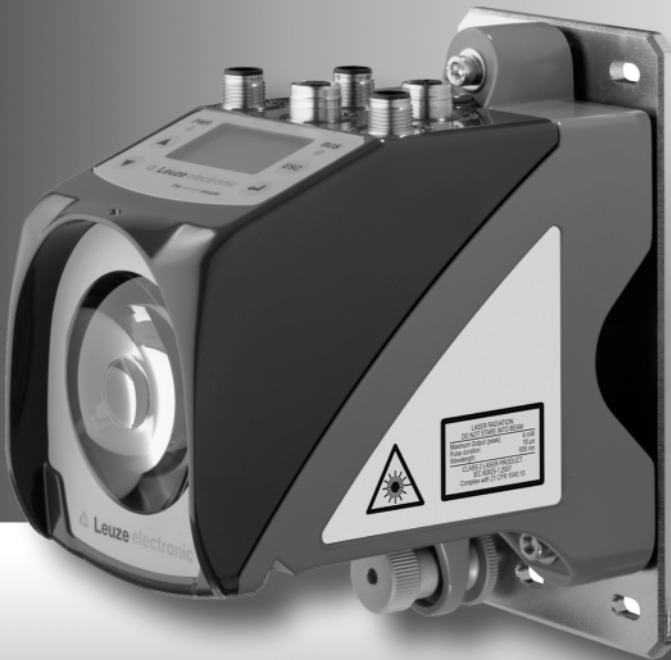


the sensor people

AMS 3004*i* PROFIBUS Optical Laser Measurement System



en 01-2015/08 50130334
We reserve the right to
make technical changes

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Leuze electronic GmbH + Co. KG

In der Braike 1

D-73277 Owen / Germany

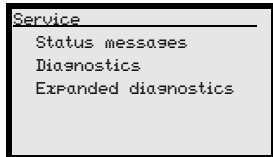
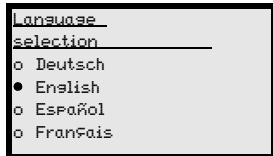
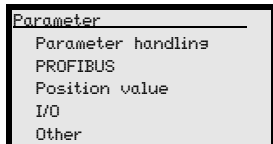
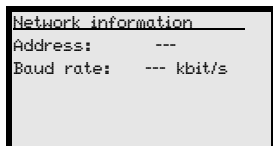
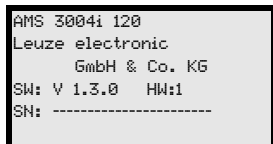
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info@leuze.de

The main menus



Device information - main menu

This menu item contains detailed information on

- Device model,
- Manufacturer,
- Software and hardware version,
- Serial number.

No entries can be made via the display.

Network information - main menu

Explanations of address 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 reception 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 for PROFIBUS is carried out via the modules of the GSD file.



Language selection - main menu

- Selection of the display language.
- See "Language selection menu" on page 48.

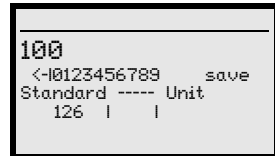
Service - main menu

- 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/laterally
-  Navigate downward/laterally
-  ESCAPE leave
-  ENTER confirm

Input of values



-  Delete character
-  Enter digit
-  Save input

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1 General information

1.1 Explanation of symbols

The symbols used in this operating manual are explained below.



Attention!

This symbol precedes text messages which must strictly be observed. Failure to comply with this information results in injuries to persons or damage to the equipment.



Attention Laser!

This symbol warns of possible danger caused by hazardous laser radiation.



Notice!

This symbol indicates text passages containing important information.

1.2 Declaration of conformity

The AMS 3004*i* absolute measuring optical laser measurement system was designed and manufactured in accordance with applicable European directives and standards.



Notice!

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/Teck, possesses a certified quality assurance system in accordance with ISO 9001.



1.3 Description of functions AMS 3004*i*

The AMS 3004*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 3004*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 integration time are designed for position control applications.

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 30xx*i* is an absolute measuring optical laser measurement system which allows distance measurement of up to 200m against a reflector.

Areas of application

The AMS 30xx*i* 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.

NOTICE

Comply with conditions and regulations!

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

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:

- Rooms with explosive atmospheres
- For medical purposes

NOTICE
<p>Do not modify or otherwise interfere with the device.</p> <p> 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.</p>

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 BGV A3 (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.

2.5 Laser safety notices



ATTENTION LASER RADIATION – LASER CLASS 2

Never look directly into the beam!

The device satisfies the requirements of IEC 60825-1:2007 (EN 60825-1:2007) safety regulations for a product in **laser class 2** as well as the U.S. 21 CFR 1040.10 regulations with deviations corresponding to "Laser Notice No. 50" from June 24th, 2007.

- ↖ Never look directly into the laser beam or in the direction of reflecting 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 or adjusting devices other than those specified here or 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.

NOTICE

Affix laser information and warning signs!

Laser information and warning signs are attached to the device (see figure 2.1):

In addition, self-adhesive laser warning and information signs (stick-on labels) are supplied in several 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 are legible without exposing the reader to the laser radiation of the device or other optical radiation.

