DANAK
PROD Reg. nr 7026

FORCE Certification

EU Type Examination Certificate

No. 0200-MID-08121 Revision 2

AWS

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 **Poul Tarp A/S**
Jomfruløkken 4
8930 Randers NØ
Denmark

In respect of Vehicle or stationary mounted automatic catch weighing instrument designated AWS with variants of modules of load receptors, load cells and peripheral equipment.
Accuracy class Y(a) or Y(b).
Maximum capacity: 10 kg ≤ Max ≤ 5000 kg.
Verification scale interval: $e_i = Max_i / n_i$.
Maximum tare: ≤ -Max
Maximum number of verification scale intervals: n ≤ 3000 for class Y(a), and n ≤ 1000 for class Y(b). (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 19 pages.

Issued on **2020-09-15**
Valid until **2030-06-11**

Jens Hovgård Jensen
2020-09-15

Digitally signed by Jens Hovgård Jensen
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FORCE Certification references:
Task no.: 119-36123.90.30 and ID no.: 0200-MID-09148

Signatory: Jens Hovgård Jensen

Descriptive annex

Contents

1. Introduction

The weighing instrument is designated AWS, which is a system of modules consisting of an digital terminal, connected to one or more load cell amplifier(s) and peripheral equipment such as printers or other devices, as appropriate. To each load cell amplifier can be connected to one or more separate load cells. The power supply is 10-30V DC and it may be supplied from a vehicle battery.

AWS designates automatic weighing system fitted on vehicles or stationary equipment.

The instrument is a Class Y(a) or Y(b), self-indicating weighing instrument. The scale is either single-interval or multi-interval.

The indicator consists of display and keyboard, power supply, microprocessor control circuitry, communication ports and SD card for storage of calibration settings and weighing results - contained within a single enclosure.

The Load Cell Amplifier consists of 1 or more inputs each for 1 load cell and is having individual supply, microprocessor control circuitry, power supply, and communication port contained in a single enclosure.

The modules appear from Sections 3.1 to 3.4; the principle of the composition of the modules is set out in Sections 6.1 and 10.

The type designator is describing the weighing systems:

xWS	**-aab**	**-c**	**-d**	**-eem**	
A					Automatic mobile or statonary weighing system
	04				LCI II / LCA II weighing system
	b				Number of load cells connected (hexadecimal)
		A			Box-shaped weighing system
		C			Platform weighing system
		D			Floor weighing system
		H			Lift weighing system with inclination compensation
		J			Weighing hook for crane
			d		number of intervals
				eem	maximum load [kg] ee, first 2 digits m, multiplier

Example, AWS-042-H-3-301, automatic weighing system with 4 channel load cell amplifier, 2 load cells, lift weighing system with inclination compensation, 3 intervals and maximum 300 kg.

2. Description of the construction and function

The AWS weighing instrument contains an indicator and one or more load cell amplifier(s). The load cell amplifiers can be grouped in 1 to 3 weighing system(s). The indicator and the load cell amplifier are normally separate units but can also be joint together in a common enclosure.

2.1 Indicator

The digital terminal is named LCI II. Its specifications are listed in section 3.1.

2.1.1 Construction

2.1.1.1 Enclosure

The LCI II is housed in an aluminum enclosure approx. 23 cm wide, 12 cm high and 9 cm deep (Fig. 2a, 2b). This enclosure is designed to meet an IP 67 rating.
The enclosure contains a printed circuit board.
The front panel of the enclosure contains:

- A graphical LCD display with adjustable backlight
- A membrane keyboard with up to 25 keys for entering commands or data to the weight system. Each key is identified with a name and / or pictogram.

The bottom panel of the enclosure contains gland connectors for connection of:

- DC power supply
- One or more load cell amplifiers. Daisy chain CAN bus including power supply
- CAN interface for optional use
- RS485 serial port for optional use
- serial RS232 serial interface for optional use
- Digital I/O control signals PNP type for optional use

2.1.1.2 Electronics

The electronics are contained on a printed circuit board:

- DC/DC power supply
- Microcontroller with internal/external program FLASH, internal/external RAM and and slot for sd-card memory card
- Inclinometer 3 axis
- Graphical display interface
- Keyboard interface
- CAN interface with power for the load cell amplifier(s)
- CAN interface, isolated for optional functions
- RS485 port, isolated for optional functions
- RS232 interface with power for optinal functions
- Digital input and output port for monitoring and controlling the weighing functions. PNP type

All serial and digital ports for peripherals are implemented as "protective interface".

2.1.2 Functions

The LCI II indicator front panel displays per default the actual weight value for one or more load receptors/weighing systems. Setup and control of the weighing system(s) is done from the indicator user interface or communication interface. The weight value(s) may be transmitted to peripheral equipment for recording, processing or displaying. The primary functions provided are detailed below:

2.1.2.1 Power-up

A self-test is performed to ensure the system integrity. Check for connected load cell amplifier(s) and updating them with operating parameters. If the SD card is missing the display remains blank.

2.1.2.2 Display range

The weight indicators will display weight values in the range from -MAX to MAX (gross weight).

2.1.2.3 Weighing result

See out in section 2.6.

2.1.2.4 Operator information

If the actual weight is more than $9 \times e_1$ lower than the zero point, the text "<MIN" will be shown on the display. If the actual weight is greater than MAX, the text ">MAX" will be shown.

