ModWeigh

FEATURES

- **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**
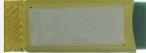
MO3 I/O for MP2

- **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**

Application

The ModWeigh MW64 Batch Weigher Systems are state of the art weighing instruments that can be used with most loadcell based weighing systems.

The batch weigher controls the filling and discharge of product in and out of a weigh hopper.

It can be set up to batch into a weigh hopper and to control the dump or discharge gate. It can also be set up to batch out of a weigh hopper and to control the refilling.

It can control single, two or three speed batching. Pre-acts are adjustable for the bulk, fast and slow output drives for in-flight compensation. Automatic in-flight compensation can be enabled.

A multi-batch option allows for automatic repeated batching to reach a batch weight larger than the hopper capacity.

ModWeigh Display

The ModWeigh Weight Indicator display are separate products which may be used with the ModWeigh family of products for display of weight, setup and calibration. It has a graphics display with easy to use menu selection of settings.
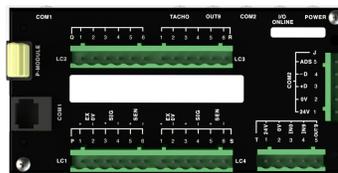

fill gate

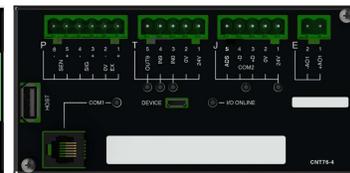loadcells

WEIGH HOPPER

dump gate
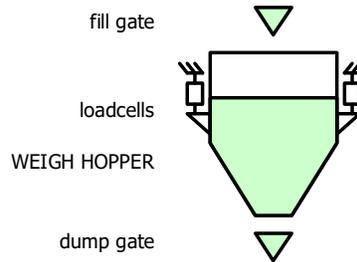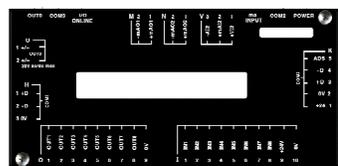
MD1,MP1

MD2,MP2

MT1

MT3

MR1

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.

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.

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.

Event Collection

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

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.

Outputs

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 op-

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

Specifications

Loadcell Input AI1

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

Analog Input AI2

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

Analog Outputs AO1 & AO2

Output range	0 to 20 mA (-0.2 mA to 21 mA, includes standard 4-20mA)
Maximum load	1000Ω
Resolution	0.4 µA
Response time	Loadcell response time setting + 20 ms

	Voltage output	Use an external resistor to convert mA to volts.
		For example 500Ω gives 10 V at 20 mA.
	Non-linearity	‹0.01 %
	Drift	‹2 µA/°C.
	Isolation	independently galvanically isolated to 50Vac
	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 kΩapproximate
	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

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	← 144mm →	
138 x 67 mm	FACIA	80mm top view
-0.0 + 1.0 mm	144 x 72 mm	approx. 400g
72mm		9mm
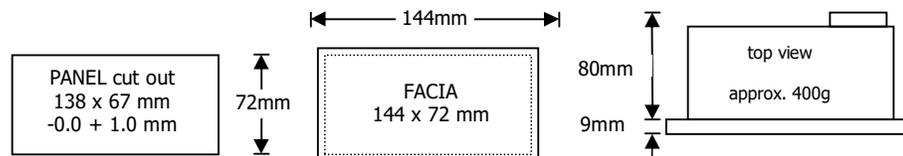
MD1 Display
MP1 Processor

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
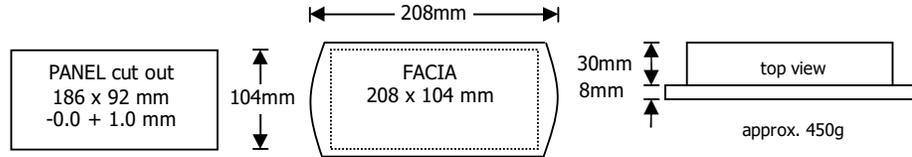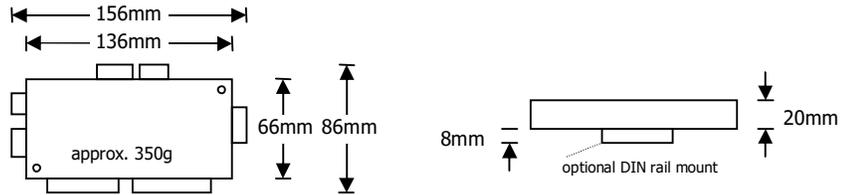
Connections

