# Weight Change Instrument MW93A
## Instruction Manual ALL

# ModWeigh

## FEATURES

- **Flowrate measurement and control for loss-in-weight (or gain-in-weight) systems**
- **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**
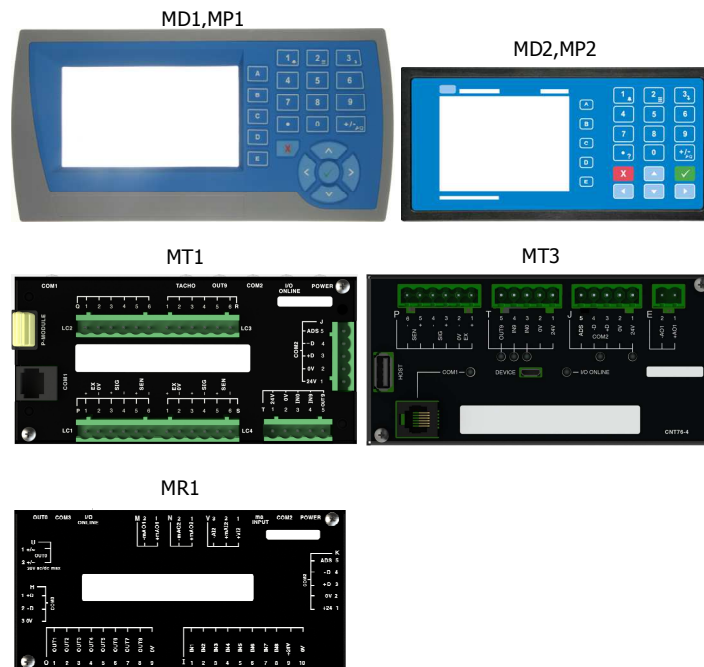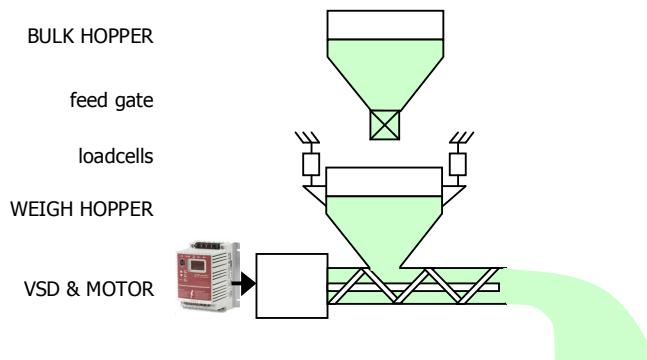
## MT3 TRANSMITTER

- **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

- MW93A - Weight Change P-Module
- MT1,MT3 - Transmitters
- MD1,MD2 - Display
- MP1,MP2 - Processor
- MR1 - Remote IO
- Software v6.09 onwards

BULK HOPPER

feed gate

loadcells

WEIGH HOPPER

VSD & MOTOR



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 |

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))

# Contents

# 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 Calibration

Direct calibration uses the loadcell capacity and loadcell sensitivity to calibrate the weight signal. Large capacity weighing systems can be quickly and accurately calibrated without the need for large test weights.

### 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 operator wants the flow regulator to convey. The MW93 can control to the local setpoint, which is set using the keypad, or it can control to the optional remote analog setpoint signal. The second analog input AI2 is required for a remote analog setpoint.

### 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 a loadcell failure.

### 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.

### Hopper Refilling

The processor uses weight setpoints and delays to produce a material feed control signal. In a weight loss system, the feed is opened to refill the weigh hopper from bulk storage when it nears empty. In a

weight gain system, the feed is opened to empty the weigh hopper when it nears full. During the filling process, the processor is put into hold during which the flowrate reading and the motor speed demand signal are held constant. This keeps the flow regulator speed constant during refilling when the flowrate can not be measured.

### Automatic Hold

The hopper weight is continuously monitored to automatically detect that filling is occurring or that the hopper has been accidentally knocked. If this is detected, the flowrate signal and speed demand signal are held constant until the weight returns to normal. This feature ensures that a constant output flowrate is always maintained during a disturbance to the hopper.

### Auto Setup

To make setting up easier, the auto setup facility allows many settings for the processor to be calculated and set automatically.

### 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 flow regulator 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.
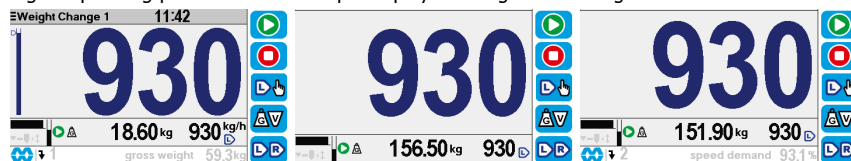
### Computer Connectivity

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 | ✗ | ✗ |

### Configurations

There are three principle configurations for gravimetric flow measurement and control systems. These are Weight Loss, Modified Weight Loss and Weight Gain.

All configurations have the same basic components of a flow regulator and weigh hopper.

#### Weight Loss
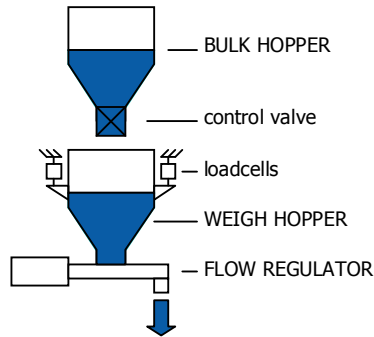


Features

- continuous flow
- weigh hopper & flow regulator combined

#### Modified Weight Loss
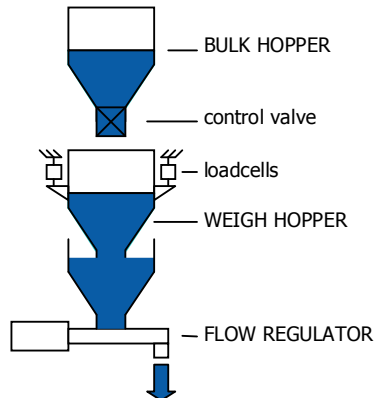


Features

- continuous flow
- weigh hopper isolated from flow regulator combined e.g. plastic extruders

## Weight Gain



BULK HOPPER

FLOW REGULATOR

loadcells

WEIGH HOPPER

control valve
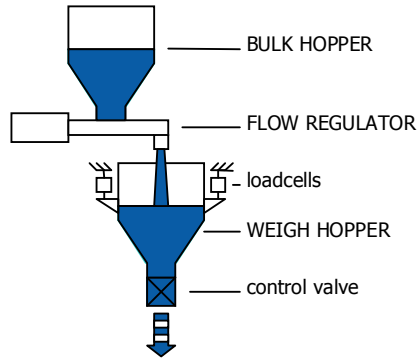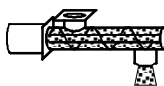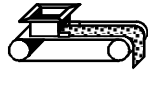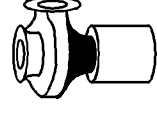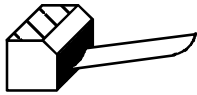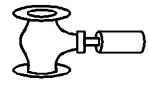
Features

- interrupted flow
- simple installation
- ideal where bulk hopper & feeder already exist

## Flow Regulators



| | |
|---|---|
| SCREW FEEDER | DRUM FEEDER |
| BELT FEEDER | TABLE FEEDER |
| ROTARY VALVE | PUMP |
| VIBRATOR FEEDER | RESTRICTOR VALVE |

## Performance

One factor which determines the performance of a system is the capacity of the loadcell weighing system used to weight the hopper. The following graph gives an indication of the useful operating range that may be used. The Loadcell Capacity is the sum of the capacity of all loadcells, and should take into account any lever system if one exists.



FLOWRATE [kg/h]

GOOD PERFORMANCE

ACCEPTABLE

POOR PERFORMANCE

LOADCELL CAPACITY [kg]
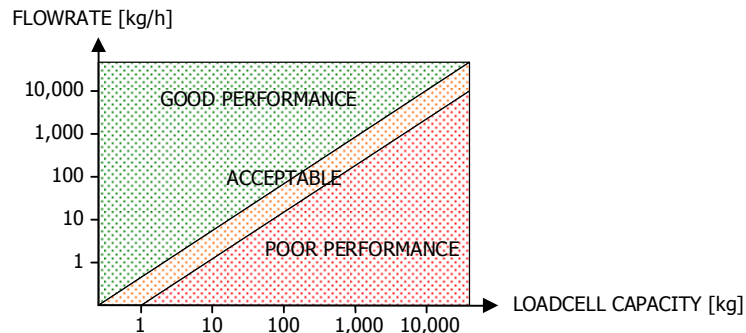
The performance is very dependent on the weighing system repeatability. It is desirable to aim for as high a repeatability as possible. With care, it is possible to achieve weighing repeatability of 1 part in 10,000 to 1 part in 100,000.

The flowrate is measured by calculating the change in weight over a period of time. The error in this measurement is limited by the length of time and loadcell accuracy. Calculate the ratio of flowrate (in kg/h) to the loadcell capacity (in kg). Using this ratio, the following graph gives an idea of the flowrate fluctuation for different measuring intervals (the flowrate response setting) and the loadcell incremental accuracy.
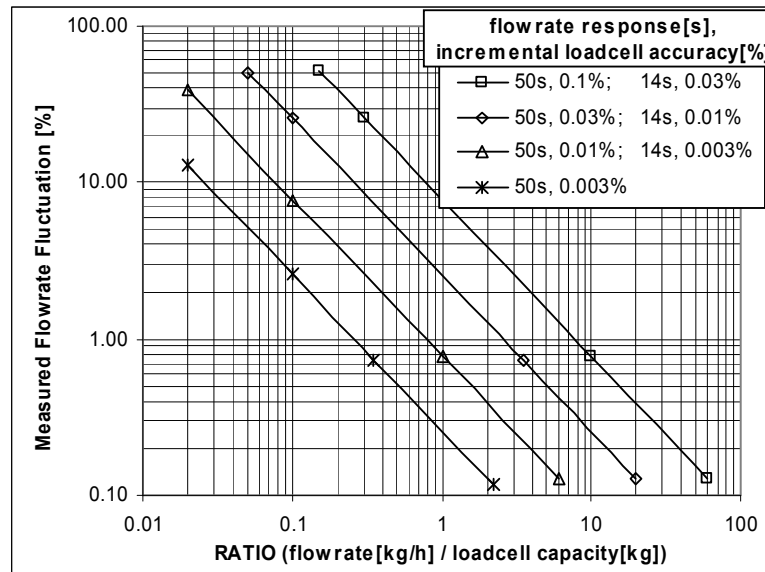
The loadcell incremental accuracy measures how accurately a loadcell can measure small changes in weight. This accuracy is not normally given on loadcell datasheets, but is generally better than the other accuracies specified.

Note that other factors may also limit the performance.

Watch flexible couplings to the weigh hopper, as these can easily reduce the achievable performance.

