

EU Type Examination Certificate

No. 0200-MID-08059 Revision 3

CargoSpect

MULTI-DIMENSIONAL MEASURING 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 **Cind AB**
Gjuterigatan 9
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Sweden

In respect of A semi-automatic multi-dimensional measuring instrument designated CargoSpect for measuring dimensions of pallet with goods moved through the instrument.

Maximum object: 240 × 240 × 220 cm (W × L × H)

Scale interval (d): 2 × 2 × 2 cm (W × L × H)

Speed of object: 1 to 7 km/h

The conformity with the essential requirements in annex 1 and the specific requirements in annex XI, chapter I & IV of Directive 2014/32/EU is met by the application of OIML R129:2000, OIML D11:2004 section 12 & 13 and WELMEC Guide 7.2:2019.

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

The annex comprises 10 pages.

Issued on **2022-03-07**
Valid until **2031-02-08**

Descriptive annex

Contents		Page
1.	Name and type of instrument and modules	2
2.	Description of the construction and function	2
2.1	Construction	2
2.2	Function	3
2.3	Software	4
3.	Technical data	5
3.1	Model CargoSpect	5
4.	Communication interfaces	5
5.	Conditions for certification	5
6.	Special conditions for verification	5
7.	Securing and location of seals and verification marks	5
7.1	Securing and sealing	5
8.	Location of CE mark of conformity and inscriptions	6
8.1	Identification plate	6
9.	Pictures	7

1. Name and type of instrument and modules

The automatic multi-dimensional measuring instrument is designated CargoSpect and is intended for scanning the dimensions of pallet with goods driven through the instrument by a pallet transporter such as pallet truck, forklift truck or AGV.

The instrument can measure on irregular shaped objects as well as black foil.

The instrument consists of three stereo cameras placed on a portal. The pictures from the cameras of the object, while it is moved through the portal, are transmitted to a PC, which analyses them and calculates the dimensions.

2. Description of the construction and function

2.1 Construction

2.1.1 Image sensors

The image sensors of the instrument are three stereo cameras placed on a portal or on a structure mounted on the ceiling. On the portal/structure can also be placed light armatures in order to ensure sufficient light for the scanning of objects.

Each stereo camera consists of two GigE Vision PoE cameras type Basler acA1920-40gm each with a high resolution fixed focal lens type Goyo GMTHR46018MCN – or cameras and lenses with similar characteristics - all placed in a common enclosure. Each camera has a separate ethernet connection to the network switch for streaming of images. This switch supplies power to connected cameras via PoE.

2.1.2 CargoSpect PC

The computing unit of the CargoSpect is a high-speed PC, which is placed in a sealable cabinet together with the giga speed network switch. In the PC is installed a separate network that is connected to the network switch.

2.1.3 Display

A display screen is connected to the PC. The screen is divided into a non-legal part and a legal part.

The legal part display to the left software versions and checksums and to the right measuring results or error messages.

Output Display Layout

Legally non-relevant information

<p>Additional information:</p> <p style="text-align: center;">Pallet ID 192837465 registered Forklift Id: 100</p>	
<p>Software version: CindOS: e07aadc CargoSpect: 1.0.0 Cargoapp: 8d6dc3feaa21657fc92e46705c43ba Ulservice: e89ee2eda47bc81bbdc0ba540cafb29 Modelbuilder: 9f3366a3bd1fad9cbda5f4a84fcb69 Calcvolume: 156ef52175b4f7cea0f0d91edd93276 Pymcap: 54df5bdcc4a7e9d2541eae09f7aa5b API: 1.0.0</p> <p>System status: Ok Camera status: Connected</p>	<p>Measurement data:</p> <p>Height: 146 cm Width: 174 cm Length: 106 cm</p>

Legally relevant version numbers

Legally relevant measurement data

2.1.4 Traffic light

The instrument is equipped with a traffic light, which the PC controls via a web relay. It indicates whether a new object may enter, or the system is busy calculating, or an error has occurred.

2.2 Function

CargoSpect software is used for calculating dimensions of the object. The software create based on the captured images a 3D point cloud of the object to be measured and the pallet truck. The software algorithms track the motion to construct the model of the object over time.

The pallet truck(s) used must be pre-registered by the system before they can be used.

An unique pallet truck id consisting of ArUco markers (see fig. 5) must be placed on the fork lift (see fig. 6), after which the pallet lifter with the registration board placed on it (see fig. 7) must be driven through the measuring zone in order to determine the size and shape of the forklift, so the forklift can be removed from 3D point cloud, when determine the dimensions of the object.

2.2.1 Power up

At power up the CargoSpect program will check its own integrity.

2.2.2 Data Storage Device

The CargoSpect software includes a data storage device working as an alibi memory in which all performed measurements are stored.

