



Australian Government
Department of Industry,
Innovation and Science

National Measurement Institute

Certificate of Approval NMI 6/20A/4

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.

VEI Model Helper P5 Wheeled Loader Weighing Instrument

submitted by VEIGROUP srl
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ITALY

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 51, *Automatic Catchweighing instruments*, dated July 2004.

This approval becomes subject to review on **1/11/21**, and then every 5 years thereafter.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern & variant 1 approved – variant 2 provisionally approved – interim certificate issued	21/10/03
1	Pattern & variant 1 approved – variant 2 provisionally approved – certificate issued	2/01/04
2	Pattern & variant 1 amended (validity) – notification of change issued	20/02/09
3	Pattern & variant 1 updated & reviewed – variant 3 provisionally approved – interim certificate issued	26/06/15
4	Pattern & variants 1 & 2 updated & reviewed – provisional variant 3 withdrawn – certificate issued	26/05/16
5	Variants 3 to 6 approved - certificate issued	23/01/18

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI (or NSC) 6/20A/4' 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.

This approval shall NOT be used in conjunction with General Certificate No 6B/0.

Special Conditions of Approval:

For this type of instrument, the ability to perform within the specified maximum permissible errors can depend substantially on characteristics of the wheeled loader to which it is fitted. Some designs of wheeled loaders simply may not be suitable for attachment of this weighing instrument, however the NMI is unable to clearly define particular wheeled loaders, or categories of wheeled weighers, for which the instrument is unsuitable.

It is the responsibility of the submitter (VEIGROUP srl) to exercise control over any installation to ensure compliance with this approval and to ensure performance within the appropriate maximum permissible errors.

In the event of unsatisfactory performance this approval may be withdrawn.

Special Conditions of Approval for Provisional Variant 2:

The submitter shall provide the NMI (pattern approval section) with copies of test results from all verification testing.

Instruments purporting to comply with the provisional variant shall be marked with approval number 'NMI (or NSC) P6/20A/4' and only by persons authorised by the submitter. (Note: The 'P' in the approval number may be a temporary marking.)

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



Darryl Hines

TECHNICAL SCHEDULE No 6/20A/4

1. Description of Pattern **approved on 21/10/03**

The VEI model Helper P5 class Y(b) automatic catchweighing instrument of 5000 kg maximum capacity with a verification scale interval of 20 kg fitted to a Caterpillar model 950g wheeled loader.

The VEI model Helper P5 automatic catchweighing instrument comprises electronic equipment and sensors attached to a wheeled loader (i.e. typically 'front end loader') which automatically determine the load lifted by the lifting mechanism of the loader during the lifting process. Figure 1 shows a typical installation.

The electronic equipment and sensors are described below.

The indicator may be fitted with output sockets for the connection of auxiliary and/or peripheral devices.

1.1 Pressure Sensor(s)

One or two HBM model P8-500 pressure sensors are used (Figure 2) depending on the type of lifting system involved. The strain gauge type pressure sensors measure the pressure acting on the piston in the lift cylinder(s), and if necessary the back pressure.

1.2 Position Reference/Lift Speed/Direction Sensors

The correct position for a weight determination is when the loading arm is between two position reference/lift speed/direction sensors (Figure 3). The first sensor detects the magnet attached to the loading arm as it passes and initiates the weight determination.

The second sensor is activated when the magnet passes it. The time between activation of the two sensors is related to the speed of lift and can provide alarms if the lift speed is outside acceptable limits.

In addition the sequence of operation of the sensors establishes the direction of travel of the lifting arm (ascending or descending).

1.3 Load Receptor ('Bucket') Location Sensor

This location sensor detects when the load receptor (bucket) is in the correct location (i.e. the bucket is fully rotated 'crowded' back, so that the load will fall into the centre of the bucket). The system will inhibit weighing if the load receptor is not in this location.

Note: A second location sensor may also be fitted to inhibit weighing if the 'bucket' has not been opened.

1.4 Level Sensor/Junction Box

Two level sensing devices attached to the vehicle detect the degree to which the vehicle is tilted from its reference (level) condition and allow the system to disable weight determination if acceptable levels of tilt are exceeded.

