



Australian Government
Department of Industry,
Innovation and Science

National Measurement Institute

Certificate of Approval

NMI 6/9C/290

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.

Marel Model PU 8000 Weighing Instrument

submitted by Marel hf
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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 76, *Non-automatic weighing instruments, Parts 1 and 2*, dated July 2004.

This approval becomes subject to review on **1/05/22**, and then every 5 years thereafter.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern & variants 1 to 4 approved – certificate issued	18/10/06
1	Pattern & variants 1 to 4 reviewed & updated – certificate issued	19/04/17

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI 6/9C/290' and 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 Certificates No S1/0/A or No S1/0B.

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/290

1. Description of Pattern

approved on 18/10/06

A Marel model PU 8000 class  non-automatic multiple range self-indicating weighing instrument (Figure 1) with a verification scale interval (e_1) of 0.2 kg for the low range which has a maximum capacity of 600 kg and with a verification scale interval (e_2) of 0.5 kg for the high range which has a maximum capacity of 1000 kg.

Note: The indicator of the instrument is marked as 'M series 1100'. When power is initially applied to the instrument it indicates C2 – 3.23. The 'C2' indicates that the instrument is a model M1100-C2.

Instruments may be configured so that the weighing range changes automatically with increasing load and when the indication remains at rest at zero. Alternatively, the weighing range may also be changed manually (see instrument users' guide). A light marked 'RANGE MAX2' illuminates whenever the instrument is in the high range.

The display has light emitting diode (LED) displays for weight values, and a separate display for information relating to the additional management functions described below.

The instrument has provision for additional management functions such as the setting of target values and limits (under/accept/over facility with associated bar graph type display), and the grading of items into weight categories, and has memories associated with these functions. These functions are not approved for trade use.

The instrument face has markings for a 'lb' mode – it shall not be possible for this mode to be accessed.

Instruments may be fitted with output sockets (output interfacing capability) for the connection of auxiliary and/or peripheral devices.

Instruments are powered by the mains power supply.

Instruments are NOT FOR TRADING DIRECT WITH THE PUBLIC and are so marked.

1.1 Basework

The basework (known as a model PU8000-1000 kg, Figure 2) has a U-shaped load receptor directly supported by four load cells fitted with self-aligning supporting feet, and is intended primarily for the weighing of pallets.

This model basework has nominal dimensions of 1010 × 1245 mm.

Note: The PU-xxxx series baseworks may be provided with wheels/rollers to facilitate ease of relocation, however levelling feet and a level indicator shall be provided and the instrument must be levelled following relocation. Adjacent to the level indicator is a notice advising that the instrument must be level when in use.

1.2 Levelling

Where instruments are liable to be tilted (i.e. they are not installed in a permanently fixed location) they are provided with adjustable feet and a level indicator.

1.3 Load Cells

Four Tedea Huntleigh model 3510 C3 load cells of 500 kg capacity are used and are mounted as shown in Figure 2.

1.4 Indicator

A Marel model M1100-C2 digital indicator is used. A display check is initiated whenever power is applied.

1.4.1 Zero

Instruments have a zero light which illuminates whenever zero is correct within $\pm 0.25e$ (e of the weighing range in use).

Instruments have a semi-automatic zero-setting device with a nominal range of not more than 4% of the maximum capacity of the instrument (Max_2).

Zero is automatically corrected to within $\pm 0.25e$ (e of the weighing range in use) when the zero button is pressed, whenever power is applied and whenever the instrument comes to rest within $0.5e$ (e of the weighing range in use) of zero.

Instruments also have an initial zero-setting device with a nominal range of not more than 20% of the maximum capacity of the instrument (Max_2).

1.4.2 Tare

Instruments have provision for a semi-automatic tare device of up to maximum capacity.

Instruments also have provision for an automatic tare device (which may or may not be enabled). This operates such that the weight of a container which is within 10% (or 30%) of a previously set initial semi-automatic tare value will be automatically tared.

Any tare value set whilst the instrument is in the lower range will also be active in the higher range. Any tare value set whilst the instrument is in the higher range will be cancelled when the indicator is switched to the lower weighing range.

1.5 Verification Provision

Provision is made for the application of a verification mark.

1.6 Sealing Provision


Provision is made for the instrument to be sealed by the application of one or more mechanical seals (Figure 2).

In addition, the password security restricting access to the SETUP menu must always be enabled. Refer to the Test Procedure.

The case components are joined during manufacture and access to the calibration points requires destruction of the case, therefore no other sealing is required.

1.7 Descriptive Markings and Notices

Instruments carry the following markings:

Manufacturer's mark, or name written in full	
Name or mark of manufacturer's agent	
Indication of accuracy class		
Pattern approval mark for the instrument	NMI 6/9C/290	
Maximum capacity and verification scale interval for Range 1	$Max_1/e_1 \dots \text{kg} / \dots \text{g}$	#1
Maximum capacity and verification scale interval for Range 2	$Max_2/e_2 \dots \text{kg} / \dots \text{g}$	#1
Minimum capacity for Range 1/Range 2	$Min \dots \text{kg}$	#1
Tare capacity (if less than Max)	$T = - \dots \text{kg}$	#2
Serial number of the instrument	

#1 These markings shall also be shown near the display of the result if they are not already located there.