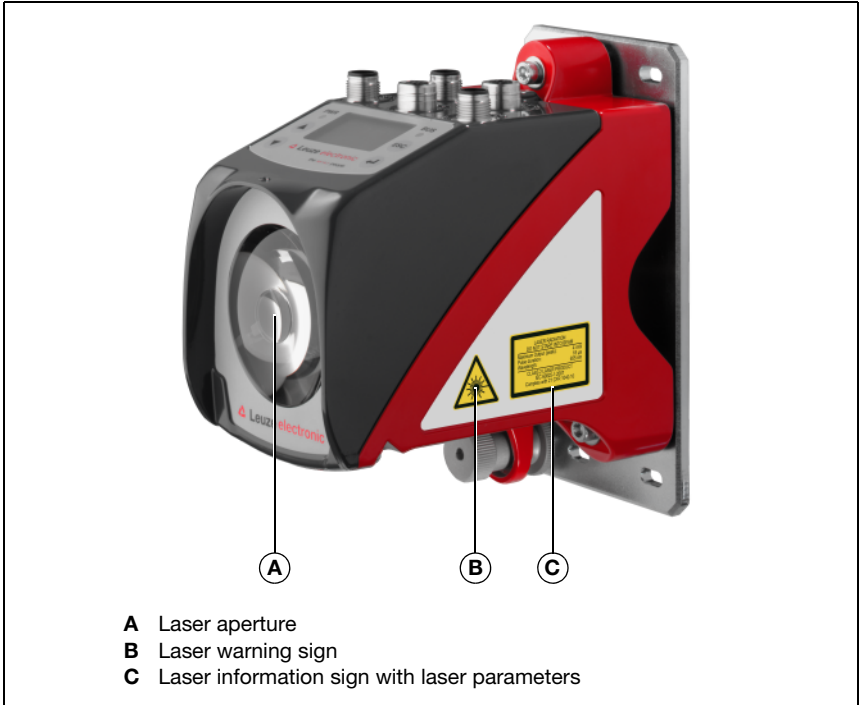


Figure 2.1: Laser apertures, laser warning signs

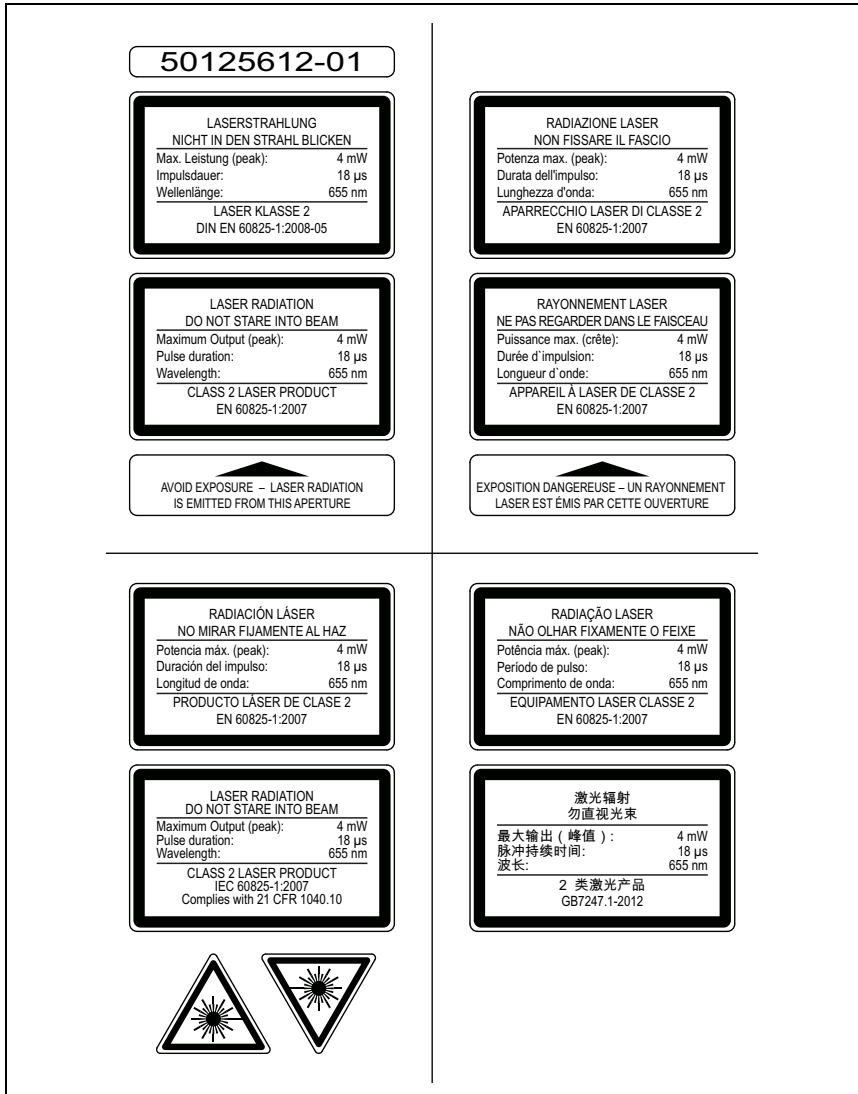


Figure 2.2: Laser warning and information signs – supplied stick-on labels

3 Fast commissioning / operating principle

**Notice!**

Below, you will find a **short description of the initial commissioning** of the AMS 3004*i*. Detailed explanations of the listed points can be found throughout the handbook.

3.1 Mounting the AMS 3004*i*

The AMS 3004*i* and the corresponding reflector are mounted on two mutually opposing, plane-parallel, flat walls.

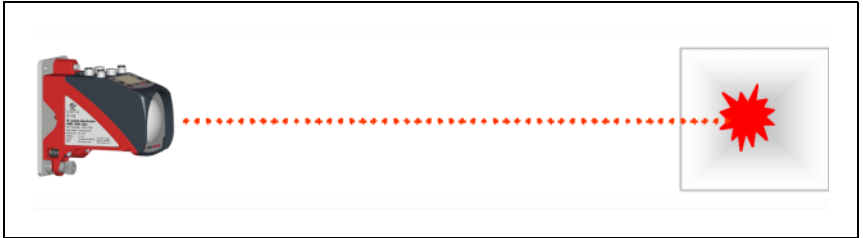


Figure 3.1: Schematic illustration of mounting

**Attention!**

For error-free position measurement, there must be an unobstructed line-of-sight between the AMS 3004*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 to be secured with the knurled nut and locked with the M5 nut.

Further 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 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 3004*i* on PROFIBUS

Install the GSD file associated with the AMS 3004*i* in the PROFIBUS Manager of your control. Activate the desired modules (at least one module).

Store the slave address for the AMS 3004*i* in the PROFIBUS manager. Make certain that the address is the same as the address configured in the device.

Detailed information can be found in chapter 9.

4 Technical data

4.1 Specifications of the laser measurement system

4.1.1 General specifications AMS 3004*i*

Measurement data	AMS 3004 <i>i</i> 40	AMS 3004 <i>i</i> 120	AMS 3004 <i>i</i> 200
Measurement range	0.2 ... 40 m	0.2 ... 120 m	0.2 ... 200 m
Accuracy	± 2 mm	± 2 mm	± 3 mm
Consistency ¹⁾	0.3 mm	0.5 mm	0.7 mm
Light spot diameter	≤ 40 mm	≤ 100 mm	≤ 150 mm
Measurement value output		1.7 ms	
Integration time		8 ms	
Resolution	adjustable, see chapter of the PROFIBUS 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 V_{in}		18 ... 30VDC	
Current consumption		≤ 250 mA / 24VDC	
Optical data			
Transmitter		laser diode, red light	
Laser class	2 in accordance with IEC 60825-1:2007, CDRH		
Wavelength		655 nm	
Impulse duration		18 μs	
Max. output power (peak)		4 mW	
Interfaces			
PROFIBUS DP to V, V1		≤ 12 Mbit/s	
Operating and display elements			
Keyboard		4 buttons	
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. 60mA, short-circuit proof

Mechanical data

Housing	cast zinc and aluminum
Optics	glass
Weight	approx. 2.45kg
Degree of protection	IP 65 acc. to EN 60529 ²⁾

Environmental conditions

Operating temperature	-5°C ... +50°C
Storage temperature	-30°C ... +70°C
Air humidity	max. 90% rel. humidity, non-condensing

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 ³⁾

- 1) Statistical error: 1 sigma; minimum switch-on time: 2 min.
- 2) With screwed-on M12 plugs or mounted caps.
- 3) 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 3004*i* is designed in accordance with safety class III for supply with PELV (protective extra-low voltage).

