Australian Government
National Measurement Institute
Bradfield Road, West Lindfield NSW 2070

Certificate of Approval

NMI 6/14B/22

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.

Intersystems Model BMW Discontinuous Totalising Automatic Weighing Instrument

submitted by Intersystems, Inc
9575 North 109th Avenue
Omaha Nebraska 68142
USA

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 1/04/18, and then every 5 years thereafter.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern provisionally approved – interim certificate issued	17/04/13
1	Pattern approved – certificate issued	27/03/14
2	Variant 1 approved – certificate issued	18/06/14

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with approval number ‘NMI 6/14B/22’ and only by persons authorised by the submittor.

Instruments purporting to comply with this approval and currently marked ‘NMI P6/14B/22’ may be re-marked ‘NMI 6/14B/22’ 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 6/14B/22

1. Description of Pattern **provisionally approved 17/04/13**
approved on 27/03/14

An Intersystems model BMW Class 0.2 discontinuous totalising automatic weighing (DTAW) instrument (Figure 1) having a weigh hopper of 18 000 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 BMW instrument is a Class 0.2 discontinuous totalising automatic weighing instrument having a weigh hopper with a maximum capacity of 18 000 kg.

The instrument is approved for use with a minimum totalised load (Σ_{min}) of not less than 15 000 kg and a totalisation scale interval of 10 kg. Although the instrument has a minimum capacity of 5000 kg, the instrument is set to have a *target discrete load* of 15 000 kg only.

The BMW 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 (Figure 1) comprises components as described below (Figure 2 provides a general system overview).

Note: 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 bin hopper with out-feed gate (Figure 1a), using four Mettler Toledo model SLS510 load cells of 7500 kg maximum capacity (Figure 1b). The load cells are located symmetrically around the weigh bin hopper.

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

(c) A Schneider Electric model Modicon 140CPU65260 (*) programmable logic controller (PLC – Figure 3), with associated networking and input/output modules.

(e) Matrixgroup BULKmetrix (version 5.4) 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 to determine the *totalised bulk load delivered*, and stores the weighing data.

Note: The software version may have an associated 'Build number'. Build numbers subsequent to Build 73412 are acceptable provided they do not involve metrological changes.

(d) 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. (*)

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 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 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 5 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 (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 approval NMI S502.

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	Intersystems Ltd
Indication of accuracy class	0.2
Pattern approval number for the instrument	NMI 6/14B/22
Model number	BMW
Serial number of the instrument	.....
Maximum capacity	*Max* = 18 000 kg *
Minimum capacity	*Min* = 5000 kg *
Minimum totalised load	Σ_{min} = 15 000 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 15 000 kg ONLY', or similar wording.

2. Variant 1 **approved on 18/06/14**

An Intersystems model BMW Class 0.2 discontinuous totalising automatic weighing (DTAW) instrument, similar to the pattern, however having a weigh hopper of 1500 kg maximum capacity (using three Mettler Toledo model SLS510 load cells of 1000 kg maximum capacity located symmetrically around the weigh bin hopper).

The instrument is approved for use with a minimum totalised load (Σ_{min}) of not less than 500 kg and a totalisation scale interval of 0.5 kg. The instrument is set to have a *target discrete load* of 1200 kg.

The instrument markings are as described in clause **1.7 Markings and Notices** for the pattern with the exception of the **following**:

Maximum capacity	*Max* = **1500** kg	*
Minimum capacity	*Min* = **500** kg	*
Minimum totalised load	Σ_{min} = **500** kg	*
Totalisation scale interval	d_t = **0.5** kg	

(b) Instruments carry a notice visible to the operator stating TARGET DISCRETE LOAD SHALL BE **1200** kg ONLY, or similar wording.

