Leuze

AMS 300i

Optical laser measurement system – RS 422 / RS 232

Original operating instructions

The Sensor People

We reserve the right to make technical changes
EN 2021/04/30 - 50113376

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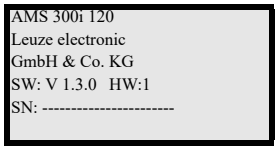
The main menus



Device information - main menu

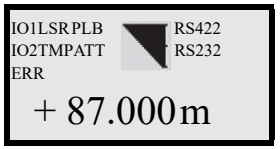
This menu item contains detailed information on

- Device type
- Manufacturer
- Software and hardware version
- Serial number

No entries can be made via the display.

Network information - main menu

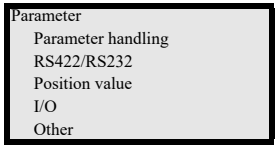
Explanations of the active interface, data format and baud rate.
No entries can be made via the display.



Status and measurement data - main menu

- Display of status, warning and error messages.
- Status overview of the switching inputs/ outputs
- Bar graph for the received signal level.
- Activated interface.
- Measurement value

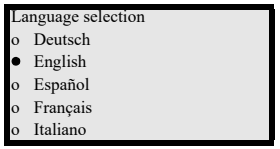
No entries can be made via the display.
See "Indicators in the display" on page 39.



Parameter - main menu

- Configuration of the AMS.

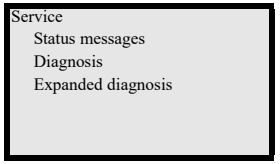
See "Parameter menu" on page 44.



Language selection - main menu

- Selection of the display language.

See "Language selection menu" on page 48.



Service - main menu

- Display of status messages.
- Display of diagnostic data.

No entries can be made via the display.
See "Service menu" on page 48.

Device buttons:

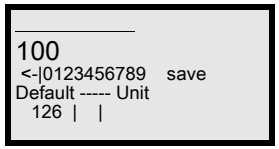
Navigate **upward/sideways**

Navigate **downward/sideways**

ESCAPE leave

ENTER confirm

Input of values



+ **Delete character**

... + **Enter digit**

save + **Save input**

1 General information

1.1 Explanation of symbols

The symbols used in this technical description are explained below.

Attention!

This symbol precedes text messages which must strictly be observed. Failure to observe the provided instructions could lead to personal injury or damage to equipment.

Attention Laser!

This symbol warns of possible danger through hazardous laser radiation.

Note!

This symbol indicates text passages containing important information.

1.2 Declaration of Conformity

The AMS 300*i* absolute measuring optical laser measurement system was designed and manufactured in accordance with the applicable European directives and standards.

The AMS series is "UL LISTED" according to American and Canadian safety standards and fulfills the requirements of Underwriter Laboratories Inc. (UL).

Note!

The Declaration of Conformity for these devices can be requested from the manufacturer.

The manufacturer of the product, Leuze electronic GmbH & Co. KG in D-73277 Owen, possesses a certified quality assurance system in accordance with ISO 9001.

1.3 Description of functions AMS 300*i*

The AMS 300*i* optical laser measurement system calculates distances to fixed as well as moving system parts. The distance to be measured is calculated according to the principle of the propagation time of radiated light. Here, the light emitted by the laser diode is reflected by a reflector onto the receiving element of the laser measurement system. The AMS 300*i* uses the "propagation time" of the light to calculate the distance to the reflector. The high absolute measurement accuracy of the laser measurement system and the fast response time are designed for position control applications.

With its AMS 3xx*i* product series, Leuze makes available a wide range of internationally relevant interfaces. Note that each interface version listed below corresponds to a different AMS 3xx*i* model.

AMS 304*i*

AMS 348*i*

AMS 355*i*

AMS 358*i*

AMS 335*i*

AMS 338*i*

AMS 308*i*

AMS 384*i*

AMS 301*i*

AMS 300*i*

2 Safety

This sensor was developed, manufactured and tested in line with the applicable safety standards. It corresponds to the state of the art.

2.1 Intended use

The AMS is an absolute measuring optical laser measurement system which allows distance measurement of up to 300 m against a reflector.

Areas of application

The AMS is designed for the following areas of application:

- Positioning of automated, moving plant components
- Travel and lifting axes of high-bay storage devices
- Repositioning units
- Gantry crane bridges and their trolleys
- Elevators
- Electroplating plants

CAUTION

Observe intended use!

- *Only operate the device in accordance with its intended use. The protection of personnel and the device cannot be guaranteed if the device is operated in a manner not complying with its intended use.*

  Leuze electronic GmbH + Co. KG is not liable for damages caused by improper use.
- *Read the technical description before commissioning the device. Knowledge of this technical description is an element of proper use.*

NOTE

Comply with conditions and regulations!

- *Observe the locally applicable legal regulations and the rules of the employer's liability insurance association.*

Attention

For UL applications, use is only permitted in Class 2 circuits in accordance with the NEC (National Electric Code).

2.2 Foreseeable misuse

Any use other than that defined under "Intended use" or which goes beyond that use is considered improper use.

In particular, use of the device is not permitted in the following cases:

- in rooms with explosive atmospheres
- as stand-alone safety component in accordance with the machinery directive [1)]
- for medical purposes

NOTE
Do not modify or otherwise interfere with the device!
Do not carry out modifications or otherwise interfere with the device.
The device must not be tampered with and must not be changed in any way.
The device must not be opened. There are no user-serviceable parts inside.
Repairs must only be performed by Leuze electronic GmbH + Co. KG.

2.3 Competent persons

Connection, mounting, commissioning and adjustment of the device must only be carried out by competent persons.

Prerequisites for competent persons:

- They have a suitable technical education.
- They are familiar with the rules and regulations for occupational safety and safety at work.
- They are familiar with the technical description of the device.
- They have been instructed by the responsible person on the mounting and operation of the device.

Certified electricians

Electrical work must be carried out by a certified electrician.

Due to their technical training, knowledge and experience as well as their familiarity with relevant standards and regulations, certified electricians are able to perform work on electrical systems and independently detect possible dangers.

In Germany, certified electricians must fulfill the requirements of accident-prevention regulations DGUV (German Social Accident Insurance) provision 3 (e.g. electrician foreman). In other countries, there are respective regulations that must be observed.

2.4 Exemption of liability

Leuze electronic GmbH + Co. KG is not liable in the following cases:

- The device is not being used properly.
- Reasonably foreseeable misuse is not taken into account.
- Mounting and electrical connection are not properly performed.
- Changes (e.g., constructional) are made to the device.

1) Use as safety-related component within the safety function is possible, if the component combination is designed correspondingly by the machine manufacturer.

2.5 Laser safety notices

ATTENTION! LASER RADIATION – CLASS 2 LASER PRODUCT

Do not stare into beam!

The device satisfies the requirements of IEC/EN 60825-1:2014 safety regulations for a product of **laser class 2** and complies with 21 CFR 1040.10 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.

- *Never look directly into the laser beam or in the direction of reflected laser beams!*

  If you look into the beam path over a longer time period, there is a risk of injury to the retina.
- *Do not point the laser beam of the device at persons!*
- *Interrupt the laser beam using a non-transparent, non-reflective object if the laser beam is accidentally directed towards a person.*
- *When mounting and aligning the device, avoid reflections of the laser beam off reflective surfaces!*
- *CAUTION! The use of operating and adjustment devices other than those specified here or the carrying out of differing procedures may lead to dangerous exposure to radiation.*
- *Observe the applicable statutory and local laser protection regulations.*
- *The device must not be tampered with and must not be changed in any way.*

  There are no user-serviceable parts inside the device.
  Repairs must only be performed by Leuze electronic GmbH + Co. KG.

NOTE

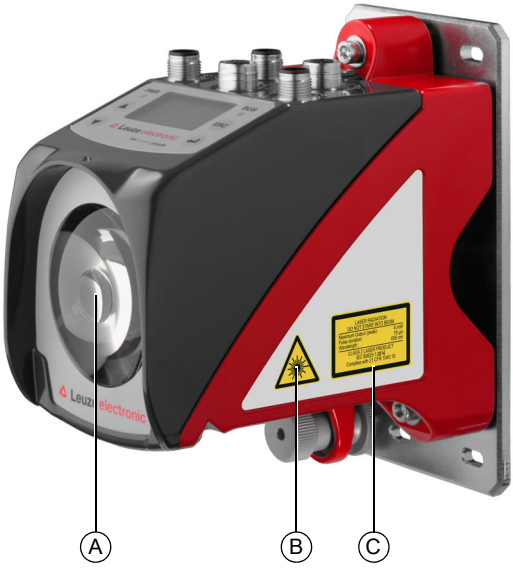
Affix laser information and warning signs!

Laser information and warning signs are attached to the device (see figure 2.1). Also included with the device are self-adhesive laser warning and laser information signs (stick-on labels) in multiple languages (see figure 2.2).

- *Affix the laser information sheet to the device in the language appropriate for the place of use.*

  When using the device in the U.S.A., use the stick-on label with the "Complies with 21 CFR 1040.10" notice.
- *Affix the laser information and warning signs near the device if no signs are attached to the device (e.g. because the device is too small) or if the attached laser information and warning signs are concealed due to the installation position.*

  Affix the laser information and warning signs so that they can be read without the reader being exposed to the laser radiation of the device or other optical radiation.



A Laser aperture
B Laser warning sign
C Laser information sign with laser parameters

Figure 2.1: Laser apertures, laser warning signs

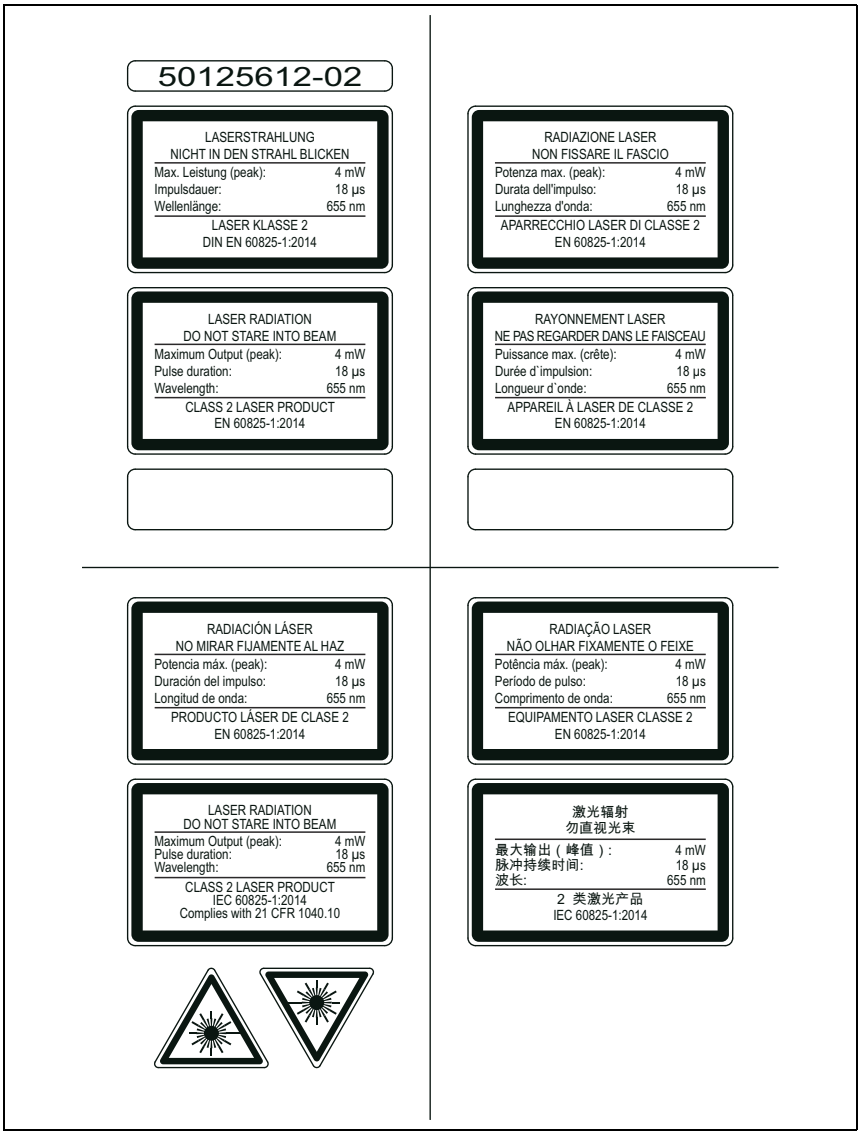


Figure 2.2: Laser warning and information signs – supplied stick-on labels

3 Fast commissioning / operating principle

Note!

Below you will find a ***short description for the initial commissioning*** *of the AMS 300i. Detailed explanations for the listed points can be found throughout the handbook.*

3.1 Mounting the AMS 300*i*

The AMS 300*i* and the corresponding reflector are mounted on two mutually opposing, plane-parallel, flat walls.

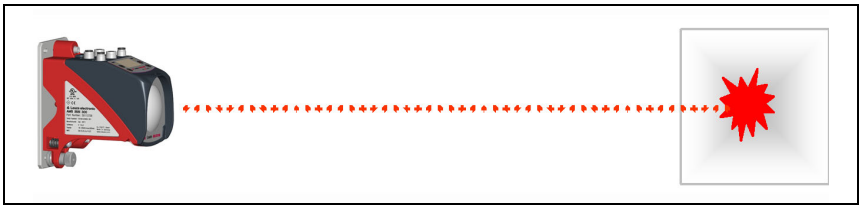


Figure 3.1: Schematic illustration of mounting

Attention!

For error-free position measurement, there must be an unobstructed line-of-sight between the AMS 300*i and the reflector.*

3.1.1 Mounting the device

The laser is mounted using 4 screws (M5).

Alignment is performed using 2 adjustment screws. Adjust so that the laser light spot is positioned at the center of the reflector. The alignment is secured with the knurled nut and locked with the M5 nut.

