and icon remain in alarm status until the alarm condition is removed.

Example:

P014 = 2m/s, design speed
P100 = 3, belt speed
P101 = 100% (2m/s)



alarm **ON** is with relay de-energized

Totalization

The totalization function is based on the internal rate (mass per unit time) signal proportional to belt speed and load on the associated belt scale. It is not affected by the damping function (P080). The rate signal is sampled several times a second to accurately count the mass of material conveyed. The count is held in the master totalizer used to increment the internal totalizers and to produce a pulse signal for the remote totalizers.

The BW100 provides four separate totalizer functions:

- internal totalizer 1
- internal totalizer 2
- remote totalizer 1
- remote totalizer 2

To avoid totalizing material at low flow rates, the totalizer drop out limit (P619) is set to a percentage of the design rate. Below this limit, totalization stops. When material flow returns to a rate above the drop out limit, totalization resumes.

Totalizer resolution or count value is set by the respective control parameters, P631 -- P639. If the resolution selected causes the totalizer to lag behind the count rate, an E2 error is displayed after making the parameter entry. The error is rectified by selecting a greater resolution value.

Example: Internal totalizer 1

Given: P005 = 1 (t/h)
P631 = 4

Then: totalizer count increments by 10 for each 10 metric tonnes registered

External totalizer 1

Given: P005 = 1 (t/h)
P638 = 5

Then: contact closure occurs once for every 10 metric tonnes registered

For remote totalization, the contact closure duration is set by the respective control parameters, P643 and P644. The value is automatically calculated upon entry of the design rate (P011) and remote totalizer parameters (P638 and P639), so that the duration of contact closure allows the relay response to track the total up to the design rate. The value can be changed to suit specific contact closure requirements, such as in the case of programmable logic controllers. If an E2 error is displayed, P638 or P639 has to be increased.

The totalizers are reset through the master reset (P999), the totalizer reset (P648) or through the keypad.

- master reset: the reset of all totalizer functions is included in the master reset.
- totalizer reset: totalizer reset can be used to resets internal totalizers 1 and 2, or totalizer 2 independently.
- keypad: pressing simultaneously while in the **RUN** mode resets internal totalizer 1, as well as the internal counts for both remote totalizers.

Placing the internal totalizers on to the display scroll of the **RUN** mode is controlled by the totalizer display parameter (P647); displaying either one or both totalizers.

Auto Zero

The Auto Zero function allows a zero calibration to be initiated automatically under the following conditions.

- the auto zero input (TB1-9/10) is in a closed state; jumper or remote switch
- the load is less than 2% of the design load

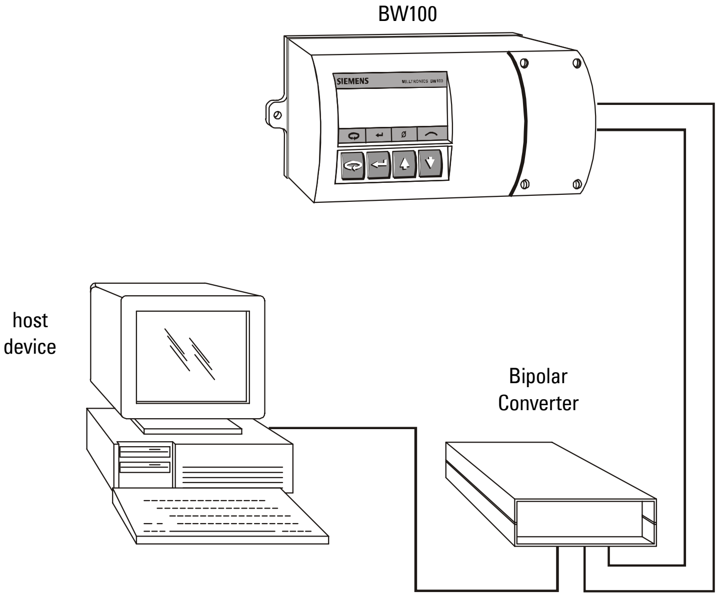
If the resulting zero deviation is less than an accumulated 2% from the last operator initiated zero, the auto zero is accepted.