1.5 Computing and Display Unit

The VEI model Helper P5 electronic computing, keyboard and display unit (Figure 4) has a liquid crystal display (LCD) on which the weighing results are displayed as well as instructions, and alarm or error messages. The LCD also provides legends for the various menu operation keys located below the LCD screen along with the power ON/OFF button.

1.6 Printer

A printing unit (typically a VEI model Helper P5, Figure 4) is attached to the Helper P5 computing and display unit.

This unit can print load tickets by manual command. The printout will print information to identify the particular 'delivery' (a unique job number, time and date), the weight value of each load (lift), together with a total of the loads. Additional information may also be printed (product description, customer name etc).

1.7 Additional Features

The system has certain additional functions:

- A function in which a particular target total weight is set. The material is delivered (e.g. loaded into a truck) by a number of lifts, and after each lift the display provides an indication of the material still to be delivered to obtain the target total weight.
- A totalisation facility.
- An 'auto enter' facility allowing each weight value to be automatically accepted (added to total and printed).
- A 'live last bucket' facility allowing adjustment of the final lift quantity. Once the quantity has been adjusted the load receptor must be lowered and re-lifted before the weight value is entered.
- Provision for storage of customer details.
- Provision for storage of product details.
- Provision for storage of pre-set target total values.
- Provision for storage of batch data (e.g. recipes of various target totals of different products).

The instrument may have other additional functions. These functions other than the indications of measured mass (i.e. gross, tare, net, totals) displayed either on the indicator or on an auxiliary or peripheral device), are not approved for trade use.

1.8 Alternative Load Receptors

It is possible for the system to be calibrated with a number of different load receptors (i.e. different attachments to the lifting system). The system shall be verified for each different load receptor, and clear identification of the attachment shall be provided and shall correspond to the identification of the attachment in use which is indicated at the top of the instrument display.

1.9 Power Supply

The instrument is powered by the vehicle power supply (battery) of 10 to 30 V DC.

1.10 Zero

A zero setting operation may be selected through the menu system or it may be requested automatically by the system (e.g. after completion of a delivery, or after a number of lifts have been carried out without zeroing).

Zero is set (to within $\pm 0.25e$) by raising the empty load receptor a number of times (according to instructions on the display). When zero has been set, this is indicated by arrows around the indication (i.e. " $>0<$ ").

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

1.11 Display Check

A display check is initiated whenever power is applied.

1.12 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, e.g. class Y(b)
Pattern approval number for the instrument	NMI or NSC No 6/20A/4
Maximum capacity	<i>Max</i> kg *
Minimum capacity	<i>Min</i> kg *
Verification scale interval	<i>e</i> = kg *
Serial number of the instrument

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

1.13 Verification Provision

Provision is made for the application of a verification mark.

1.14 Sealing Provision

The computing and display unit is sealed by placing one or more destructible labels over the join of the two halves of the housing.

2. Description of Variant 1 approved on 21/10/03

The VEI model Helper P5 class Y(b) automatic catchweighing instrument similar to the pattern but fitted to different wheeled loaders which may also have different maximum capacities.

Instruments are approved for use with up to 250 verification scale intervals

3. Description of Variant 2 provisionally approved on 21/10/03

The VEI model Helper P5 class Y(b) automatic catchweighing instrument similar to the pattern and variant 1 but fitted to various forklifts of various maximum capacities.

Figure 5 shows a typical installation.

Instruments are approved for use with up to 250 verification scale intervals.

4. Description of Variant 3 **approved on 23/01/18**

The VEI model HelperX class Y(b) automatic catchweighing instrument similar to the pattern and variant 1 but fitted with a VEI model HelperX electronic computing, keyboard and display unit (Figure 6), instead of the model Helper P5 unit described for the pattern.

The instrument utilises information from level sensing devices and prevents the weight determination where the degree of tilt exceeds ± 3 degrees.

Instruments are approved for use with up to 150 verification scale intervals.

4.1 Sealing Provision

The instrument is sealed by recording the event counter on verification.

Access to allow changing of set-up parameters including calibration parameters must be protected by a passcode.

The indicator automatically increments an event counter number each time the instrument is re-configured or calibrated.

The value of the event counter may be recorded on a destructible adhesive label attached to the instrument (as COUNTER followed by a number).

Any subsequent alteration to the calibration will be evident as the recorded value and the current counter value will differ.

The event counter number can be seen in the switch-on display sequence when the power is first applied to the instrument.