4.1.2 Dimensioned drawing AMS 3004*i*

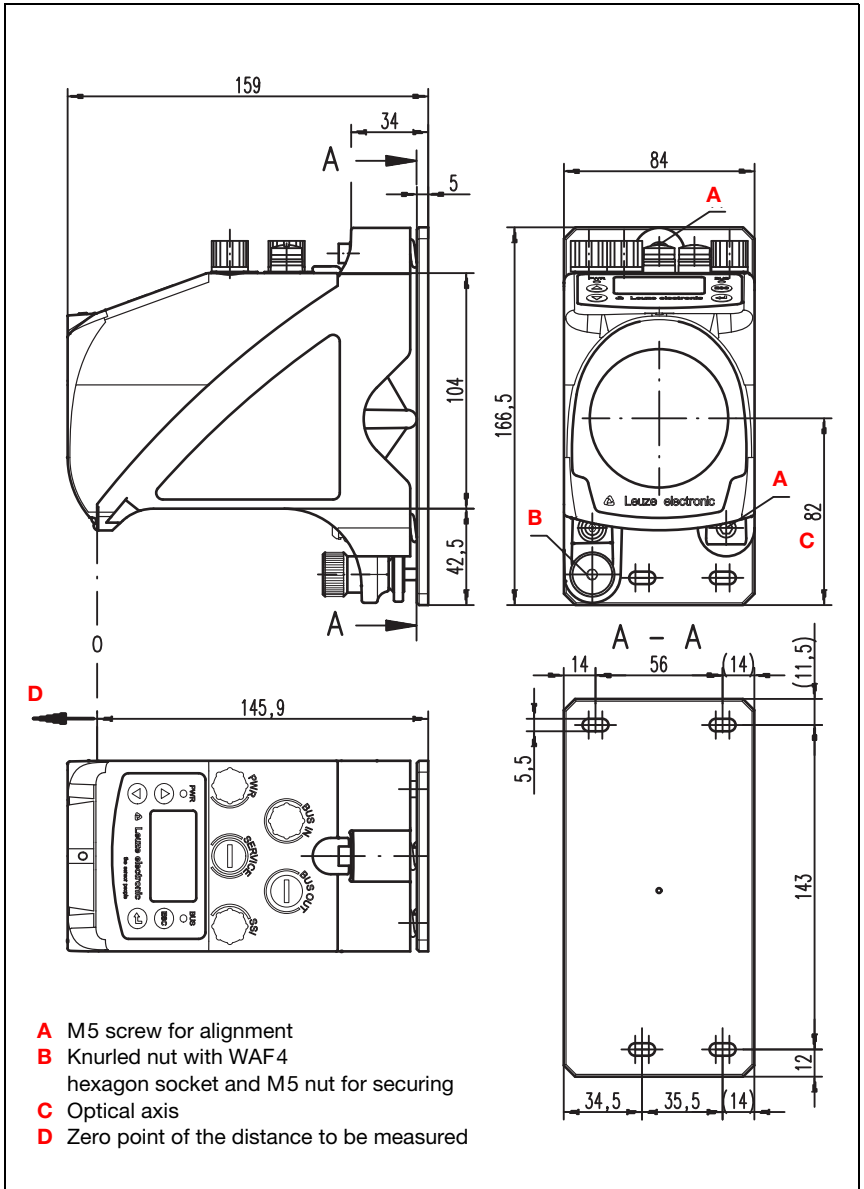


Figure 4.1: Dimensioned drawing AMS 3004*i*

4.1.3 Type overview AMS 3004*i*

AMS 3004*i* (PROFIBUS)

Type designation	Description	Part no.
AMS 3004 <i>i</i> 40	40m operating range, PROFIBUS interface	50130193
AMS 3004 <i>i</i> 120	120m operating range, PROFIBUS interface	50130194
AMS 3004 <i>i</i> 200	200m operating range, PROFIBUS interface	50130195

Table 4.1: Type overview AMS 3004*i*

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. The original packaging offers optimum protection. Heed the required environmental conditions specified in the technical data.

Unpacking

- ↪ Check the packaging 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 3004*i* type your device is. For specific information, please refer to chapter 11.2.

Name plates

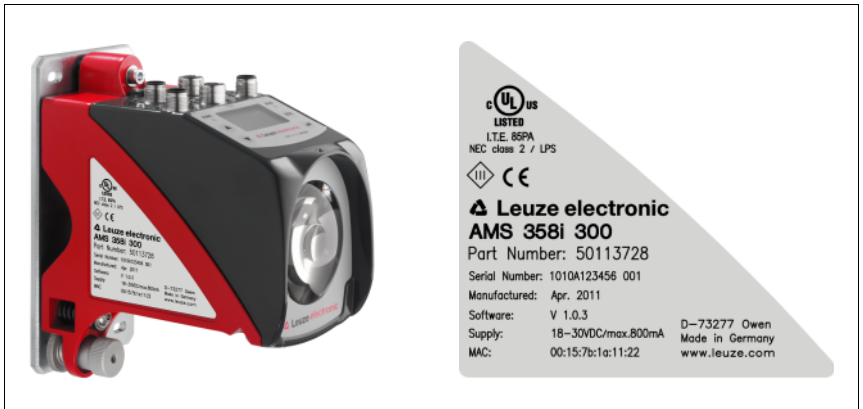


Figure 5.1: Device name plate using the AMS 358i as an example




Notice!

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 electronic sales office.

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

5.2 Mounting the AMS 3004*i*

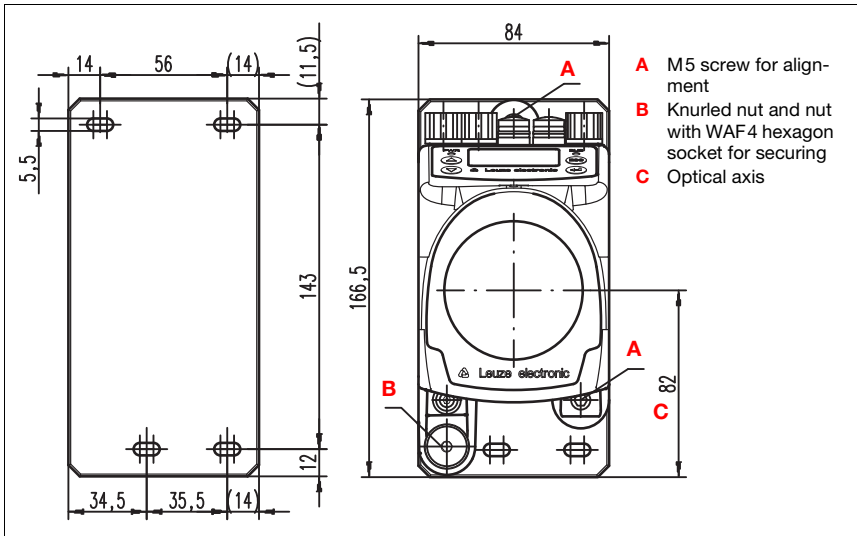


Figure 5.2: Mounting the device

The AMS 3004*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 connection between the AMS 3004*i* and the reflector.

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

Aligning the laser light spot in 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 3004*i* on a flat, horizontal surface is available as an optional accessory.

