DANAK
PROD Reg. nr 7026

FORCE Certification

EU Type Examination Certificate

No. 0200-MID-07208 Revision 1

Enviroweigh

AUTOMATIC CATCHWEIGHING / CHECKWEIGHING INSTRUMENT

Issued by **FORCE Certification**
EU - Notified Body No. 0200

In accordance with the requirements in Directive 2014/32/EU of the European Parliament and Council.

Issued to **Vehicle Weighing Solutions Ltd.**
Unit 5 Southview Park 5, Marsack Street
Caversham, Reading RG4 5AF
United Kingdom

In respect of An automatic catchweighing instrument designated Enviroweigh with variants of modules of load receptors, load cells and peripheral equipment.
Accuracy class Y(b)
Maximum capacity: Max ≤ 3500 kg
Scale interval: e ≥ 0.5 kg
(however, dependent on environment and the composition of the modules)
Variants of modules and conditions for the composition of the modules are set out in the annex.

The conformity with the essential requirements in Annex 1 and the specific requirements in Annex VIII (MI-006), chapter I & II of the Directive 2014/32/EU is met by the application of OIML R51:2006, OIML D11:2004 sect. 12 & 13 and WELMEC Guide 7.2.

The principal characteristics and approval conditions are set out in the descriptive annex to this certificate.

The annex comprises 11 pages.

Issued on **2020-01-22**
Valid until **2029-11-08**

Jens Hovgård Jensen
2020-01-22

Digitally signed by Jens Hovgård Jensen
jhje@force.dk
Certification Manager

FORCE Certification references:
Task no.: 119-36207.90.10 and ID no.: 0200-MID-07773

Signatory: Jens Hovgård Jensen

Descriptive annex

Contents

1. Introduction

The instrument, designated the Enviroweigh®, is a battery-operated automatic catchweighing instrument consisting of load cells, electronic equipment and position sensors mounted at the rear or front of a bin collection vehicle. The instrument automatically determines the weight of the loaded bin during the lifting process, then the weight of the empty bin on the way down to determine the net weight of refuse emptied. The instrument is designed to weigh statically or dynamically. ln addition, the bin may be identified by an RFID tag reader system. The data is displayed on an indicator mounted near the operating console.

Each lifting "chair" at the back of the vehicle is fitted with one load cell, the outputs are used by the instrument (using dual channel configuration) to determine the weight of individual bins (2 wheeled bins, left and right hand sides) or large bins (4 wheeled bins), the weights for each channel being added to obtain the total weight.

The name of the instrument may be followed by alphanumeric characters for technical, legal or commercial characterization of the instrument.

2. Description of the construction and function

2.1 Mechanical

Figure 1 shows a typical installation, with Figure 2 showing the block diagram for the instrument.

2.1.1 Load cell

The instrument comprises one (small bin) or two (large bin) load cells type DT4650, maximum capacity 1000 kg, mounted on the lifter at the rear of the vehicle (Figure 3).

Alternatively, may the instrument be fitted with one (small bin) or two (large bin) load cell(s) type AW685 (manufactured by Applied Weighing International Ltd), maximum capacity 1000 kg or 2000 kg, mounted on the lifter at the rear of the vehicle. In this configuration shall the instrument weigh dynamically.

Or alternatively, may the instrument be fitted with two (frontend loader) load cell(s) type PC3H (manufactured by Flintec), maximum capacity 5000 kg, mounted on the lifter at the front of the vehicle. In this configuration shall the instrument weigh dynamically.

2.1.2 Inclinometer

The instrument comprises an inclinometer type ADXL325 or ADXL327, manufactured by Analogue Devices, and fitted internally in the weighing module described in section 2.2.3. The sensor acts as a switch and prevents weighing above the maximum tilt angle. The maximum tilt angle shall be determined at initial verification and protected as part of the legally relevant parameters and shall not exceed 8 degrees.

Alternatively, can the weighing module be connected to an external inclinometer type IND350-INC using the CAN bus. The indicator compensates the weight indication based on the tilt angle. Weight indications are prevented for tilt angles greater than ±x°, with x being the maximum tilt angle determined at initial verification. The maximum tilt angle and compensation parameters must be sealed after initial verification. The maximum tilt angle shall not exceed 8°.

2.1.3 Position sensor

A position sensor type IFS209, manufactured by Pepperl & Fuchs, is mounted on the lifter. Its output is used to determine the weighing window within which the dynamic weight is calculated.

