EU Type Examination Certificate

No. 0200-MID-03042

Flexspeed

AUTOMATIC GRAVIMETRIC FILLING 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 of February 26, 2014 on Measuring Instruments (MID).

Issued to	**Kosan Crisplant A/S** P.O. Pedersensvej 22 DK-8200 Aarhus N DENMARK

In respect of	An automatic gravimetric filling instrument designated Flexspeed. Reference class: Ref (1) MaxFill: 20 kg MinFill: 12 kg Verification scale interval: d = 50 g Number of verification scale intervals: n = 3000 (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 Directive 2014/32/EC Annex 1 and the specific requirements in Annex XIII, chapter I & III are met by the application of OIML R61:2004, OIML D11:2004 section 12 & 13 applying severity level 3 and WELMEC Guide 7.2:2015.

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

The annex comprises 12 pages.

Issued on	**2017-12-04**
Valid until	**2027-12-04**

Signatory: J. Hovgård

FORCE Certification references:
Task no.: 117-21948 and ID no.: 0200-MID-03042

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Descriptive annex

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1. Name and type of instrument and modules

The automatic weighing instrument designated Flexspeed is an automatic gravimetric filling instrument.

Flexspeed is a carousal with from 24 to 72 filling stations – depending of model - intended for filling gas cylinders with liquefied petroleum gas (LPG).

The rail of Flexspeed, on which the carousal is running, has at 5 positions a load receptor built into separated parts of the rail. Each load receptor is placed on a load cell, which is connected to a load cell module (LCM) operating as an analogue to digital data processing unit. The LCM transmit the weight to a CUC-Ex weight transmitter working as a digital data processing unit.

The 5 CUC-EX weight transmitters are all connected to the overall CUC-Ex system controller.

The 5 weighing stations of Flexspeed are: 1. Zero setting scale, 2. Residual gas scale, 3. Trend scale, 4. Top-up scale and 5 Check scale. Only the Zero setting scale and the Check scale are legal weighing, while the other three scales are used for determination of the filling speed.

When Flexspeed is running there is only a filling station on the load receptors in approximately 70% of the time, while the other 30% of the time is used for automatic zero-setting.
The Zero setting scale is used for tare balancing the weight of each filling station.
The Check scale's weighing result is used together with the tare balancing result for the filling station and the received preset tare weight of the gas cylinder to determine whether the net filling of the gas cylinder is within the error limits for the preset value of fill, or the cylinder shall be sorted out for manual adjustment.

There are two models of the electronics of Flexspeed: MKIII and MKIV.
MKIV has compared to MKIII updated electronic interfaces with respect to EX protection
The specifications and the software of the two models are identically.

The modules appear from Sections 3.2, 3.3, and 3.4; the principle of the composition of the modules is set out in Sections 6.1 and 10.

2. Description of the construction and function

2.1 Construction

2.1.1 CUC-Ex

Enclosures and keyboard
The CUC module is housed in a plastic enclosure 125 mm wide 245 mm high 90 mm deep. It is designed primarily for industrial use, but may also be used in an office environment. This enclosure is designed to meet an IP65 rating and can be exposed to water and dust.
See Figure 3.

The front panel comprises:
- LCD display
- 16 key sealed membrane keypad (12 keys for encoding and 4 function keys).
  Each key is identified with a name and / or pictograph.
- Push button

The bottom of the enclosure contains:
- A power/communication cord attached to the instrument via a gland connector.
- A load cell module cord attached to the instrument via a gland connector.
- A gland connector for cable to digital inputs (not used).
- A gland connector for cable to digital outputs (not used).

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The CUC-Ex produces a voltage of 5 VDC for powering the LCM module.

Electronics

The CUC module consists of microprocessor control circuitry with volatile and non-volatile memory, keyboard, and display.

Weight transmitter

The function of it is to control the weighing sequence and receive weight information from the load cell interface module (LCM) and send it to the system controller. The digital represented weight is shown in the display for service purposes only.

System controller

The function of it is the overall control of the filling based on received information from the weight transmitters and the from an external source received preset tare value of the individual gas cylinders.

2.1.2 LCM

The LCM module is housed in aluminium enclosure approximately 80 mm wide, 75 mm high, and 60 mm deep. The enclosure is designed to meet an IP66 rating and can be exposed to water and dust.

The side of the enclosure contains:
*   A 4 pin female connector for connecting the CUC Ex weight transmitter.
*   A gland connector for access to the load cell input terminal block inside the enclosure.