TEST PROCEDURE No 6/14B/22

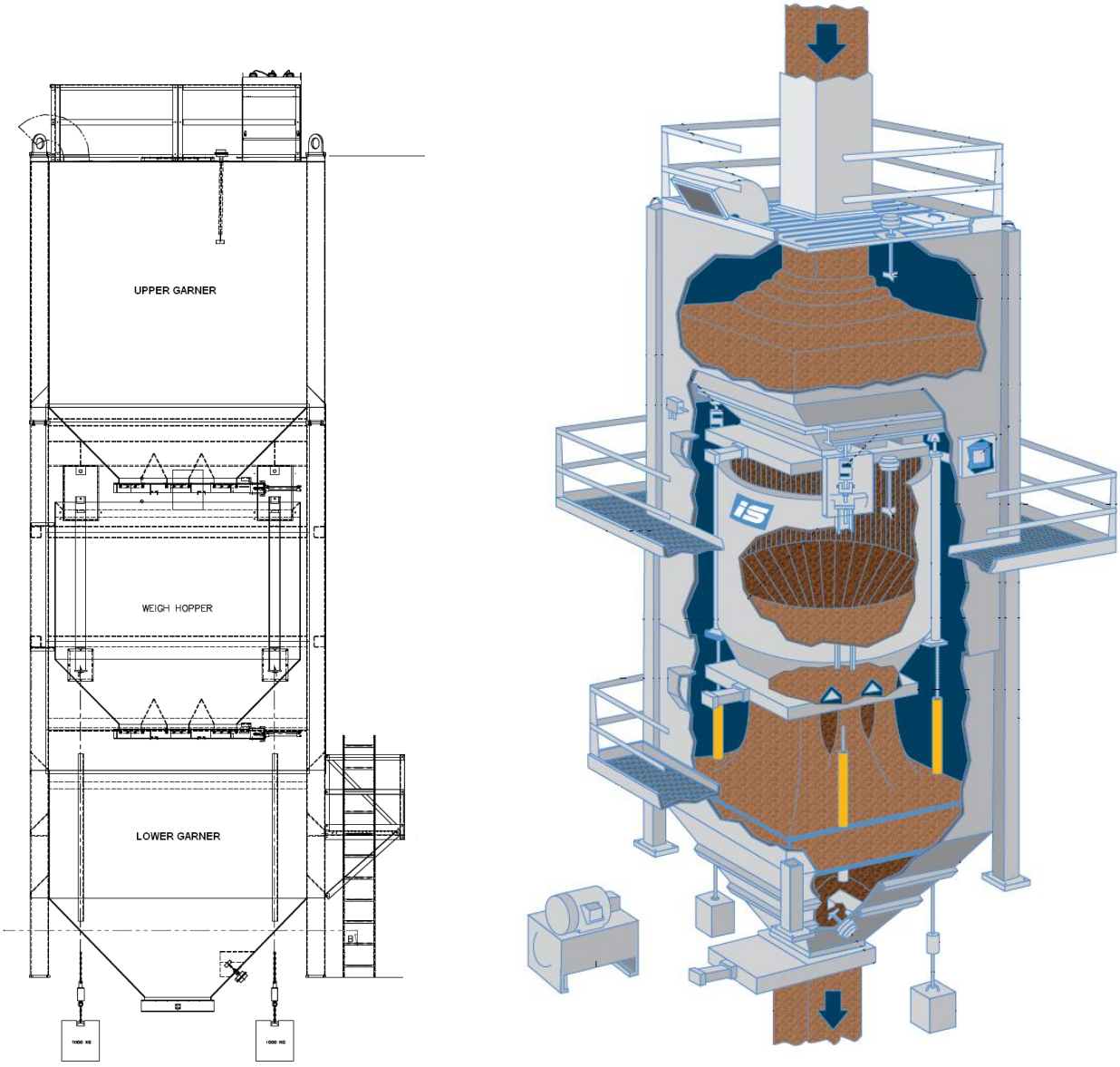
Instruments shall be tested in accordance with any relevant tests specified in the applicable National Instrument Test Procedures for this category of instrument.

Where an applicable National Instrument Test Procedure does not exist, a copy of an appropriate test procedure should be requested from NMI.

