



Australian Government
**Department of Industry, Science,
Energy and Resources**

National Measurement Institute

36 Bradfield Road, West Lindfield NSW 2070

Certificate of Approval NMI 6/4C/272

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.

Teraoka Model Digi DS-521 Weighing Instrument

submitted by W W Wedderburn Pty Ltd
101 Williamson Road
Ingleburn NSW 2565

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 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 & variants 1 to 4 approved – interim certificate issued	24/11/11
1	Pattern & variants 1 to 4 updated – certificate issued	14/12/11
2	Pattern & variants 1 to 4 updated & reviewed – certificate issued	7/12/16
3	Variant 1 amended (platform size corrected) – certificate issued	28/01/21

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with approval number 'NMI 6/4C/272' and 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 Certificates No S1/0/A or No S1/0B.

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

A handwritten signature in blue ink, appearing to read 'Darryl Hines', is written over a large, empty oval shape.

Darryl Hines
Manager
Policy and Regulatory Services

TECHNICAL SCHEDULE No 6/4C/272

1. Description of Pattern **approved on 24/11/11**

A Teraoka model DIGI DS-521 (*) class Ⅲ multi-interval self-indicating non-automatic weighing instrument (Figure 1a) with a verification scale interval (e_1) of 0.005 kg for up to 15 kg and with a verification scale interval (e_2) of 0.01 kg from 15 kg up to the maximum capacity of 30 kg. Instruments may also be known as a model DIGI DS-520 III.

The instrument is fitted with an LCD display for display of the weight value.

Instruments shall be marked 'NOT FOR TRADING DIRECT WITH THE PUBLIC' (or similar wording).

Power for the model DIGI DS-521 instrument may be supplied by:

- an internal or external AC/DC mains adaptor; and/or
- 4 x 1.5 V C-size batteries.

Note: The AC/DC mains adaptor supplied for the instrument is a HON-KWANG model HK-CH05-A09 (9 V DC, 0.5 A) **or an ENG model 3A-066WP09 switch-mode power supply (output 9 V DC, 0.67 A)** adaptor – the submitter should be consulted regarding the acceptability of alternative power supply units.

The pattern is fitted with a Teraoka model DS-521 indicator (Figure 1b) and a Teraoka model S-YE basework having a load receptor of 400 x 400 mm. The basework uses a single Teraoka model P type load cell of 45 kg maximum capacity. The indicator has a metal housing and may be mounted on a column or it may be located remotely.

(*) The instrument model number may include an alpha suffix indicating the basework fitted and the indicator mounting, e.g. the pattern fitted with a column-mounted indicator may be known as either a model DS-521 or a model DS-521EP.

1.1 Zero

The initial zero-setting device has a nominal range of not more than 20% of the maximum capacity of the instrument.

The instrument has a semi-automatic zero-setting device with a nominal range of not more than 4% of the maximum capacity of the instrument.

A zero-tracking device may be fitted.

1.2 Tare

A semi-automatic subtractive tare device of up to 14.995 kg may be fitted.

1.3 Levelling

The instrument is provided with adjustable feet.

1.4 Display Check

A display check is initiated whenever power is applied.

1.5 Verification Provision

Provision is made for the application of a verification mark.

1.6 Sealing Provision

Provision is made for access to the calibration switch within the instrument to be sealed either using a 'lead and wire' type seal or use of destructible adhesive labels across the join in the indicator housing on two sides of the indicator as shown in Figure 3a.

1.7 Descriptive Markings and Notices

Instruments carry the following markings:

Manufacturer's mark, or name written in full	Teraoka
Name or mark of manufacturer's agent	WEDDERBURN
Indication of accuracy class	Ⓜ
Pattern approval mark for the instrument	NMI 6/4C/272
Maximum capacity	<i>Max</i> g or kg #1
Minimum capacity	<i>Min</i> g or kg #1
Verification scale interval	<i>e</i> = g or kg #1
Maximum subtractive tare	<i>T</i> = - g or kg #2
Serial number of the instrument

#1 These markings are also 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.

Note: For multi-interval instruments the markings shall be as above, with the exception that the 'Maximum capacity' and 'Verification scale interval' shall be marked for both interval ranges, e.g. as follows:

Maximum capacity	<i>Max</i>/..... g or kg
Verification scale interval	<i>e</i> =/..... g or kg

2. Description of Variant 1

approved on 14/12/11
amended on 28/01/21

The Digi DS-521 series of multi-interval instruments in certain capacities using certain models of S-series baseworks as listed in Table 1 (see Figure 1 for typical instruments). In each case the instrument may be known according to a combination of the indicator model and a 'suffix' comprising part of the basework model #GA, #GB, #GC, #GAS, #GBS, #GCS, #GD, #GH, #A, #B, #C, #D, #E, #WP, #QAS, #YFA, #YFB or #YFC, where # represents the indicator model. An additional suffix 'P' may be used to indicate a column-mounted display. For example the model DS-521EP, which uses a column-mounted DS-521 indicator and an S-YE basework.