Type designation: MW OMS/AMS 01

Part no.: 50107255

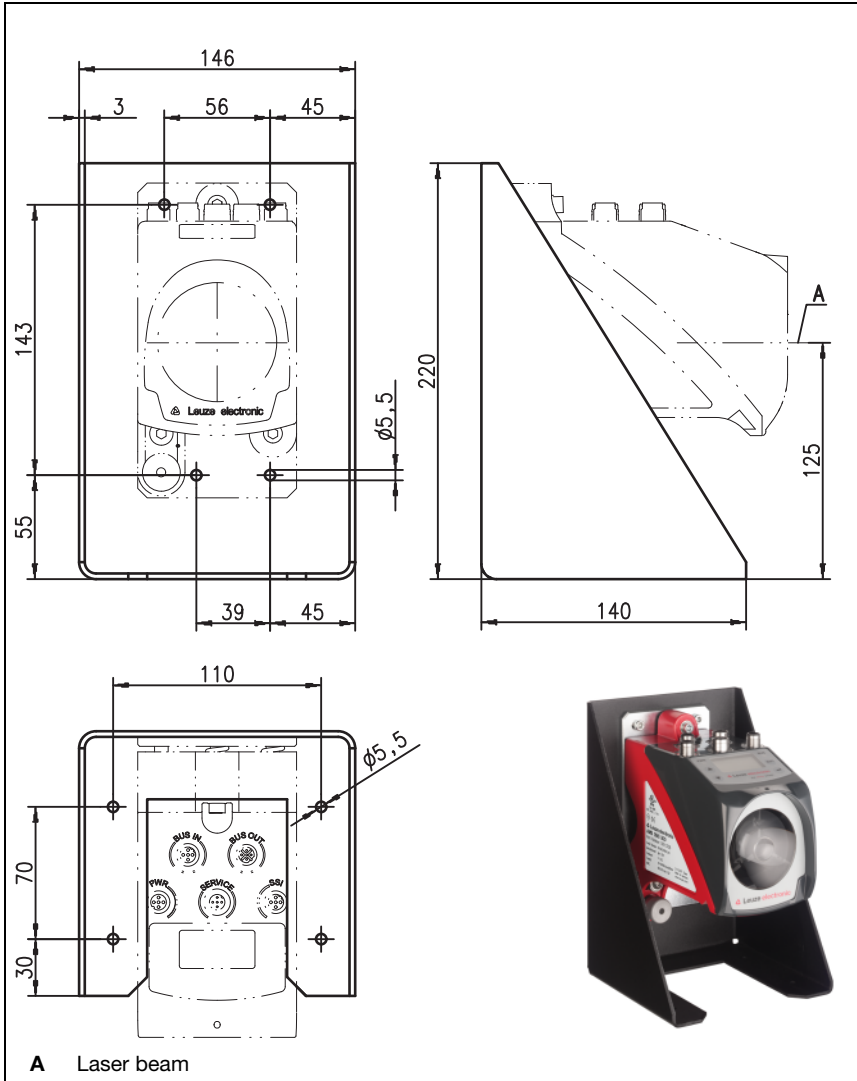


Figure 5.3: Optional mounting bracket

5.2.2 Parallel mounting of the AMS 3004*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.

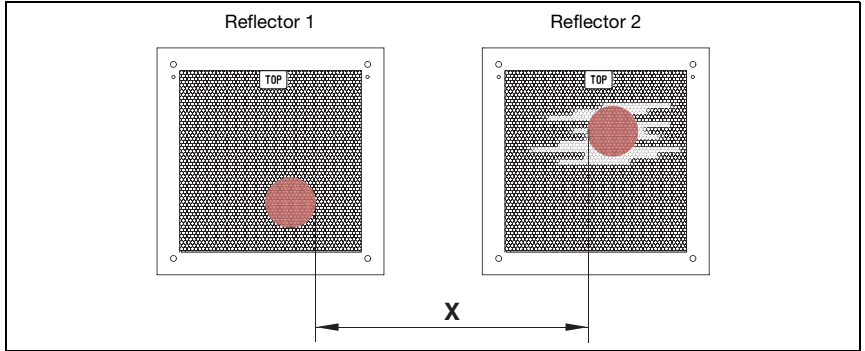


Figure 5.4: Minimum parallel spacing X between adjacent AMS 3004*i*

The diameter of the light spot increases with distance.

	AMS 3004 <i>i</i> 40	AMS 3004 <i>i</i> 120	AMS 3004 <i>i</i> 200
Max. measurement distance	40m	120m	200m
Light spot diameter	≤ 40mm	≤ 100mm	≤ 150mm

Thus, the center-to-center spacing of the two AMS 3004*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 3004*i*, it is necessary to distinguish between three different arrangements of AMS 3004*i* and reflectors.

The AMS 3004*i* are mounted stationary and in parallel on one plane. Both reflectors move independently of one another at different distances to the AMS 3004*i*.

Minimum parallel spacing X of the two laser light spots:

$$X = 100\text{mm} + (\text{max. measurement distance in mm} \times 0.01)$$

The AMS 3004*i* are mounted stationary and in parallel on one plane. Both reflectors move in parallel at the same distance to the AMS 3004*i*.

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

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

The reflectors are mounted stationary and in parallel on one plane.

Both AMS 3004*i* move independently of one another at different or the same distances to the reflectors.

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

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



Notice!

*Please note that when the AMS 3004*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 3004*i*.*

5.2.3 Parallel mounting of AMS 3004*i* and DDLS optical data transmission

The optical data transceivers of the DDLS series and the AMS 3004*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 100mm to the AMS 3004*i*. The parallel spacing is independent of the distance.

5.3 Mounting the AMS 3004*i* with laser beam deflector unit

General information

The two available deflector units are used for the 90° deflection of the laser beam, see "Accessory deflector unit" on page 89.



Attention!

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

5.3.1 Mounting the laser beam deflector unit with integrated mounting bracket

The AMS 3004*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 plant components. For error-free position measurement, there must be an interruption-free line-of-sight between the AMS 3004*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 toothed lock washer to protect against loosening caused by vibrations.

