Weighfeeder Instrument MW96A
Instruction Manual ALL

ModWeigh

FEATURES

- **Flowrate measurement and control for weighfeeders**
- **Motor Speed Control Output Signal**
- **Flowrate Output**
- **Material Totaliser**
- **Modbus communications (independent RS232 and RS485 ports)**
- **USB Host & Device (memory stick & PC)**
- **Field software upgrades**
- **12-24Vdc power supply**
- **Overall accuracy better than 0.01%**

MD2,MP2 INDICATOR

- **IP54 Facia**
- **2.8" (70mm) colour LCD**
- **320 x 240 pixels**
- **Polyester film tactile keypad**
- **4-20mA output, 1 digital input & 2 digital outputs**

MO3 I/O for MP2

- **4 Digital inputs**
- **4 Digital outputs**
- **4-20mA input (or 0-10V)**
- **4-20mA output**

MD1,MP1 INDICATOR

- **IP65 Facia**
- **4.3" (109mm) colour LCD**
- **480 x 272 pixels**
- **Silicone tactile keypad**

MT1 TRANSMITTER

- **Size 136 x 66 x 50mm**
- **Optional removable P-Module holds calibration settings**

MT3 TRANSMITTER

- **Size 136 x 66 x 50mm**

MR1 I/O

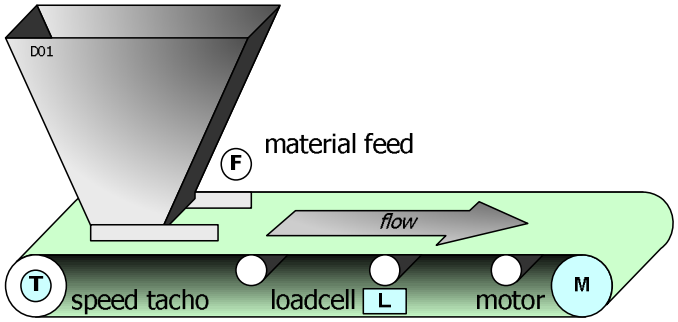
- **Size 136 x 66 x 30mm**
- **8 Digital inputs**
- **8 Digital outputs**
- **4-20mA input (or 0-10V)**
- **4-20mA output x 2**
- **Pulse output**

INCLUDES

- Installation
- Setting up principles
- Setup Summary
- I/O Function Table
- Operation
- Alarms

APPLIES TO

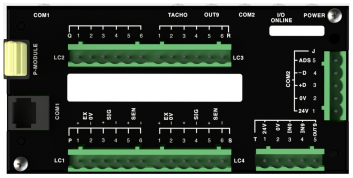
- MW96A - Weighfeeder P-Module
- MT1,MT3 - Transmitters
- MD1,MD2 - Display
- MP1,MP2 - Processor
- MR1 - Remote IO
- Software v6.09 onwards



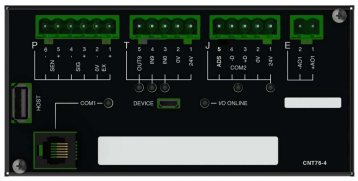
MD1,MP1

MD2,MP2

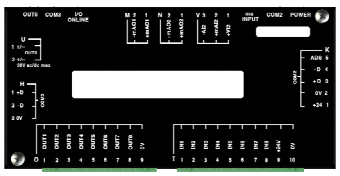
MT1



MT3



MR1



AVAILABLE DOCUMENTATION

PRODUCT	DESCRIPTION	DOCUMENTATION
MW61	Weigher Instrument	Technical Information Instruction Manual
MW64	Batch Weigher Instrument	Technical Information Instruction Manual
MW65	Process Weigher Instrument	Technical Information Instruction Manual
MW93	Weight Change Instrument	Technical Information Instruction Manual
MW94	Impact Flowmeter Instrument	Technical Information Instruction Manual
MW95	Belt Weigher Instrument	Technical Information Instruction Manual
MW96	Weighfeeder Instrument	Technical Information Instruction Manual

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As we are continuously improving our products, changes to this specification may occur without notice.
(Document Details: g0 g1 g2 g3 g4 g5 g6 g7 g8 g9 g10 g11 g12 g13 g14 g15 MT1,MT3,MD1,MD2,MP1,MP2))

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INTRODUCTION

Features

Basic

Units & Resolution

The units for each variable type (weight etc.) can be selected from a list of metric and imperial units. The resolution of each variable type can be adjusted, this alters the count by e.g 100kg displayed in 0.2kg increments.

OIML Design

The instrument is designed to OIML standards.

Language Support

Support is available for the following languages: English, Chinese, Korean, German, Spanish, French, Italian and Polish.

Inputs

Digital Inputs INx

The digital inputs are programmable to a range of function including 'acquire zero', 'print' etc.

Direct & Dynamic Calibration

Direct calibration uses the loadcell capacity and loadcell sensitivity to calibrate the weight signal. Dynamic calibration allows calibration of the weight while the belt is moving knowing the platform weight (kg) or the belt loading (kg/m). This is useful when calibrating is done using chains.

Corner Adjustment (MT1 only)

The input sensitivity can be individually adjusted for up to 4 loadcells, allowing differences in loadcell sensitivities to be corrected.

Four Loadcell Inputs (MT1 only)

Separate inputs are available for 4 loadcells allowing the signal of each to be monitored sperately. This provide an aid for load balancing across loadcells and also for fault finding.

Flowrate Setpoint

The setpoint is the flowrate of material the belt conveyor should be carrying. The processor can control to the local setpoint, which is set using the keypad, or it can control to the remote setpoint. The second analog input AI2 is required for a remote analog setpoint.

The calibration of analog input (AI2) is fully adjustable over the range 0-20mA and 0-10V. If the remote setpoint is not used, the analog input is available for other functions.

Tacho Input

The tacho input is used to measure the belt speed and belt travel. Basic calibration is done using a tacho constant setting.

The system can be used to calibrate the tacho by measuring the number of pulses as a known length of belt passes a point. Other belt lengths can be measured in a similar manner.

Zeroing

The weight of the unloaded belt is averaged over one complete belt revolution and the resulting value is stored as the dynamic zero.

The zeroing can be semi-automated by using an output signal to stop the material feed onto the belt, waiting until the belt is empty, performing the zero averaging, restarting the feed and waiting until material has reached the weigh point before returning to flow control.

Auto zeroing continuously monitors the platform weight. Any small drift in the weight measurement or material build up on the weigh platform is automatically zeroed out. This ensures that with no product on the belt, a zero flowrate is recorded.

Signal Filtering

Filtering for the weight can be adjusted to get the optimum compromise between reduction of plant vibration and response speed.

Internal Signals

Limits

The high and low limits have adjustable setpoints which may be programmed to operate on any internal signal.

Batching

The system can be used to batch out a desired weight by stopping the feeder when the batch weight has been totalised. A pre-act is available to compensate for overrun.

Event Collection

Process events are collected for operation with external equipment (PLCs etc.)

Loop Control

The processor compares the flowrate with the setpoint. A proportional/integral (PI) control technique with feed forward alters the motor speed demand signal to maintain the flowrate at setpoint. Feed forward allows the system to reach the desired set flowrate very quickly and also to respond to changes in setpoint rapidly.

Volumetric Mode

Normally the controller operates gravimetrically and automatically adjusts the speed demand signal to reach the required flowrate setpoint.

In volumetric mode, the PI control is disabled, and the speed demand is estimated using the feed forward settings.

This allows the system to be kept operating even in the event of loadcell or tacho failures.

Advanced Control Settings

Feed forward settings can be adjusted and corrections for plant delays (transport delay) can be made. A ratio setting is available to multiply the setpoint signal by a percentage for ratio control applications.

Memory Storage

Allows a group of settings to be stored or recalled from memory. This can be used for example to store settings for different products. There are 20 memory locations with up to 4 settings in each.

Material Total

The processor incorporates a totaliser which totalises the weight of material through the system. The totaliser can be reset to zero. A pulse output is available to operate external counters. A low flow cutout ensures that low flows do not cause false counts. The total is retained after a power failure.

The totaliser can be set to operate with 5, 6, 7 or 8 digits.

Outputs

Speed Demand

An analog speed demand output signal is used to drive an externally connected motor controller to vary the belt speed.

Material Flowrate

An analog flowrate output signal is available for connection to other instruments.

Analog I/O Scaling

The analog output range can be adjusted over the full 0 to 20mA range. The output will drive to a slight negative mA, allowing a live zero to be achieved when using a 0 to 20mA range. A voltage output is easily produced by connecting a resistor to the output.

In addition the analog output signal is selectable to come from any internal signal in the instrument e.g weight, flowrate etc.

Digital Outputs OUTx

The digital outputs are programmable to operate from any internal signal. These signals include the digital input states, status conditions (running, paused etc) and any fault conditions that are detected. This makes it easy connect into other systems.

Communications & Display

Comms

RS232 and RS485 ports are available. These are used to connect ModWeigh units together and also to connect to other systems. The protocol is either ASCII output for example to drive a printer or Modbus for interactive communications. Baud rates and node addresses are programmable.

USB host and device ports are available. This allows for example PC and USB flash drive connectivity. It can be used to update the units software, for data logging and for recording of the units settings.

Printouts & Macros

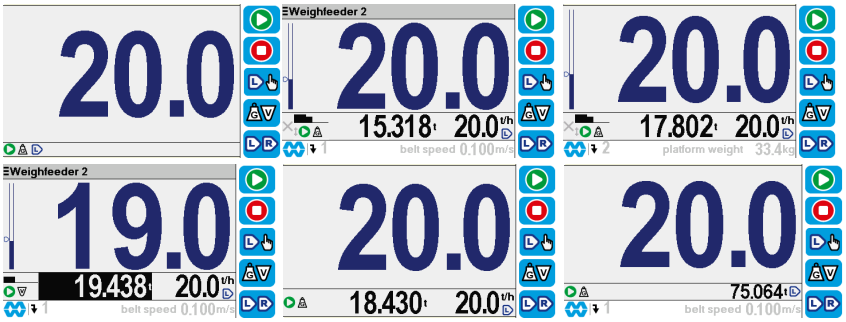
Printouts can be triggered by a key press or set up to occur at set times during the day or week. Data may also be output continuously for data collection purposes. Data is output on the COM1 RS232 port. The content of the printouts is fully programmable using Macros.

Macros are programs used to customise printouts, but can also be used to perform arithmetic calculations. The Macro language also contains conditional terms for more advanced programming.

Display Customisation

Locks may be set to prevent unauthorised use of the operator keys and restrict entry to the operator menu. The keys are individually lockable and optionally a passcode can be used to allow authorised operators to use the keys. Alternatively a confirmation of the key action can be requested.The operator MENU can be customised to make additional settings or signals available to the operator.

The contents of the main display can be set to suit any condition, from a comprehensive display showing all operating parameters to a simple display showing the basic signals.



Computer Connectivity

ModWeigh instruments can be connected to a computer withan RS232 connection. Data can be sent to the PC at a preset rate. The data sent can be set up using macros.

There is also a command line interface which allows any of the settings and data to be read or written.

IO Summary

	Digital Inputs (includes pulse input)	NAMUR pulse input option	Digital Outputs (includes pulse output)	Isolated Pulse Output	Isolated 4-20mA Inputs	Isolated 4-20mA Outputs	RS232	RS485	USB Host (Memory Stick)	USB Device (PC Cable)	Corner adjustment and balancing for 4 loadcells	Trade approvals (MW95, MW96)
MP2	1	×	2	1	0	1	1	1	1	1	×	×
MP2,MO3	1+4	×	2+4	1	1	1+1	1	1	1	1	×	×
MP1,MR1	1+8	×	9	1	1	2	2	1	1	1	×	×
MD1,MT1,MR1	2+8	✓	1+9	1	1	2	2	2	1	1	✓	✓
MD2,MT1,MR1	2+8	✓	1+9	1	1	2	2	2	1	1	✓	✓
MD1,MT3	2	×	1	0	0	1	2	1	1	1	×	×
MD2,MT3	2	×	1	0	0	1	2	1	1	1	×	×
MD1,MT3,MR1	2+8	×	8	1	1	3	2	1	1	1	×	×
MD2,MT3,MR1	2+8	×	8	1	1	3	2	1	1	1	×	×

Specifications

Loadcell Input AI1

Input Range	±4 mV/V (0-20mV)
Excitation	5 Vdc ±20 %, 250 mA maximum current
Signal processing rate	100 Hz (response time setting≤ 0.5 s)
Input sensitivity	0.5 µV/division maximum
Zero range	±3 mV/V (±15 mV)
Zero drift	±0.02 µV+0.0005 % of deadload/°C typical
Span drift	±0.0005 %/°C typical
Non-linearity	‹0.002 % of FS
Input noise	0.15 µVp-p typical
Filtering	0.04 s to 32.0 s response time adjustable
Sense voltage range	1-5 V

Analog Input AI2

4-20mA input resistance	<60 Ω
0-10V input resistance	›100 kΩ
Isolation	galvanically isolated to 50Vac

Analog Outputs AO1 & AO2

Output range	0 to 20 mA (-0.2 mA to 21 mA, includes standard 4-20mA)
Maximum load	1000Ω

Resolution	0.4 µA
Response time	Loadcell response time setting + 20 ms
Voltage output	Use an external resistor to convert mA to volts. For example 500Ω gives 10 V at 20 mA.
Non-linearity	‹0.01 %
Drift	‹2 µA/°C.
Isolation	independently galvanically isolated to 50Vac

Pulse Input IN0 - frequency input

Maximum range	0.01Hz to 4 kHz
Typical operating range	10 to 1000 Hz
Minimum pulse width	50us
IN0 set to PNP	
High voltage	› 8 V
Low voltage	‹ 4 V
Maximum voltage	32 V
Input load	4 kΩ approximate
IN0 set to NAMUR	
Terminal voltage	8 V
Switching threshold	1.55 mA
Hysteresis	0.2 mA
Namur fault	‹0.1 mA or ›6 mA
IN0 set to AC	
Voltage range	0.2 to 50 Vac

Digital Inputs INx (except IN0)

High voltage	› 8 V
Low voltage	‹ 4 V
Maximum voltage	32 V
Input load	6 kΩapproximate
Input type	PNP output sensors

Pulse Output OUT0

Max output current	50 mA
Max working voltage	30V ac/dc
Max frequency	500 Hz
Duty cycle	50 % ±20 % (f › 0.5 Hz)
Max output pulse time	1000 ms (f ‹ 0.5 Hz)
Isolation	galvanically isolated to 50 Vac

Digital Outputs OUTx (except OUT0)

Max output current	$\Sigma I_{IOx} < 0.25$ A
Output voltage	same as supply voltage

Communications COM1, COM2 & COM3

COM1 Interface	RS232
COM1 Handshake	CTS can be enabled
COM2/COM3 Interface	RS485
Baud rates	9600, 19200, 38400, 57600, 115200 (230400 on COM2)
Settings	8 data bits, no parity, 2 stop bits (8-N-2)
Protocol	Modbus RTU (MWBUS on COM2)

General

IP Rating	IP20 (MD1,MP1 facia IP65) (MD2,MP2 facia IP54)
Operating temperature	-10 to 45 °C
Supply voltage	10 to 28 Vdc
Power MT1	1.0 to 2.2 W + $P_{Tacho\ Excitation}$
Power MT3	1.0 to 2.2 W + $P_{Tacho\ Excitation}$
Power MR1	1.5 to 2.5 W + P_{OUTx}
Power MD1	1.8 W
Power MP1	1.8 to 3.0 W
Power MD2	1.4 W

Power MP2	1.4 to 3.1 W
Power MP2 + MO3	3.4 to 5.0 W + P_{OUTx} + $P_{Tacho\ Excitation}$
MP2 Restrictions	$P_{Loadcell\ Excitation}$ + P_{AO1} + P_{AO2} < 1.5 W
	I_{Supply} < 0.5 A

INSTALLATION

The instrumentation must be mechanically installed and then the electrical connections made. The important electrical connections are as follows.

Power supply connections: 24Vdc fused or current limited to 5A.

Communications: A shielded cable is recommended to connect units together with COM2. It can extend up to 500m. This leaves COM1 (RS232) free for other applications. For a cable length over 50m, MAT line terminators must be fitted at each end of the cable.

Loadcell connections: For cable runs less than 20m, a 4 wire connection should be adequate. For longer cable lengths, a 6 wire connection is recommended.

Tacho connections: A shielded cable should be used.

The MT1 tacho input can connect to a sensor with PNP, NAMUR or AC output. Before operating the tacho, the sensor type must be set. See setting Q2220.

Speed demand signal (4-20mA) wired to motor speed controller with shielded cable.

If the control feeder motor run/stop is controlled remotely (by PLC etc), then the ModWeigh RUN input must be connected. It must be ON when the weigh belt motor is running. In this case the START key on the MD1,MD2 display should be disabled when the system is commissioned.

If the feeder motor run/stop is to be controlled by the ModWeigh instrument, the ModWeigh RUN MOTOR output should be used to control the feeder motor.

Some additional optional connections are as follows.

A remote totaliser.

The 4-20mA measured flowrate output.

The 4-20mA flowrate setpoint input.

Belt tracking switches to detect belt miss-alignment.

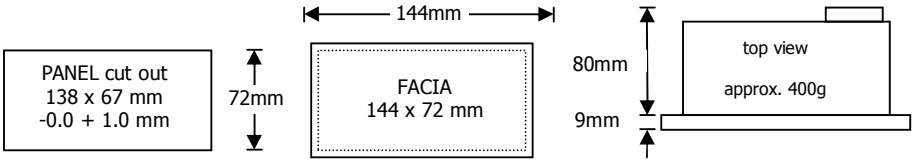
The 'calibration control' input for remote operation of basic calibration functions.

Dimensions

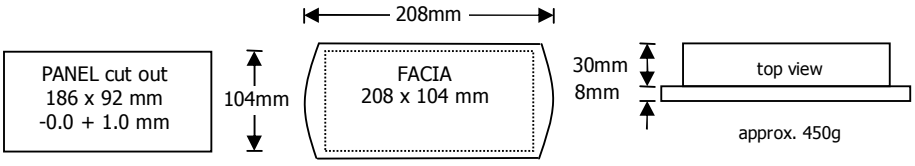
Following are the dimensions of the hardware items that make up the system.

The displays/processors are designed for panel mounting.

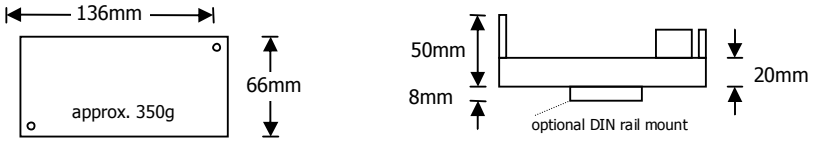
MD2 Display
MP2 Processor



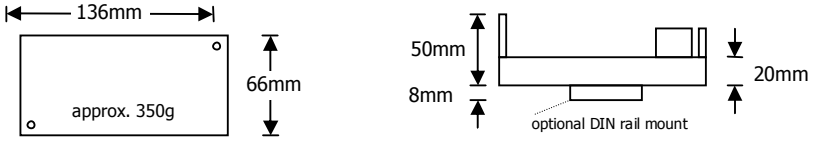
MD1 Display
MP1 Processor



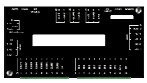
MT1 Transmitter

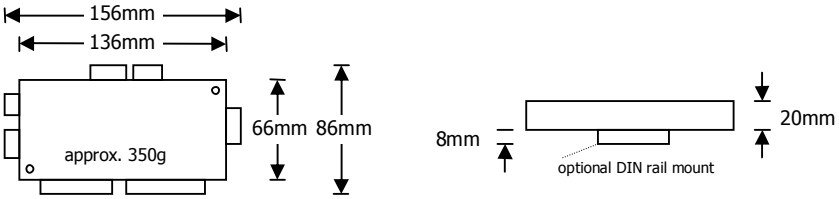


MT3 Transmitter



MR1 Remote IO





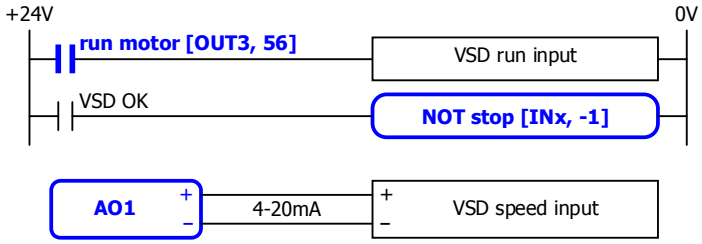
Connections

Motor integration

The following diagrams show various methods to connect a ModWeigh to a VSD drive or motor contactor.

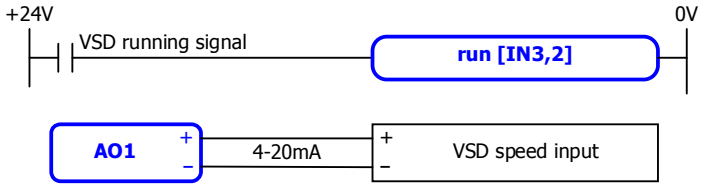
VSD Drive, keypad run/stop

ModWeigh keypad used to start and stop the system. Can be used for batching applications.



VSD Drive, VSD run/stop

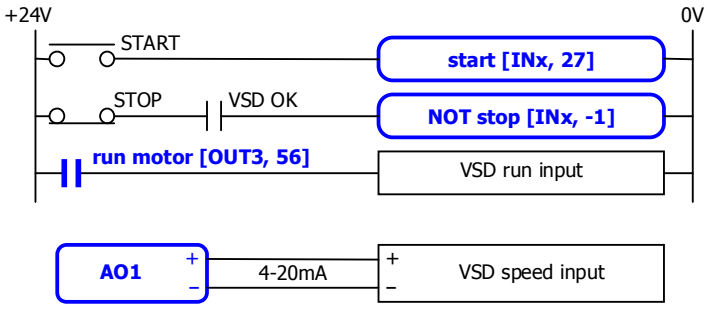
ModWeigh slaved from VSD running signal.