TABLE 1 – Baseworks

The baseworks listed below have capacity ranges, maximum platform sizes and use a single load cell of the model of the model as listed below:

Basework Model	Capacity Range (kg)	Platform Size (mm)	Load Cell Model
S-GA	60 to 300	368 x 488	P
S-GB	60 to 300	500 x 600	PMB
S-GC	150 to 600	700 x 800	PMD
S-GAS	60 to 300	368 x 488	P
S-GBS	60 to 300	500 x 600	PMB
S-GCS	150 to 600	700 x 800	PMD
S-GD	30 to 150	350 x 400	P
S-GH	60 to 300	450 x 500	P
S-YA	30 to 150	380 x 380	P
S-YB	30 to 300	480 x 480	PMB
S-YC	6 to 30	341 x 284	P
S-YD	6 to 30	341 x 284	P
S-YE	30 to 300	400 x 400	P
S-WP	3 to 30	336 x 246	P
S-QAS	30 to 300	350 x 500	PMB
S-YFA	150 to 600	700 x 800	PMD
SYFB	150 to 600	700 x 800	PMD
S-YFC	150 to 600	700 x 800	PMD

Within the basework capacity ranges listed in Table 1 above, instruments are available in certain capacities and use a load cell of the capacity as shown in Table 2 below.

TABLE 2 – Multi-interval instruments

Maximum Capacity (Max_1/Max_2)	Verification Scale Interval (e_1, e_2)	Maximum Subtractive Tare Capacity ($T = - \dots$)	Load Cell Capacity
3/6 kg	0.001/0.002 kg	2.999 kg	9 kg
6/15 kg	0.002/0.005 kg	5.998 kg	22.5 kg
15/30 kg	0.005/0.01 kg	14.995 kg	45 kg
30/60 kg	0.01/0.02 kg	29.99 kg	90 kg
60/150 kg	0.02/0.05 kg	59.98 kg	225 kg
150/300 kg	0.05/0.1 kg	149.95 kg	450 kg
300/600 kg	0.1/0.2 kg	299.9 kg	900 kg

3. Description of Variant 2

approved on 14/12/11

The Digi DS-521 series of single interval instruments in certain capacities using certain models of S-series baseworks as listed in Table 1.

Within the basework capacity ranges listed in Table 1 above, instruments are available in certain capacities and use a load cell of the capacity as shown in Table 3 below.

TABLE 3 – Single-interval instruments

Maximum Capacity (Max)	Verification Scale Interval (e)	Maximum Subtractive Tare Capacity (T = - ...)	Load Cell Capacity
3 kg	0.001 kg	1.499 kg	4.5 kg
6 kg	0.002 kg	2.998 kg	9 kg
15 kg	0.005 kg	7.495 kg	22.5 kg
30 kg	0.01 kg	14.99 kg	45 kg
60 kg	0.02 kg	29.98 kg	90 kg
150 kg	0.05 kg	74.95 kg	225 kg
300 kg	0.1 kg	149.9 kg	450 kg
600 kg	0.2 kg	299.8 kg	900 kg

4. Description of Variant 3

approved on 14/12/11

The Digi DS-531 series of single and multi-interval instruments (Figure 2a) using any basework approved for the pattern and variants 1 and 2 but fitted with a model DS-531 indicator (Figures 2b). This indicator has a plastic housing and may be powered from a mains adaptor and/or by 4 x 1.5 V C size batteries.

The AC/DC mains adaptor supplied for the instrument was an ENG model 3A-066WP09 (9 V DC, 0.67 A) adaptor – the submitter should be consulted regarding the acceptability of alternative power supply units.

Instruments may also be known as model DIGI DS-530 III.

Access to the calibration switch within the instrument is to be sealed as shown in Figure 3b (see also the description of sealing for the pattern).

5. Description of Variant 4

approved on 14/12/11

Any model basework of this approval, used with a compatible approved (by Supplementary Certificate) indicator **provided the conditions set out below are met**. In this case instruments may be known according to the basework model number. These baseworks and their limiting characteristics are given in Tables 1 to 4.

The resulting instrument may be single range, multiple range, or multi-interval (according to the indicator used), provided that the conditions given are met.