If the deviation is greater than an accumulated 2%, an E9 error is displayed and the relay, if so programmed, goes into alarm (refer to *Operation/Relay Output,* page 44). The E9 error is cleared after five seconds.

If material feed resumes during an auto zero function, the totalizing function is maintained.

Communications

The BW100 bipolar current loop provides long distance communication to a customer device.



The BW100 communication port (TB1-21 to 25) is software set for baud (P751) and mode enable (P760). Refer to *Installation/Communication* on page 14 for wiring details.

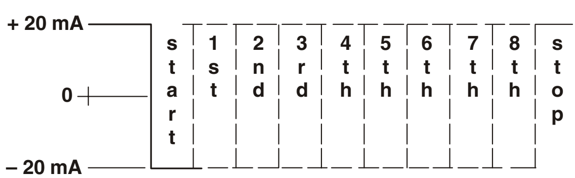
> **Note:** If communicating via Milltronics Dolphin software, the baud rate must be set to **4800**.

Protocol

Protocol refers to the format, sequence and value of the data fields used in communication messages. Each data field of a BW100 message contains one or more bytes of ASCII binary code.

Each byte contains:

- » 8 data bits
- » no parity bit
- » 1 stop bit



Data Field Descriptions

The following data fields are used.

som

BW100 start of message, ASCII character = STX (Hex Value = 02).

DEVICE

Identifies the BW100 to which the message applies. The device is a 2 character number that equals the Unit I.D. code, (P761). ASCII characters = 00 to 15.

MT

Identifies the 2 character message type transmitted, ASCII characters:

50 = material flow rate
51 = material load
52 = belt speed
53 = totalizer 1, internal
54 = totalizer 2, internal

READING

Contains the measurement value in the engineering units of measure selected during BW100 programming. The number of bytes in this data field varies dependent upon the reading value. Up to 8 ASCII characters including the decimal point may be transmitted.

UNITS

Three ASCII characters identify the totalizer engineering units (MT=53 and MT=54). The first character is always a space. The remaining characters may be:

t = tonnes
T = tonnes
LT = long tonnes
kg = Kilograms
lb = pounds

eom
BW100 end of message, ASCII character = CR (Hex Value = 0D).

Message Requests

Message requests must be transmitted from the host to the BW100 in the following format.

som DEVICE MT eom

Example:

Data Field	ASCII Character	Example Description
som	STX	start of message
DEVICE	01	for BW100 # 1
MT	50	material flow rate request
eom	CR	end of message

Message Responses

The BW100 response to a flow rate (MT=50) load (MT=51) or speed (MT=52) message request is in the following format.

som DEVICE MT READING eom

Example:

Data Field	ASCII Character	Example Description
som	STX	start of message
DEVICE	00	from BW100 # 0
MT	50	material flow rate response
READING	392.5	is 392.5
eom	CR	end of message

The response to a material total (MT=53) message request is in the following format.

som DEVICE MT READING UNITS eom

Example:

Data Field	ASCII Character	Example Description
som	STX	start of message
DEVICE	01	from BW100 # 1
MT	53	material total response
READING	129.2	is 129.2
UNITS	t	metric tonnes
eom	CR	end of message

Parameters

> **Note:** *f* denotes factory default.

P000 Security lock

Locks out the programming **change value** function such that the values of P001 through P999 cannot be changed. This however does not prevent the **select** function from use; i.e. for viewing values.

Programming is locked out if the value of P000 is other than 1954.

Entry:

1954 = unlocked[f]
~~1954~~ = locked

Quick Start (P005 to P017)

> **Note:** **Quick Start** is the minimum parameter programming required before attempting a calibration and successful entry into the **RUN** mode.

P005 Design Rate Units

Determines the units for programming and measurement.