Good accuracy also requires repeatable results from the flow regulator system. Some materials can be difficult to control (for example powders that fluidise)

# 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 |
| High voltage | › 8 V |
| Low voltage | ‹ 4 V |
| Maximum voltage | 32 V |

|                          | Input load               | 4 kΩ approximate |
| **Digital Inputs INx**   |                          |                  |
|                          | High voltage             | › 8 V |
|                          | Low voltage              | ‹ 4 V |
|                          | Maximum voltage          | 32 V |
|                          | Input load               | 6 kΩ approximate |
|                          | Input type               | PNP output sensors |
| **Digital Outputs OUTx** |                          |                  |
|                          | 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.

The 'material feed' output to control filling of the weigh hopper.

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.

# 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**

PANEL cut out
138 x 67 mm
-0.0 + 1.0 mm

72mm

144mm

FACIA
144 x 72 mm

80mm

9mm

top view

approx. 400g
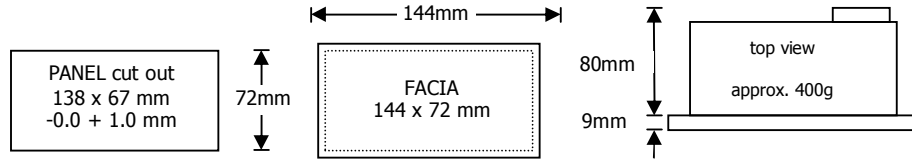
**MD1 Display**
**MP1 Processor**

PANEL cut out
186 x 92 mm
-0.0 + 1.0 mm

104mm

208mm

FACIA
208 x 104 mm

30mm

8mm

top view

approx. 450g

**MT1 Transmitter**

136mm

66mm

approx. 350g

50mm

8mm

20mm

optional DIN rail mount

**MT3 Transmitter**

136mm

66mm

approx. 350g

50mm

8mm

20mm

optional DIN rail mount

**MR1 Remote IO**

156mm

136mm

66mm  86mm

approx. 350g

8mm

20mm

optional DIN rail mount
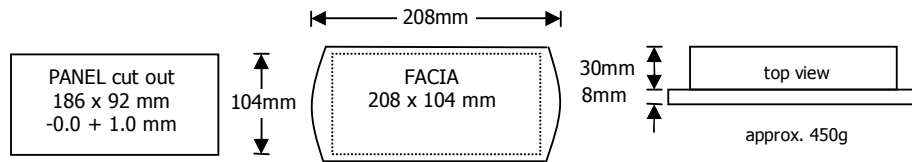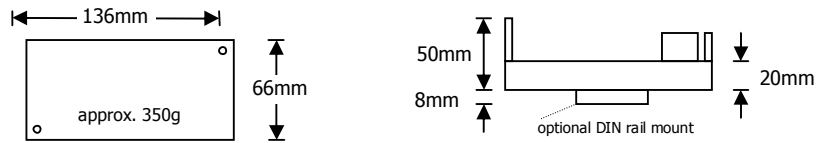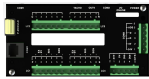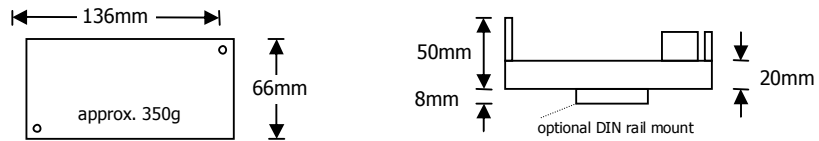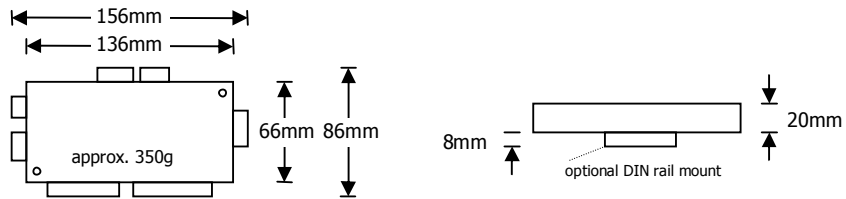
# Connections

**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.

+24V                                       0V

**run motor [OUT3, 56]**      VSD run input

VSD OK             **NOT stop [INx, -1]**

**AO1** + −     4-20mA     + − VSD speed input
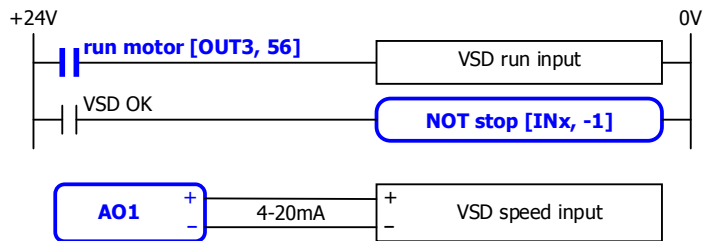
### VSD Drive, VSD run/stop

ModWeigh slaved from VSD running signal.

+24V — VSD running signal — **run [IN3,2]** — 0V

**AO1** + / − — 4-20mA — + / − VSD speed input
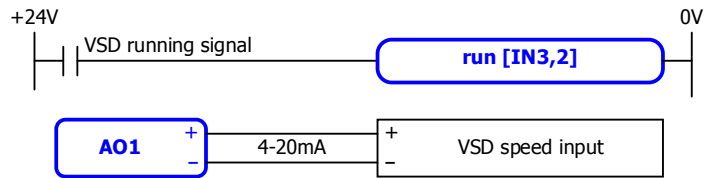
- disable START key
- do not use start function

### VSD drive, start/stop buttons

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

+24V — START — **start [INx, 27]** — 0V

STOP — VSD OK — **NOT stop [INx, -1]**

**run motor [OUT3, 56]** — VSD run input

**AO1** + / − — 4-20mA — + / − VSD speed input
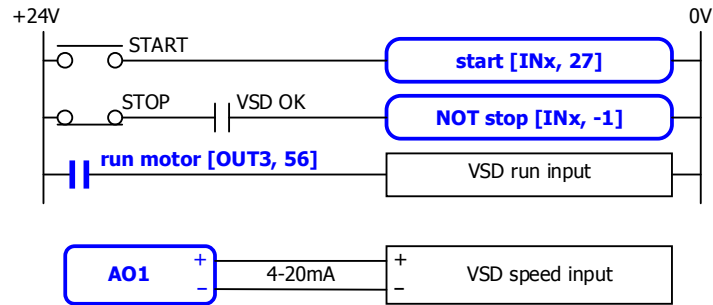
### Motor Contactor, keypad run/stop

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

+24V — **run motor [OUT3, 56]** — overload — motor contactor — 0V

overload — **NOT stop [INx, -1]**
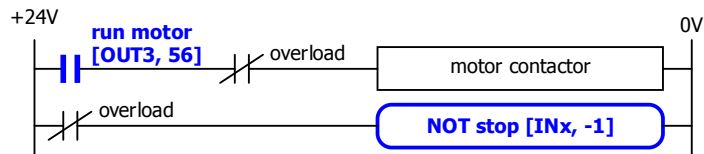
### Motor Contactor, run/stop buttons

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

+24V — START — STOP — overload — motor contactor (mc) — 0V

mc

mc — **run [IN3, 2]**
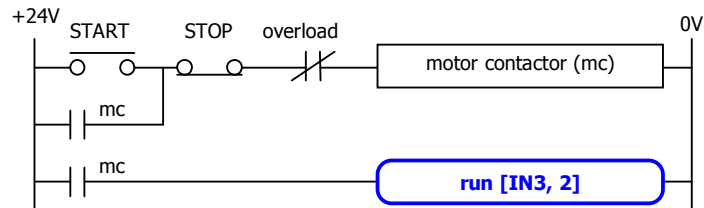
- disable START key
- do not use start function

**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.

+24V — **run motor [OUT3, 56]** — motor contactor (mc) — 0V

START — **batch start [INx, 29]**

CONTINUE — **start [INx, 27]**

STOP — **NOT stop [INx, -1]**
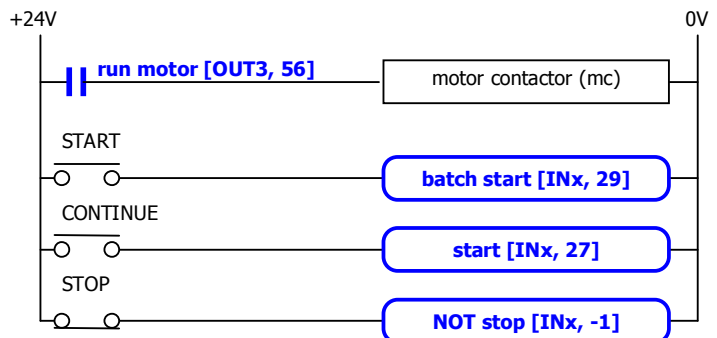
- disable START key

### 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.

+24V                                                                          0V

**run motor [OUT3, 56]**         motor contactor (mc)

START
**batch start [INx, 29]**

PAUSE
**pause [INx, 30]**
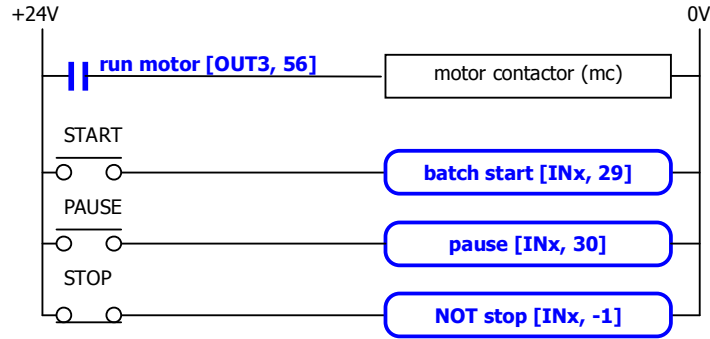
STOP
**NOT stop [INx, -1]**

- 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.