Detailed information can be found in Chapter 5.2 and Chapter 5.3.

3.1.2 Mounting the reflector

The reflector is mounted using 4 screws (M5). The reflector is angled using the spacer sleeves included. Incline the reflector by approx. 1°.

Detailed information can be found in Chapter 6.4.

3.2 Connecting the voltage supply

The laser measurement system is connected using M12 connectors. The voltage supply is connected via the PWR M12 connection.

Detailed information can be found in Chapter 7.

3.3 Display

Once the laser measurement system is supplied with voltage, the device status as well as the measured position values can be read on the display. The display automatically switches to the display of the measurement values.

Use the up/down buttons ▲ ▼ to the left of the display to read and change a wide range of data and parameters.

Depending on the connected interface, the network address or IP addresses must be configured via the display.

Detailed information can be found in Chapter 8.

3.4 AMS 300*i* on the RS 422/RS 232

The AMS 300*i* can transfer position values either via the RS 422 or via the RS 232. The two interfaces cannot be active at the same time.

3.4.1 Data transfer via RS 422

The RS 422 interface is active by default.

The transmission parameters are listed in the menu structure and on the foldout at the end of the technical description.

The parameters can be changed after activation of parameter enable.

Detailed information can be found in Chapter 8.3 and Chapter 9.4.4.

3.4.2 Data transfer via RS 232

Activating the RS 232 interface

- Activation of parameter enable
- Deactivation of the RS 422 interface – activation OFF
- Activation of the RS 232 interface – activation ON
- Deactivation of parameter enable

The RS 232 transfers the data with the preset parameters. They are listed in the menu structure and on the foldout at the end of the technical description.

The parameters can be changed after activation of parameter enable.

Detailed information can be found in Chapter 8.3 and Chapter 9.4.4.

4 Technical data

4.1 Technical data of laser measurement system

4.1.1 General specifications AMS 300*i*

Measurement data	AMS 300*i* **40 (H)**	AMS 300*i* **120 (H)**	AMS 300*i* **200 (H)**	AMS 300*i* **300 (H)**
Measurement range	0.2 … 40 m	0.2 … 120 m	0.2 … 200 m	0.2 … 300 m
Accuracy	± 2 mm	± 2 mm	± 3 mm	± 5 mm
Reproducibility [1]	0.3 mm	0.5 mm	0.7 mm	1.0 mm
Light spot diameter	≤ 40 mm	≤ 100 mm	≤ 150 mm	≤ 225 mm
Output time	1.7 ms			
Response time	14 ms			
Basis for contouring error calculation	7 ms			
Resolution	Adjustable; see chapters on individual interfaces			
Temperature drift	≤ 0.1 mm/K			
Ambient temperature sensitivity	1 ppm/K			
Air pressure sensitivity	0.3 ppm/hPa			
Traverse rate	≤ 10 m/s			
Electrical data				
Supply voltage Vin [2]	18 … 30 VDC			
Current consumption	Without device heating: ≤ 250 mA / 24 VDC With device heating: ≤ 500 mA / 24 VDC			
Optical data				
Transmitter	Laser diode, red light			
Laser class	2 in acc. with IEC 60825-1:2014			
Wavelength	655 nm			
Impulse duration	≤ 18 µs			
Max. output power (peak)	≤ 4 mW			
Interfaces				
Baud rate in kbit/s				
RS 422	19.2 / 38.4 / 57.6 / 115.2			
RS 232	19.2 / 38.4 / 57.6 / 115.2			
Controls and indicators				
Keyboard	4 keys			
Display	Monochromatic graphical display, 128 x 64 pixels			
LED	2 LEDs, two-colored			
Inputs/outputs				
Quantity	2, programmable			
Input	Protected against polarity reversal			
Output	Max. 60 mA, short-circuit-proof			

Mechanical data

Housing	Diecast zinc/aluminum
Optics	Glass
Weight	Approx. 2.45 kg
Degree of protection	IP 65 acc. to EN 60529 [3]

Environmental conditions

Operating temperature	
without device heating	-5 °C … +50 °C
with device heating	-30 °C … +50 °C [4]
Storage temperature	-30 °C … +70 °C
Air humidity	Max. 90 % rel. humidity, non-condensing
MTTF	31 years (at 25 °C) [5]

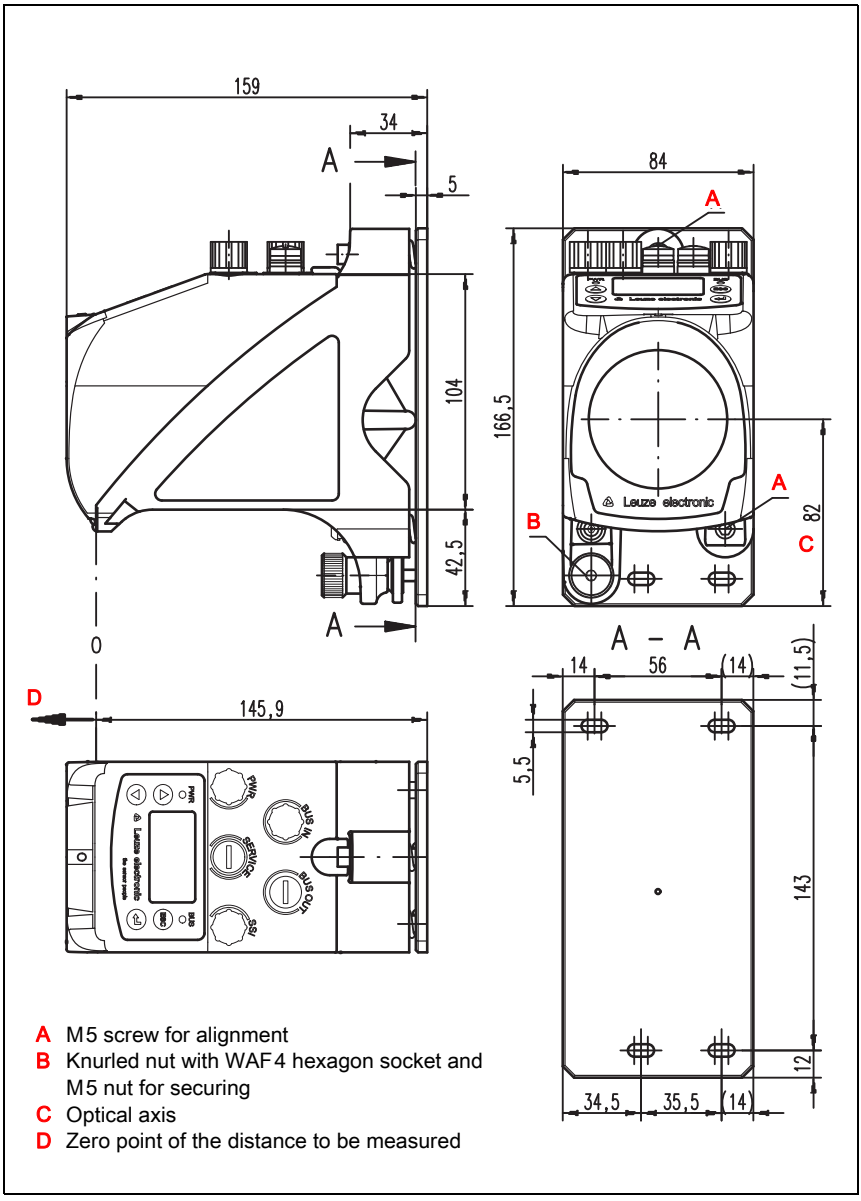
Mechanical/electrical loading capacity

Vibration	Acc. to EN 60068-2-6
Noise	Acc. to EN 60060-2-64
Shock	Acc. to EN 60068-2-27
EMC	Acc. to EN 61000-6-2 and EN 61000-6-4 [6]

1) Statistical error: 1 sigma; minimum switch-on time: 2 min.
2) For UL applications: only for use in "Class 2" circuits according to NEC.
3) With screwed-on M12 plugs or mounted caps.
4) With devices with heating, the switch on/off area of the internal heating can be extended to prevent condensation from forming. Total prevention of condensation cannot be guaranteed due to the limited heating capacity of the AMS 300*i*.
5) We reserve the right to make changes. (Value is updated at regular intervals.)
6) This is a Class A product. In a domestic environment this product may cause radio interference, in which case the operator may be required to take adequate measures.

The AMS 300*i* is designed in accordance with protection class III for supply with PELV (protective extra-low voltage).

4.1.2 AMS 300*i* dimensioned drawing



A M5 screw for alignment
B Knurled nut with WAF4 hexagon socket and M5 nut for securing
C Optical axis
D Zero point of the distance to be measured

Figure 4.1: AMS 300*i* dimensioned drawing

4.1.3 Overview of AMS 300*i* types

AMS 300*i* (RS 422/RS 232)

Type designation	Description	Part no.
AMS 300*i* 40	40m operating range, RS 422/RS 232 interface	50113661
AMS 300*i* 120	120m operating range, RS 422/RS 232 interface	50113662
AMS 300*i* 200	200m operating range, RS 422/RS 232 interface	50113663
AMS 300*i* 300	300m operating range, RS 422/RS 232 interface	50113664
AMS 300*i* 40 H	40m operating range, RS 422/RS 232 interface, integrated heating	50113665
AMS 300*i* 120 H	120m operating range, RS 422/RS 232 interface, integrated heating	50113666
AMS 300*i* 200 H	200m operating range, RS 422/RS 232 interface, integrated heating	50113667
AMS 300*i* 300 H	300m operating range, RS 422/RS 232 interface, integrated heating	50113668

Table 4.1: Overview of AMS 300*i* types

5 Installation and mounting

5.1 Storage, transportation

Attention!

Package the device for transport and storage in such a way that is protected against shock and humidity. Optimum protection is achieved when using the original packaging. Ensure compliance with the approved environmental conditions listed in the specifications.

Unpacking

- *Check the packaging content for any damage. If damage is found, notify the post office or shipping agent as well as the supplier.*
- *Check the delivery contents using your order and the delivery papers:*
  - Delivered quantity
  - Device type and model as indicated on the name plate
  - Brief manual

The name plate provides information as to what AMS 300*i* type your device is. For specific information, please refer to Chapter 11.2.

Name plates

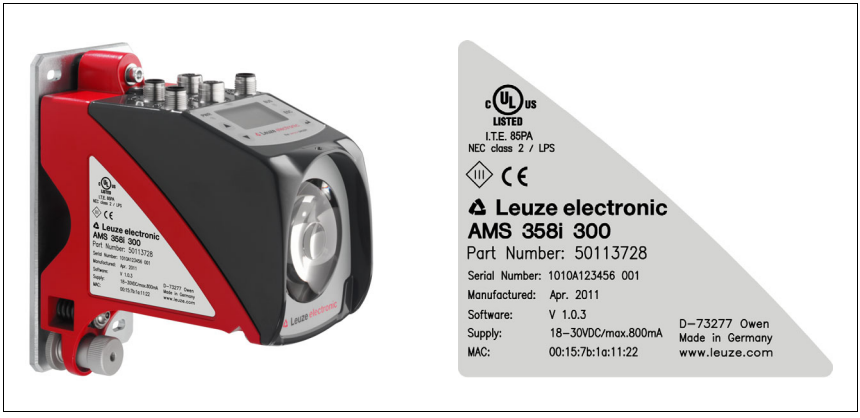


Figure 5.1: Device name plate using the AMS 358*i* as an example

Note!

Please note that the shown name plate is for illustration purposes only; the contents do not correspond to the original.

- *Save the original packaging for later storage or shipping.*

If you have any questions concerning your shipment, please contact your supplier or your local Leuze sales office.

↳ *Observe the applicable local regulations when disposing of the packaging materials.*

5.2 Mounting the AMS 300*i*

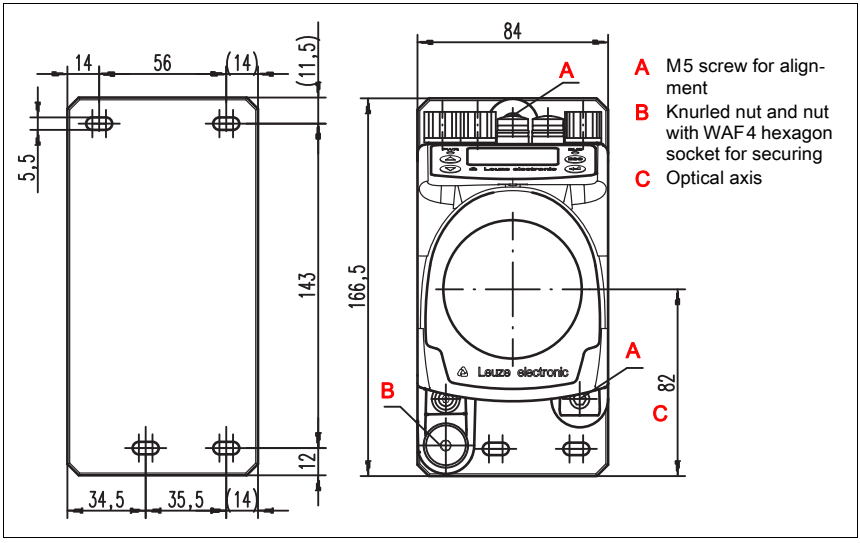


Figure 5.2: Mounting the device

The AMS 300*i* and the corresponding reflector are mounted on two mutually opposing, plane-parallel, flat walls or system parts. For error-free position measurement, there must be an unobstructed line-of-sight between the AMS 300*i* and the reflector.

Use M5 screws to fasten the laser measurement system. Secure the screws with a lock washer to protect against loosening caused by vibrations.

Aligning the laser light spot with the center of the reflector

The laser light spot has to be aligned so that it always hits the center of the opposing reflector, both at close range as well as at the maximum measurement distance. **To align, use the two M5 Allen screws** ("**A**" in Figure 5.2). When aligning, please ensure that the knurled nut and the lock nut ("**B**" in Figure 5.2) are opened wide.