4.2 Software

The legally relevant software is identified by a checksum number (CRC) 7460FE1C.

The checksum number can be seen in the switch-on display sequence (when the power is first applied to the instrument).

5. Description of Variant 4 **approved on 23/01/18**

Similar to variant 3 but fitted to various forklifts of various maximum capacities.

Instruments are approved for use with up to 250 verification scale intervals.

6. Description of Variant 5 **approved on 23/01/18**

Similar to variant 3 but fitted to wheeled loaders with a retractable lifting mechanism (boom) with a boom extension sensor to ensure that the boom is fully retracted during weighing (see Figure 7).

Instruments are approved for use with up to 150 verification scale intervals.

7. Description of Variant 6 **approved on 23/01/18**

The VEI model Helper XE class Y(b) automatic catchweighing instrument (Figure 8) of 150 kg maximum capacity with a verification scale interval of 1 kg. The minimum capacity is 10 kg.

The system is intended for the determination of the net weight of the contents of a waste bin picked up by (emptied into) a waste bin pick up vehicle, to which the instrument has been fitted. A transaction will generally be the result of a weighing of the full waste bin, with the result of the weighing of the empty waste bin

subtracted from this. The system may also be suitable for other similar applications.

The system operates in dynamic mode and is intended to only weigh whilst the vehicle is not moving, and a sensor/interlock to ensure this is provided.

7.1. Weighing Mechanism

The VEI model Helper XE comprises a weighing module incorporating a HBM model SSC load cell (Figure 9a) of 550 kg maximum capacity, mounted as part of the waste bin lifting mechanism at the rear of the vehicle (Figure 8).

The system also includes a DIS SENSORS model QG65N-KDXYh-090-CAN-CFM 2-axis 90° inclination sensor (Figure 9b) to compensate weight values for out-of-level conditions, and a DIS SENSORS model QG65-KI-360H-CAN-CFM single axis 360° inclination sensor (Figure 9c) to sense the location of the lifting mechanism and hence determine an appropriate 'weighing window' for the weight determination.

7.2 Weighing Calculator and Indicator

The load cell and other sensors are connected to a VEI model Helper X electronic computing, keyboard and display unit (Figure 6), which utilises data from the sensors to determine the weight value.

7.3 Power Supply

The system is powered from the power supply of the vehicle (12 - 30 V DC).

7.5 Additional Information Regarding System

The following is additional information regarding operation of the system.

- The system utilises information from the DIS SENSORS model QG65N-KDXYh-090-CAN-CFM inclination sensor, to compensate weight values for out-of-level conditions in longitudinal and transverse directions, and prevents the weight determination where the degree of tilt exceeds ± 7 degrees.
- The system is intended to only weigh whilst the vehicle is not moving, and a sensor/interlock to ensure this is provided.
- Additional (optional) sensors may be provided (e.g. GPS location input or RFID tag reader).
- Instruments may be fitted with output sockets (output interfacing capability) for the connection of auxiliary and/or peripheral devices.

The system may have additional features, including a totalisation facility (accumulated net weight). Such features (other than the indications of measured net weight values – displayed either on the instrument's indicator or an auxiliary or peripheral device), are not approved for trade use.

7.6 Data Storage/Printout

The system may incorporate a data storage device. For each weighing request weighing results together with identification including date and time are stored into the storage device. Alternatively (or in addition) a printer may be provided for printout of a receipt/transaction record.

Any printout shall comply with the requirements of NMI General Supplementary Certificate S1/0B.

7.7 Interfaces

Instruments may be fitted with interfaces for the connection of auxiliary and/or peripheral devices. Any interfaces shall comply with clause 4.2.4 of document NMI R51 (the basic intent of which is that it shall not be possible to alter weighing results via the interfaces).

Any measurement data output from the instrument or its interfaces shall only be used for trade in compliance with Supplementary Certificate No S1/0B (in particular in regard to the data and its format).

Indications other than the indications of measured mass (i.e. gross, tare, net, totals) displayed either on the instrument or on an auxiliary or peripheral device, are not for trade use.

Instruments may be fitted with RS-232 serial data interface, CAN and Bluetooth.

7.8 Display Check

A display check is initiated whenever power is applied.

7.9 Sealing Provision

Provision is made for the calibration adjustments to be sealed.