Electronics

The LCM module comprises a microprocessor circuitry, analogue to digital conversion circuitry, a 4 wire interface for load cell input and a serial communication interface to the CUC-Ex, non-volatile memory for storage of calibration data within a single enclosure. The function of the LCM module is to convert the load cell signal into a digitized representation and send information to the CUC-Ex. All the configuration parameters for the weight that are under legal metrology control are stored in the non-volatile memory of the LCM module.

The module is specified in Section 3.2.

2.1.3 Power supply box / junction box

The CPI-Ex power supply for the instrument is of universal switching type and can accept an input voltage from mains from 100 to 240 VAC 50 or 60 Hz. Several CPI-Ex power supplies can be connected in parallel.

When the instrument is powered, a junction box is inserted between the CUC and power source. The power supply includes an interface to a bi-directional RS485 serial interface.

2.1.4 Load cells

Set out in Section 3.3.

2.1.5 Load receptor

Set out in Section 3.4.

2.1.6 Interfaces and peripheral equipment

Set out in Section 4.

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2.2 Functions and devices

The automatic weighing instrument has the following permitted functions and devices that are subject to the Measuring Instrument Directive:

- Power up test
- Initial zero setting device (max. 20 % of Max)
- Zero tracking device (max 4 % of Max)
- Automatic zero setting device (max 4 % of Max)
- Automatic tare weighing
- Preset tare weighing
- Gravity compensation
- Event Counter
- Detection of significant fault

2.2.1 Software version

The software of CUC-Ex MKIII and CUC-Ex MKIV are the same.

The software version of a CUC-Ex can be shown by selecting: Menu -> Service -> General -> Version. After this press 'Enter' to show LCM software version on weight transmitters.

The non-volatile memory of the LCM module holds a serial number and an incremental event counter number.
S/N [YYMMDD-XXXX]
where YY=year, MM=month, DD=date followed by a number in succession.
EVT CNT [kkkkk] is the LCM event counter value. The counter is a non-resettable value that increments once each time special operational mode of the weighing instrument is entered and one or more changes are made to the configuration of the legal parameters of the weighing instrument.

The approved software versions are:
CUC-Ex system controller   306xx
CUC-Ex weight transmitter   305xx
LCM load cell module   101xx

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3. Technical data

The automatic weighing instruments and its modules are set out as follows:

3.1 Automatic gravimetric filling instrument

Type:	Flexspeed
Electronic controller and weight transmitters:	CUC-Ex MKIII or CUC-Ex MKIV
Reference class:	Ref(1)
Accuracy class:	X(1)
Maximum capacity (Max):	$90 \text{ kg} \leq \text{Max} \leq 150 \text{ kg}$
Maximum filling capacity (MaxFill):	20 kg
Minimum filling capacity (MinFill):	12 kg
Verification scale interval (d):	0.05 kg
Weighing range:	Single-interval
Number of Verification Scale Intervals (n):	≤ 3000
Maximum tare effect:	$\leq 100 \text{ \% of Max}$
Maximum preset tare effect:	$\leq 100 \text{ \% of Max}$
Filling speed:	$\leq 3800 \times N/72$ cylinders/hour for CUC-Ex MKIII $\leq 4200 \times N/72$ cylinders/hour for CUC-Ex MKIV, where N is the number of filling stations on the carousal
Temperature range:	-10° to +55° C
Weighing mode:	dynamic
Electromagnetic class:	E2
Humidity:	Non-condensing
Supply voltage:	100 to 240 VAC (50/60 Hz) or 12 VDC battery
Peripheral interface:	Set out in Section 4

3.2 LCM – load cell module

The analogue to digital data processing device has the following characteristics:

Type:	LCM
Fractional factor:	$p_i = 0.5$
Minimum input-voltage per VSI:	$1 \ \mu V$
Excitation voltage:	5 Vdc
Analogue range:	0 to 10 mV
Circuit for remote sense:	None
Minimum input-impedance:	175 ohm for CUC-Ex MKIV 350 ohm for CUC-Ex MKIII
Maximum input-impedance:	1200 ohm

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3.2.1 Connecting cable between the LCM and the load cell

Cable between LCM and load cell: 4 wires (no sense), shielded

Cable length: The certified length of the load cell cable.

3.3 Load cells

Flintec PCB 250kg C3

3.4 Load receptors

Construction: Rail placed on the load cell.

Maximum capacity: 150 kg

Reduction ratio   1

Load cells   One load cell according to section 3.3

3.5 Documents

The documents filed under No. 117-21948 are valid for the weighing instruments described here.