Attention!

To prevent the laser measurement system from moving out of alignment during continuous operation, subsequently hand-tighten the knurled nut and counterlock with the nut with WAF4 hexagon socket ("B" in Figure 5.2*). Knurled nut and nut must not be tightened until alignment has been completed.*

Attention!

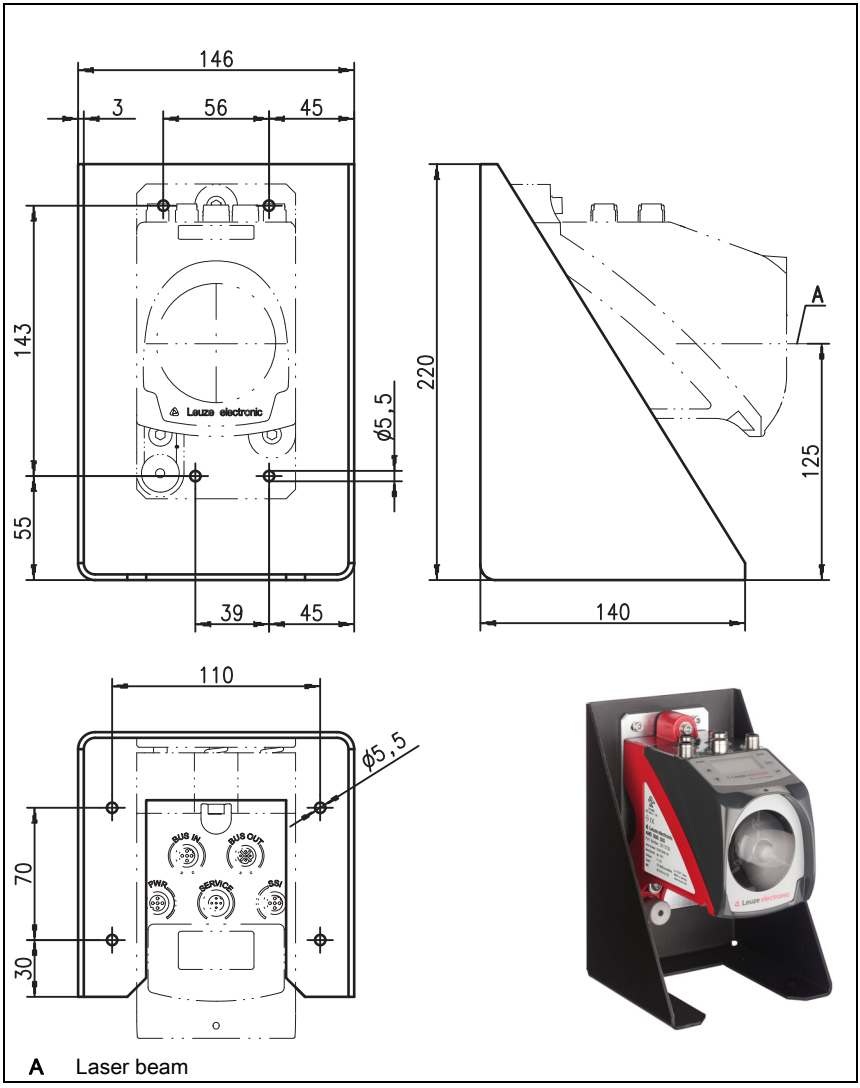
The device must not be opened. Failure to comply will render the guarantee void. Warranted features cannot be guaranteed after the device has been opened.

5.2.1 Optional mounting bracket

A mounting bracket for mounting the AMS 300*i* on a flat, horizontal surface is available as an optional accessory.

Type designation: MW OMS/AMS 01

Part no.: 50107255



A Laser beam

Figure 5.3: Optional mounting bracket

5.2.2 Parallel mounting of the AMS 300*i*

Definition of the term "parallel spacing"

As shown in Figure 5.4, dimension X describes the "parallel spacing" of the inner edges of the two laser light spots on the reflector.

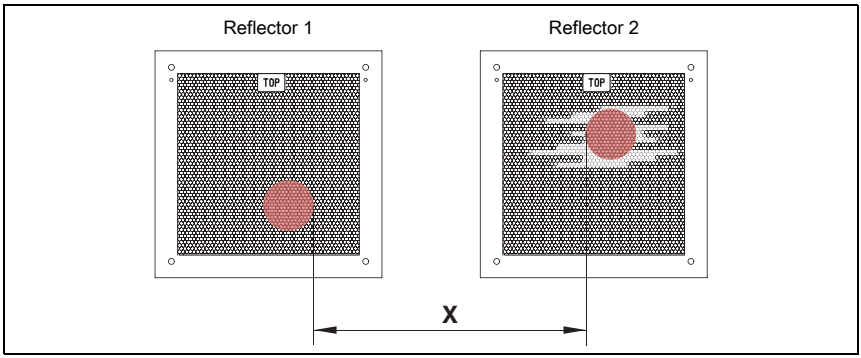


Figure 5.4: Minimum parallel spacing X between adjacent AMS 300*i*

The diameter of the light spot increases with distance.

	AMS 300*i* **40 (H)**	AMS 300*i* **120 (H)**	AMS 300*i* **200 (H)**	AMS 300*i* **300 (H)**
Max. measurement distance	40 m	120 m	200 m	300 m
Light spot diameter	≤ 40 mm	≤ 100 mm	≤ 150 mm	≤ 225 mm

Thus, the center-to-center spacing of the two AMS 300*i* devices with respect to one another can be calculated as a function of the maximum measurement distance.

To define the minimum parallel spacing between two AMS 300*i*, it is necessary to distinguish between three different arrangements of AMS 300*i* and reflectors.

The AMS 300*i* are mounted stationary and in parallel on one plane.
Both reflectors move independently of one another at different distances to the AMS 300*i*.

Minimum parallel spacing X of the two laser light spots:

X = 100 mm + (max. measurement distance in mm x 0.01)

The AMS 300*i* are mounted stationary and in parallel on one plane.
Both reflectors move in parallel at the same distance to the AMS 300*i*.

Measurement distance **up to 120 m**: minimum parallel spacing **X ≥ 600 mm**

Measurement distance **up to 200 m**: minimum parallel spacing **X ≥ 750 mm**

Measurement distance **up to 300 m**: minimum parallel spacing **X ≥ 750 mm**

The reflectors are mounted stationary and in parallel on one plane.
Both AMS 300*i* move independently of one another at different or the same distances to the reflectors.

Measurement distance **up to 120 m**: minimum parallel spacing **X ≥ 600 mm**

Measurement distance **up to 200 m**: minimum parallel spacing **X ≥ 750 mm**

Measurement distance **up to 300 m**: minimum parallel spacing **X ≥ 750 mm**

Note!

Please note that when the AMS 300*i are mounted in a mobile manner, travel tolerances could cause the two laser light spots to move towards each other.*
Take the travel tolerances of the vehicle into account when defining the parallel spacing of adjacent AMS 300i.

5.2.3 Parallel mounting of AMS 300*i* and DDLS optical data transmission

The optical data transceivers of the DDLS series and the AMS 300*i* do not interfere with one another. Depending on the size of the used reflector, the DDLS can be mounted with a minimum parallel spacing of 100 mm to the AMS 300*i*. The parallel spacing is independent of the distance.

5.3 Mounting the AMS 300*i* with laser beam deflector unit

General information

The two available deflector units are used for the 90° deflection of the laser beam, see "Accessories – Deflector unit" on page 62.

Attention!

The deflector units are designed for a maximum range of 40 m.
Longer distances on request.

5.3.1 Mounting the laser beam deflector unit with integrated mounting bracket

The AMS 300*i* is screwed onto the mechanism of the US AMS 01 deflector unit. The mirror can be mounted for three deflection directions:

1. Upward beam deflection
2. Beam deflection to the left
3. Beam deflection to the right

The deflector unit is mounted on plane-parallel, flat walls or system parts. For error-free position measurement, there must be an unobstructed line-of-sight between the AMS 300*i*... and the deflection mirror as well as between the mirror and the reflector.

Use the M5 screws to mount the deflector unit. Secure the screws with a lock washer to protect against loosening caused by vibrations.

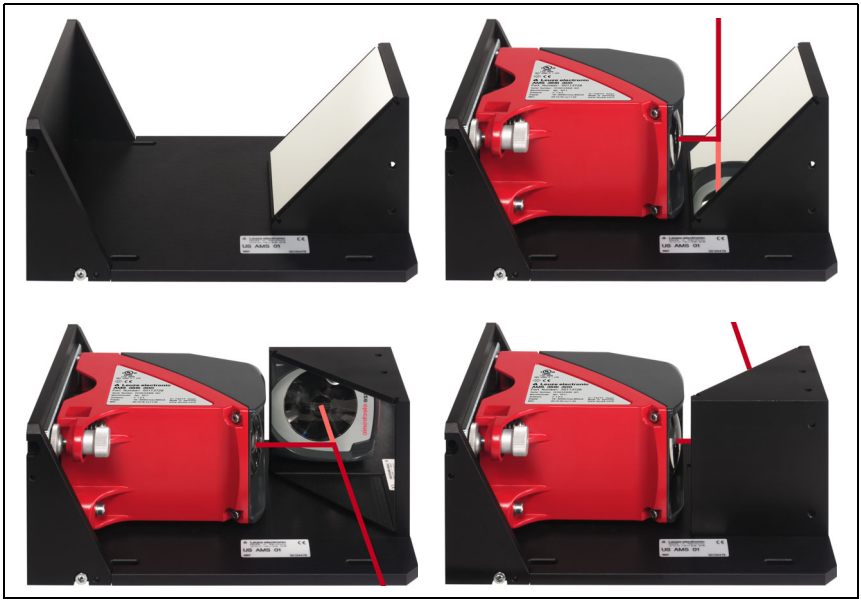
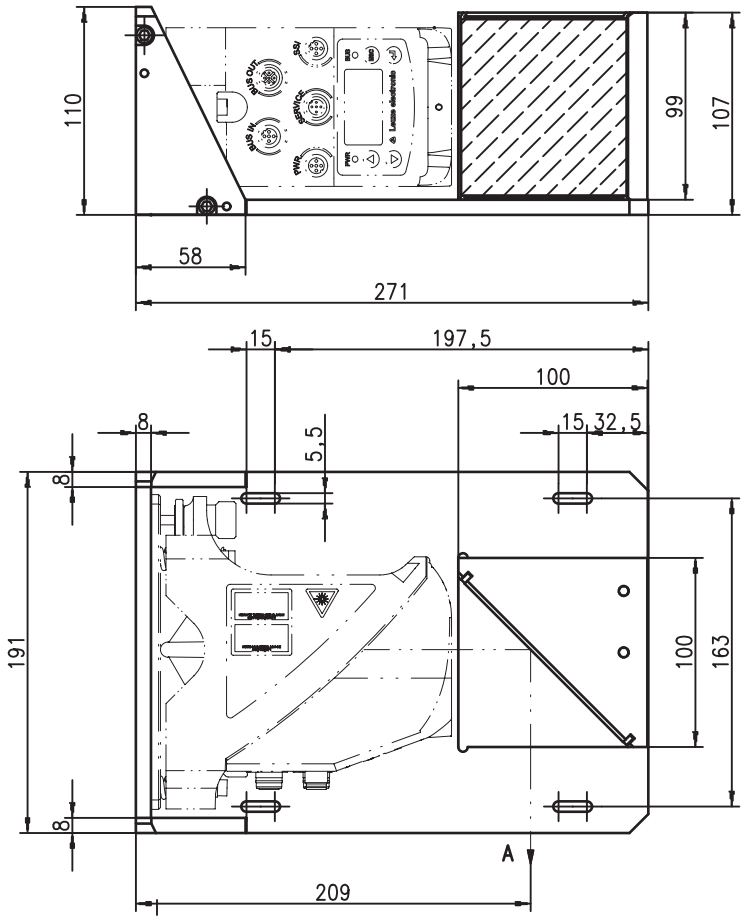


Figure 5.5: Mounting variants of the US AMS 01 laser beam deflector unit

5.3.2 Dimensioned drawing of US AMS 01 deflector unit



A Laser beam

Figure 5.6: Dimensioned drawing of US AMS 01 deflector unit

5.3.3 Mounting the US 1 OMS deflector unit without mounting bracket

The US 1 OMS deflector unit and the AMS 300*i* are mounted separately.

Note!