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

MP2

Power/COM2

24V	A1	
0V	A2	
+D	A3	
−D	A4	
IN0	A5	

POWER SUPPLY
- +24V
- 0V

LOADCELL(s)
optional sense for 6 wire connection

Loadcell

+EX	P1	
−EX/0V	P2	
+SIG	P3	
−SIG	P4	
+SEN	P5	
−SEN	P6	

COM1
RJ12 — RTS / TXD / 0V — 0V / RXD / CTS

MAD to PC/PLC — DB9F

2	TXD
3	RXD
4	DSR
5	SG
6	DTR
7	CTS
8	RTS

MAC

batch drive signal

I/O

+AO1	B1	
−AO1	B2	
+/~ OUT0	B3	
−/~ OUT0	B4	
OUT9	B5	slow drive
IN9	B6	stop
0V	B7	

24V

TOTALISER
- input
- 0V

MAP to Printer — DB25M

2	RXD
3	TXD
4	CTS
6	DSR
7	SG
20	DTR

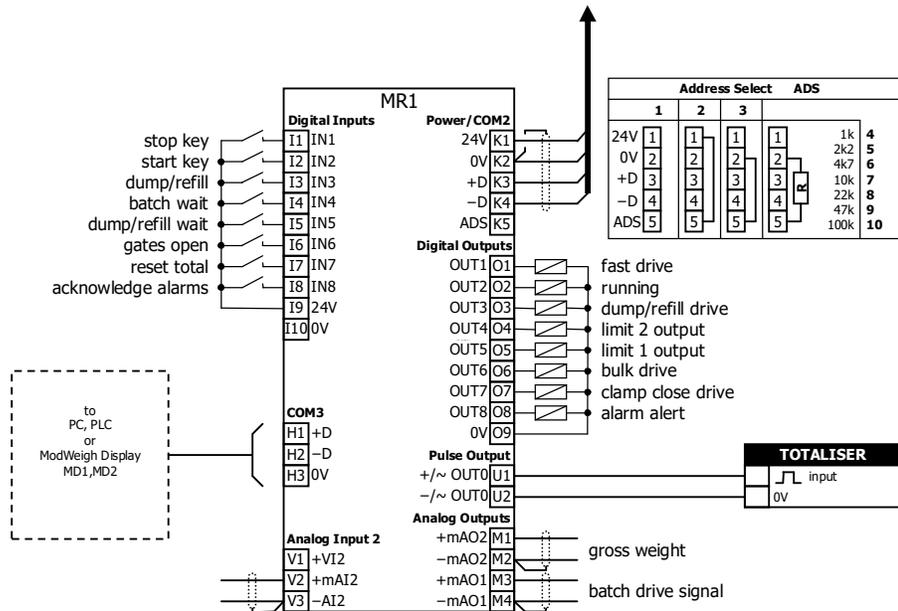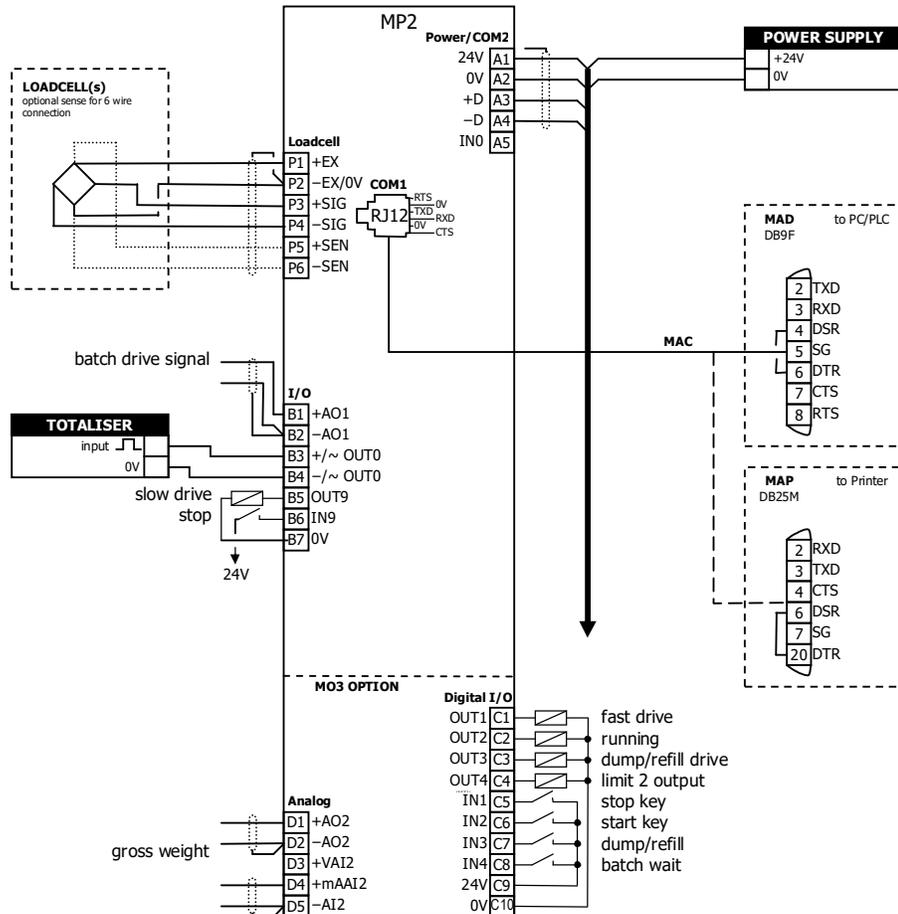**MO3 OPTION**