4. Interfaces

4.1 Interfaces

4.1.1 Load cell interface

A 4-terminal connector for the load cell is positioned inside the LCM and is accessed through a gland connector on the load cell module enclosure.

4.1.2 Serial I/O interface

The communication between a LCM and its CUC-Ex weight transmitter as well as the communication between the CUC-Ex system controller and the CUC-Ex weight transmitters are done using RS485.

The CUC-EX system controller has an external RS485 connection through the junction box and power supply. This connection is used to receive the preset tare values of the gas cylinders.

4.1.3 Power supply / junction box

The power supply includes electronics to convert the main power supply to appropriate supply voltage for the weighing system. Flexspeed will normally use more than one power supply. These are connected in parallel.

The junction box includes connectors for distributing the supply voltage.

5. Approval conditions

5.1 Connection of cables

All cables shall be shielded, and the shield shall be properly EMC wise connected to the housing / connector in both ends.

6. Special conditions for verification

Verification shall only be performed on the Zero setting scale and the Check scale.

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7. Securing and location of seals and verification marks

7.1 Securing and sealing

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

7.1.1 LCM

The configuration and calibration parameters are stored in the LCM and access to these are protected by a password and an event counter. The electronics of the LCM unit is protected against dismantling/adjustment by sealing the enclosure of the with brittle stickers across the assembly of the enclosure (see figure 4).

7.1.2 LCM - load cell connector - load receptor

Securing of the load cell connector with the LCM is done by means of a brittle sticker (see figure 4).

7.1.3 CUC-Ex

The electronics of the CUC-Ex units is protected against dismantling/adjustment by sealing the enclosure of the CUC-Ex with brittle stickers across the assembly of the enclosure (see figure 3).

8. Location of CE mark of conformity and inscriptions

8.1 CE mark

The CE mark of conformity and the supplementary metrological marking according to article 20 to 22 of Directive 2014/32/EU shall be located on the identification plate.