#2 This marking is required if T is not equal to Max .

In addition, instruments shall carry a notice stating NOT FOR TRADING DIRECT WITH THE PUBLIC, or similar wording.

2. Description of Variant 1 approved on 18/10/06

Certain other capacities of multiple range instruments with other parameters as listed in Table 1. Instruments are fitted with either the indicator of the pattern (model M1100-C2) or with a model M2200-P02 indicator (as described in the documentation of approval NMI S437).

3. Description of Variant 2 approved on 18/10/06

Certain capacities of single-interval instruments with other parameters as listed in Table 2. Instruments are fitted with either the indicator of the pattern (model M1100-C2) or with a model M2200-P02 indicator (as described in the documentation of approval NMI S437).

4. Description of Variant 3 approved on 18/10/06

The model PU-xxxx series, either as multiple range or single-interval instruments, with a metal platform covering the U-shaped load receptor so the baseworks have a full platform.

If approach ramps are provided care shall be taken to ensure that these do not interfere with the platform.

5. Description of Variant 4

approved on 18/10/06

Certain baseworks of this approval used with a compatible NMI approved (by Supplementary Certificate) indicator provided the conditions set out below are met.

In addition to the markings specified in clause **1.7 Markings and Notices**, instruments are marked with the NMI approval number for the indicator used, together in the same location.

The approved baseworks and their limiting characteristics are given in Table 3.

The conditions to be met are given below, and include calculations using the following terms:

E_x = Excitation from indicator (V)

LC_Sens = Load cell sensitivity (mV/V)

E_{max} = Load cell maximum capacity (kg)

Indicator Sensitivity = Minimum sensitivity value per verification scale interval for the indicator (μV)

e = verification scale interval of the instrument (kg). ***In the case of multi-interval or multiple range instruments, any reference to 'e' refers to the smallest verification scale interval (i.e. e_1).***

e_1, e_2, \dots = verification scale interval of each range for multiple range instruments (or partial weighing ranges for multi-interval instruments), e_1 refers to the smallest verification interval.

Max = the maximum capacity of the instrument. This refers to the maximum capacity of the highest range (i.e. Max_r for multiple range instruments).

Max_r = the maximum capacity of the instrument for a multiple range instrument, i.e. the maximum capacity of the highest range.

Max_1, Max_2, \dots = the maximum capacity of the various ranges for a multiple range instrument. Max_1 refers to the maximum capacity of the smallest range.

n_{LC} = the maximum number of verification intervals for which the load cell or basework is approved (e.g. 3000 for a 'class C3' load cell).

DR = dead load return value for the load cell. Note: Many load cells do not have a specified DR value.

N = Number of load cells used.

The conditions are:

- The excitation voltage used is within the range approved for the baseworks.
- The maximum load applied to the basework (live load plus any dead load) does not exceed the load cells maximum capacity, i.e.

$$E_{max} > (Max + platform\ dead\ load)/N$$

- The verification scale interval is not less than the minimum value specified. ***In the case of multi-interval or multiple range instruments, the verification scale interval (e) refers to the smallest verification scale interval (i.e. e_1).***

$$V_{min} < \frac{e}{\sqrt{N}}$$

- The number of verification scale intervals is less than or equal to the n_{max} value specified. ***In the case of multi-interval or multiple range instruments, the number of verification scale intervals refers to the largest number in any weighing range or partial weighing range (i.e. the largest of Max_1/e_1 , Max_2/e_2 etc).***
- The signal voltage per verification scale interval is not less than the minimum sensitivity value per verification scale interval for the indicator (as specified in the approval documentation for the indicator), i.e.

$$IndicatorSensitivity \leq \frac{1000 \times Ex \times LC _ Sens \times e}{N \times E_{max}}$$

Additional requirement for multi-interval operation:

In the case of indicators which are configured to form a multi-interval weighing instrument the instrument shall comply with one of the following conditions:

- (i) ***The smallest verification scale interval (e_1) shall satisfy the following:***

$$e_1 \geq Max/n_{LC}$$

- (ii) ***Or, the smallest verification scale interval (e_1) shall satisfy the following:***

$$e_1 \geq 2 \cdot DR \cdot Max/E_{max}$$

Of course (ii) cannot apply where a value of 'Deadload return' DR is not given.