+24V                                                                          0V

**run motor [OUT3, 56]**         motor contactor (mc)

START
**batch start [INx, 29]**

PAUSE/STOP
**pause/stop [INx, 31]**

**paused [OUTx, 58]**                         ⊗   PAUSED
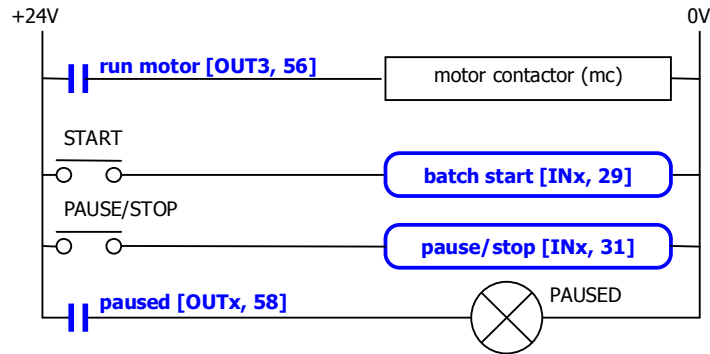
- disable START key

### Key

**[OUTx, output function]**          ModWeigh digital output

**[INx, input function]**            ModWeigh digital input

**AOx** +/−                          ModWeigh analog output

## 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
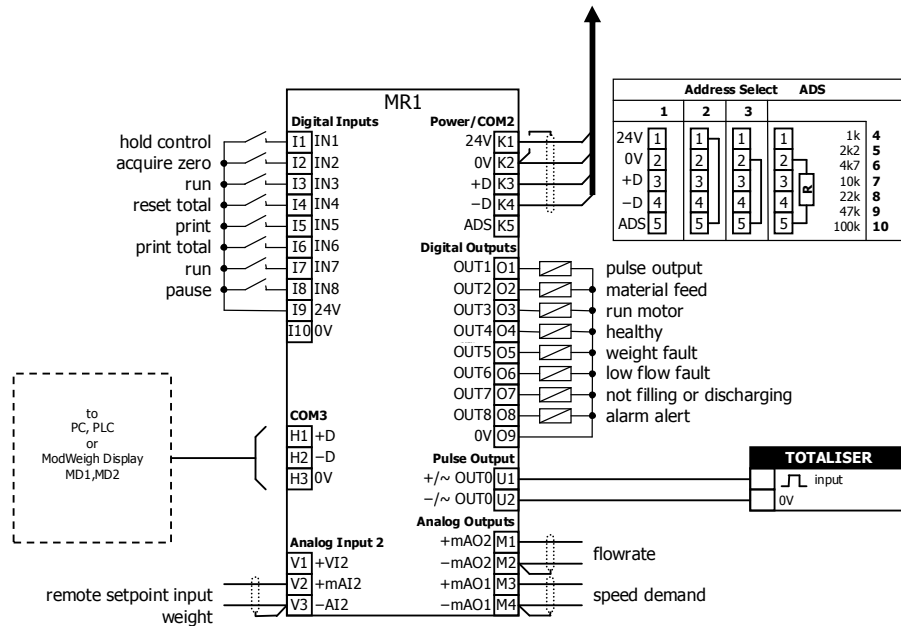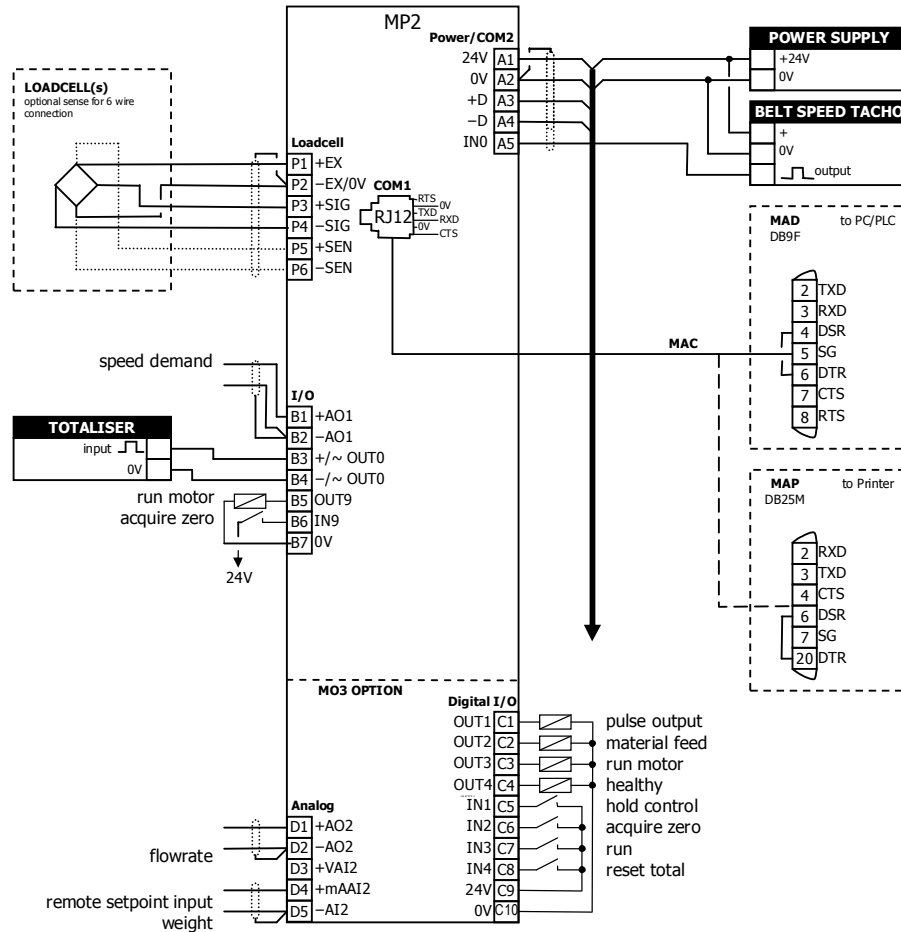
## Connection Diagram – MP1

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.

**LOADCELL(s)**
optional sense for 6 wire connection

**MP1**

**Power/COM2**
| | |
|---|---|
| 24V | A1 |
| 0V | A2 |
| +D | A3 |
| −D | A4 |
| IN0 | A5 |

**Loadcell**
| | |
|---|---|
| P1 | +EX |
| P2 | −EX/0V |
| P3 | +SIG |
| P4 | −SIG |
| P5 | +SEN |
| P6 | −SEN |

**COM1**
RJ12 — RTS, TXD, 0V, RXD, 0V, CTS

**POWER SUPPLY**
| +24V |
| 0V |

**BELT SPEED TACHO**
| + |
| 0V |
| output |

**MAD** to PC/PLC  DB9F
| 2 | TXD |
| 3 | RXD |
| 4 | DSR |
| 5 | SG |
| 6 | DTR |
| 7 | CTS |
| 8 | RTS |

**MAC**

**MAP** to Printer  DB25M
| 2 | RXD |
| 3 | TXD |
| 4 | CTS |
| 6 | DSR |
| 7 | SG |
| 20 | DTR |

**MR1**

**Digital Inputs**
| | | |
|---|---|---|
| hold control | I1 | IN1 |
| acquire zero | I2 | IN2 |
| run | I3 | IN3 |
| reset total | I4 | IN4 |
| print | I5 | IN5 |
| print total | I6 | IN6 |
| run | I7 | IN7 |
| pause | I8 | IN8 |
| | I9 | 24V |
| | I10 | 0V |

**Power/COM2**
| | |
|---|---|
| 24V | K1 |
| 0V | K2 |
| +D | K3 |
| −D | K4 |
| ADS | K5 |

**Address Select  ADS**

| | 1 | 2 | 3 | | |
|---|---|---|---|---|---|
| 24V | 1 | 1 | 1 | 1 | 1k — 4 |
| 0V | 2 | 2 | 2 | 2 | 2k2 — 5 |
| +D | 3 | 3 | 3 | 3 | 4k7 — 6 |
| −D | 4 | 4 | 4 | 4 | 10k — 7 |
| ADS | 5 | 5 | 5 | 5 | 22k — 8 |
| | | | | | 47k — 9 |
| | | | | | 100k — 10 |

**Digital Outputs**
| | | |
|---|---|---|
| OUT1 | O1 | pulse output |
| OUT2 | O2 | material feed |
| OUT3 | O3 | run motor |
| OUT4 | O4 | healthy |
| OUT5 | O5 | weight fault |
| OUT6 | O6 | low flow fault |
| OUT7 | O7 | not filling or discharging |
| OUT8 | O8 | alarm alert |
| 0V | O9 | |

to PC, PLC or ModWeigh Display MD1,MD2

**COM3**
| H1 | +D |
| H2 | −D |
| H3 | 0V |

**Pulse Output**
| +/~ OUT0 | U1 |
| −/~ OUT0 | U2 |

**TOTALISER**
| input |
| 0V |

**Analog Input 2**
| V1 | +VI2 |
| V2 | +mAI2 |
| V3 | −AI2 |

remote setpoint input weight

**Analog Outputs**
| +mAO2 | M1 | flowrate |
| −mAO2 | M2 | |
| +mAO1 | M3 | speed demand |
| −mAO1 | M4 | |

**Connection Diagram – MT1**

Keep all wiring separated from mains wiring.

Use shielded cable where indicated.

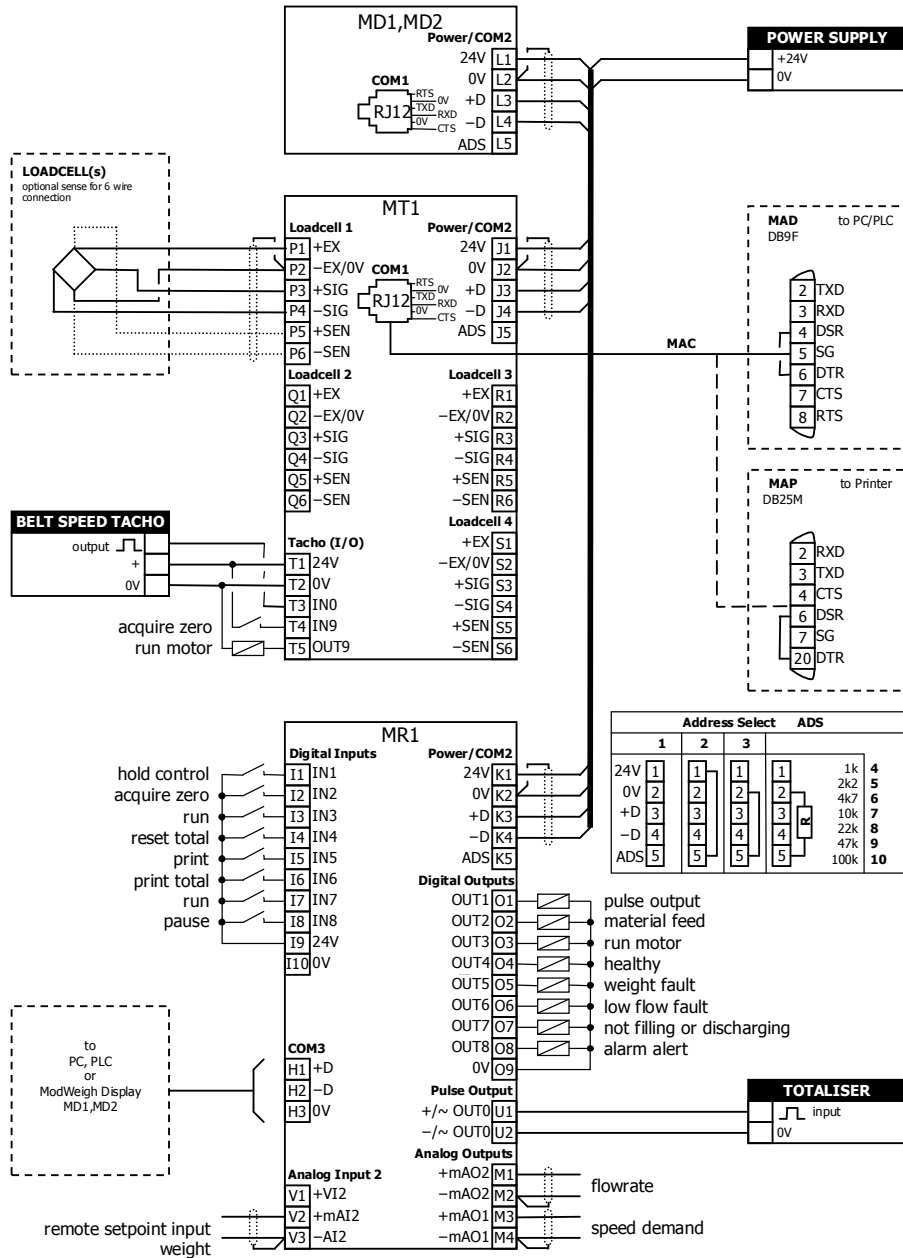Either the RUN input or the RUN MOTOR output should be used.

