Australian Government
Department of Industry, Science and Resources

National Measurement Institute

36 Bradfield Road, West Lindfield NSW 2070

Certificate of Approval

NMI 6/14B/32

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.

Viterra Model MT-30 Discontinuous Totalising Automatic Weighing Instrument

submitted by Viterra Operations Pty Ltd
186 Greenhill Road
Parkside SA 5063

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 is subject to review at the decision of the Chief Metrologist in accordance with the conditions specified in the document NMI P 106.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern provisionally approved – interim certificate issued	03/10/23
1	Pattern approved – certificate issued	27/05/24

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI 6/14B/32' and only by persons authorised by the submittor.

Instruments purporting to comply with this approval and currently marked 'NMI P6/14B/32' may be re-marked 'NMI 6/14B/32' but only by persons authorised by the submittor.

It is the submittor'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 of Approval 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*.

Darryl Hines
Manager
Policy and Regulatory Services

TECHNICAL SCHEDULE No 6/14B/32

1. Description of Pattern **provisionally approved on 03/10/23**
approved on 27/05/24

A Viterra model MT-30 Class 0.2 discontinuous totalising automatic weighing instrument (DTAWI) having a weigh hopper of 25 000 kg maximum capacity.

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 MT-30 instrument is a Class 0.2 discontinuous totalising automatic weighing instrument having a weigh hopper with a maximum capacity of 25 000 kg.

The instrument is approved for use with a minimum totalised load (Σ_{min}) of not less than 50 000 kg and a totalisation scale interval of 10 kg. The instrument has a minimum capacity of 5000 kg, and is set to have a *target discrete load* from 5000 kg to 24 000 kg.

The MT-30 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.

1.2 Weighing System

The pattern comprises components as described below.

(a) A weigh hopper with out-feed gate, using three (3) Mettler Toledo model SLC820 (POWERCELL PDX) digital load cells of 30 000 kg maximum capacity. The load cells are also described in the documentation of approval NMI S529. The load cells are located symmetrically around the weigh hopper.

(b) A Mettler Toledo model IND780 digital indicator (Figure 3) for the weighing system (the digital indicator is also described in the documentation of approval NMI S502).

(c) A Fuji Electric type NP1L-PL1 (*) programmable logic controller (PLC), with associated networking and input/output modules.

(d) Bulk weigher control software D300WIN version 3635 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 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.

(e) A printer (to print transaction data), or equivalent record in electronic form.

(f) Actuators and associated position sensors to control the product in-feed and the out-feed gates for the weigh hopper. (*)

(*) For items marked (*) above, ‘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.

1.3 Indicator and Weighing Control Arrangements

The Bulk weigher control software D300WIN 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 (level sensors, blocked chutes and 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 control software D300WIN 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 control 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 control software D300Win 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 BULKmetrix Supervisory Control and Data Acquisition (SCADA) version 5.5 (Build 82291) software and the operator interface computer(s). The BULKmetrix SCADA software runs on the Server and interfaces with the software running of the PLC. The operator interface computer(s) can retrieve weight data for printing if required.

The system has provision for a number of additional modes:

Feed through mode

In which the system simply feeds product, the product delivery is not totalised. This mode is not for trade use (no transaction record is generated).

Manual operation

In which the gates of the system may be manually operated, outside the normal operation sequence, the product delivery is not totalised.

Simple weighing mode

In which the weigh hopper operates as a simple (non-automatic) weighing instrument, without any data entry or additional functions (automatic and manual tare facilities, as well as zero setting are available, together with a capability to display the net weight value with expanded resolution. The product delivery is not totalised.

These modes are not approved for trade use.

1.4 Operation

An overview of the sequence of operation of the system is shown in Figure 4 and typical operator screens are shown in Figure 5.

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 delivery sequence has been set and a *target totalised load value* entered.

(b) The system will commence filling the weigh hopper via the feed gate until the target discrete load value is reached. The status of the Start signal from the plant operator's control system (PCS) 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 (determined by receipt of a stable signal from the indicator), 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.

