Australian Government
Department of Industry, Innovation and Science

National Measurement Institute

Certificate of Approval

NMI 6/14B/25

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.

Kotzur Model BW 15-4400-I Discontinuous Totalising Automatic Weighing Instrument

submitted by Kotzur Pty Ltd
56 – 60 Commercial Street
Walla Walla NSW 2659

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 1/01/21, and then every 5 years thereafter.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern and variant 1 provisionally approved – interim certificate issued	10/12/14
1	Pattern amended, variants 2 & 3 provisionally approved – interim certificate issued	22/12/15
2	Pattern and variants 1 to 3 amended and approved – certificate issued	10/02/16

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number ‘NMI 6/14B/25’ and only by persons authorised by the submittor.

Instruments purporting to comply with this approval and currently marked ‘NMI P6/14B/25’ may be re-marked ‘NMI 6/14B/25’ 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 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 6/9C/286

1. Description of Pattern **provisionally approved on 10/12/14**
approved on 10/02/16

A Kotzur Model BW 15-4400-I Class 0.2 discontinuous totalising automatic weighing instrument (DTAWI) having a weigh hopper of 12 000 kg maximum capacity (Figures 1(a) 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 BW 15-4400-I 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 5 kg.

Note: In the model designation BW 15-4400-I, the first number (15) indicates a nominal capacity of the weigh hopper in m^3, the second number (4400) indicates the nominal diameter of the weigh hopper in mm, whereas the 'I' indicates the 'integrated' nature of the instrument using the EKA *Site Automation Control (SAC)* [formerly known as BULKmetrix] system for totalisation.

The instrument is approved for use with a minimum totalised load (Σ_{min}) of not less than 18 000 kg and a totalisation scale interval of 5 kg. The instrument is set to have a target discrete load of from 9000 to 11 000 kg.

The BW 15-4400-I 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 5 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.

(a) A weigh hopper with out-feed gate, using three (3) Scaime model CB50X10t C4 CH 10e load cells of 10 000 kg maximum capacity. The load cells are also described in the documentation of approval NMI S547, and are mounted as shown in Figures 1(b) and 1(c). The load cells are located symmetrically around the weigh hopper.

(b) A Systec model IT6000E digital indicator is used (the digital indicator is also described in the documentation of approval NMI S556). The indicator is fitted with associated networking and input/output modules as necessary to control gates of the hoppers, interface with relevant sensors (e.g. upper garner fill level), and communicate with any plant control system, computer, printer etc.

(c) A Schneider Electric model M580 (*) programmable logic controller (PLC) (Figure 3). Special temperature limits of 0°C to 40°C apply (see Note 2 under 1.7 Markings and Notices).

(d) EKA Software Solutions model *Site Automation Control (SAC)* software (version 5.4) [formerly known as BULKmetrix] 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 protected 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 *Site Automation Control (SAC)* 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 *Site Automation Control (SAC)* 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 *Site Automation Control (SAC)* 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 *Site Automation Control (SAC)* 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 4 and a typical operator screen is 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 target totalised load value is entered, a delivery sequence has been set by the plant control PLC and started 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 feed gate 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 (determined by receipt of a stable signal from the indicator for a period of 3 seconds), 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, e.g. as shown in Figure 6.

1.5 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	Kotzur Pty Ltd
Indication of accuracy class	0.2
Pattern approval mark for the instrument	NMI 6/14B/25
Model number	BW 15-4400-I
Serial number of the instrument	.....
Maximum capacity	*Max* = 12 000 kg (#)
Minimum capacity	*Min* = 9 000 kg (#)
Minimum totalised load (not less than)	Σ_{min} = 18 000 kg (#)
Totalisation scale interval	d_t = 5 kg
Special temperature limits	0°C / 40°C
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 9000 kg to 11000 kg).

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).

1.6 Verification Provision

Provision is made for the application of a verification mark.

