



EU-type Examination Certificate

0402-MID-SC1392-16

Issued to

Cargotec CHS PTE LTD BROMMA, 15 Tukang Innovation Drive Singapore 618299 Singapore.

In respect of (type of instrument)

An electronic automatic weighing instrument.

In accordance with

The Measuring Instruments Regulations STAFS 2016:1 and The Regulations and Guidelines concerning automatic weighing instruments STAFS 2016:7, implementing in the NB's country law the Directive 2014/32/EU of 26 February 2014 on measuring instruments (MID).

Applicable essential requirements of directive 2014/32/EU

- Annex I, Essential requirements
- Annex VIII (MI-006), Automatic weighing instruments

Harmonised standards and normative documents used

Applicable parts of the following normative documents referred to in the Official Journal of the European Union 2006/C 269/01 OIML R51, edition 2006, Automatic catchweighing instruments.

Further applied documents

- WELMEC 2.6, Guide for the testing of automatic catchweighing instruments (Issue 3)
- WELMEC 7.2, Software Guide (Issue 5)
- WELMEC 8.16-1 Issue 3

Rated operating conditions

Measurand:	Weight of discrete loads in tonnes	Mechanic environment class:	NA
Accuracy class:	Y(b)	Electromagnetic environment class:	E2
Measurement range:	10e-200 e	Climatic environment:	-20 to +60°C

Miscellaneous

Valid until December 19, 2026. This is the first issue of this certificate.

The principal characteristics, approval conditions are set out in the appendix hereto, which forms part of the approval documents. All the plans, schematic diagrams and documentations are recorded under reference files 5P06890.

SP Technical Research Institute of Sweden
Certification - Notified Body No. 0402

Lennart Aronsson

Bengt Gutfelt



Certificate 0402-MID-SC1392-16, issue 1, dated 2016-12-19

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Appendix

The instruments / measuring systems must correspond with the following specifications:

1 Design of the instrument

1.1 Construction

The Load Sensing System (the instrument) is designed to weigh containers dynamically during a regular lift cycle. The system is integrated with the spreader through load sensors mounted to each twist lock pin. The spreader, in turn, is attached to a crane, for example a Yard Crane, Ship to Shore Crane, Reach Stacker or Straddle Carrier. A system typically comprises four load sensors that can weight containers of varying sizes. Twin spreaders equipped with load sensing has eight load sensors connected to the same network and sharing the same control unit. This system can provide the independent weight of each container (see figure below).

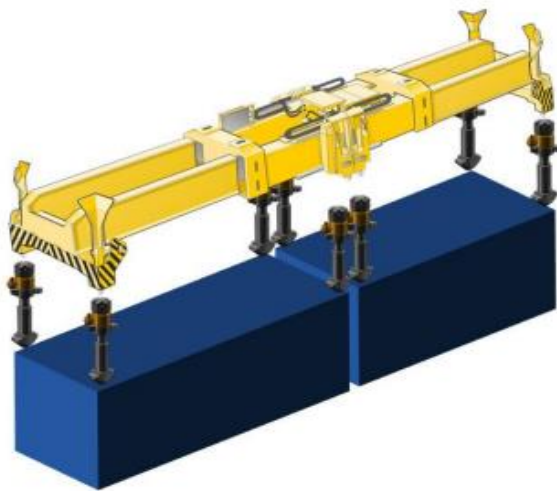


Figure 1: Concept of twistlock-mounted load sensing

There are basically two versions of load sensing system: one in which the control, monitoring and data processing is an integrated part of the spreader control system (SCS) and one in which all load sensing functionality is stand-alone and handled by separate units, see below.

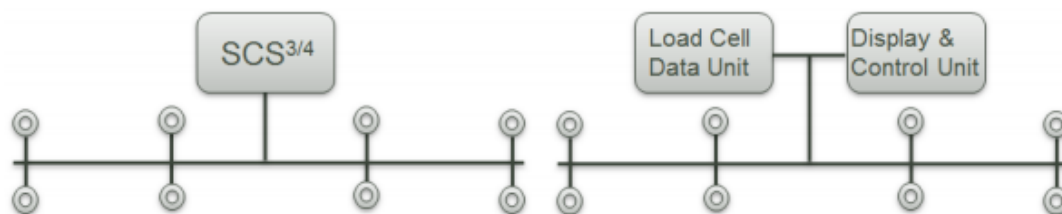


Figure 2: Integrated Load Sensing System and Stand-Alone Load Sensing System

1.2 Measurand sensor

Type	0120
Manufacturer	Brosa
Capacity	15000 kg
EMC class	E2

1.3 Measurand processing

Hardware

The weighing instrument consists of four to eight twistlock-mounted load cells, CANopen network, control unit and indicating unit.



Figure 3: The load sensor

Software

The validation of software was based on the essential requirements given in MID and WELMEC Guide 7.2. A report with number 5P06890-02-1, dated 2016-12-15 was issued and is held by SP.

