



Australian Government

Department of Industry and Science

**National  
Measurement  
Institute**

**Certificate of Approval**

**NMI 6/14B/23**

Issued by the Chief Metrologist under Regulation 60  
of the  
National Measurement Regulations 1999

This is to certify that an approval for use for trade has been granted in respect of the instruments herein described.

Accuweigh Model DW21 Discontinuous Totalising Automatic Weighing Instrument

submitted by      AccuCorp Pty Ltd  
                         12 Kembla Way  
                         WILLETON    WA    6155

**NOTE:** This Certificate relates to the suitability of the pattern of the instrument for use for trade only in respect of its metrological characteristics. This Certificate does not constitute or imply any guarantee of compliance by the manufacturer or any other person with any requirements regarding safety.

This approval has been granted with reference to document NMI R 107, *Discontinuous Totalising Automatic Weighing Instruments (Totalising Hopper Weighers)*, dated July 2004.

This approval becomes subject to review on 1/12/19, and then every 5 years thereafter.

**DOCUMENT HISTORY**

Rev	Reason/Details	Date
0	Pattern and variant 1 provisionally approved – interim certificate issued	14/11/14
1	Pattern amended (markings) – interim certificate issued	18/11/14
2	Pattern & variant 1 approved – certificate issued	14/08/15
3	Pattern amended (markings) – certificate issued	14/09/15

## CONDITIONS OF APPROVAL

### General

Instruments purporting to comply with this approval shall be marked with approval number 'NMI 6/14B/23' and only by persons authorised by the submitter.

Instruments purporting to comply with this approval and currently marked 'NMI P6/14B/23' may be re-marked 'NMI 6/14B/23' but only by persons authorised by the submitter.

It is the submitter's responsibility to ensure that all instruments marked with this approval number are constructed as described in the documentation lodged with the National Measurement Institute (NMI) and with the relevant Certificate of Approval and Technical Schedule. Failure to comply with this Condition may attract penalties under Section 19B of the National Measurement Act and may result in cancellation or withdrawal of the approval, in accordance with document NMI P 106.

Auxiliary devices used with this instrument shall comply with the requirements of General Supplementary Certificate No S1/0B.

The values of the performance criteria (maximum number of scale intervals etc.) applicable to the instrument shall be within the limits specified herein and in any approval documentation for the components where they are approved separately.

This approval shall NOT be used in conjunction with General Certificate No 6B/0

Signed by a person authorised by the Chief Metrologist to exercise their powers under Regulation 60 of the *National Measurement Regulations 1999*.



**Dr A Rawlinson**

TECHNICAL SCHEDULE No 6/14B/23

1. Description of Pattern

provisionally approved on 14/11/14  
approved on 14/08/15

An Accuweigh model DW21 Class 0.2 discontinuous totalising automatic weighing (DTAW) instrument having a weigh hopper of 12 000 kg maximum capacity (Figures 1 and 2).

The instrument is installed in a permanently fixed location.

Note: This approval has been granted with reference to document NMI R 107, *Discontinuous Totalising Automatic Weighing Instruments (Totalising Hopper Weighers)*, dated July 2004. The following description is intended to introduce terms used in this Certificate and Technical Schedule which may be additional to those in that document but which are consistent with the terminology in the document.

The system aims to provide a *bulk load delivery* using a particular automatic *delivery sequence* (the term 'delivery' may also be taken to refer to 'receipt').

This sequence involves the totalisation of the results of a number of *discrete load deliveries* or *weighing cycles*, each of which involves the division of the bulk product into *discrete loads*, according to a *target discrete load* the mass of which is then determined by weighing to give the *discrete load delivered* following which the product is discharged to the bulk output. Note that the *target discrete load* may be achieved by stopping or slowing the bulk product delivery prior to the *target discrete load* value being reached according to *discrete load target shutoff adjustments* (such as inflight adjustments or slow flow pre-sets).

Each *discrete load delivered* is totalised (at any time this may be termed the *cumulative totalisation*).