- disable START key
- do not use start function

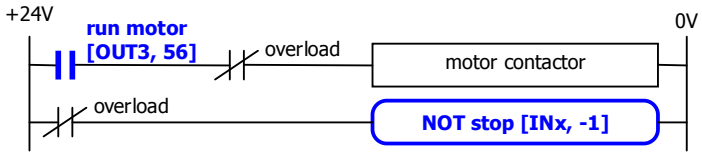
VSD drive, start/stop buttons

External START / STOP buttons connected to ModWeigh instrument driving motor VSD.



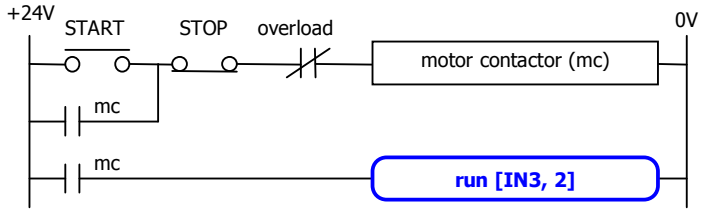
Motor Contactor, keypad run/stop

ModWeigh keypad used to start and stop system. Contactor used to run motor.



Motor Contactor, run/stop buttons

External START / STOP buttons connected to ModWeigh instrument controlling motor contactor.

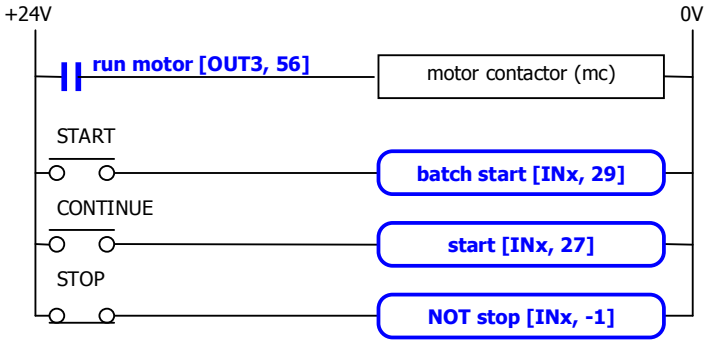


- disable START key
- do not use start function

Batch Weighing

External Buttons for Batching – Method 1

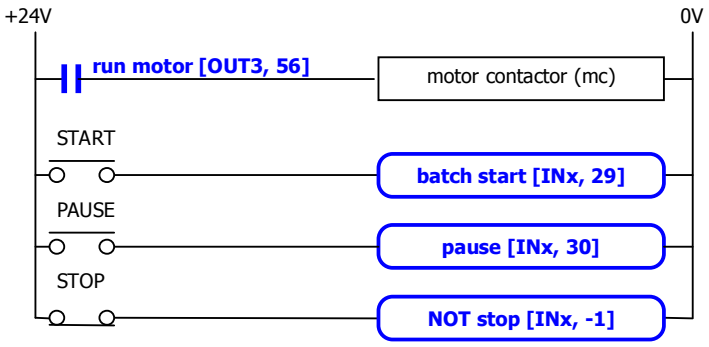
When START is pressed, the total is reset and the motor started. Pressing STOP at anytime stops the motor. If CONTINUE is pressed with the total weight below the batch weight, the motor will start without resetting the total.



- disable START key

External Buttons for Batching – Method 2

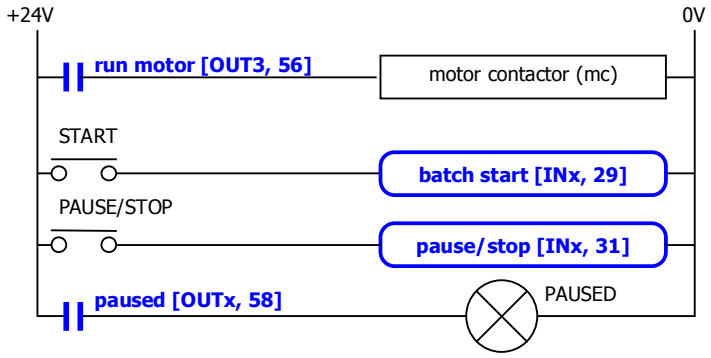
Pressing START resets the total and starts the motor. Pressing PAUSE stops the motor. If paused, the batch may be continued by pressing START. Pressing STOP stops the motor and aborts the batch.



- disable START key

External Buttons for Batching – Method 3

Pressing START will reset the total and start the motor. If running, pressing PAUSE/STOP will stop the motor and pause. Pressing PAUSE/STOP a second time will cancel the pause and abort the batch. Pressing START when the controller is paused will start the motor without resetting the total.



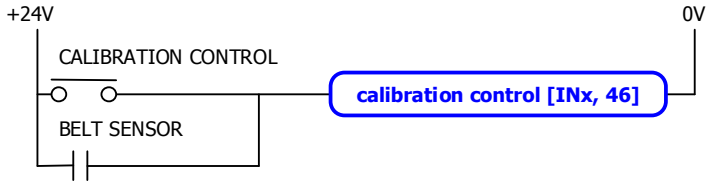
- disable START key

Belt Track Switches

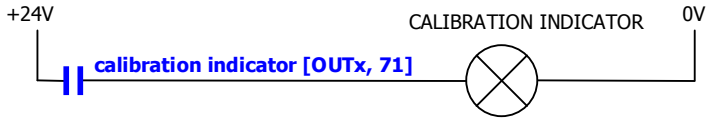
Used to detect belt miss-alignment, raise an alarm and stop the conveyor. The input function must be set to 11.

Calibration control I/O

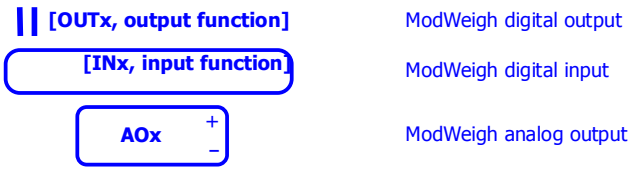
One of the digital inputs can be wired to a push button located near the weighing system. It can also be wired to a sensor which generates one pulse at each belt rotation. See the section 'Remote Operation of Calibration'. The input function must be set to 46.



One of the digital outputs can be wired to an indicator lamp to show when a measurement is in progress. The output function must be set to 71.



Key



Run/Stop/Pause Logic

The following table describes how the status is affected by the inputs.

Inputs (Control1)				**Outputs** (Status1)		
stop	run	pause	start	running	paused	run motor
1	X	X	X	0	0	0
0	1	0	X	1	0	1
0	0	0	0 *	0	0	0
0	X	1	X	NC	1	0
0	0	0	⮥	1	0	1
0	0	1	⮥	1	1	0

	KEY
Entry	**Description**
0	input or output off
1	input or output on
X	don't care (either on or off)
NC	no change
⮥	rising edge (input turns on)
*	remains off since last stop

Connection Principles

ModWeigh instruments can be configured in many different ways to suit any given application.

The display is normally located to suit an operator. The transmitter can be located in the field to reduce field wiring or can be located with the display for a more conventional approach.

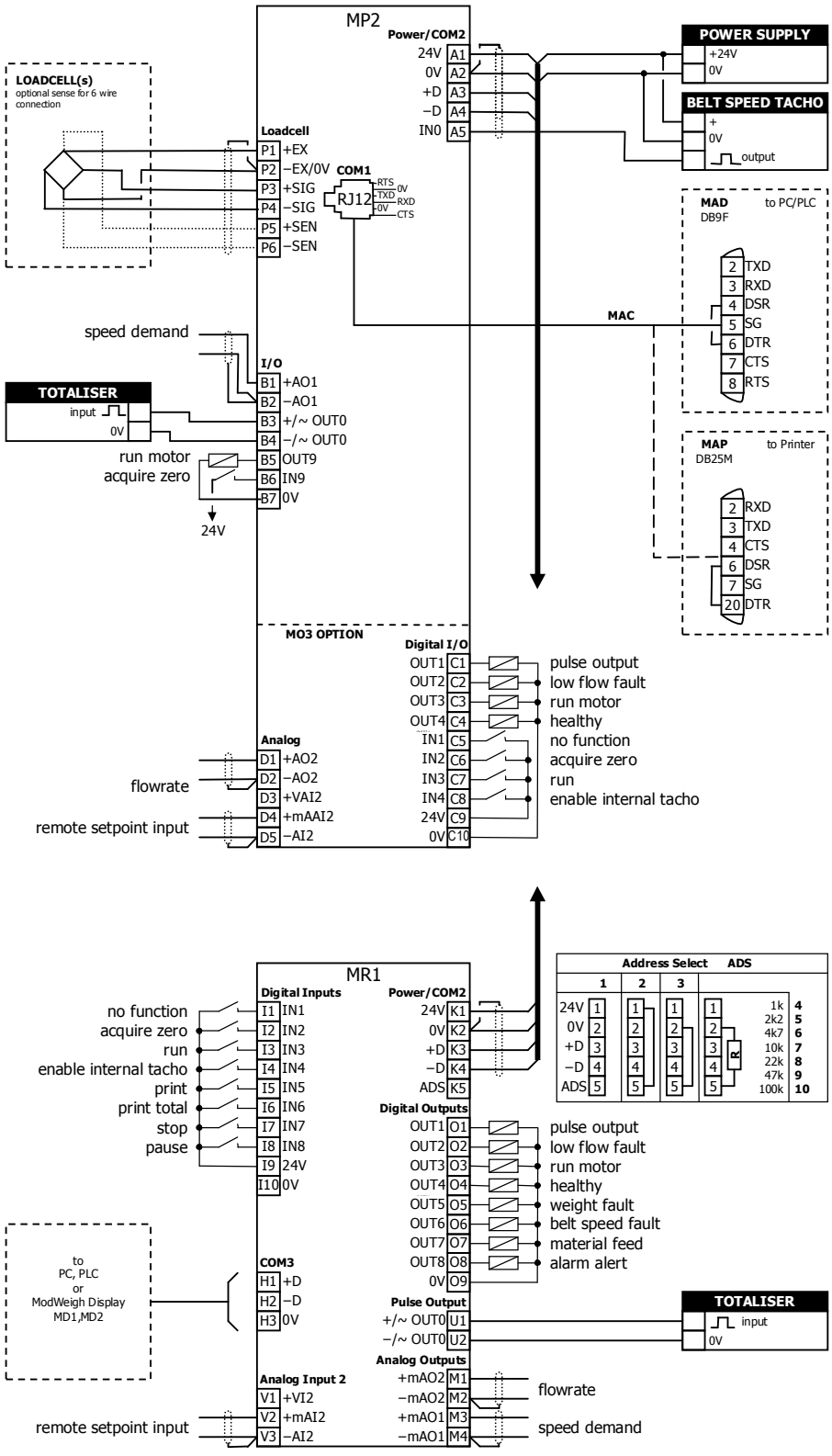
The I/O can conveniently be situated on a DIN rail in a cabinet.

Connection Diagram – MP2

Keep all wiring separated from mains wiring

Use shielded cable where indicated

Either the RUN input or the RUN MOTOR output should be used



Connection Diagram – MP1

Keep all wiring separated from mains wiring

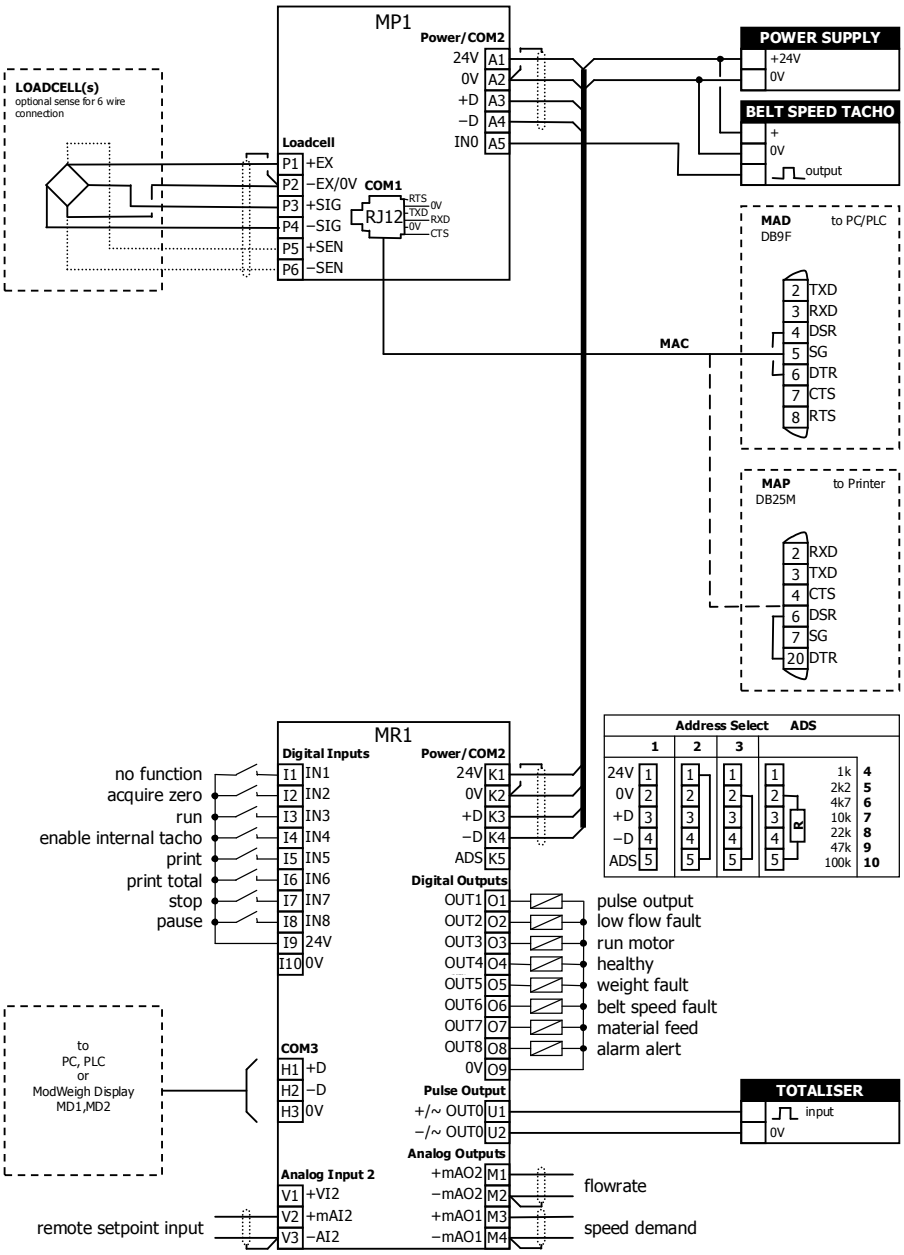
Use shielded cable where indicated

Either the RUN input or the RUN MOTOR output should be used

MP1 bus address set with setting (Q2522).

MR1 bus address set with ADS pin and must be same as MP1.

Fit an MAT terminator to each end of COM2 cable if length exceeds 50m.



Connection Diagram – MT1

Keep all wiring separated from mains wiring.

Use shielded cable where indicated.

Either the RUN input or the RUN MOTOR output should be used.

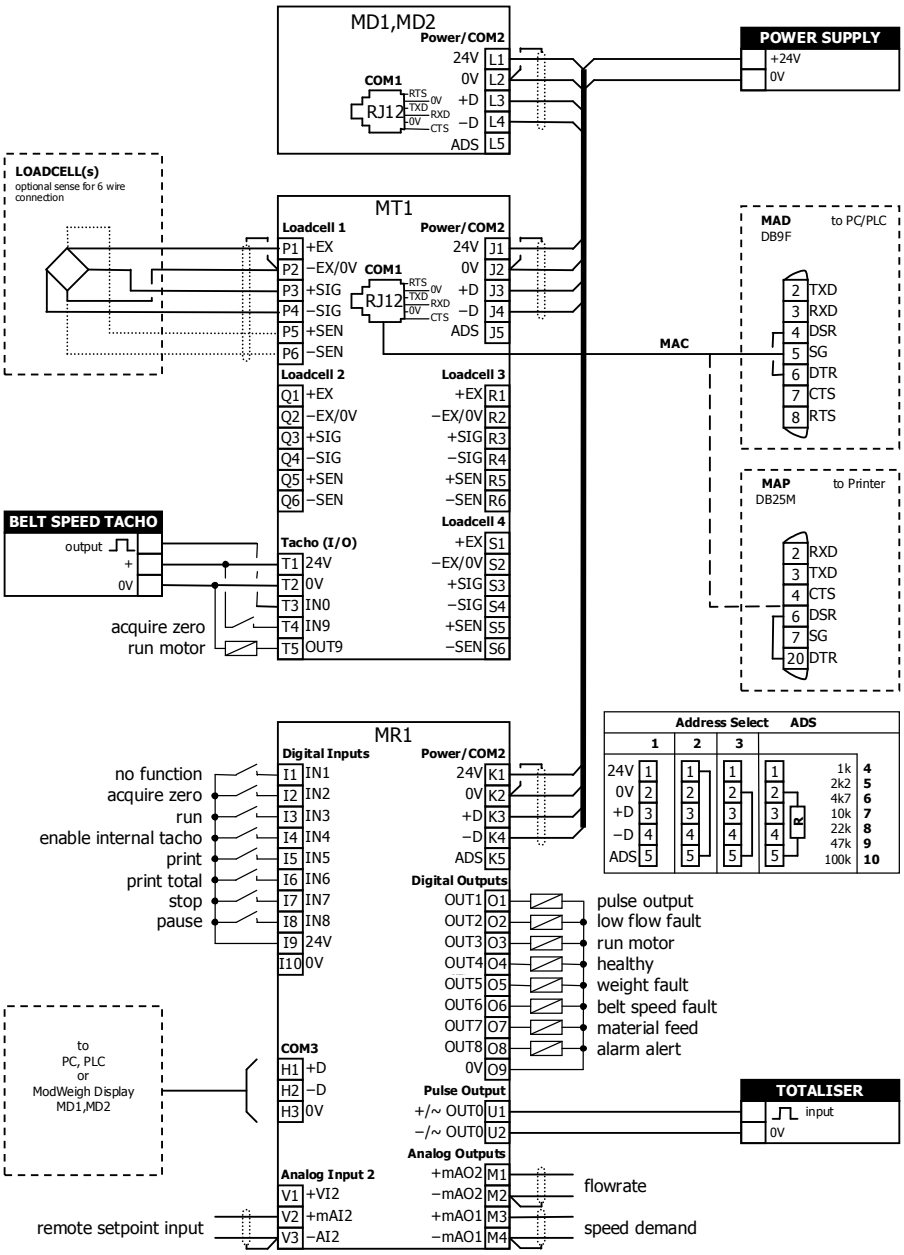
For individual loadcell sensitivity adjustment, use terminals P, Q, R and S.

Display and transmitter can alternatively be connected COM1 to COM1 using an MAC cable.

MT1 bus address set with ADS pin or a setting.

MR1 bus address set with ADS pin and must be same as MT1.

Fit an MAT terminator to each end of COM2 cable if length exceeds 50m.



Connection Diagram – MT3

Keep all wiring separated from mains wiring.

Use shielded cable where indicated.

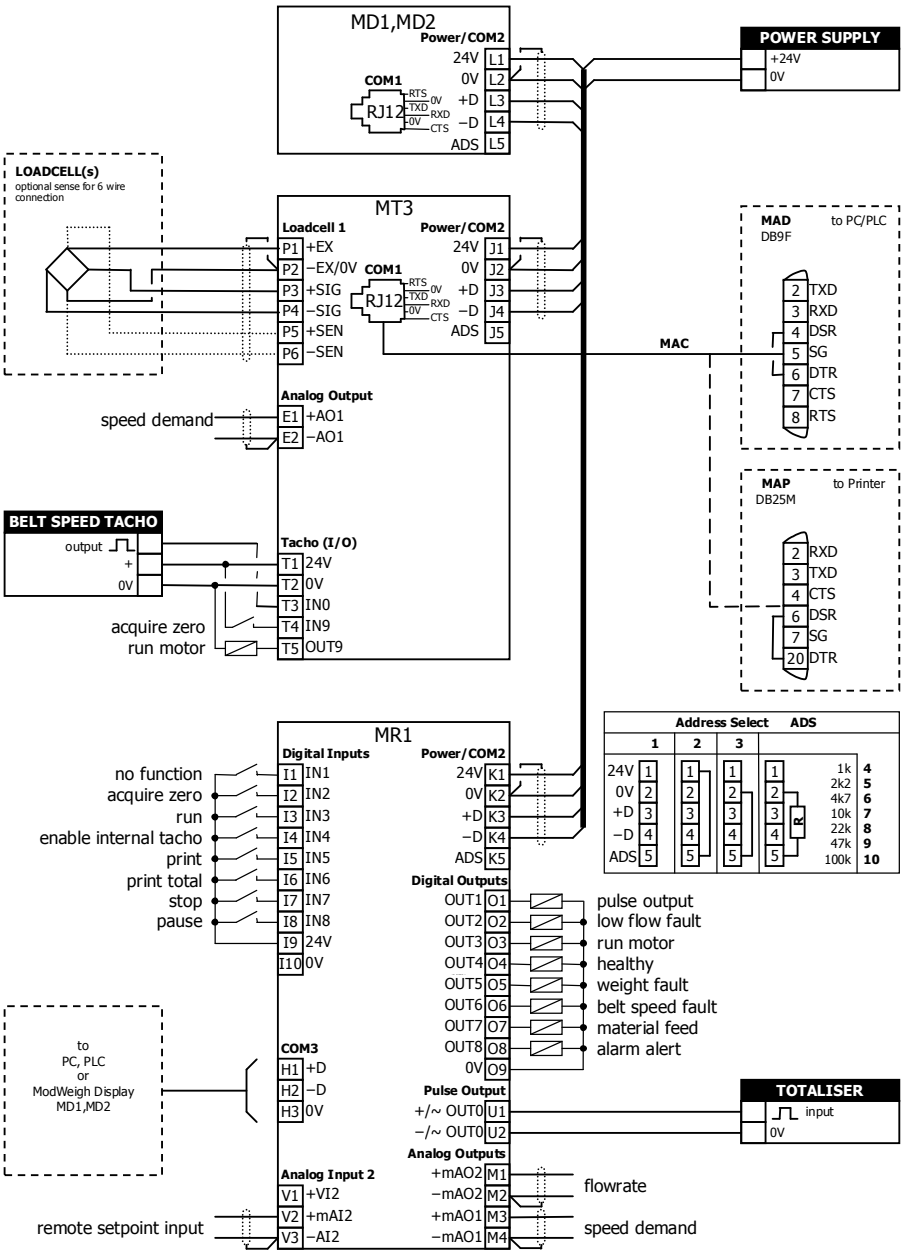
Either the RUN input or the RUN MOTOR output should be used.