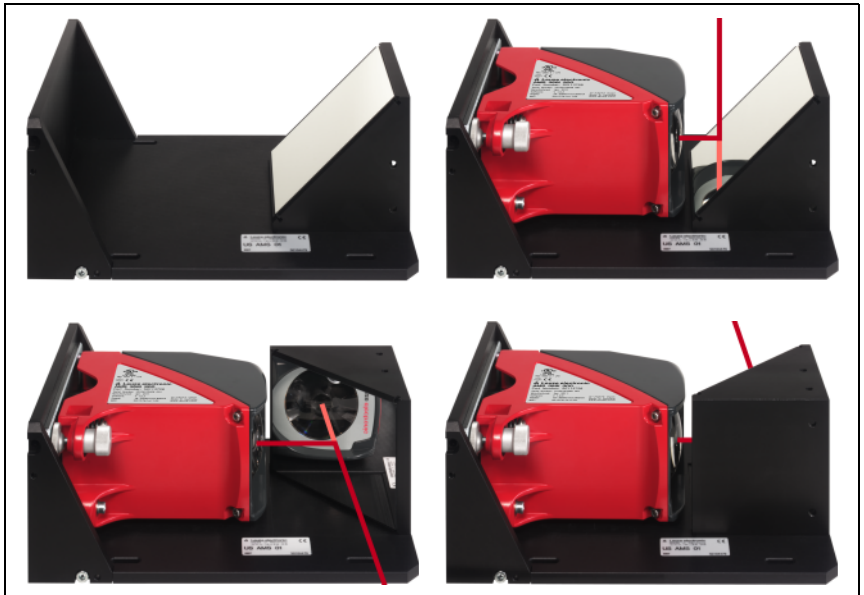


Figure 5.5: Mounting variants of the US AMS 01 laser beam deflector unit

5.3.2 Dimensioned drawing of US AMS 01 deflector unit

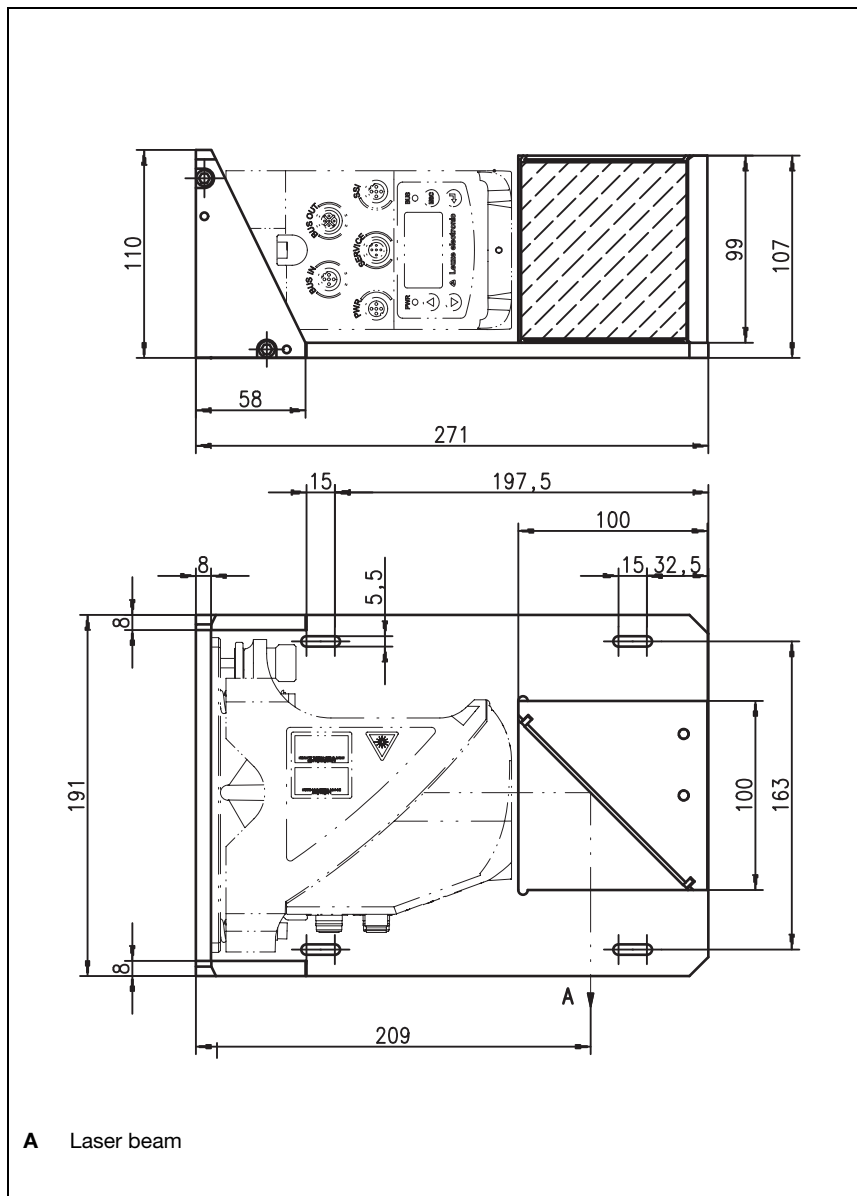


Figure 5.6: Dimensioned drawing of US AMS 01 deflector unit

5.3.3 Mounting the US 1 OMS deflector unit without mounting bracket

The US 1 OMS deflector unit and the AMS 3004*i* are mounted separately.



Notice!

When mounting, make certain that the laser light spot of the AMS 3004*i* is aligned in the center of the deflection mirror.

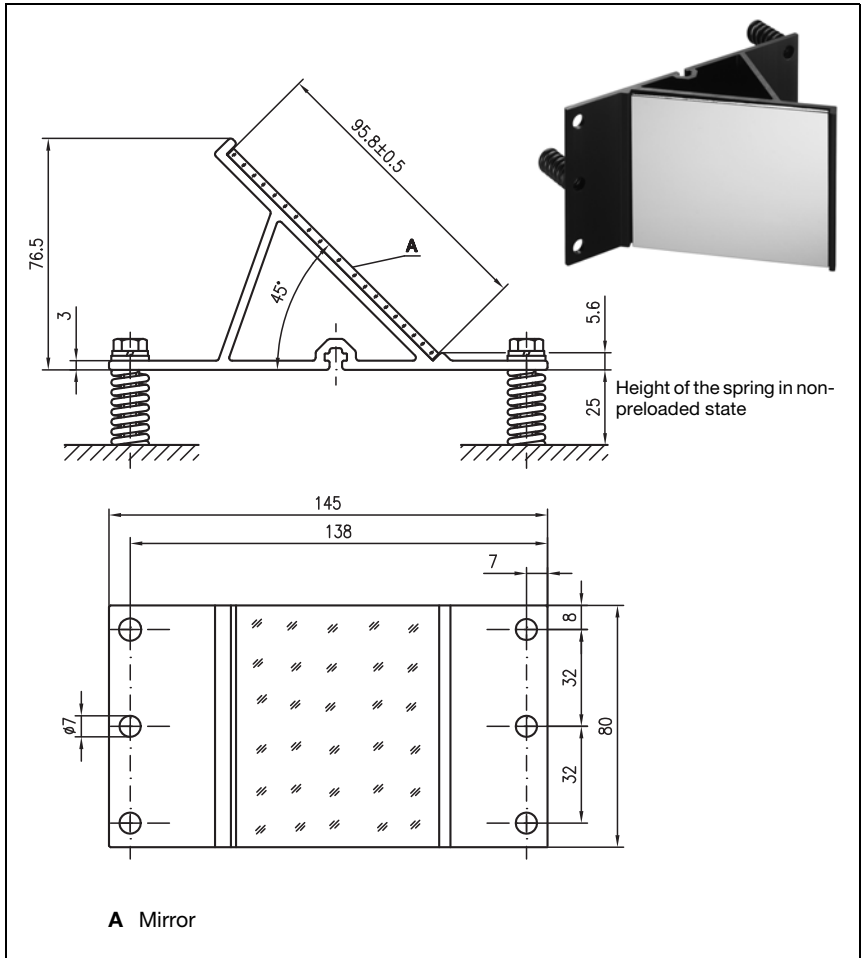


Figure 5.7: Photo and dimensioned drawing of the US 1 OMS deflector unit

Alignment of the laser light spot on the reflector is performed as described in chapter 5.2.

6 Reflectors

6.1 General information

The AMS 3004*i* measures distances against a reflective tape specified by Leuze electronic. All provided specifications for the AMS 3004*i*, such as the operating range or accuracy, can only be achieved with the reflective tape specified by Leuze electronic.