(h) The gross, tare and net weight for each weighing cycle are permanently recorded in the system database along with a running total of the product weighed. Various reports are available to print (a typical example is shown in Figure 6).

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).

1.7 Software

The Bulk Weigher Control System software running on Fuji Electric Model NP1L-PL1 PLC is designated D300WIN version 3635.

The operator interface Plant Control System software is designated version 5.5 (Build 82291).

1.8 Descriptive 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	Viterra
Indication of accuracy class	0.2

Pattern approval mark for the instrument	NMI 6/14B/32
Model number	MT-30
Serial number of the instrument	MT-DTAW-V1
Maximum capacity	*Max* = 25 000 kg (#)
Minimum capacity	*Min* = 5000 kg (#)
Minimum totalised load (not less than)	Σ_{min} = 50 000 kg (#)
Totalisation scale interval	d_t = 10 kg
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 xxxx kg to yyyy kg ONLY, or similar wording (where xxxx and yyyy are in the range of 5000 kg to 24 000 kg).

TEST PROCEDURE No 6/14B/32

Instruments shall be tested in accordance with any relevant tests specified in the National Instrument Test Procedures.

Where a specific National Instrument Test Procedure for DTAWI does not exist, an appropriate test procedure (e.g., Inspectors Handbook Test Procedure No 22) shall be used and a copy of Test Procedure No 22 should be requested from NMI.

Maximum Permissible Errors

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

Application of Inspectors Handbook Test Procedure No 22 Clause 5.2

Weighing Performance Tests

The following test procedure assesses the weighing performance of the DTAWI with the type of material that it is intended to weigh. The performance tests shall be carried out in accordance with *separate verification method* only.

A minimum of 3 material weighing tests is required as specified below.

Maximum Target Discrete Load

This test procedure assesses the weighing performance operating with maximum target discrete loads.

1. Determine the number of weighing cycles required to deliver the minimum totalised load (Σ_{min}) when operating with maximum target discrete loads (Max_T) as follows:

$$N_{Max} = \frac{\Sigma_{min}}{Max_T}$$

where N_{Max} is rounded up to the next integer.

2. Perform a weighing test with a target discrete load of Max_T and a target totalised load of Σ_{min}.
3. If N_{Max} is less than 5, perform an additional material weighing test with a target discrete load of Max_T and a target totalised load of $5 \times Max_T$.

Minimum Target Discrete Load

This test procedure assesses the weighing performance operating with minimum target discrete loads.

1. Determine the number of weighing cycles required to deliver the minimum totalised load when operating with minimum target discrete loads (Min_T) as follows:

$$N_{Min} = \frac{\Sigma_{min}}{Min_T}$$

where N_{Min} is rounded up to the next integer.

2. Perform a weighing test with a target discrete load of Min_T and a target totalised load of Σ_{min}.

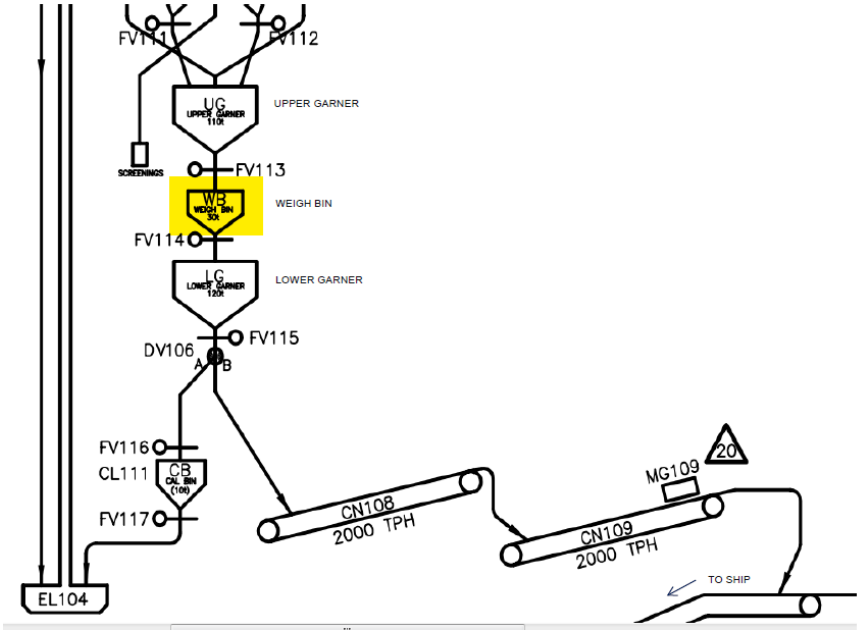
3. If N_{Min} is less than 5, perform an additional weighing test with a target discrete load of Min_T and a target totalised load of $5 \times Min_T$.