1.7 Sealing Provision

The digital indicator shall be sealed as described in the documentation of its approval (see 1.2 (b) above).

2. Description of Variant 1 — provisionally approved on 10/12/14, approved on 10/02/16

The Kotzur model BW 15-4400-I instrument of different configurations as a Class 0.2, 0.5, 1 or 2 discontinuous totalising automatic weighing (DTAW) instrument having a weigh hopper with a maximum capacity of up to 15 000 kg maximum capacity, and a totalisation scale interval (d_t) of 5 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 5 kg.

The instrument may be set to have a *target discrete load*, within the range shown below, and have a minimum totalised load value (Σ_{min}) of not less than the value shown below. The minimum capacity shall be equal to the lesser of the Minimum Target Discrete Load, and the Minimum totalised load.

The Kotzur model BW 15-4400-I is similar to the pattern, and uses (3) Scaime model CB50X10t C4 CH 10e load cells of 10000 kg maximum capacity (NMI S547).

Class	Target Discrete Load		Minimum totalised load (not less than)
	Min	Max	
0.2	9 000 kg	12 000 kg	18 000 kg
0.5	2000 kg	12 000 kg	7000 kg
1	1000 kg	12 000 kg	3500 kg
2	500 kg	12 000 kg	1500 kg

Note: Clearly, for a particular instrument the Maximum Target Discrete Load cannot exceed the maximum capacity of the instrument. For practical reasons (to allow for the possibility of a discrete load exceeding the maximum target) the Maximum Target Discrete Load will generally be significantly less than the maximum capacity.

3. Description of Variant 2 — provisionally approved on 22/12/15 approved on 10/02/16

Instruments similar to the pattern, however as a model BW 20-4400-I.

The Kotzur model BW 20-4400-I instrument is a Class 0.2, 0.5, 1 or 2 discontinuous totalising automatic weighing (DTAW) instrument having a weigh hopper with a maximum capacity of up to 18 000 kg maximum capacity, and a totalisation scale interval (d_t) of 5 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 5 kg.

The instrument may be set to have a *target discrete load*, within the range shown below, and have a minimum totalised load value (Σ_{min}) of not less than the value shown below. The minimum capacity shall be equal to the lesser of the Minimum Target Discrete Load, and the Minimum totalised load.

The Kotzur model BW 20-4400-I is similar to the pattern, and uses (3) Scaime model CB50X10t C4 CH 10e load cells of 10000 kg maximum capacity (NMI S547).

Class	Target Discrete Load		Minimum totalised load (not less than)
	Min	Max	
0.2	9 000 kg	15 000 kg	18 000 kg
0.5	2000 kg	15 000 kg	7000 kg
1	1000 kg	15 000 kg	3500 kg
2	500 kg	15 000 kg	1500 kg

Note: Clearly, for a particular instrument the Maximum Target Discrete Load cannot exceed the maximum capacity of the instrument. For practical reasons (to allow for the possibility of a discrete load exceeding the maximum target) the Maximum Target Discrete Load will generally be significantly less than the maximum capacity.

3. Description of Variant 2 provisionally approved on 22/12/15 approved on 10/02/16

Instruments in accordance with the pattern (model BW 15-4400-I) or variant 1 (model BW 20-4400-I), however with the following differences:

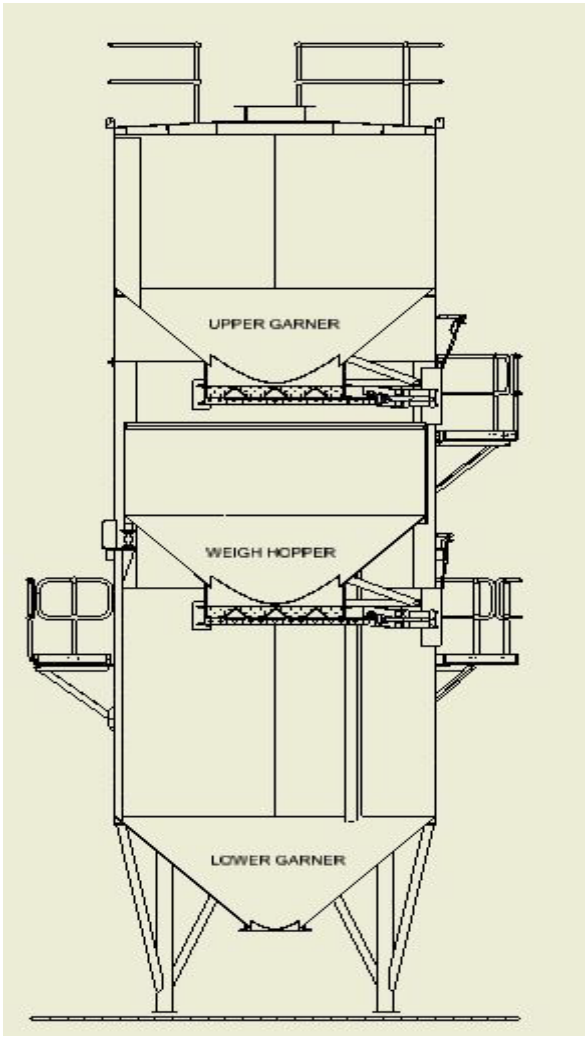
(a) A Mettler Toledo model IND780 digital indicator (also described in the documentation of approval NMI S502) is used instead of the Systec model IT6000E described for the pattern.

(b) A Schneider Electric model Modicon BMEP583040M580 (*) programmable logic controller (PLC) is used rather than that described for the pattern.

TEST PROCEDURE No 6/14B/25

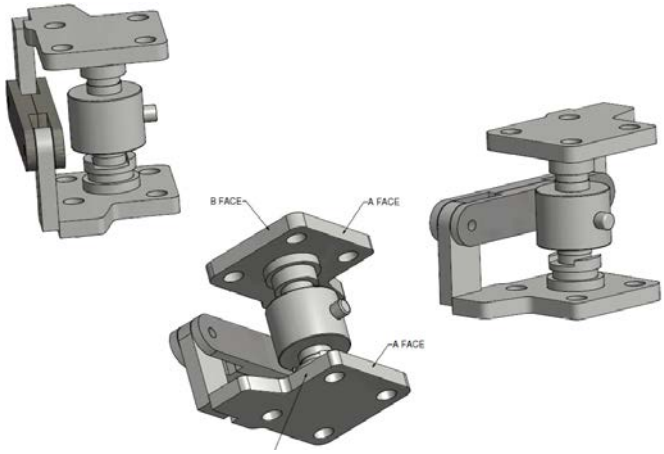
Instruments shall be tested in accordance with any relevant tests for this category of instrument.