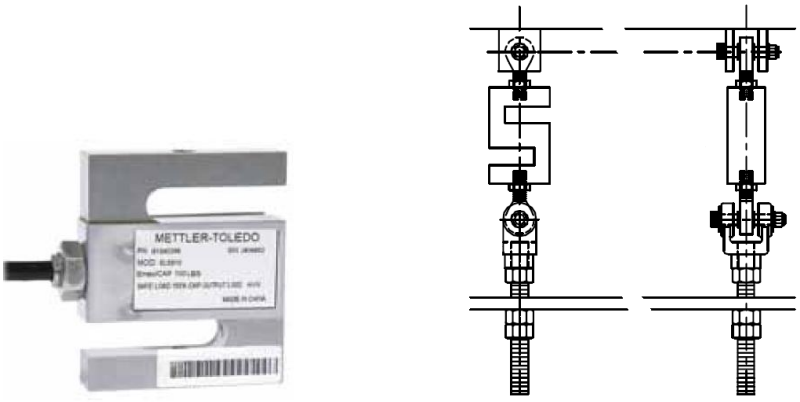
Maximum Permissible Errors

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

FIGURE 6/14B/22 – 1



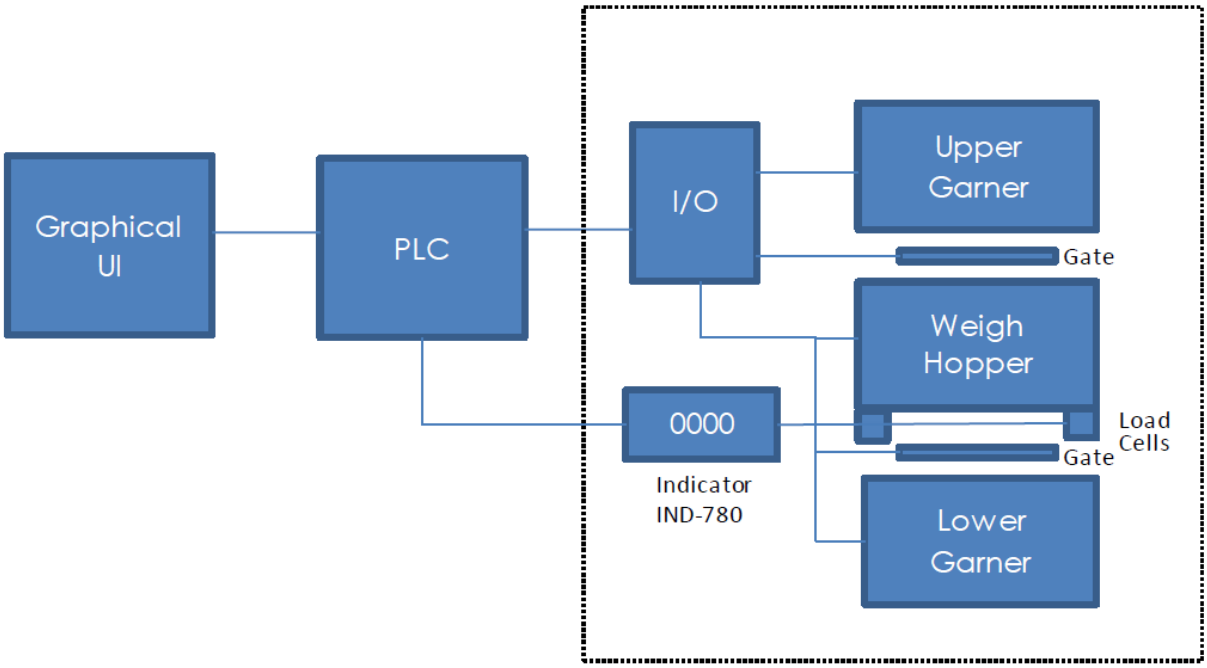
(a) Intersystems BWM



(b) Load Cell & Load Cell Mounting