Entry:

1[f] = t/hr (tonnes per hour)
2 = kg/hr (kilograms per hour)
3 = LT/Hr (long tons per hour)
4 = T/h (short tons per hour)
5 = lb/hr (pounds per hour)

Changing this parameter does not affect the rate (P011), belt speed (P014) or belt length (P016) parameters. These parameters should be re-entered for conformity in units.

t = 1000 kg
LT = 2240 lb.
T = 2000 lb.

P011 Design Rate

Specifies the design rate of material flow for the belt scale.

Enter the design rate from the supplied design data sheet

P014 Design Speed

Specifies the design speed for the conveyor belt.

Speed unit s are:

metre/s if P005 = 1 or 2

feet/min. if P005 = 3, 4 or 5

P015 Speed Constant

This value multiplied with the speed sensor frequency, calculates the actual belt speed.

Entry: If speed input is wired for constant speed (TB1 5/6 jumpered), value defaults to **100**.

Enter the speed constant = from the supplied design data sheet

or

= speed sensor pulses per revolution*
pulley circumference (m or ft)/ revolution

* refer to speed sensor nameplate or consult Siemens Milltronics or their agent.

Note: Common speed sensor pulses per revolution:
RBSS - 150.4 pulses/meter (45.8 pulses/ft.)
TASS - 9.947 pulses/meter (3.03 pulses/ft.)

P016 Belt Length

The length of the conveyor belt (one belt revolution).

Length units are:

metre if P005 = 1 or 2

feet if P005 = 3, 4 or 5

Enter the belt length

P017 Test Load

The load to be referenced when performing a span.

Load units are:

kg/m if P005 = 1 or 2

lb./ft. if P005 = 3, 4 or 5

The value for P017 can be calculated as follows:

$$\text{Test Load} = \frac{\text{Total weight of of all test weights}}{\text{idler spacing}} \quad \frac{(kg)}{(m)} \text{ or } \frac{(lb)}{(ft)}$$

*End of **Quick Start** parameters. A calibration can now be performed.*

Parameters

P018 Speed Constant Adjust

This parameter allows adjustment to the speed constant (P015).

Initially, this parameter displays the dynamic speed of the belt. If the displayed speed is not equal to the actual speed, enter the actual belt speed.

For speed sensor applications, the value of P015 is automatically adjusted.

For constant speed (TB1 5/6 jumper) the value of P014 is automatically adjusted.

P019 Manual Span Adjust

This parameter allows adjustment to the span calibration.

The adjustment value is generally determined by performing material tests. Refer to *Recalibration/Material Tests,* page 30.

Enter the calculated adjustment.

P022 Minimum Speed Frequency

Sets the minimum frequency that the speed sensor can reliably read. Signals at low frequencies are erratic, adversely affecting the performance of the weighing system.

Entry:

1 = 1 Hz (at 1 Hz, it takes 1 sec before defaulting to 0 speed)
2 = 2 Hz (at 2 Hz, it takes 0.5 sec before defaulting to 0 speed)

P080 Damping

Sets the speed of response to which the displayed readings (rate, load and speed), and outputs (alarm and mA) react to change.

Note: The effect of damping (P080) on mA output can be overridden by mA output damping (P220).

The greater the damping value, the slower the response.

Enter damping value, range 1 - 9999.

P081 Display Mode

Sets the display mode. Normally, the display shows rate, or the last manually selected function. If set to alternating, the display alternates between rate and totalizer (1 and/or 2, as programmed by P647).

Entry:

0 = normal
1 = alternating

Relay/Alarm Function (P100 - P117)

Note: These parameter are specific to the use of the relay/alarm function. Refer to *Operation/Relay Output*, page 13.

P100 Relay Set Up

Sets the alarm mode for the relay.

Entry:

0 = off
1 = rate
2 = auto zero
3 = belt speed
4 = belt load
5 = error

P101 High Alarm

Sets the high alarm setpoint for relay functions P100 = 1, 3 or 4.

Enter the value in % of full scale.

P102 Low Alarm

Sets the low alarm setpoint for relay functions P100 = 1, 3 or 4.

Enter the value in % of full scale.