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.



### MD1,MD2

| Power/COM2 | |
|---|---|
| 24V | L1 |
| 0V | L2 |
| +D | L3 |
| −D | L4 |
| ADS | L5 |

COM1: RJ12 — RTS, TXD, CTS, 0V, RXD, 0V

### POWER SUPPLY
+24V
0V

### MT1

**Loadcell 1**
| P1 | +EX |
| P2 | −EX/0V |
| P3 | +SIG |
| P4 | −SIG |
| P5 | +SEN |
| P6 | −SEN |

**Power/COM2**
| J1 | 24V |
| J2 | 0V |
| J3 | +D |
| J4 | −D |
| J5 | ADS |

COM1: RJ12 — RTS, TXD, CTS, 0V, RXD, 0V

**LOADCELL(s)** optional sense for 6 wire connection

**Loadcell 2**
| Q1 | +EX |
| Q2 | −EX/0V |
| Q3 | +SIG |
| Q4 | −SIG |
| Q5 | +SEN |
| Q6 | −SEN |

**Loadcell 3**
| R1 | +EX |
| R2 | −EX/0V |
| R3 | +SIG |
| R4 | −SIG |
| R5 | +SEN |
| R6 | −SEN |

**Loadcell 4**
| S1 | +EX |
| S2 | −EX/0V |
| S3 | +SIG |
| S4 | −SIG |
| S5 | +SEN |
| S6 | −SEN |

### MAD
to PC/PLC — DB9F
| 2 | TXD |
| 3 | RXD |
| 4 | DSR |
| 5 | SG |
| 6 | DTR |
| 7 | CTS |
| 8 | RTS |

MAC

### MAP
to Printer — DB25M
| 2 | RXD |
| 3 | TXD |
| 4 | CTS |
| 6 | DSR |
| 7 | SG |
| 20 | DTR |

### BELT SPEED TACHO
output
+
0V

**Tacho (I/O)**
| T1 | 24V |
| T2 | 0V |
| T3 | IN0 | acquire zero |
| T4 | IN9 | run motor |
| T5 | OUT9 | |

### MR1

**Digital Inputs**
| hold control | I1 | IN1 |
| acquire zero | I2 | IN2 |
| run | I3 | IN3 |
| reset total | I4 | IN4 |
| print | I5 | IN5 |
| print total | I6 | IN6 |
| run | I7 | IN7 |
| pause | I8 | IN8 |
| | I9 | 24V |
| | I10 | 0V |

**Power/COM2**
| K1 | 24V |
| K2 | 0V |
| K3 | +D |
| K4 | −D |
| K5 | ADS |

**Digital Outputs**
| O1 | OUT1 | pulse output |
| O2 | OUT2 | material feed |
| O3 | OUT3 | run motor |
| O4 | OUT4 | healthy |
| O5 | OUT5 | weight fault |
| O6 | OUT6 | low flow fault |
| O7 | OUT7 | not filling or discharging |
| O8 | OUT8 | alarm alert |
| O9 | 0V | |

**COM3**
| H1 | +D |
| H2 | −D |
| H3 | 0V |

to PC, PLC or ModWeigh Display MD1,MD2

**Pulse Output**
| U1 | +/~ OUT0 |
| U2 | −/~ OUT0 |

### TOTALISER
input
0V

**Analog Input 2**
| V1 | +VI2 |
| V2 | +mAI2 |
| V3 | −AI2 |

remote setpoint input weight

**Analog Outputs**
| M1 | +mAO2 | flowrate |
| M2 | −mAO2 | |
| M3 | +mAO1 | speed demand |
| M4 | −mAO1 | |

### Address Select — ADS

| | 1 | 2 | 3 | | | |
|---|---|---|---|---|---|---|
| 24V | 1 | 1 | 1 | 1 | 1k | 4 |
| 0V | 2 | 2 | 2 | 2 | 2k2 | 5 |
| +D | 3 | 3 | 3 | 3 | 4k7 | 6 |
| −D | 4 | 4 | 4 | 4 | 10k | 7 |
| ADS | 5 | 5 | 5 | 5 | 22k | 8 |
| | | | | | 47k | 9 |
| | | | | | 100k | 10 |

## Connection Diagram – MT3

Keep all wiring separated from mains wiring.
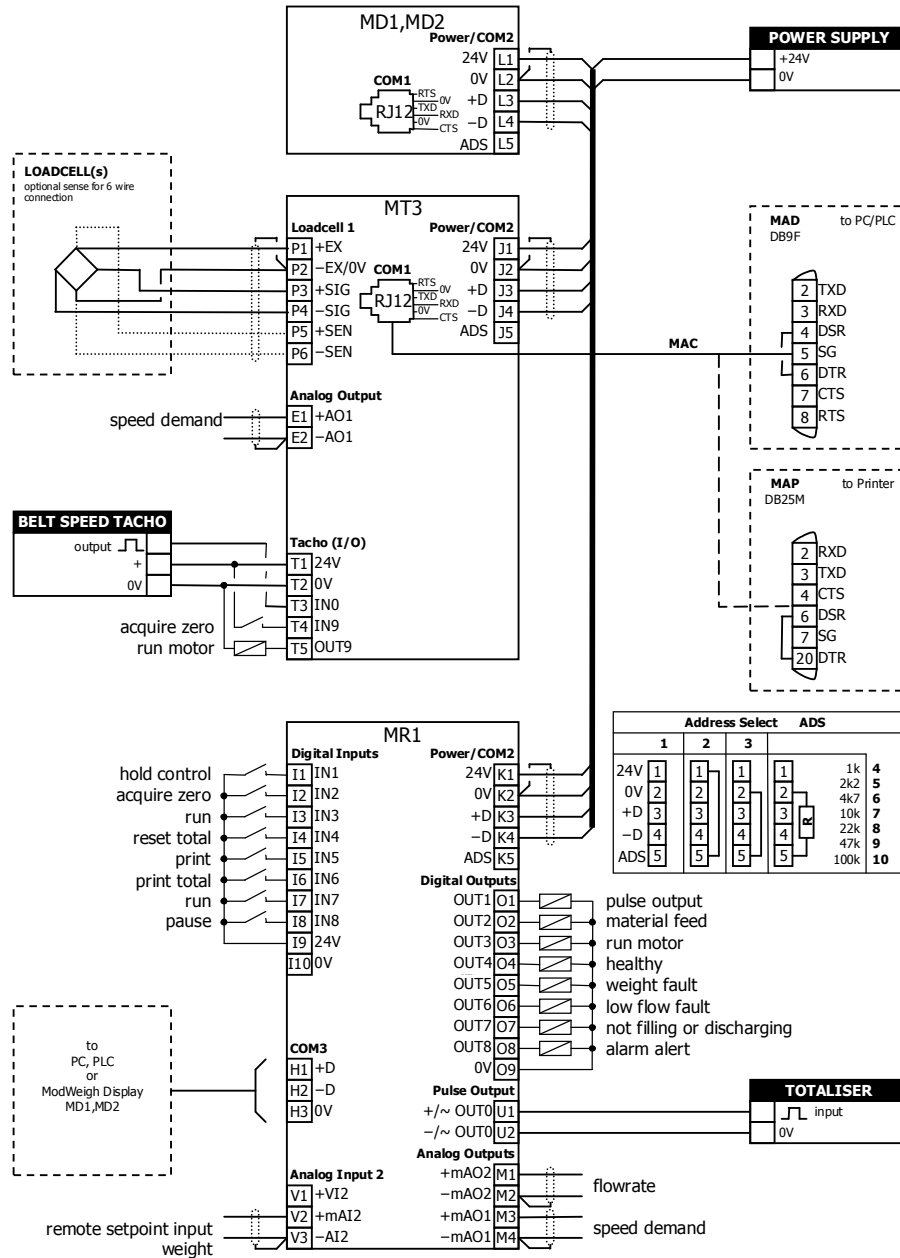
Use shielded cable where indicated.

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.



**Address Select — ADS**

| | 1 | 2 | 3 | | |
|---|---|---|---|---|---|
| 24V | 1 | 1 | 1 | 1 | 1k  4 |
| 0V | 2 | 2 | 2 | 2 | 2k2  5 |
| +D | 3 | 3 | 3 | 3 | 4k7  6 |
| −D | 4 | 4 | 4 | 4 | 10k  7 |
| ADS | 5 | 5 | 5 | 5 | 22k  8 |
| | | | | | 47k  9 |
| | | | | | 100k  10 |

## 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.
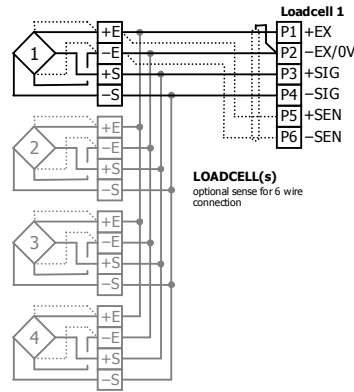
Loadcells Wired to Junction Box

For best accuracy use a 6-wire connection to controller
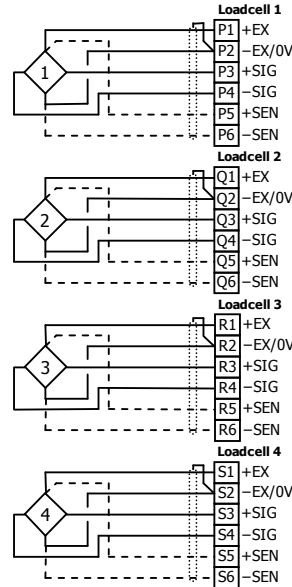
MT1