Intersystems Model BMW Discontinuous Totalising Automatic Weighing Instrument

FIGURE 6/14B/22 – 2

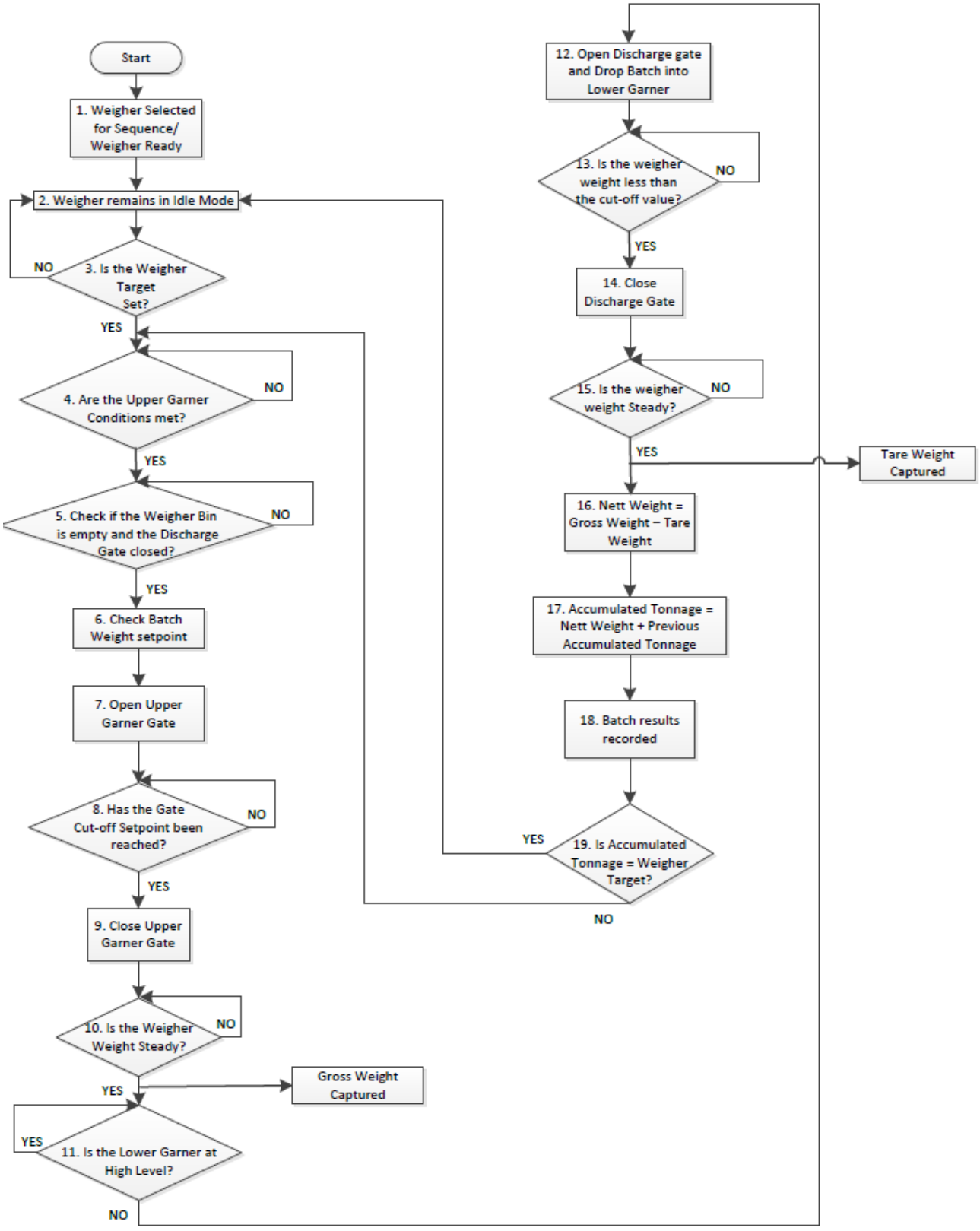


Intersystems Model BMW Weighing Instrument – System Overview

FIGURE 6/14B/22 – 3

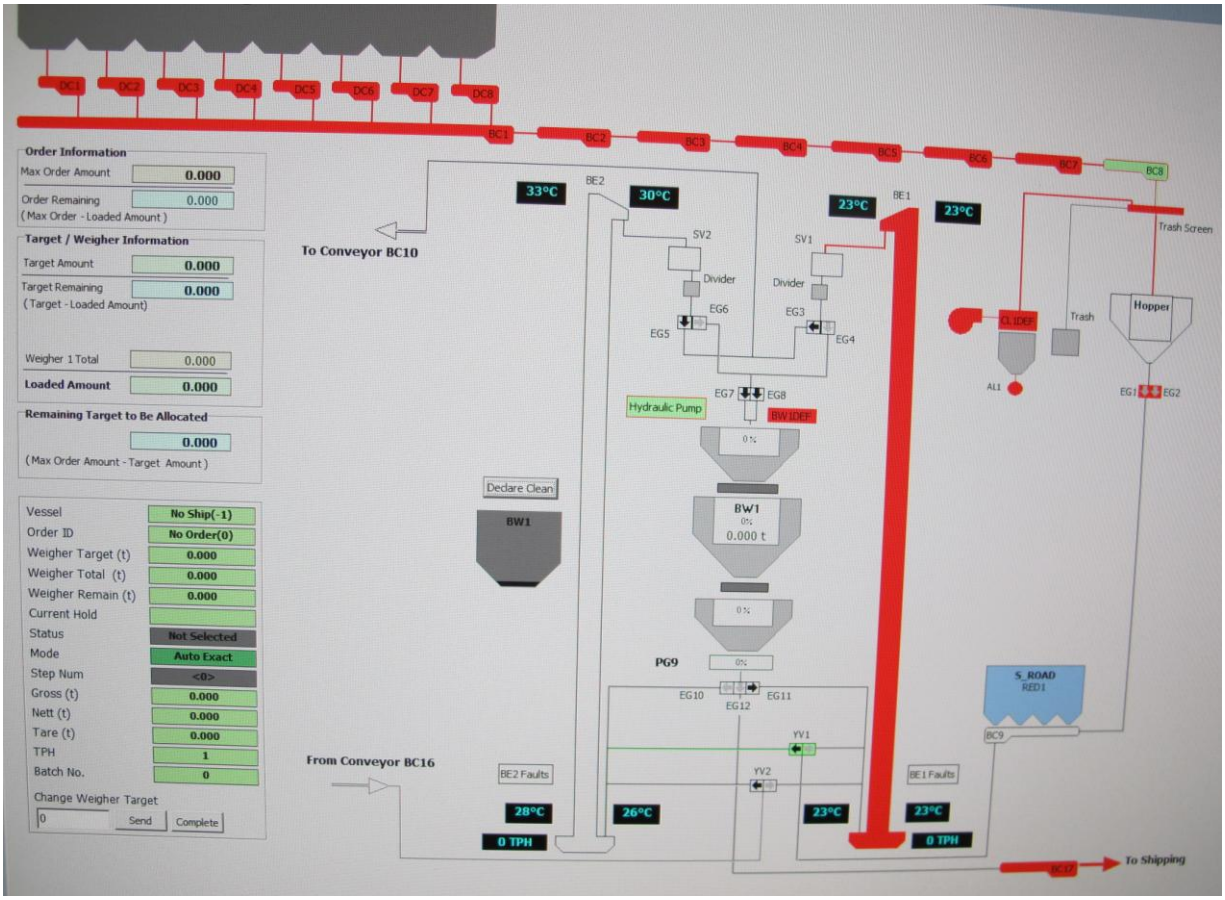
Schneider Electric Model Modicon 140CPU65260 PLC