The *target discrete load* is generally a pre-selected value that is the same for most of the *discrete load deliveries* (this may be termed the *pre-selected target discrete load*). However for the final one or two deliveries in the *bulk load delivery* the *target discrete load* may differ (for example to avoid excessively large or small *discrete loads*). In addition, arrangements for stopping or slowing the bulk product delivery prior to the *target discrete load* value being reached may vary for the final discrete deliveries in the delivery sequence according to *target totalised load shutoff adjustments* (such as inflight adjustments or slow flow pre-sets).

The *totalised bulk load delivered* may be intended to be close to a requested amount (*target totalised load*) in which case adjustments and pre-sets as described above may be used to achieve this as closely as possible.

Alternatively the *totalised bulk load delivered* may be the quantity measured without a particular target totalised load.

The *totalised bulk load delivered* is the cumulative totalisation (sum of all discrete loads delivered), in the complete *bulk load delivery*. The transaction is based on the *totalised bulk load delivered* (not the *target totalised load*).

## 1.1 Details

The model DW21 instrument is a Class 0.2 discontinuous totalising automatic weighing instrument having a weigh hopper with a maximum capacity of 12 000 kg. The indication of the weigh hopper (which is used to determine discrete load values that are totalised and then rounded to the nearest totalisation scale interval to provide the totalised load value) has a scale interval of 2 kg.

The instrument is approved for use with a minimum totalised load ( $\Sigma_{\min}$ ) of not less than 55 000 kg and a totalisation scale interval ( $d_t$ ) of 10 kg. The instrument is set to have a *target discrete load* of from 7150 to 11 100 kg.

The model DW21 instrument permanently records the *totalised bulk load delivered* and the net value of each discrete load delivered. This information can be sent to a printer if required.

Note: The discrete load values are NOT approved for trade use. The totalised bulk load delivered (a total of the discrete load delivered values) is the value approved for trade use.

Note: The hopper weighing instrument is not approved for operation as a non-automatic weighing instrument, however the hopper weighing instrument may be used as a control instrument (for weighing of material test loads in testing of the instrument). Where the hopper weighing instrument is used in this way, for the purposes of determining accuracy of the control instrument the verification scale interval of the hopper weighing instrument may be taken as 10 kg.

## 1.2 Weighing System

The pattern comprises components as described below (see Figure 2 for an overview).

- (\*) For items marked (\*) below, 'Compatible and Equivalent' equipment may be used. 'Compatible and Equivalent' refers to equipment of the same or better specifications, requiring no changes to software for satisfactory operation of the complete system including all checking facilities.
- (a) A weigh bin hopper with out-feed gate, using three PT Limited model PSB10000 load cells of 10 000 kg maximum capacity (the load cells are also described in the documentation of approval NMI S346, and are mounted in accordance with that documentation and as shown in Figure 2). The load cells are located symmetrically around the weigh bin hopper.
- (b) A Systec model IT6000E digital indicator for the weighing system (the digital indicator is also described in the documentation of approval NMI S556).
- (c) A Schneider Electric model Modicon 140CPU65260 (\*) programmable logic controller (PLC) (Figure 4). Special temperature limits of 0°C to 40°C apply (see Note 2 under 1.7 Markings and Notices).
- (d) EKA BULKmetrix (version 5.4.1 software) which runs on the programmable logic controller mentioned in (c) above, and utilises the weight readings from the digital indicator to determine the discrete load values and totalises them, and rounds to the nearest totalisation scale interval, to determine the *totalised bulk load delivered*, and stores the weighing data.
- (e) An operator interface computer by which the operator can control the system, and access the weighing data.

Note: The system may also be controlled and weighing data accessed by other (networked) computers.

- (f) A printer (to print transaction data), or equivalent record in electronic form.
- (g) Actuators and associated position sensors to control the product in-feed and the out-feed gates for the weigh bin.

The system is designed to ensure retention of metrological information in the event of a power failure, including transition to an emergency power supply if necessary for this purpose.

### 1.3 Indicator and PLC Control

The BULKmetrix software running on the PLC, along with weight data from the digital indicator, controls the weighing sequence, including checking of various aspects of the system operation (blocked chutes, gates open or closed as appropriate) and filling of the weigh-bin by starting and stopping of product flow (opening and closing of in-feed and out-feed gates) according to messages from the plant operator's control system.