FIGURE 6/14B/24 - 1



(a) Kotzur BW 15-4400-I

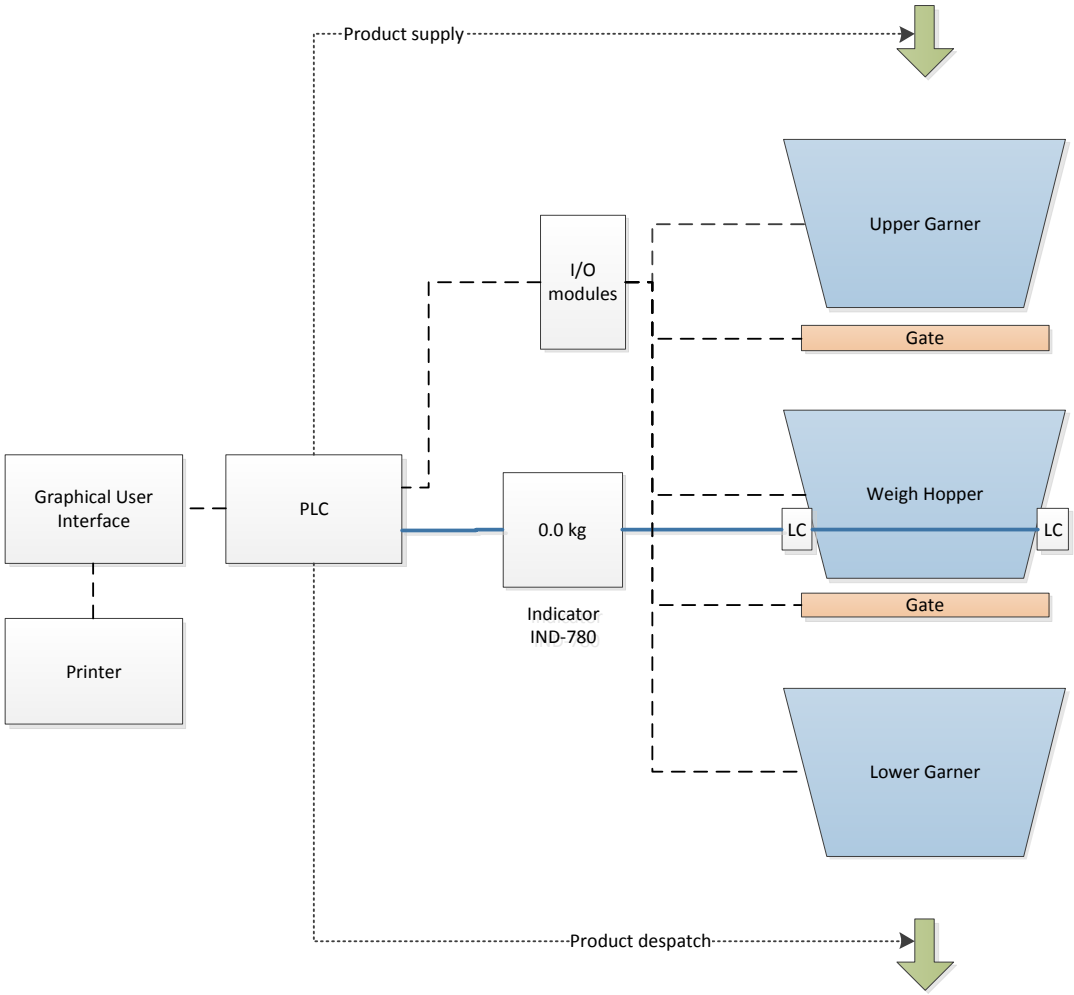
(b) Load cell



(c) Load cell mounting

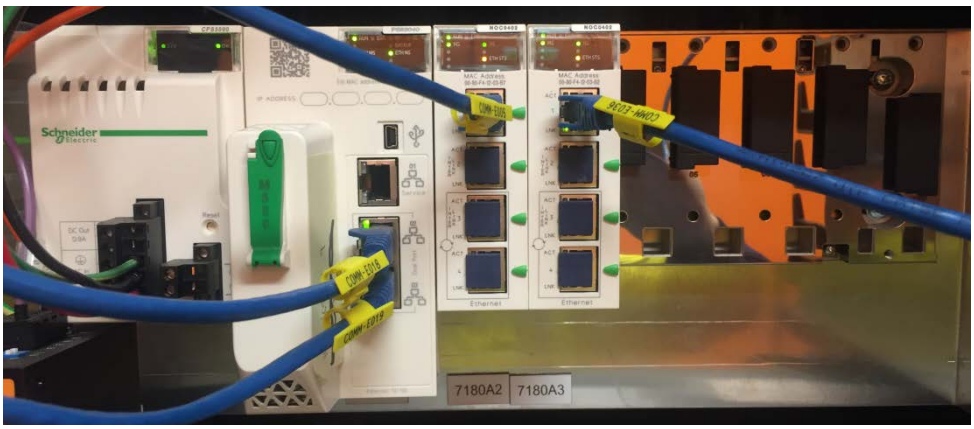
Kotzur Model BW 15-4400-I Discontinuous Totalising Automatic Weighing Instrument