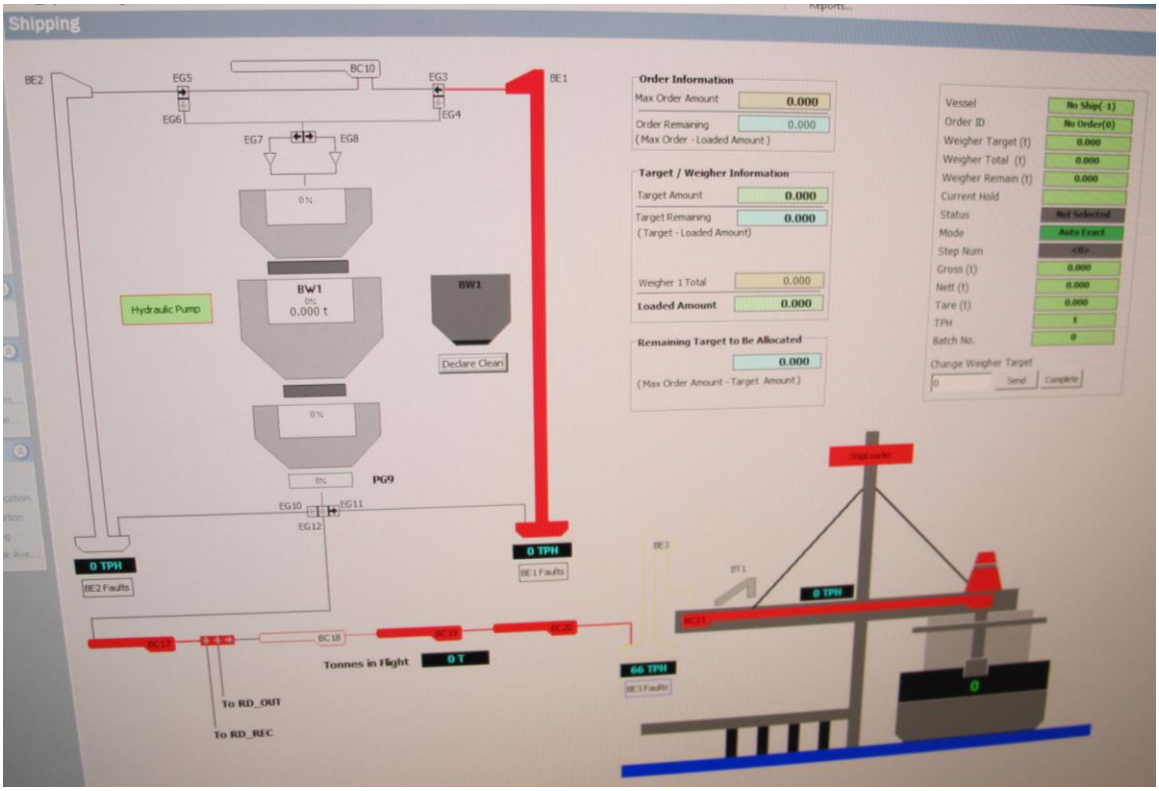
FIGURE 6/14B/22 – 4



Weighing Sequence Flowchart (Overview

FIGURE 6/14B/22 – 5





Intersystems Model BMW System Operator Screens (Typical)