Display and transmitter can alternatively be connected COM1 to COM1 using an MAC cable.

MT3 bus address set with ADS pin or a setting.

MR1 bus address set with ADS pin and must be same as MT3.

Fit an MAT terminator to each end of COM2 cable if length exceeds 50m.

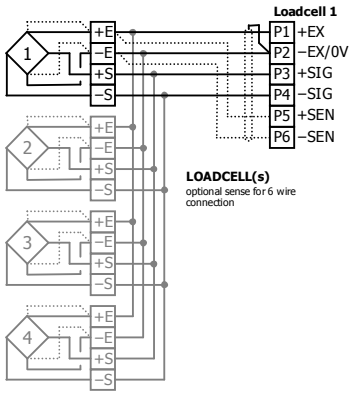


Loadcell Connections

The loadcell(s) may be wired directly to the loadcell terminals or connected together in the field with a junction box and connected to the ModWeigh unit with a single cable.

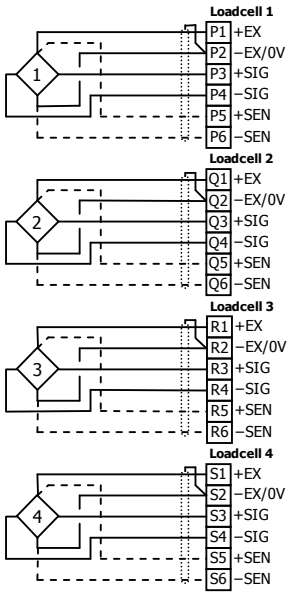
When connected to the terminals only a 4-wire connection is used, and digital corner adjustments are possible. (MT1 only)

When connected with one cable and a junction box no corner adjustments are possible. It is preferable to use a 6-wire connection as this eliminates voltage drop errors in long cables caused by cable resistance.



Loadcells Wired to Junction Box

For best accuracy use a 6-wire connection to controller



MT1

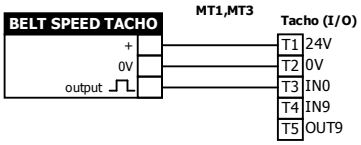
Loadcells Wired to Directly to Terminals

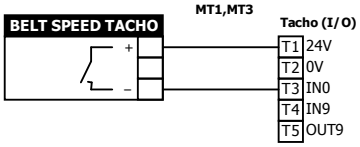
Allows corner adjustment and individual monitoring of loadcell outputs

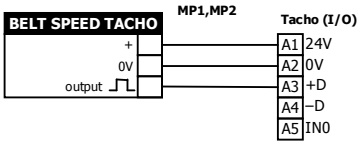
Tacho Connections

A tacho is normally used to measure the belt speed. The output of the sensor is a frequency which is proportional to the belt speed.

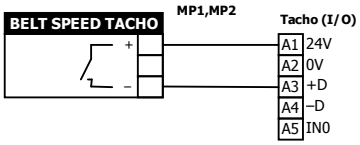
The tacho sensor may use either a 2 wire or 3 wire connection.



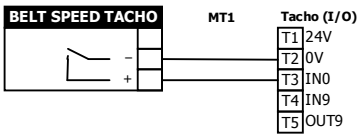




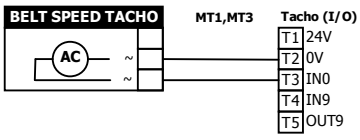
3 Wire PNP or Push Pull Output



2 Wire Output



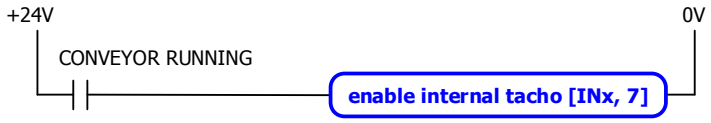
NAMUR Sensor



AC Sensor

Internal Tacho

It is always recommended to use a tacho to measure the belt speed, however it is possible to set a fixed belt speed into the controller using the setting 'internal belt speed'. If this is used, it is essential that the controller know when the belt is running or stopped to avoid large errors in the totalised weight. A conveyor run signal must be connected to one of the digital inputs and its function programmed to be 'enable internal tacho' (input function 7).

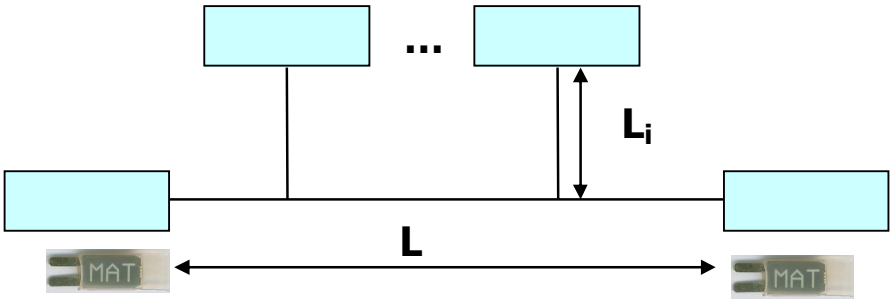


Multidrop Systems

ModWeigh instruments can be connected using the COM2 RS485 bus. Up to 10 systems may be connected on the bus. A ModWeigh display can select any one of the systems on the bus to work with.

A multidrop connection can also be used with any other Modbus master device such as a PLC. If a non ModWeigh master is used on the bus, then the ModWeigh instruments are unable to communicate with one another. An external Modbus master can alternatively be connected to an RS232 COM1 port.

An MR1 unit cannot share the bus with a non ModWeigh master such as a PLC. A PLC could be connected using the COM3 port on the MR1.



$Li \leq \frac{40}{n}[m]$ $L \leq 500\,[m]$

if D = MD1,MD2 Display, then n ≤ 10
if D = PLC master, then n ≤ 32

To connect in mutidrop use the RS485 connection COM2. The wiring should be made in a daisy-chain, with one instrument connected to the next. If a stub connection is used to a main cable as shown in the diagram, then make sure its length limit is adhered to.

Two MAT line terminators must be fitted, one at each end of the cable run.

The +D, -D and a 0V terminal must all be connected together through the data cable.

Setting the COM1 Modbus Address

Before a multidrop system will operate, the addresses in each of the ModWeigh units will need to be set differently. This can be done by wiring a link or resistor to the ADS terminal where available. See the table on the connection diagram. Alternatively the address setting can be changed in each unit using a display connected to its COM1.

The following procedure is used to set a units address.

1. Press the Q key to access the setup menu.
2. Key in the quick key code 2512 to select the 'COM1&2 modbus address' step.
3. Press the EDIT key. (If editing is locked, key in the password 111 and press ENTER).
4. Enter the desired address (1, 2 or 3 etc.) and press ENTER.
5. Press and hold the BACK key to return to normal operation.
6. Repeat for each of the units which are to be used on the bus.

When the multidrop system is then connected and powered, the display should be able to see each of the ModWeigh systems. This is done by pressing the SELECT key on the display.

SETTING UP

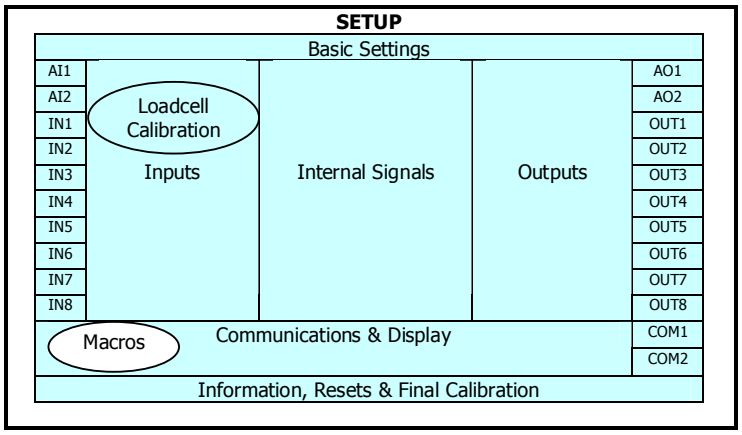
Setup

ModWeigh instruments must be calibrated for each specific application. The parameters stored are collectively known as the Setup.

Description

Press the Q key to access the setup menu.

The setup is divided into sections as shown in the following diagram.



Setup Diagram

The Setup contains ***Settings*** and ***Macros*** which are described next.

Settings

Most of the setup for a system involves setting calibration constants which for example calibrate the loadcell input, the 4-20mA outputs and the operation of relays etc. These settings are simple numeric values.

Macros

Macros are used to store short programs which are used to construct text strings to output to the printer, perform arithmetic calculations and other special control functions. Macros are a collection of program segments which can call one another as subroutines. They have structured if/then/else statements and program looping constructs.

A macro is a sequence of numbers (bytes with values of 0 to 255).

Menus

All the setup parameters are contained within a menu structure which follows the setup sections.

Basic Settings

Inputs

Internal Signals

Outputs

Communications & Display

Information, Resets & Final Calibration

Factory Settings

Basic Settings

The basic settings are settings which generally must be set first and often affect other settings through the controller. For example, they set the engineering units and measuring range for the application.

Inputs

The inputs are settings and calibration which effect the basic inputs signals. For example the loadcell input, tacho input (where used) and digital inputs.

Internal Signals

This section contains the main calculations for the instrument. Most signals are here, for example the weight, zero weight, total weight etc. Much of the instruments configuration is done in this section.

Outputs

The output are settings and calibration which effect the basic output signals. For example the 4-20mA outputs and digital outputs. These change the calibration range and select the signal to appear on the digital outputs.

Communications & Display

This section sets the baud rates etc for the communications ports. It sets the key locks for the MD1,MD2 Display. It also contains the Macros for the instrument.

These settings are not available in 'B' model instruments.

Information, Resets & Final Calibration

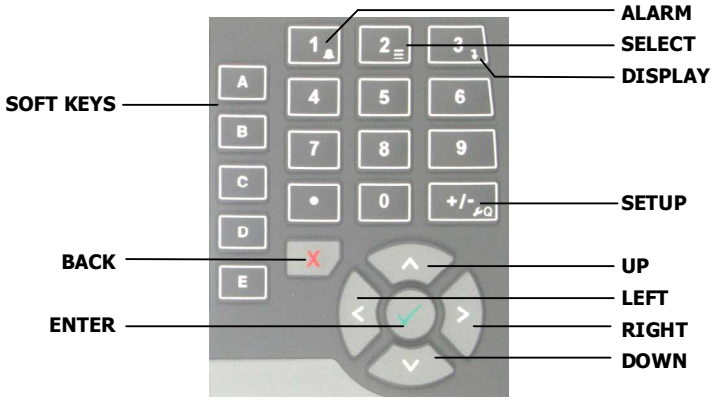
This section contains information about the unit, including its serial number, the product type etc. These settings allow all the settings & macros to be reset back to their default values. The final calibration is also done here.

Factory Settings

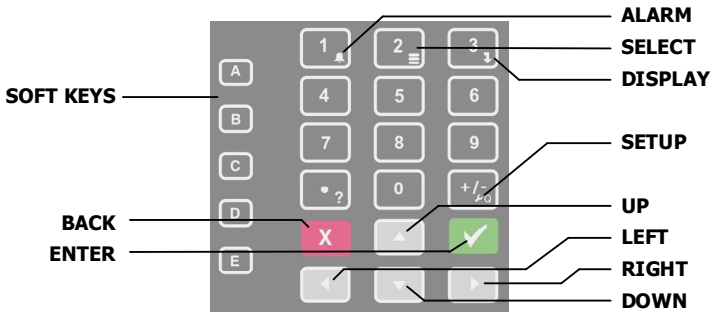
The factory settings are used to calibrate the basic instrument in the factory. These are password protected and are not usually required once the instrument has left the factory.

Keypad

MD1,MP1 Keypad



MD2,MP2 Keypad



SOFT keys

The function of the 5 soft keys is indicated on the display.

ALARM key

Used to access the alarm list menu.

SELECT key

Used to select a system to display if more than one unit is connected on the network.

DISPLAY key

Allows the operator to select the display layout.

SETUP key

Press to view the setup menus.

ALPHANUMERIC keypad

Used to enter numerical data values.

UP and DOWN keys

Use these keys to move up and down a menu, or to increase or decrease a setting when editing is enabled.

LEFT and RIGHT keys

Used to step thorugh macros and the selection of some other items.

ENTER key

Use this key to move forwards through the menu, or to confirm a change to a setting.

BACK key

Use this key to move backwards through the menu, or to cancel a change to a setting. Hold the key to exit completely out of the menus and back to normal operation.

Displaying the Setup Menus

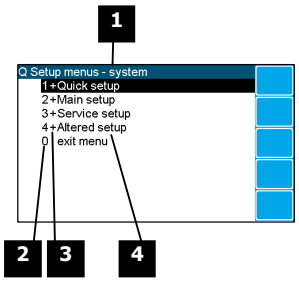
Press the SETUP key (Q) to display the setup menus.

Selecting a Menu Item

To the left of each menu item is a single digit. This is the Quick Key number. Simply key in this number to select the corresponding menu item. Items which have a + to the left will then display a sub-menu in the same format. Continue pressing Quick Keys to navigate to the desired setting. Refer to the Setup Summary for the sequence of Quick Keys to go directly to each setting.

Alternatively, repeatedly press the ENTER key to step through all the menus, sub-menus and settings in turn.

You can use the UP and DOWN keys to highlight a menu or sub-menu item, then press the ENTER key to continue from there. When viewing a setting, the UP and DOWN keys will move between the settings.



1 Menu name.

2 Quick Key number. Press key with same number to directly enter the named menu.

3 Menu item descriptor.

Element	Description
+	Selecting this menu item will open a sub-menu.
(blank)	Selecting this menu item will display the corresponding setting, or will return from a sub-menu
!	The action described will be implemented directly either if the ENTER key is pressed when item is highlighted or when the item's Quick Key is pressed. (Quick Key number is the left most number shown in the item line)

4 Name of menu item.

Description of Menus

Quick setup

Quick setup menu contains the most important settings, and is a shortened version of the Main setup menu. Use the Quick setup menu for initial setup of the unit. In many applications, no further setup will be needed. The quick setup settings are marked with an asterix in the Setup Summary. (*)

Main setup

Main setup menu contains all standard information and settings. Use this menu to view the units information (eg serial number), and adapt the unit for the application (eg change the speed demand output to 0 to 20mA). The main setup settings are listed in the Setup Summary.

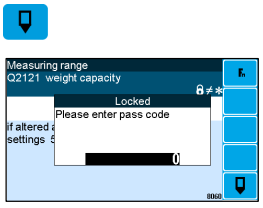
Service

Service menu contains all standard settings as well as settings for advanced configuration and diagnostics. Use this menu if there are special application requirements, or if special diagnostics are required. This menu includes the Factory settings, for which certified equipment is required. These settings are not documented in this manual, contact the factory for further information.

Altered settings

Altered settings menu lists all settings that are different from the default. Use this menu to fill in the field settings on the Setup Summary

To Adjust A Setting

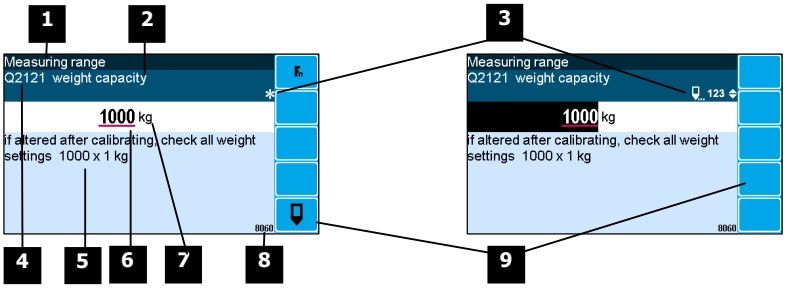


Press the EDIT key to allow changes to the selected setting.

If editing is locked, a password will be requested. For **Quick setup** and **Main setup**, the password is 111. For **Service setup** the password is 9713. For **Altered setup** there is no password as settings are display only.

Use the keypad and/or UP and DOWN arrow keys to increase or decrease the displayed setting. Some settings allow only one method, and some are display only.

Holding either key down will automatically continually increase or decrease the value.



1 Menu item.

2 Setting name.

3 Gives information about the settings and indicates active keys or the preferred method of making a value change while editing.

Icon	Description
	The setting is locked. Password must be entered to edit.
	The setting can only be viewed.
≠	The setting has been changed from the default.
*	An important setting.
	The setting is being edited.
123	Use numbered keys to change setting value.
	Use UP & DOWN keys to scroll through selection list.
on off	Use UP & DOWN keys to turn setting on or off.
	Use the arrow keys to move through the bits of a control or status register.

4 Sequence of quick-keys used to reach this setting. Not editable. The left-most digit identifies the current menu as follows: 1 for Quick setup, 2 for Main setup, 3 for Service setup, and 4 for Altered setup.

5 Hint line which reveals extra information about the setting.

6 Setting value. To change press EDIT key. If editing is locked, a password will be requested. Key in the password and press the ENTER key. The setting will become highlighted by a black background. Key in changes then press ENTER key. For Quick setup and Main setup, the password is 111. For Service the password is 9713.

7 Engineering unit setting is displayed in.

8 Modbus address of this setting. Not editable.

9 Soft keys used with settings.

Icon	Description
	Press Fn key for menu of special functions.
	Press EDIT key to edit the macro.
	Use the soft key to start and stop an operation.

Macros

A macro is a list of numbers representing text characters and instructions codes. Each number is edited separately, and is entered either as a number using the numeric keys, or as an text character using the letter keys much like a cell phone. There are three data entry modes, instruction, lower case text and upper case text.

Macro Codes

Code	Description	
0	end of macro	Terminates execution of macro or returns from subroutine.
1 - 127	standard ASCII characters	Characters are sent out COM1 (RS232).
128 - 187	extended ASCII characters	

A	Alternate Instructions
	Used to encode printable characters (Unicode values 0 to 65536) outside the ASCII range.Sends the Unicode characters out COM1 with UTF8 encoding. Some characters can be used in the "system name macro" to appear on a ModWeigh display. arg0 and arg1 must be in the range 1 to 128.

A	**Alternate Instructions**	
188	ALT0 <arg1> <arg0>	UC = (arg0 - 1) + (arg1 - 1) × 128
189	ALT1 <arg1> <arg0>	UC = (arg0 - 1) + (arg1 - 1) × 128 + 16384
190	ALT2 <arg1> <arg0>	UC = (arg0 - 1) + (arg1 - 1) × 128 + 32768
191	ALT3 <arg1> <arg0>	UC = (arg0 - 1) + (arg1 - 1) × 128 + 49152

R	**Register Instructions**	
192	NOP	no operation
193	RECALL "register"	"register" is an ASCII Modbus address (8000 to 8992).
194	RECALL <argument>	<argument> register 1 weight 2 platform weight 3 net weight 4 zero weight 5 tare weight 6 total weight 7 running total 8 peak weight 9 flow rate 10 belt speed 11 current setpoint 12 speed demand 13 COM 2 modbus address 14 print settings & macros 15 product serial number 16 flowrate raw 17 temp 1 18 temp 2 19 perm 1 20 perm 2 21 P_Module serial number 22 perm3 23 perm4 24 perm5 25 temp3 26 temp4 27 temp5 28 batch setpoint 29 batched weight 30 batch number 31 last batched weight 32 number to batch 101 with address in VALUE 102 default_value 103 minimum_value 104 maximum_value 105 column 106 memory 107 register_number 108 port 109 slave_address Other aruments are invalid and not all arguments available in all products.
195	STORE "register"	"register" is an ASCII Modbus register (8000 to 8992).
196	STORE <argument>	<argument> selects register. See RECALL instruction.
197	MENU <argument>	<argument> action 1 start_menu 3 next_quick 5 next_service 6 next_factory 7 next_altered
198	MACRO <argument>	<argument> action 1 start_macro 2 next_macro 3 next_ altered _macro

P	**Print Instructions**	
200	PRINT_VALUE	"format" is an ASCII format code of the form CcDdBb. c is the column width, d is the number of decimal places and b is the count by. Any one or combination of the three parts can be included. (e.g. C10d2b5 sets the column width to 10, the decimal places to 2 and the count by to 5; C10 sets column width to 10). The default is 0.
201	PRINT_NAME	
202	PRINT_UNITS	
203	PRINT_HINT	
204	PRINT_DATE	
205	PRINT_TIME	
206	PRINT_SECONDS	

P	**Print Instructions**	
207	PRINT_MENU_HEADING	‹column› is a number 1 to 99. Columns are numbered from 0. ‹macro› is number 1 to 99. If ‹macro› = 101, lists macro number in VALUE.
208	PRINT_MENU_PATH	
209	PRINT_QUICK_KEY	
212	FORMAT "format"	
213	NEWLINE	
214	NEWPAGE	
215	TAB ‹column›	
218	LIST ‹macro›	
219	DUMP ‹macro›	

C	**Calculation Instructions**	
	Calculations are done on a stack in RPN (reverse polish notation). When a value is entered onto the stack with a RECALL or VALUE instruction, the other values on the stack are moved up first. An instruction like ADD or MUL operates on the values in VALUE and Y and places the result in VALUE. Z is moved to Y and T is copied to Z. The operation follows the values. e.g RECALL ‹weight› VALUE "2" MUL., this multiplies the weight by 2. e.g. 2 + 3 x weight = VALUE "2" VALUE "3" RECALL ‹weight› MUL ADD	
220	VALUE "number"	"number" is an ASCII number (e.g. 123.4) If there is no number, then the stack is pushed up.
221	ADD	VALUE = VALUE + Y
222	SUB	VALUE = VALUE + Y
223	MUL	VALUE = VALUE + Y
224	DIV	VALUE = VALUE + Y
225	MOD	VALUE = VALUE + Y
226	SWAP_VALUE&Y	VALUE and Y swapped
227	ROLL	stack rolled down
230	CLEAR_VALUE	VALUE is set to zero
231	CLEAR_ALL	VALUE, Y, Z and T all set to 0
232	INC_ VALUE	VALUE = VALUE + 1
233	DEC_ VALUE	VALUE = VALUE – 1
235	CHANGE_SIGN	sign of VALUE changed, plus and minus
236	ABS	absolute value of VALUE (e.g. ABS(-12.54) = 12.54)
237	INT	integer value of VALUE (e.g. INT(12.54) = 12)
238	FIX	fixed value of VALUE (e.g. INT(12.54) = 13)

STACK	**RECALL** or **VALUE**	**ROLL**	**ADD, SUB, MUL, DIV, MOD**
T	T lost	↶	copied
Z	↑	↓	↓
Y	↑	↓	↓
VALUE	↑	↺	RESULT (using VALUE & Y)

L	Looping and Control Instructions
239	DRIVE_BIT ‹bit›
240	IF ‹condition›
241	IF_EVENT ‹event condition›
242	NOT
243	AND ‹condition›
244	OR ‹condition›
245	ELSE
246	END_IF
247	SET_BIT ‹bit›
248	CLEAR_BIT ‹bit›
249	TOGGLE_BIT ‹bit›
250	GOSUB ‹macro›
251	STOP
252	STACK
253	LOOP
254	EXIT_WHEN ‹condition›
255	END_LOOP

value	test
1-150	See I/O Function Table

value	test
151	VALUE›=0
152	VALUE›0
153	VALUE=0
154	VALUE‹›0
155	VALUE‹0
156	VALUE‹=0
157	Y›=VALUE
158	Y›VALUE
159	Y=VALUE
160	Y‹›VALUE
161	Y‹VALUE
162	Y‹=VALUE

value	test
163	VALUE_ALTERED
164	VALUE_NOT_ALTERED
165	VALUE_VIEW_ONLY
166	DEC_temp1=0
180	with_stack
181	end_of_macro
182	end_of_menus
183	new_menu_heading
184	new_menu_path
185	macro_altered
186	clock_active

operator	result
AND	true if both values are true
OR	true if either value is true

‹condition› is a logical expression made up of one or more values and operators evaluated from left to right. e.g. ‹IN3› OR NOT ‹IN4›

‹condition› = **value** [**NOT**] [**operator**] [**value**] [**NOT**] [**operator**]

NOT reverses the sense of the **value**, (e.g. true becomes false).