When mounting, make certain that the laser light spot of the AMS 300*i* *is aligned with the center of the deflection mirror.*

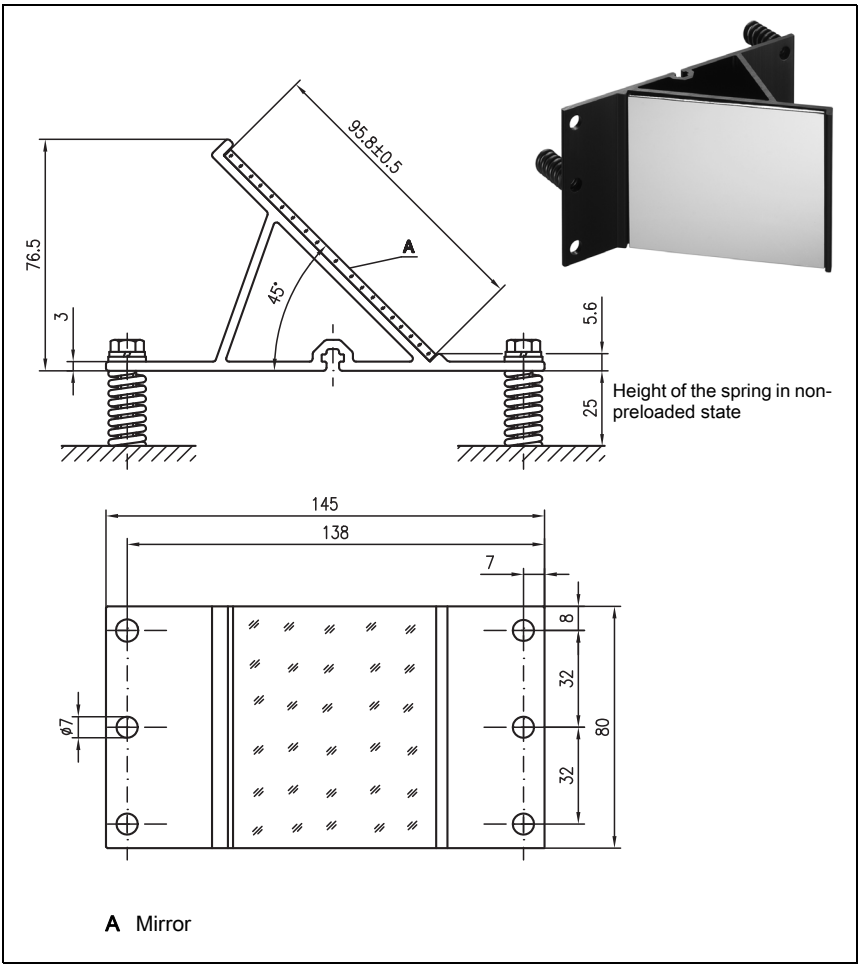


Figure 5.7: Photo and dimensioned drawing of the US 1 OMS deflector unit

The laser light spot is aligned with the reflector as described in Chapter 5.2.

6 Reflectors

6.1 General information

The AMS 300*i* measures distances against a reflective tape specified by Leuze. All technical data given for the AMS 300*i*, such as the operating range or accuracy, can only be achieved with the reflective tape specified by Leuze.

The reflective tapes are available as self-adhesive tapes or affixed to a carrier plate and with an integrated heater especially for use at low temperatures. Reflective tapes with heating have the designation "**Reflective tape …x…-H**", where "**H**" is an abbreviation for the heating variant.

The reflective tapes/reflectors must be ordered separately. The choice of size is left to the user. In Chapter 6.3, recommendations on reflector size are given depending on the distance that is to be measured. In each case, the user must check whether the recommendation is suitable for the respective application.

6.2 Description of the reflective tape

The reflective tape consists of a white, microprism-based reflective material. The microprisms are protected by a hard, highly transparent protective layer.

Under certain circumstances, the protective layer can cause surface reflections. The surface reflections can be directed past the AMS 300*i* by positioning the reflective tape at a slight incline. The inclination of the reflective tape/reflectors is described in Chapter 6.4.2. The required pitch can be found in Table 6.1 "Reflector pitch resulting from spacer sleeves" on page 35.

The reflective tapes have a protective film that is easy to peel off. It must be removed from the reflector before the complete system is put into operation.

6.2.1 Technical data of self-adhesive tape

	Article				
Type designation	**Reflective tape 200x200-S**	**Reflective tape 500x500-S**	**Reflective tape 914x914-S**	**REF 4-A-150x150**	**REF 4-A-300x300**
Part no.	50104361	50104362	50108988	50141015	50141014
Film size	200 x 200 mm	500 x 500 mm	914 x 914 mm	150 x 150 mm	300 x 300 mm
Recommended application temperature for adhesive tape	+5 °C … +25 °C				
Temperature resistance, affixed	-40 °C … +80 °C				
Bonding surface	The bonding surface must be clean, dry and free of grease.				
Cutting tape	Cut with a sharp tool, always on the side with the prism structure.				
Cleaning	Do not use any abrasive agents. A conventional household detergent can be used as a cleaning agent. Rinse with clear water and dry the surface.				
Film storage	Store in a cool and dry place.				

6.2.2 Technical data of reflective tape on carrier plate

The reflective tape is affixed to a carrier plate. Included with the carrier plate are spacers for positioning at an incline in order to avoid surface reflections (see chapter 6.4.2 "Mounting the reflector").

	Article		
Type designation	**Reflective tape 200x200-M**	**Reflective tape 500x500-M**	**Reflective tape 914x914-M**
Part no.	50104364	50104365	50104366
Film size	200 x 200 mm	500 x 500 mm	914 x 914 mm
Outer dimensions of carrier plate	250 x 250 mm	550 x 550 mm	964 x 964 mm
Weight	0.4 kg	1.6 kg	6 kg
Cleaning	Do not use any abrasive agents. A conventional household detergent can be used as a cleaning agent. Rinse with clear water and dry the surface.		
Reflector storage	Store in a cool and dry place.		

6.2.3 Dimensioned drawing of reflective tape on carrier plate

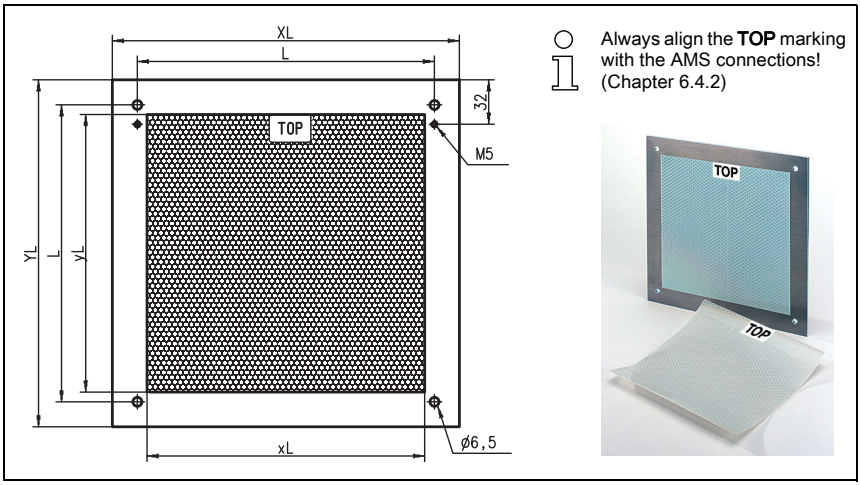


Figure 6.1: Dimensioned drawing of reflectors

Article	Reflective tape (mm)		Reflector plate (mm)		
	xL	yL	XL	YL	L
Reflective tape 200x200-M	200	200	250	250	214
Reflective tape 500x500-M	500	500	550	550	514
Reflective tape 914x914-M	914	914	964	964	928

6.2.4 Technical data of heated reflectors

The reflective tape is affixed to a heated, thermally insulated carrier. The insulation results in a very high energetic efficiency.

Only the reflective tape is kept at the specified temperature by the integrated heater. The insulation on the back prevents the generated heat from being dissipated via the steel construction. Energy costs are greatly reduced in the case of continuous heating.

	Article		
Type designation	**Reflective tape 200x200-H**	**Reflective tape 500x500-H**	**Reflective tape 914x914-H**
Part no.	50115020	50115021	50115022
Voltage supply	230 VAC		
Power	100 W	600 W	1800 W
Current consumption	~ 0.5 A	~ 3 A	~ 8 A
Length of supply line	2 m		
Size of reflective tape	200 x 200 mm	500 x 500 mm	914 x 914 mm
Outer dimensions of base material	250 x 250 mm	550 x 550 mm	964 x 964 mm
Weight	0.5 kg	2.5 kg	12 kg
Temperature control	Controlled heating with the following switch-on and switch-off temperatures, measured at the reflector surface.		
Switch-on temperature	~ 5 °C		
Switch-off temperature	~ 20 °C		
Operating temperature	-30 °C … +70 °C		
Storage temperature	-40 °C … +80 °C		
Air humidity	Max. 90 %, non-condensing		
Cleaning	Do not use any abrasive agents. A conventional household detergent can be used as a cleaning agent. Rinse with clear water and dry the surface.		
Reflector storage	Store in a cool and dry place.		

6.2.5 Dimensioned drawing of heated reflectors

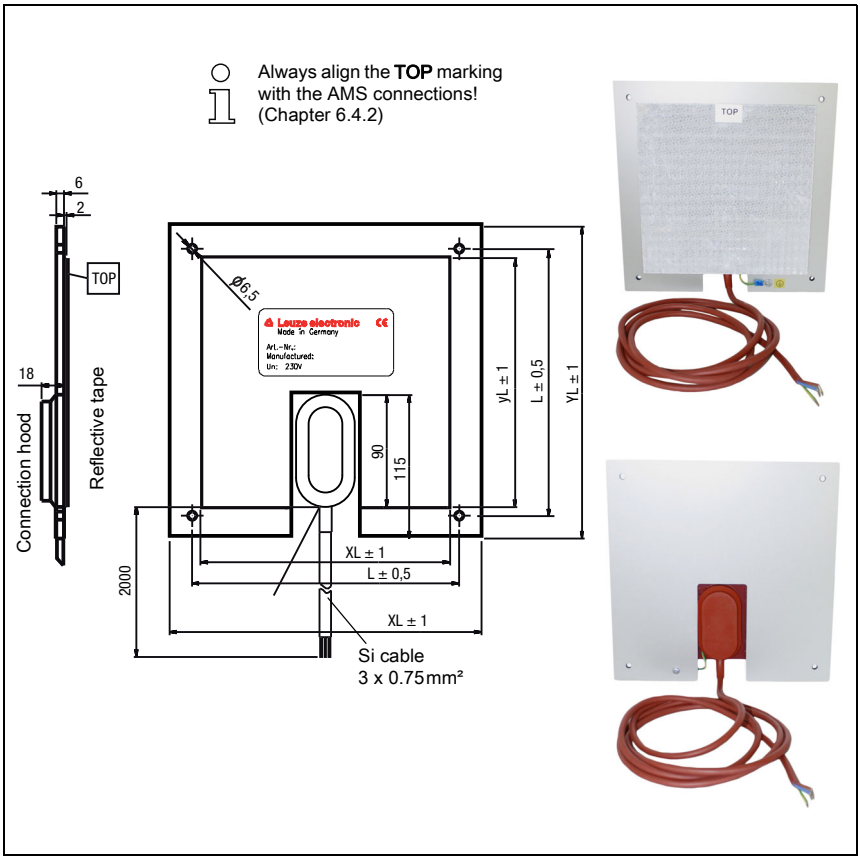


Figure 6.2: Dimensioned drawing of heated reflectors

Article	Reflective tape (mm)		Insulated carrier plate (mm)		
	xL	yL	XL	YL	L
Reflective tape 200x200-H	200	200	250	250	214
Reflective tape 500x500-H	500	500	550	550	514
Reflective tape 914x914-H	914	914	964	964	928

6.3 Selecting reflector size

Depending on the system design, the reflector can be mounted so that it moves with the vehicle or it can be mounted at a fixed location.

Attention!

The reflector sizes shown below are a recommendation from Leuze for on-vehicle mounting of the AMS 300i. For stationary mounting of the AMS 300*i, a smaller reflector is generally sufficient for all measurement distances. For this reason, two smaller reflector sizes are available in the self-adhesive variant "-S".*

During system planning and design, always check whether mechanical travel tolerances require the use of a reflector larger than that which is recommended. This applies, in particular, when the laser measurement system is mounted on a vehicle. During travel, the laser beam must reach the reflector unobstructed. For on-vehicle mounting of the AMS 300*i, the reflector size must accommodate any travel tolerances that may arise and the associated "wandering" of the light spot on the reflector.*

Overview of reflector types

Recommended reflector size			
Selected AMS 300*i* (operating range in m)	**Recommended reflector size (H x W)**	**Type designation …-S = self-adhesive …-M = Carrier plate …-H = heating**	**Part no.**
AMS 300*i*40 (max. 40m)	200 x 200mm	REF 4-A-150x150[1)] Reflective tape 200x200-S Reflective tape 200x200-M Reflective tape 200x200-H REF 4-A-300x300[1)]	50141015 50104361 50104364 50115020 50141014
AMS 300*i*120 (max. 120m)	500x500mm	Reflective tape 500x500-S Reflective tape 500x500-M Reflective tape 500x500-H	50104362 50104365 50115021
AMS 300*i*200 (max. 200m)	749x914mm 914x914mm	Reflective tape 749x914-S Reflective tape 914x914-M Reflective tape 914x914-S Reflective tape 914x914-H	50104363 50104366 50108988 50115022
AMS 300*i*300 (max. 300m)	749x914mm 914x914mm	Reflective tape 749x914-S Reflective tape 914x914-M Reflective tape 914x914-S Reflective tape 914x914-H	50104363 50104366 50108988 50115022

1) For landside mounting

6.4 Mounting the reflector

6.4.1 General information

Self-adhesive reflective tapes

The reflective tapes of the "Reflective tape …x…-**S**" series (self-adhesive) must be affixed to a flat, clean and grease-free surface. We recommend using a separate carrier plate, which is to be provided on-site.

As described in Table 6.1, the reflective tape must be at an angle.

Reflective tapes on carrier plate

The reflective tapes of the "Reflective tape …x…-**M**" series have corresponding mounting holes. Spacer sleeves are provided to enable mounting at the necessary pitch angle. For further information, see Table 6.1.

Heated reflectors

The reflective tapes of the "Reflective tape ...x...-**H**" series have corresponding mounting holes. Due to the voltage supply affixed on the rear, the reflector cannot be mounted flat. Four spacer sleeves in two different lengths are supplied. Use the spacer sleeves to ensure separation from the wall as well as to provide the necessary pitch for avoiding surface reflection. For further information, see Table 6.1.

The reflector has a 2 m-long connection cable for supplying with 230 V AC. Connect the cable to the nearest power distribution point. Observe the current consumptions listed in the technical data.

Attention!

Connection work must be carried out by a certified electrician.

6.4.2 Mounting the reflector

The combination of laser measurement system and reflective tape/reflector is mounted so that the laser light spot hits the film as centered as possible and without obstruction.

For this purpose, use the alignment elements provided on the AMS 300*i*… (see chapter 5.2 "Mounting the AMS 300i"). If necessary, remove the protective film from the reflector.

Attention!