2.2 Electrical

2.2.1 Power supply

The pattern operates from 9-32 V DC, supplied from the 12 or 24 V DC vehicle battery. The indicator console is fitted with a non-volatile static RAM with Lithium battery to maintain the basic functions such as clock, etc

2.2.2 PCB/CPU/ADC

The load cell output is digitized by the AD converter type CS5532 24 bit manufactured by Cirrus Logic.

2.2.3 Weighing module

The weigh module is housed in a die cast lP66 sealed enclosure. Calibration setting, transaction record and configuration settings are stored on a solid-state flash memory. Communication is via CAN messaging. Figure 9 shows the weighing module.

2.2.4 I/O Control module

The l/O control module is housed in a die cast IP66 sealed enclosure. Digital input / output signals from the vehicle are processed and communication is via CAN messaging. Figure 4 shows the I/O control module.

2.2.5 Indicator

The 350 weight indicator displays weight data, current lifter status, total weights, RFID tag numbers and fault diagnosis. Communication is via CAN messaging. Figure 5 shows the indicator.

2.2.6 RFID Control module / Tag readers

The RFID control module is housed in a die cast lP66 sealed enclosure. The unit can power up to 2 separate RFID antennas. RFID tag information is decoded and transmitted via CAN messaging. Figure 6 shows the RFID antenna and Figure 7 shows the RFID control module.

2.3 Devices and interlocks

2.3.1 Semi-automatic zero-setting

The instrument is provided with a semi-automatic zero-setting device. It works within a range of ±2 % of Max.

2.3.2 Net weight

The calculation of net weights are determined by the difference between the rising "full" bin and falling "empty" bin hence any errors due to a drift of zero cannot affect the net result, provided the drift remains in an acceptable range. This is achieved by checking the real time mV output of the load cell while a bin is not on the lifter. If the drift remains outside the pre-set limit of ±2% of Max from the zero point over consecutive samples for 5 seconds, a flag will be set and weighing shall be prevented. If the output drifts back into range the flag will be cleared and weighing resumed.

2.3.3 Data storage

The measurement data is automatically stored in an internal SD card located in the sealed weighing module and can be retrieved via the communication ports. The following data is recorded:

- Weigh module serial number
- Incremental transaction number
- Data of transaction
- Time of transaction
- NET weight of transaction and unit of measurement
- RFID tag number (if used)
- Lifter used (|eft, right or trade - with trade used to designate large bins)

2.3.4 Self test

The indicator runs through a standard check at power up, defects shall be obvious to the user, and displayed as error messages.

2.3.5 Interlocks

The following interlocks prevent the weighing process:

- Realtime clock not running
- Storage card not responding
- Load cell output error

2.4 Operation

- A bin is placed on the lifter
- The lifter raises the bin
- The RFID tag is read when present
- Lifter reached weighing position
- 'UP' weight is calculated
- Bin contents is emptied into the vehicle
- Lifter then lowers to weighing position
- 'DOWN' weight is calculated
- Resultant NET weight is calculated, displayed and recorded
- Bin is removed
- Sequence complete

2.5 Software

2.5.1 Verification information

On power up, the LED pixels on the 350 display are inverted to confirm operation. The display shows the software firmware version. The weighing module version (3.xx, with xx reflecting minor, non-legally relevant modifications), last calibration date and incremental calibration number are then displayed on the screen before the system reverts to normal weighing mode.

2.5.2 Security

The source code is compiled and downloaded into the micro controller. The device is then protected to prevent removal or modification of the software code.

Calibration is accessed via a password protected parameter. When a calibration is carried out, the date and incremental calibration number is recorded to solid state flash memory. The solid-state flash memory is sealed within the weighing module. On power up, the date and sequential calibration number is displayed on the screen prior to system operation.

3. Technical data

3.1 The system has the following technical characteristics:

	Small bin		Large bin		Front end loader
Maximum capacity (Max):	≤ 150 kg		≤ 500 kg		≤ 3500 kg
Scale interval (e =):	≥ 0.5 kg	1 kg	≥ 2 kg		≥ 20 kg
Minimum capacity (Min):	≥ 5×e for garbage or else ≥ 10×e				
Operation	Static or Dynamic				
Climatic environment	-20°C to +50°C				
	350 indicator: Non-condensing (closed) 350 indicator in IP66 enclosure and other parts: Condensing (open)				
Electromagnetic environment:	E3				
Power supply:	9-32 VDC (from 12 or 24V vehicle battery)				
Accuracy class:	Y(b)				
Cable length (load cell to indicator):	5 m				
Load cell type	DT4650 or AW685	AW685	DT4650	AW685	PC3H
E_{max} for load cell	1000 kg	2000 kg	1000 kg	1000 kg or 2000 kg	3500 kg
Number of load cells	1		2		

3.2 Documents

The documents filed at FORCE (reference No. 119-32311) are valid for the weighing instruments described here.