Additional Test

In some cases the above procedure may indicate only two tests to be performed. To achieve three material tests in total, perform an additional weighing test with target totalised load of Σ_{min} and a target discrete load value which is standard or typical for the installation. If it is difficult to arrive at a standard value then use Min_T.

Note: For some types of instruments the quantity delivered (target totalised load) must be an integer multiple of the discrete load. In this case unless the minimum totalised load is an integer multiple of the discrete load, it may be necessary to use the next larger possible test load (which is an integer multiple of the discrete load).

FIGURE 6/14B/32 – 1

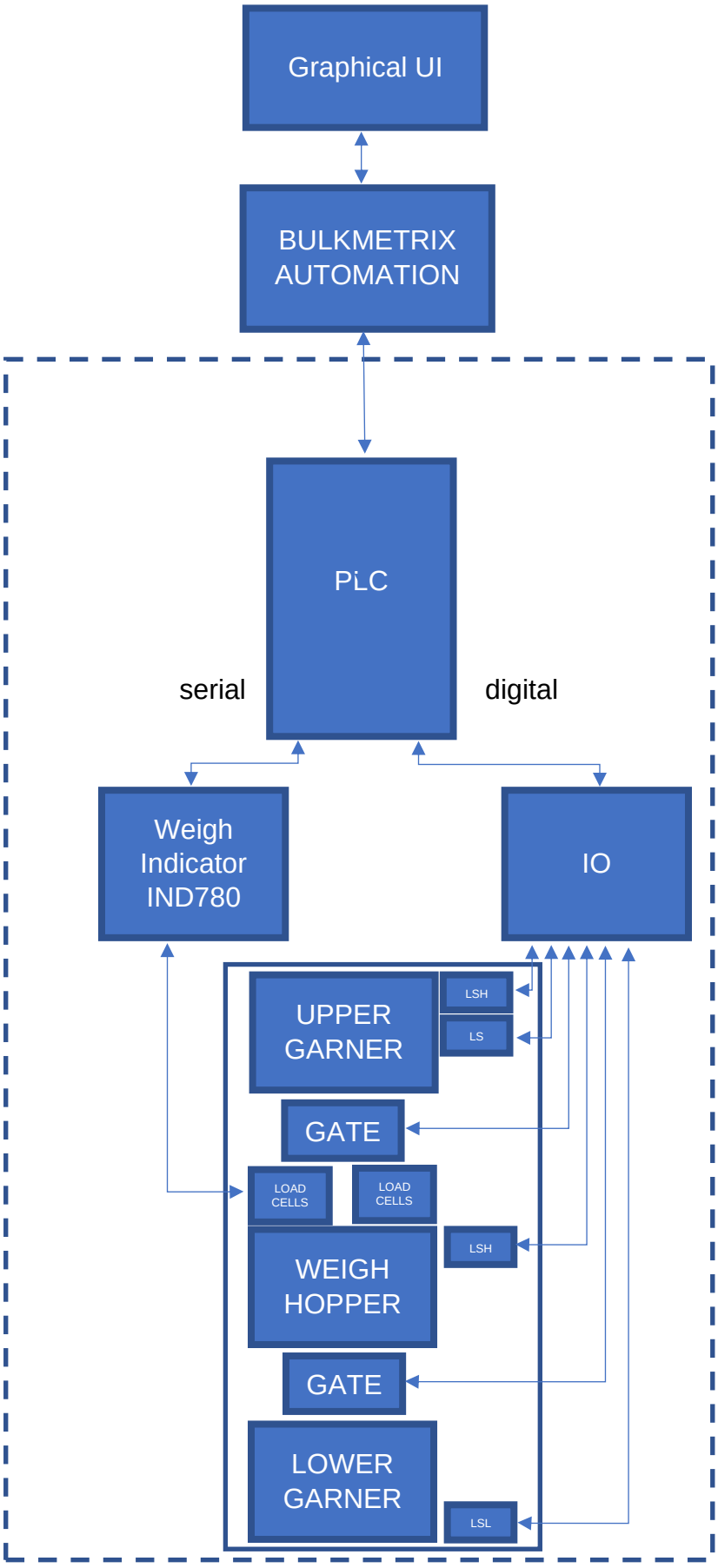


(a) Viterra Model MT-30 (The Pattern)

(b) Load Cell & Load Cell Mounting

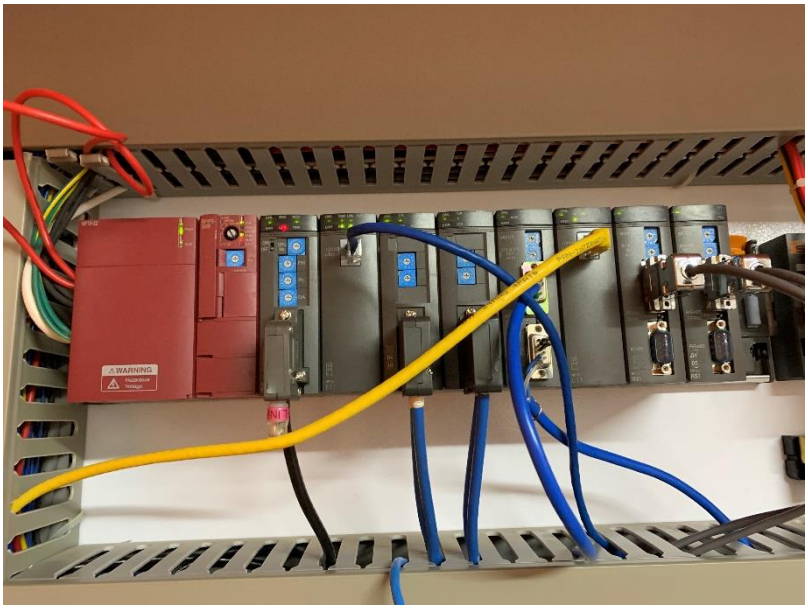
Viterra model MT-30 Discontinuous Totalising Automatic Weighing Instrument