FIGURE 6/14B/24 - 2



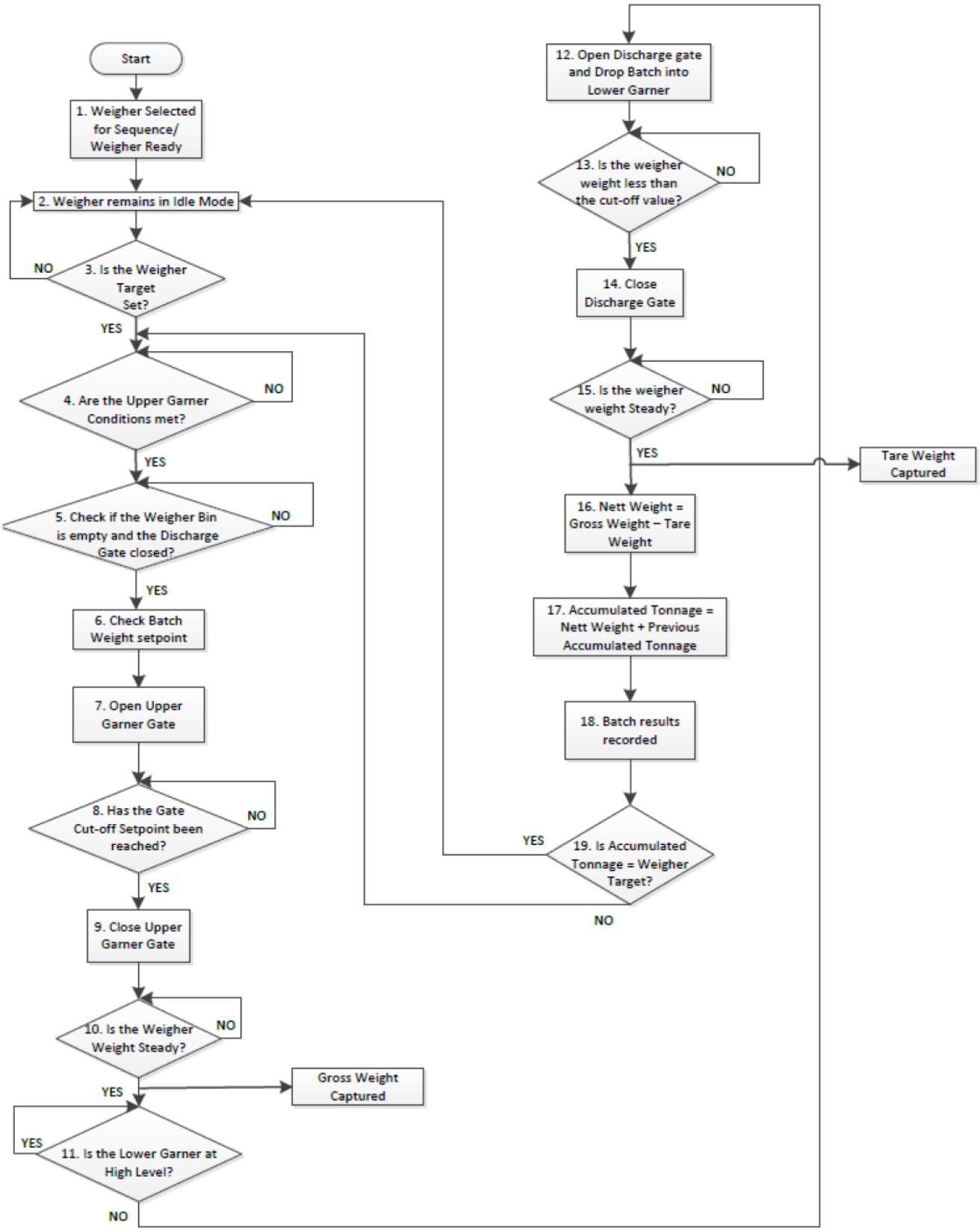
Kotzur Model BW 15-4400-I Weighing Instrument – System Overview - Integrated with Plant Control