Digital I/O

OUT1	C1	fast drive
OUT2	C2	running
OUT3	C3	dump/refill drive
OUT4	C4	limit 2 output
IN1	C5	stop key
IN2	C6	start key
IN3	C7	dump/refill
IN4	C8	batch wait
24V	C9	
0V	C10	

Analog

+AO2	D1	
−AO2	D2	gross weight
+VAI2	D3	
+mAAI2	D4	
−AI2	D5	

MR1

Digital Inputs

stop key	I1	IN1
start key	I2	IN2
dump/refill	I3	IN3
batch wait	I4	IN4
dump/refill wait	I5	IN5
gates open	I6	IN6
reset total	I7	IN7
acknowledge alarms	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	1k — 4
0V	2	2	2	2k2 — 5
+D	3	3	3	4k7 — 6
−D	4	4	4	10k — 7
ADS	5	5	5	22k — 8
				47k — 9
				100k — 10

Digital Outputs

OUT1	O1	fast drive
OUT2	O2	running
OUT3	O3	dump/refill drive
OUT4	O4	limit 2 output
OUT5	O5	limit 1 output
OUT6	O6	bulk drive
OUT7	O7	clamp close drive
OUT8	O8	alarm alert
0V	O9	

COM3

+D	H1
−D	H2
0V	H3

to PC, PLC or ModWeigh Display MD1, MD2

Pulse Output