Loadcells Wired to Directly to Terminals

Allows corner adjustment and individual monitoring of loadcell outputs

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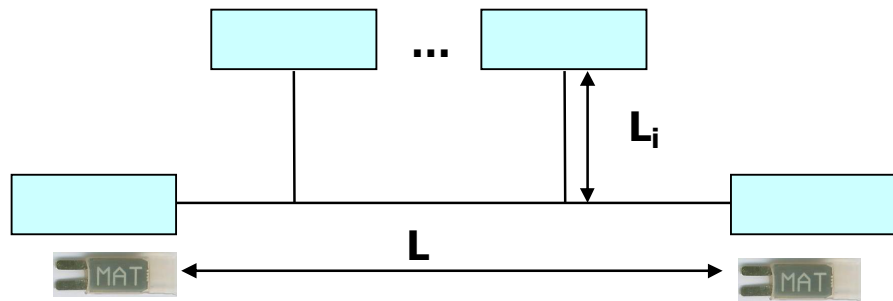
$$Li \leq \frac{40}{n}\,[m] \qquad L \leq 500\,[m]$$

if D = MD1,MD2 Display, then $n \leq 10$
if D = PLC master, then $n \leq 32$

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.
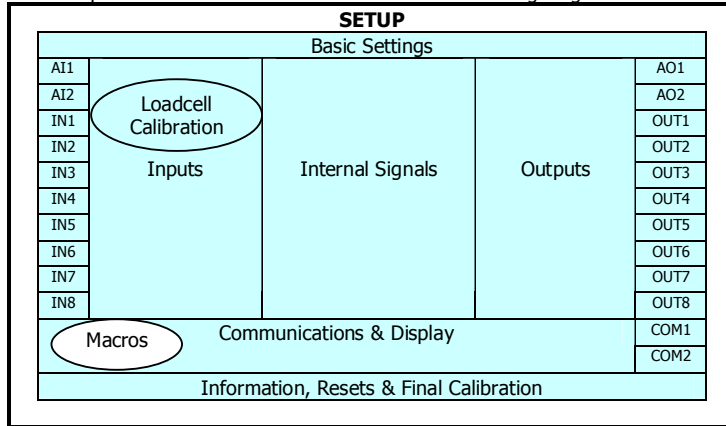
# SETTING UP
# Setup

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.
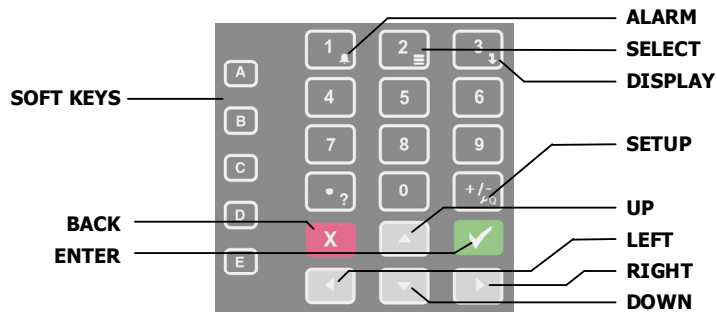
*Factory Settings*

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**
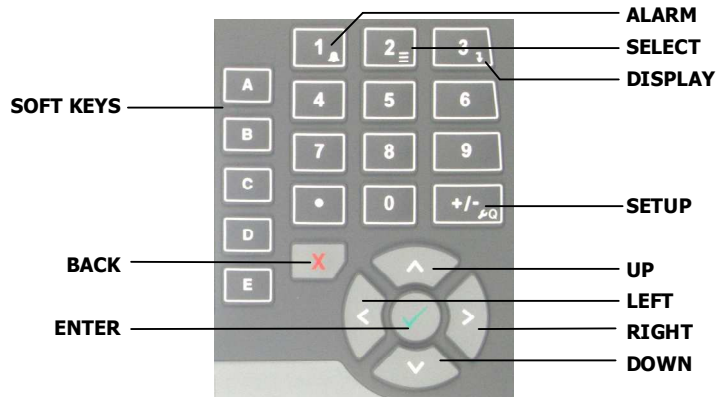


**MD2,MP2 Keypad**



**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.
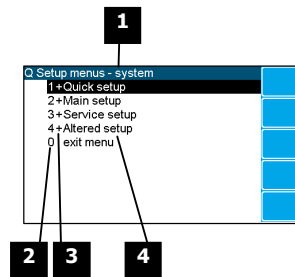


| **1** | Menu name. |
| **2** | Quick Key number. Press key with same number to directly enter the named menu. |
| **3** | Menu item descriptor. |

| 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.
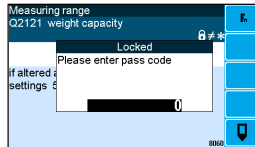
**Service**

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.
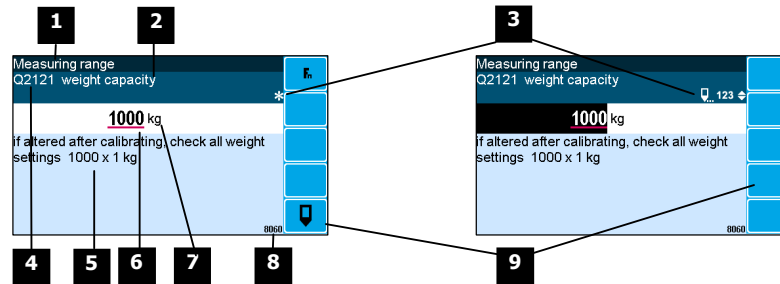
| 1 | Menu item. |
| 2 | Setting name. |
| 3 | Gives information about the settings and indicates active keys or the preferred method of making a value change while editing. |

| Icon | Description |
|---|---|
| 🔒 | The setting is locked. Password must be entered to edit. |
| Q | 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 |
|---|---|
| Fn | 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. <br><br> arg0 and arg1 must be in the range 1 to 128. | |
| 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› | <table><tr><td>‹argument›</td><td>register</td></tr><tr><td>1</td><td>weight</td></tr><tr><td>2</td><td>gross weight</td></tr><tr><td>3</td><td>net weight</td></tr><tr><td>4</td><td>zero weight</td></tr><tr><td>5</td><td>tare weight</td></tr><tr><td>6</td><td>total weight</td></tr><tr><td>7</td><td>running total</td></tr><tr><td>8</td><td>peak weight</td></tr><tr><td>9</td><td>flow rate</td></tr><tr><td>10</td><td>belt speed</td></tr><tr><td>11</td><td>current setpoint</td></tr><tr><td>12</td><td>speed demand</td></tr><tr><td>13</td><td>COM 2 modbus address</td></tr><tr><td>14</td><td>print settings & macros</td></tr><tr><td>15</td><td>product serial number</td></tr><tr><td>16</td><td>flowrate raw</td></tr><tr><td>17</td><td>temp 1</td></tr><tr><td>18</td><td>temp 2</td></tr><tr><td>19</td><td>perm 1</td></tr><tr><td>20</td><td>perm 2</td></tr><tr><td>21</td><td>P_Module serial number</td></tr><tr><td>22</td><td>perm3</td></tr><tr><td>23</td><td>perm4</td></tr><tr><td>24</td><td>perm5</td></tr><tr><td>25</td><td>temp3</td></tr><tr><td>26</td><td>temp4</td></tr><tr><td>27</td><td>temp5</td></tr><tr><td>28</td><td>batch setpoint</td></tr><tr><td>29</td><td>batched weight</td></tr><tr><td>30</td><td>batch number</td></tr><tr><td>31</td><td>last batched weight</td></tr><tr><td>32</td><td>number to batch</td></tr><tr><td></td><td></td></tr><tr><td>101</td><td>with address in VALUE</td></tr><tr><td>102</td><td>default_value</td></tr><tr><td>103</td><td>minimum_value</td></tr><tr><td>104</td><td>maximum_value</td></tr><tr><td>105</td><td>column</td></tr><tr><td>106</td><td>memory</td></tr><tr><td>107</td><td>register_number</td></tr><tr><td>108</td><td>port</td></tr><tr><td>109</td><td>slave_address</td></tr></table> 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. |

| R | Register Instructions | | |
|---|---|---|---|
| 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 | |
| 207 | PRINT_MENU_HEADING | ‹column› is a number 1 to 99. Columns are numbered from 0. |
| 208 | PRINT_MENU_PATH | |
| 209 | PRINT_QUICK_KEY | |
| 212 | FORMAT "format" | |
| 213 | NEWLINE | ‹macro› is number 1 to 99. If ‹macro› = 101, lists macro number in VALUE. |
| 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.<br>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.<br>The operation follows the values. e.g RECALL ‹weight› VALUE "2" MUL., this multiplies the weight by 2.<br>e.g. 2 + 3 x weight =<br>VALUE "2" VALUE "3" RECALL ‹weight› MUL ADD | |

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

| | | |
|---|---|---|
| 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) |

| L | Looping and Control Instructions | | | | | |
|---|---|---|---|---|---|---|
| 239 | DRIVE_BIT ‹bit› | **value** | **test** | | | |
| 240 | IF ‹condition› | 1-150 | See I/O Function Table | | | |
| 241 | IF_EVENT ‹event condition› | | | | | |
| 242 | NOT | **value** | **test** | | **value** | **test** |
| 243 | AND ‹condition› | 151 | VALUE>=0 | | 163 | VALUE_ALTERED |
| 244 | OR ‹condition› | 152 | VALUE>0 | | 164 | VALUE_NOT_ALTERED |
| 245 | ELSE | 153 | VALUE=0 | | 165 | VALUE_VIEW_ONLY |
| 246 | END_IF | 154 | VALUE‹›0 | | 166 | DEC_temp1=0 |
| 247 | SET_BIT ‹bit› | 155 | VALUE‹0 | | 180 | with_stack |
| 248 | CLEAR_BIT ‹bit› | 156 | VALUE‹=0 | | 181 | end_of_macro |
| 249 | TOGGLE_BIT ‹bit› | 157 | Y>=VALUE | | 182 | end_of_menus |
| 250 | GOSUB ‹macro› | 158 | Y>VALUE | | 183 | new_menu_heading |
| 251 | STOP | 159 | Y=VALUE | | 184 | new_menu_path |
| 252 | STACK | 160 | Y‹›VALUE | | 185 | macro_altered |
| 253 | LOOP | 161 | Y‹VALUE | | 186 | clock_active |
| 254 | EXIT_WHEN ‹condition› | 162 | Y‹=VALUE | | | |
| 255 | END_LOOP | | | | | |

| 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.
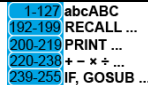
IF ‹condition› *INST* ENDIF                    IF_EVENT ‹event condition› *INST* ENDIF

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

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

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

**Adjusting a Macro**
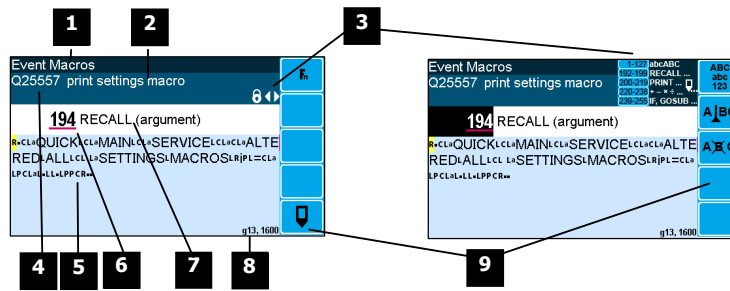


**1** Menu item.

**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. |
| keypad | Shows which numeric keys are used to enter lower case letters. |

| | |
|---|---|
| (keypad image) | 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. |
| (EDIT icon) | 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. |
| AⱵC | 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
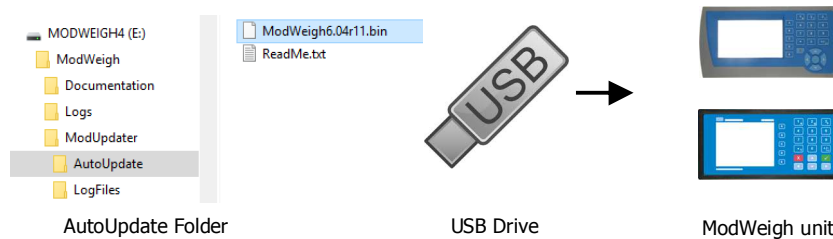
### Updating Procedure