The reflective tapes are available as adhesive tapes, affixed to a metal 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 provided as a function of the distance that is to be measured. In any case, the user must check to determine 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 with a highly transparent, hard protective layer.

Under certain circumstances, the protective layer may lead to surface reflections. The surface reflections can be directed past the AMS 3004*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 are provided with a protective foil that can easily be pulled off. This must be removed from the reflector before the complete system is put into operation.

6.2.1 Specifications of the self-adhesive foil

	Part		
Type designation	Reflective tape 200x200-S	Reflective tape 500x500-S	Reflective tape 914x914-S
Part no.	50104361	50104362	50108988
Foil size	200x200mm	500x500mm	914x914mm
Recommended application temperature for adhesive tape	+5°C ... +25°C		
Temperature resistance, affixed	-40°C ... +80°C		
Mounting surface	The mounting surface must be clean, dry and free of grease.		
Cutting the tape	Cut with a sharp tool, always on the side of the prism structure.		
Cleaning	Do not use any agents that act with a grinding effect. A conventional household detergent can be used as a cleaning agent. Rinse with clear water and dry the surface.		
Storing the foil	Store in a cool and dry place.		

6.2.2 Specifications of the reflective tape on a metal plate

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

	Part		
Type designation	Reflective tape 200x200-M	Reflective tape 500x500-M	Reflective tape 914x914-M
Part no.	50104364	50104365	50104366
Foil size	200x200mm	500x500mm	914x914mm
Outer dimensions of the metal plate	250x250mm	550x550mm	964x964mm
Weight	0.8kg	4kg	25kg
Cleaning	Do not use any agents that act with a grinding effect. A conventional household detergent can be used as a cleaning agent. Rinse with clear water and dry the surface.		
Storing the reflector	Store in a cool and dry place.		

6.2.3 Dimensioned drawing of reflective tape on a metal plate

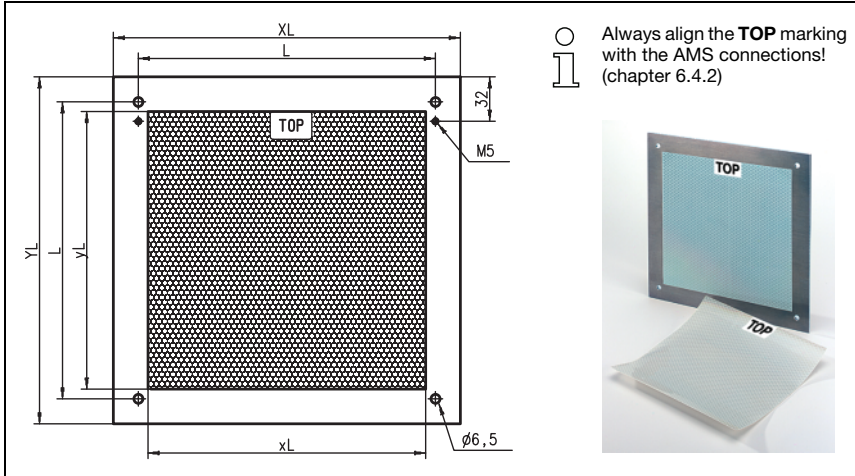


Figure 6.1: Dimensioned drawing of reflectors

Part	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 Specifications of heated reflectors

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

Only the reflective tape is kept at the specified temperature by the integrated heater. Through the insulation on the back, the generated heat cannot be transferred via the steel construction. Energy costs are greatly reduced in the case of continuous heating.

	Part		
Type designation	Reflective tape 200x200-H	Reflective tape 500x500-H	Reflective tape 914x914-H
Part no.	50115020	50115021	50115022
Voltage supply	230VAC		
Power	100W	600W	1800W
Current consumption	~ 0.5A	~ 3A	~ 8A
Length of the supply line	2 m		
Size of the reflective tape	200x200mm	500x500mm	914x914mm
Outer dimensions of the base material	250x250mm	550x550mm	964x964mm
Weight	0.5kg	2.5kg	12kg
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 agents that act with a grinding effect. A conventional household detergent can be used as a cleaning agent. Rinse with clear water and dry the surface.		
Storing the reflector	Store in a cool and dry place.		

6.2.5 Dimensioned drawing of heated reflectors

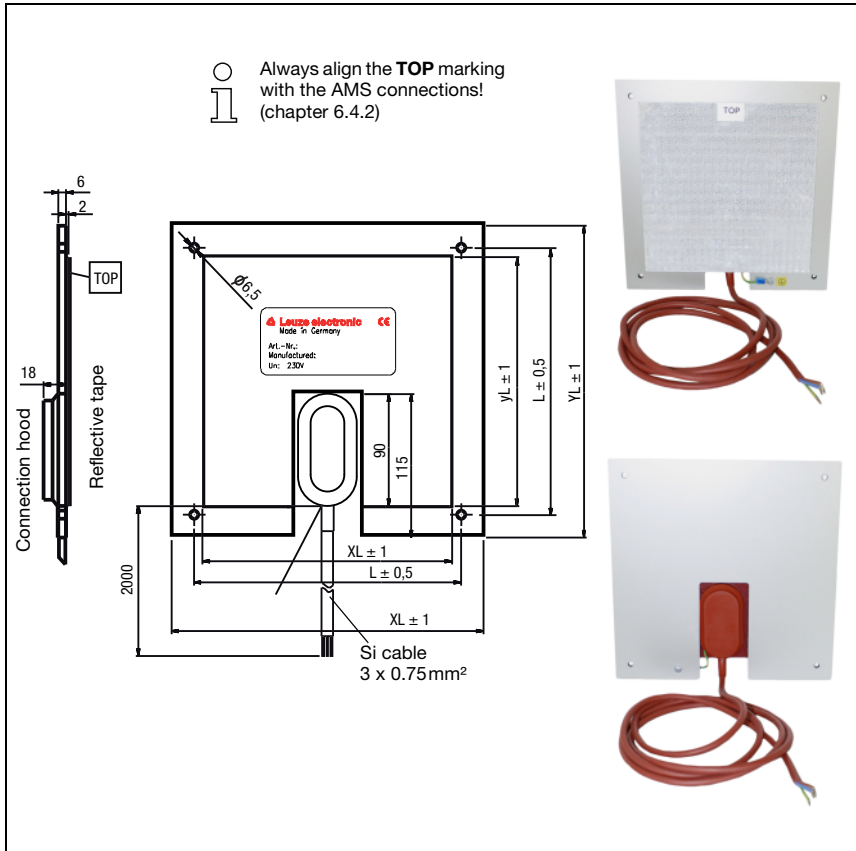


Figure 6.2: Dimensioned drawing of heated reflectors

Part	Reflective tape (mm)		Insulated base 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 sizes

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



Attention!

The reflector sizes shown below are a recommendation from Leuze electronic for on-vehicle mounting of the AMS 3004*i*. For stationary mounting of the AMS 3004*i*, a smaller reflector is generally sufficient for all measurement distances.