+/~ OUT0	U1
−/~ OUT0	U2

TOTALISER
- input
- 0V

Analog Input 2

+VI2	V1
+mAI2	V2
−AI2	V3

Analog Outputs

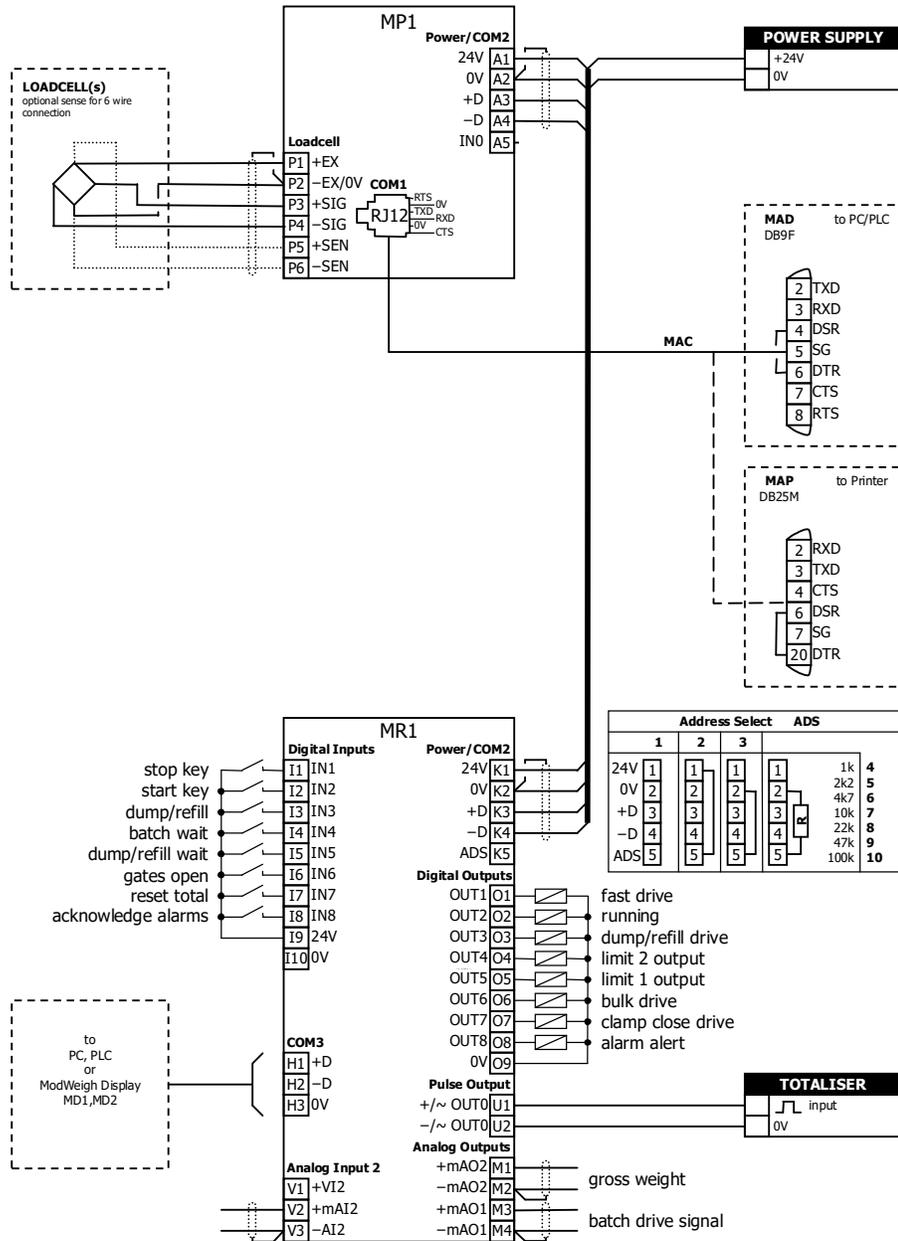|		
+mAO2	M1	
−mAO2	M2	gross weight
+mAO1	M3	
−mAO1	M4	batch drive signal

Connection Diagram – MP1

Keep all wiring separated from mains wiring

Use shielded cable where indicated

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

POWER SUPPLY
- +24V
- 0V

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

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

MAC

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

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

MR1

Digital Inputs
- stop key — I1 IN1
- start key — I2 IN2
- dump/refill — I3 IN3
- batch wait — I4 IN4
- dump/refill wait — I5 IN5
- gates open — I6 IN6
- reset total — I7 IN7
- acknowledge alarms — I8 IN8
- I9 24V
- I10 0V