4. Interfaces and peripheral equipment

4.1 Interfaces

The instrument may have the following interfaces:

- 6-wire load cell connection
- RS-232
- CAN bus communication

4.2 Peripheral devices

The instrument may be connected to any peripheral device that has been issued with a Part Certificate or Evaluation Certificate issued by a Notified Body responsible for Module B for MI-006 under Directive 2014/32/EU and bears the CE marking of conformity to the relevant directives; or

A peripheral device without a Part or Evaluation certificate may be connected under the following conditions:

- it bears the CE marking for conformity to the EMC Directive;
- it is not capable of transmitting any data or instruction into the measuring instrument, other than to release a printout, checking for correct data transmission or validation;
- it prints measurement results and other data as received from the measuring instrument without any modification or further processing; and
- it complies with the applicable requirements of Paragraph 8.1 of Annex I.

5. Approval conditions

None special.

6. Special conditions for verification

See section 2.1.2 regarding determination of maximum tilt angle.

7. Securing and location of seals and verification marks

7.1 Securing and sealing

Seals shall bear the verification mark of a notified body or alternative mark of the manufacturer or his representative according to ANNEX II, module F or D of Directive 2014/32/EU.

The inscription plate is located visible on the indicating device and is secured, either by sealing or by being of a form such that it is destroyed when removed.

Access to the configuration and calibration facility is via the password protection on the 350 display.

Every time the configuration or calibration is modified, the calibration number counter is incremented (see 3.3.2) and shall to be recorded on the instrument on a descriptive label near the rating plate. The label shall be impossible to remove without being destroyed.

Components that may not be dismantled or adjusted by the user shall be secured by wire and seal or tamper-evident sticker(s).

A junction box for load cells shall – if present - be sealed against opening with wire and seal or tamper-evident sticker(s).

8. Location of CE mark of conformity and inscriptions

8.1 Scale

8.1.1 CE mark

CE mark and supplementary metrological marking shall be applied to the instrument according to article 20 of Directive 2014/32/EU.

8.1.2 Inscriptions

Max, Min, and e= shall be located near the display.

On the inscription plate of the instrument:

- Manufacturer's name and/or trademark
- Postal address of manufacturer
- Type designation
- Serial number
- Product(s) designation
- Accuracy class
- Max, Min, e =
- Event counter
- Temperature range: -20 / +50 °C
- Electromagnetic class: E2
- Humidity
- EU type examination certificate number
- Supply voltage
- Pneumatic/hydraulic pressure (if applicable)
- Maximum subtractive tare (if ≠ -Max)

The markings and inscriptions shall fulfil the requirements of Article 8, Article 21, Article 22 and Point 9 of Annex I of Directive 2014/32/EU.