FIGURE 6/14B/32 – 2



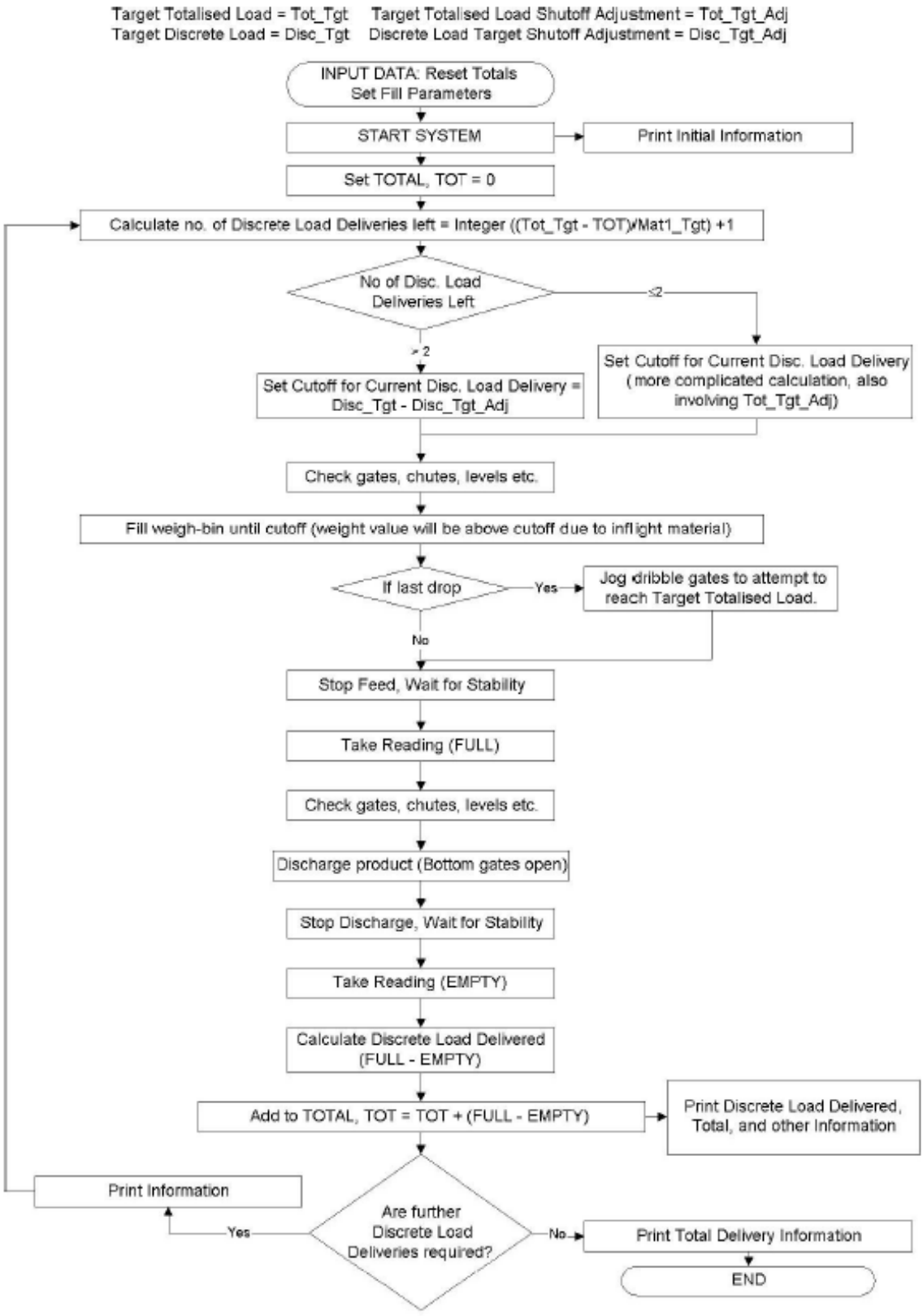
Viterra model MT-30 Weighing Instrument – System Overview