If weight value calculated in the going down window (see Fig. 7) is greater than the MAX TARE setting and the MAX TARE check is enabled, the display will show ">MAX TARE".

If tilt alarm is enabled and maximum tilt limit setting is passed, the text "TILT" will be shown constantly. If half of the tilt setting is passed, the display will alternate by showing the actual weight or the text “TILT”.

The indicator has a number of general and diagnostic messages, which are described in detail in the User manual.

2.1.2.5 Semi-automatic zero setting

From the user interface the zero-point can be semi-automatic adjusted up to 4 % of MAX, when automatic mode is not enabled.

2.1.2.6 Software version

The software version of the indicator is displayed during the power up sequence.
The format of the LCI II software record is 746021 v02.xxx
where ‘746021’ is the software name, ‘v02’ is the version of the legal software, and ‘xxx’ is the version of the none legal software including bug fixes.

The software version of the LCI II can be shown via the user interface by selecting MENU, SETTINGS, UNIT.

2.1.2.7 Communication

The indicator can be connected to one or more load cell amplifiers in a CAN bus daisy chain configuration for retrieving groups of load cell values and inclinometer information from each of the load cell amplifier(s) connected.

2.1.2.8 Alibi backup

When a weighing is done, the indicator saves the weight including various information and a time-stamp.

The storage capacity is 30 days of registrations. If the storage is filled up, the registrations will be erased one day at a time from the oldest end.

The stored registrations can be recalled for being displayed and optionally printed from user interface or communication interface.

2.2 Load cell amplifier

The load cell amplifier is named LCA II. Its specifications are listed in section 3.2.

2.2.1 Construction

2.2.1.1 Enclosure

The LCA II is housed in a polyester box approx. 16cm wide by 7.5cm high by 5.5cm deep. This enclosure is designed to meet an IP 67 rating,

2.2.1.2 Electronics

The electronics are contained on one printed circuit board (see Fig. 1b):

- Connectors for 4 load cells, power supply and serial communication
- DC/DC power supply galvanic isolated
- Individual load cell excitation voltage supply. Short circuit protected.
- Load cell A/D converters
- Inclinometer 3 axis
- Microcontroller with on-chip program FLASH, static RAM and EEPROM
- CAN bus interface for communication with the indicator.
- Optional RS485 interface for digital load cells

The CAN bus communication interface is designed as protective interface, galvanic isolated. CAN bus and RS485 bus termination is selectable on the circuit board.

2.2.2 Function

The LCA measures signals from one or more connected load cells and a 3-axis inclinometer and temperature. The measured signals are preprocessed, before they are send to the indicator for further processing.

2.2.2.1 Setup and control

All setup and control parameters are sent from the indicator at power-up.

2.2.2.2 Software version

The format of the LCA II software record is 746020 v01.xxx
where '746020' is the software name, 'v01' is the version of the legal software, and 'xxx' is the version of the none legal software including bug fixes.

The software version of the connected LCA II(s) is viewable on the indicator. Press MENU, LCA, LCAx, SETTINGS, UNIT.

2.3 Inclinometers

The load cell amplifier is fitted with an inclinometer for measuring the inclination of the load receptor. The inclination values are sent to the indicator where they are used for correction of the weight value.

The indicator is fitted with an inclinometer sensor too for measuring the inclination of the whole weighing system. The inclination values are used for tilt warning/alarm. The maximum tilt limit can be configured from 0 % up to 20 % individually in each of the four directions.

2.4 Load receptors, load cells and load receptor support

Set out in Section 3.3.

2.5 Interfaces and peripheral equipment

Set out in Section 4.

2.6 Automatic weighing function

2.6.1 Automatic lift weighing - dynamic

Fig. 7 shows the principle of weighing the content of a container during emptying. A weight value is calculated automatically from measurements taken in the going up window and measurements taken in the going down window. The net weight is the first value subtracted from the second one. The net weight is rounded according to the actual verification scale interval.

2.6.2 Automatic lift weighing – static

Fig. 7 shows the principle of weighing the content of a container during emptying. A weight value is calculated automatically from a measurement taken during stopping the movement of the lifter in the going up window and a measurement taken during stopping the movement of the lifter in the going down window. The net weight is the first value subtracted from the second one. The net weight is rounded according to the actual verification scale interval.

3. Technical data

3.1 Indicator

Type:	LCI II
Accuracy class:	Y(a) or Y(b)
Weighing range:	Single-interval, multi-interval or multi-range (up to 6 intervals)
Maximum capacity, Max_i:	10 kg to 5,000kg
Verification scale interval:	$e_i = Max_i / n_i$
Number of Verification Scale Intervals:	$n \leq 3000$ per interval/range for class Y(a) $n \leq 1000$ per interval/range for class Y(b)
Internal resolution:	> 1,000,000 counts
Maximum tare effect:	≤ -Max
Power supply:	24V DC nominal, 10-30V DC approved
Temperature range:	-25° to 40° C
Peripheral interface:	Set out in Section 4

3.2 Load cell amplifier

The load cell amplifier has the following characteristics:

Type:	LCA II
Number of load cell connections	4 separate channels
Internal resolution:	> 1,000,000 counts
Load cell excitation voltage:	5 V DC
Minimum input-voltage per VSI:	0.3 µV
Fractional factor:	p'i = 0.5
Analogue input range from load cell:	0 to 10 mV
Circuit for remote sense:	No sense
Minimum input-impedance:	350 ohm
Maximum input-impedance:	1200 ohm
Power supply:	24V DC nominal, 10-30V DC approved
Temperature range:	-25° to 40° C
Peripheral interface:	CAN, RS485

3.2.1 Connecting cable for load cell(s),

Cable between the load cell amplifier and load cell(s) is the supplied and certified load cell cable. 4 wires, shielded.