9. Pictures

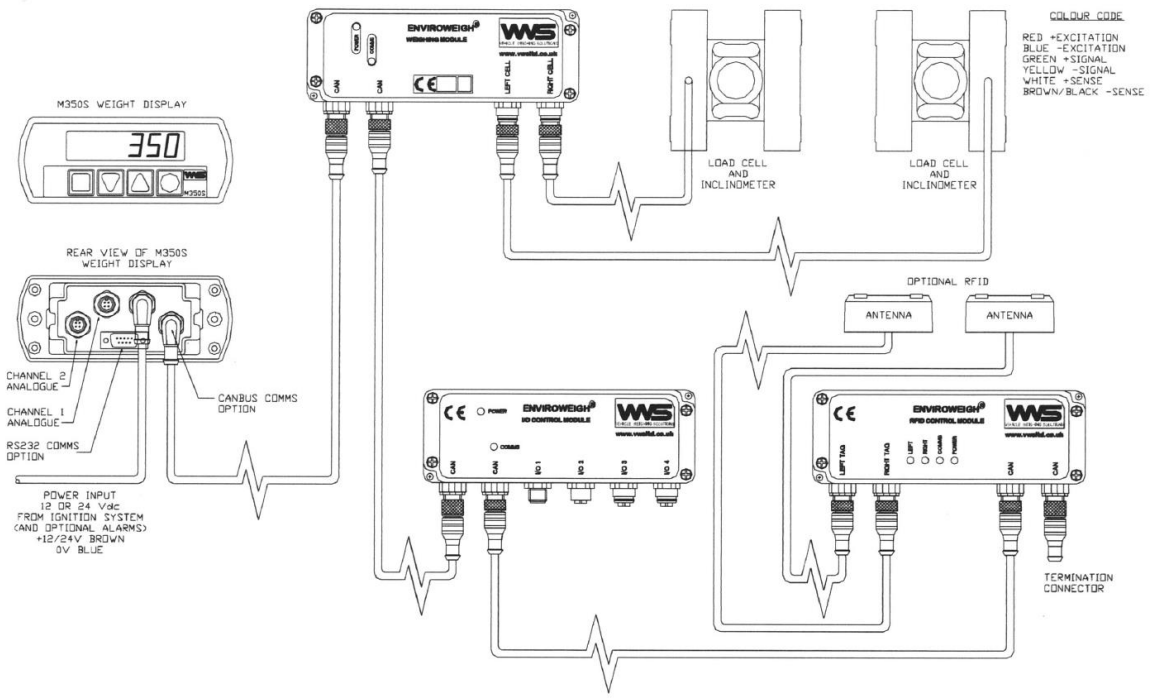

Figure 1 Typical configuration

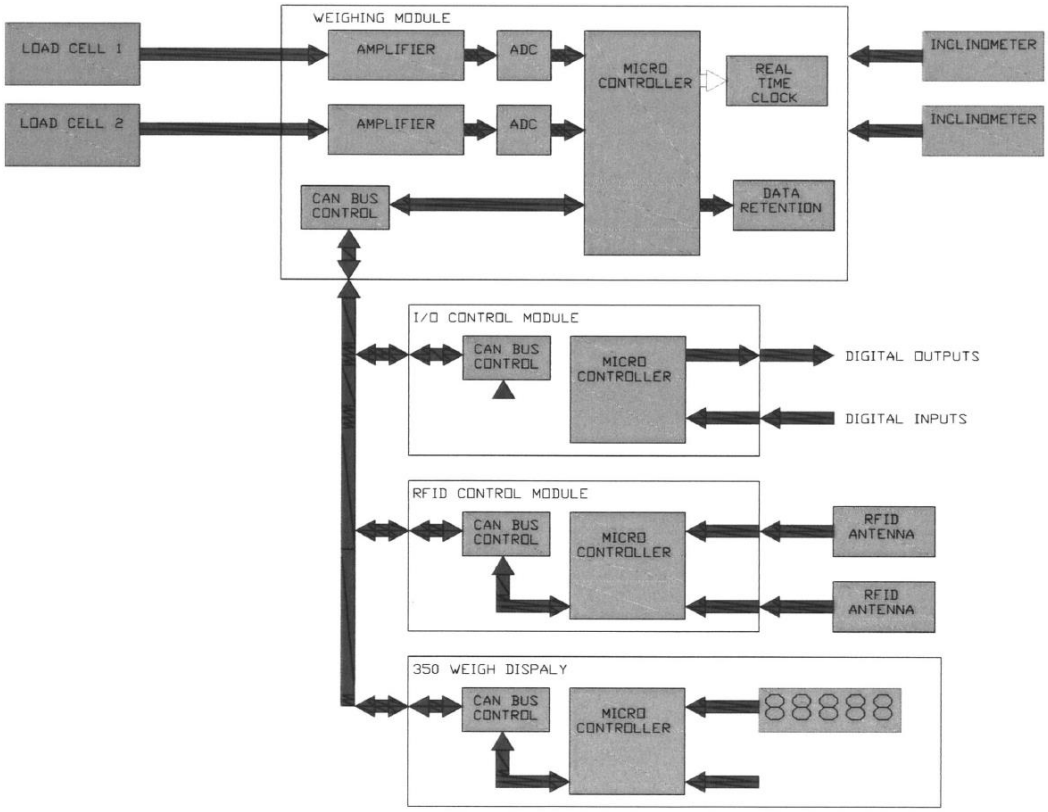

Figure 2 Block diagram

Figure 3 Load cell mounted on lifter

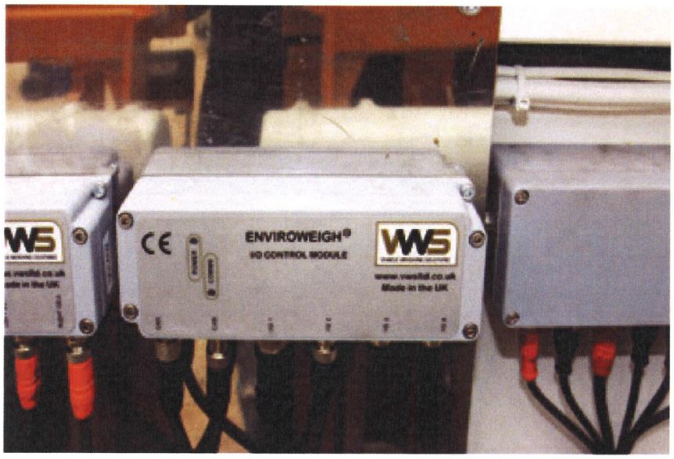

Figure 4 Control and I/O boards in enclosure

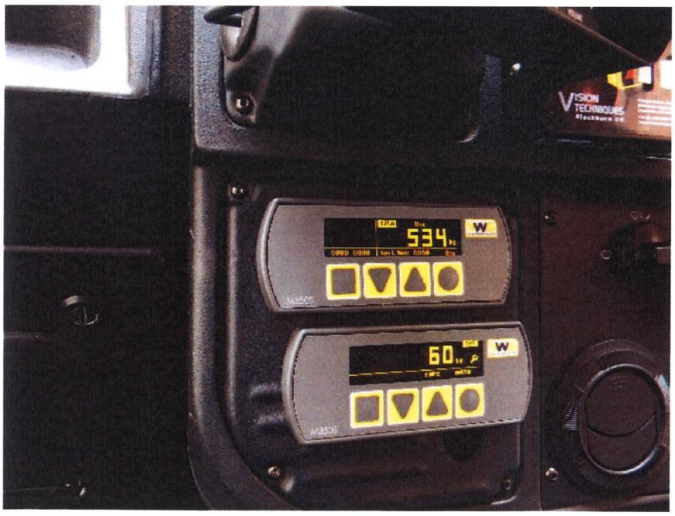