P117 Alarm Dead Band

Sets the dead band to prevent relay chatter due to fluctuations at the high or low setpoint.

Enter the value in % of full scale

End of relay/alarm parameters.

mA Output Parameters (P200 - P220)

Note: These parameters are specific to the use of the mA output. Refer to *Operation* on page 42 for details.

P200 mA Range

Sets the range for the mA output.

Entry:

1 = 0 - 20 mA
2 = 4 - 20 mA

P201 mA Function

Assigns the mA output to track one of the integrator functions.

Entry:

1 = rate
2 = load
3 = speed

P212 mA Min Limit

Limits the lower mA range (0 or 4 mA) to a minimum output value.

Enter limit value, range 0 - 22.

P213 mA Max Limit

Limits the upper mA range (20 mA) to a maximum output value.

Enter limit value, range 0 - 22.

P214 4 mA Trim

Adjusts the 4 mA output level to agree with a milliammeter or other external mA input device.

Enter trim value, range 0 - 9999.

P215 20 mA Trim

Adjusts the 20 mA output level to agree with a milliammeter or other external mA input device.

Enter trim value, range 0 - 9999

P220 mA Output Damping

Sets the speed at which the mA output reacts to change.

The greater the damping value, the slower the response. If the value is 0, the mA output assumes the damping set in P080.

Enter the damping value, range 0 - 9999

End of mA output parameters.

Load Cell Balancing Parameters (P291 - P295)

Note: These parameters are used for verifying or balancing the load cells (2) on the associated conveyor belt scale. Refer to *Start Up*, page 17, for details and procedure for use of these parameters.

P291 Calculator Input 1

This register displays the count associated with the summation of load cell A and B signals, when balancing the A and B load cells of the associated belt scale.

P292 Calculator Input 2

This register displays the count associated with the load B signal, when balancing the A and B load cells of the associated belt scale.

P293 Calculator Input 3

This register displays the count associated with the load cell B signal, when balancing the A and B load cells of the associated belt scale.

P294 Calculator Input 4

This register displays the count associated with the summation of load cell A and B signals, when balancing the A and B load cells of the associated belt scale.

P295 Load Cell Balance

Used in conjunction with balance calculator parameters (P291 - P 294), this parameter displays the adjustment required to complete the load cell balance procedure.

End of balancing parameters

P341 Run Time

The cumulative days that the application device has been in service. The time is recorded once daily in a non-resetable counter. Periods of less than 24 hr. are not recorded, nor accumulated.

P350 Calibration Security

This parameter provides additional security to the global lock (P000).

Entry:

0 = view parameters, perform zero and span, no reset of totalizer 1
1 = same as level 0, but cannot perform span
2 = same as level 0, but cannot perform zero and span

P359 Factoring

Factoring is used as a method of calculating the value of the test load (P017) to a new physical test weight.

Entry:

0 = idle
1 = factor

Note: Totalization is halted during the factoring procedure, and resumed only upon return to the **RUN** mode.

Parameters

P360 Calibration Duration

Sets the number of belt revolutions to use during a zero or span calibration.

Enter number of belt revolutions, range 1 - 99.

P367 Direct Zero

This parameter allows the zero reference count to be viewed or entered directly.

Direct entry is intended for use when replacing software or hardware and it is not convenient to perform an initial zero at that time.

P368 Direct Span

This parameter allows the span reference count to be viewed or entered directly.

Direct entry is intended for use when replacing software or hardware and it is not convenient to perform an initial span at that time.

P370 Zero Limit

Sets the zero calibration deviation limit from the last initial zero. If the accumulated deviation exceeds the limit, the zero calibration is aborted (E3).

Entry:

0 = +/- 12.5% of initial zero
1 = +/- 2% of initial zero

P377 Initial Zero

The initial zero is the reference zero to which all subsequent operator initiated zero calibrations are compared in determining whether they have deviated beyond the zero limit (P370).

Entry:

0 = idle
1 = initial zero

Note: Refer to *Recalibration/Initial Zero* on page 33 for use of this function.