- The inclination sensors shall be sealed (using lead & wire or similar type seals, or destructible adhesive labels) to restrict any change in position or seal against adjustment.
- The load cells shall be sealed (using lead & wire or similar type seals, or destructible adhesive labels) to seal against replacement.
- The instrument is sealed by recording the event counter on verification.

Access to allow changing of set-up parameters including calibration parameters must be protected by a passcode.

The instrument automatically increments an event counter number each time the instrument is re-configured or calibrated.

The value of the event counter may be recorded on a destructible adhesive label attached to the instrument (as COUNTER followed by a number).

Any subsequent alteration to the calibration will be evident as the recorded value and the current counter value will differ.

The event counter number can be seen in the switch-on display sequence when the power is first applied to the instrument.

7.10 Software

The legally relevant software is identified by a checksum number (CRC) 00EAF533.

The checksum number can be seen in the switch-on display sequence when the power is first applied to the instrument.

7.11 Two Baseworks Facility

Up to two weighing modules (each with its own load cell) may be connected to a single Helper X unit. Other sensors (e.g. inclination sensors) may be shared between the two modules.

In this arrangement the system may operate in either of the following modes:

- (a) Weighing smaller bins individually.
In this case each instrument operates in a single interval arrangement with a verification scale interval of 1 kg up to the maximum capacity of the instrument (150 kg).
- (b) Weighing a single larger bin utilising both weighing modules (Figure 8).
In this case the bin is supported by both weighing modules and operates in a single interval arrangement with a verification scale interval of 2 kg up to the maximum capacity of the instrument (400 kg). The minimum capacity is 20 kg.

Where operation in mode (b) above is possible, an additional switch is provided which is intended to determine when a single larger bin is in use, and hence to automatically switch the system into 'COMMERCIAL' mode.

In 'COMMERCIAL' mode the combined weight indication does not necessarily represent the mathematical sum of the values determined for each weighing platform. This is because the combined weight function indication is assigned its own maximum capacity (*Max*), minimum capacity (*Min*) and verification scale interval (*e*), and the indication is based on a separate determination of the weight value using these parameters.

Suitable markings regarding the combined value are required.