Characteristics of the load cells used are needed to determine that the required conditions are met. These characteristics are given in Table 5.

In addition to the markings specified in clause 1.7 **Descriptive Markings and Notices**, instruments are marked with the NMI approval number for the indicator used, together in the same location. Where the resulting instrument is a multiple range instrument, appropriate markings regarding the ranges and scale intervals shall be provided in accordance with the Supplementary Certificate for the indicator.

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.

Max₁ Max₂ ... = 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.

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 cell maximum capacity.
- 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 refers to the smallest verification scale interval (i.e. e_1).***
- 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.

$$\text{Indicator Sensitivity} \leq 1000 \times E_x \times LC_Sens \times e / E_{max}$$

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.

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.

TABLE 5 – Load Cell Data

Load cell model used	P	P	P	P PMB	P PMB PMD	P PMB PMD	P PMB PMD	PMD
Load cell max. capacity, E_{max} (kg)	4.5	9	22.5	45	90	225	450	900
Maximum number of verification scale intervals (n_{LC})	3000	3000	3000	3000	3000	3000	3000	3000
Minimum value of verification scale interval (v_{min} of load cell) (kg)	0.001	0.001	0.002	0.005	0.01	0.02	0.05	0.1
Load cell sensitivity at E_{max} (mV/V)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Input impedance (Ω)	1100	1100	1100	1100	1100	1100	1100	1100
Excitation voltage (max.) (V)	20	20	20	20	20	20	20	20
Cable length ($m \pm 0.1m$) (#)	1	3	3	3	3	3	3	3
Number of leads (plus shield)	4	4	4	4	4	4	4	4

(#) Cable supplied with the basework shall not be shortened.

TEST PROCEDURE No 6/4C/272

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*.

FIGURE 6/4C/272 – 1



(a) Teraoka Model Digi DS-521 Weighing Instrument with a Model S-YE Basework (the pattern)



(b) Teraoka Model DIGI DS-521 Indicator

FIGURE 6/4C/272 – 2

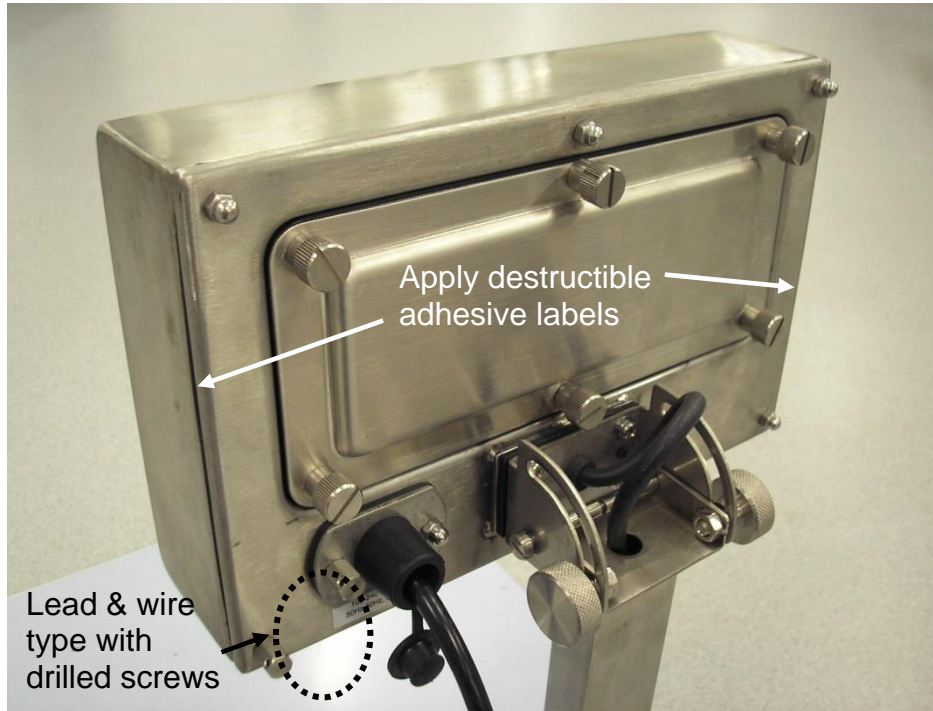


(a) Teraoka Model Digi DS-531 Weighing Instrument with a Model S-GA Basework (Variant 3)



(b) Teraoka Model DIGI DS-531 Indicator (Variant 3)

FIGURE 6/4C/272 – 3



(a) Typical Sealing of Model Digi DS-521 Weighing Instruments



(b) Typical Sealing of Model Digi DS-531 Weighing Instruments

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