P388 Initial Span

The initial span is the reference to which all subsequent span calibrations are compared in determining whether they have deviated beyond 12.5% of the initial span.

Entry:

0 = idle
1 = initial span

Note: Refer to R*ecalibration/Initial Span* on page 36 for use of this function.

Linearization Parameters (P390 - P396)

Note: These parameters are used to compensate for non-linear response of the weighing system to the BW100. Refer to Recalibration/Linearization for details and example on the use of these parameters.

P390 Linearization

Enables or disables the linearization function.

Entry:

0 = OFF
1 = ON

P391 Linearizer, Point 1

Enter the load, in units of P017, for point 1

P392 Compensation, Point 1

Enter the calculated compensation, in percent, for compensation point 1

P393 Linearizer, Point 2

Enter the load, in units of P017, for point 2.

P394 Compensation, Point 2

Enter the calculated compensation, in percent, for compensation point 2.

P395 Linearizer, Point 3

Enter the load, in units of P017, for point 3.

P396 Compensation, Point 3

Enter the calculated compensation, in percent, for compensation point 3.

End of Linearization Parameters.

Totalization (P619 - P648)

The following parameters are specific to the use to the BW100 totalizers. Refer also to *Operation/Totalization*, page 45.

Note: If the resolution (P631 - P639) selected would cause the totalizer to lag behind the count rate, a message E2 is displayed after making the entry.

Select a greater resolution value.

Example

Given:	P005 = 1 (t/h) P631 = 5
Then:	totalizer count increments by 10 for each 10 metric tonne registered

P619 Totalizer Drop Out

This parameter sets the limit, in percent of design rate, below which material rates are not totalized.

The value of **0** is reserved to allow both negative and positive totalization.

Enter drop out value in % of design rate.

P631 Totalizer 1 Resolution, Internal

This parameter sets the resolution of internal totalizer 1.

Entry:

1 = 0.001 (one thousandth)
2 = 0.01 (one hundredth)
3 = 0.1 (one tenth)
4 = 1 (unit)
5 = 10 (x ten)
6 = 100 (x hundred)
7 = 1000 (x thousand)

P632 Totalizer 2 Resolution, Internal

This parameter sets the resolution of internal totalizer 2.

Entry:

1 = 0.001 (one thousandth)
2 = 0.01 (one hundredth)
3 = 0.1 (one tenth)
4 = 1 (unit)
5 = 10 (x ten)
6 = 100 (x hundred)
7 = 1000 (x thousand)

P638 Totalizer 1 Resolution, External

This parameter sets the resolution of external totalizer 1.

Entry:

1 = 0.001 (one thousandth)
2 = 0.01 (one hundredth)
3 = 0.1 (one tenth)
4 = 1 (unit)
5 = 10 (x ten)
6 = 100 (x hundred)
7 = 1000 (x thousand)

P639 Totalizer 2 Resolution, External

This parameter sets the resolution of external totalizer 2.

Entry:

1 = 0.001 (one thousandth)
2 = 0.01 (one hundredth)
3 = 0.1 (one tenth)
4 = 1 (unit)
5 = 10 (x ten)
6 = 100 (x hundred)
7 = 1000 (x thousand)

P643 Totalizer 1 Contact Closure, External

The value of this parameter represents a multiple of 32 ms of contact closure for remote totalizer 1. The value is automatically calculated upon entry of P1 (design rate) and P638 (totalizer 1 resolution, external) so that the duration of contact closure allows the transistor switch response to track the total, up to the design rate.

The value can be changed to suit specific contact closure requirements, such as in the case of programmable logic controllers. If a message E2 is displayed, P638 has to be increased.

Entry:

1 = 32 ms
2 = 64
3 = 96
4 = 128
5 = 160
6 = 192
7 = 224
8 = 256
9 = 288

Parameters

P644 Totalizer 2 Contact Closure, External

The value of this parameter represents a multiple of 32 ms of contact closure for remote totalizer 2. The value is automatically calculated upon entry of P1 (design rate) and P639 (totalizer 2 resolution, external) so that the duration of contact closure allows the transistor switch response to track the total, up to the design rate.