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

Digital Outputs
- OUT1 O1 — fast drive
- OUT2 O2 — running
- OUT3 O3 — dump/refill drive
- OUT4 O4 — limit 2 output
- OUT5 O5 — limit 1 output
- OUT6 O6 — bulk drive
- OUT7 O7 — clamp close drive
- OUT8 O8 — alarm alert
- 0V O9

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

COM3
- H1 +D
- H2 −D
- H3 0V

to PC, PLC or ModWeigh Display MD1, MD2

Pulse Output
- +/~ OUT0 U1
- −/~ OUT0 U2

TOTALISER
- input
- 0V

Analog Input 2
- V1 +VI2
- V2 +mAI2
- V3 −AI2

Analog Outputs
- +mAO2 M1
- −mAO2 M2 — gross weight
- +mAO1 M3
- −mAO1 M4 — batch drive signal

Connection Diagram – MT1

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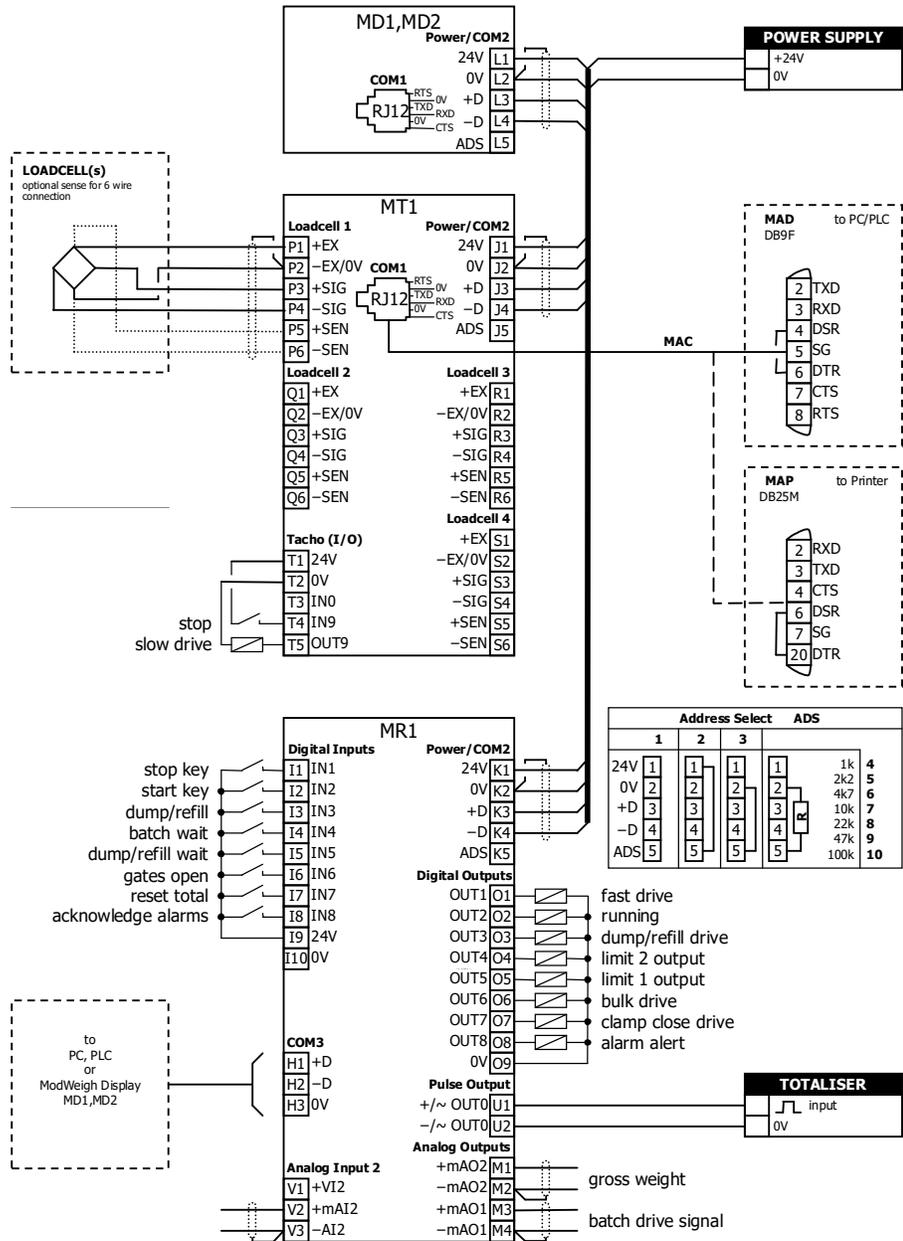
Use shielded cable where indicated.