The "TOP" label on the reflectors should be aligned the same as the connections of the AMS 300*i*.

Example:

If the AMS 300*i is mounted so that the M12 connections are on the top, the "TOP" label of the reflector is also on the top. If the* AMS 300*i is mounted so that the M12 connections are on the side, the "TOP" label of the reflector is also on the side.*

Note!

The reflector must be positioned at an angle. Use the spacer sleeves for this purpose. Angle the reflector so that the ***surface reflections of the foil seal are deflected to the left, right or upwards****. Chapter 6.4.3 gives the correct pitch with respect to the reflector size and, thus, the length of the spacers.*

Reflective tapes …-S and …-M

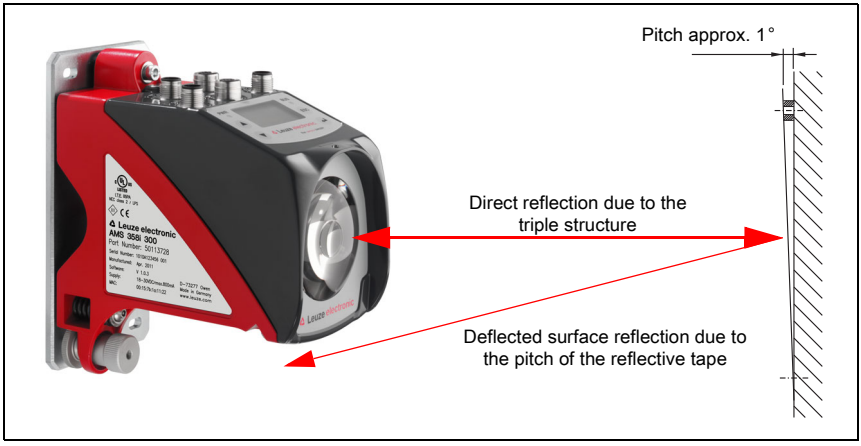


Figure 6.3: Mounting the reflector

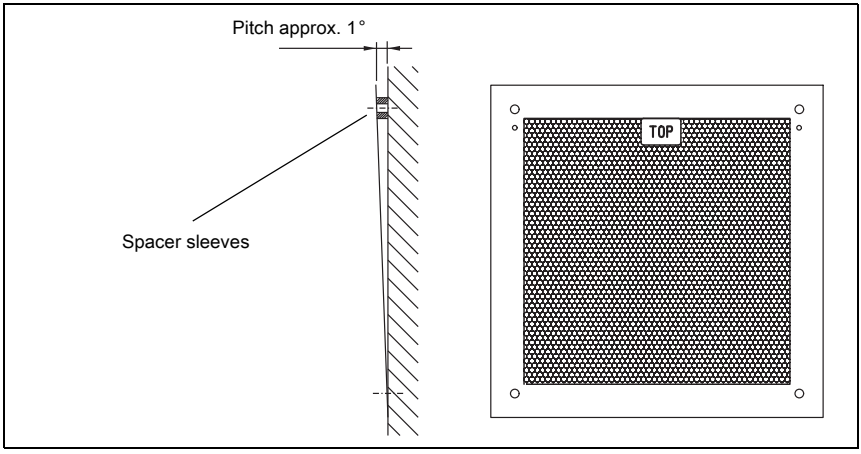


Figure 6.4: Pitch of the reflector

Reflective tapes …-H

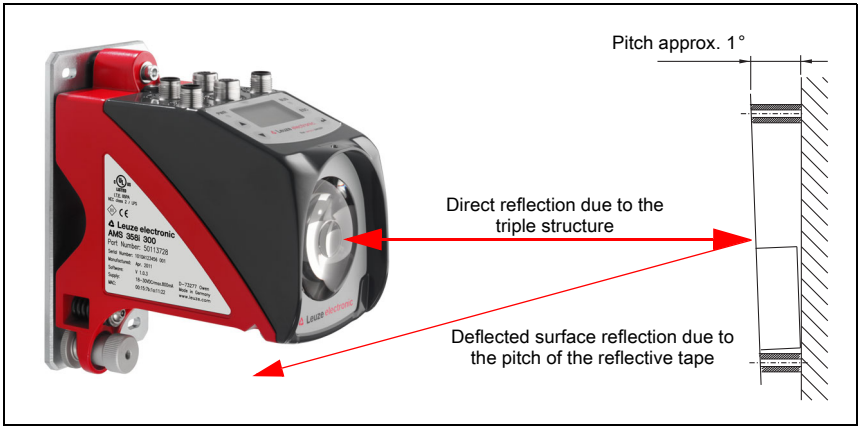


Figure 6.5: Mounting of heated reflectors

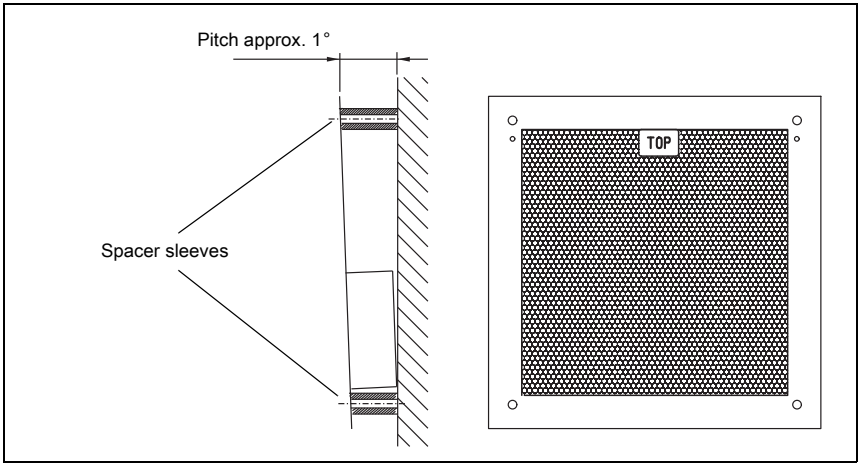


Figure 6.6: Pitch of the heated reflector

6.4.3 Table of reflector pitches

Reflector type	Pitch resulting from spacer sleeves [1]	
Reflective tape 200x200-S Reflective tape 200x200-M	**2 x 5mm**	
Reflective tape 200x200-H	**2 x 15mm**	**2 x 20mm**
Reflective tape 500x500-S Reflective tape 500x500-M	**2 x 10mm**	
Reflective tape 500x500-H	**2 x 15mm**	**2 x 25mm**
Reflective tape 749x914-S	**2 x 20mm**	
Reflective tape 914x914-S Reflective tape 914x914-M	**2 x 20mm**	
Reflective tape 914x914-H	**2 x 15mm**	**2 x 35mm**

1) Spacer sleeves are included with reflective tape …-**M** and …-**H**

Table 6.1: Reflector pitch resulting from spacer sleeves

Note!

Reliable operation of the AMS 300*i* *and, thus, max. operating range and accuracy can only be achieved with the reflective tape specified by Leuze. Correct operation cannot be guaranteed if other reflectors are used!*

7 Electrical connection

The AMS 300*i* laser measurement systems are connected using variously coded M12 connectors. This ensures unique connection assignments.

Note!

The corresponding mating connectors and ready-made cables are available as accessories for all connections. For further information, see chapter 11 "Type overview and accessories"*.*

Figure 7.1: Connections of the AMS 300*i*

7.1 Safety notices for the electrical connection

Attention!

Before connecting the device, be sure that the supply voltage agrees with the value printed on the name plate.
The device may only be connected by a qualified electrician.
Ensure that the functional earth (FE) is connected correctly. Unimpaired operation is only guaranteed when the functional earth is connected properly.
If faults cannot be cleared, the device should be switched off and protected against accidental use.

Attention!

For UL applications, use is only permitted in Class 2 circuits in accordance with the NEC (National Electric Code).

The laser measurement systems are designed in accordance with protection class III for supply by PELV (protective extra-low voltage with reliable disconnection).

Note!

Degree of protection IP65 is achieved only if the connectors and caps are screwed into place!

Described in detail in the following are the individual connections and pin assignments.

7.2 PWR – voltage supply / switching input/output

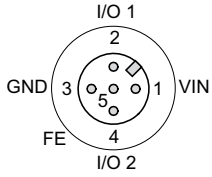
PWR (5-pin plug, A-coded)			
PWR  M 12 connector (A-coded)	Pin	Name	Comment
	1	VIN	Positive supply voltage +18 … +30VDC
	2	I/O 1	Switching input/output 1
	3	GNDIN	Negative supply voltage 0VDC
	4	I/O 2	Switching input/output 2
	5	FE	Functional earth
	Thread	FE	Functional earth (housing)

Table 7.1: Pin assignments - PWR

Further information on configuring the input/output can be found in Chapter 8 and Chapter 9.

7.3 RS 422 BUS IN

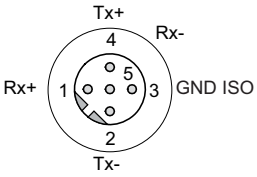
RS 422 BUS IN (5-pin plug, B-coded)			
BUS IN RS 422  M12 connector (B-coded)	Pin	Name	Comment
	1	Rx	RS 422 receiving line
	2	Tx-	RS 422 transmission line
	3	GND ISO	RS 422 reference potential
	4	Tx	RS 422 transmission line
	5	Rx-	RS 422 receiving line
	Thread	FE	Functional earth (housing)

Table 7.2: RS 422 BUS IN pin assignment

7.4 RS 232 BUS IN

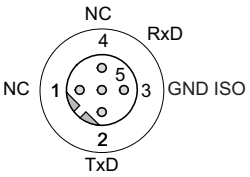
RS 232 BUS IN (5-pin plug, B-coded)			
BUS IN RS 232  M12 connector (B-coded)	**Pin**	**Name**	**Comment**
	1	NC	Not assigned
	2	TxD	RS 232 transmission line
	3	GND ISO	RS 232 reference potential
	4	NC	Not assigned
	5	RxD	RS 232 receiving line
	Thread	FE	Functional earth (housing)

Table 7.3: RS 232 BUS IN pin assignment

7.5 Service

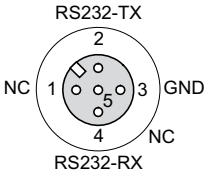
Service (5-pin socket, A-coded)			
SERVICE  M12 socket (A-coded)	**Pin**	**Name**	**Comment**
	1	NC	Not assigned
	2	RS232-TX	Transmission line RS 232/service data
	3	GND	Voltage supply 0VDC
	4	RS232-RX	Receiving line RS 232/service data
	5	NC	Not used
	Thread	FE	Functional earth (housing)

Table 7.4: Pin assignment - Service

Note!

The service interface is designed only for use by Leuze!

8 Display and control panel AMS 300*i*

8.1 Structure of the control panel

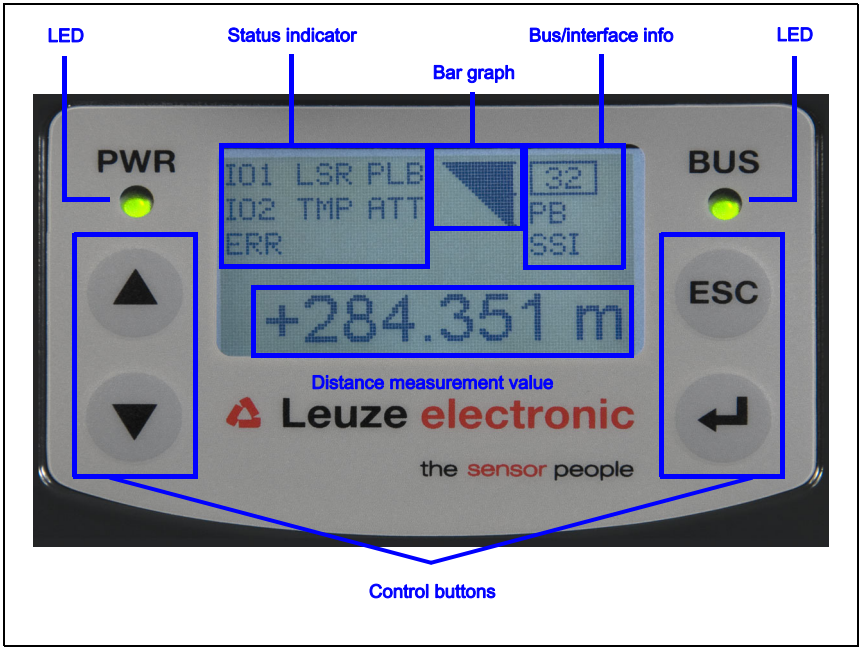


Figure 8.1: Structure of the control panel using the AMS 304*i* PROFIBUS device variant as an example

Note!

The figure is for illustration purposes only and does not correspond to the AMS 300*i* *with respect to specified bus/interface info.*

8.2 Status indicators and operation

8.2.1 Indicators in the display

Status and warning messages in the display

IO1 **Input 1 or output 1 active:**
Function depending on configuration.

IO2 **Input 2 or output 2 active:**
Function depending on configuration.

LSR **Warning - laser prefailure message:**
Laser diode old, device still functional, exchange or have repaired.

TMP **Warning - temperature monitoring:**
Internal device temperature above/below permissible range.

PLB **Plausibility error:**
Implausible measurement value. Possible causes: light beam interruption, outside of measurement range, permissible internal device temperature considerably exceeded or traverse rate >10m/s.

Depending on the configuration, either zero or the last valid measurement value is output at the interfaces.

ATT **Warning - received signal:**
Laser exit window or reflector soiled or fogged by rain, water vapor or fog. Clean or dry surfaces.

ERR **Internal hardware error:**
The device must be sent in for inspection.

Bar graph

Indicates the **strength of the received laser light**.

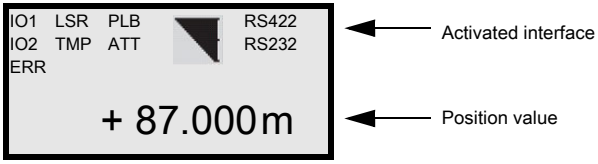
The center bar represents the **ATT** warning threshold. The distance value remains valid and is output at the interfaces.