The BULKmetrix software running on the PLC, uses inputs from the system to determine when no further product delivery is required (e.g. when the in-feed bin is empty, the out-feed bin is full, or sufficient product has been supplied). In some cases these inputs may be provided by the plant operator's control system (e.g. to indicate that sufficient product has been supplied).

Weight data from the digital indicator is continually provided to the BULKmetrix software which uses this information to determine the discrete load values, totalise them to determine the *totalised bulk load delivered*, and store this weight data.

Where sufficient product has been supplied, the BULKmetrix software finalises the delivery and totalises the discrete load deliveries to form the *total bulk load delivered* value.

The weight data, together with information regarding the weighing sequence status, is also provided continually to the operator interface computer(s). The operator interface computer(s) can retrieve weight data for printing if required.

### 1.4 Operation

An overview of the sequence of operation of the system is shown in Figure 5 and a typical operator screen is shown in Figure 6.

The system is considered to be a discontinuous totalising automatic weighing instrument as it follows a predetermined program of automatic processes characteristic of the instrument. The product is weighed by individual discrete loads, which are totalised to determine the bulk product weighed.

- (a) Initially the target discrete load ('batch target') is set in the PLC (generally this will be a fixed value and will not vary between deliveries). The target discrete load may be programmed to different values for different grain types due to the volume of the grain.

The system remains in an idle state until a start signal is received and valid shipping information is set by the operator. When the system receives a start signal from the plant operator an initial check of the system is carried out. (gates are closed, air pressure OK, grain in upper garner, etc.).

- (b) The system will commence filling the weigh hopper via the fast and slow feed gates until the target discrete load value is reached. The status of the Start Signal from the plant operator's control system is also monitored as absence of this signal will indicate that product is not available for measurement, in which case the set-point cannot be reached, and the delivery will be finalised.
- (c) Once the weigh bin is full (or no further product is available) and the feed gates are closed, the system waits for a stable weight signal, and records the gross weight reading for the loaded weigh bin.
- (d) The system checks the status of alarms and inputs and then discharges the product into the lower garner. When the weigh bin is empty, the discharge gates are closed and when the weight reading is stable, the system records the empty ('tare') weight reading for the empty bin.
- (e) The gross weight value for the loaded bin at (c), minus the tare weight value for the empty bin at (d) is the discrete load delivered from the weigh bin. This can then be added to values of previous cycles to provide a cumulative totalised load.
- (f) If the Start Signal is present – indicating that further product is required, and there are no faults or alarms present – the system will repeat the sequence from (b) to (e).
- (g) If the quantity of product required to reach the target totalised load ('shipping target') is less than three times the target discrete load, the system will recalculate the value for each remaining discrete load to avoid attempting to weigh less than the minimum capacity in one cycle. On the final cycle, a small amount of product will be fed into the weigher using the jog function to enable the shipping target totalised load to be reached as closely as possible.
- (h) The gross, tare and net weight for each weighing cycle are permanently recorded along with a running total of the product weighed. Various reports are available to print, e.g. as shown in Figure 7.

## **1.5 Verification Provision**

Provision is made for the application of a verification mark.

## **1.6 Sealing Provision**

The digital indicator shall be sealed as described in the documentation of its approval (see 1.2(b) above). Access to settings within the BULKmetrix software is password protected.

## 1.7 Markings and Notices

- (a) Instruments carry the following markings, grouped together in a clearly visible place on the instrument, either on a descriptive plate fixed near the indicating device or on the indicating device itself:

Manufacturer's mark, or name written in full	Accuweigh Australia Pty Ltd
Indication of accuracy class	0.2
Pattern approval number for the instrument	NMI 6/14B/23
Model number	DW21
Serial number of the instrument	.....
Maximum capacity	$Max = 12\ 000\text{ kg}$ (#)
Minimum capacity	$Min = 7150\text{ kg}$ (#)
Minimum totalised load (not less than)	$\Sigma_{min} = 55\ 500\text{ kg}$ (#)
Totalisation scale interval	$d_t = 10\text{ kg}$
Special temperature limits	0°C to 40°C (PLC) (Note 2:)
Material to be measured	.....