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

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

MT1 bus address set with ADS pin or a setting.

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

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

Connection Diagram – MT3

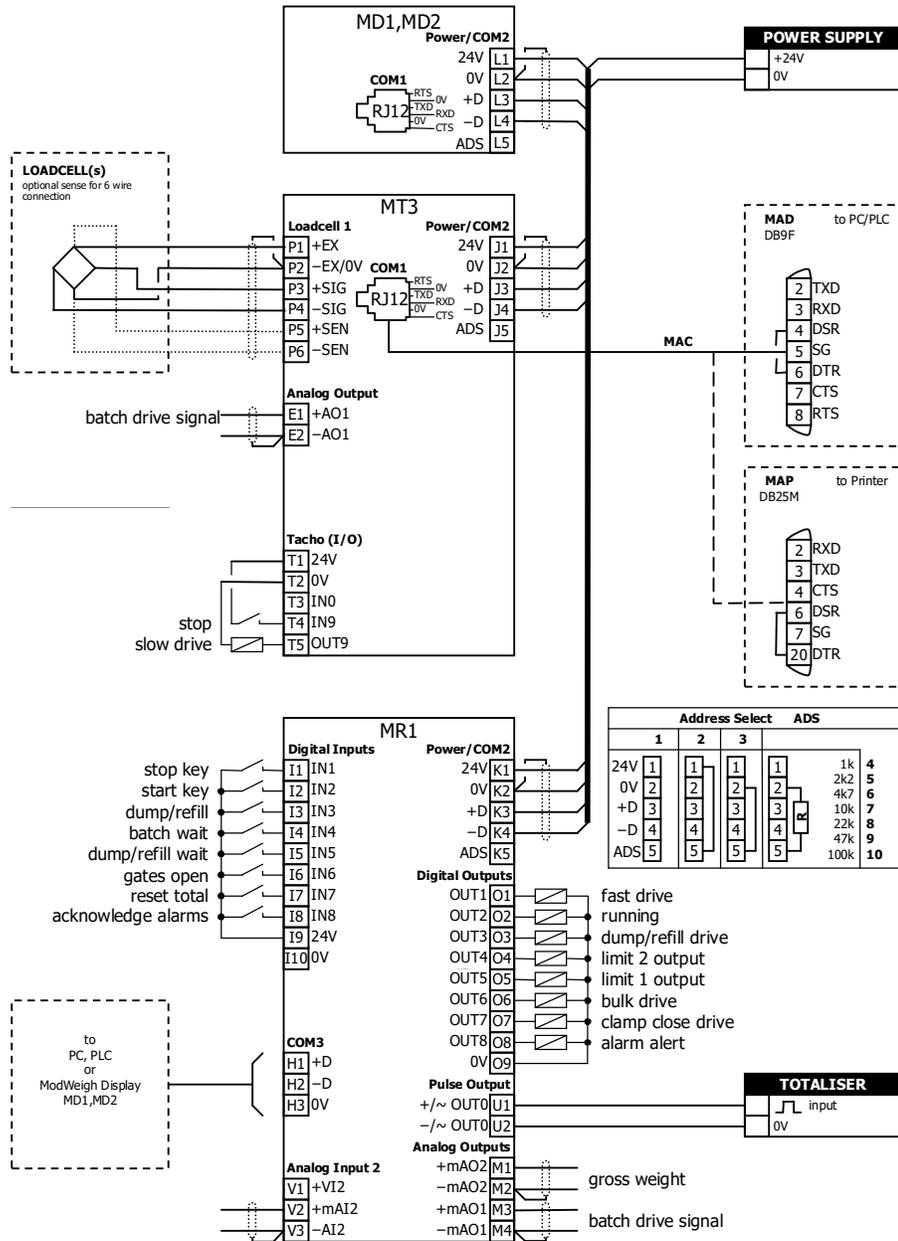Keep all wiring separated from mains wiring.