FIGURE 6/14B/25 – 3



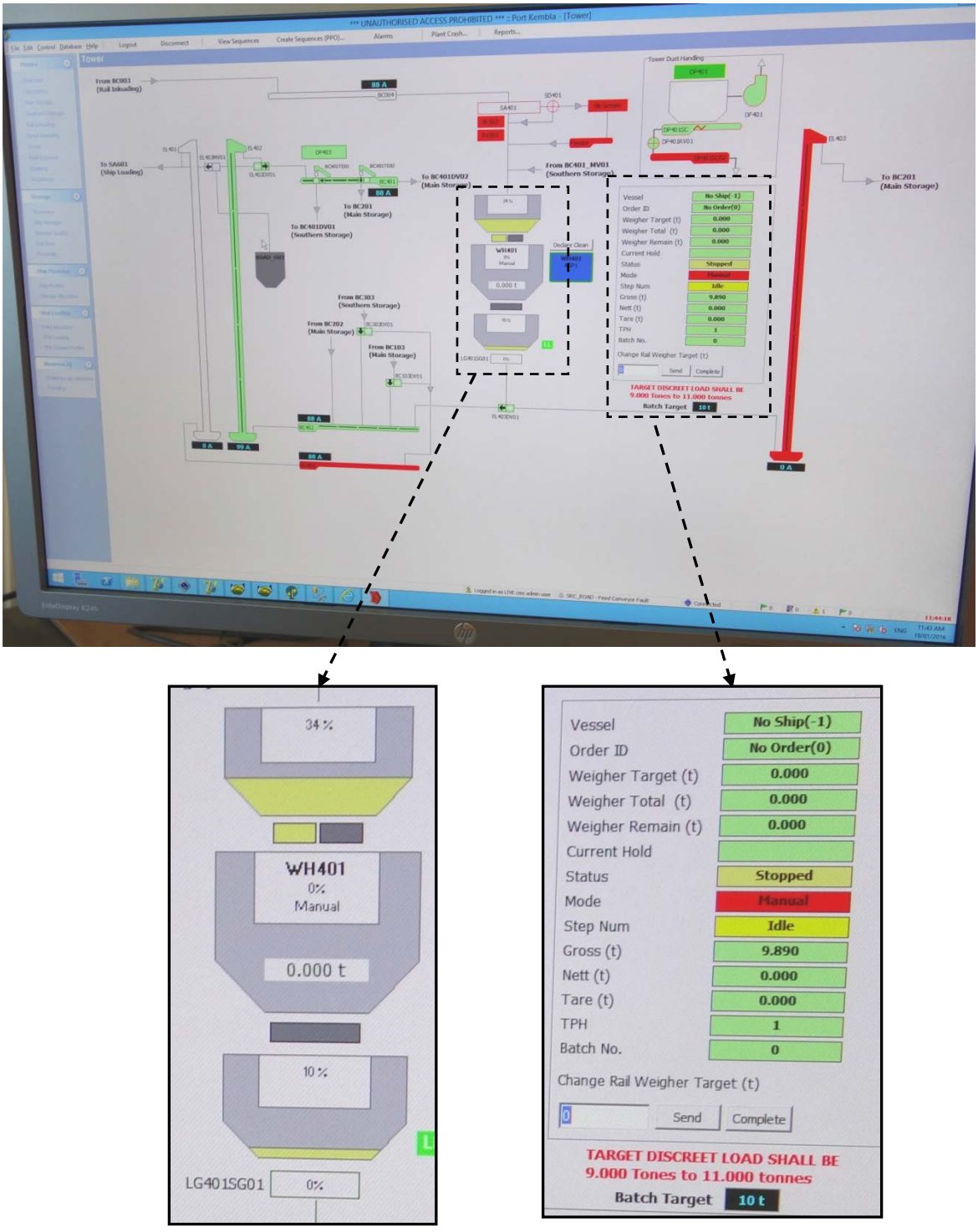
Schneider Electric model M580 Series Programmable Logic Controller (typical configuration)