The instrument shall also comply with the following condition:

$$Max_i / e_{i+1} \geq 500 \text{ (e.g. } Max_1/e_2 \geq 500 \text{ and } Max_2/e_3 \geq 500 \text{)}$$

Additional requirement for multiple range operation:

In the case of indicators which are configured to form a multiple range weighing instrument the instrument shall comply with one of the following conditions:

- (i) ***The smallest verification scale interval (e_1) shall satisfy the following:***

$$e_1 \geq 0.4 Max_r/n_{LC}$$

- (ii) ***Or, the smallest verification scale interval (e_1) shall satisfy the following:***

$$e_1 \geq DR \cdot Max_r/E_{max}$$

Of course (ii) cannot apply where a value of 'Deadload return' DR is not given.

TEST PROCEDURE No 6/9C/290

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

The instrument shall not be adjusted to anything other than as close as practical to zero error, even when these values are within the maximum permissible errors.

Maximum Permissible Errors

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

Tests

For multiple range instruments with verification scale intervals of $e_1, e_2 \dots$, apply e_1 for zero adjustment, and maximum permissible errors apply $e_1, e_2 \dots$, as applicable for the load.

TABLE 1

Approved multiple range instruments using Marel models M1100 or M2200 indicators and Teda Huntleigh model 3510 Class C3 load cells.

Basework Model / Capacity	Max ₁ /e ₁	Max ₂ /e ₂	Min ₁ /Min ₂	Maximum Platform Dimensions mm x mm	Load cell E _{max}
PU8000-1000kg	600 kg / 0.2 kg	1000 kg / 0.5 kg	4 kg / 10 kg	845 x 1245	500 kg
PU8000-2000kg	1500 kg / 0.5 kg	2000 kg / 1 kg	10 kg / 20 kg	845 x 1245	1000 kg
PU9000-1000kg	600 kg / 0.2 kg	1000 kg / 0.5 kg	4 kg / 10 kg	1010 x 1245	500 kg
PU9000-2000kg	1500 kg / 0.5 kg	2000 kg / 1 kg	10 kg / 20 kg	1010 x 1245	1000 kg
PU9010-1000kg	600 kg / 0.2 kg	1000 kg / 0.5 kg	4 kg / 10 kg	1230 x 1245	500 kg
PU9010-2000kg	1500 kg / 0.5 kg	2000 kg / 1 kg	10 kg / 20 kg	1230 x 1245	1000 kg

TABLE 2

Approved single interval instruments using Marel models M1100 or M2200 indicators and Teda Huntleigh model 3510 Class C3 load cells.

Basework Model / Capacity	Max/e	Min	Maximum Platform Dimensions mm x mm	Load cell E _{max}
PU8000-3000kg	3000 kg / 1 kg	20 kg	845 x 1245	1000 kg
PU9000-3000kg	3000 kg / 1 kg	20 kg	1010 x 1245	1000 kg
PU9010-3000kg	3000 kg / 1 kg	20 kg	1230 x 1245	1000 kg

TABLE 3
Approved multiple range baseworks using Tedea Huntleigh model 3510 Class C3 load cells.

Instrument model	PU8000 - 1000kg	PU9000 - 1000kg	PU9000 - 2000kg	PU9010 - 1000kg	PU9010 - 2000kg	PU8000 - 3000kg	PU9000 - 3000kg	PU9010 - 3000kg
Maximum capacity (kg)	1000	1000	2000	1000	2000	3000	3000	3000
Max platform size (mm x mm)	845 x 1245	1010 x 1245	1230 x 1245	1230 x 1245	1230 x 1245	845 x 1245	1010 x 1245	1230 x 1245
Material	S/S	S/S	S/S	S/S	S/S	S/S	S/S	S/S
Max no. of verification scale intervals, n_{LC}	3000	3000	3000	3000	3000	3000	3000	3000
Load cell make	Tedea Huntleigh	Tedea Huntleigh	Tedea Huntleigh	Tedea Huntleigh	Tedea Huntleigh	Tedea Huntleigh	Tedea Huntleigh	Tedea Huntleigh
Load cell model	3510	3510	3510	3510	3510	3510	3510	3510
Load cell classification	C3	C3	C3	C3	C3	C3	C3	C3
No of load cells	4	4	4	4	4	4	4	4
Load cell Max cap, E_{max} (kg)	500	500	1000	500	1000	1000	1000	1000
V_{min} of load cell (kg)	0.042	0.042	0.083	0.042	0.083	0.083	0.083	0.083
DR value (kg)	0.0625	0.0625	0.125	0.0625	0.125	0.125	0.125	0.125
Load cell sensitivity (mV/V)	2	2	2	2	2	2	2	2
Input impedance (ohm)	400	400	400	400	400	400	400	400
Excitation voltage (max) (V)	15	15	15	15	15	15	15	15
Cable length (m)	3	3	3	3	3	3	3	3
No of leads (plus shield)	6	6	6	6	6	6	6	6

FIGURE 6/9C/290 – 1



Marel Model PU8000-1000 kg Basework and M1100-C2 Indicator

FIGURE 6/9C/290 – 2



View of Bottom of PU8000-1000 kg Platform

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