FIGURE 6/14B/22 – 6

E01 Internal Batch Log

Date From: 10/02/2014 12:00:00 AM

Date To: 12/02/2014 12:00:00 AM

DATERECORDED	WEIGHER NAME	DESTINATION STORAGE NAME	BATCH NUMBER	GROSS (t)	NETT (t)	TARE (t)	CYCLE TIME (s)	ACCUM TOTAL (t)
10/02/2014 9:39 AM	BW1	GS5	1	15.83	15.83	0.00	75	15.83
10/02/2014 10:11 AM	BW1	GS5	2	15.92	15.92	0.00	116	31.75
10/02/2014 10:14 AM	BW1	GS5	3	15.24	15.24	0.00	46	46.99
10/02/2014 10:17 AM	BW1	GS5	4	15.14	15.14	0.00	101	62.13
10/02/2014 10:25 AM	BW1	GS5	5	15.22	15.22	0.00	10	77.35
10/02/2014 10:29 AM	BW1	GS5	6	15.13	15.13	0.00	84	92.48
10/02/2014 10:33 AM	BW1	GS5	7	15.30	15.30	0.00	104	107.78
10/02/2014 10:36 AM	BW1	GS5	8	15.13	15.13	0.00	112	122.91
10/02/2014 10:40 AM	BW1	GS5	9	15.37	15.37	0.00	108	138.28
10/02/2014 10:44 AM	BW1	GS5	10	15.37	15.37	0.00	113	153.65
10/02/2014 10:48 AM	BW1	GS5	11	15.30	15.30	0.00	113	168.95
10/02/2014 10:52 AM	BW1	GS5	12	15.28	15.28	0.00	117	184.23
10/02/2014 10:55 AM	BW1	GS5	13	15.33	15.33	0.00	51	199.56
10/02/2014 10:59 AM	BW1	GS5	14	15.34	15.34	0.00	119	214.90
10/02/2014 11:02 AM	BW1	GS5	15	15.24	15.24	0.00	66	230.14
10/02/2014 11:06 AM	BW1	GS5	16	15.17	15.17	0.00	87	245.31
10/02/2014 11:09 AM	BW1	GS5	17	15.18	15.18	0.00	76	260.49
10/02/2014 11:12 AM	BW1	GS5	18	15.19	15.19	0.00	86	275.68
10/02/2014 11:15 AM	BW1	GS5	19	15.13	15.13	0.00	70	290.81
10/02/2014 11:21 AM	BW1	GS5	20	15.33	15.33	0.00	82	306.14
11/02/2014 7:30 PM	BW1	GS5	1	15.28	15.28	0.00	89	15.28
11/02/2014 7:42 PM	BW1	GS5	2	15.24	15.24	0.00	105	30.52
11/02/2014 7:47 PM	BW1	GS5	3	15.12	15.12	0.00	80	45.64
11/02/2014 7:55 PM	BW1	GS5	4	15.21	15.21	0.00	81	60.85
11/02/2014 8:00 PM	BW1	GS5	5	15.01	15.01	0.00	65	75.86
11/02/2014 8:05 PM	BW1	GS5	6	15.22	15.22	0.00	66	91.08
11/02/2014 8:10 PM	BW1	GS5	7	15.19	15.19	0.00	44	106.27
11/02/2014 8:14 PM	BW1	GS5	8	15.33	15.33	0.00	43	121.60
11/02/2014 8:18 PM	BW1	GS5	9	15.24	15.24	0.00	104	136.84
11/02/2014 8:21 PM	BW1	GS5	10	15.11	15.11	0.00	66	151.95
11/02/2014 8:26 PM	BW1	GS5	11	15.25	15.25	0.00	22	167.20
11/02/2014 8:29 PM	BW1	GS5	12	15.12	15.12	0.00	112	182.32

E01 Internal Batch Log 1 of 1 13/02/2014 4:20:21 PM

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 ~