On the basis of the system planning and design, always check whether mechanical travel tolerances may 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 without interruption. For on-vehicle mounting of the AMS 3004*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 sizes			
AMS 3004 <i>i</i> selection (Operating range in m)	Recommended reflector size (H x W)	Type designation ...-S = Self-adhesive ...-M = metal plate ...-H = heating	Part no.
AMS 3004 <i>i</i> 40 (max. 40m)	200x200mm	Reflective tape 200x200-S Reflective tape 200x200-M Reflective tape 200x200-H	50104361 50104364 50115020
AMS 3004 <i>i</i> 120 (max. 120m)	500x500mm	Reflective tape 500x500-S Reflective tape 500x500-M Reflective tape 500x500-H	50104362 50104365 50115021
AMS 3004 <i>i</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

6.4 Mounting the reflector

6.4.1 General information

Self-adhesive reflective tapes

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

As described in table 6.1, the reflective tape must be angled.

Reflective tapes on metal

The reflective tapes of the "Reflective tape ...x...-M" series are provided with corresponding mounting holes. Spacer sleeves are provided in the packet for achieving the necessary pitch angle. For further information see table 6.1.

Heated reflectors

The reflective tapes of the "Reflective tape ...x...-H" series are provided with corresponding mounting holes. Due to the voltage supply affixed on the rear, the reflector cannot be mounted flat. Included in the package are four distance sleeves in two different lengths. Use the distance sleeves to achieve a base separation to the wall as well as the necessary pitch for avoiding surface reflection. For further information see table 6.1.

The reflector is provided with a 2m-long connection cable for supplying with 230VAC. Connect the cable to the closest power outlet. Observe the current consumptions listed in the specifications.



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 tape as centered as possible and without interruption.

For this purpose, use the alignment elements provided on the AMS 3004*i*... (see chapter 5.2 "Mounting the AMS 3004*i*"). If necessary, remove the protective foil from the reflector.



Attention!

The "TOP" label mounted on the reflectors should be aligned the same as the connections of the AMS 3004*i*.

Example:

*If the AMS 3004*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 3004*i* is mounted so that the M12 connections are on the side, the "TOP" label of the reflector is also on the side.*



Notice!

The reflector must be angled. To do this, use the spacer sleeves. Angle the reflectors 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

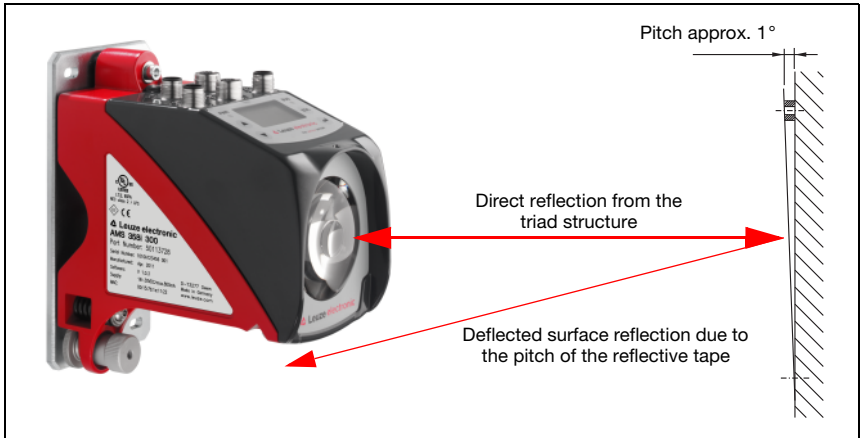


Figure 6.3: Mounting the reflector

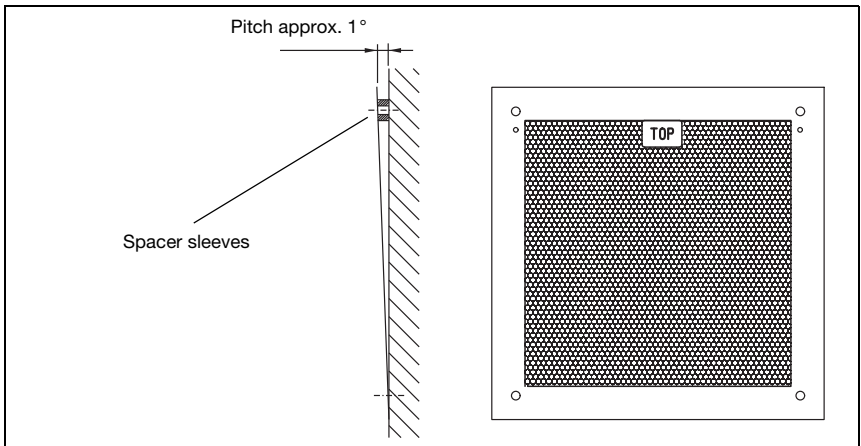


Figure 6.4: Pitch of the reflector

Reflective tapes ...-H

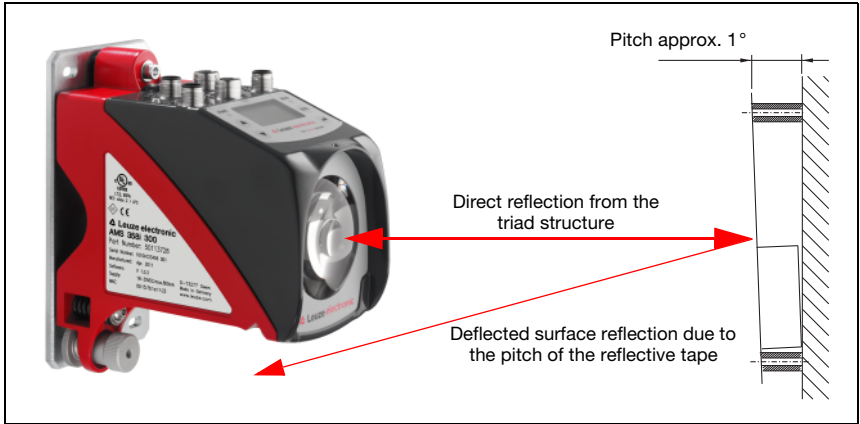


Figure 6.5: Mounting of heated reflectors

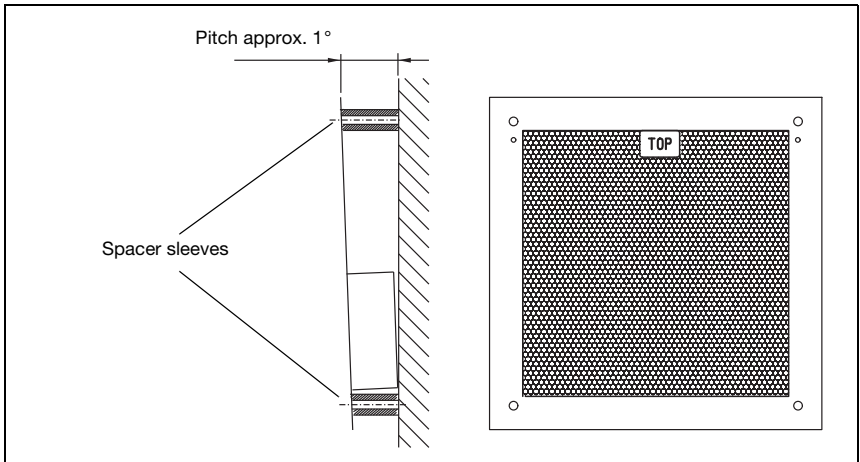


Figure 6.6: Pitch of the heated reflector

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 in the delivery contents of reflective tape ...-M and ...-H

Table 6.1: Reflector pitch resulting from spacer sleeves



Notice!