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 |
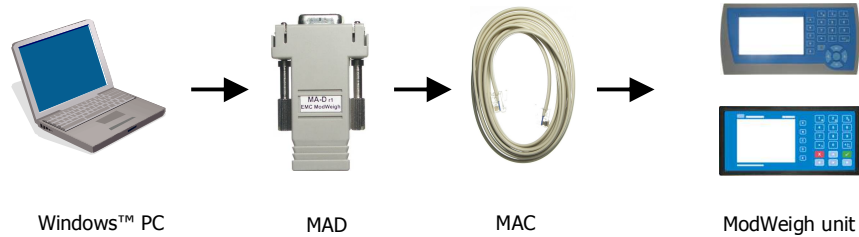
### Updating Procedure

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** | |
| p30 | Change the engineering units | 211x |
| p30 | Change the measuring range | 212x |
| p30 | Change the display resolution | 213x |
| | **INPUTS** | |
| p32 | Set the digital input terminal functions | 221x |
| p32 | Calibrate with weights | 2232x |
| p33 | Calibrate using loadcell specifications | 2233x |
| p34 | Change the 4-20mA flowrate setpoint input calibration | 224x |
| | **INTERNAL SIGNALS** | |
| p35 | Set up how zeroing operates | 2312x |

|      | Step                                                       | Quick Keys |
|------|------------------------------------------------------------|------------|
| p36  | Change the totaliser resolution and when the totaliser operates | 234x   |
| p38  | Change the PI settings to improve the loop control stability | 2371x    |
| p39  | Improve the step response time with the feed forward settings | 2374x   |
| **OUTPUTS** |                                                     |            |
| p41  | Change the 4-20mA output calibrations                      | 241x       |
|      |                                                            | 242x       |
| p42  | Set the digital output terminal functions                  | 243x       |
| **INFORMATION, RESETS & FINAL CALIBRATION** |                     |            |
| p46  | Set key locks or customise the display                     | 256xx      |

# Initial Setup

Before calibration can be done, the system integrators will need to have completed any setup to allow the system to be run, and you will need to be able to run the system.

**Engineering Units**

By default the measuring units of the controller are;

- weight          kg
- flowrate        kg/h
- total           kg

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

|      | Step                    | Quick Keys |
|------|-------------------------|------------|
| p30  | Select weight units     | 2112       |
|      | 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 |
|------|-------------------------|------------|
| p30  | Enter weight capacity   | 2121       |
|      | 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 |
|------|------------------------|------------|
| p30  | Enter weight division  | 2131       |
|      | Enter flowrate division| 2133       |

# Main Calibration Sequence

|      | Step                         | Quick Keys |
|------|------------------------------|------------|
| p30  | Enter control function       | 2181       |
|      | Enter hopper filling setpoints | 2182 & 2183 |
| p32  | Calibrate loadcell           | 22321 remove all weights and set to 0 |
|      |                              | 22322 apply test weights & enter test weight value |
| p36  | Adjust motor calibration     |            |
| p37  | Check flowrate measurement   |            |
| p37  | Enter flowrate disturbance hold | 2332    |
| p49  | Run an auto tune process     | 2653       |

# SETUP – MW93A WEIGHT CHANGE
# 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[1] | kg=101 |
|---|---|---|---|

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

| Q2114 | flowrate units | 8048, g0[2] | kg/h=162 |
|---|---|---|---|

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

| Q2115 | totaliser units (**TU**) | 8050, g0[3] | kg=101 |
|---|---|---|---|

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

## 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.

| [4]* Q2121 | weight capacity (WCAP) | 8060 | 100.0 kg,t,g |
|---|---|---|---|
| * Q2123 | flowrate capacity | 8064 | 1000 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 | 0.1 kg,t,g |
|---|---|---|---|
| Q2133 | flowrate division | 8074, g0 | 2 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.

## Weight change constants

These weight change constants define the operation of the loss in weight or gain in weight system.

### Enter hopper filling setpoints

If the weigh hopper is to be automatically filled whenever it has nearly emptied, the hopper high and low weight setpoints must be set up.

The 'material feed' output is used to control the filling system. The high setpoint is set to the weight the filling should stop. Usually this is around 60-50% of the hopper capacity. The low setpoint is the weight at which the filling of the weigh hopper should start. Usually this is around 5-20% of the hopper capacity.

To disable the filling control, set the low setpoint to 0.

---

[1]  Metric: 100=g, 101=kg, 102=t, Imperial: 110=oz, 111=lb, 112=tons
[2]  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
[3]  Metric: 100=g, 101=kg, 102=t, Imperial: 110=oz, 111=lb, 112=tons
[4]  * Appears in Quick Setup menu. These are the most important setting for this controller.

To have the filling controlled by the time, set the high setpoint to 0 and the 'feed gate delay' to the desired filling time.

| * Q2181 | control function | 8088, g0[5] | 0 |
|---|---|---|---|

The control function sets whether the system is a weight loss or weight gain system.

| | **Weight loss** (control function = 0) | **Weight gain** (control function = 1) |
|---|---|---|
| **high setpoint** | Refill ends when the weight reaches this value. Set to 0 for timed refill only. | Discharge of product starts when the weight reaches this value. |
| **low setpoint** | Refilling starts when the weight drops to this value. Set to 0 to disable refill control, 'material feed' remains off. | Discharge of product ends at this weight. |
| **feed gate delay** | Sets the time to terminate a refill. Set to 0 to disable. | Sets the time to keep the material feed on after the weight has dropped below the low setpoint. |
| **alarm timeout** | If the feed gate delay = 0 then a NOT FILLING ALARM occurs if the weight is less than high setpoint for this time during refill. If the feed gate delay is not 0, then a NOT FILLING ALARM occurs if the weight is less than the low setpoint for this time during refill. | A NOT DISCHARGING ALARM occurs if the weight is greater than the low setpoint this time after the material feed is turned off. |
| **hold time** | During the feed period (when the vessel is being refilled or discharged), the controller speed demand and the flowrate signal are held constant. An automatic hold can also be activated by using the **Internal Signal** 'flowrate disturbance hold' setting (QK 2332). The hold time maintains the hold for this amount of time after the feed or automatic hold ends, to allow the flowrate to stabilise again. | |

| * Q2182 | high setpoint | 8090, g0 | 80 kg,t,g |
|---|---|---|---|
| * Q2183 | low setpoint | 8092, g0 | 20 kg,t,g |
| * Q2184 | feed gate delay [0 to 255] | 8094, g0 | 20 s |
| * Q2185 | alarm timeout [0 to 600] | 8096, g0 | 60 s |
| * Q2186 | hold time [1 to 60] | 8098, g0 | 6 s |

## 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 | [6] |
|---|---|---|---|

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.

---

[5] 0=weight loss, 1=weight gain
[6] Defaults to whatever the current setting is.

# 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)[7] | 8170, g3[8] | hold control=9 |
|---|---|---|---|
| Q2212 | IN2 function (& state) | 8172, g3 | acquire zero=16 |
| Q2213 | IN3 function (& state) | 8174, g3 | run=2 |
| Q2214 | IN4 function (& state) | 8176, g3 | reset total=32 |
| Q2215 | IN5 function (& state) | 8178, g3 | print=40 |
| Q2216 | IN6 function (& state) | 8180, g3 | print total=41 |
| Q2217 | IN7 function (& state) | 8182, g3 | run=2 |
| Q2218 | IN8 function (& state) | 8184, g3 | pause=3 |
| Q2219 | IN9 function (& state) | 8186, g3 | acquire zero=16 |
| Q2210 | IN0 function (& state) | 8190, g3 | no function=0 |

## Loadcell input (vessel weight)

### Input settings

| Q22311 | AI1 response time [0.04 to 32] | 8120, g1 | 0.50 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 (gross 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[9] | (shows weight) kg,t,g |
|---|---|---|---|
| * Q22322 | AI1 span (apply weight & enter weight value) | 8912[9] | (shows weight) kg,t,g |

### *Calibrate loadcell*

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 all material and test weights are removed from the weighing system.
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.

---

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

[8]  See I/O Function Table page 52. Use negative numbers to reverse the signal sense eg 1=stop (stop when input is on), -1=NOT stop (stop when input is off).

[9]  Entering a value initiates a calibration.

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) [10] | 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).

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 all material and test weights are removed from the weighing system.

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.

---

[10] 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

| 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.

## 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[11] | 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[12] | 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[12] | 1000 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 |
|---|---|---|---|

---

[11] 0=general, 1=weight, 2=belt speed, 3=flowrate, 4=total, 5=belt loading, 6=length, 7=short length, 8=current, 9=voltage
[12] Signal units are determined by units of AI2 signal type

| 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 | gross weight | 8740 | 🔍 kg,t,g |
|---|---|---|---|

Displays the gross weight.

### 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 band | 8216, g5[13] | 0.5 divs |
|---|---|---|---|

Defines the zero band either side of zero. A setting of 0 sets a band of ± ¼ of a division. If set to 0.5kg, the zero band is between -0.5kg and +0.5kg This setting effects the automatic zero tracking if enabled.

| Q23125 | auto-tune progress | 8752 | 🔍 |
|---|---|---|---|

Displays the percentage progress through the auto-tune cycle.

| Q23126 | zero weight | 8220 | kg,t,g |
|---|---|---|---|

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

## 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

| Q2332 | flowrate disturbance hold (set to 0 to disable) [0 to 1000] | 8292 | 0 % |
|---|---|---|---|

Sets a threshold to changes in weight when the flowrate is held constant.  The flowrate is normally expected to be within the band of 0 to the flowrate capacity. This setting sets a band beyond these limits which if the flowrate exceeds, the previous flowrate value is held.

| 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.

| Q2335 | flowrate response [10s, 14s, 20s, 30s, 50s] | 8296, g6 | normal=1 |
|---|---|---|---|

Sets the how quickly the flowrate is determined. For systems with a small weight change signal, the flowrate may be more stable when this setting is higher, but it will take longer to reach a steady flowrate reading.

| 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.