STACK stacks the current value. The stacked value is used with an operator followed by ‹with_stack›. DRIVE_BIT sets the bit to the value evaluated by the condition.

e.g. IF ‹IN1› AND ‹IN2› STACK ‹IN3› AND ‹IN4› OR ‹with_stack› DRIVE_BIT ‹user bit 1›

‹event condition› has a value of 1-150, and is true if the bit in the I/O Function table has changed since the "event macro" last ran.

‹bit› is a value from 1 to 187 from the I/O Function Table. Used Output Functions should not be set.

‹macro› is a macro number from 1 to 99. If macro = 101, calls subroutine number in VALUE.

The conditional and looping structures are as follows. Any sequence of instructions may be placed where *INST* appears.

IF ‹condition› *INST* ENDIF

IF ‹condition› *INST* ELSE *INST* ENDIF

IF ‹condition› *INST* DRIVE_BIT ‹bit›

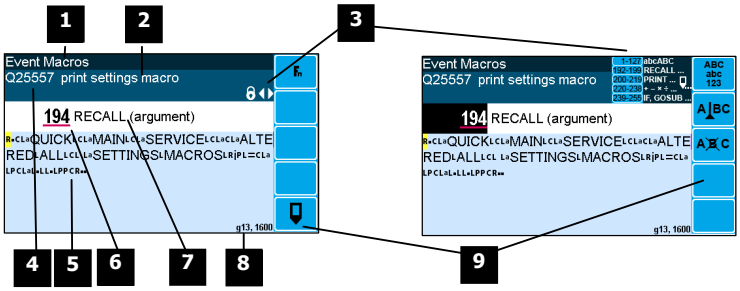
IF_EVENT ‹event condition› *INST* ENDIF

IF_EVENT ‹event condition› *INST* ELSE *INST* ENDIF

IF_EVENT ‹event condition› *INST* DRIVE_BIT ‹bit›

LOOP *INST* EXIT_WHEN ‹condition› *INST* END_LOOP

Adjusting a Macro



1 Menu item.

2 Setting name.

3 Gives information about the macro and indicates active keys or the prefered method of making a value change while editing.

Icon	Description
🔒	The macro is locked. Password must be entered to edit.
≠	The macro has been changed from the default.
◀▶	Use the 1 & 2 keys to move the cursor back and forth through the macro.
1 ␣ 2 abc 3 def 4 ghi 5 jkl 6 mno 7 pqrs 8 tuv 9 wxyz	Shows which numeric keys are used to enter lower case letters.

1 ␣ 2 ABC 3 DEF 4 GHI 5 JKL 6 MNO 7 PQRS 8 TUV 9 WXYZ	Shows which numeric keys are used to enter upper case letters.
1-127 abcABC 192-199 RECALL ... 200-219 PRINT ... 220-238 + − × ÷ ... 239-255 IF, GOSUB ...	Gives a guide to the range of values for text, register instructions, print instructions, calculation instructions and looping & control instructions.

4 Sequence of quick-keys used to reach this macro. Not editable. The left-most digit identifies the current menu as follows: 1 for Quick setup, 2 for Main setup, 3 for Service setup, and 4 for Altered setup.

5 Shows the macro. ASCII characters are displayed normally, instruction codes are shown displayed as a small icon as shown below. A cursor highlights the code currently displayed.

Icon	Description
R	A register instruction like RECALL or STORE.
C	A calculation instruction like VALUE, ADD, MUL etc.
P	A print instruction, like PRINT_VALUE, PRINT_UNITS etc.
L	A looping or control instruction like GOSUB, IF, LOOP etc

6 Code value of the item at the cursor position. It is either as ASCII code value or an instruction code value.

7 Displays the ASCII character or instruction description for the code value displayed.

8 Modbus address of the macro. Not editable.

9 Soft keys used with macros.

Icon	Description
Fn	Press Fn key for menu of special functions.
	Press EDIT key to edit the macro.
ABC abc 123	Press this key to swap between numeric entry and text entry modes.
A|BC	Press this key to insert codes at the cursor.
A⌫C	Press this key to delete the code at the cursor.

Software Updating

ModWeigh instrument software can be upgraded in the field to add new features and other improvements. The following diagram shows the setup required for this purpose.

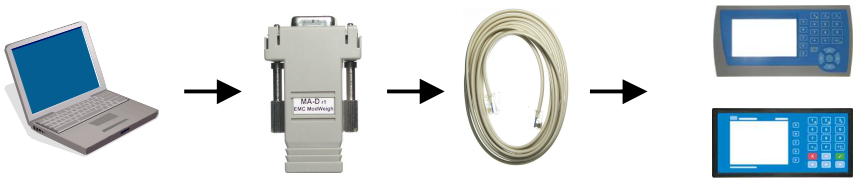
Update with USB Drive

AutoUpdate Folder USB Drive ModWeigh unit

Updating Procedure

1. The USB drive needs to have three folders, ModWeigh, ModUpdater and AutoUpdate as shown.
2. Copy the ModUpdater binary file (ModWeigh6.XXrXX.bin) into the AutoUpdate folder.
3. When the USB drive is plugged into a compatible ModWeigh unit, update files will be copied.
4. Update files will be copied to all connected units.
5. The actual software update occurs after all files have been copied.

Update with a PC



Windows™ PC MAD MAC ModWeigh unit

Updating Procedure

1. Copy the ModUpdater program (e.g. ModUpdaterv6.01r10.exe) onto a PC. The name contains the version number of the software to be installed.
2. Before starting, it may be advisable to record the settings in the unit if you wish to restore these after updating.
3. Connect the ModWeigh unit to an RS232 COM port of the computer. For this you must use the MAC cable and MAD adaptor.
4. Connect power to the ModWeigh unit, 24Vdc.
5. Double click on ModUpdater program.
6. The upgrade process should then begin. Following the instructions given, usually you can simply press ENTER at each stage.
7. Restore and/or check settings.

If this does not work, then turn the power off to the ModWeigh instrument and back on again as instructed by the ModUpdater program.

If you have any problems, you can contact your supplier.

SETTING UP GUIDE

This guide suggests how a system can be setup. Full details on each of the settings can be found in the 'Setup' sections following the guide.

Settings

To calibrate the system, you must access and adjust various settings in the unit. The settings are accessed using their **Quick Key** numbers.

Quick Keys

To Access A Setting

1. Press the Q key to access the setup menu.
2. Press the **Quick Key** number to go directly to the setting. The UP & DOWN keys can be used to go between sequential numbers.
3. To select another setting, repeat the above process.

4. Press and hold the BACK key to exit and return to normal operation.

To Adjust A Setting

1. Press the EDIT key.
2. If editing is locked, a password will be requested. Key in the password of 111 and press ENTER.
3. Use the keypad and/or UP and DOWN arrow keys to increase or decrease the displayed setting.
4. Holding either key down will automatically continually increase or decrease the value.

5. Press ENTER to accept the changes or BACK to revert to the previous setting.

Quick Keys Reference

The following table is a quick reference to common settings.

	Step	Quick Keys
	BASIC SETTINGS	
p33	Change the engineering units	211x
p33	Change the measuring range	212x
p33	Change the display resolution	213x
	INPUTS	
p34	Set the digital input terminal functions	221x
p34	Calibrate tacho and set platform & belt lengths	222x
p36	Calibrate with weights	2232x
p37	Calibrate using loadcell specifications	2233x
p39	Change the 4-20mA flowrate setpoint input calibration	224x

	Step	Quick Keys
	INTERNAL SIGNALS	
p40	Set up how zeroing operates	2312x
p41	Change the totaliser resolution and when the totaliser operates	234x
p42	Change the PI settings to improve the loop control stability	2371x
p43	Improve the step response time with the feed forward settings	2374x
	OUTPUTS	
p45	Change the 4-20mA output calibrations	241x 242x
p46	Set the digital output terminal functions	243x
	INFORMATION, RESETS & FINAL CALIBRATION	
p49	Set key locks or customise the display	256xx
p53	Calibration setup	2651x
p53	Calibration	2652x
p53	Change the correction factor	26525

Initial Setup

Engineering Units

By default the measuring units of the controller are;

- weight kg
- belt speed m/s
- flowrate t/h
- total t

All settings must be entered using these measured units. The units can be changed if required.

	Step	Quick Keys
p33	Select weight units	2112
	Select belt speed units	2113
	Select flowrate units	2114
	Select totaliser units	2115

Measuring Range

Set the measuring range to the largest value that will occur during normal operation. Most settings having the same units as one of the capacities are stored as a percentage of this capacity. If the capacity is changed, these settings will also change.

	Step	Quick Keys
p33	Enter weight capacity	2121
	Enter belt speed capacity	2122
	Enter flowrate capacity	2123
	Enter the internal & external totaliser resolutions	2342 & 2343

Display Resolution

The display resolution for each engineering value can be changed if needed.

	Step	Quick Keys
p33	Enter weight division	2131
	Enter belt speed division	2132
	Enter flowrate division	2133

Belt Revs To Calibrate

Using the specified mechanical system accuracy calculate and set the 'belt revs to calibrate' setting.

System Accuracy	Calibration Time
☐ 1%	60s (1 minute)
☐ 0.5%	120s (2 minutes)
☐ 0.2%	300s (5 minutes)
☐ 0.1%	600s (10 minutes)

	Step	Quick Keys
p53	Enter belt revs to calibrate	• measure the time for one belt revolution • select the Calibration Time from the table above 26513 calculate and set 'belt revs to calibrate' $belt\ revs\ to\ calibrate \geq \frac{Calibration\ Time\ [s]}{time\ for\ one\ belt\ revolution\ [s]}$

Platform Length

The weighing platform length must be accurately measured and entered.

	Step	Quick Keys	
p35	Enter platform length	2223	mechanical measurement

Calibrate Belt Speed & Length

The belt speed tacho must be calibrated and some system length measurements entered into the instrument.

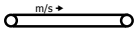
Following are three typical calibration methods which are characterised by how the belt speed is to be calibrated.

- Select **one** of these methods.

Given Belt Length

☐ tick method used

This is a simple method of calibration that requires that the total belt length be accurately known.



	Step	Quick Keys	
p35	Enter belt length	2225	accurately measure belt length and enter
p53	Calibrate belt speed	•	mark belt to measure rotation & run belt
		26522	set 'measurement method' to 1 (speed)
		26523	set measurement on (press EDIT, 1 & ENTER)
	▶ ■	•	press softkey (or remote input) to record belt rotations [1]
		•	repeat the last two steps to record up to 5 tests
	◀ ▶	26524	use the arrow keys to select test result
		26524	calibrate : press Fn,2 & ENTER at 'enter measurement'
p35	Enter belt length	2225	accurately measure belt length and enter
	Calculate belt speed	•	mark belt to measure rotation & run belt time one or more belt revolutions (N) calculate the bet speed as follows:- $belt\ speed\,[m/s] = \frac{belt\ length\,[m]\ \times N}{time[s]}$
p35	Enter belt speed	2222	with belt still running, enter calculated belt speed

With a Calibrated Tacho Wheel

☐

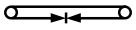
This method requires that the speed calibration can be calculated. For example if the speed is measured with a 0.5m circumference measuring wheel coupled with a 500 pulse per revolution encoder, it is known that the tacho will produce 1 pulse per millimetre of belt travel.

	Step	Quick Keys	
p35	Enter tacho constant	2221	calculate & enter tacho constant
p35	Enter belt length	2225	accurately measure belt length and enter
p53	**OR**	•	mark belt to measure rotation & run belt
	Calibrate belt length	26522	set 'measurement method' to 0 (belt length)
		26523	set measurement on (press EDIT, 1 & ENTER)
	▶ ■	26523	press softkey (or remote input) to record belt rotations [1]
		•	repeat the last two steps to record up to 5 tests
	◀ ▶	26524	use the arrow keys to select test result
		26524	calibrate : press Fn,2 & ENTER at 'enter measurement'

With Hand Held Tachometer

☐

Here the belt speed is accurately measured with a hand held speed tachometer or some other method.



	Step	Quick Keys	
p35	Enter known belt speed	2222	run belt, measure belt speed and enter speed
p35	Enter belt length	2225	accurately measure belt length and enter
p53	**OR**	•	mark belt to measure rotation & run belt
	Calibrate belt length	26522	set 'measurement method' to 0 (belt length)
		26523	set measurement on (press EDIT, 1 & ENTER)
	▶ ■	26523	press softkey (or remote input) to record belt rotations [1]
		•	repeat the last two steps to record up to 5 tests
	◀ ▶	26524	use the arrow keys to select test result
		26524	calibrate : press Fn,2 & ENTER at 'enter measurement'

Calibrate Weight

The weight can be calibrated with the belt stopped or running.

Belt Stopped

☐

The weight can be calibrated statically. This can be useful to detect and correct any weighing mechanism problems.

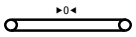
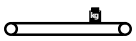
[1] Each time the belt mark passes a fixed point press the 1 key. (Alternatively activate the 'calibration control' input, see page 55)

	Step	Quick Keys	
p36	Calibrate loadcell	22321	remove all weights and set to 0
		22322	apply test weights & enter test weight value

Belt Running

☐

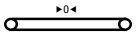
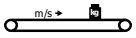
Dynamic weight calibration is done using either test weights applied to the weighing rollers or chains applied to the belt over the weigh platform with the belt running.

	Step	Quick Keys	
p53 	Calibrate zero with belt running	•	run belt with no material and no test weights
		26521	set to 1 to calibrate (press EDIT, 1 & ENTER)
p53	Calibrate weight	•	apply chains or test weights & run belt
		26511	set 'test weight type' to chains or test weights
		26512	set 'calibration weight' to test weight value
		26522	set 'measurement method' to 2 (weight)
p53 		26523	set measurement on (press EDIT, 1 & ENTER)
		•	wait until measurement is completed
		•	repeat the last two steps to record up to 5 tests
		26524	use the arrow keys to select test result
		26524	calibrate : press Fn,2 & ENTER at 'enter measurement'

Belt Running & Calibrate Speed

☐

It is possible to calibrate the weight and belt speed at the same time. This can be useful for regular re-calibrations using test weights.

	Step	Quick Keys	
p53 	Calibrate zero with belt running	•	run belt with no material and no test weights
		26521	set to 1 to calibrate (press EDIT, 1 & ENTER)
p53	Calibrate weight	•	apply chains or test weights & run belt
		26511	set 'test weight type' to chains or test weights
		26512	set 'calibration weight' to test weight value
		26522	set 'measurement method' to 3 (weight & speed)
p53 		26523	set measurement on (press EDIT, 1 & ENTER)
		26523	press softkey (or remote input) to record belt rotations [1]
		•	repeat the last two steps to record up to 5 tests
		26524	use the arrow keys to select test result
		26524	calibrate : press Fn,2 & ENTER at 'enter measurement'

Calibrate Correction Factor

Even after the belt speed and weight have been calibrated, there may still remain some error in the calculated flowrate. This is corrected using the flowrate 'correction factor'.

Only one of the following methods should be used.

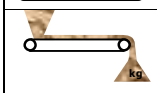
Material Testing

The most accurate calibration is achieved by feeding a known weight of material over the conveyor. The weight of material is entered into the instrument which is compared to the instruments total allowing an adjustment of the correction factor to be calculated.

Material Testing with Manual Change

☐

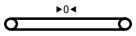
After one or material tests are completed, the 'correction factor' can be changed to adjust the calibration.

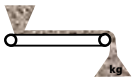
	Step	Quick Keys	
p53 	Calibrate zero with belt running	•	run belt with no material and no test weights
		26521	set to 1 to calibrate (press EDIT, 1 & ENTER)
	Calibrate with material	•	reset the totaliser
		•	run known weight of material over belt
		26525	calculate & enter new correction factor
		$new\ correction\ factor = old\ correction\ factor \times \frac{known\ weight}{totaliser\ weight}$	

Material Testing with Automatic Change

☐

When doing a series of material tests, record the test number with the true known weight of material.



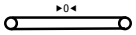


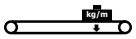
	Step	Quick Keys	
p53	Calibrate zero with belt running	•	run belt with no material and no test weights
		26521	set to 1 to calibrate (press EDIT, 1 & ENTER)
p53	Calibrate with material	26522	set 'measurement method' to 4 or 5 (material) 4: quicker test 5: more accurate; uses whole number of belt revolutions
p53		26523	set measurement on (press EDIT, 1 & ENTER)
		•	record the test number
		•	run known weight of material over belt
		26523	end measurement (press EDIT, 0 & ENTER)
		•	wait for measurement to stop if using method 5
		26524	use arrow keys to select correct test
		26524	enter measurement - actual material total
		•	repeat the last six steps to record up to 5 tests [2]
		26525	use the arrow keys to select test result
		26525	adjust 'correction factor' : press Fn,2 & ENTER

Using Chains

Use this method if;

- a material test won't be done
- and the weight has been calibrated with test weights
- and chains are available
- and the belt speed and belt length are accurately calibrated



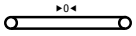


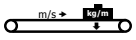
	Step	Quick Keys	
p53	Calibrate zero with belt running	•	run belt with no material and no test weights
		26521	set to 1 to calibrate (press EDIT, 1 & ENTER)
p53	Calibrate correction factor	•	apply chains & run belt
		26511	set 'test weight type' to 1 (chains)
		26512	set 'calibration weight' to test weight value
		26522	set 'measurement method' to 6 (correction)
p53		26523	set measurement on (press EDIT, 1 & ENTER)
		•	wait until measurement is completed
		•	repeat the last two steps to record up to 5 tests
		26524	use the arrow keys to select test result
		26524	calibrate : press Fn,2 & ENTER at 'enter measurement'

Using Chains & Belt Length

Use this method if;

- a material test won't be done
- and the weight has been calibrated with test weights
- and chains are available
- and the belt speed is to be recalibrated (belt length must be measured)





	Step	Quick Keys	
	Enter belt length	2225	accurately measure belt length and enter
p53	Calibrate zero with belt running	•	run belt with no material and no test weights
		26521	set to 1 to calibrate (press EDIT, 1 & ENTER)
p53	Calibrate correction factor & speed	•	apply chains & run belt
		26511	set 'test weight type' to 1 (chains)
		26512	set 'calibration weight' to test weight value
		26522	set 'measurement method' to 7 (correction/speed)
p53		26523	set measurement on (press EDIT, 1 & ENTER)
		•	press softkey (or remote input) to record belt rotations [1]
		•	repeat the last two steps to record up to 5 tests
		26524	use the arrow keys to select test result
		26524	calibrate : press Fn,2 & ENTER at 'enter measurement'

No Correction

If none of the above methods are used, the 'correction factor (QK 26525) should be left set at 1.000.

Re-Calibration

After some time of use, the system calibration should be checked and if necessary adjusted. Any of the above methods that were used to initially calibrate the system, can be used to re-calibrate.

When re-calibrating the weight, use the same method as was used initially. Do not change between using test weights and chains as this may produce different results and the correction factor would need to be re-calibrated.

[2] A new test can be started before the actual weight is entered.

SETUP – MW96A WEIGHFEEDER
Basic Settings

Basic Settings		
Inputs	Internal Signals	Outputs
Communications & Display		
Information, Resets & Final Calibration		

Engineering units

These settings affect the engineering units that will be used for many other settings. The engineering units can be changed at any time. Note that you must enter settings in the same units as set here eg 750 g calibration weights must be entered as 0.75 kg if the weight units are kg.

Q2111	units metric/imperial [0=both, 1=metric, 2=imperial]	8042, g0	

Selects between metric units, imperial units or any if a mixture of metric and imperial units is required.

Q2112	weight units	8044[3]	kg=101

These are the engineering units that will be used for all weight settings except the totaliser (eg kg).

Q2113	belt speed units	8046, g0[4]	m/s=80

These are the engineering units that will be used for all belt speed settings (eg m/min).

Q2114	flowrate units	8048, g0[5]	t/h=164

These are the engineering units that will be used for all flowrate settings (eg t/h).