- (#) These markings shall also be shown near the display of the result if they are not already located there.
- (b) Instruments carry a notice visible to the operator stating TARGET DISCRETE LOAD SHALL BE 7150 kg to 11 100 kg ONLY, or similar wording.

Note 1: Markings for variants vary according to particular characteristics.

Note 2: The 0°C limit of the special temperature limits derives from the specified operating temperature range of the programmable logic controller (item 1.2(c) above). Where the programmable logic controller is within an environment controlled to be within the 0°C to 40°C range, the normal operating temperature range of -10°C to 40°C applies to other items of equipment (e.g. load cells).

## 2. Description of Variant 1

**provisionally approved on 14/11/14**  
**approved on 14/08/15**

The pattern as a Class 0.2, 0.5, 1 or 2 discontinuous totalising automatic weighing (DTAW) instrument having a weigh hopper of 12 000 kg maximum capacity and a totalisation scale interval ( $d_t$ ) of 10 kg. The instrument is set to have a *target discrete load* of from 7150 to 11 100 kg, and shall have a minimum totalised load value ( $\Sigma_{min}$ ) of no less than 55 000 kg.

The indication of the weigh hopper (which is used to determine discrete load values that are totalised and then rounded to the nearest totalisation scale interval to provide the totalised load value) has a scale interval of no greater than 2 kg.

### TEST PROCEDURE No 6/14B/23

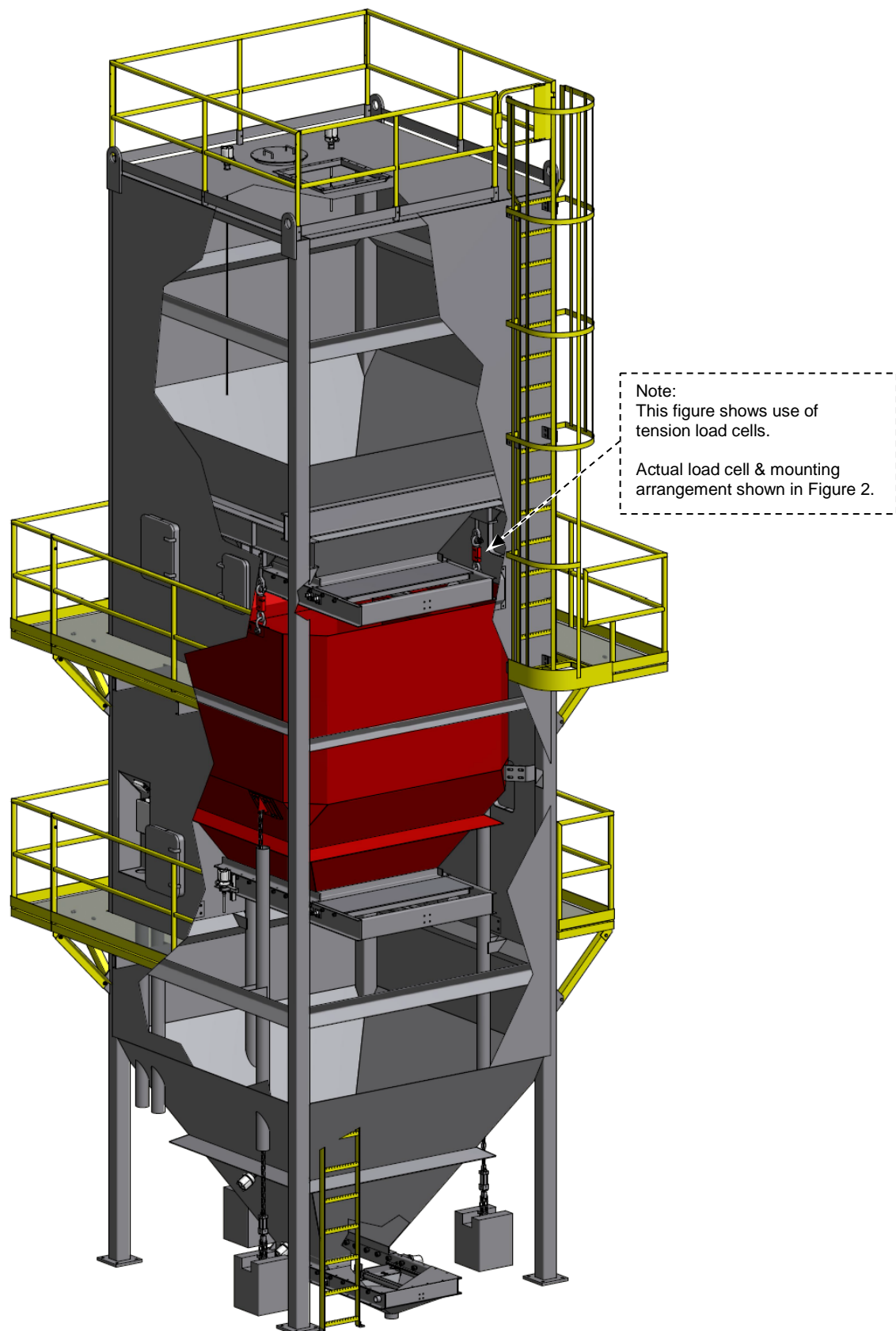
Instruments shall be tested in accordance with any relevant tests for this category of instrument.