The value can be changed to suit specific contact closure requirements, such as in the case of programmable logic controllers. If a message E2 is displayed, P639 has to be increased.

Entry:

1 = 32 ms	6 = 192
2 = 64	7 = 224
3 = 96	8 = 256
4 = 128	9 = 288
5 = 160	

P647 Totalizer Display

Selects the totalizer combination to be displayed, either manually through the scroll display key or automatically by control of the display mode (P081).

Entry:

1 = totalizer 1
2 = totalizer 2
3 = totalizers 1 and 2

P648 Totalizer Reset, Internal

Resets the internal totalizers.

Entry:

0 = idle
1 = reset totalizer 2
2 = reset totalizers 1 and 2

End of Totalization parameters.

Communication (P751 - P761)

These parameters are specific to the use of the communication parameters. Refer also to *Communications*, page 47.

P751 Baud Rate

Sets the baud rate for the proprietary bi-polar current loop. This baud rate is not applicable to communication via Milltronics Comverter.

Entry:

300, 1200, 2400, 4800 or 9600 baud

4800 baud is required for Dolphin communications over the bi-polar current loop.

P760 Communication Mode

Selects the communication mode.

- bi-polar current loop: interface with the host device (PLC or computer)
- infrared link: communication is made using the Milltronics ComVerter.
- maintenance: communication is made via the bi-polar current loop for **RUN** mode operations and infrared link for **PROGRAM** mode operations

Entry:

1 = bipolar current loop
2 = infrared link
3 = maintenance

P761 Identification Number

Sets the identification number for the unit.

Enter the desired identification number, range 0 - 15.

End of communication parameters.

Test and Diagnostic (P900 - P951)

> **Note:** These parameters are used for test and diagnostic purposes.

P900 Software Revision

Displays the EPROM (Flash ROM) software revision level.

P901 Memory

Tests the memory. Test is initiated by scrolling to the parameter or repeated by pressing ENTER.

Display:

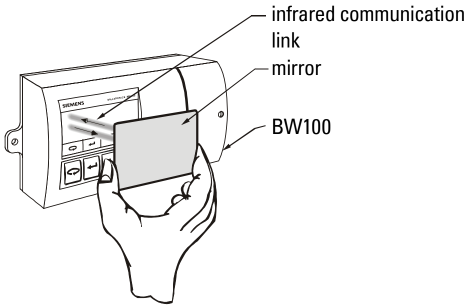
PASS = normal
FAIL = consult Siemens Milltronics.

P907 Programmer Interface

Tests the infrared communications link. Test is initiated by scrolling to the parameter or repeated by pressing ENTER.

Display:

PASS = normal
FAIL = consult Siemens Milltronics.



P911 mA Output Value

Displays the value from the previous measurement. A test value can be entered and the displayed value is transmitted to the output. Upon returning to the RUN mode, the parameter assumes the actual mA output level.

P940 Load Cell A, mV_{in}

Displays the mV signal input from the load cell. Range 0.00 - 60.00 mV.

P941 Load Cell B, mV_{in}

Displays the mV signal input from the load cell. Range 0.00 - 60.00 mV.

P942 V/F converter, V_{in}

Displays the input voltage to the voltage to frequency converter.
Range 0 - 3.98 V

P943 V/F converter, f_{out}

Displays the output frequency of the voltage to frequency converter.
Range 0 - 131,072

P944 Power sensor

Displays a voltage supply reference for diagnostic purposes.

P949 Diagnostic Errors

Enables or disables diagnostic error checking, E101 - E104

Entry:

0 = disable
1 = enable

Refer to *Troubleshooting* on page 65.

P950 Zero register

Registers the number of zero calibrations that have been done since the last master reset.

P951 Span Register

Registers the number of span calibrations that have been done since the last master reset.