Use shielded cable where indicated.

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.

MD1,MD2

Power/COM2
24V L1
0V L2
COM1 +D L3
RJ12 RTS/TXD/0V/RXD/0V/CTS −D L4
ADS L5

POWER SUPPLY
+24V
0V

LOADCELL(s) optional sense for 6 wire connection

MT3

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

Power/COM2
24V J1
0V J2
COM1 +D J3
RJ12 RTS/TXD/0V/RXD/0V/CTS −D J4
ADS J5

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

MAC

Analog Output
batch drive signal E1 +AO1
E2 −AO1

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

Tacho (I/O)
T1 24V
T2 0V
T3 IN0
stop T4 IN9
slow drive T5 OUT9

MR1

Digital Inputs
stop key I1 IN1
start key I2 IN2
dump/refill I3 IN3
batch wait I4 IN4
dump/refill wait I5 IN5
gates open I6 IN6
reset total I7 IN7
acknowledge alarms 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 fast drive
OUT2 O2 running
OUT3 O3 dump/refill drive
OUT4 O4 limit 2 output
OUT5 O5 limit 1 output
OUT6 O6 bulk drive
OUT7 O7 clamp close drive
OUT8 O8 alarm alert
0V O9

COM3
to PC, PLC or ModWeigh Display MD1,MD2
H1 +D
H2 −D
H3 0V

Pulse Output
+/~ OUT0 U1
−/~ OUT0 U2

TOTALISER
input
0V

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

Analog Outputs
+mAO2 M1
−mAO2 M2 gross weight
+mAO1 M3
−mAO1 M4 batch drive signal

Applications

Following are typical applications for the instrument.

Batch Out with Manual Refill (Bulk Bag Unloading)

Used to dispense a quantity of material from a bulk bag. The bulk bag feeds into a buffer hopper. The bag and hopper are both supported by loadcells and weighed. The material is dispensed using an auger attached to the buffer hopper with a flexible coupling to give isolation from the weighing system.
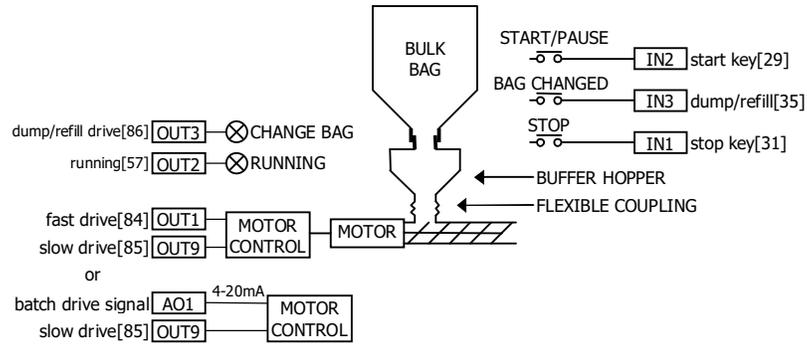
Quick Key	Description	Setting	Details
Q23211	batch setpoint	1300kg	set to desired batch weight
Q23213	slow cutoff	?kg	set to stop motor before setpoint to allow for overrun
Q23214	fast cutoff	?kg	set if using 2 speed filling control, set to weight before setpoint to turn of fast fill
Q23221	batching mode	5	batch out with manual refill
Q23241	low weight	20kg	must replace bag below this weight
Q23242	high weight	100kg	must not replace bag above this weight
Q23251	slow signal	20%	sets slow filling motor speed if using 4-20mA connection
Q23252	fast signal	100%	sets fast filling motor speed if using 4-20mA connection

The operator enters the desired weight to dispense (e.g. 1300kg) and presses START. If the weight is less than 100kg, a bag changes may be requested (the CHANGE BAG indicator will come on). After a bag is replaced, the operator presses BAG CHANGED (or the 'dump/refill' key). The 'fast drive' and 'slow drive' outputs control the auger speed to dispense the material until the requested batch weight has been reached. The motor can optionally be controlled with a 4-20mA speed signal (batch drive signal, AO1) and a run/stop signal (slow drive, OUT9).