Ensure that the programmable logic controller is only being used within the special temperature limits stated elsewhere in this Technical Schedule.

### Maximum Permissible Errors

The maximum permissible errors are specified in Schedule 1 of the *National Trade Measurement Regulations 2009*.

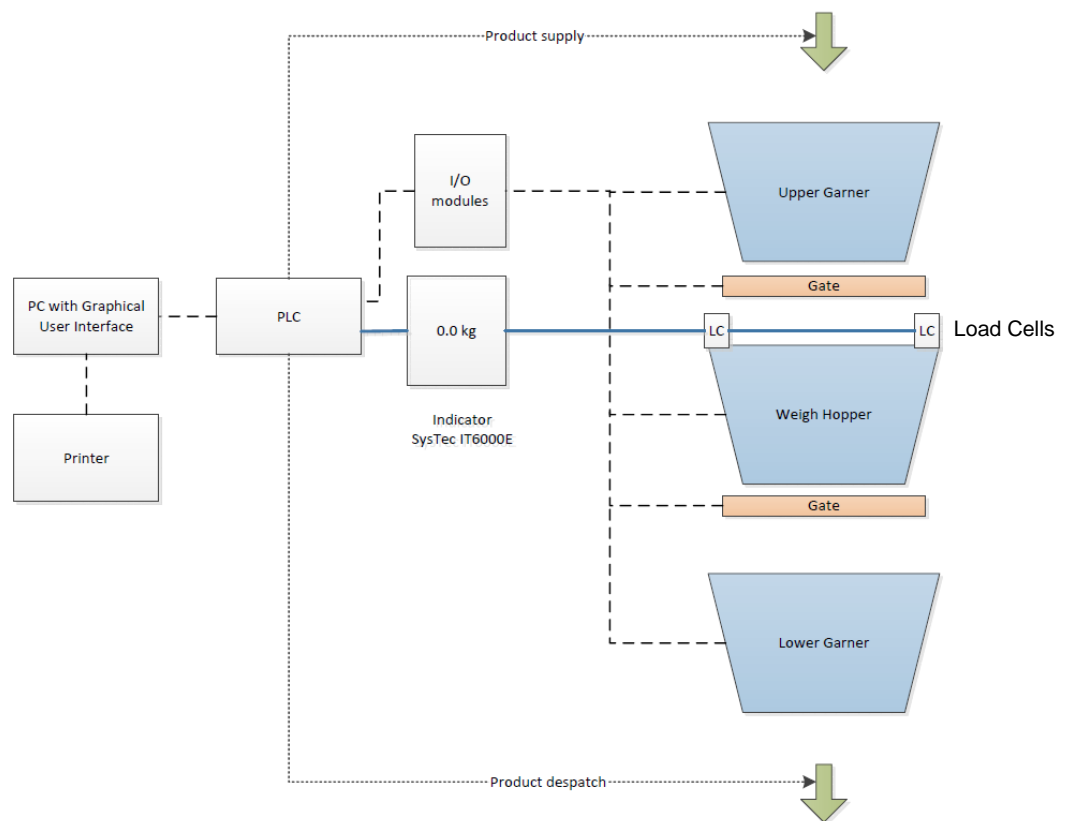
FIGURE 6/14B/23 – 1



Accuweigh Model DW21 Discontinuous Totalising Automatic Weighing Instrument  
(weigh hopper shown in red)