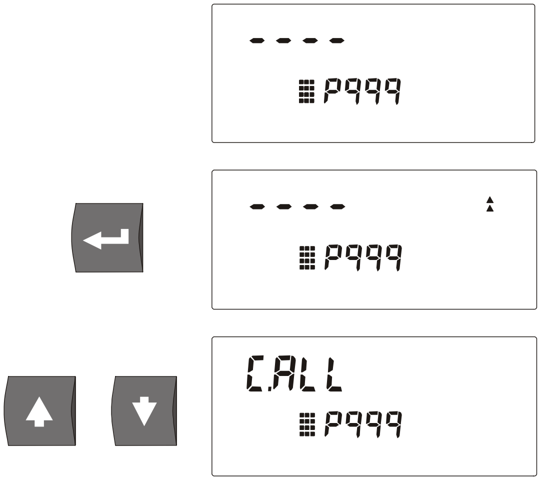
P952 Design Load

Displays the value of the design load, which corresponds to the full scale value for alarm and mA output functions. The design load is calculated, based on the design rate and design speed.

End of test and diagnostic parameters.

P999 Master Reset

Resets parameters and totalizers to their factory setting.



Troubleshooting

message	diagnosis	action
E1 (program)	security code required	enter access code into P000
E2 (run)	totalizer resolution too low	increase value (P631 - P639)
E3 (run)	zero out of range	consider an initial zero P377, refer to *Recalibration/Initial Zero* on page 33
E4 (run)	span out of range	consider an initial span P388, refer to *Recalibration/Initial Span* on page 36
E5 (run)	parameter not entered	check parameters P005 - P017 for entry
E6 (run)	zero calibration required	do a zero calibration
E7 (run)	span calibration required	do a span calibration
E8 (program)	parameter value error	check that value is valid
E9(run)	auto zero out of range	auto zero has accumulated deviation beyond 2% from last operator initial zero. If error is not caused by material on belt, then do an operator initiated zero.
E10 (run)	rate or span out of range	loading on belt is 300% of rated load or greater. Investigate and if no mechanical cause, check to see if re-rating the design rate is required.
E11 (run)	speed greater than twice the design speed	check design belt speed against actual belt speed, check speed constant, perform speed constant adjust (P018) if necessary
E12 (factoring)	span out of range	test load is either too low or beyond 100% of design load (P952). Replace test weight with a heavier or lighter weight and try factoring again.

<table>
<thead>
<tr><th>message</th><th>diagnosis</th><th>action</th></tr>
</thead>
<tbody>
<tr><td>E101 (run)</td><td>load cell A mV reading is out of range</td><td rowspan="2">error will appear if:
• mV signal from load cell A or B is out of the 0-50 mV range
• the mV signal from load cell A or B is less than the zero calibration mV level minus one half the span mV level
• A or B mV is greater than 4 times the span mV value

check load cell mV signal and ensure that it is within range

check wiring</td></tr>
<tr><td>E102 (run)</td><td>load cell B mV reading is out of range</td></tr>
<tr><td>E103 (run)</td><td>combined mV signal from load cell A and B is out of range</td><td>error will appear if the combined mV signal from load cell A and B is too low

check both load cell signals and ensure that they are greater than 0 mV

check wiring</td></tr>
<tr><td>E104 (run)</td><td>faulty memory location found</td><td>cycle power and perform memory test (P901)

if error reappears, the BW 100 must be repaired or replaced.</td></tr>
<tr><td>OF</td><td>no speed signal</td><td>check speed circuit or run conveyor</td></tr>
</tbody>
</table>

- Error messages are cleared when the condition is remedied.
- **RUN** mode errors are suppressed during **PROGRAM** mode, zero or span calibration.
- Zero and span errors are cleared when zero or span is initiated. Errors that happen during the calibration require re-starting the procedure.
- Program errors are cleared when any key is pressed.
- The messages E101 through E104 can be turned off (P949).
- The load cell errors are detected by certain conditions where it is apparent that the load cell is not functioning or incorrectly wired. It is not a conclusive test, since even with incorrect wiring, the resulting input from the load cell may be within a valid range.

Maintenance

The BW100 requires no maintenance.