2.2.3 Operator information messages

The instrument has a number of error messages, which are described in the user manual.

2.2.4 Extended resolution

It is possible – but only for verification and re-verification purpose and by breaking the sealing – to setup the instrument to measure with 1 mm resolution. This can only be done in the password protected setting menu, and the correct d values must be re-entered after the measurements.

2.3 Software

2.3.1 PC user accounts

There are two users defined in the PC:

Root: System user with disabled login. Runs the software.

Maintenance: Maintenance user used for diagnostics and data retrieval. Read only access with limited execute rights.

2.3.2 Software versions

The legal PC software has the following versions:

Cargospect: 1.0.0

API: 1.0.0

and the following checksums for the modules:

Cargoapp: 8d6dc3cfeaa21657fc92e46705c43ba

UIserver: e89ee2eda47bc81bbdc0ba540cafb29

Modelbuilder: 9f3366a3bd1fad9cbeda5f4a84fcb69

Calcvolume: 156ef52175b4f7cea0f0d91edd93276

Pymcap: 4df5bdcc4a7e9d2541eae09f7aa5b

or

Cargospect: 1.1.1

API: 1.0.0

and the following checksums for the modules:

Cargoapp: e26d2066307a8f691604be0b202e726

UIserver: 65ce97eef9c1eddf1d8167873b621c

Modelbuilder: f2e64f78ae0a7e8d4be2e728523f5ba

Calcvolume: 4869d912c4d2e32bbaf5c7e0b09ca9c

Pymcap: 7d45c2d4de76e5132338f1baf11c084

or

Cargospect: 1.1.5

API: 1.0.2

and the following checksums for the modules:

Cargoapp: a0fe4145158e2e5d2dd707552038966f

UIserver: 80d99a04432947d134089e5b5f6d459a

Modelbuilder: 211c2e95f03a9459d7839437a0015156

Calcvolume: 5cc91e5e1dd78c07a52423c8004cab21

Pymcap: e3e7cb8d31f373e21f0b681e5a27dc1e

3. Technical data

The multi-dimensional measuring instrument has the following characteristics:

3.1 Model CargoSpect

Cameras:	3 stereo cameras each with 2 pcs. GigE Vision PoE cameras type Basler ACE-Camera 1920-40GM with Goyo Optical fixed focal lens
Operation mode:	Automatic
Maximum object size:	240 × 240 × 220 cm (W × L × H)
Minimum object size:	80 × 60 × 20 cm (W × L × H)
Scale interval (d):	2 × 2 × 2 cm (W × L × H)
Object speed:	1 to 7 km/h
Power supply:	230 VAC, 50 Hz
Electromagnetic class:	E2
Temperature range:	+5 °C to +40 °C
Humidity:	Non-condensing
Peripheral interface:	Set out in Section 4

4. Communication interfaces

The CargoSpect uses the following interfaces of its PC for communication out of the instrument,

- Ethernet interface.

The interfaces are characterised "Protective interfaces" according to paragraph 8.4 of annex I of the Directive.

5. Conditions for certification

None.

6. Special conditions for verification

See section 2.2.4.

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 according to ANNEX II, module F or D of Directive 2014/32/EU.

7.1.1 Mechanical sealing

The identification plate shall be secured against removal with a tamper evident sticker or be of a form that is destroyed at removal.

The enclosure of the stereo cameras shall be sealed against opening with tamper-evident stickers (see picture 8)

The cabinet for the PC and the network switch shall be sealed with a tamper-evident sticker (see fig. 9).

8. Location of CE mark of conformity and inscriptions

8.1 Identification plate

All inscriptions for the instrument shall be placed on the identification plate, which shall be located visible on the instrument.

8.1.1 CE mark

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

8.1.2 Inscriptions

The identification plate shall bear the following inscriptions,

- Manufacturer's trademark and/or name
- Postal address of manufacturer
- Type designation
- Serial number
- d, Min, and Max for each dimension
- Temperature range: +5 / +40 °C
- Electromagnetic class: E2
- Humidity: Non-condensing
- Object type: EU pallets with goods
- Type examination certificate number