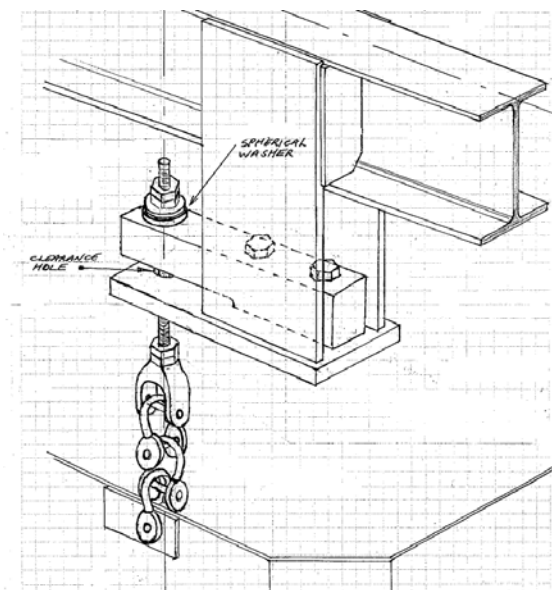


FIGURE 6/14B/23 – 2



Accuweigh Model DW21 Discontinuous Totalising Automatic Weighing Instrument  
System Overview

FIGURE 6/14B/23 – 3



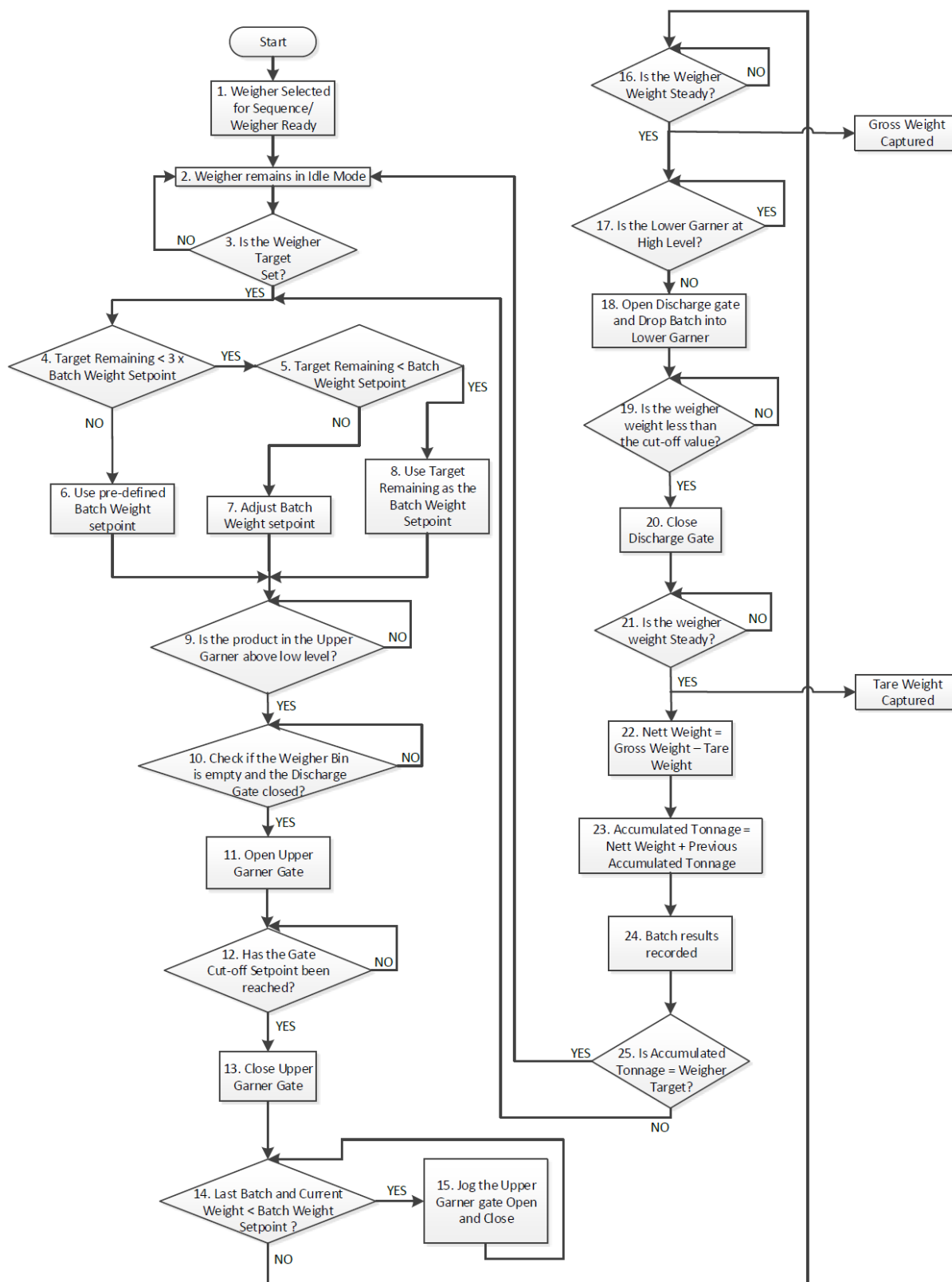
Load Cell Mounting

FIGURE 6/14B/23 – 4



Schneider Electric Modicon Series Programmable Logic Controller  
(similar to model 140CPU65260 of the pattern)