The external surface of the enclosure may be cleaned using a vacuum cleaner and a clean dry paint brush. The display window should be cleaned with a moist non-abrasive cloth.

It is a good idea to check the associated load sensing device, according to its instruction manual.

Software Updates

The software can be updated from a floppy disk by use of a PC (IBM Compatible) with Milltronics Dolphin software. It is recommended that a reset (P999) is done after the software update followed by zero and span calibrations.

Direct zero entry (P367) and direct span entry (P368) will suffice in lieu of dynamic zero and span calibrations. Therefore, zero and span counts should be recorded prior to doing the software update.

Alphabetical Parameter List

Parameter	Number
Alarm Dead Band	P117
Baud Rate	P751
Belt Length	P016
Calculator Input 1	P291
Calculator Input 2	P292
Calculator Input 3	P293
Calculator Input 4	P294
Calibration Duration	P360
Calibration Security	P350
Communication Mode	P760
Compensation Point 1	P392
Compensation Point 2	P394
Compensation Point 3	P396
Damping	P080
Design Rate	P011
Design Speed	P014
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Direct Zero	P367
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High Alarm	P101
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Initial Span	P388
Linearization	P390
Linearizer Point 1	P391
Linearizer Point 2	P393
Linearizer Point 3	P395
Load Cell **A**, mV in	P940
Load Cell **B**, mV in	P941
Load Cell Balance	P295
Lock	P000

Parameter	Number
Low Alarm	P102
mA Function	P201
mA Output Damping	P220
ma Output Value	P911
mA Maximum Limit	P213
mA Minimum Limit	P212
mA Range	P200
mA Trim, 20	P215
mA Trim, 4	P214
Manual Span Adjust	P019
Master Reset	P999
Memory	P901
Minimum Speed Frequency	P022
Power Sensor	P944
Programmer Interface	P907
Relay Set Up	P100
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Software Revision Number	P900
Span Register	P951
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Speed Constant Adjust	P018
Test Load	P017
Totalizer 1 Closure, External	P643
Totalizer 2 Closure, External	P644
Totalizer 1 Resolution, External	P638
Totalizer 2 Resolution, External	P639
Totalizer 1 Resolution, Internal	P631
Totalizer 2 Resolution, Internal	P632
Totalizer Display	P647
Totalizer Drop out	P619
Totalizer Reset, Internal	P648
Units	P005
V/F Converter, V in	P942
V/F Converter, f out	P943
Zero Register	P950
Zero Limit	P370

Program Record

Program Record	
Parameter	**Value**
P005 Units	
P011 Design Rate	
P014 Design Speed	
P015 Speed Constant	
P016 Belt Length	
P017 Test Load	
P018 Speed Constant Adjust	
P019 Manual Span Adjust	
P022 Minimum speed Frequency	
P080 Damping	
P081 Display Mode	
P100 Relay Set Up	
P101 High Alarm	
P102 Low Alarm	
P117 Alarm Dead Band	
P200 mA Range	
P201 mA Function	
P212 mA Min Limit	
P213 mA Max Limit	
P220 mA Output Damping	
P341 Run Time	
P350 Calibration Security	
P360Calibration Duration	
P367 Direct Zero	
P368 Direct Span	
P370 Zero Limit	
P390 Linearization	
P391 Linearizer, Point 1	
P392 Compensation, Point 1	
P393 Linearizer, Point 2	
P394 Compensation, Point 2	
P395 Linearizer, Point 3	
P396 Compensation, Point 3	

Program Record	
Parameter	**Value**
P396 Compensation, Point 3	
P619 Totalizer Dropout	
P631 Total 1 Resolution, Int	
P632 Total 2 Resolution, Int	
P638 Total 1 Resolution, Ext	
P639 Total 2 Resolution, Ext	
P643 Total 1 Closure, Ext	
P644 Total 2 Closure, Ext	
P647 Totalizer Display	
P648 Totalizer Reset, Int	
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P761 Identification Number	
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P949 Diagnostic Errors	
P950 Zero Register	
P951 Span Register	
P952 Design Load	

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