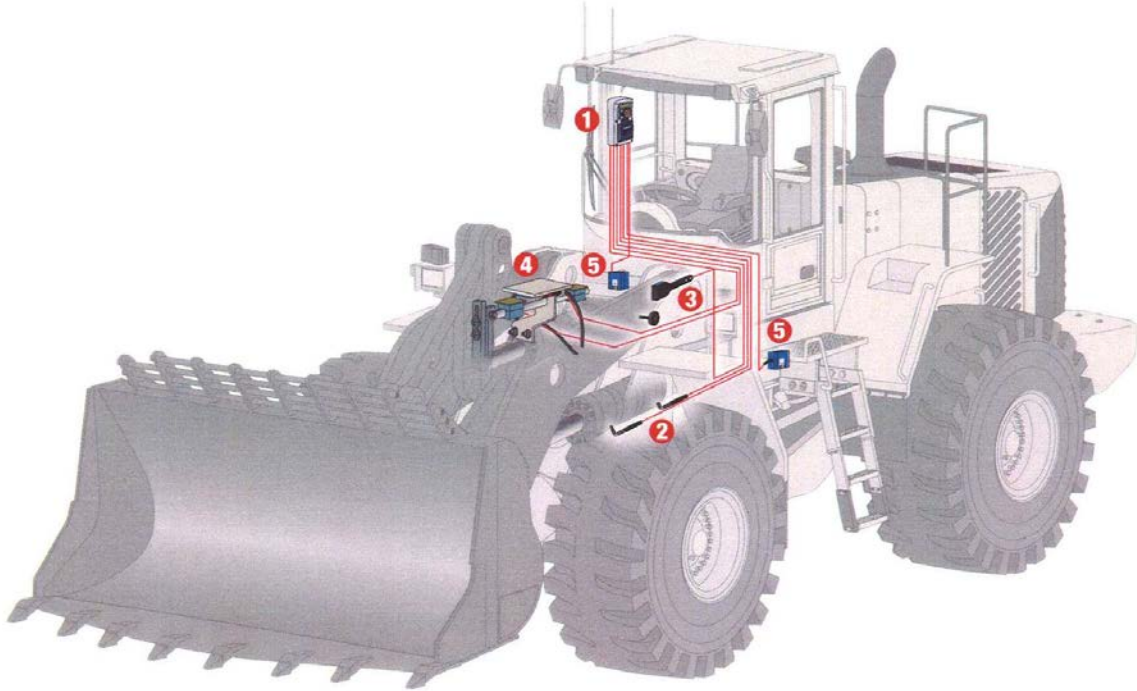
TEST PROCEDURE

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

Maximum Permissible Errors

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

FIGURE 6/20A/4 – 1



- 1 – Computing, display & printing unit
- 2 – Pressure sensors
- 3 – Position reference sensor
- 4 – Location open/closed sensor
- 5 – Level sensors

Typical VEI Model Helper P5 Wheeled Loader System (Pattern)

FIGURE 6/20A/4 – 2



HBM Model P8-500 Pressure Sensors

FIGURE 6/20A/4 – 3



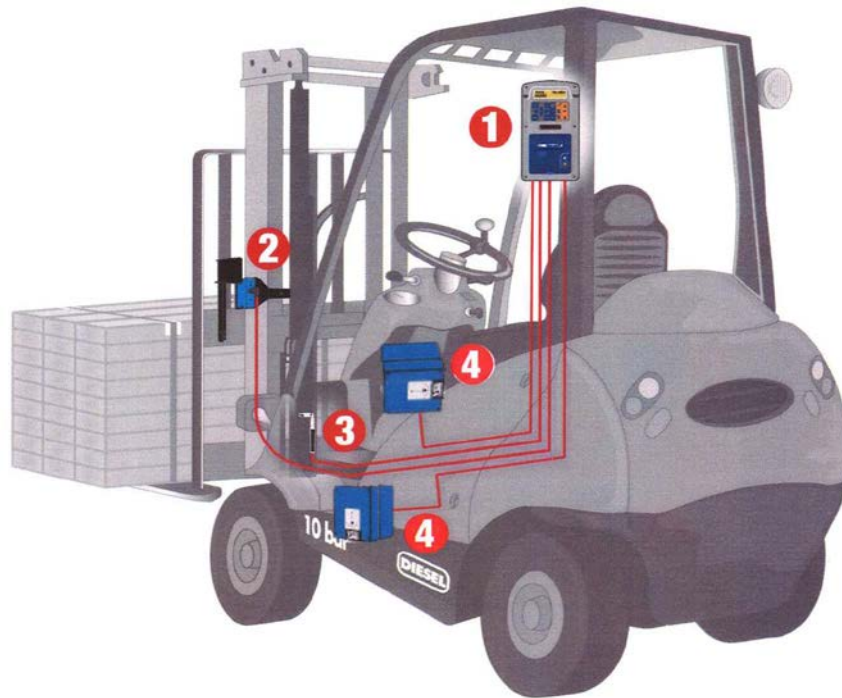
Position Reference Sensor

FIGURE 6/20A/4 – 4



VEI Model Helper P5 Computing, Display and Printing Unit

FIGURE 6/20A/4 – 5



- 1 – Computing, display & printing unit
- 2 – Position reference sensor
- 3 – Pressure sensor
- 4 – Level sensors

Typical VEI Model Helper P5 Forklift System (Variant 2)

FIGURE 6/20A/4 – 6



VEI Model HelperX Computing, Display and Printing Unit

FIGURE 6/20A/4 – 7



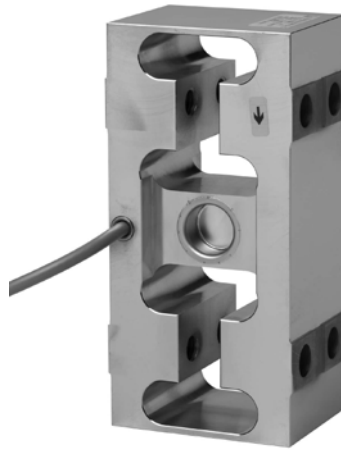
Boom Extension Sensor

FIGURE 6/20A/4 – 8



VEI Model Helper XE Rear Lift Wheeled Loader Weighing Instruments

FIGURE 6/20A/4 – 9



(a) HBM Model SCC Load Cell



(b) Inclination Sensor



(c) Inclination Sensor

~ End of Document ~