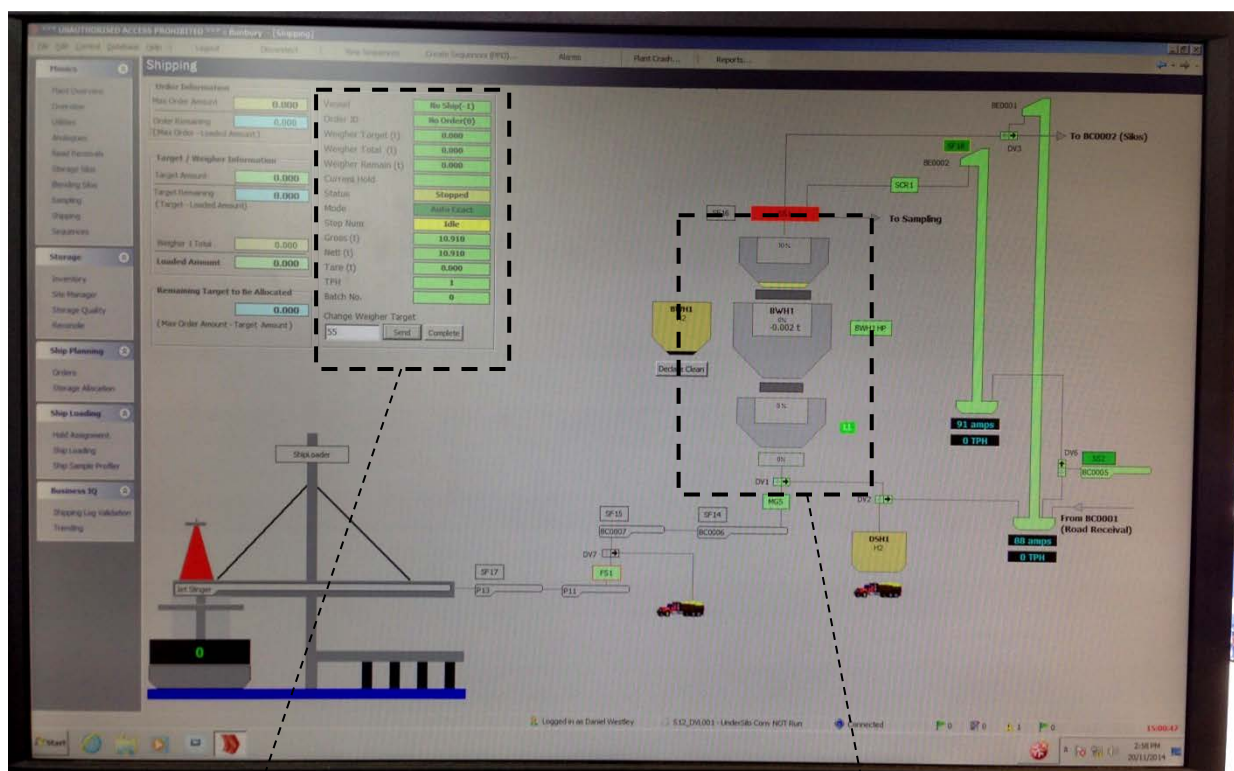
FIGURE 6/14B/23 – 5



Note: Terminology used in this diagram differs from that in the note to **1. Description of Pattern**. 'Batch' is used in the sense of 'Discrete Load Delivery'

### Weighing Sequence Flowchart (Overview)

FIGURE 6/14B/23 – 6



(a) Operator's screen

Vessel	FAT
Order ID	EX2
Weighter Target (t)	1000.000
Weighter Total (t)	527.200
Weighter Remain (t)	472.800
Current Hold	Hold 2A
Status	Running
Mode	Auto Exact
Step Num	Level
Gross (t)	9.050
Nett (t)	0.000
Tare (t)	0.000
TPH	1
Batch No.	59
Change Weigher Target	0
	<input type="button" value="Send"/> <input type="button" value="Complete"/>


(a) Information re weighing in progress




(b) Schematic of weighing operation

Accuweigh Model DW21 Discontinuous Totalising Automatic Weighing Instrument  
(Typical examples - screens may vary between installations)

FIGURE 6/14B/23 – 7





3/07/2015 7:51:38 AM

Weigher Batch Log - Voyage

Voyage ID :

Ship Name :

Actual Amount (t)

18700.01


Seq ID	Date	Weigher	Hold	Batch	Batch Weight (t)	Running Total (t)	Cycle Time (s)
556920	25/05/2015 8:42:43 AM	BWH1	Hold 3A	1	10.530	10.53	81
556920	25/05/2015 8:44:47 AM	BWH1	Hold 3A	2	10.524	21.05	3
556920	25/05/2015 8:46:57 AM	BWH1	Hold 3A	3	10.526	31.58	9
556920	25/05/2015 8:49:07 AM	BWH1	Hold 3A	4	10.532	42.11	9