Q2115	totaliser units (**TU**)	8050, g0[6]	t=102

These are the engineering units that will be used for the totaliser (eg t).

Q2116	length units	8052, g0[7]	m=20

These are the engineering units that will be used for all lengths (eg m).

Measuring range

If a signal exceeds the capacity setting, it will display as over-range. Therefore the range settings should be set larger than the maximum value that will occur during normal operation.

The measuring range affects the way many other settings are stored and displayed. These other settings are stored internally as a percentage of the relevant capacity. Once these capacities are set, the other settings, eg the analog output, will automatically work. Note that, in particular, the 'weight capacity' must be set before any other weight settings are entered.

[8]* Q2121	weight capacity (WCAP)	8060	100.0 kg,t,g
* Q2122	belt speed capacity	8062	1.000 m/s,m/min
* Q2123	flowrate capacity (FCAP)	8064	600 t/h,kg/h

Display resolution

The division settings affect to what resolution a signal is displayed. For most practical weighing systems, the total number of divisions will be within the range 500 to 5000.

Q2131	weight division	8070, g0	0.2 kg,t,g
Q2132	belt speed division	8072, g0	0.002 m/s,m/min
Q2133	flowrate division	8074, g0	1 t/h,kg/h

Trade setup

Q2141	trade use check	8702, g7	🔍

Displays off if instrument is not suitable for trade use. Information on what needs changing for trade use is shown.

Q2142	calibration verification code	8714, g7	🔍

Whenever a setting is changed which may alter the trade calibration of the instrument, this value will change. It can be used to check if the calibration has been changed since this value was last recorded.

Q2143	calibration lock	8078, g7	off=0

When set to on, all settings which effect the trade calibration are locked.

---

[3] Metric: 100=g, 101=kg, 102=t, Imperial: 110=oz, 111=lb, 112=tons

[4] Metric: 80=m/s, 81=mm/s, 82=cm/s, 83=m/min, Imperial: 90=ft/s, 91=in/s, 92=yd/s, 93=ft/min

[5] Metric: 160=kg/s, 161=kg/min, 162=kg/h, 163=t/min, 164=t/h, Imperial: 170=lb/s, 171=lb/min, 172=lb/h, 173=ton/min, 174=ton/h

[6] Metric: 100=g, 101=kg, 102=t, Imperial: 110=oz, 111=lb, 112=tons

[7] Metric: 20=m, 21=mm, 22=cm, Imperial: 30=in, 31=ft, 32=yd

[8] * Appears in Quick Setup menu. These are the most important setting for this controller.

Clock

The unit has a real time clock. The clock is used to date stamp printouts and can cause printouts (or other events) to occur at user set times during the day or week. The clock will run continue to run for a few days or weeks without power. The time is also shown in the top right corner of the display (if no alarms are present).

Q2191	clock enable	9910	0

Set to 0 to disable the clock or 1 to enable the clock. When disabled, time & date information is not shown on any printouts.

Daylight saving

Q21921	locality	9912	0

Selects the locality for daylight saving correction. Use the UP & DOWN keys to select a locality or set to 0 to disable daylight saving correction or set to CUSTOM to set your own correction dates. If CUSTOM is selected, the following three settings specify when the correction will be made.

Q21922	weekday & time for DST	9914	[9]

Selects the day of the week and time when the daylight saving correction will be made.

Q21923	start of daylight saving	9916	0

Selects the time of the year when daylight saving will start.

Q21924	end of daylight saving	9918	0

Selects the time of the year when daylight saving will end.

Q21925	daylight saving time (DST)	9920	0

Shows if daylight saving is on or off. If automatic daylight saving correction is off, then this setting may be used to move the clock forwards or backwards by one hour.

Set clock

Q21931	set date	9922

Sets the date. For example to set 9 March 2021 enter 210309.

Q21932	set time	9924

Sets the time in 24hour format.

Inputs

Basic Settings		
Inputs	Internal Signals	Outputs
Communications & Display		
Information, Resets & Final Calibration		

Digital inputs

The following settings select the function of the digital inputs. The hint line shows (off) when there is no voltage present, and (on) when voltage is applied to the input.

The UP and DOWN keys can be used to select the function from the available list.

The list is shown in the **Instruction Manual** in the 'I/O Function Table'.

Q2211	IN1 function (& state)[10]	8170, g3[11]	no function=0
Q2212	IN2 function (& state)	8172, g3	acquire zero=16
Q2213	IN3 function (& state)	8174, g3	run=2
Q2214	IN4 function (& state)	8176, g3	enable internal tacho=7
Q2215	IN5 function (& state)	8178, g3	print=40
Q2216	IN6 function (& state)	8180, g3	print total=41
Q2217	IN7 function (& state)	8182, g3	stop=1
Q2218	IN8 function (& state)	8184, g3	pause=3
Q2219	IN9 function (& state)	8186, g3	acquire zero=16
Q2210	IN0 function (& state)	8190, g3	pulse input=0

Tacho & Belt lengths

The tacho must be calibrated and some belt lengths must be known. The values for these can be entered directly and/or measured using a running belt.

The belt speed calibration is held by the setting 'tacho constant' (QK 2221).

If no tacho is used, the 'internal belt speed' can be set as a constant.

Two important lengths that must be set are the 'platform length' (QK 2223) and the 'belt length' (QK 2225).

[9] Defaults to whatever the current setting is.

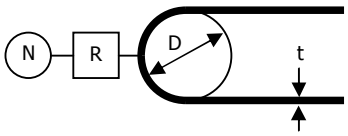
[10] Hint line shows state as (on) or (off)

[11] See I/O Function Table page 57. Use negative numbers to reverse the signal sense eg 1=stop (stop when input is on), -1=NOT stop (stop when input is off).

* Q2221	tacho constant (belt travel for 1000 tacho pulses)	8160	1.000 m

Enter the Tacho Constant

With this method, the tacho constant is obtained by calculation. This applies when for example the tacho is connected to the motor and gear box which drives the drum. It can also be used for a trailing wheel tacho.



$$tacho\ constant = \frac{\pi \times (D + t) \times 1000}{N \times R}$$

where		Example 1	Example 2	Example 3
π	≈ 3.142			
D	drum diameter [m]	0.14	0.14	0.159 *
t	belt thickness [m]	0.01	0.01	0
N	number of pulses per rev	1	1000	500
R	reduction ratio	56	1	1
	tacho constant	7.910	0.4430	1.000

* (0.5m wheel)

Q2222	belt speed	8908 (shows belt speed)	m/s,m/min

The belt speed setting normally shows the current belt speed but can be adjusted while the belt is running. When a new value is entered the tacho constant will be adjusted automatically.

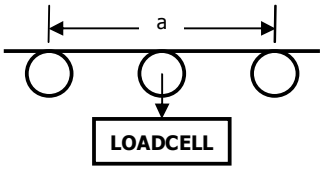
Enter Known Belt Speed

The belt speed reading can be adjusted by entering the correct belt speed value while the belt is running. This alters the 'tacho constant'. This requires measuring the belt speed by for example using a belt speed measuring device or by calculating the speed by measuring the time for a known length of belt to pass a point.

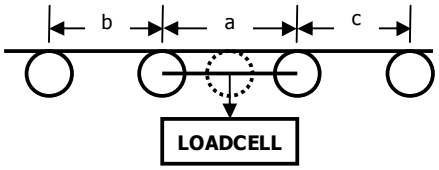
* Q2223	platform length	8080	0.600 m

Enter Platform Length

The platform length is the effective length over which material is weighed. For a single idler weigh platform, the platform length is half the distance between the two fixed idlers which are on either side of the weigh idler. For a multi idler weigh platform the platform length is the distance between the two outside weighing idlers plus half the sum of the distances from each outside weigh idler to the first fixed idler either side of the weigh platform.

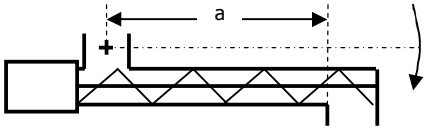


$$Lp = \frac{a}{2} \quad [m]$$



$$Lp = a + \frac{b + c}{2} \quad [m]$$

A pivoted screw weighfeeder is shown below.



$$Lp = a \quad [m]$$

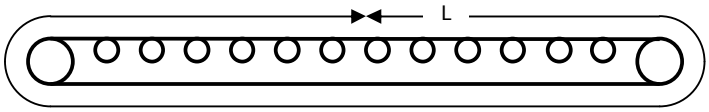
Q2224	belt unload length	8082, g14	0.000 m

This is the length of belt that will pass before a zeroing is started, to ensure that the belt is clear of all material. The Totaliser operates during this time.

* Q2225	belt length	8084	10.00 m

Enter Belt Length

The belt length is the total length of belt around the conveyor. During zeroing the weight is averaged over this length of belt. The belt length setting is also required for some of the measurement methods.



Q2226	belt reload length	8086, g14	0.000 m

This is the length of belt that will pass after a zeroing is completed before the transmitter returns to Flow Control. This allows material back on the belt for a smooth return to Flow Control mode. The Totaliser operates during this time.

Q2227	belt speed response time	8162, g4	4=2s

The response time for the speed signal. This should be adjusted to give a steady speed reading under normal conditions.

Q2228	internal belt speed (set to 0 when using tacho)	8272, g4	0.000 m/s,m/min

Set to 0 when using a tacho to measure the belt speed. If a tacho is not fitted, set the 'internal belt speed' to the measured fixed speed of the belt. If the speed of the belt is not fixed, then a tacho is required.

When the internal tacho is used, one of the digital inputs must be set and used to 'enable internal tacho'.

Q2220	tacho sensor type	8164, g4	PNP=0

Selects the type of tacho input sensor. 0 = PNP, 1=AC, 2=NAMUR

Loadcell input (platform weight)

Input settings

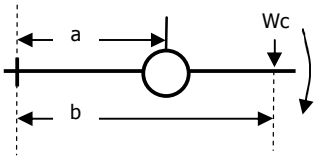
Q22311	AI1 response time [0.04 to 32]	8120, g1	2.00 s

The response time for the weight signal. A larger value will help reduce variations in the weight reading caused by vibrations or movement on the weighing system.

Q22312	lever ratio	8130, g1	1.0000

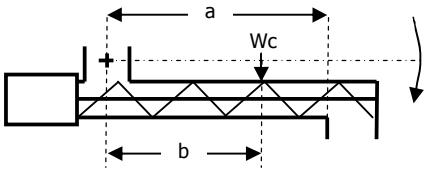
The lever ratio adjusts the weight reading during calibration. It is the ratio of calibration weight (test weight) to displayed weight (platform weight).

pivoted weigh roller



$$R = \frac{b\,[m]}{a\,[m]}$$

pivoted screw weighfeeder



$$R = \frac{2b\,[m]}{a\,[m]}$$

$$Wc\,[kg] = Wd\,[kg] \times R$$

where

Wd	displayed weight
R	lever ratio
Wc	calibration weight

Q22313	4 or 6 wire connection	8128, g1	auto=0

Selects if the loadcell has a 4 wire or 6 wire connection to the instrument. If set to auto, it will power up in 6 wire mode, but switch to 4 wire mode if there is no sense voltage detected.

Q22314	loadcell scan	8168, g7	0

Set to 0 for normal operation. Selects the number of loadcells to be individually measured. Loadcell inputs P, Q, R, and S are multiplexed, measuring each one for the 'AI response time'. The individual signals are saved in 'AI1 signal P, Q, R & S'. The average signal is saved in 'AI signal'.

Calibration with weights

The basic procedure is to remove all weight from the weighing system and set the zero setting to 0. Then a known weight is applied to the weighing system and the span setting adjusted to this weight.

* Q22321	AI1 zero (remove all weight & set to zero)	8910[12]	(shows weight) kg,t,g
* Q22322	AI1 span (apply weight & enter weight value)	8912[12]	(shows weight) kg,t,g

Calibrate loadcell

A known weight is applied to the weighing platform. This weight simulates a weight on the belt but is applied directly to the loadcell. A weighfeeder may be supplied with special test weights for this purpose.

This is often the easiest method of calibration. It is useful to detect problems with the weighing mechanism which may not otherwise be shown using other calibration methods. It is also a quick method which can be used at anytime to check the loadcell and weighing system.

1. Press the Q key to access the setup menu.
2. Key in the quick key code 22321 to select the 'AI1 zero' step.
3. Make sure the belt is stopped, there is no weight on the belt and the test weights are removed.

4. Press the EDIT key. (If editing is locked, key in the password 111 and press ENTER).
5. Press the 0 key followed by ENTER and wait while the display shows 'Calibrating, please wait…'
6. Press ENTER twice to move to the 'AI1 span' step. (Or press the DOWN key).
7. Apply the known test weight.
8. Press EDIT and enter the value of the test weight followed by the ENTER key and wait while the display shows 'Calibrating, please wait…'.

   If possible, remove and apply the test weights several times checking the weight reading each time. Make sure the weight reading is within acceptable error limits. If not there may be a mechanical fault which should be fixed before proceeding with the calibration. Repeat the calibration process if necessary. (To return to the 'AI1 zero' step, press the UP key).

9. Press and hold the BACK key to return to normal operation.

Direct loadcell calibration

Q22331	loadcell capacity (sum of the capacity of all loadcells) [13]	8122	100.0 kg,t,g

Set to be equal to the total capacity of all the loadcells in the weighing system. If there are two 50 kg loadcells, this setting should be 100 kg.

This setting can be adjusted even if the transmitter has been calibrated with test weights, and it will not alter the calibration. If set correctly, the 'system sensitivity' and 'deadload' settings will then show how the instrument has been calibrated.

Q22332	system sensitivity (average sensitivity of all loadcells)	8124	2.00000 mV/V

Shows the loadcell sensitivity (if the 'loadcell capacity' has been set correctly first).

If calibrating without test weights, set this value to the loadcell sensitivity. If there is more than one loadcell and if each loadcell has a slightly different sensitivity, use the average value. For example, if there are two loadcells with sensitivities 2.003 and 2.007 mV/V, set the 'system sensitivity' to 2.005 mV/V.

Q22333	deadload (dead weight on loadcells)	8126	0.0 kg,t,g

Shows the approximate dead weight on the loadcell(s), provided the 'loadcell capacity' has been set correctly first.

If calibrating without test weights, then set this value to the weighing system's weight when there is no material load.

Calibrate Using Loadcell Specifications

The loadcell can be calibrated using the loadcell(s) capacity and sensitivity supplied by the manufacturer. Using this method avoids the need to load and unload test weights onto the weighing system. If the system has already been calibrated using test weights, the actual dead load and loadcell sensitivity are displayed. These settings should not then be adjusted.

1. Press the Q key to access the setup menu.
2. Key in the quick key code 22331 to select the 'loadcell capacity' step.

3. Press the EDIT key. (If editing is locked, key in the password 111 and press ENTER).
4. Key in the total loadcell capacity followed by ENTER. This is normally the sum of all of the loadcell capacities (e.g. 4 x 100kg loadcells = 400kg total capacity).

5. Press BACK then 2 (or press the DOWN key) to move to the 'system sensitivity' step (QK 22332).

[12] Entering a value initiates a calibration.

[13] WARNING: Altering loadcell capacity will NOT change the loadcell calibration, but will re-scale the system sensitivity and deadload values. Altering the system sensitivity or deadload values WILL change the loadcell calibration

6. Key in the loadcell sensitivity followed by ENTER. This is normally the average of all of the loadcell sensitivities.
7. Press BACK then 3 (or press the DOWN key) to move to the 'deadload' step (QK 22333).
8. If you know or can estimate the deadload, key this in followed by ENTER. This value is the total weight of the mechanical components applied to the loadcell but excluding any material weight.
9. Press and hold the BACK key to return to normal operation.

If the deadload is unknown (as is usually the case), a loadcell zero should be performed.

1. Press the Q key to access the setup menu.
2. Key in the quick key code 22321 to select the 'AI1 zero' step.
3. Make sure the belt is stopped, there is no weight on the belt and the test weights are re-moved.
4. Press the EDIT key. (If editing is locked, key in the password 111 and press ENTER).
5. Press the 0 key followed by ENTER to initiate a zero calibration.
6. Press and hold the BACK key to return to normal operation.

Loadcell signals

These settings are used for diagnostics and fault detection on the loadcell input.

Q22351	AI1 signal	8700	mV/V

Displays the loadcell signal in mV/V.

Q22352	AI1 signal P	8710	mV/V
Q22353	AI1 signal Q	8712	mV/V
Q22354	AI1 signal R	8716	mV/V
Q22355	AI1 signal S	8718	mV/V

Displays each loadcell signal when scanning has been enabled. (refer to Q22314)

Q22350	loadcell check	8914, g7	off=0

Set to 1 (on) to measure mV/V signal of each loadcell.

Loadcell trim

These settings are used to trim the input gain of up to four loadcells. This can be used to correct for sensitivity differences when using 2, 3 or 4 loadcells. A typical application is corner adjustment of a platform scale.

Q22361	trim 1 [-1250 to 1251]	8132, g7	disabled =1251
Q22362	trim 2 [-1250 to 1251]	8134, g7	disabled =1251
Q22363	trim 3 [-1250 to 1251]	8136, g7	disabled =1251
Q22364	trim 4 [-1250 to 1251]	8138, g7	disabled =1251

The trim settings are set to 1251 when not in use, which sets the excitation voltages to their maximum.

Corner adjustment procedure:

1. Set trim 1 through to excitation 4 to the value 0.
2. Calibrate the scale (zero and span) with the test weights applied centrally.
3. Apply the test weight as close to loadcell1 as possible, adjust the setting 'trim 1' so that the weight reading corresponds to the test weight value.
4. Repeat for each of the remaining loadcells.

Inclination correction

These settings are used to correct for changes in inclination (angle) of the weigh platform. The weight signal is multiplied by 1/cos(inclination). In addition, changes to the zero with inclination can also be corrected.

Q22371	inclination mode	8154, g7	disabled =0
Q22372	inclination	8156, g7	0.0
Q22373	inclination zero adjustment	8158, g7	0 kg,t,g

inclination mode	description
0	disabled
1	manual angle entry the angle is entered at the 'inclination' setting.
2	use AI2 for angle An angle transducer connected to AI2 must be calibrated. Set 'AI2 signal type' (QK2245) to 7 (angle). Requires an MO2 option to be fitted.

Inclination zero adjustment correction procedure:

1. Set the 'inclination zero adjustment' setting to 0.
2. At an initial inclination, zero the weight (use 'AI1 zero' QK22321 or 'zero calibration' QK26521).

3. Change the inclination and take note of the change in weight reading, Wz.
4. Go to the 'inclination zero adjustment', it should show the two inclinations and a multiplying factor. Divide Wz by this multiplying factor and enter the value.
5. Re-zero the weight (use 'AI1 zero' QK22321 or 'zero calibration' QK26521).

Current/Voltage input (remote flowrate setpoint)

When AI2 is available, a remote setpoint signal can be connected as either a current (eg 4 to 20mA) or as a voltage (eg 0 to 10V). The transmitter auto-detects whether the current or voltage input is active and uses the relevant calibration from the following settings.

Q2241	AI2 current low	8140, g2	4.000 mA

This is the low point of the analog signal (when using the current input) within the range 0 to 20 mA (typically set this variable to 4 mA).

Q2242	AI2 current high	8142, g2	20.000 mA

This is the high point of the analog signal (when using the current input) within the range 0 to 20 mA (typically set this variable to 20 mA).

Q2243	AI2 voltage low	8144, g2	0.000 V

This is the low point of the analog signal (when using the voltage input) within the range 0 to 10 V (typically set this variable to 0 V).

Q2244	AI2 voltage high	8146, g2	10.000 V

This is the high point of the analog signal (when using the voltage input) within the range 0 to 10 V (typically set this variable to 10 V).

Q2245	AI2 signal type	8148, g2[14]	3

This allows correct units and ranging to be applied to the AI2 signal. For example a setting of 1 converts the signal to a weight, a setting of 3 converts the signal to a flowrate.

Q2246	AI2 signal low	8150, g2[15]	0 t/h,kg/h

This is the signal that should correspond with the 'AI2 current low' or 'AI2 voltage low' point.

Q2247	AI2 signal high	8152, g2[15]	600 t/h,kg/h

This is the signal that should correspond with the 'AI2 current high' or 'AI2 voltage high point.

Q2248	AI2 current/voltage	8720, g2	mA or V

Displays the remote analog signal as a current or voltage.

Q2249	AI2 signal	8722, g2	t/h,kg/h

Displays the remote analog signal in engineering units.

Input options

Q2201	local/remote option	8188, g8	0

local/remote option	description
0	default
1	When in local mode, the run input function is disabled. When in remote mode, the start/stop key functions are disabled.

Internal Signals

Basic Settings		
Inputs	Internal Signals	Outputs
Communications & Display		
Information, Resets & Final Calibration		

Weight

Basic weight

Q23111	platform weight	8740	kg,t,g

Displays the platform weight.

Q23115	belt loading	8746	kg/m

Displays the weight per unit length currently on the belt.

Q23116	platform load	8748	%

Displays the platform load as a percentage of the weight capacity.

[14] 0=general, 1=weight, 2=belt speed, 3=flowrate, 4=total, 5=belt loading, 6=length, 7=short length, 8=current, 9=voltage
[15] Signal units are determined by units of AI2 signal type

Weight zeroing

Q23121	zero range	8212	2.00 %

The maximum range as a percentage of the Weight Capacity over which a zero may be acquired. This restricts the operation of both an operator initiated zero (pressing the ZERO key) or an automatic zero when the zero tracking band is enabled.

Q23123	zero tracking band (set to 0 to disable)	8216, g5[16]	0.0 divs

Zero tracking is disabled if set to 0.

When not set to zero, automatic zeroing is enabled. When enabled, the average weight is continuously measured over the belt length setting. The last three of these are recorded and compared to the zero tracking band. If all three are within the band, the zero is adjusted to the second value. This process helps to ensure that a zero is not automatically taken with a starting or finishing product tailing.

During normal operation, the status of zero tracking is displayed as a bar showing the belt revolution and three dots. The dots indicate which of the three average weights are within the zero tracking band.

Q23125	zeroing progress	8752	

Displays the percentage progress through the zeroing cycle.

Q23126	zero weight	8220	kg,t,g

Displays the amount of weight that has been zeroed out since the last zero calibration.