Software version

The following program versions are approved:

Type of program	Program version
Measuring module	1

1.4 Indication of the measurement results

As control unit it is possible to use different displays and interfaces.

Type	Description
SCS3	SCS control unit, gen 3
SCS4	SCS control system, gen 4
CR0403	Data acquisition unit for stand-alone load sensing
CR0451	Control unit for stand-alone load sensing

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SCS3

The main task of the SCS is to control the spreader movements. Load sensing control and monitoring is an integrated module. The SCS is connected to the load sensing network as well as the crane interface.



Figure 4: SCS control unit, gen 3

Version handling:

The type approved version of the SCS3 software can be accessed through the menus in the GUI.

SCS3 GUI -> Spreader-> Settings-> Load Cells -> Audit Trail:

Type	Value	Date - Time
Adjustment Factor set	1.05	2016-11-03-15:20:36
Adjustment Factor set	1.1	2016-11-03-15:19:39
All Loadcells 0 - calibrated	1001	2016-11-03-15:13:44
Loadcell 44 Serial Number	44	2016-11-03-15:05:54
Loadcell 43 Serial Number	43	2016-11-03-15:05:54
Loadcell 42 Serial Number	42	2016-11-03-15:05:54
Loadcell 41 Serial Number	41	2016-11-03-15:05:54

Audit Trail
Load Cells

System Version: 1

MID Certificate:
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OIML Certificate:
R51.2006-SE1-16.01

Accuracy class: Y(b)
Verification scale interval: e=200
Actual scale interval: d=200

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SCS4

The SCS4 is an upgraded version of SCS3. The main task of the SCS is to control the spreader movements. Load sensing control and monitoring is an integrated module. The SCS is connected to the load sensing network as well as the crane interface.

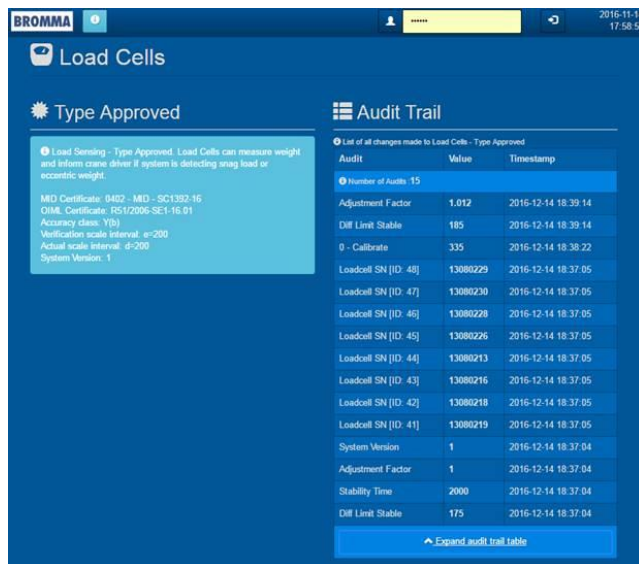


Figure 5: SCS control unit (gen 4)

Version handling:

The type approved version of the SCS4 software can be accessed through the menus in the GUI.

- 1) Connect laptop to SCS4 Ethernet interface and open web browser with address 192.168.2.99:



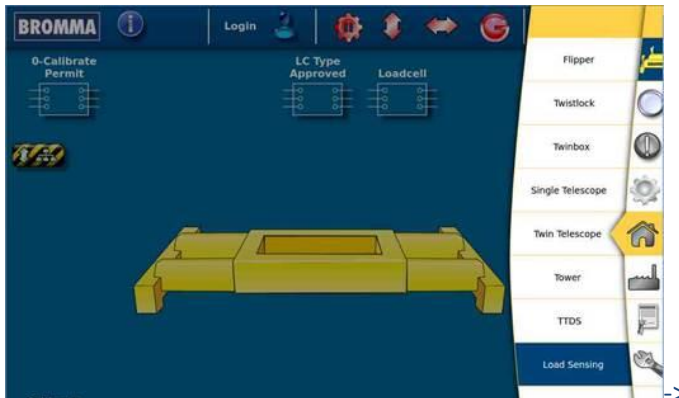
- 2) SCS4 GUI -> Menu -> Load Sensing->LC Type Approved

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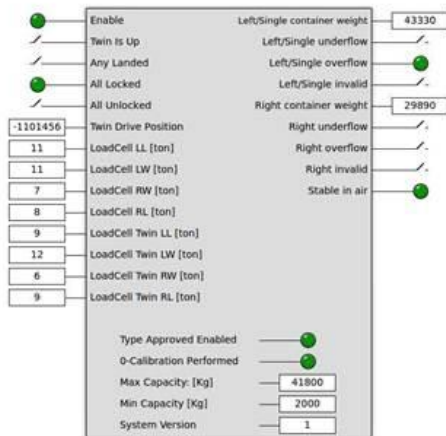
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block for LC Type Approved



CR0403

The CR0403 serves as the data acquisition unit for the stand-alone system. It is connected to the CR0451 control unit as well as the crane and the load sensing network.