FIGURE 6/14B/25 - 4



Weighing Sequence Flowchart (Overview)

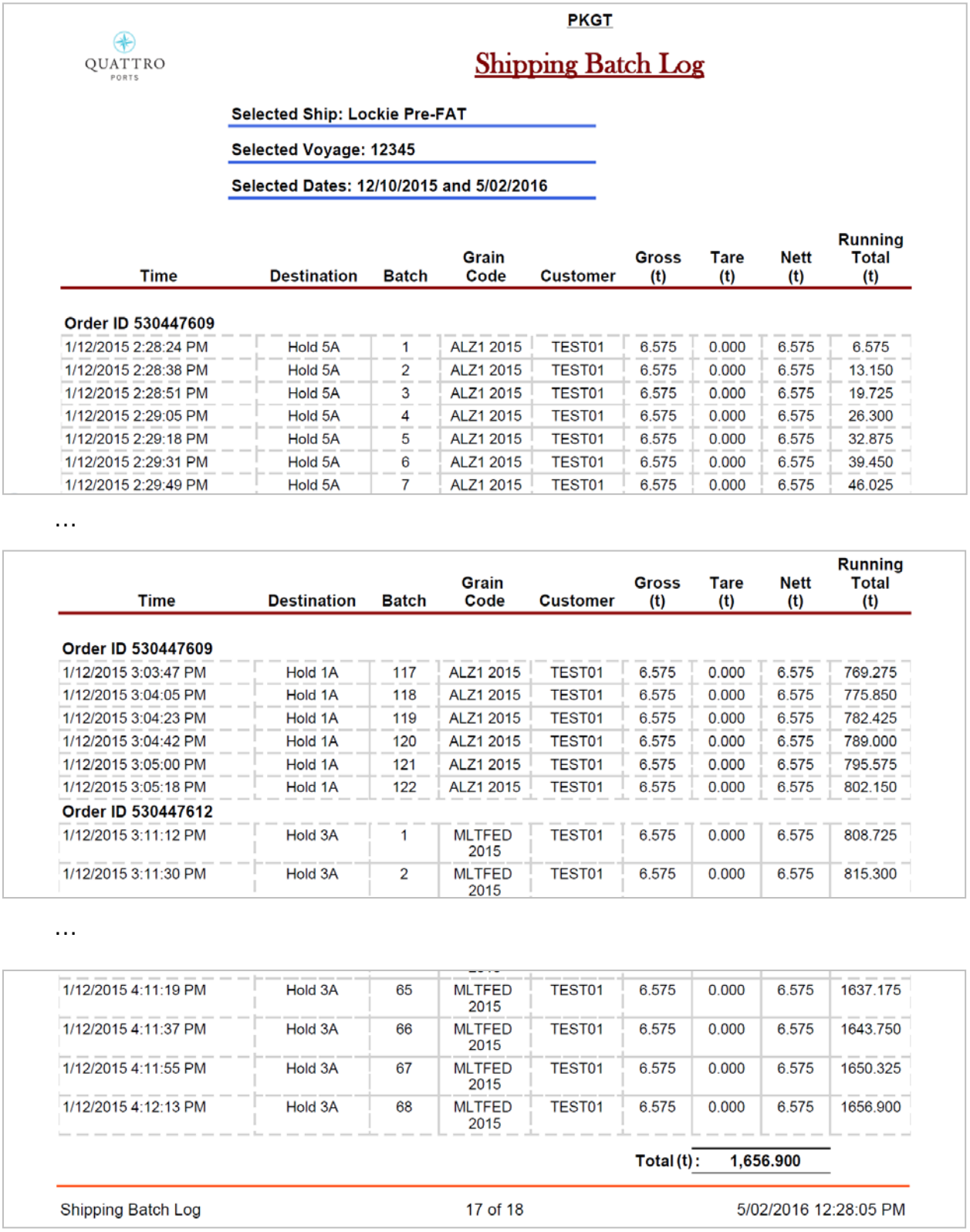
FIGURE 6/14B/25 – 5



(a) Schematic of weighing operation (b) Information of weighing in progress

Kotzur Model BW 15-4400-I System Operator Screens
(Typical examples – screens may vary between installations)