Q23128	speed demand during zero	8224, g5	50.0 %

Sets the speed value for the speed demand signal during the zero process. During a zero, the system automatically is set to MANUAL SPEED CONTROL. After the zero process, it returns to the control that was in operation before the zero began.

t

Batching

Q23211	batch setpoint	8400, g7	0.00 **TU**

Set the target 'batch weight' here.

Q23212	batch preact (stop this amount before batch setpoint)	8402,	0.00 **TU**

Stop when the 'total weight' is this amount before 'batch setpoint'. Set the 'batch preact' so that the total weight just reaches the 'batch weight' by the time the system has come to a complete stop.

Flowrate

Q2333	flowrate	8762	t/h,kg/h

Displays the flowrate.

Q2334	simulator [0=off, 1=simulate flow]	8294	0

Usually Off. Simulates a flowrate for testing purposes.

Q2336	dynamic filter [0=off,1=low,2=medium,3=high]	8298, g6	0

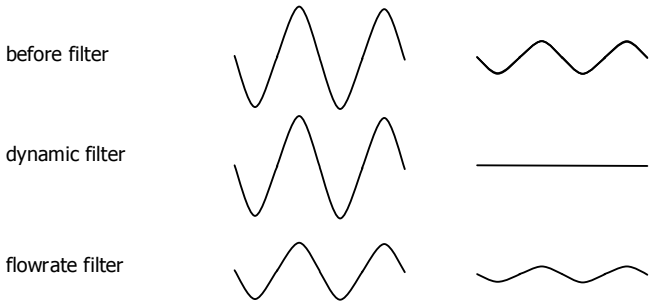
Additional flowrate filtering. Does not affect the control loop settings.

Large signal fluctuations are filtered less than small signal fluctuations. It is better turned off for batching applications. See diagrams following.

Q2337	flowrate filter [0s, 0.5s, 0.7s, 1s, 1.4s, 2s, 3s, 5s, 7s, 10s, 14s, 20s, 30s, 50s]	8308, g6	0

Additional flowrate filtering. Does not affect the control loop settings.

Averages out fluctuations in the flowrate. The amount of filtering does not depend on the signal amplitude. See diagrams following.



Q2338	flowrate raw	8764, g6	t/h,kg/h

The flowrate before the dynamic filter and flowrate filter.

[16] Set in divisions of weight, the smallest weight increment as displayed when setting the weight capacity or weight divisions. [0.0 to 12]

Totaliser

Q2341	low flow cutout	8310	2.0 %

Totalising stops when the flowrate is less than this value.

If a negative value is used, then the low flow cut out occurs within a band. For example, with a setting of -2%, totalising will stop when the flowrate is between -2% and +2%.

Q2342	totaliser division	8312	0.02 kg,t,g

Set the resolution of the totaliser.

Q2343	pulse output division	8314	0.02 kg,t,g

Set the resolution of the external totaliser.

Q2344	total weight	8730	0.00 **TU**

Displays the weight totaliser. The total is retained after a power failure.

Q2345	running total	8732, g6	0.00 **TU**

Displays a running weight total. This total is not reset by the RESET TOTAL operation.

Q2346	totaliser digits	8320, g6	6

Sets the number of digits the totaliser counts to.

Increasing the number of digits requires more space and the display may become cramped. More room can be made, for example by removing the material feed stopped icon. This can be done by setting the 'secondary line options' (QK 25643) to 4. To remove the speed demand bar graph and icons as well, set the 'secondary line options' to 12. (▄▄▁▁ & ✕)

Q2349	running time	8728, g6	h

The total time the system has been running. Accumulates anytime the 'low flow cutout' is off.

Limits

Limit 1

Q23511	limit 1 source (modbus address of signal)	8350, g7	

Set this to the modbus address of the signal that will be compared with the setpoint.

Q23512	limit 1 mode	8354, g7	high limit = 0

Sets the limit operating mode.

limit mode	description
0	high limit
1	low limit
2	outside band
3	inside band
4	fill control
5	empty control

Q23513	limit 1 delay	8352, g7	0.00 s

Sets a delay to activate or de-active the limit.

Q23514	setpoint 1	8330, g7	

Sets the limit value.

Q23515	setpoint 1 preact	8356	

Sets the preact value.

Limit 2

Q23521	limit 2 source (modbus address of signal)	8360, g7	
Q23522	limit 2 mode	8364, g7	low limit = 1
Q23523	limit 2 delay	8362, g7	0.00 s
Q23524	setpoint 2	8332, g7	
Q23525	setpoint 2 preact	8366	

Limit 3

Q23531	limit 3 source (modbus address of signal)	8340, g7	
Q23532	limit 3 mode	8344, g7	fill control = 4
Q23533	limit 3 delay	8342, g7	0.00 s
Q23534	setpoint 3H	8334	
Q23535	setpoint 3L	8346	

Events/Alarms/Faults

Various events can be triggered by the inputs (eg to capture the weight) or automatically when certain situations are detected by the transmitter. Each event has an ID and produces a value.

Q2361	event ID	8780, g8	🔍

ID of most recent event.

Q2362	event value	8782, g8	

Value of most recent event.

Q2363	last alarm event	8784, g8	

Value of most recent event.

Q2364	alarm list (press EDIT to view list of all possible alarms)	8920, g8	

Scroll through a list of all possible alarms.

Q2365	delay time [0.00 to 300.00]	8458, g8	0.00 s

A timer used by the macros.

Q2366	healthy options	8456, g8	0

Selects which faults control the healthy signal.

Q2367	fault delay	8486, g8	10 s

Delay used for belt speed, low platform weight and error limit faults.

Q2369	fault options	8454	

Allows selected faults to not raise an alarm.

Control

The belt speed is controlled to keep the measured flowrate as close as possible to the flowrate set-point. The technique used to determine the belt speed demand is a combination proportional and integral control ie. PI control for short. These variables affect the PI control characteristics.

PI settings

Q23711	proportional band (increase if flow control is unstable)	8460	200.0 %

This is the proportional band. Generally, the larger the proportional band, the slower the response time of the weighfeeder. The smaller the proportional band, the more likely the weighfeeder is to go unstable and begin to hunt up and down.

When the flowrate is this value above setpoint the PI Demand is -100%. When the flowrate is this value below setpoint, the PI Demand is 100%. As the flowrate approaches setpoint, from above or below, the PI Demand falls proportionally to 0% at setpoint.

However, these values assume that the Integral portion of the PI Control is adding 0% to PI demand. If the Integral is adding 50%, then the PI demand is -50% one proportional band above setpoint, 50% at setpoint and 100% at half a proportional band below setpoint.

The PI Demand is limited to be within the range -100% to 100%. So in the above example, at one proportional band below setpoint the PI Demand is still 100%(not 150% as might be expected). This has been achieved by automatically forcing the Integral portion to 0%. Similarly, at two proportional bands below setpoint the PI Demand is still 100%, achieved by automatically forcing the Integral portion to -100%.

As a starting point, the 'proportional band' should be set to twice the flowrate achieved by the system when the speed demand output is at 100%. If the weigh feeder is unstable (hunts), increase the value. If the weigh feeder is slow to respond, decrease the value.

Q23712	integral time constant (increase for slow systems)	8462	2.0 s

This is the integral time constant. It sets the rate at which the integral control changes the PI demand until the flowrate is correct. Note that the Integral action is disabled when the speed demand is 0% and the flowrate is above the setpoint and also when the speed demand is 100% and the flowrate is below setpoint.

Q23714	slew rate limit (limits rate of change to setpoint)	8466, g8	50 %/s

Limits the rate at which PI demand can change.

Q23715	transport delay [0 to 25]	8468, g8	0.8 s

Sets the delay from a change in speed demand, until the measured flowrate changes. This could occur when the belt speed is constant, and the flowrate is controlled upstream of the weigh point introducing a delay into the control loop.

This setting can be used to optimise the response to a change in setpoint.

Q23716	system time constant	8484, g8	5=2 s

Time for the measured flowrate to reach 66% of its final value after a step change in speed demand.

This setting can be used to optimise the response to a change in setpoint.

Q23717	error	8798	t/h,kg/h

Displays the error signal (Setpoint – Measured Flowrate) used by the PI Control.

Q23718	error limit (set to 0 to disable)	8488	t/h,kg/h

An error limit fault occurs if +/- the error exceeds this value for longer than the fault delay.

Setpoint

These are the signals used to determine the setpoint for the PI calculation.

Q23721	set local flowrate	8470	0 t/h,kg/h

Sets the local flowrate setpoint.

Q23722	ratio (multiplying ratio on remote setpoint)	8472, g8	100.00 %

The remote setpoint is multiplied by this ratio for applications where the system is to run as a per-

centage of a master flowrate.

Q23723	current setpoint	8790, g9	t/h,kg/h

Displays the flowrate setpoint that is currently being used for control purposes ie the 'set local flowrate' setting if the local setpoint is being used, or the 'AI2 signal' (Current/Voltage Input AI2 is the default input for the remote flowrate setpoint) if the remote setpoint is being used.

Q23724	minimum setpoint (set to 0 to disable)	8474, g8	0 t/h,kg/h

When the current setpoint is less than the minimum setpoint, the speed demand is held at zero. Set to 0 to disable this function.

Q23726	setpoint delay [0 to 25]	8478, g8	0.0 s

Sets a delay for the remote setpoint signal. Maybe be used for ratio systems to delay the flowrate setpoint.

Q23727	system setpoint enable (set to 0 to disable)	8502, g8	0

The local setpoint is sent to all other units connected on the same communication bus.

Q23728	setpointS	8788, g8	t/h,kg/h

Displays the system setpoint.

Speed demand

The speed demand is a 0 to 100% signal used to control the flowrate.

Q23731	speed demand (flow control speed signal)	8792	%

Displays the control signal for the flowrate control.

Q23732	set manual speed	8482	%

Sets a manaul speed demand and sets volumentric mode.

Feed forward

These are the signals used to adjust the feed forward of the control for fast response.

The first two settings control setpoint feed forward while the 2nd and 3rd settings control the weight feed forward.

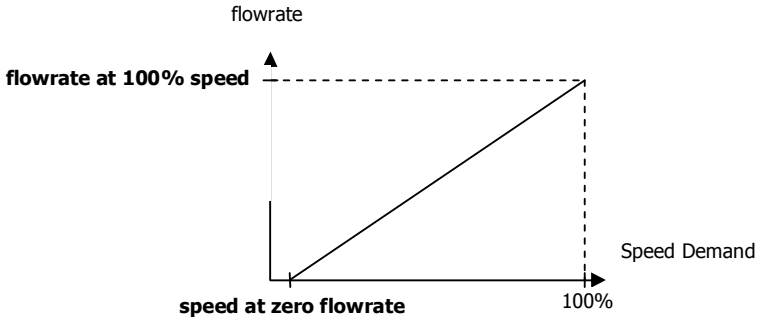
Q23742	speed at zero flowrate	8492, g8	2.0 %

Set this to the speed demand at the point when the flowrate just reaches 0.

Q23743	flowrate at 100% speed	8494	600 t/h,kg/h

Allows for feed-forward to ensure a fast response time when the setpoint is changed. The value should be equal to the flowrate achieved at the speed demand value shown in the hint line (typically 100%).

To disable setpoint feed forward, set this setting to 0.



Q23746	tune feed forward time	8490, g9	0.0 min

Automatic adjustment is disabled if the 'tune feed forward time' is set to zero. Sets a rate at which the feed forward values are automatically adjusted.

Volumetric

Q23751	auto volumetric enable	8480, g8	0

If enabled the controller switches automatically into volumetric mode if there is a 'weight fault' or 'belt speed fault'. To return to gravimetric mode, the operator must press the toggle volumetric mode key.

Q23752	minimum platform weight	8500, g8	0.0 kg,t,g

Set to 0 to disable.

Whenever the platform weight is less than this setting, the controller runs temporarily in volumetric mode. If the weight returns to a value above the setting, normal gravimetric operation is resumed. This occurs with no delay, and operates independently of the 'auto volumetric enable' setting.

A low platform weight alarm occurs after the fault delay time.

Memory Storage

Memory storage is used to save or recall a group of settings to memory. This can for example be used to save different settings that change for different products. The instrument can store up to 20 groups of settings.

Memory Setup

Q23811	memory usage	8680, g8	0

Selects how the memory will be used. Several preset choices are available or it may be set for a custom setup.

memory usage	description	default memory store name
0	disabled	
1	custom	
2	setpoint 1	PRODUCT
3	setpoints 1 & 2	PRODUCT
4	loadcell calibration	CALIBRATION
5	flowrate setpoint	PRODUCT
6	feed forward	PRODUCT

Q23812	data 1 source	8670, g8	0
Q23813	data 2 source	8672, g8	0
Q23814	data 3 source	8674, g8	0
Q23815	data 4 source	8676, g8	0

The four items above contain the addresses of settings that will be stored in the group memory. The addresses can only be set if the memory usage is set to 'custom'.

Q23810	memory store name	3600, g8	

This sets a name for the memory store. If a text name is entered, it will replace the word 'GROUP' in the following memory settings.

Memory Recall/Store

The following 3 settings are used to recall or store a group of settings and to set a name for each group. The groups are numbered from 0 to 19. Unless the memory usage is disabled, these settings will appear in the operator's MENU, accessed by pressing the MENU key.

Q23821	recall GROUP	8816, g8	0
Q23822	store GROUP	8814, g8	0
Q23823	edit GROUP name	3700, g8	

Edit Stored Memory

The following allow a group of stored settings to be altered without recalling them first. The 'GROUP to edit' is set to the group number 0 to 19, and the remaining steps used to edit the stored values.

Q23831	GROUP to edit	8818, g8	0
Q23832	GROUP name	3800, g8	
Q23833	data 1 source not used	8820, g8	0
Q23834	data 2 source not used	8822, g8	0
Q23835	data 3 source not used	8824, g8	0
Q23836	data 4 source not used	8826, g8	0

User data

Additional user data which for example may be used by macros.

The PERM settings are retained when the power is removed from the controller.

The TEMP settings are not retained when the power is removed from the controller.

Retained

Q23911	perm 1	8596, g13	0
Q23912	perm 2	8598, g13	0
Q23913	perm 3	8570, g13	0
Q23914	perm 4	8572, g13	0
Q23915	perm 5	8574, g13	0

Other data

Q23921	temp 1	8612, g13	0
Q23922	temp 2	8614, g13	0
Q23923	temp 3	8576, g13	0
Q23924	temp 4	8578, g13	0
Q23925	temp 5	8582, g13	0
Q23928	date	8830, g13	

Displays the date in the form 'YYMMDD'.

Q23929	time	8832, g13	

Displays the time in the form 'HHMM'.

Outputs

Basic Settings		
Inputs	Internal Signals	Outputs
Communications & Display		
Information, Resets & Final Calibration		

Analog output 1 (speed demand)

These variables select which signal should appear on the analog output and how it is to be scaled.

The speed demand varies from 0 to 100 % where 0 % means stopped and 100 % means maximum speed. This demand is converted to an analog signal for connection to the motor speed controller. As an example, a speed demand ranging from 0 to 100 % is to be converted to an analog signal ranging from 4 to 20 mA.

Q2411	AO1 source (modbus address of signal)	8520, g10	speed demand=8792

Set this to the address of the transmitter's signal that will be output via AO1.

Q2412	AO1 signal low	8522	0.0 **%**

This is the low point of the signal to corresponding to the 'AO1 current low' setting (typically set to 0).

Q2413	AO1 signal high	8524	100.0 **%**

This is the high point of the signal corresponding to the 'AO1 current high' setting (typically set to the capacity of the signal).

Q2414	AO1 current low	8526, g10	4.000 mA

This is the low point of the analog output signal within the range 0 to 20 mA (typically set to 4mA).

Q2415	AO1 current high	8528, g10	20.000 mA

This is the high point of the analog output signal within the range 0 to 20 mA (typically set to 20mA).

Q2416	AO1 current (can override output signal)	8800, g10	mA

Displays AO1 current. This setting may be altered to temporarily manually set the output current. This is useful to test the analog output. The output will return to normal after you exit from the settings.

Q2417	AO1 signal (can override output signal)	8804	**%**

Displays the signal currently being output. If this value is altered, the output is set to a value corresponding to the signal. This is useful to test the analog output. The output will return to normal after you exit from the settings.

Analog output 2 (flowrate)

These variables select which signal should appear on the analog output and how it is to be scaled.

The flowrate is converted to an analog signal for connection to remote equipment. As an example, a flowrate ranging from 0 to 100 t/h is to be converted to an analog signal ranging from 4 to 20 mA.

Q2421	AO2 source (modbus address of signal)	8530, g10	flowrate=8762

Set this to the address of the transmitter's signal that will be output via AO2.

Q2422	AO2 signal low	8532	0 **FU**

This is the low point of the signal corresponding to the 'AO2 current low' setting (typically set to 0).

Q2423	AO2 signal high	8534	FCAP **FU**

This is the high point of the signal corresponding to the 'AO2 current high' setting (typically set to the capacity of the signal).

Q2424	AO2 current low	8536, g10	4.000 mA

This is the low point of the analog output signal within the range 0 to 20 mA (typically set to 4mA).

Q2425	AO2 current high	8538, g10	20.000 mA

This is the high point of the analog output signal within the range 0 to 20 mA (typically set to 20mA).

Q2426	AO2 current (can override output signal)	8802, g10	mA

Displays AO2 current. This setting may be altered to temporarily manually set the output current. This is useful to test the analog output. The output will return to normal after you exit from the settings.

Q2427	AO2 signal (can override output signal)	8806	**FU**

Displays the signal currently being output. If this value is altered, the output is set to a value corresponding to the signal. This is useful to test the analog output. The output will return to normal after you exit from the settings.

Digital outputs

The following settings select the function of the digital outputs. The hint line shows (off) when the output is at 0V, and (on) when it is at +V1.

The UP and DOWN keys can be used to select the function from the available list.

If the negative value of the output function is used, the signal sense is reversed. eg 16=motion (output on when weight is in motion), -16=NOT motion (output off when weight is in motion).

The list is shown in the 'Instruction Manual' in the 'I/O Function Table'.

Q2431	OUT1 function (& state)[17]	8550, g11[18]	pulse output=48
Q2432	OUT2 function (& state)	8552, g11	low flow fault=116
Q2433	OUT3 function (& state)	8554, g11	run motor=56
Q2434	OUT4 function (& state)	8556, g11	healthy=60
Q2435	OUT5 function (& state)	8558, g11	weight fault=112
Q2436	OUT6 function (& state)	8560, g11	belt speed fault=113
Q2437	OUT7 function (& state)	8562, g11	material feed=59
Q2438	OUT8 function (& state)	8564, g11	alarm alert=63
Q2439	OUT9 function (& state)	8566, g11	run motor=56
Q2430	OUT0 function (& state)	8568, g11	pulse output=48

Communications & Display

Basic Settings		
Inputs	Internal Signals	Outputs
Communications & Display		
Information, Resets & Final Calibration		

Comms port 1 - RS232

Q2511	COM1 baud rate (8 data, no parity, 2 stop)	8580, g12	19200

Sets the communications speed.

Q2512	COM1&2 modbus address [1 to 30]	8592, g12	1

modbus address.

Q2513	COM1 stop bits	18052, g12	0

stop bits	description
0	automatic (1 stop on receive, 2 bits for send)
1	1 stop bit
2	2 stop bits

Q2514	COM1 mode	18060, g12	0

COM1 mode	description
0	auto : use extended modbus
1	modbus : use standard modbus

Setting to modbus may speed up the select key in some situations where strict modbus protocols are required. For example Modbus gateways and convertors.

Q2515	COM1 handshake enable [0=disable, 1=enable]	8584, g12	0

When set to 1, hardware handshaking is enabled. Set to 0 to disable hardware handshaking.

Q2510	COM1 error count	8810, g12	

Comms port 2 - RS485

Q2521	COM2 baud rate (8 data, no parity, 2 stop)	8590, g12	230400

Sets the communications speed.

Q2522	COM1&2 modbus address [1 to 30]	8592, g12	1

modbus address.

Q2523	COM2 stop bits	18054, g12	0

[17] Hint line shows state as (on) or (off)

[18] See I/O Function Table page 57. Use negative numbers to reverse the signal sense eg 16=motion (output on when weight is in motion), -16=NOT motion (output off when weight is in motion)

Q2524	COM2 mode	8838, g12	0

COM2 mode	description
0	auto : use mwbus – automatic fall back to modbus slave
1	modbus : use standard modbus

If this port is connected to an external modbus master, then this should be set to modbus.

Q2520	COM2 error count	8812, g12	Hz

Shows the operating mode (MWBUS or MODBUS). The 'cycle time' is the MR1 update rate. A list of device addresses on the bus is shown. Communications error counts are shown, which should usually read 0.

Comms port 3 - RS485 MR1

Q2531	COM3 baud rate (8 data, no parity, 2 stop)	8588, g12	115200

Sets the communications speed.

Q2533	COM3 stop bits	18056, g12	0

Interface registers

These registers are the recommended registers to use for extracting the basic signals from the transmitter via Modbus. The advantage of using these registers is that multi-register Modbus commands can be used to make the interface more efficient.

A control or status register contains 32 bits of on or off information. When one of these registers is displayed, a bit is selected by using the left and right arrow keys.

Registers 1

Q25411	platform weight	8000, g12
Q25412	belt speed	8002, g12
Q25413	speed demand	8004, g12
Q25414	current setpoint	8006, g12
Q25415	total weight	8008, g12
Q25416	flowrate	8010, g12
Q25417	control1 & control2	8012, g12
Q25418	control3 & status1	8014, g12
Q25419	status2 & status3	8016, g12
Q25410	IOx & faults	8018, g12

Registers 2

Q25421	no function	8020, g12
Q25422	no function	8022, g12
Q25423	no function	8024, g12
Q25424	no function	8026, g12
Q25425	speedC	8028, g12
Q25426	ratioC	8030, g12
Q25427	setpointC	8032, g12
Q25428	control2 & control3	8034, g12
Q25429	control1C & control1G	8036, g12
Q25420	IO Control	8038, g12

Printing & Macros

Q2551	print settings and macros[19]	8922, g13	0

Used to start a print out of the settings or of the macros. Select the number of the print out required.

number	printout
1	print quick settings
2	print main settings
3	print service macros
4	print altered settings
5	print altered macros
6	print all macros

[19] 0=press EDIT then use up & down keys to select printout, 1=print quick settings, 2=print main settings, 3=print service settings, 4=print altered settings, 5=print altered macros, 6=print all macros

Print options

Q25521	print continuous rate[20]	8610, g13	0

Sets the rate at the which the print continuous macro is run. Use the UP and DOWN keys to select the rate.