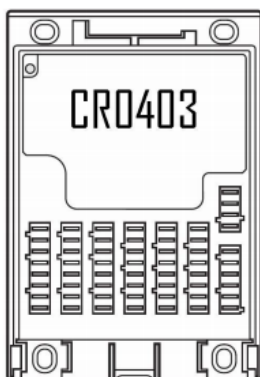


Figure 6: Data Acquisition Unit in the stand-alone system

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CR0451

The CR0451 control unit is used for load sensing communication, parameter settings and monitoring of the current weight data.

The CR0451 can also be used as a simple indication unit. Below are some twin container examples: “Not stable”, “Stable”, “Overflow”, “Underflow”. Overflow/underflow indicates that weight is outside certified range.

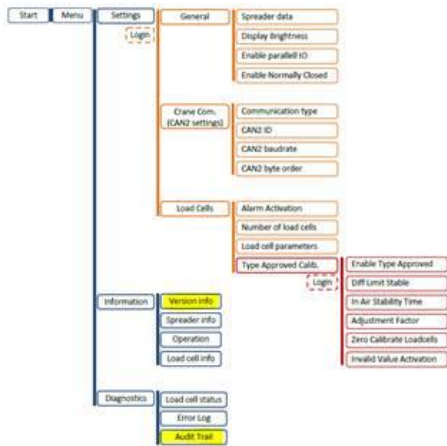


Figure 7: Stand-alone control unit configured as indication unit

Version handling:

The type approved version of the stand-alone system software can be accessed through the menus in the GUI.

Stand Alone: Start->Menu->Information->Version Info:



1.5 Optional equipment and functions subject to MID requirements

- semi automatic zero setting

The Load Sensing System has a semi-automatic zero-setting feature. The zero-setting is manually initiated from the control unit displays on the spreader. The feature uses the readings from each load cell at unloaded condition as offset. This offset is added to (or removed from) the load cell values in all consecutive measurements. The offset will automatically include the own-weight of relevant parts of the twistlock arrangement.

1.6 Technical documentation

Listed below are the main reference documents from the MID examination:

- Appendix 5 – System Description
- Appendix 6 – Software Description
- Appendix 15 – Product Specification Load Cell
- Appendix 20 – SCS User Manual
- Appendix 31 – Operating Manual Stand-alone
- Appendix 40 – System Software Design
- Appendix 42 – Declaration of Commands

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The Software Description and the System Software Design describes the software protection solution for the load sensing system (for example password and audit trail).

Dynamic settings are protected by a password not available to the user.

1.7 Integrated equipment and functions not subject to MID

See applicable reference documents in section 1.6.

2 Technical data

2.1 Rated operating conditions

Measurand

Container within the measuring range, weight expressed in tonnes.

Measurement range

Maximum capacity,	Max \leq 60 t
Minimum capacity,	Min \geq 2 t
Verification scale interval, e	e \geq 0,2 t
Number of verification scale intervals	n \leq 200
Maximum lifting speed,	\leq 120 m/min

Accuracy class

Y(b)

Environments / influence quantities

Climatic:	-20 to +60°C
Mechanic:	NA
Electromagnetic:	class E2

2.2 Other operating conditions

Not applicable.

3 Interfaces and compatibility conditions

The instrument may use the following protective interfaces for data communication:

Crane Interface:	CANopen (DS444) and CAN2.
Other Interfaces:	Ethernet, RS-232, USB

4 Requirements on production, putting into use and utilisation

4.1 Requirements on production

No special requirements identified.

4.2 Requirements on putting into use

No special requirements identified.

4.3 Requirements for consistent utilisations

No special requirements identified.

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5 Control of the measuring tasks of the instrument in use

5.1 Documentation of the procedure

No special measuring tasks are identified.

6 Security measures

6.1 Sealing

Interfaces

No sealing of interfaces is necessary.

Control of software version and checksum

The SW protection solution of the Load Sensing System is a combination of change routines, bit-flip checksum, password protection, software separation and event logs (audit trail). The software separation separates the legally relevant data from the non-legally relevant data.

Load cell

No sealing is necessary.

Descriptive plate

The descriptive plate shall be sealed with control marks.

6.2 Data logger

There is no mandatory requirement to have a data storage device.

7 Labelling and inscriptions

7.1 Information to be borne by the instrument

The marking on the instrument shall contain the following information:

The descriptive plate mounted on the instrument shall contain the following information:

- name or identification mark of the manufacturer
- serial number and type designation
- number of certificate
- accuracy class
- verification scale interval, e
- temperature range
- electrical supply

7.2 Conformity marking in accordance to MID article 17

The instrument shall be marked in accordance to MID article 17 which e.g. describes the CE-marking together with M, year of marking and the notified body number.

7.3 Further inscriptions, if necessary

No further inscriptions considered necessary.