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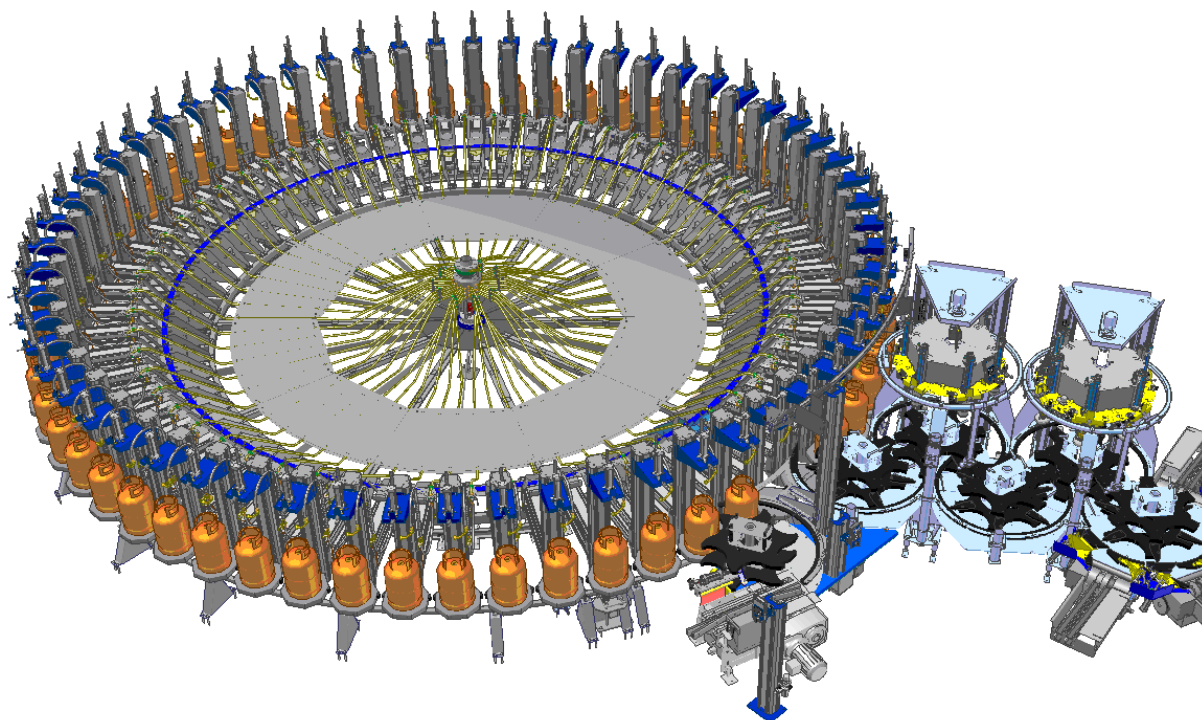
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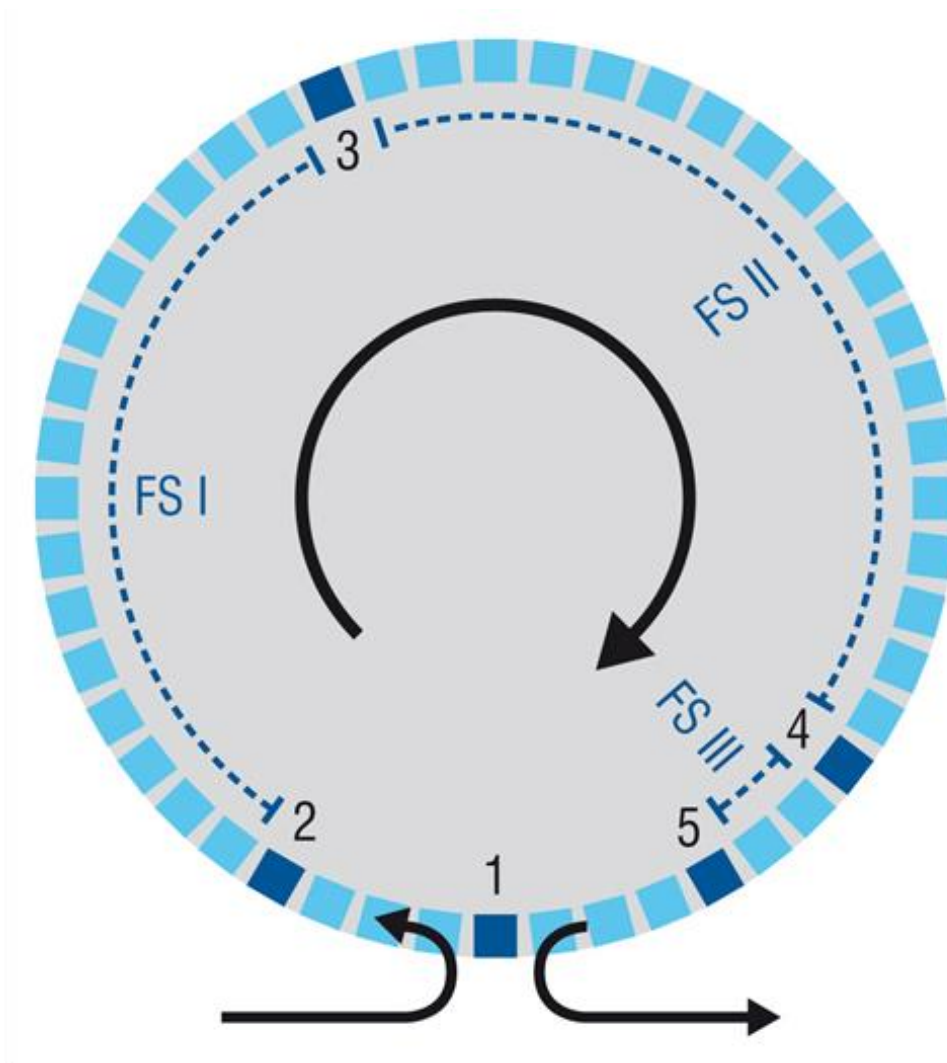
8.2 Inscriptions

The identification plate shall bear the following inscriptions:

- Manufacturer's trademark and / or name

- Postal address of manufacturer

- Type designation

- Serial number

- Reference class

- Accuracy class

- Max, MaxFill, MinFill and d =
  (these shall additional be duplicated near the display of the CUC-Ex system controller, unless the identification plate is located near the display of the CUC-Ex system controller)

- Temperature range: -10 °C / +55 °C

- Electromagnetic class: E2

- Humidity: Non-condensing

- Maximum weighing speed (cylinders/hour)

- Type examination certificate number

- Event counter of LCM in Zero-scale and Check-scale

- Software versions of LCM and CUC-Ex n Zero-scale and Check-scale and of CUC-Ex system controller.

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9.   Pictures

Figure 1 Flexspeed

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Figure 2 Sketch of Flexspeed carousal with position of the 5 load receptors and 3 filling stages(FS).

1 Zero setting scale
2 Residual gas scale
3 Trend scale
4 Top-up scale
5 Check scale

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Figure 3 CUC-Ex sealing - . applies for both system controller and weight transmitters.

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Figure 4 Sealing of LCM

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