Q25522	disable macros [0=off, 1=on]	8616, g13	0

Disables all macros from running. This includes the system name macro.

Q25523	event print control	8586, g13	0

Controls what data is logged to the internal User Log File

control	description
1	None
2	AlarmLog
3	
4	BatchSummary
5	
6	BatchDetail

Q25524	key macro options	8508, g13	0

Sets the behaviour of some of the operator key functions such as START and STOP.

options	description
0 - 9	Preset options (fixed).
10-19	Behavour maybe customised with the Key Macros. The default macros are the same as the preset options. e.g. If set to 10, the default Key Macro is the same as when the option is set to 0. Similarly 11 to 1, 12 to 2 etc.

Q25525	macro output select	8506, g13	0

Selects which port data from macros and 'event print control' is output. By default, data is output on the controllers COM1 (RS232) port.

Ports on other devices connected to the controller can be selected, including some RS485 ports and USB virtual comm ports.

Macros

Q25531	print macro	1000, g13

This macro is run when PRINT is activated.

Q25532	print total macro	1100, g13

This macro is run when PRINT TOTAL is activated.

Q25533	print remote macro	1200, g13

This macro is run when a digital input with the function print, is activated.

Q25534	print total remote macro	1300, g13

This macro is run when a digital input with the function print total, is activated.

Q25535	user function 1 macro	3200, g13
Q25536	user function 2 macro	3300, g13
Q25537	user function 3 macro	3400, g13

These macros run when the user function (in the operator menu) is activated.

Macro subroutines

Q25541	system name macro	2000, g4

This macro sets the units name. This name is displayed by the display to identify the unit.

Q25542	print key subroutine	2100, g13

A subroutine used by the print key macro.

Q25543	print total key subroutine	2200, g13

A subroutine used by the print total key macro.

Q25544	settings subroutine	2300, g13

A subroutine used by the print settings macro.

Q25545	macros subroutine	2400, g13

A subroutine used by then print settings macro.

Q25546	heading subroutine	2500, g13

A subroutine used by the several macros to identify the unit on the printout.

[20] 0=off, 1=100Hz, 2=50Hz, 3=20Hz, 4=10Hz, 5=5Hz, 6=2Hz, 7=1Hz, 8=2s, 9=5s, 10=10s, 11=30s, 12=1min, 13=2min, 14=5min, 15=10min

Q25547	information subroutine	2600, g13

A subroutine used by several macros to print information about the system.

Q25548	user subroutine 1	2700, g13

This macro is not used by default, and is free for the user to use.

Q25549	user subroutine 2	2800, g13

This macro is not used by default, and is free for the user to use.

Event Macros

Q25551	print continuous macro	1700, g13

This macro runs when the print continuous rate is not set to off.

Q25552	power up macro	1800, g13

This macro runs each time the controller powers up.

Q25553	times to print	1400, g13

This macro sets the times of the day and week when the print at times macro is run. This macro contains a list of times and optionally days of the week. Examples of how it may be set follows.

macro	print at times macro runs
0:00 8:00 12:00 20:00	At midnight, 8am, midday and 8pm
9:00 15:00 M-F; 12:00 SA	At 9am & 3pm Monday to Friday and 12pm Saturday
:30	At half past the hour, every hour

Time specifications are separated with a space or comma (,). A semicolon (;) is used to separate a group of specifications. The days of the week are identified using the following letters M, TU, WE, TH, F, SA, SU. Upper or lower case letters may be used.

Q25554	print at times macro	1500, g13

This macro runs at the times specified by the times to print macro.

Q25555	capture weight macro	3000, g13

This macro is run when an input set to the capture weight function is activated.

Q25556	event macro	3100, g13

This macro runs when any change is detected in the following registers. Control1, Control2, Control3, Status1, Status2, Status3 or IOx. (see the 'I/O Function Table' in the 'Instruction Manual'). This corresponds to the Input & Output Function 0 through 111. Exceptions to this are changes on the pulse input and/or pulse output bits 0, 96 & 104 when they are used.

In the macro, the IF_EVENT ‹condition› can be used to select an event to react to. The argument ‹condition› refers to the input/output function 0 to 111.

Q25557	print settings macro	1600, g13

This is the macro run when the print settings & macros is set.

Q25558	at 1Hz macro	1900, g13

This is the macro runs continuously every second.

Q25559	at 10Hz macro	2900, g13

This is the macro runs continuously 10 times per second.

These macros run at various points through the batching process.

Key Macros

These macros determine the behaviour of some of the opertor key functions. See also the 'key macro options' (Q25524).

Q25571	start key macro	5000, g13
Q25572	pause key macro	5100, g13
Q25573	stop key macro	5200, g13
Q25574	start2 key macro	5300, g13
Q25575	stop2 key macro	5400, g13

Display (MD1,MD2,MP1,MP2)

Operator menu 1 locks

These settings allow operator menu items to be locked.

These settings allow functions assigned to the number keys to be locked (ie password protected, locked out entirely or confirmation of the action requested).

setting	lock function
0	Never locked
1	A pass code is required before the key may be used
2	The key is always locked and cannot be used
3	Confirmation of the key action is requested

Q25611	start lock	8620, g4[21]	2
Q25612	stop lock	8622, g4[21]	0
Q25613	toggle volumetric mode lock	8624, g4[21]	0
Q25614	toggle remote mode lock	8626, g4[21]	0
Q25615	set local flowrate lock	8628, g4[21]	0
Q25616	set manual speed lock	8630, g4[21]	0
Q25617	batch setpoint lock	8632, g4[21]	0
Q25618	aquire zero lock	8634, g4[21]	0
Q25619	reset total weight lock	8636, g4[21]	0

Operator menu 2 locks

Q25621	print lock	8638, g4[21]	0
Q25622	print total lock	8640, g4[21]	0
Q25623	user function 1 lock	8642, g4[21]	0
Q25624	user function 2 lock	8644, g4[21]	0
Q25625	user function 3 lock	8646, g4[21]	0
Q25626	operator menu 26 lock	8682, g4[21]	0
Q25627	operator menu 27 lock	8684, g4[21]	0
Q25628	operator menu 28 lock	8266, g4[21]	0
Q25629	operator menu 29 lock	8268, g4[21]	0

Operator menu 3 locks

Q25631	operator menu 31 lock	8650, g4[21]	0
Q25632	operator menu 32 lock	8652, g4[21]	2
Q25633	operator menu 33 lock	8654, g4[21]	0
Q25634	operator menu 34 lock	8656, g4[21]	0
Q25635	operator menu 35 lock	8658, g4[21]	0
Q25636	operator menu 36 lock	8660, g4[21]	0
Q25637	operator menu 37 lock	8662, g4[21]	0
Q25638	operator menu 38 lock	8664, g4[21]	0
Q25639	operator menu 39 lock	8666, g4[21]	0

Operator menu 4 locks

Q25641	display select lock	8678, g4[21]	0
Q25642	Alarm Menu lock	8688, g4[21]	0

Display customisation

Q25651	identification line [0=off to 1=on]	8608, g4	1

Allows the top display line (identification line) to be turned off. This line shows the name of the transmitter currently in use, and optionally shows the time or current alarm number.

Q25652	main line options	8668, g14	1

Controls the main display.

Add up the numbers in the following table to change the display as described.

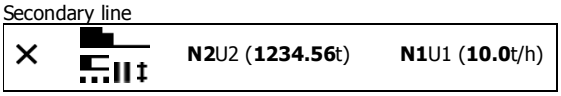
Value	Display	Description
1		display bar graph
2	t/h	show units
4	112	show alarm number
8	123456 **t**	display total (not flowrate)

Q25653	secondary line options	8648, g14	0

Controls the secondary line, below the main large display.

Add up the numbers in the following table to change the display as described.

Secondary line



[21] 0=never locked, 1=locked with pass code access, 2=always locked (pass code = 99)

Value	Display	Description
0	**N1**U1 **10.0**t/h	display current setpoint
1	**N1**U1	hide current setpoint
2048	**N1**U1 **6543.21**t	display running total (in place of current setpoint)
2049 (2048+1)	**N1**U1 **1000.00**t	display batch weight (in place of current setpoint)
0	**N2**U2 **1234.56**t	display total/batch weight
2	**N2**U2	hide total/batch weight
8192	**N2**U2 **10.0**t/h	display flowrate (in place of total)
4	✕	hide material feed stopped icon
8		hide speed demand bar graph and icons
32	t/h	hide setpoint (flowrate) units
64	t	hide total/batch weight units
128	total weight	include total name
256	12	include limit icons
1024		do not display secondary line

Q25654	display select sourceA	8600, g14	0
Q25655	display select sourceB	8602, g14	0

The above two settings allow up to two additional settings to be added to the items displayed in the bottom line of the display. These items are selected during normal use with the DISPLAY key.

Q25656	menu sourceA	8604, g14	0
Q25657	menu sourceB	8606, g14	0
Q25658	menu sourceC	8594, g14	0

The above three settings allow up to three additional settings to be added to the operator menu. These items will appear in the menu shown when the MENU key is pressed during normal operation.

Q25659	display select options	8678, g14	0

Controls the select line at the bottom of the display.

Add up the numbers in the following table to change the display as described.

Value	Description
1	permanently hide the whole line
2	hide the logo

Softkey customisation

These settings set the functions of each of the soft keys A, B, C, D and E.

Q25661	key A function & lock	8690, g4	0
Q25662	key B function & lock	8692, g4	3
Q25663	key C function & lock	8694, g4	5
Q25664	key D function & lock	8696, g4	2
Q25665	key E function & lock	8698, g4	1

Signal customisation

These settings allow the names and units of any signal to be changed.

Signal 1

Q256711	signal 1 source	18000
Q256712	signal 1 name	4000
Q256713	signal 1 type	18010

Signal 2

Q256721	signal 2 source	18002
Q256722	signal 2 name	4100
Q256723	signal 2 type	18012

Signal 3

Q256731	signal 3 source	18004
Q256732	signal 3 name	4200
Q256733	signal 3 type	18014

Signal 4

Q256741	signal 4 source	18006
Q256742	signal 4 name	4300
Q256743	signal 4 type	18016

Signal 5

Q256751	signal 5 source	18008
Q256752	signal 5 name	4400
Q256753	signal 5 type	18018

USB

The controller setup can be saved to a file on a USB drive. The setup may also be loaded from a saved file. User log files and system log files can also be saved to the drive.

Q2581	save setup	8938

Set to 1 to save the setup to a file on a USB drive. It is saved in a folder called ModWeigh\Setup. The file will be named 'AA PP SSSSS MM.csv, where AA is the modbuss address of the unit, PP is the product number, SSSSS is the units serial number and MM is the model of the unit.

The file is a comma separated list of settings, strings and memory storage which can be viewed as a spreadsheet.

Q2582	select 'load setup' file	8940

This allows a file to be selected to be loaded. The file must have a .csv extension and must be in a folder called Setup which itself must be in a folder called ModWeigh. To select a file, press the 'C' key to show a list of the files found.

Q2583	load setup	8942

Use the UP and DOWN keys to select what data to load from the selected file.

setting	lock function
1	exclude: strings, memory storage, loadcell calibration, totaliser, comms, calibration lock
2	load strings (macros)
3	load memory storage
4	load loadcell calibration

Q2584	save user log	8944
Q2585	save system logs	8946

Display settings

The following settings only appear in MP1,MP2.

Q25693	disable beeper	8518	0
Q25694	comms latency	8510	0 mS

Info, Resets & Final Cal

Basic Settings		
Inputs	Internal Signals	Outputs
Communications & Display		
Information, Resets & Final Calibration		

Product Information

These settings can only be viewed, and show important features of the transmitter.

Q2611	system name	8844[22]	Weighfeeder 1

Displays the name of the product. This is usually displayed on the top line of a ModWeigh display. It is created by the system name macro.

Q2612	product serial number	8852	

Displays the serial number of the product

Q2613	software version number	8854	

Displays the version number of the software currently installed in the product.

Q2614	CPU type	8858	

Displays the CPU type.

Q2615	product key	8864	

Displays the product key if it has been applied.

[22] Defined by the "system name macro" at Quick Key 25541

Q2616	P-Module serial number	8860	

Displays the serial number of the P-Module.

Q2617	MR1 serial number	8862	

Displays the serial number of the MR1 unit if connected.

Q2618	MO3 serial number	8866	

Displays the serial number of the MO3 option if fitted.

Reset settings

Q2631	reset loadcell calibration (1=reset to defaults)	8950	0

Set to 1 to reset the loadcell calibration to the default.

Q2632	reset comms settings (1=reset to defaults)	8952, g12	0

Set to 1 to reset the comms settings back top their defaults.

Q2633	reset other settings (1=reset to defaults)	8954	0

Set to 1 to reset all user settings to the defaults. A Quick or Main setup is required next. Does not reset the loadcell calibration, comms settings or any of the macros.

Reset macros

Q2641	reset all macros (1=reset to defaults)	8956, g13	0

Set to 1 to reset all the macros to the defaults. Does not reset any settings.

Final calibration

Calibration setup

Q26511	test weight type	8300	0

Selects either a weight or belt loading (when using chains) for the test weight.

Q26512	calibration weight	8302	WCAP kg,t,g

Sets either test weight used during calibration or the belt loading (using chains) used during calibration.

Q26513	belt revs to calibrate	8304, g15	1

Sets the number of belt revolutions that a test is measured over. It is used for measurement methods 1, 3 and 7 (speed, weight & speed and correction & speed).

The accuracy that is expected from the system determines the length of time the test will require. The 'belt revs to calibrate' determines over how many revolutions of the belt the test will be made and should be set according to the following table.

System Accuracy	Calibration Time
1%	60s (1 minute)
0.5%	120s (2 minutes)
0.2%	300s (5 minutes)
0.1%	600s (10 minutes)

A simple way to calculate the 'belt revs to calibrate' is to measure the time for one belt revolution and calculate as follows.

$$belt\ revs\ to\ calibrate \geq \frac{Calibration\ Time\,[s]}{time\ \ for\ one\ belt\ revolution\,[s]}$$

Alternatively if the belt speed is known, the 'belt revs to calibrate' setting can be calculated as follows.

$$belt\ revs\ to\ calibrate \geq \frac{Calibration\ Time\,[s] \times belt\ speed\,[m/s]}{belt\ length\,[m]}$$

For example if the system should achieve 0.5% accuracy, has a belt speed of 3 m/s and the belt length is 100m the belt revs to calibrate would be selected as 4.

$$\frac{120[s] \times 3\,[m/s]}{100\,[m]} = 3.6$$

Q26514	reset tests	8902, g15	0

Set to 1 to clear all test results.

Calibration

The following settings are used to set the zero and calibrate the span. The procedure depends on which measurement method has been chosen.

Q26521	zero calibration	8984	0

To average out any belt weight variation, the weight zero point is best set with the belt running. The calibration runs for the duration of one complete belt revolution as set with the 'belt length' setting.

Before initiating a zero adjustment, the belt should be running with no material on the belt. Once successfully completed the average flowrate should read zero.

Zero Calibration	**uses**	**sets**
	QK 2221 tacho constant	QK 22333 deadload
	QK 2225 belt length	QK 23126 zero weight

Q26522	measurement method	8306, g15	2

Sets the measurement method. See the table following.

Q26523	start measurement	8986	0

Initiates a measurement.

Q26524	enter measurement	8988

Is used to enter the result after a measurement.

* Q26525	correction factor	8290	1.0000

This is used to correct for differences between measurements by test weights and a material test. Normally this is only used after material tests have been performed to correct the totalised results.

Measurement methods

Method	**Description**
0 belt length	The belt length is measured over one belt revolution. The belt rotation is measured by pressing a key (or a remote input signal is activated) at each rotation. The tacho must already have been calibrated. **uses**: mark on belt, the tacho calibration **sets**: QK 2225 belt length
1 speed	The belt speed is measured over one or more belt revolutions. The belt rotation is measured by pressing a key (or a remote input signal is activated) at each rotation. The belt length must be accurately known. The calibration can be done over any length of belt by setting the 'belt length' to the value the measurement is taken over. When the belt speed calibration is completed, be sure to set the 'belt length' back to the correct value. **uses**: mark on belt, QK 2225 belt length, QK 26513 belt revs to calibrate **sets**: QK 2221 tacho constant
2 weight	The average belt loading is measured over one belt revolution. **uses**: QK 2225 belt length, QK 26511 test weight type, QK 26512 calibration weight, the tacho calibration **sets**: QK 22332 system sensitivity, QK 22333 deadload
3 weight & speed	The total is measured over one or more belt revolutions. The belt rotation is measured by pressing a key (or a remote input signal is activated) at each rotation. The expected total is calculated from the 'calibration weight', 'platform length' (if needed), 'belt length', 'belt revs to calibrate' and 'correction factor' settings. If an adjustment is made, the loadcell calibration, 'tacho constant' and the 'correction factor' (if the expected total is entered manually) are set. The correction factor is used in calculating the expected total, so that if a material test has been done, the correction factor is retained. If no material tests are done, then the correction factor would normally be set to one before this test is done. **uses**: mark on belt, QK 2225 belt length, QK 26511 test weight type, QK 26512 calibration weight, QK 26513 belt revs to calibrate, QK 26525 correction factor **sets**: QK 2221 tacho constant, QK 22332 system sensitivity, QK 22333 deadload, QK 26525 correction factor
4 material short	The total is measured as a known amount of material is passed over the conveyor. Totalising stops as soon as the operator stops the process. **uses**: - **sets**: QK 26525 correction factor
5 material long	The total is measured as a known amount of material is passed over the conveyor. After the operator indicates the material test is complete, measuring continues until a whole number of belt rotations has occurred. **uses**: QK 2225 belt length, the tacho calibration **sets**: QK 26525 correction factor

Method	Description
6 correction	The total is measured over one belt revolution with a known belt loading applied. The tacho must be calibrated and the 'belt length' accurately set. The expected total is calculated from the 'calibration weight', the 'belt length' and the 'belt revs to calibrate'. If an adjustment is made, the 'correction factor' is set. This method is ideal when calibrating with chains after the weight has been calibrated with a test weight and a material test can not be performed. **uses** / **sets** QK 2225 belt length / QK 26525 correction factor QK 26511 test weight type QK 26512 calibration weight the tacho calibration
7 correction & speed	The total is measured over one or more belt revolutions with a known belt loading applied. The belt rotation is measured by pressing a key (or a remote input signal is activated) at each rotation. The 'belt length' must be accurately set and the 'belt revs to calibrate' determines how many revolutions will be measured. The expected total is calculated from the 'calibration weight', the 'belt length' and the 'belt revs to calibrate'. If an adjustment is made, the 'correction factor' and 'tacho constant' are set. **uses** / **sets** QK 2225 belt length / QK 2221 tacho constant QK 26511 test weight type / QK 26525 correction factor QK 26512 calibration weight QK 26513 belt revs to calibrate

Remote Operation of Calibration

The calibration functions can be activated remotely from the instrument with the 'calibration control' input (I/O Function 46). The input is used to indicate when the belt mark has passed a fixed point on the belt.

Multi-presses of the calibration control button can also be used to start and stop the system, to start a zero adjustment or start a measurement.

Number of presses	Operation
1	records mark has passed the fixed point
2	starts or stops a measurement
3	starts or stops the conveyor
5	starts a zero adjustment

A digital output can also be used to indicate that a measurement is in progress (I/O Function 71).

Refer to Connections in the Instruction Manual for further information.

SETUP – DISPLAY

Basic Settings

Clock

The display has a clock whose data is sent to each transmitter connected to it. The clock is used to date stamp printouts and can cause printouts (or other events) to occur at user set times during the day or week. The clock will run continue to run for a few days or weeks without power. The time is also shown in the top right corner of the display (if no alarms are present).

Q92191	clock enable	9910	0

Set to 0 to disable the clock or 1 to enable the clock. When disabled, time & date information is not shown on any printouts.

Daylight saving

Q921921	locality	9912	0

Selects the locality for daylight saving correction. Use the UP & DOWN keys to select a locality or set to 0 to disable daylight saving correction or set to CUSTOM to set your own correction dates. If CUSTOM is selected, the following three settings specify when the correction will be made.

Q921922	weekday & time for DST	9914	[23]

Selects the day of the week and time when the daylight saving correction will be made.

[23] Defaults to whatever the current setting is.

Q921923	start of daylight saving	9916	0

Selects the time of the year when daylight saving will start.

Q921924	end of daylight saving	9918	0

Selects the time of the year when daylight saving will end.

Q921925	daylight saving time (DST)	9920	0

Shows if daylight saving is on or off. If automatic daylight saving correction is off, then this setting may be used to move the clock forwards or backwards by one hour.

Set clock

Q921931	set date	9922

Sets the date. For example to set 9 March 2007, enter 070309.

Q921932	set time	9924

Sets the time in 24hour format.

Communications & Display

Comms port 1 – RS232

Q92511	COM1 baud rate (8 data, no parity, 2 stop)	8580	19200
Q92512	COM1&2 modbus address [1 to 30]	8592	30
Q92513	COM1 stop bits	18052	0
Q92514	COM1 mode	18060, g12	0

COM1 mode	description
0	auto : use extended modbus
1	modbus : use standard modbus

Q92515	COM1 handshake enable [0=disable, 1=enable]	8584	0
Q92510	COM1 error count	8810	

Comms port 2 – RS485

Q92521	COM2 baud rate (8 data, no parity, 2 stop)	8590	230400
Q92522	COM1&2 modbus address [1 to 30]	8592	30
Q92523	COM2 stop bits	18054	0
Q92524	COM2 mode	8838	0

COM2 mode	description
0	auto : use mwbus – automatic fall back to modbus slave
1	modbus : use standard modbus

Q92520	COM2 error count	8812	

Display

Display settings

Q925692	disable touch	8514	1
Q925693	disable beeper	8518	0
Q925694	comms latency	8510	0 mS

May improve the select key performance for connections where there is a transport delay. For example wireless links, routers etc.