If no bar graph is available, the **PLB** status information appears at the same time.

The measurement value is assessed as implausible. Depending on the configuration, either zero or the last valid measurement value is output at the interfaces.

Interface info

The designation "RS 422" or "RS 232" in the display indicates the currently active interface.



Position value

The measured position value is displayed in the configured unit of measurement.

+87.000 m With the **metric** setting, the measurement value is always displayed in meters to **three decimal places**.

+87.0 in With the **inch** setting, the measurement value is always displayed in inches to **one decimal place**.

8.2.2 LED status indicators

PWR LED

PWR 	**Off**	**Device OFF** - No supply voltage
PWR 	**Flashing green**	**Power LED flashes green** - No measurement value output - Voltage connected - Self test running - Initialization running - Boot process running
PWR 	**Green continuous light**	**Power LED green** - AMS 300*i* OK - Measurement value output - Self test successfully finished - Device monitoring active
PWR 	**Red flashing**	**Power LED flashes red** - Device OK but warning message (ATT, TMP, LSR) set in display - Light beam interruption - Plausibility error (PLB)
PWR 	**Red continuous light**	**Power LED red** - No measurement value output; for details, see display

BUS LED

BUS 	**Flashing green**	**BUS LED flashes green** - Initialization of the host interface
BUS	**Green continuous light**	**BUS LED green** - Host interface active

8.2.3 Control buttons

▲	**Up**	Navigate upward/sideways.
▼	**Down**	Navigate downward/sideways.
ESC	**ESC**	Exit menu item.
↵	**ENTER**	Confirm/enter value, change menu levels.

Navigating within the menus

The menus within a level are selected with the up/down buttons ▲ ▼.

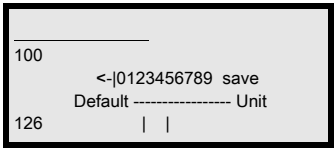
The selected menu item is activated with the enter button ↵.

Press the ESC button ESC to move up one menu level.

When one of the buttons is actuated, the display illumination is activated for 10 min.

Setting values

If input of a value is possible, the display looks like this:



← + ↵ Delete character

0...9 + ↵ Enter digit

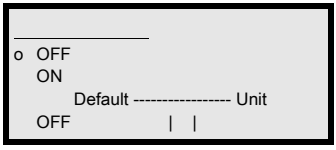
save + ↵ Save

Use the ▲ ▼ and ↵ buttons to set the desired value. An accidental, incorrect entry can be corrected by selecting <-| and then pressing ↵.

Then use the ▲ ▼ buttons to select save and save the set value by pressing ↵.

Selecting options

If options can be selected, the display looks like this:

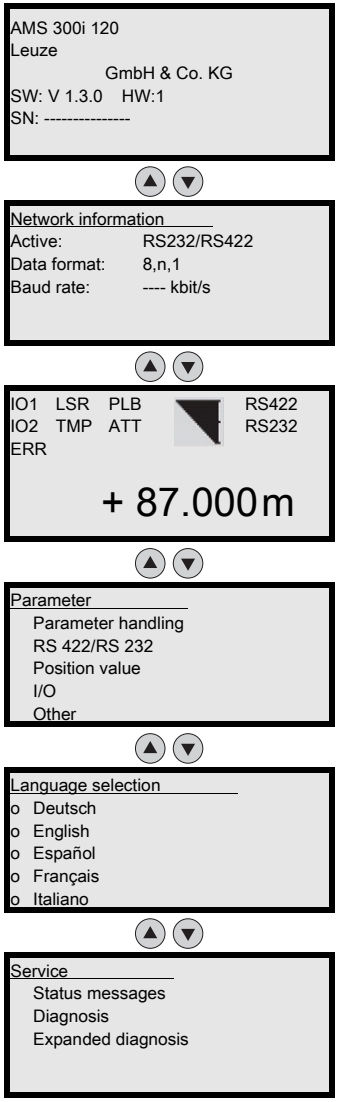


Select the desired option with the ▲ ▼ buttons. Activate the option by pressing ↵.

8.3 Menu description

8.3.1 The main menus

After voltage has been applied to the laser, device information is displayed for several seconds. The display then shows the measurement window with all status information.



Device information - main menu

This menu item contains detailed information on
- Device type
- Manufacturer
- Software and hardware version
- Serial number

No entries can be made via the display.

Network information - main menu

- Explanations of the active interface, data format and baud rate.

No entries can be made via the display.

Status and measurement data - main menu

- Display of status, warning and error messages.
- Status overview of the switching inputs/outputs
- Bar graph for the received signal level.
- Activated interface.
- Measurement value

No entries can be made via the display.
See "Indicators in the display" on page 39.

Parameter - main menu

- Configuration of the AMS.

See "Parameter menu" on page 44.

Language selection - main menu

- Selection of the display language.

See "Language selection menu" on page 48.

Service - main menu

- Display of status messages.
- Display of diagnostic data.

No entries can be made via the display.
See "Service menu" on page 48.

Note!

The rear cover of this manual includes a fold-out page with the complete menu structure. It describes the menu items in brief.

8.3.2 Parameter menu

Parameter handling submenu

The following functions can be called up in the Parameter handling submenu:

- Lock and enable parameter entry
- Set up a password
- Reset the AMS 300*i* to the default settings

Table 8.1: Parameter handling submenu

Level 3	Level 4	Level 5	Selection/configuration option Description	Standard
Parameter enable			ON/OFF The standard setting (OFF) prevents unintended parameter changes. With parameter enable activated (ON), the display is inverted. In this state, it is possible to change parameters manually.	OFF
Password	Activate password		ON/OFF To enter a password, parameter enable must be activated. If a password is assigned, changes to the AMS 300*i* can only be made after the password is entered. The master password 2301 overrides the individually set password.	OFF
	Password entry		For setting a four-digit numerical password.	
Parameters to default			By pressing the enter button ↵ after selecting Parameters to default, all parameters are reset to their standard settings without any further security prompts. In this case, English is selected as the display language.	

Additional important information on parameter handling can be found at the end of the chapter.

RS 422/RS 232 submenu

Table 8.2: RS 422/RS 232 submenu

Level 3	Level 4	Level 5	Selection/configuration option Description	Standard
Selection			RS422 / RS232 Selection of the RS 422 or RS 232 communication interface. The interface must be connected to the bus via the M12 connection plug.	RS 422
Baud rate			19.2kbit/s / 38.4kbit/s / 57.6kbit/s / 115.2kbit/s Selection of the serial communication baud rate. The baud rate must be the same on the transmission and reception side in order to enable communication.	38.4 kbit/s

Table 8.2: RS 422/RS 232 submenu

Level 3	Level 4	Level 5	Selection/configuration option Description	Standard
Format			… 8,n,1 / … 8,e,1 / … 8,o,1 Selection of the serial communication data mode. This is specified with the number of data bits, parity (N=none, E=even, O=odd) and number of stop bits. For example, '8N1' thus means 8 data bits, no parity, 1 stop bit.	8,n,1
Output cycle			Value input Output cycle of data in multiples of the AMS 300*i* measurement cycle of 1.7 ms. The parameter is only valid if cyclical transmission of the position values is selected. Cyclical transmission is selected via the protocol.	1
Position resolution			0.01 mm / 0.1 mm / 1 mm / 10 mm / free resolution The measurement value can be displayed in these resolutions. The value of the free resolution is determined in the "Position value" submenu in the "Free resolution value" parameter.	0.1 mm
Velocity resolution			1 mm/s / 10 mm/s / 100 mm/s	1 mm/s

Position value submenu

Table 8.3: Position value submenu

Level 3	Level 4	Level 5	Selection/configuration option Description	Standard
Unit			Metric/Inch Specifies the units of the measured distances	Metric
Counting direction			Positive/Negative Positive: The measurement value begins at 0 and increases with increasing distance. Negative: The measurement value begins at 0 and decreases with increasing distance. Negative distance values may need to be compensated with an offset or preset.	Positive
Offset			Output value = measurement value + offset The resolution of the offset value is independent of the selected "Position resolution" and is entered in mm or inch/100. The offset value is effective immediately after entry. If the preset value is activated, this has priority over the offset. Preset and offset are not offset against each other.	0 mm
Preset			The preset value is accepted by means of teach pulse. The teach pulse can be applied to a hardware input of the M12 PWR connector. The hardware input must be appropriately configured. See also configuration of the I/Os.	0 mm
Free resolution value			The measurement value can be resolved in increments of 1/1000 within the 5 … 50000 value range. If e.g. a resolution of 0.875 mm per digit is required, the parameter is set to 875. In the activated interface, the measurement value display must also be set to "free resolution" ("Position resolution" parameter).	1000

Table 8.3: Position value submenu

Level 3	Level 4	Level 5	Selection/configuration option Description	Standard
Error delay			ON/OFF Specifies whether, in the event of an error, the position value immediately outputs the value of the "Position value in the case of failure" parameter or the last valid position value for the configured error delay time.	ON/100 ms
Position value in the case of failure			Last valid value / zero Specifies which position value is output after the error delay time elapses.	Zero

I/O submenu

Table 8.4: I/O submenu

Level 3	Level 4	Level 5	Selection/configuration option Description	Standard
I/O 1	Port configuration		Input/Output Defines whether I/O 1 functions as an output or input.	Output
	Switching input	Function	No function/teach preset/laser ON/OFF	No function
		Activation	Low active/High active	Low active
	Switching output	Function	Pos. limit value 1 / Pos. limit value 2 / Velocity / Intensity (ATT) / Temp. (TMP) / Laser (LSR) / Plausibility (PLB) / Hardware (ERR) The individual functions are "ORed" on the selected switching output.	Plausibility (PLB), hardware (ERR)
		Activation	Low active/High active	Low active
I/O 2	Port configuration		Input/Output Defines whether I/O 2 functions as an output or input.	Output
	Switching input	Function	No function/teach preset/laser ON/OFF	No function
		Activation	Low active/High active	Low active
	Switching output	Function	Pos. limit value 1 / Pos. limit value 2 / Velocity / Intensity (ATT) / Temp. (TMP) / Laser (LSR) / Plausibility (PLB) / Hardware (ERR) The individual functions are "ORed" on the selected switching output.	Intensity (ATT), Temp. (TMP), Laser (LSR)
		Activation	Low active/High active	Low active
Limit values	Upper pos. limit 1	Activation	ON/OFF	OFF
		Limit value input	Value input in mm or inch/100	0
	Lower pos. limit 1	Activation	ON/OFF	OFF

Table 8.4: I/O submenu

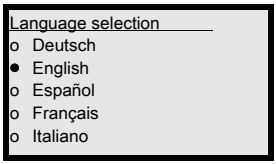
Level 3	Level 4	Level 5	Selection/configuration option Description	Standard
		Limit value input	Value input in mm or inch/100	0
	Upper pos. limit 2	Activa-tion	ON/OFF	OFF
		Limit value input	Value input in mm or inch/100	0
	Lower pos. limit 2	Activa-tion	ON/OFF	OFF
		Limit value input	Value input in mm or inch/100	0
	Max. velocity	Activa-tion	ON/OFF	OFF
		Max. velocity	Value input in mm/s or inch/100s	0

Other submenu

Table 8.5: Other submenu

Level 3	Level 4	Level 5	Selection/configuration option Description	Standard
Heating con-trol			Standard (10°C … 15°C)/Extended (30°C … 35°) Defines a switch-on/switch-off range for the heating control. The extended switch-on/switch-off range for heating may pro-vide a remedy in the event of condensation problems. Due to the limited heating capacity, it cannot be guaranteed that no condensation will form on the optics in the extended switch-on/switch-off range. This parameter is available as standard, but functions only for devices with integrated heating (AMS 300*i*… **H**).	Standard
Display illumi-nation			10 minutes/ON Display illumination is switched off after 10 minutes or, if the parameter is set to "ON", illumination is always on.	10 min
Display contrast			Weak/Medium/Strong The display contrast may change at extreme temperature val-ues. The contrast can subsequently be adapted using the three levels.	Medium
Service RS232	Baud rate		57.6 kbit/s / 115.2 kbit/s The service interface is only available to Leuze personnel.	115.2 kbit/s
	Format		8,e,1 / 8,n,1 The service interface is only available to Leuze personnel.	8,n,1

8.3.3 Language selection menu



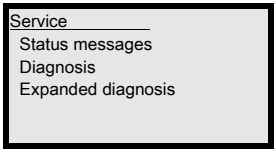
5 display languages are available:

- German
- English
- Spanish
- French
- Italian

The AMS 300*i* is delivered from the factory with the display preset to English.

To change the language, no password needs to be entered nor must parameter enable be active. The display language is a passive operational control and is therefore not a function parameter per se.

8.3.4 Service menu



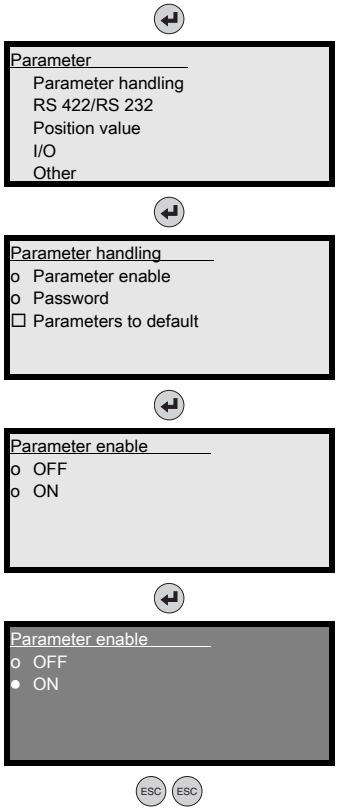
A detailed description of the individual functions can be found in Chapter 10.

8.4 Operation

An operating process is described here using parameter enable as an example.