Figure 5 Indicator mounted near operating console

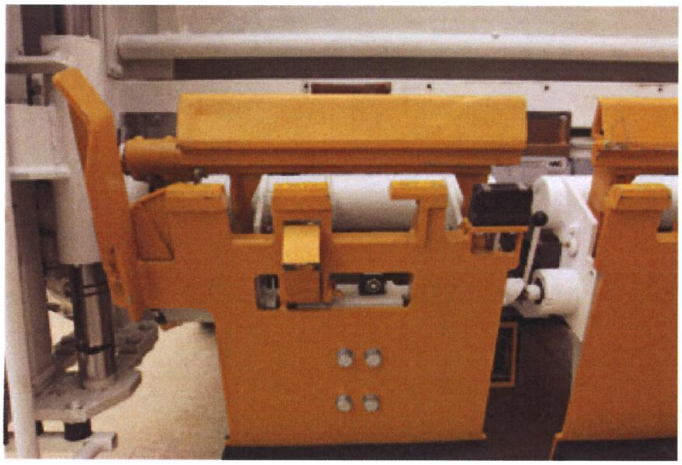

Figure6 RFID antenna at rear of vehicle

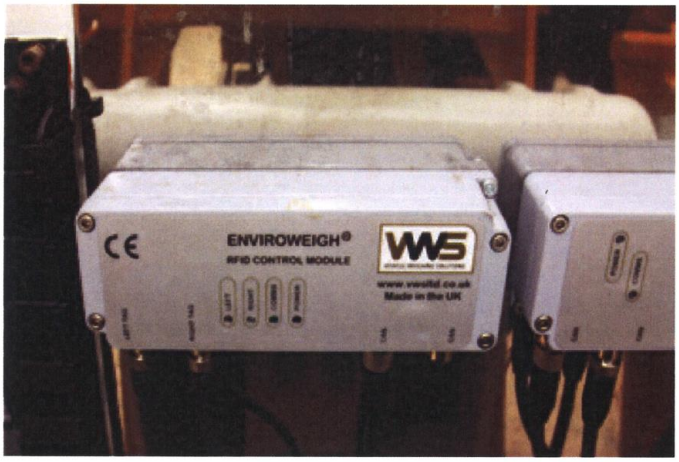

Figure 7 RFID control box at rear of vehicle

Figure 8 Labelled weigh control enclosure

Figure 9 Tilt sensor type IND350-INC