Q925695	master mode option	1

master mode option	description
0	auto
1	length framing : tolerates packet fragmentation

Length framing is necessary when connections are made through external hardware which fragment the Modbus packets. For example wireless modems.

Q925696	view only	0

When set on, settings of the connected unit are view only. They can ont be edited.

Q925697	select loadcell transmitter	0

Shows the currently connected unit and allows it to be manually selected.

Q925698	select comm port	2

select comm port	description
1	COM1 RS232 port
2	COM2 RS485 port
5	USB device (only if currently connected)
7	USB host (only if currently connected)

Shows the current comm port and allows it to be manually selected.

Q925699	select baudrate		0

select baudrate	description
0	auto : scan through all baudrates to find a controller
1	fixed : use port baudrate setting

Q925690	connection test		0

Tests whether the connection to the connected transmitter or processor is working. Useful to diagnose problems with communications links.

CompactCom

Q92571	reset CompactCom	8948	0

Information & Resets

Product Information

These settings can only be viewed, and show important features of the display.

Q92612	product serial number	8852	🔍
Q92613	software version number	8854	🔍
Q92614	CPU type	8858	🔍

Reset settings

Q92633	reset other settings (1= reset to defaults)	8954	0

Set to 1 to reset all user settings to the defaults.

Other display settings

Q97	language select	8618

Selects the language to use for the display.

To change the language in the identification line of the display (top line), reset the 'system name design'. When at this setting, press Fn 1 to reset. (Q25541).

When a non-English language is selected, pressing the language key will toggle between the language and English.

Q98	display brightness	8516

Adjusts the display brightness.

I/O Function Table

Input Functions (level sensitive ⊓)			
0		no function/pulse input †	0
1		stop	1 ↥
2		run	2 ↥
3		pause	3 ↥
4			4 ↥
5		volumetric mode	5 ↥
6	*	remote flowrate mode	6 ↥
7		enable internal tacho	7 ↥
8		hold flowrate	8 ↥
9		hold control	9 ↥
10			10 ↥
11		belt track switch	11 ↥
12		timer enable	12 ↥
13			13 ↥
14		user bit 1	14 ↥
15		user bit 2	15 ↥

Control1 = control1_inputs or control1_internal (0 – 15) or control1C (208 – 223) or control1G (224 – 239) or control1_inputs_aux

Input Functions (edge sensitive ⊥)			
16	acquire zero	0 †	Control2
17		1 †	
18		2 †	
19		3 †	
20		4 †	
21	set volumetric mode	5 †	
22	reset volumetric mode	6 †	
23	volumetric/gravimetric	7 †	
24	set remote mode	8 †	
25	reset remote mode	9 †	
26	remote/local	10 †	
27	start	11 †	
28	timer start	12 †	
29	start key	13 †	
30	pause key	14 †	
31	stop key	15 †	

CONTROL1
The control1 register contains 16 level sensitive input signals. This register has 5 control sources which are combined together.

control1_inputs come from the digital inputs as set with the 'INx functions'.
control1_internal are internally generated signals (e.g. the START/STOP keys).
control1C and control1G are registers accessible via communications and are for remote control of the instrument.
control1_input_aux come from auxiliary IO

The 4 registers are or'ed together, so for example a 1 on bit 2 of any of the 4 sources will set the run bit. Any control1 register with bit 1 set (stop) will override and cause a stop.

Input Functions (edge sensitive ⊥)			
32	reset total	0 †	Conotrol3
33	totalise	1 †	
34		2 †	
35	start2 key	3 †	
36	stop2 key	4 †	
37	user function 1	5 †	
38	user function 2	6 †	
39	user function 3	7 †	
40	print	8 †	
41	print total	9 †	
42	print remote	10 †	
43	print total remote	11 †	
44		12 †	
45	acknowledge alarms	13 †	
46	calibration control	14 †	
47	capture weight	15 †	

NOTES
To invert signal, use negative value.
e.g. for NOT run, use -2.

† IN0 is pulse input, other inputs are no function.
‡ Only OUT0 & OUT1 maybe set to pulse output. Other outputs are no function.
† can be set and reset with macros and the setting IO Control (Q25420)
* retained while power is off

Output Functions			
48	pulse output‡	0	Status1
49		1	
50 *		2	
51		3	
52		4	
53 *		5	
54	in volumetric mode	6	
55 *	speed demand set	7	
56	run motor	8	
57	running	9	
58	paused	10	
59	material feed	11	
60	healthy	12	
61	fault	13	
62	alarm	14	
63	alarm alert	15	

IO FUNCTION BITS
In most cases, IO Function bits are set and reset by the controller or the digital input signals.

MODBUS
The registers control1, control2, control3, status1, status2, status3, IOx, faults, control4 and IOx2 can all be read over modbus.
The registers control2, control3, control1C and control1G can be written to over modbus.
Bits marked † can also be set by writing their bit number to the IO Control register (address 8038). Writing the negative value of the number will reset the bit. For example writing -14 to 8038 will reset 'user bit 1'. (write 14 to set)

MACROS
IO Function bits 1 to 187 can be set & reset using the SET_BIT, CLEAR_BIT and TOGGLE_BIT instructions.
The IF instruction can test bits 1 to 150.

Output Functions			
64		0	Status2
65	holding flowrate	1	
66	holding control	2	
67	minimum setpoint control	3	
68	low flow cutout	4	
69		5	
70	tune control	6	
71	calibration indicator	7	
72		8	
73 *	user bit 3	9 †	
74 *	user bit 4	10 †	
75 *	user bit 5	11 †	
76 *	user bit 6	12 †	
77	timer output	13	
78	clock active	14	
79	daylight saving time	15	

Output Functions			
80	limit 1 output	0	Status3
81	limit 2 output	1	
82	limit 3 output	2	
83	in remote flowrate mode	3	
84		4	
85		5	
86		6	
87		7	
88	low platform weight	8	
89	IN0	9	
90	IN9	10	
91	OUT0	11	
92	OUT9	12	
93	MO3 fitted	13	
94	disable macros	14	
95	MR1 connected	15	

Output Functions			
96	output function	IN1	0	IOx
97		IN2	1	
98		IN3	2	
99		IN4	3	
100		IN5	4	
101		IN6	5	
102		IN7	6	
103		IN8	7	
104		OUT1	8	
105		OUT2	9	
106		OUT3	10	
107		OUT4	11	
108		OUT5	12	
109		OUT6	13	
110		OUT7	14	
111		OUT8	15	

IOx
This register hold the state of inputs IN1 to IN8 and outputs OUT1 to OUT8.

The status of IN0, IN9, OUT0 and OUT9 are in the status3 register

Output Functions			
112	output function	weight fault	0	Faults
113		belt speed fault	1	
114		flowrate fault	2	
115			3	
116		low flow fault	4	
117		low platform weight fault	5	
118		error limit fault	6	
119			7	
120			8 ↑	
121		user fault 1	9 ↑	
122		user fault 2	10 ↑	
123		user fault 3	11	
124			12	
125		Comms fault	13	
126		P-Module not compatible	14	
127		no P-Module fitted	15	

Faults/Alarms
The Faults register holds the fault status of the unit.
Faults are conditions that are either present or not. The source of the fault must be removed to clear the fault.
The "fault bit" (61) is on when any fault condition exists.
User faults can be created and cleared by setting and resetting bits.

Alarms
Alarm events are created by a new fault or other alarm sources in the controller.
When any alarm event occurs, the "alarm" (62) and "alarm alert" (63) bits are set.
When alarms are acknowledged (45), the "alarm alert" is reset.
The "alarm" bit will also be reset by an acknowledge if there are no faults present.

Output Functions			
144	output function	IN1aux	0	IOxAux
145		IN2aux	1	
146		IN3aux	2	
147		IN4aux	3	
148		IN5aux	4	
149		IN6aux	5	
150		IN7aux	6	
151		IN8aux	7	
152		OUT1aux	8	
153		OUT2aux	9	
154		OUT3aux	10	
155		OUT4aux	11	
156		OUT5aux	12	
157		OUT6aux	13	
158		OUT7aux	14	
159		OUT8aux	15	

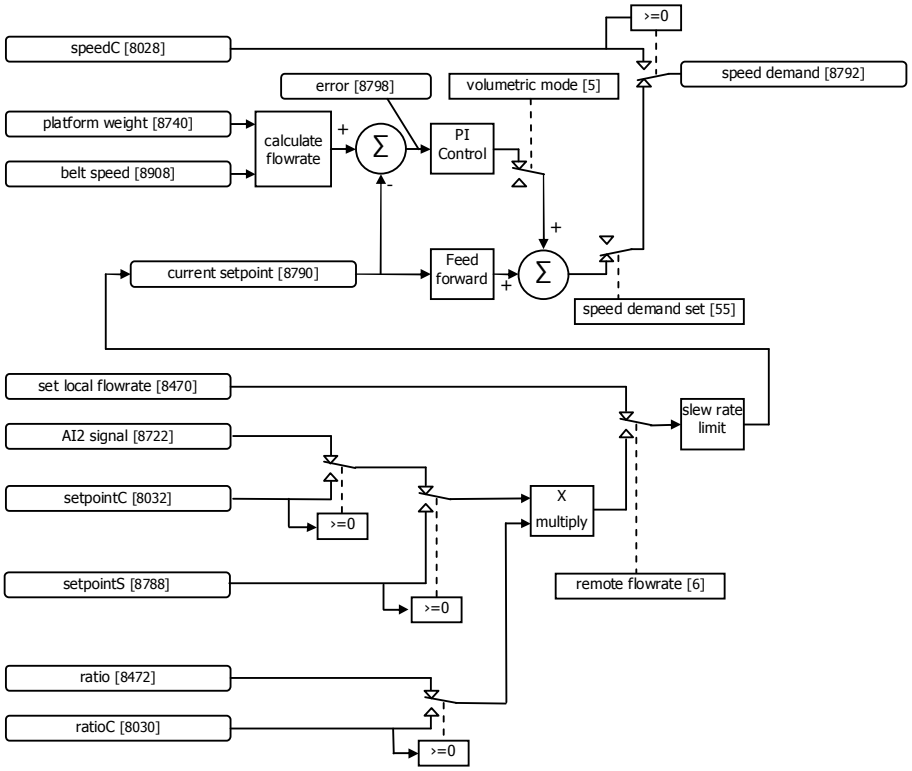
IOxAux
This register hold the state of inputs IN1aux to IN8aux and outputs OUT1aux to OUT8aux.

The output states are set using the factory default OUT1 to OUT8 functions.

Input Functions (level sensitive **Π** or edge sensitive **⊥**)			
160		0	Control4
161		1	
162		2	
163		3	
164		4	
165		5	
166		6	
167		7	
168		8	
169		9	
170		10	
171		11	
172		12	
173		13	
174		14	
175		15	

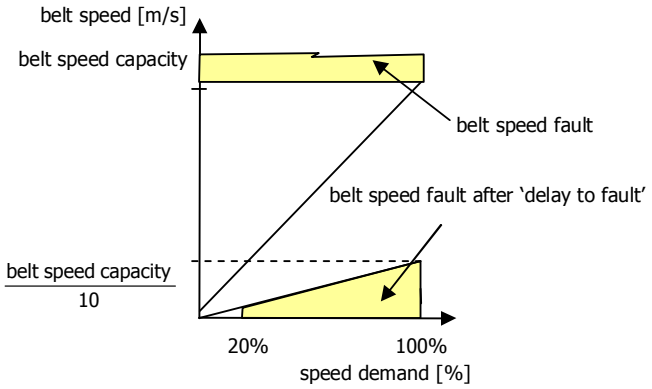
OPERATING DETAILS

Setpoint & Speed Demand Signals



Belt Speed Fault Detection

A belt speed fault is created when the measured belt speed falls outside an expected region, as shown in the following diagram. One region is when the belt speed over-ranges. The other region detects if the belt speed is too low.



Flowrate Calculation

$$Wc = Wp \times R \qquad BL = \frac{Wp}{Lp} \qquad F = BL \times V \times Kcf \times 0.06$$

where

Wp	[kg]	platform weight
R		lever ratio
Wc	[kg]	calibration weight
Lp	[m]	platform length
BL	[kg/m]	belt loading
V	[m/s]	belt speed
Kcf		correction factor
F	[t/h]	flowrate

Modbus Access

The communications ports of the ModWeigh Controllers (COM1 and COM2) use Modbus protocol. This can be used to access any data value and any user setting.

The Modbus protocol supported is RTU. (ASCII mode is not supported). Transmission is with 8 data bits, no parity and 2 stop bits. The following function codes are supported;

3 - read holding registers

4 - read input registers

6 - preset single register

16 - preset multiple registers (10 hex)

23 - read/write multiple registers (17 hex)

Data can be accessed as floats (4 bytes) or integers (2 or 4 bytes). Floats are preferred as the data is stored in engineering units. The following table shows how the addresses shown in the setup summary are translated into Modbus register addresses. (Note with Modbus protocol, the actual address transmitted is one less than the register address. With some systems, you must specify an address one less than expected).

Address	Modbus Register Address		Data description
1000 to 4999	Address	1000 to 4999	Macro strings
8000 to 8999	6000 + (Address - 8000) / 2	6000 to 6499	Integer (16 bit) (limited by integer range)
8000 to 8999	7000 + (Address - 8000)	7000 to 7999	Long integers (32 bit words)
8000 to 8999	Address	8000 to 8999	Float (IEEE 4 byte reals)

The interface registers starting at address 8000 contain the most common data required for Modbus access.

Modbus registers are 2 bytes, so 4 byte floats or 4 byte integers are stored in two consecutive registers.

The following tables provide information for Modbus access to the transmitter.

Address	Data description
1000 to 4999	Macro strings (contains printouts and programs)
8000 to 8029	Interface registers (PLC access)
8030 to 8699	Configuration settings (full instrument calibration)
8700 to 8899	Data outputs (values produced by the instrument)
8900 to 8999	Activations (when set, a process is activated e.g. a zero or span)

Control and status bits can be read over modbus. Refer to the IO Function table page 57 and the Interface Registers page 47 for further information.

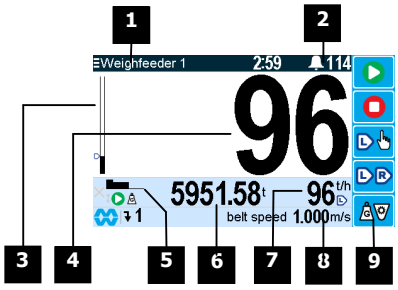
Bits may be set in one of two ways. Either by writing to the control registers (contol1C, control1G, control2, control3) or by setting and resetting individual bits using the "IO Control" register.

OPERATION

The display normally shows the detailed operating status of the system. There are 5 soft keys with labelled functions. Dedicated keys give access to the operator menu, alarm menu, system select menu, setup menu and change the displayed data.

Display

Following is a description of the various elements of the display.



1 Identification of selected unit. Press SELECT (Ξ) to view and select another unit from list of units connected.

2 Alarm Symbol flashes when an alarm is present.

3

	Main display bar graph. Shows the flowrate. The indicator shows the position of the setpoint.

4 Main display of measured value. Normally flowrate.

5 A group of annunciators described below.

	Speed demand bar graph 0 to 100%. The top smaller graph shows the feed forward contribution to the speed demand.
clear	Belt is being cleared. The bar graph shows the progress.
zero	Automatic belt zeroing is in progress. The bar graph shows the progress.
load	The belt is being re-loaded. The bar graph shows the progress.
cal	A dynamic zero or span is in progress. The bar graph shows the progress.
✕	Material feed stopped.
⏸	Paused.
1	Limit 1 active.
2	Limit 2 active.
↕	Tuning feed forward active.
	Zeroing status. The bar graph shows the belt rotation, the line extends from zero to full length over one belt revolution. The dots show that the platform weight was within the zero band for each of the last 3 belt revolutions. The absence of a dot indicates the weight was outside the band.
▶	The system is running.
■	The system is stopped.
⏸	The system is paused.
G	The system is in gravimetric mode, and is controlling the flowrate.
V	The system is in volumetric mode, and the speed demand is being estimated.
V	The system is in volumetric mode, and the speed demand has been manually controlled.

6 Displays the totaliser. If the Batch Weight is not zero, then it is displayed below the totaliser.

8 Secondary display shows one of a selection of values. Press the ↴ key to scroll through the list.

9 Shows functions of soft keys A to E.

Keys

operator menu

Press the OK (tick) key to reach the operator menu. See the Operator Menu section below for details.

alarm menu

Press the ALARM key to reach the alarm menu. See the Alarm Menu section below for details

system select menu

Press this key to view and select another unit from list of units connected.

scroll display

Press this key to select the next line at the bottom of the display.

soft keys A – E

The function of the soft keys is shown in the display. These are shortcuts to items in the operator menu.

cancel

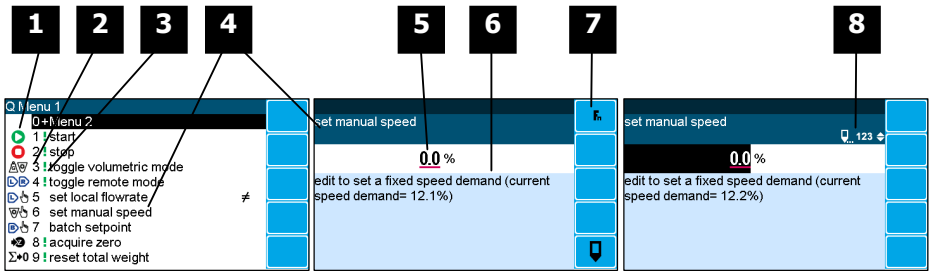
Press this key to cancel an entry or back up a menu. When in any of the menus, holding this key down for 2 seconds will exit back to the operator status display.

setup menu

The setup menu is used to calibrate and setup the system. Refer to the Instruction Manual.

Operator Menu

The operator menu allows selection of one of several actions or settings.



1 Soft key icon for this function. See Actions and Settings below for a description of these icons.

2 Quick key number. Press key with same number to directly enter the named menu. Alternatively use the UP and DOWN keys to select and item and press ENTER.

3 Type of menu entry

+	open another menu.
(blank)	setting
!	action

4 Name of the menu entry

5 Setting value. To change press EDIT key. If editing is locked, a password will be requested. The password is 11.

6 Hint line which reveals extra information about the setting.

7 Soft keys used with settings.

Icon	Description
Fn	Press Fn key for menu of special functions.
	Press EDIT key to edit the setting.

8 Gives information about the settings and indicates active keys or the preferred method of making a value change while editing

Icon	Description
	The setting is locked. Password must be entered to edit.
	The setting can only be viewed.
≠	The setting has been changed from the default.
	The setting is being edited.
123	Use numbered keys to change setting value.
	Use UP & DOWN keys to scroll through selection list.
on off	Use UP & DOWN keys to turn setting on or off.
	Use the arrow keys to move through the bits of a control or status register.

Actions

start key

Press this key to start the system. If the system is running, pressing this key will pause the system.

stop key

Press this key to stop the system.

pause key

Press this key to pause or unpause the system.

stop2 key

This key may be customised for a particular application.

toggle volumetric mode

Press this key to put the controller into volumetric mode. In volumetric mode, the required speed demand is estimated from the flowrate setpoint. When the volumetric icon is displayed, the speed demand has been set manually, and no longer does it increase or decrease with the flowrate setpoint.

print

Press the PRINT key to produce a Status Report printout.

print total

Press this key to print the totalised weight.

reset total weight

Press this key to reset the totalised weight.

acquire zero

Press this key to start a belt zero cycle. The MATERIAL FEED output is used to clear the belt, then the belt is zeroed over a full revolution, then the material is allowed back onto the belt.

toggle remote mode

Press this key to select the remote flowrate setpoint. Press the key again to use the local flowrate setpoint.

user function 1

This key may be customised for a particular application.

user function 2

This key may be customised for a particular application.

user function 3

This key may be customised for a particular application.

Settings

batch setpoint

Press this key to display the BATCH WEIGHT setting. Use the keypad to set the batch weight.

speed demand

Press this key to display the SPEED DEMAND setting. If the speed demand is set using the keypad, the controller is automatically put into volumetric mode.

flow

Press this key to display the LOCAL FLOWRATE setting. Use the keypad to set the local flowrate setpoint.

Alarm menu

An alarm is indicated by a flashing alarm icon. An alarm number will flash in the display while a fault is active or until it is acknowledged.

Press the ALARM key to see the alarm menu and acknowledge the alarms. The menu shows a list of the previous alarms.

For details on an alarm in the list, use the UP, DOWN and ENTER keys, or key in the number next to the alarm.

Press BACK to exit the alarm menu, or press 6 to clear the alarms and exit the menu.

Alarms		**Alarm Comments**
112	weight fault	AI1 < -4mV/V: faulty loadcell or wiring AI1 > 4mV/V: faulty loadcell or wiring weight too low weight too high no sense voltage: faulty loadcell or wiring
113	belt speed fault	belt speed too high belt speed too low NAMUR sensor fault
114	flowrate fault	flowrate too high
115		
116	low flow fault	flowrate setpoint cannot be achieved
117	low platform weight fault	weight < minimum platform weight setting
118	error limit fault	abs(error) > error limit
119		
120		
121	user fault 1	
122	user fault 2	
123	user fault 3	
124		
125	Comms fault	
126	P-Module not compatible	
127	no P-Module fitted	fit P-Module
176		
177		
178		
179		
180	can't start	stop input is on
181		
182	unable to zero	belt is not empty or requires re-calibration
183	zero limited	signal > 3mV/V
184	span limited	signal too low to span
185	belt track error	check belt lateral alignment
186		
187		
188		
189		
190		
191		
192		
193		
194		
195	power supply brown out	check power supply
196	error at power down	totaliser and other data may be invalid
197	setting error	at address ####
198	macro error	at address #### excess recursion at address #### bit stack error at address ####
200	controller alarm	STORAGE error: unit requires servicing COP error: unit requires servicing RAM error: cycle power and check alarms controller fault: contact your supplier language file data error
201	P-Module alarm	STORAGE error: unit requires servicing
202	MO3 card alarm	STORAGE error: unit requires servicing
203	MR1 alarm	