3.3 Load receptors, load cells, and load receptor supports

3.3.1 General acceptance of load cells

Any load cell(s) may be used for non-critical load receptors this EU Type Examination Certificate provided the following conditions are met:

1) There is a respective OIML Certificate of Conformity (R60:2000 or R60:2017) or a part (test) or evaluation certificate (EN 45501:2015) issued for the load cell by a Notified Body responsible for type examination under the Directive 2014/31/EU.

2) The certificate contains the load cell types and the necessary load cell data required for the manufacturer's declaration of compatibility of modules (WELMEC 2: 2015), and any particular installation requirements. A load cell marked NH is allowed only if humidity testing to EN 45501 has been conducted on this load cell.

3) The compatibility of load cells and indicator is established by the manufacturer by means of the compatibility of modules form, contained in the above WELMEC 2 document, or the like, at the time of EC verification or declaration of EC conformity of type.

4) The load transmission must conform to one of the examples shown in the WELMEC 2.4 Guide for load cells.

3.3.2 Specific load cells

The certified load cells, which are listed below, may be used for critical load receptors.

Manufacturer	Load cell type	Interface
ESIT Electronics	DT2220	analogue
	DT2250	analogue
	DT310i	analogue
	SBS-R-DME	analogue
	SSB-R1-DME	analogue
	SSB-R2-DME	analogue
DAN-Transducer ApS	DT4650	analogue
Welvaarts Weegsystemen	WSSB	analogue
	W-DLC/xx	analogue
Load Indicator AB	DME SB75	analogue
	PM	analogue
Flintec GmbH	PC2H	analogue
	PCB	analogue
Vishay Revere Tranducers B.V.	ABC	analogue
Revere-Transducers Europe BV	RLC	analogue
Schenck Process GmbH	RTN	analogue
Tedea Huntleigh	620	analogue
	1320	analogue
	3510	analogue

3.3.3 Automatic weighing systems

The weighing systems can be mobile fitted on e.g. trucks or stationary systems. Fig. 3 to 6 shows examples.

3.4 Composition of modules

In case of composition of modules, EN 45501:2015 Section 3.5 and 4.12 shall be satisfied.

3.5 Documents

The documents filed at Force Certification (reference 119-36123) are valid for the weighing instrument described here.

4. Interfaces and peripheral equipment

All communication and digital interfaces are characterized as "Protective interfaces", and do not have to be secured.

4.1 Load cell amplifier

The bottom part of the load cell amplifier contains one or more gland connectors for connecting 1 analogue load cell each.
There is also a gland connector available for connecting one or more load cell amplifiers in daisy chain bus configuration using a 4-wire shielded cable. Power supply is routed in the same cable.

4.2 Indicator

The LCI II can be supplied with the following optional interfaces:

- CAN bus
- RS485
- RS232
- PNP 24V

4.3 Peripheral equipment

Connection between the indicator and peripheral equipment is allowed by shielded cable. The instrument may be connected to any simple peripheral device with a CE mark of conformity.

5. Approval conditions

5.1 Compatibility of modules

The composition of modules shall satisfy EN 45501:2015 annex F.

6. Special conditions for verification

6.1 Maximum tare weight

The maximum tare weight is to be determined at initial verification.

6.2 Extended display resolution

In “verification mode” the normal verification scale interval setting is overruled by the “verification mode” verification scale interval. All registrations made while in “verification mode” are marked as not legal.
While in “verification mode” only the selected load receptor/weighing system is active. Verification mode can be selected even if the indicator is locked.

6.3 Verification scenario

The verification testing may be performed using calibrated weights instead of materials.

When using calibrated weights these shall be fasten in the container or on a special stand for weights. As the weights will not be emptied, one shall look at the weighing result for up-weighing and the weighing result for down-weighing, which are shown in verification mode, instead of looking on the net weight of the material emptied.

For down-weighing shall only weighing results for masses less than or equal to maximum tare be considered.

7. Securing and location of seals and verification marks

Seals shall bear the verification mark of the manufacturer or alternative mark of a notified body according to article 20 of the Directive 2014/32/EU.

7.1 Indicator

The indicator holds the legal settings on the SD card. The SD card must be sealed in the connector. Lock the indicator settings must be set to lock mode by pressing MENU, SETTINGS, LOCK, ON, ENTER.

To unlock the indicator, power it shortly without the SD card inserted.

SD card sealing, see example Fig. 2d.

7.2 Load cell amplifier, load cell(s)

The load cell amplifier enclosure must be sealed to prevent dismantling.

Load cell amplifier enclosure sealing. See example Fig. 1c.

7.3 Indicator – load cell amplifier cable

The indicator enclousure must be sealed to prevent dismantling. See example Fig. 2c.