9. Pictures

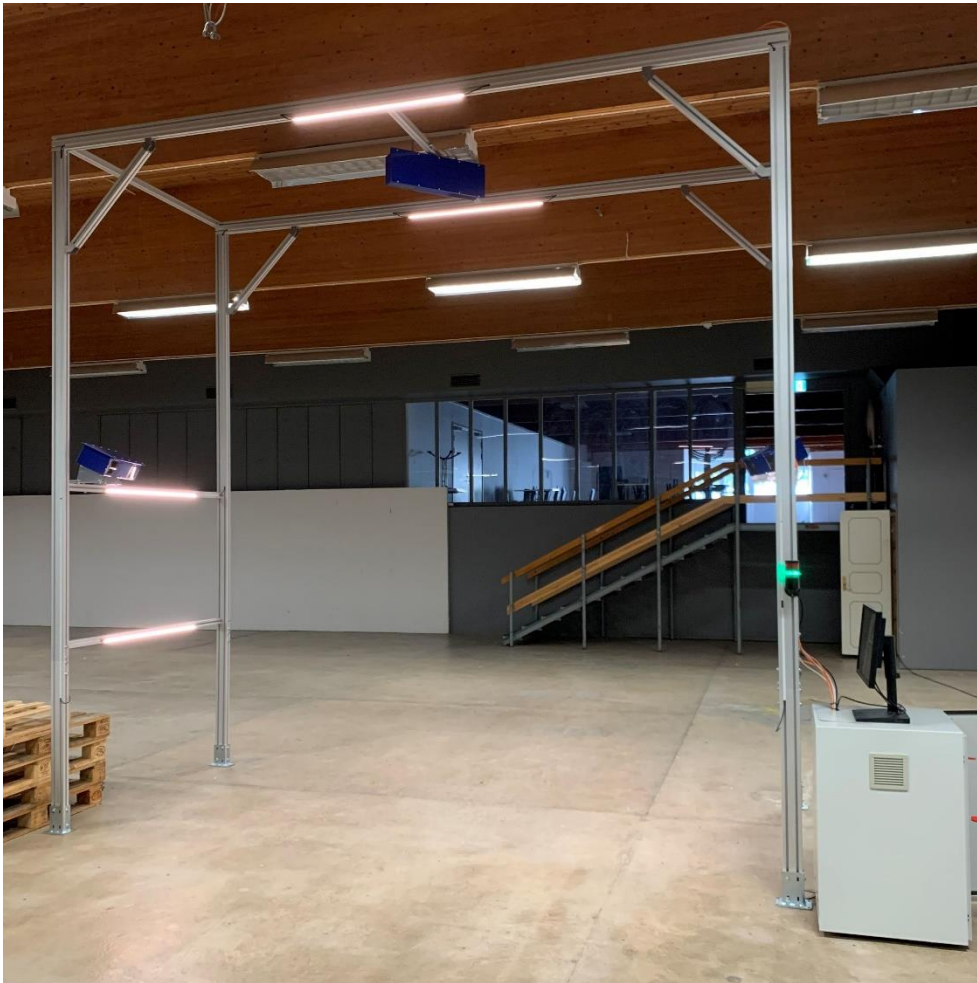


Figure 1 Typical CargoSpect system installation.

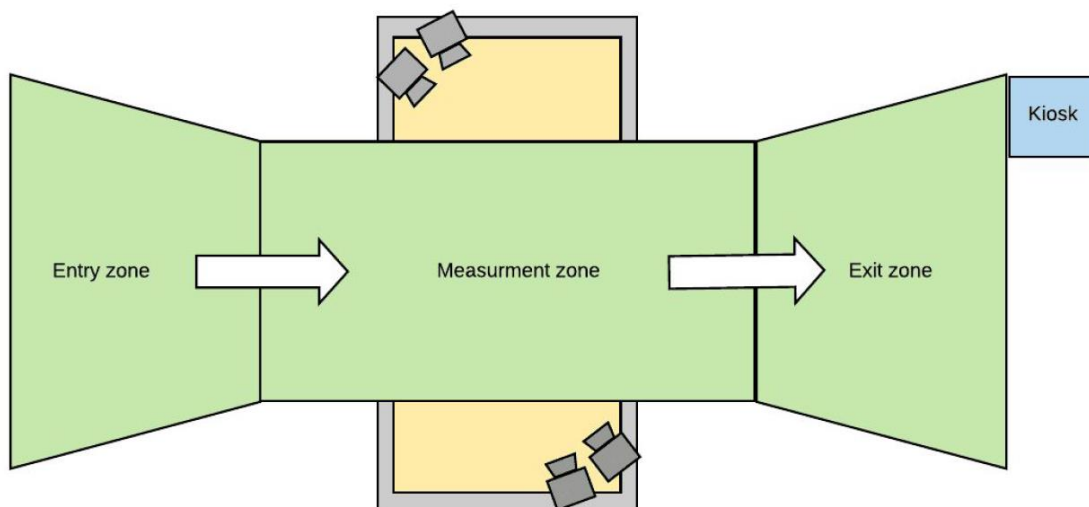


Figure 2 CargoSpect zones.