System Ordering

A ModWeigh system is a group of ModWeigh parts that together form the system. Many possible systems can be created, but most applications will use one of the systems listed below. When ordering, just specify the system order code. To create a custom system, specify the individual components required.

Batch Weigher	System Order Code
Product Key, Processor, IO	**MK64A,MP2,MO3**
Product Key, Processor, IO	**MK64A,MP1,MR1**
Transmitter, display, IO	**MW64A,MT3,MD1,MR1**
Transmitter, display, IO	**MW64A,MT3,MD2,MR1**
P-Module, transmitter, display, IO	**MW64A,MT1,MD1,MR1**
P-Module, transmitter, display, IO	**MW64A,MT1,MD2,MR1**

Parts Ordering

Following is a list of order codes for the individual parts of a ModWeigh system.

The order code (and options) are shown below.

Product
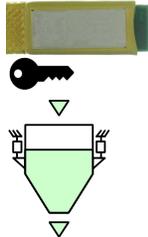
select one of the following	
P-Module (for transmitter only)	**MW64A**
Unactivated P-Module (requires a product key)	**MX64A**
Product Key	**MK64A**

Special Options

select any (or none) of the following	
Chinese manuals	**,CH**
Korean manuals	**,KO**
German manuals	**,DE**
Spanish manuals	**,ES**
French manuals	**,FR**
Italian manuals	**,IT**
Polish manuals	**,PL**
No manuals	**,NM**
Manufacturing certificate	**,MC**

Processor

select one (or none) of the following	
Loadcell processor	**,MP2**
Loadcell processor	**,MP1**
Loadcell transmitter	**,MT3**
Loadcell transmitter	**,MT1**

Transmitter

IO Option

select one (or none) of the following (only for MP2)	
digital IO - 4In 4Out, 1 x 4-20mA input & output	**,MO3**

Display

select one (or none) of the following	
4.3" Colour display	**,MD1**
2.8" Colour display	**,MD2**

Remote IO
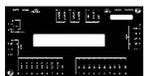
select one (or none) of the following	
Remote IO unit	**,MR1**

Accessories

| select one (or none) of the following	
RJ12 Cable 2m (COM1 cable)	**,MAC**
RJ12 to 9 pin D-connector adaptor (ModWeigh to PC)	**,MAD**
RJ12 to 25 pin D-connector adaptor (ModWeigh to printer)	**,MAP**
DIN Rail mount kit for MT1,MT3 or MR1	**,MAR**
Stack mount kit for MT1,MT3 or MR1	**,MAS**
RS485 Line Terminator	**,MAT**

Other ModWeigh Products

Contact Details

WESTERN AUSTRALIA
- 22 Beneficial Way,
  Wangara, WA 6065
- +61 8 6314 1111
- support@automation-control.com.au
  ABN: 87 619 578 595

NEW SOUTH WALES
- Unit 7, 70 Holbeche Road,
  Arndell Park, NSW 2148
- +61 2 8078 2288
- support@automation-control.com.au
  ABN: 61 645 267 116

AUTOMATION CONTROL ®
ROBOTICS > DRIVES > SYSTEMS
EC 13722

automation-control.com.au
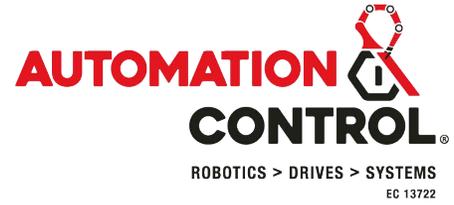
As we are continuously improving our products, changes to this specification may occur without notice.

(Document Details: g0 g1 g2 g3 g4 g5 g6 g7 g8 g9 g10 g11 g12 g13 g14 g15   MT1,MT3,MD1,MD2,MP1,MP2))