7.4 Peripheral interfaces

All peripheral interfaces are "protective", and do not have to be secured.

8. Location of CE mark of conformity and inscriptions

8.1 CE mark

The CE mark of conformity is placed as shown on Fig. 8, for the Load cell amplifier LCA II. The mark is placed on the side. See Fig. 1a.

Fig. 9, for the Indicator LCI II. The mark is placed on the side. See Fig. 2a.

8.2 Inscriptions plate(s)

The inscription plate shall fulfil the requirements in EU directive 2014/32/EU and in OIML R51:2006.

The plate must be placed on the indicator near the display. If there is more than one load receptor in the system a plate for each weight system is placed on the indicator and on the load cell amplifiers. The serial numbers will identify the weight systems with a "-1" on the first system and "-2" on the second. See Fig. 10, Inscription plate example.

9. Pictures

Fig. 1a, Load Cell Amplifier enclosure

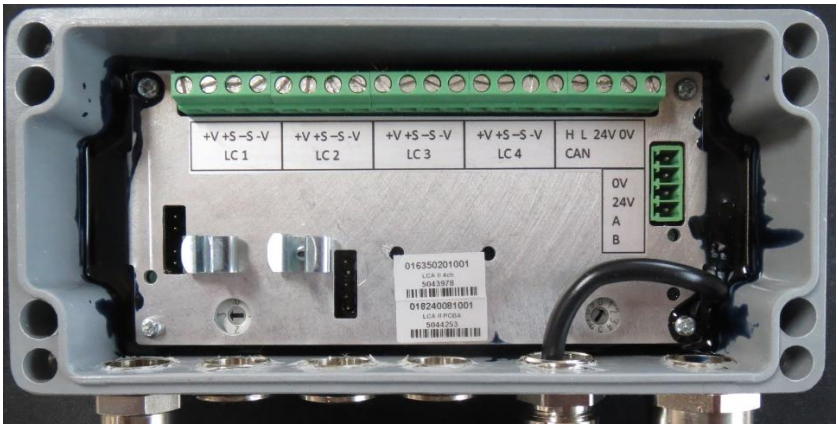

Fig. 1b, Load Cell Amplifier connectors

Fig. 1c, Load Cell Amplifier sealing example

Fig. 2a, Indicator enclosure

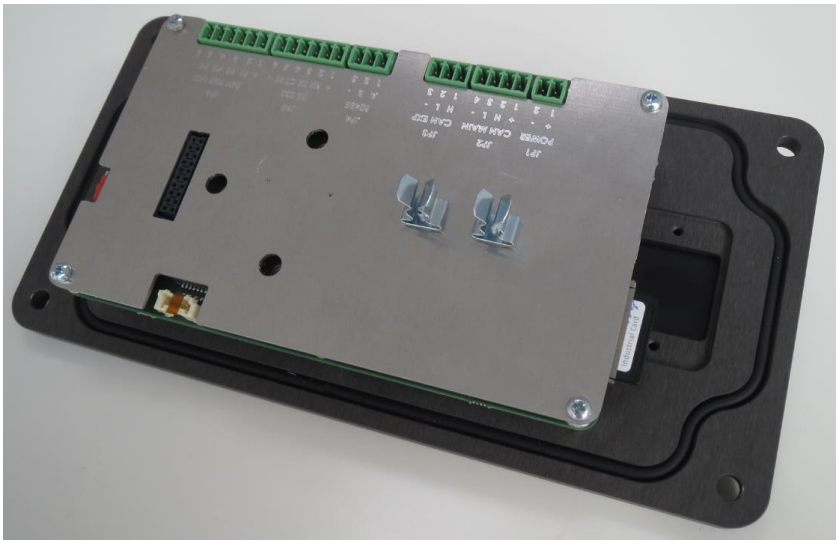

Fig. 2b, Indicator connectors

Fig. 2c, Indicator sealing example

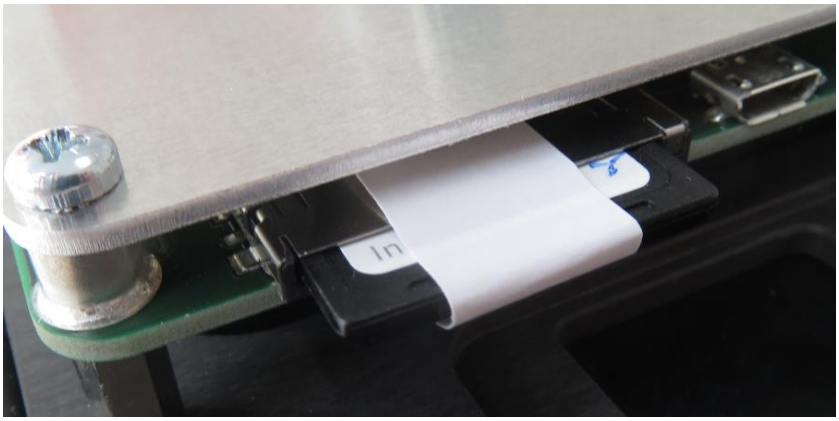

Fig. 2d, Indicator SD card sealing example

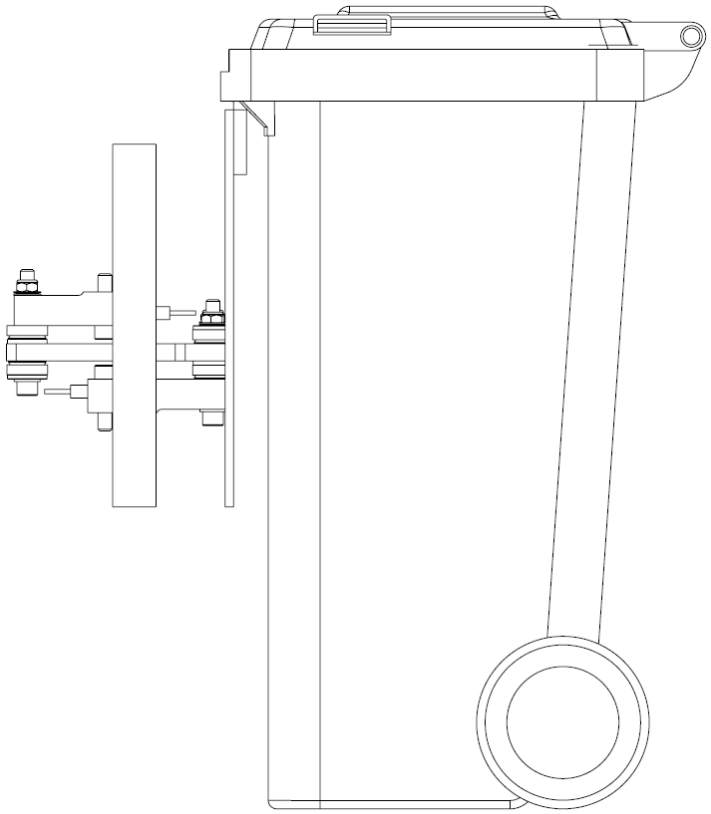