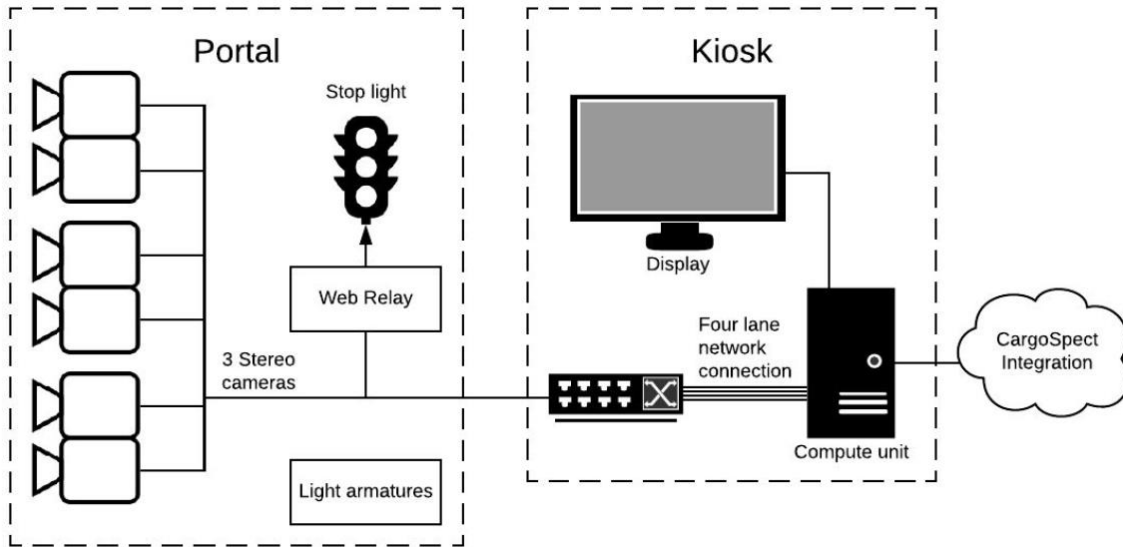


Figure 3 Block diagram of a typical CargoSpect system installation.

Output Display Layout

Legally non-relevant information

<p>Additional information:</p> <p style="text-align: center;">Pallet ID 192837465 registered Forklift Id: 100</p>	
<p>Software version: CindOS: e07aadc Cargospect: 1.0.0 Cargoapp: 8d6dc3cfeaa21657fc92e46705c43ba UIserver: e89ee2eda47bc81bbdc0ba540cafb29 Modelbuilder: 9f3366a3bd1fad9cbada5f4a84fcb69 Calcvolume: 156ef52175b4f7cea0f0d91edd93276 Pymcap: 54df5bdcc4a7e9d2541eae09f7aa5b API: 1.0.0</p> <p>System status: Ok Camera status: Connected</p>	<p>Measurement data:</p> <p>Height: 146 cm Width: 174 cm Length: 106 cm</p>

Legally relevant version numbers

Legally relevant measurement data

Figure 4 Example of display layout.



Figure 5 Examples of ArUco markers for forklift identification.



Figure 6 Example of ArUco marker placement on forklift.

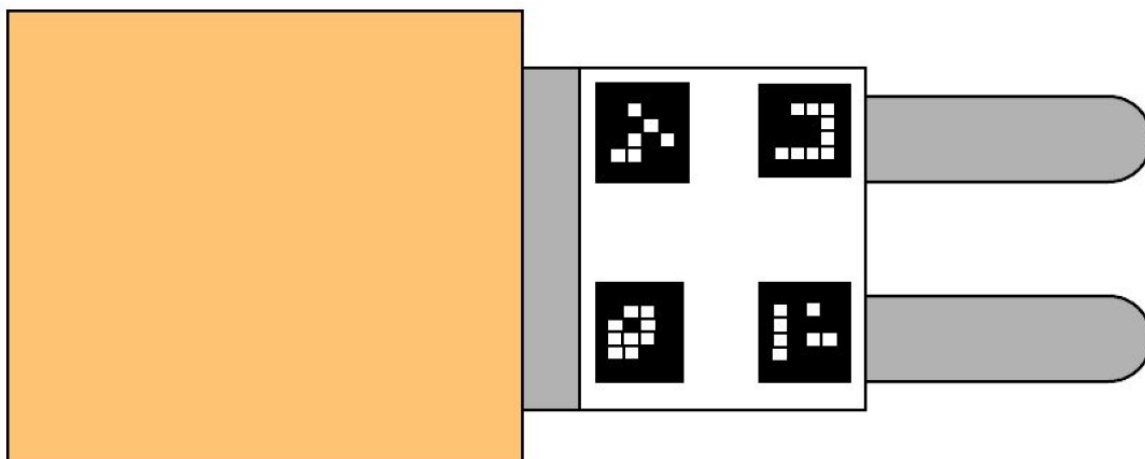


Figure 7 The registration board placed on a forklift.



Figure 8 Sealing of stereo camera.



Figure 9 Sealing of cabinet for PC.