FIGURE 6/14B/32 – 3



Fuji Electric NP1L-PL1 PLC

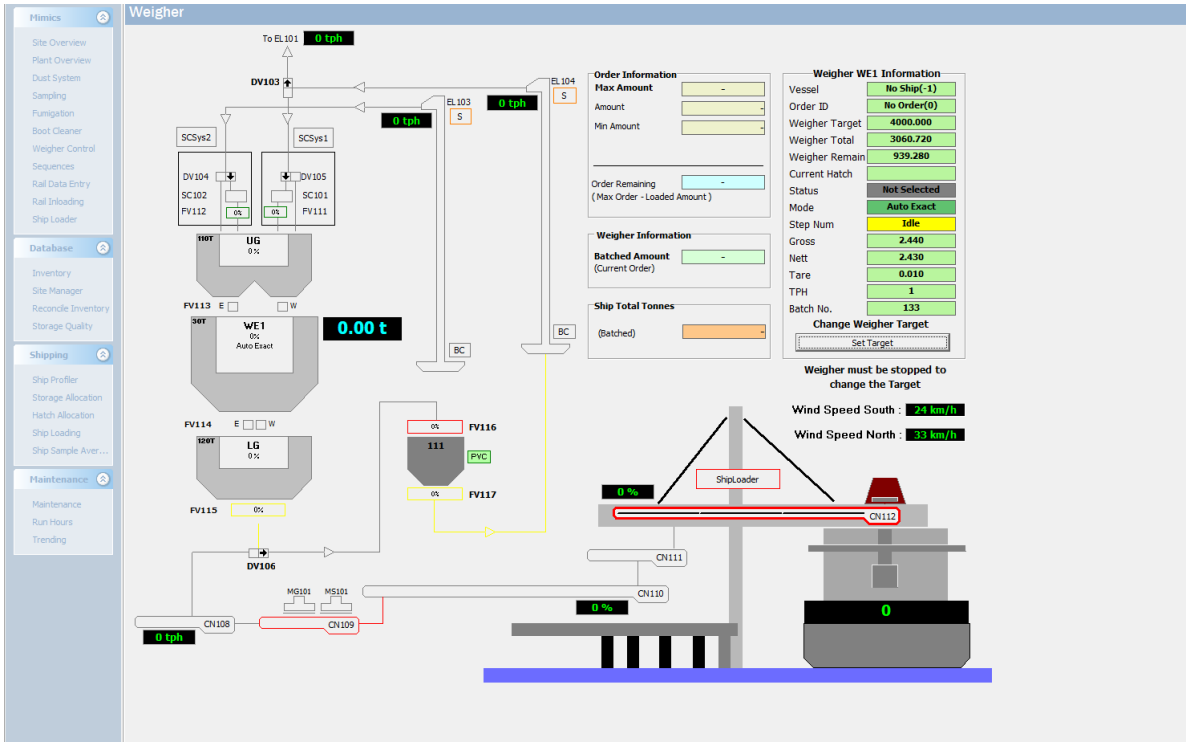
FIGURE 6/14B/32 – 4



Full - Following Empty Method

Weighing Sequence Flowchart (Overview)

FIGURE 6/14B/32 – 5



BULKmetrix Plant Control System Operator Screen (Typical)

FIGURE 6/14B/32 – 6

Viterra Outer Harbor

Batch Log - 02/06/2023

Vessel Name: VASSOS (50000780)
Destination: IRAQ

Authorisation 50000780

Date/Time	Weigher	Batch Number	Gross	Nett	Tare	Accumulated
31/05/2023 1:43:22 PM	WE1	1	23.800	23.750	0.050	23.750
31/05/2023 1:44:49 PM	WE1	2	23.130	23.080	0.050	46.830
31/05/2023 1:46:49 PM	WE1	3	23.150	23.110	0.040	69.940
31/05/2023 1:47:30 PM	WE1	4	23.250	23.230	0.020	93.170
31/05/2023 1:48:13 PM	WE1	5	23.330	23.320	0.010	116.490
31/05/2023 1:48:57 PM	WE1	6	23.110	23.100	0.010	139.590
31/05/2023 1:49:39 PM	WE1	7	23.310	23.290	0.020	162.880
31/05/2023 1:50:26 PM	WE1	8	23.130	23.120	0.010	186.000
31/05/2023 1:51:07 PM	WE1	9	23.260	23.240	0.020	209.240
31/05/2023 1:51:53 PM	WE1	10	23.090	23.060	0.030	232.300
31/05/2023 1:52:36 PM	WE1	11	23.180	23.150	0.030	255.450
31/05/2023 1:53:14 PM	WE1	12	23.270	23.260	0.010	278.710
31/05/2023 1:53:55 PM	WE1	13	23.170	23.150	0.020	301.860
31/05/2023 1:54:35 PM	WE1	14	23.240	23.230	0.010	325.090
31/05/2023 1:55:13 PM	WE1	15	23.220	23.210	0.010	348.300
31/05/2023 1:55:56 PM	WE1	16	23.180	23.160	0.020	371.460
31/05/2023 1:56:35 PM	WE1	17	23.370	23.340	0.030	394.800
31/05/2023 1:57:15 PM	WE1	18	23.170	23.140	0.030	417.940

Note: The cycle time shown in the report represents the time between values being recorded into the system database, due to possible network/computer delays it does not necessarily accurately reflect the time between the ‘gross’ and ‘tare’ readings

Typical Output/Printout

~ End of Document ~