FIGURE 6/14B/25 – 6



PKGT

QUATTRO PORTS

Shipping Batch Log

Selected Ship: Lockie Pre-FAT

Selected Voyage: 12345

Selected Dates: 12/10/2015 and 5/02/2016

Time	Destination	Batch	Grain Code	Customer	Gross (t)	Tare (t)	Nett (t)	Running Total (t)
Order ID 530447609								
1/12/2015 2:28:24 PM	Hold 5A	1	ALZ1 2015	TEST01	6.575	0.000	6.575	6.575
1/12/2015 2:28:38 PM	Hold 5A	2	ALZ1 2015	TEST01	6.575	0.000	6.575	13.150
1/12/2015 2:28:51 PM	Hold 5A	3	ALZ1 2015	TEST01	6.575	0.000	6.575	19.725
1/12/2015 2:29:05 PM	Hold 5A	4	ALZ1 2015	TEST01	6.575	0.000	6.575	26.300
1/12/2015 2:29:18 PM	Hold 5A	5	ALZ1 2015	TEST01	6.575	0.000	6.575	32.875
1/12/2015 2:29:31 PM	Hold 5A	6	ALZ1 2015	TEST01	6.575	0.000	6.575	39.450
1/12/2015 2:29:49 PM	Hold 5A	7	ALZ1 2015	TEST01	6.575	0.000	6.575	46.025

…

Time	Destination	Batch	Grain Code	Customer	Gross (t)	Tare (t)	Nett (t)	Running Total (t)
Order ID 530447609								
1/12/2015 3:03:47 PM	Hold 1A	117	ALZ1 2015	TEST01	6.575	0.000	6.575	769.275
1/12/2015 3:04:05 PM	Hold 1A	118	ALZ1 2015	TEST01	6.575	0.000	6.575	775.850
1/12/2015 3:04:23 PM	Hold 1A	119	ALZ1 2015	TEST01	6.575	0.000	6.575	782.425
1/12/2015 3:04:42 PM	Hold 1A	120	ALZ1 2015	TEST01	6.575	0.000	6.575	789.000
1/12/2015 3:05:00 PM	Hold 1A	121	ALZ1 2015	TEST01	6.575	0.000	6.575	795.575
1/12/2015 3:05:18 PM	Hold 1A	122	ALZ1 2015	TEST01	6.575	0.000	6.575	802.150
Order ID 530447612								
1/12/2015 3:11:12 PM	Hold 3A	1	MLTFED 2015	TEST01	6.575	0.000	6.575	808.725
1/12/2015 3:11:30 PM	Hold 3A	2	MLTFED 2015	TEST01	6.575	0.000	6.575	815.300

…

1/12/2015 4:11:19 PM	Hold 3A	65	MLTFED 2015	TEST01	6.575	0.000	6.575	1637.175
1/12/2015 4:11:37 PM	Hold 3A	66	MLTFED 2015	TEST01	6.575	0.000	6.575	1643.750
1/12/2015 4:11:55 PM	Hold 3A	67	MLTFED 2015	TEST01	6.575	0.000	6.575	1650.325
1/12/2015 4:12:13 PM	Hold 3A	68	MLTFED 2015	TEST01	6.575	0.000	6.575	1656.900
					Total (t):		**1,656.900**	

Shipping Batch Log 17 of 18 5/02/2016 12:28:05 PM

Typical Output/Printout

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