Parameter enable

During normal operation parameters can be viewed only. If parameters are to be changed, the ON menu item in the Parameter -> Parameter handling -> Parameter enable menu must be activated. To do this, proceed as follows.



In the main menu, press the enter button to enter the Parameter menu.

Use the ▲▼ buttons to select the Parameter handling menu item.

Press the enter button to enter the Parameter handling menu.

In the Parameter handling menu, use the ▲▼ buttons to select the Parameter enable menu item.

Press the enter button to enter the Parameter enable menu.

In the Parameter enable menu, use the ▲▼ buttons to select the ON menu item.

Press the enter button to activate parameter enable.

The PWR LED lights up orange; the display is inverted. You can now set the individual parameters on the display.

Press the ESC button twice to return to the Parameter menu.

Viewing and editing parameters

As long as parameter enable is active, the entire AMS 300*i* display is inverted.

Communication between the control and the AMS 300*i* via the RS 422/RS 232 interface is also active when parameter enable is active.

Note!

Changes to parameters via display entry have immediate effect.
If a password was stored, parameter enable is not possible until this password is entered; see "Password for parameter enable" below.

Password for parameter enable

Parameter entry on the AMS 300*i* can be protected with a four-digit numerical password. On the AMS 300*i*, the password is entered via the display. If parameter enable has been activated after successfully entering the password, parameters can be changed via the display.

Note!

The **master password 2301** *can enable the* AMS 300*i* *at any time.*

9 RS 422/RS 232 interface

9.1 General information on the RS 422/RS 232 interface

The AMS 300*i* features an integrated RS 422 interface and an RS 232 interface. On delivery, the RS 422 interface is active; alternatively, the RS 232 can be activated. The currently active interface is indicated in the display.

Note!

To activate/deactivate the respective interface, parameter enable must be activated (see "Parameter enable" on page 49.).

Note!

Both interfaces are contacted via the M12 connection for BUS IN. Either the RS 422 or the RS 232 can be activated.

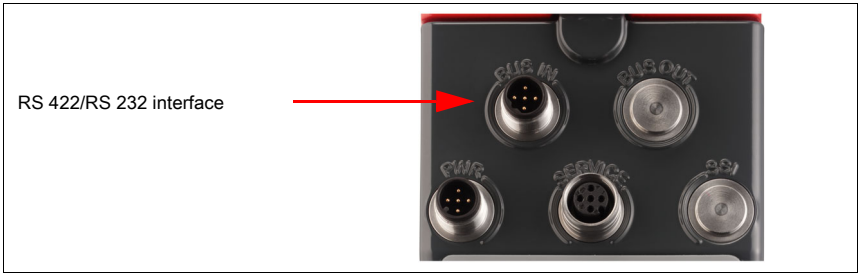
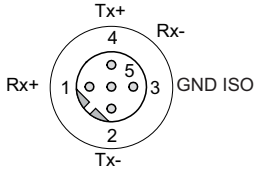
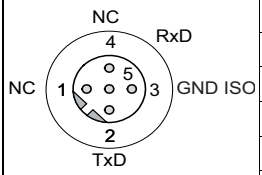


Figure 9.1: Interfaces of the AMS 300*i*

9.2 RS 422 – Electrical connection

RS 422 BUS IN (5-pin plug, B-coded)			
BUS IN RS 422  M12 connector (B-coded)	Pin	Name	Comment
	1	Rx+	RS 422 receiving line
	2	Tx-	RS 422 transmission line
	3	GND ISO	RS 422 reference potential
	4	Tx+	RS 422 transmission line
	5	Rx-	RS 422 receiving line
	Thread	FE	Functional earth (housing)

9.3 RS 232 – Electrical connection

RS 232 BUS IN (5-pin plug, B-coded)			
BUS IN RS 232  M12 connector (B-coded)	Pin	Name	Comment
	1	N.C.	Not assigned
	2	TxD	RS 232 transmission line
	3	GND ISO	RS 232 reference potential
	4	NC	Not assigned
	5	RxD	RS 232 receiving line
	Thread	FE	Functional earth (housing)

9.4 RS 422/RS 232 interface data

9.4.1 Default settings for the RS 422 interface

The RS 422 is active in the delivered condition.

Designation	Value range	Default
Activation	ON/OFF	**ON**
Baud rate in kbit/s	19.2 / 38.4 / 57.6 / 115.2	**38.4**
Data format	8,n,1 / 8,e,1 / 8, o, 1	**8,n,1**

9.4.2 Default settings for the RS 232 interface

The RS 232 is inactive in the delivered condition.

Designation	Value range	Default
Activation	ON/OFF	**OFF**
Baud rate in kbit/s	19.2 / 38.4 / 57.6 / 115.2	**38.4**
Data format	8,n,1 / 8,e,1 / 8, o, 1	**8,n,1**

9.4.3 Parameter settings for AMS 300*i*

An overview of all parameters to be set is given in the foldout at the end of the manual.
All parameters are set via the panel/display
Basic operation of the display is described in Chapter 8.4.
To change parameters, parameter enable must be activated.

Note!
Changed parameters take effect on the interface immediately.

9.4.4 Communication protocol (binary protocol)

Request for AMS 300*i* data

Transfer of the measured distances or the velocity is requested and actuation of the laser diode (ON/OFF) controlled via a 3-byte-long protocol.

Note!

The protocol is valid for both interfaces (RS 422 and RS 232).

Request to the AMS 300*i*

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	1	0	0	0	0	0	0
1	CMD	CMD	CMD	CMD	CMD	CMD	CMD	CMD
2	XOR	XOR	XOR	XOR	XOR	XOR	XOR	XOR

Byte 0: Reserve control byte.
Bit 7 and bit 6 must be set to logical 1.

Byte 1: CMD
Command = Data request to the AMS 300*i*.

Binary coding	Hex coding	Function
1111 0001	F1	Request of a single distance value
1111 0010	F2	Cyclical request for the distance values [1)]
1111 0011	F3	Stop cyclical transfer
1111 0100	F4	Laser diode ON
1111 0101	F5	Laser diode OFF
1111 0110	F6	Request of a single velocity value
1111 0111	F7	Cyclical request for the velocity values *
1111 1000	F8	Single request for position and velocity value

1) The output cycle is set to 1 x 1.7 ms by default.

In the parameter menu under RS 422 and RS 232, the output cycle for cyclically requested data can be configured in the range of (1 … 20) x 1.7 ms.

Byte 2: XOR link of byte 0 and byte 1
An even number of binary 1 (calculated column by column from top to bottom) sets the XOR bit to 1.

Example

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	0	1	1	1	1	0	0
1	1	1	1	1	0	1	1	0
XOR	0	1	0	0	1	0	1	0

The XOR checksum is entered by the sender (control) in the request protocol and checked by the receiver (AMS 300*i*). A protocol is correctly transferred if the XOR checksum of the transmitter and the XOR checksum of the receiver are the same. If the XOR comparison is negative (different checksums), the protocol is not accepted by the AMS 300*i*. The AMS 300*i* does not send acknowledgment for an unequal checksum.

Response of the AMS 300*i* data to the CMD request for $F1_h$ to $F7_h$

The output of the AMS 300*i* data (response) is contained in 6 bytes.

Note!

Data output is the same for both interfaces (RS 422 and RS 232).

Response of the AMS 300*i*

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	Laser	I/O2	I/O1	0	0	0	0
1	Ready	LSR	TMP	ERR	ATT	PLB	OVFL	SIGN
2	D23	D22	D21	D20	D19	D18	D17	D16
3	D15	D14	D13	D12	D11	D10	D09	D08
4	D07	D06	D05	D04	D03	D02	D01	D00
5	XOR	XOR	XOR	XOR	XOR	XOR	XOR	XOR

Response of the AMS 300*i* data to the request for $F8_h$

The output of the AMS 300*i* data (Response) is contained in 8 bytes.

Note!

Data output is the same for both interfaces (RS 422 and RS 232).

Response of the AMS 300*i*

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	LASER	IO2	IO1	0	0	0	0
1	READY	LSR	TMP	ERR	ATT	PLB	OVFL	SIGN
2	D23	D22	D21	D20	D19	D18	D17	D16
3	D15	D14	D13	D12	D11	D10	D9	D8
4	D7	D6	D5	D4	D3	D2	D1	D0
5	V15	V14	V13	V12	V11	V10	V9	V8
6	V7	V6	V5	V4	V3	V2	V1	V0
7	XOR	XOR	XOR	XOR	XOR	XOR	XOR	XOR

Laser:	Laser status; laser ON = 0; laser OFF = 1
I/O1 / I/O2:	I/O status: signal level inactive = 0; signal level active = 1
Ready:	AMS 300*i* status: not ready = 0, ready = 1
LSR:	Prefailure message for laser diode: OK = 0, warning = 1
TMP:	Temperature warning: OK = 0, warning = 1
ERR:	Device error: OK = 0, error = 1
ATT:	Weakening reception signal: OK = 0, warning = 1
PLB:	Implausible measurement value: OK = 0, warning = 1
OVFL:	Measurement value cannot be represented in 24 bits: OK = 0, warning = 1
Sign:	Sign of measurement value: 0 = positive, 1 = negative
D23 - D00:	Distance value or velocity value D23 = MSB, D00 = LSB
V15 - V00:	Velocity value V15 = MSB, V00 = LSB

XOR: XOR link of byte 0 to byte 4
An odd number of binary 1 (calculated column by column from top to bottom) sets the XOR bit to 1.

Example

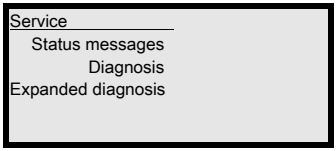
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	0	1	1	1	1	0	0
1	1	1	1	1	0	1	1	0
XOR	0	1	0	0	1	0	1	0

The XOR checksum is entered by the AMS 300*i* in the response protocol and checked by the receiver (control). A protocol is correctly transferred if the XOR checksum of the transmitter and the XOR checksum of the receiver are the same. If the XOR comparison is negative (different checksum), the protocol is rejected by the control or the control outputs an error message.

10 Diagnostics and troubleshooting

10.1 Service and diagnosis in the display of the AMS 300*i*

In the main menu of the AMS 300*i*, expanded "Diagnostics" can be called up under the Service heading.



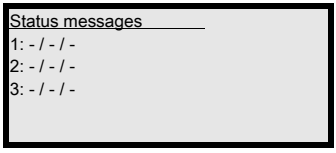
From the Service main menu, press the enter button ↵ to access the underlying menu level.

Use the up/down buttons ▲ ▼ to select the corresponding menu item in the selected level; use the enter button ↵ to activate the selection.

Return from any sub-level to the next-higher menu item by pressing the ESC button ESC.

10.1.1 Status messages

The status messages are written in a ring memory with 25 positions. The ring memory is organized according to the FIFO principle. No separate activation is necessary for storing the status messages. Power OFF clears the ring memory.



Basic representation of the status messages

n: Type / No. / 1

Meaning:

n:	memory position in the ring memory
Type:	type of message: **I** = info, **W** = warning, **E** = error, **F** = severe system error.
No:	internal error detection
1:	frequency of the event (always "1" because no summation occurs)

The status messages within the ring memory are selected with the up/down buttons ▲ ▼. Use the enter button ↵ to call up **detailed information** about the respective status message:

Detailed information about a status message

Type: type of message + internal counter

UID: Leuze-internal coding of the message

ID: description of the message

Info: not currently used

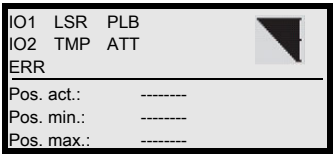
Within the detailed information, press the enter button ↵ again to activate an **action menu** with the following functions:

- Acknowledge message
- Delete message
- Acknowledge all
- Delete all

10.1.2 Diagnosis

The diagnostics function is activated by selecting the Diagnostics menu item. The ESC button ESC deactivates the diagnostics function and clears the contents of the recordings.

The recorded diagnostic data is displayed in 2 fields. In the upper half of the display, status messages of the AMS and the bar graph are displayed. The lower half contains information used for Leuze-internal evaluation.



Use the up/down buttons ▲ ▼ to scroll in the bottom half between various displays. The contents of the scrollable pages are intended solely for Leuze for internal evaluation.

The diagnostics have no influence on communication with the host interface and can be activated during operation of the AMS 300*i*.

10.1.3 Expanded diagnosis

The Expanded diagnosis menu item is used for Leuze-internal evaluation.

10.2 General causes of errors

10.2.1 Power LED

See also Chapter 8.2.2.

Error	Possible error cause	Measure
PWR LED "OFF"	No supply voltage connected	Check supply voltage.
	Hardware error	Send in device.
PWR LED "flashes red"	Light beam interruption	Check alignment.
	Plausibility error	Traverse rate >10m/s.
PWR LED "static red"	Hardware error	For error description, see display, It may be necessary to send in the device.

Table 10.1: General causes of errors

10.3 Interface errors

10.3.1 BUS LED

After the AMS 300*i* is started, the **BUS** LED is always on.

10.4 Status indicators in the display of the AMS 300*i*

Display	Possible error cause	Measure
PLB (implausible measurement values)	Laser beam interruption	Laser spot must always be incident on the reflector.
	Laser spot outside of reflector	Traverse rate < 10 m/s?
	Measurement range for maximum distance exceeded	Restrict traversing path or select AMS with larger measurement range.
	Velocity greater than 10 m/s	Reduce velocity.
	Ambient temperature far outside permissible range (TMP display; PLB)	Select AMS with heating or ensure cooling.
ATT (insufficient received signal level)	Reflector soiled	Clean reflector or glass lens.
	Glass lens of the AMS soiled	
	Performance reduction due to snow, rain, fog, condensing vapor or heavily polluted air (oil mist, dust)	Optimize usage conditions.
	Laser spot only partially on reflector	Check alignment.
	Protective film on reflector	Remove protective film from reflector.
TMP (operating temperature outside of specification)	Ambient temperatures outside specified range	In case of low temperatures, remedy may be an AMS with heating. If temperatures are too high, provide cooling or change mounting location.
LSR Laser diode warning	Laser diode prefailure message	Send in device at next possible opportunity to have laser diode replaced. Have replacement device ready.
ERR Hardware error	Indicates an uncorrectable error in the hardware	Send in device for repair.