---

[13] Set in divisions of weight, the smallest weight increment as displayed when setting the weight capacity or weight divisions. [0.5 to 12]

| 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.
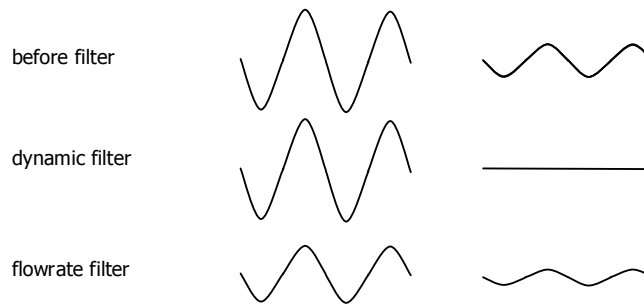


| Q2338 | flowrate raw | 8764, g6 | 🔍 t/h,kg/h |
|---|---|---|---|

The flowrate before the dynamic filter and flowrate filter.

**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%.

The displayed flowrate is zeroed when the measured flowrate is below the low flow cutout and the controller is stopped.

| Q2342 | totaliser division | 8312 | 0.05 kg,t,g |
|---|---|---|---|

Set the resolution of the totaliser.

| Q2343 | pulse output division | 8314 | 0.05 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.

### *Adjust motor calibration*

The MW93 typically controls a motor speed controller and motor which drives a material feed screw. The motor speed controller must be set up so that it produces a linear change in screw speed over the range.

It is recommended that the zero point be adjusted with a speed demand value of 2%.
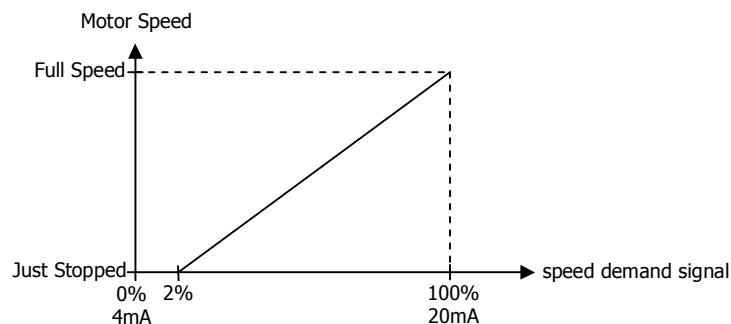


1. Press START or start the motor externally so that the running light above the START key is on.

2.  Press the SPEED DEMAND key and the display will beep and show the speed demand setting.
3.  Press the EDIT key.
4.  Key in 100 and press ENTER to set the spend demand to 100%.
5.  Adjust the motor controller max speed control so that the motor runs at the maximum desired speed.
6.  Press the EDIT key.
7.  Key in 2 and press ENTER to set the speed demand to 2%.
8.  Adjust the motor controller minimum speed setting so that the motor is just stopped, but is on the point of running.
9.  Press and hold the BACK key to return to normal operation.

### Check flowrate measurement

Once the weight and motor have been calibrated the material flowrate measurement should be checked at a number of motor speeds say 0%, 20%, 40%, 60%, 80% and 100%. After each speed demand setting is entered, wait and check that the flowrate more or less reaches a steady value. Write down the flowrates at each speed and check that the relationship is approximately linear.

If a steady value is not reached, check that the weighing is repeatable – repeatability's of 1 part in 10,000 or 100,000 are often required for loss-in-weight systems. A steadier reading can be obtained by increasing the 'AI1 response time' (QK 22311) or choosing a different 'flowrate response' (QK 2335) setting.

It is often a good idea to firstly set the 'flowrate disturbance hold' setting to 0 to disable the feature while this test is done.

### Enter flowrate disturbance hold

Whenever the weigh hopper is being filled, the flowrate signal and speed demand output must be held constant to maintain a constant flowrate during this period.

The instrument is put into 'holding flowrate' and holding control' whenever something activates the hold. The hold remains on for the 'hold time' (QK 2186).

Holding is activated by one or more of three ways.

- The material feed output is on (during a normal refill).
- When the flowrate exceeds the 'flowrate disturbance hold' setting (the hopper has been disturbed or a manual refill has occurred).
- An input set to the 'hold control' function is activated.

Follow these steps to set the flowrate disturbance hold.

1.  Run the feeder at a constant speed (for example 50%) with material.
2.  Press the Q key to access the setup menu.
3.  Key in the quick key code 2332 to select the 'flowrate disturbance hold' step.
4.  Press the EDIT key. (If editing is locked, key in the password 111 and press ENTER).
5.  Key in a desired disturbance value as a percentage and press ENTER. The lower display will show the current flowrate disturbance as a percentage, the setting will need to be made larger than this value.
6.  Press and hold the BACK key to return to normal operation.

**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 setpoint. 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 | 220.0 % |
|--------|----------------------------------------------------------|------|---------|

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 | 3.2 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 | 1.8 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 | 1=0.5 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 percentage 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.

| Q23725 | setpoint disturbance hold (set to 0 to disable) | 8476, g9 | 5 %/s |
|---|---|---|---|

This feature is disabled if set to 0.

Sets a threshold (in %/s) for changes in the setpoint signal. When the threshold is exceeded, a hold is triggered (see 'hold time' QK 2186).

| 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 | 1000 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.

flowrate

**flowrate at 100% speed**

Speed Demand

**speed at zero flowrate**          100%
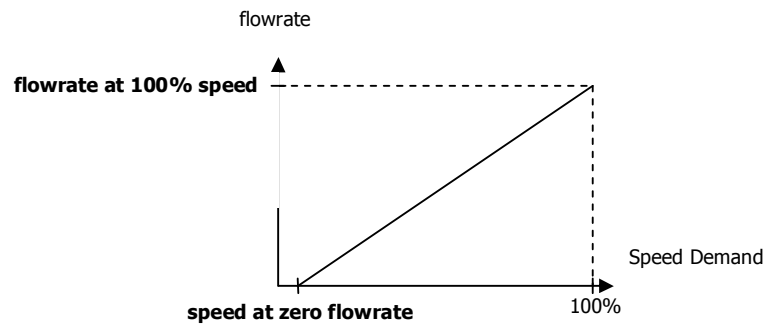
| Q23744 | weight feed forward % | 8496, g9 | 0.0 % |
|---|---|---|---|

Sets the percentage increase in speed demand if the hopper emptied completely.

| Q23745 | weight feed forward limit | 8498, g9 | 50 kg,t,g |
|---|---|---|---|

This is the weight below which the weight feed forward begins to be applied.

% Increase In Speed Demand

100%

**weight feed forward %**

**weight feed forward limit**     hopper full     Weight
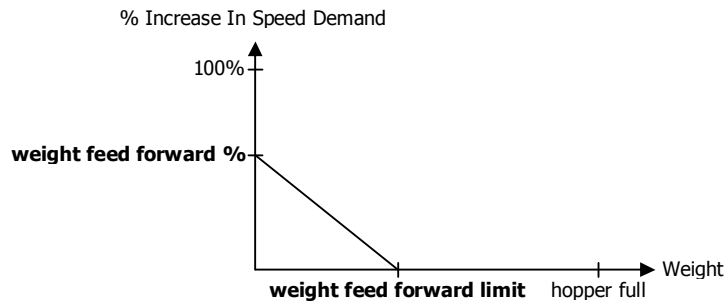
| Q23746 | tune feed forward time | 8490, g9 | 0.0 min |
|---|---|---|---|

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.

## 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.

| 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)[14] | 8550, g11[15] | pulse output=48 |
|---|---|---|---|
| Q2432 | OUT2 function (& state) | 8552, g11 | material feed=59 |
| 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 | low flow fault=116 |
| Q2437 | OUT7 function (& state) | 8562, g11 | not filling or discharging=115 |
| 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.

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

[15] See I/O Function Table page 52. 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)

| 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 |
|---|---|---|---|

| 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 | gross weight | 8000, g12 |
|---|---|---|
| Q25412 | no function | 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[16] | 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 |

### Print options

| | | | |
|---|---|---|---|
| Q25521 | print continuous rate[17] | 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 | Behaviour 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.

---

[16] 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

[17] 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

| 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.

| 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 macros 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[18] | 2 |
|---|---|---|---|
| Q25612 | stop lock | 8622, g4[18] | 0 |
| Q25613 | toggle volumetric mode lock | 8624, g4[18] | 0 |
| Q25614 | toggle remote mode lock | 8626, g4[18] | 0 |
| Q25615 | set local flowrate lock | 8628, g4[18] | 0 |
| Q25616 | set manual speed lock | 8630, g4[18] | 0 |
| Q25617 | batch setpoint lock | 8632, g4[18] | 0 |
| Q25618 | aquire zero lock | 8634, g4[18] | 0 |
| Q25619 | reset total weight lock | 8636, g4[18] | 0 |

### Operator menu 2 locks

| Q25621 | print lock | 8638, g4[18] | 0 |
|---|---|---|---|
| Q25622 | print total lock | 8640, g4[18] | 0 |
| Q25623 | user function 1 lock | 8642, g4[18] | 0 |
| Q25624 | user function 2 lock | 8644, g4[18] | 0 |
| Q25625 | user function 3 lock | 8646, g4[18] | 0 |
| Q25626 | operator menu 26 lock | 8682, g4[18] | 0 |
| Q25627 | operator menu 27 lock | 8684, g4[18] | 0 |
| Q25628 | operator menu 28 lock | 8266, g4[18] | 0 |
| Q25629 | operator menu 29 lock | 8268, g4[18] | 0 |

### Operator menu 3 locks

| Q25631 | operator menu 31 lock | 8650, g4[18] | 0 |
|---|---|---|---|
| Q25632 | operator menu 32 lock | 8652, g4[18] | 2 |
| Q25633 | operator menu 33 lock | 8654, g4[18] | 0 |
| Q25634 | operator menu 34 lock | 8656, g4[18] | 0 |
| Q25635 | operator menu 35 lock | 8658, g4[18] | 0 |
| Q25636 | operator menu 36 lock | 8660, g4[18] | 0 |
| Q25637 | operator menu 37 lock | 8662, g4[18] | 0 |
| Q25638 | operator menu 38 lock | 8664, g4[18] | 0 |
| Q25639 | operator menu 39 lock | 8666, g4[18] | 0 |

### Operator menu 4 locks

| Q25641 | display select lock | 8678, g4[18] | 0 |
|---|---|---|---|
| Q25642 | Alarm Menu lock | 8688, g4[18] | 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

---

[18] 0=never locked, 1=locked with pass code access, 2=always locked (pass code = 99)

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.