556920	25/05/2015 8:51:17 AM	BWH1	Hold 3A	5	10.534	52.65	9
556920	25/05/2015 8:53:27 AM	BWH1	Hold 3A	6	10.538	63.18	9
556920	25/05/2015 8:55:34 AM	BWH1	Hold 3A	7	10.534	73.72	6
556920	25/05/2015 8:57:44 AM	BWH1	Hold 3A	8	10.530	84.25	9
556920	25/05/2015 9:03:58 AM	BWH1	Hold 3A	9	10.546	94.79	11
556920	25/05/2015 9:11:22 AM	BWH1	Hold 3A	10	10.432	105.23	81

.... (part of report deleted – following shows report may spread over many pages, and totalisation sequences)

556921	26/05/2015 10:11:52 AM	BWH1	Hold 1A	144	10.780	1551.20	39
556921	26/05/2015 10:12:33 AM	BWH1	Hold 1A	145	10.774	1561.97	41
556921	26/05/2015 10:13:13 AM	BWH1	Hold 1A	146	10.780	1572.75	40
556921	26/05/2015 10:13:53 AM	BWH1	Hold 1A	147	10.788	1583.54	40

Weigher Batch Log - Voyage

17 of 39



3/07/2015 7:51:38 AM

Weigher Batch Log - Voyage

Seq ID	Date	Weigher	Hold	Batch	Batch Weight (t)	Running Total (t)	Cycle Time (s)
556921	26/05/2015 10:14:33 AM	BWH1	Hold 1A	148	10.772	1594.31	40
556921	26/05/2015 10:15:13 AM	BWH1	Hold 1A	149	10.796	1605.11	40
556921	26/05/2015 10:15:54 AM	BWH1	Hold 1A	150	10.802	1615.91	41
556921	26/05/2015 10:16:34 AM	BWH1	Hold 1A	151	10.780	1626.69	40

Note: The report may total results of several weighers, and Holds.

Typical Report Printout

~ End of Document ~