Service hotline:

You can find the contact information for the hotline in your country on our website www.leuze.com under "Contact & Support".

Repair service and returns:

Defective devices are repaired at our service centers competently and quickly. We offer you an extensive service packet to keep any system downtimes to a minimum. Our service center requires the following information:

- Your customer number
- Product description or part description
- Serial number and batch number
- Reason for requesting support together with a description

For this purpose, please register the merchandise concerned. Simply register return of the merchandise on our website www.leuze.com under Contact & Support -> Repair Service & Returns:

To ensure quick and easy processing of your request, we will send you a returns order with the returns address in digital form.

Note!

Please use Chapter 10 *as a master copy should servicing be required.*
Cross the items in the "Measures" column which you have already examined, fill out the following address field and fax the pages together with your service contract to the fax number listed below.

Customer data (please complete)

Device type:	
Company:	
Contact person/department:	
Phone (direct dial):	
Fax:	
Street / no.:	
ZIP code / City:	
Country:	

Leuze Service fax number:

+49 7021 573 - 199

11 Type overview and accessories

11.1 Part number code

AMS 3**xx** *i* **yyy** **H**

Heating option	H =	With heating
Operating range	40	Max. operating range in m
	120	Max. operating range in m
	200	Max. operating range in m
	300	Max. operating range in m
	i =	Integrated fieldbus technology
Interface	00	RS 422/RS 232
	01	RS 485
	04	PROFIBUS DP / SSI
	08	TCP/IP
	35	CANopen
	38	EtherCAT
	48	PROFINET RT
	55	DeviceNet
	58	EtherNet/IP
	84	Interbus

AMS **A**bsolute **M**easurement **S**ystem

11.2 Overview of AMS 300*i* types (RS 422/RS 232)

Type designation	Description	Part no.
AMS 300*i*40	40m operating range, RS 422/RS 232 interface	50113661
AMS 300*i*120	120m operating range, RS 422/RS 232 interface	50113662
AMS 300*i*200	200m operating range, RS 422/RS 232 interface	50113663
AMS 300*i*300	300m operating range, RS 422/RS 232 interface	50113664
AMS 300*i*40 H	40m operating range, RS 422/RS 232 interface, integrated heating	50113665
AMS 300*i*120 H	120m operating range, RS 422/RS 232 interface, integrated heating	50113666
AMS 300*i*200 H	200m operating range, RS 422/RS 232 interface, integrated heating	50113667
AMS 300*i*300 H	300m operating range, RS 422/RS 232 interface, integrated heating	50113668

Table 11.1: Overview of AMS 300*i* types

11.3 Overview of reflector types

Type designation	Description	Part no.
REF 4-A-150x150	Reflective tape, 150x150mm, self-adhesive	50141015
Reflective tape 200x200-S	Reflective tape, 200x200mm, self-adhesive	50104361
REF 4-A-300x300	Reflective tape, 300x300mm, self-adhesive	50141014
Reflective tape 500x500-S	Reflective tape, 500x500mm, self-adhesive	50104362
Reflective tape 914x914-S	Reflective tape, 914x914mm, self-adhesive	50108988
Reflective tape 200x200-M	Reflective tape, 200x200mm, affixed to carrier plate	50104364
Reflective tape 500x500-M	Reflective tape, 500x500mm, affixed to carrier plate	50104365
Reflective tape 914x914-M	Reflective tape, 914x914mm, affixed to carrier plate	50104366
Reflective tape 200x200-H	Reflective tape, 200 x 200mm, heated	50115020
Reflective tape 500x500-H	Reflective tape, 500 x 500mm, heated	50115021
Reflective tape 914x914-H	Reflective tape, 914 x 914mm, heated	50115022

Table 11.2: Overview of reflector types

11.4 Accessories

11.4.1 Accessories – Mounting bracket

Type designation	Description	Part no.
MW OMS/AMS 01	Mounting bracket for mounting AMS 300*i* to horizontal surfaces	50107255

Table 11.3: Accessories – Mounting bracket

11.4.2 Accessories – Deflector unit

Type designation	Description	Part no.
US AMS 01	Deflector unit with integrated mounting bracket for AMS 300*i*. Variable 90° deflection of laser beam in different directions	50104479
US 1 OMS	Deflector unit without mounting bracket for simple 90° deflection of laser beam	50035630

Table 11.4: Accessories – Deflector unit

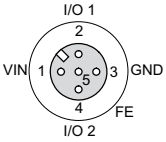
11.4.3 Accessories – M12 connector

Type designation	Description	Part no.
KD 02-5-BA	M12 connector, B-coded socket, BUS IN	50038538
KD 095-5A	M12 connector, A-coded socket, Power (PWR)	50020501

Table 11.5: Accessories – M12 connector

11.4.4 Accessories – Ready-made cables for voltage supply

Contact assignment/core color of PWR connection cable

PWR connection cable (5-pin socket, A-coded)			
PWR  M12 socket (A-coded)	Pin	Name	Core color
	1	VIN	Brown
	2	I/O 1	White
	3	GND	Blue
	4	I/O 2	Black
	5	FE	Gray
	Thread	FE	Bare

Technical data of the cables for voltage supply

Operating temperature range	In idle state: -30°C … +70°C In motion: -5°C … +70°C
Material	Sheathing: PVC
Bending radius	> 50 mm

Order codes of the cables for voltage supply

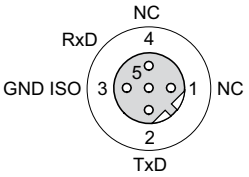
Type designation	Description	Part no.
K-D M12A-5P-5m-PVC	M12 socket, A-coded, axial plug outlet, open cable end, cable length 5 m	50104557
K-D M12A-5P-10m-PVC	M12 socket, A-coded, axial plug outlet, open cable end, cable length 10 m	50104559

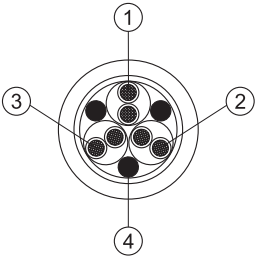
11.4.5 Accessories – Ready-made cables for RS 232

Note!

The RS 232 interface is wired via an SSI/IBS connection cable.

Contact assignment of RS 232 connection cable

RS 232 connection cable (5-pin socket, B-coded)			
 M12 socket (B-coded)	**Pin**	**Name**	**Core color**
	1	NC	**Yellow**
	2	TxD	**Green**
	3	GND ISO	**Gray**
	4	NC	**Pink**
	5	RxD	**Brown**
	Thread	FE	**Bare**



1 Conductor pair with **white/brown** insulation
2 Conductor pair with **green/yellow** insulation
3 Conductor pair with **gray/pink** insulation
4 Filler (polyester threads)

All conductor pairs stranded,
colors acc. to DIN 47100

Technical data of RS 232 connection cable

Operating temperature range	In idle state: -40°C … +80°C In motion: -5°C … +80°C
Material	The lines comply with the RS 232 requirements, Free of halogens, silicone and PVC
Bending radius	> 80 mm, suitable for drag chains

Order codes for RS 232 connection cables

Type designation	Description	Part no.
KB SSI/IBS-2000-BA	M12 socket, B-coded, for SSI/Interbus, axial connector, open cable end, cable length 2m	50104172
KB SSI/IBS-5000-BA	M12 socket, B-coded, for SSI/Interbus, axial connector, open cable end, cable length 5m	50104171
KB SSI/IBS-10000-BA	M12 socket, B-coded, for SSI/Interbus, axial connector, open cable end, cable length 10m	50104170
KB SSI/IBS-15000-BA	M12 socket, B-coded, for SSI/Interbus, axial connector, open cable end, cable length 15m	50104169
KB SSI/IBS-20000-BA	M12 socket, B-coded, for SSI/Interbus, axial connector, open cable end, cable length 20m	50104168
KB SSI/IBS-25000-BA	M12 socket, B-coded, for SSI/Interbus, axial connector, open cable end, cable length 25m	50108447
KB SSI/IBS-30000-BA	M12 socket, B-coded, for SSI/Interbus, axial connector, open cable end, cable length 30m	50108446
KB SSI/IBS-2000-BA	M12 socket, B-coded, for SSI/Interbus, axial connector, open cable end, cable length 2m	50104172
KB SSI/IBS-5000-BA	M12 socket, B-coded, for SSI/Interbus, axial connector, open cable end, cable length 5m	50104171

11.4.6 Cables for RS 422

No ready-made cables are available for the RS 422.

In accordance with the RS 422 pin assignment (see Chapter 9.2), a cable suitable for Interbus can be connected to the KD 02-5-BA M12 connector with part no. 50038538.

To prevent electromagnetic coupling (EMC), we recommend using only shielded cables with twisted wire pairs.

12 Maintenance

12.1 General maintenance information

With normal use, the laser measurement system does not require any maintenance by the operator.

Cleaning

In the event of dust build-up or if the warning message (ATT) is displayed, clean the device with a soft cloth; use a cleaning agent (commercially available glass cleaner) if necessary.

Also check the reflector for possible soiling.

Attention!

Do not use solvents and cleaning agents containing acetone. The use of such solvents can dull the reflector, the housing window and the display.

12.2 Repairs, servicing

Attention!

Access to or changes on the device, except where expressly described in this operating manual, is not authorized.
The device must not be opened. Failure to comply will render the guarantee void. Warranted features cannot be guaranteed after the device has been opened.

Repairs to the device must only be carried out by the manufacturer.

↳ *Contact your Leuze distributor or service organization should repairs be required. The addresses can be found on the inside of the cover and on the back.*

Note!

When sending laser measurement systems to Leuze for repair, please provide an accurate description of the fault.

12.3 Disassembling, packing, disposing

Repacking

For later reuse, the device is to be packed so that it is protected.

Note!

Electrical scrap is a special waste product! Observe the locally applicable regulations regarding disposal of the product.

Level 1 ▲▼ : Selection	Level 2 ▲▼ : Selection ESC : Back	Level 3 ▲▼ : Selection ESC : Back	Level 4 ▲▼ : Selection ESC : Back	Level 5 ▲▼ : Selection ESC : Back	Selection/configuration option ▲▼ : Selection ↵ : Activate ESC : Back	Detailed information on
Device information						Page 43
Network information						Page 43
Status and measurement data						Page 43
Parameter ↵	Parameter handling	↵ Parameter enable			ON/OFF	Page 44
		↵ Password	↵ Activate password		ON/OFF	
			↵ Password entry		For setting a four-digit numerical password	
		↵ Parameters to default			All parameters are reset to their factory settings	
	↵ RS 422/RS 232	↵ Selection			RS 422/RS 232	Page 44
		↵ Baud rate			19.2 kbit/s / 38.4 kbit/s / 57.6 kbit/s / 115.2 kbit/s	
		↵ Data format			… 8,n,1 / … 8,e,1 / … 8,o,1	
		↵ Output cycle			Value input:	
		↵ Position resolution			0.01 mm / 0.1 mm / 1 mm / 10 mm / free resolution	
		↵ Velocity resolution			1 mm/s / 10 mm/s / 100 mm/s	
	↵ Position value	↵ Unit			Metric/Inch	Page 45
		↵ Counting direction			Positive/Negative	
		↵ Offset			Value input:	
		↵ Preset			Value input	
		↵ Error delay			ON/OFF	
		↵ Position value in the case of failure			Last valid value / zero	
		↵ Free resolution value			5 … 50000	
	↵ I/O	↵ I/O 1	↵ Port configuration		Input/Output	Page 46
			↵ Switching input	↵ Function	No function/teach preset/laser ON/OFF	
				↵ Activation	Low active/High active	
			↵ Switching output	↵ Function	Pos. limit value 1 / Pos. limit value 2 / Velocity / Intensity (ATT) / Temp. (TMP) / Laser (LSR) / Plausibility (PLB) / Hardware (ERR)	
				↵ Activation	Low active/High active	
		↵ I/O 2	↵ Port configuration		Input/Output	
			↵ Switching input	↵ Function	No function/teach preset/laser ON/OFF	
				↵ Activation	Low active/High active	
			↵ Switching output	↵ Function	Pos. limit value 1 / Pos. limit value 2 / Velocity / Intensity (ATT) / Temp. (TMP) / Laser (LSR) / Plausibility (PLB) / Hardware (ERR)	
				↵ Activation	Low active/High active	
		↵ Limit values	↵ Upper pos. limit 1	↵ Activation	ON/OFF	
				↵ Limit value input	Value input in mm or inch/100	
			↵ Lower pos. limit 1	↵ Activation	ON/OFF	

						Limit value input	Value input in mm or inch/100	
				Upper pos. limit 2		Activation	ON/OFF	
						Limit value input	Value input in mm or inch/100	
				Lower pos. limit 2		Activation	ON/OFF	
						Limit value input	Value input in mm or inch/100	
				Max. velocity		Activation	ON/OFF	
						Max. velocity	Value input in mm/s or inch/100s	
	Other		Heating control				Standard (heating: on < 10°C, off > 15°C) / Extended (heating: on < 30°C, off > 35°C)	Page 47
			Display background				10 minutes/ON	
			Display contrast				Weak/Medium/Strong	
			Service RS232	Baud rate			57.6kbit/s / 115.2kbit/s	
				Format			8,e,1 / 8,n,1	
Language selection							Deutsch / English / Español / Français / Italiano	Page 48
Service	Status messages						Number of readings, reading gates, reading rate / non-reading rate etc.	Page 48
	Diagnosis						Only for use by Leuze personnel for service purposes	
	Expanded diagnosis						Only for use by Leuze personnel for service purposes	