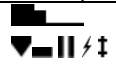| Value | Display | Description |
|---|---|---|
| 1 | | display bar graph |
| 2 | kg/h | show units |
| 4 | 112 | show alarm number |
| 8 | 123456 **kg** | display total (not flowrate) |

| 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

| | |
|---|---|
| ▼▄❚❚⚡↕ | **N2**U2 (**123456**kg)        **N1**U1 (**100**kg/h) |

| Value | Display | Description |
|---|---|---|
| 0 | **N1**U1 **100**kg/h | display current setpoint |
| 1 | **N1**U1 | hide current setpoint |
| 2048 | **N1**U1 **654321**kg | display running total (in place of current setpoint) |
| 2049 (1+2048) | **N1**U1 **2000**kg | display batch weight (in place of current setpoint) |
| 0 | **N2**U2 **123456**kg | display total/batch weight |
| 2 | **N2**U2 | hide total/batch weight |
| 8192 | **N2**U2 **100**kg/h | display flowrate (in place of total) |
| 4 | ▼ | hide feed icon |
| 8 | ▄▄   ▼▄❚❚⚡↕ | hide speed demand bar graph and icons |
| 16 | ❚❚ | hide hopper level graph |
| 32 | kg/h | hide setpoint (flowrate) units |
| 64 | kg | 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[19] | 🔍 Weight Change 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.

| 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

| * Q2653 | auto-tune control settings [0=stop, 1=start] | 8900, g00 | |
|---|---|---|---|

Set to 1 to start the auto-tune process, or to 0 to stop the process.

### Run an Auto-Tune Process

An auto-tune process will measure the flowrate at speeds of 80% and 20% for a period of time while the flowrate is monitored. If successful, the following control settings are adjusted;

- proportional band
- integral time constant
- speed at zero flowrate
- flowrate at 100% speed
- flowrate disturbance hold
- system time constant
- transport delay

1. Make sure the system is running with material.
2. Press the Q key to access the setup menu.
3. Key in the quick key code 2653 to select the 'auto-tune control settings' step.
4. Press the EDIT key. (If editing is locked, key in the password 111 and press ENTER).

---

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

5.   Press the 1 key followed by ENTER to start the tuning.

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

7.   The tuning progress is displayed on a bar graph.

8.   If the tuning was unsuccessful, an alarm is raised at completion.

# 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 | 20 |
|---|---|---|---|

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

| 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 |

---

[20] Defaults to whatever the current setting is.

| 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.
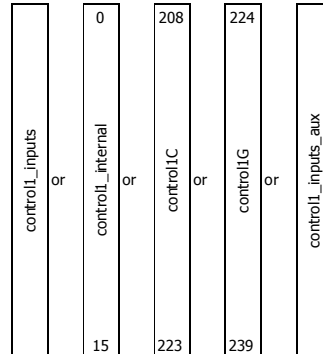
| Q98 | display brightness | 8516 |
|-----|--------------------|------|

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 | | 7 ⇕ | | |
| 8 | hold flowrate | 8 ⇕ | Control1 | |
| 9 | hold control | 9 ⇕ | | |
| 10 | feed disable | 10 ⇕ | | |
| 11 | | 11 ⇕ | | |
| 12 | timer enable | 12 ⇕ | | |
| 13 | | 13 ⇕ | | |
| 14 | user bit 1 | 14 ⇕ | | |
| 15 | user bit 2 | 15 ⇕ | | |

Control1 = control1_inputs (0–15) 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 ⇕ | | |
| 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 ⇕ | Control2 | |
| 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 ⇕ | | |
| 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 ⇕ | Conotrol3 | |
| 40 | print | 8 ⇕ | | |
| 41 | print total | 9 ⇕ | | |
| 42 | print remote | 10 ⇕ | | |
| 43 | print total remote | 11 ⇕ | | |
| 44 | | 12 ⇕ | | |
| 45 | acknowledge alarms | 13 ⇕ | | |
| 46 | | 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 | |
| 49 | | 1 | |
| 50 * | | 2 | |
| 51 | | 3 | |
| 52 | | 4 | |
| 53 * | | 5 | |
| 54 | in volumetric mode | 6 | |
| 55 * | speed demand set | 7 | |
| 56 | run motor | 8 | Status1 |
| 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 | setpoint disturbance | 0 | |
| 65 | holding flowrate | 1 | |
| 66 | holding control | 2 | |
| 67 | minimum setpoint control | 3 | |
| 68 | low flow cutout | 4 | |
| 69 | weight disturbance | 5 | |
| 70 | tune control | 6 | |
| 71 | calibration indicator | 7 | |
| 72 | | 8 | Status2 |
| 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 | |
| 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 | | 8 | Status3 |
| 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 | IN1 | 0 | |
| 97 | IN2 | 1 | |
| 98 | IN3 | 2 | |
| 99 | IN4 | 3 | |
| 100 | IN5 | 4 | |
| 101 | IN6 | 5 | |
| 102 | IN7 | 6 | |
| 103 | IN8 | 7 | |
| 104 | OUT1 | 8 | IOx |
| 105 | OUT2 | 9 | |
| 106 | OUT3 | 10 | |
| 107 | OUT4 | 11 | |
| 108 | OUT5 | 12 | |
| 109 | OUT6 | 13 | |
| 110 | OUT7 | 14 | |
| 111 | OUT8 | 15 | |

(Rows 96–103 labelled "output function")

**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 | | weight fault | 0 |
| 113 | | | 1 |
| 114 | | flowrate fault | 2 |
| 115 | | not filling or discharging | 3 |
| 116 | | low flow fault | 4 |
| 117 | | | 5 |
| 118 | output function | 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)

**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 | | IN1aux | 0 |
| 145 | | IN2aux | 1 |
| 146 | | IN3aux | 2 |
| 147 | | IN4aux | 3 |
| 148 | | IN5aux | 4 |
| 149 | | IN6aux | 5 |
| 150 | output function | 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)

**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 |
| 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 |

(Control4)

# OPERATING DETAILS

**Setpoint & Speed Demand Signals**
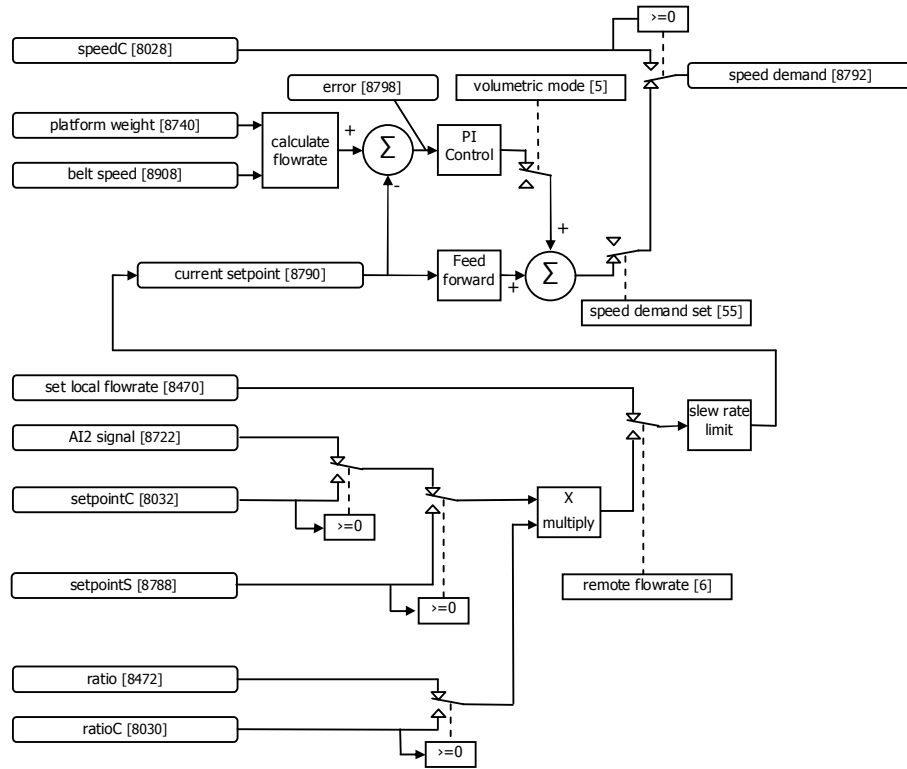


**Modbus Access**

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 52 and the Interface Registers page 43 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.
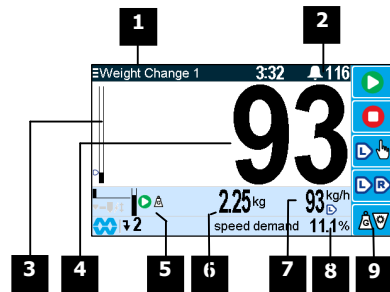


| **1** | Identification of selected unit. Press SELECT (≡) to view and select another unit from list of units connected. |
|---|---|
| **2** | Alarm Symbol flashes when an alarm is present. |
| **3** | Main display bar graph. Shows the flowrate. The indicator shows the position of the setpoint. |
| **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. |
| tune | An auto-tune is in progress. The bar graph shows the progress. |
| | Hopper disturbance |
| | Refilling |
| | Flowrate and control being HELD |
| ‖ | Paused. |
| **1** | Limit 1 active. |
| **2** | Limit 2 active. |
| ⌁ | Setpoint change detected. |
| ↕ | Tuning feed forward active. |
| | Hopper level indicator. |
| ▶ | The system is running. |
| ⬤ | The system is stopped. |
| ⏸ | The system is paused. |
| ⚖ | 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
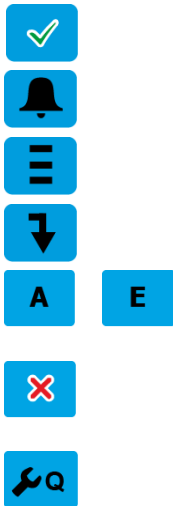
**operator menu**

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.
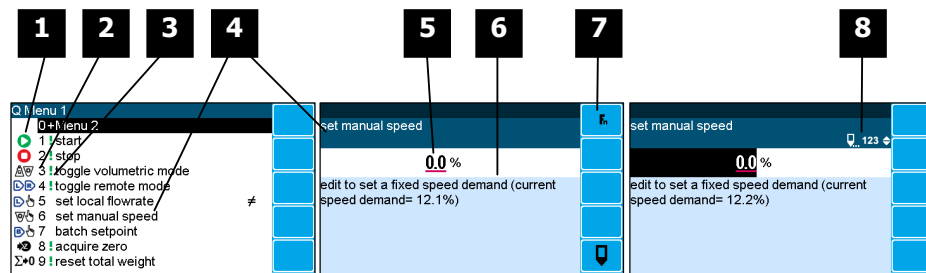


**1**   Soft key icon for this function. See Actions and Settings below for a description of these icons.

**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 zero the weight display.

### 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<br>AI1 > 4mV/V: faulty loadcell or wiring<br>weight too low<br>weight too high<br>no sense voltage: faulty loadcell or wiring |
| 113 | | |
| 114 | flowrate fault | flowrate too high |
| 115 | not filling or discharging | material flow may be blocked |
| 116 | low flow fault | flowrate setpoint cannot be achieved |
| 117 | | |
| 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 | auto setup failure | flowrates measured are out of range |
| 182 | | weight not stable or outside zero band |
| 183 | zero limited | signal > 3mV/V |
| 184 | span limited | signal too low to span |
| 185 | | |
| 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 ####<br>excess recursion at address ####<br>bit stack error at address #### |
| 200 | controller alarm | STORAGE error: unit requires servicing<br>COP error: unit requires servicing<br>RAM error: cycle power and check alarms<br>controller fault: contact your supplier<br>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 | |