Fig. 3, lift weighing system with container, beam load cell

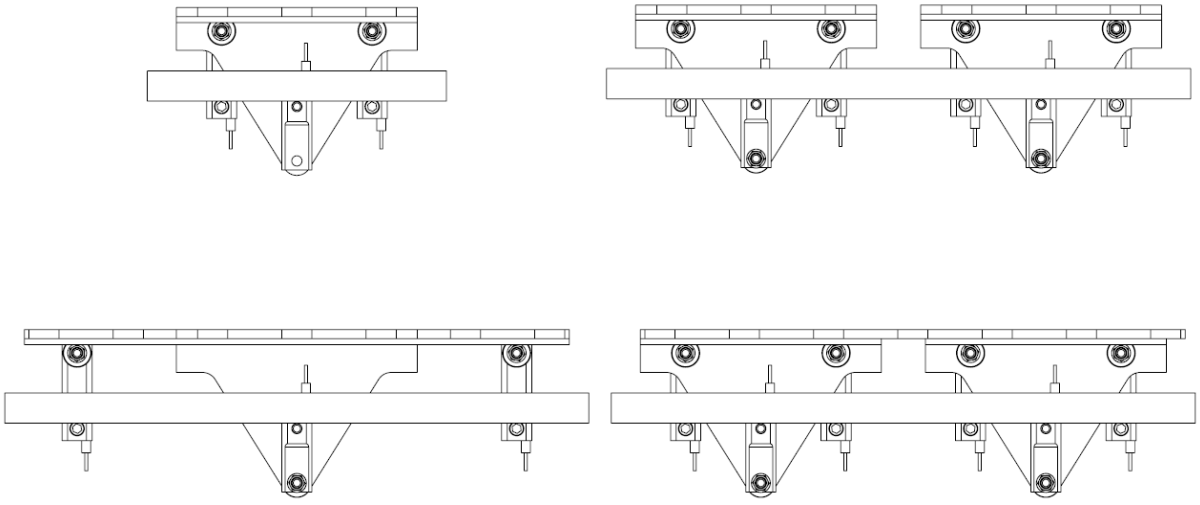

Fig. 3a, load receptors, beam load cell, top view

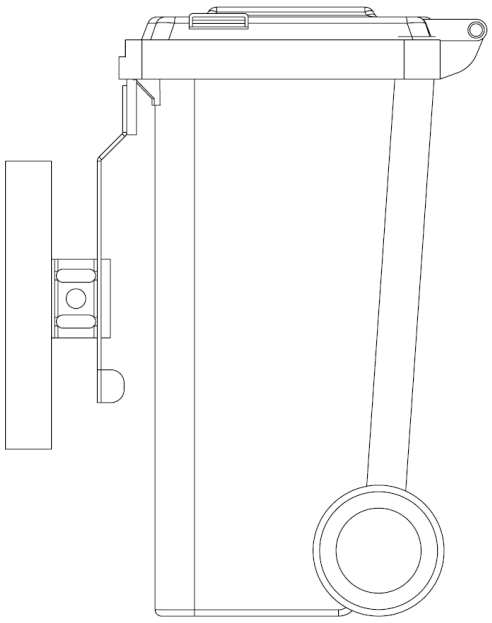

Fig. 4, weighing system with container, single point load cell

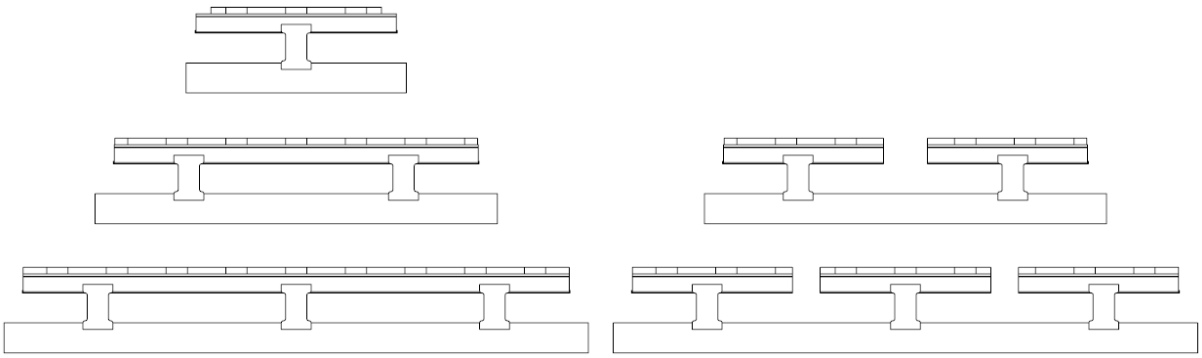

Fig. 4a, load receptors, single point load cell, top view

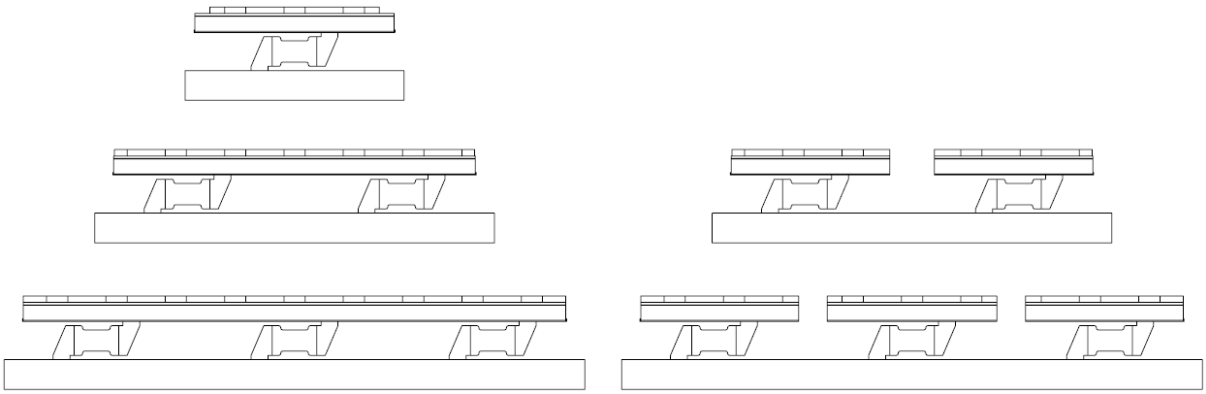

Fig. 4b, load receptors, single point load cell alternative fitting, top view

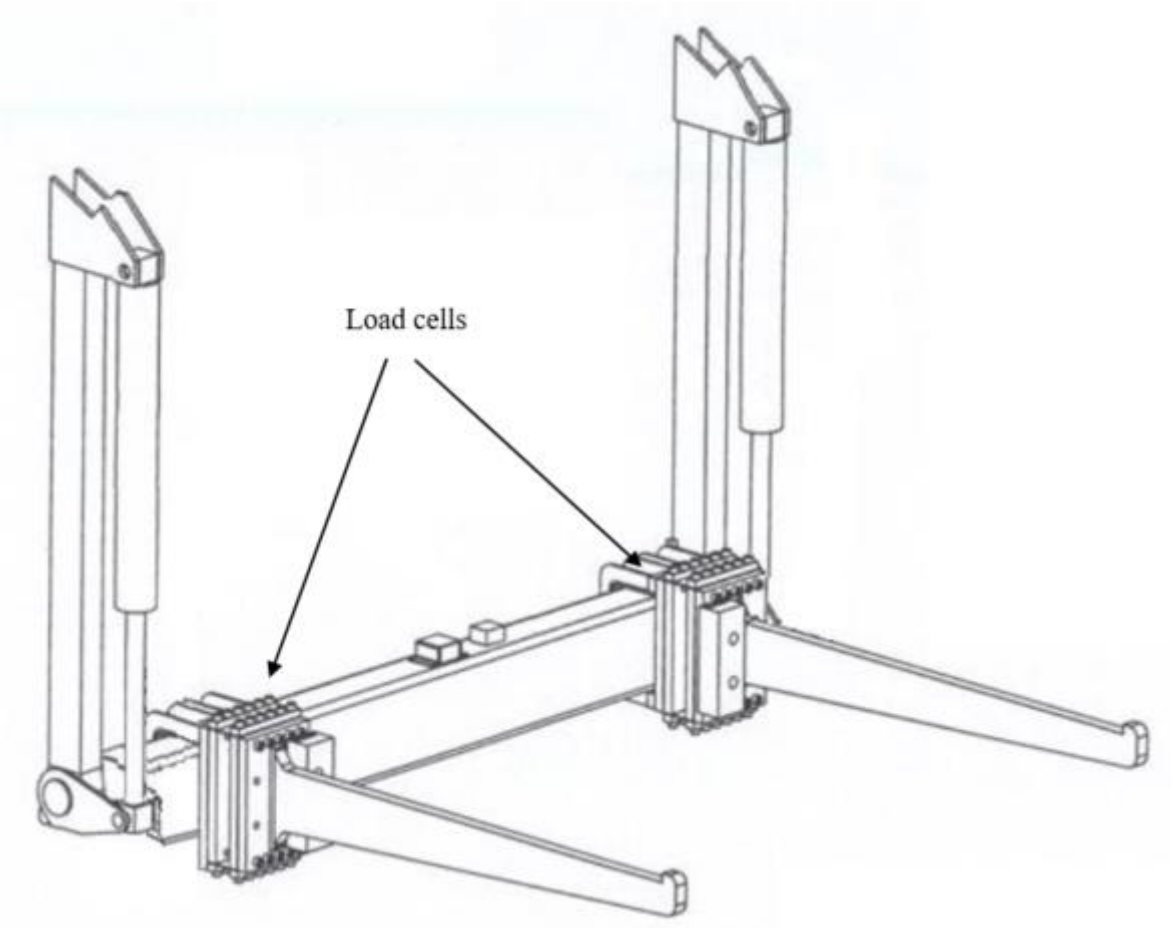

Fig. 5, Lift weighing system - Frontloader

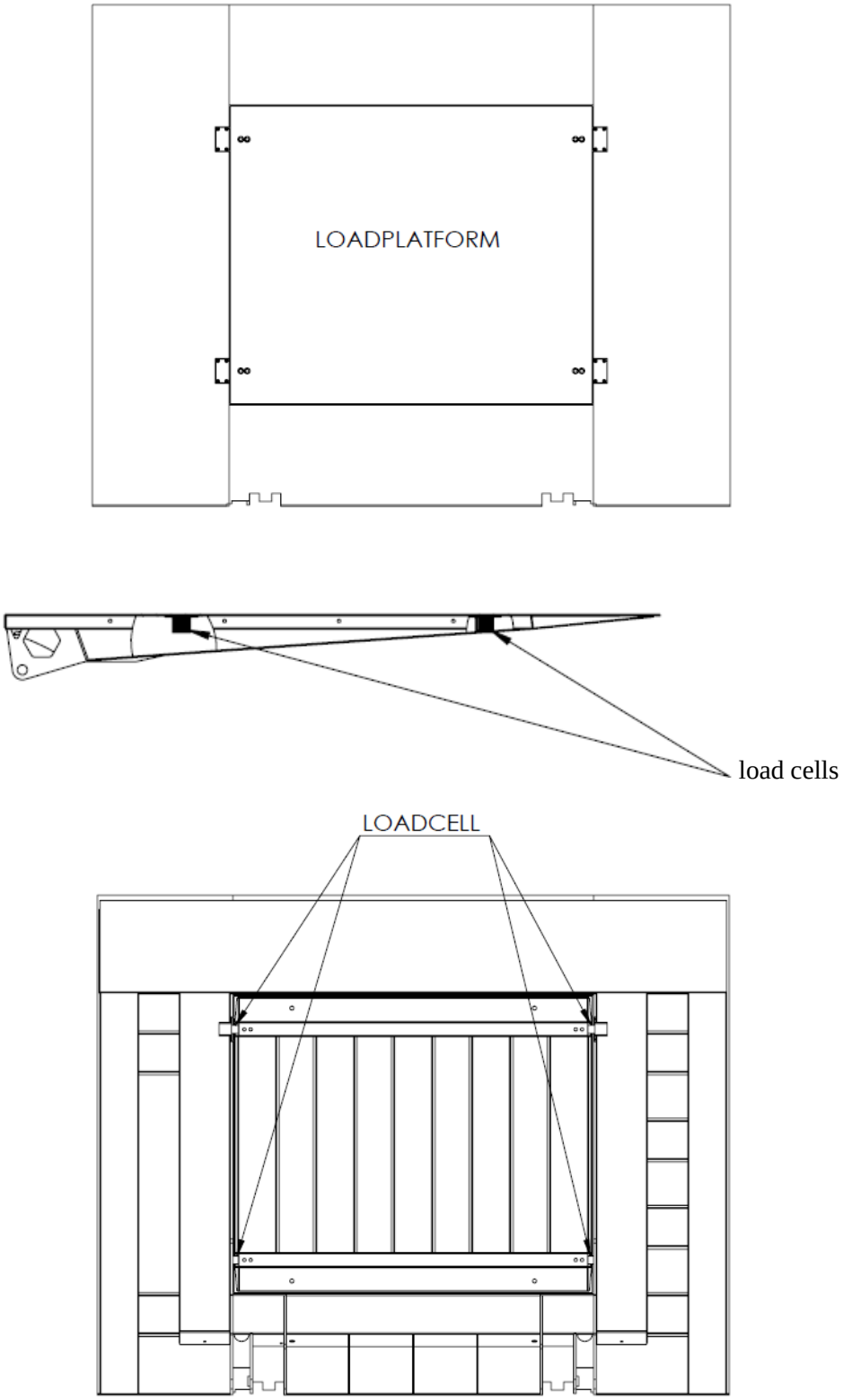

Fig. 6 Tail lift weighing system

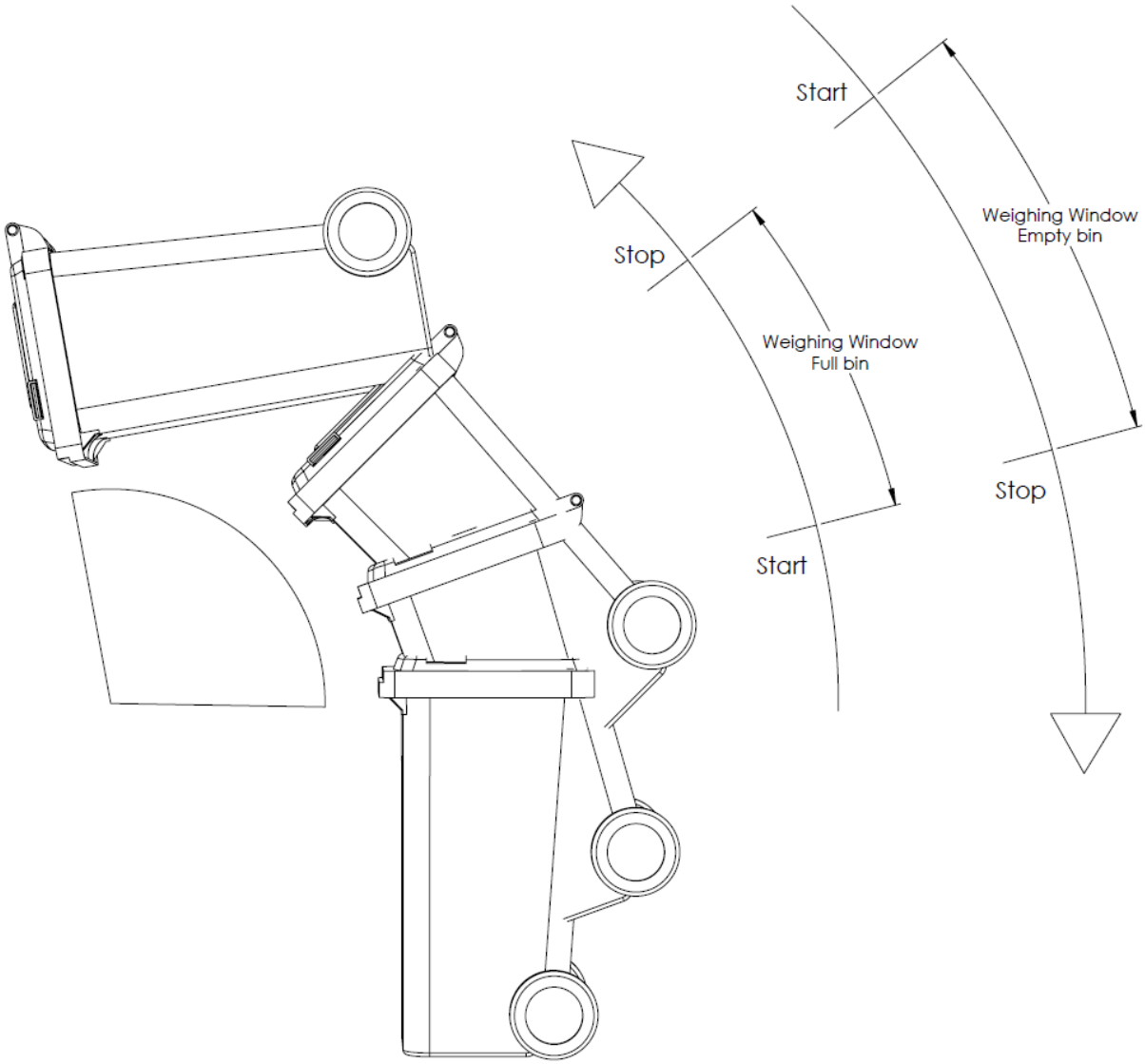

Fig. 7 Container emptying example

Fig. 8, Load Cell Amplifier CE mark

Fig. 9, Indicator CE mark

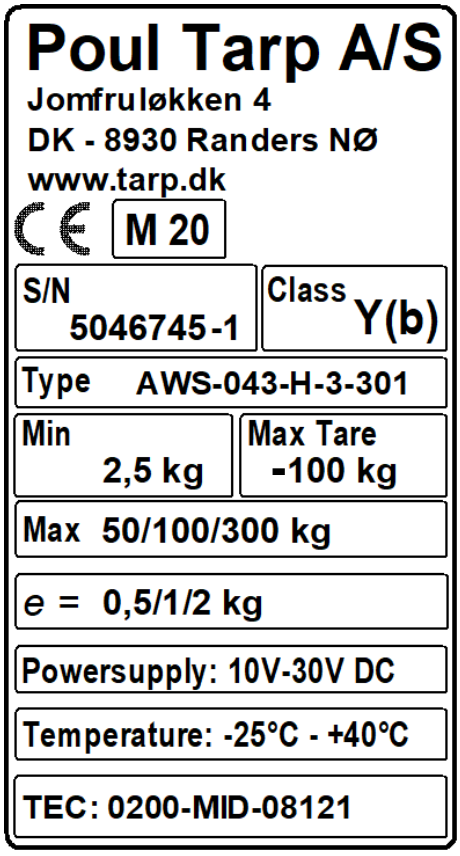

Fig. 10, Inscription plate example