Reliable function of the AMS 3004i and, thus, max. operating range and accuracy can only be achieved with the reflective tape specified by Leuze electronic. No function can be guaranteed if other reflectors are used!

7 Electrical connection

The AMS 3004*i* laser measurement systems are connected using variously coded M12 connectors. This ensures unique connection assignments.



Notice!

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



Figure 7.1: Connections of the AMS 3004*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 corrected, the device should be removed from operation and protected against possible use.



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



Notice!

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

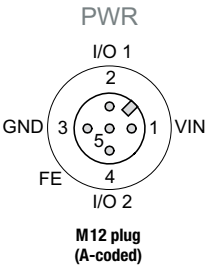
PWR (5-pin plug, A-coded)			
 <p>PWR I/O 1 2 GND 3 5 FE 4 I/O 2 M12 plug (A-coded)</p>	Pin	Name	Remark
	1	VIN	Positive supply voltage +18 ... +30VDC
	2	I/O 1	Switching input/output 1
	3	GND	Negative supply voltage 0VDC
	4	I/O 2	Switching input/output 2
	5	FE	Functional earth
	Thread	FE	Functional earth (housing)

Table 7.1: PWR pin assignment

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

7.3 PROFIBUS BUS IN

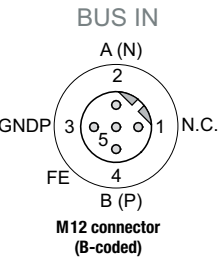
BUS IN (5-pin plug, B-coded)			
 <p>BUS IN A (N) 2 GNDP 3 5 FE 4 B (P) M12 connector (B-coded)</p>	Pin	Name	Remark
	1	NC	Not used
	2	A (N)	Receive/transmit data A-line (N)
	3	GNDP	Data reference potential
	4	B (P)	Receive/transmit data B-line (P)
	5	SHIELD	Shield or functional earth
	Thread	FE	Functional earth (housing)

Table 7.2: BUS IN pin assignment

7.4 PROFIBUS BUS OUT

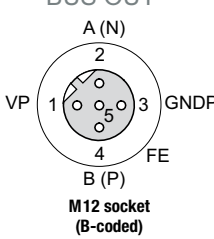
BUS OUT (5-pin socket, B-coded)			
 <p>BUS OUT A (N) 2 VP 1 3 GNDP 4 B (P) FE 5 M12 socket (B-coded)</p>	Pin	Name	Remark
	1	VP	Supply voltage +5V (termination)
	2	A (N)	Receive/transmit data A-line (N)
	3	GNDP	Data reference potential
	4	B (P)	Receive/transmit data B-line (P)
	5	SHIELD	Shield or functional earth
	Thread	FE	Functional earth (housing)

Table 7.3: BUS OUT pin assignment

7.5 Service

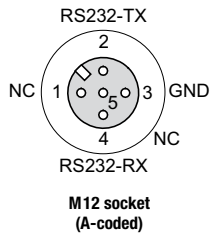
Service (5-pin socket, A-coded)			
 <p>SERVICE RS232-TX 2 NC 1 3 GND 4 RS232-RX 5 M12 socket (A-coded)</p>	Pin	Name	Remark
	1	NC	Not used
	2	RS232-TX	Transmission line RS 232/service data
	3	GND	Voltage supply 0VDC
	4	RS232-RX	Receiving line RS 232/service data
	5	NC	Not used
	Thread	FE	Functional earth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

Table 7.4: Service pin assignment



Notice!

The service interface is designed only for use by Leuze electronic!

8 Display and control panel AMS 3004i

8.1 Structure of the control panel

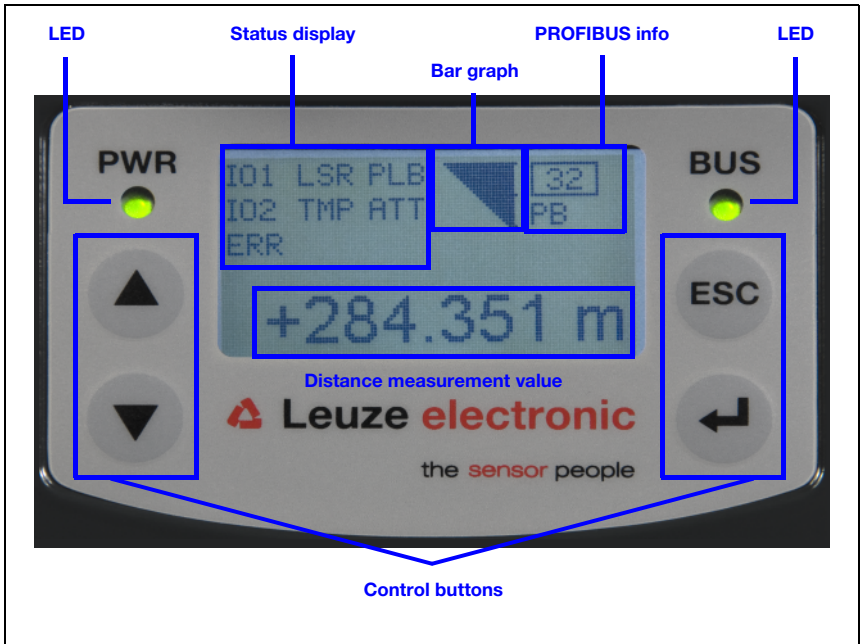


Figure 8.1: Structure of the control panel

8.2 Status display and operation

8.2.1 Indicators in the display

Status and warning messages in the display

- I01 **Input 1 or output 1 active:**
Function depending on configuration. See also module 4/5.
- I02 **Input 2 or output 2 active:**
Function depending on configuration. See also module 4/5
- LSR **Warning - laser prefailure message:**
Laser diode old, device still functional, exchange or have repaired.
- TMP **Warning - temperature monitoring:**
Permissible internal device temperature exceeded / not met.

- 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 outlet 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.

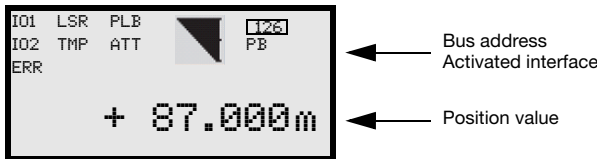
Bar graph



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

Interface info

The bus address set (in figure "126") as well as the "PB" identifier displays an activated PROFIBUS interface.



Position value

- The measured position value is displayed in the configured unit of measurement.
- +87.000m With the **metric** setting, the measurement value is always displayed in meters with **three decimal places**.
- +87.0in With the **inch** setting, the measurement value is always displayed in inches with **one decimal place**.

8.2.2 LED status displays

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
- Parameter download running
- Boot process running

PWR



Green continuous light

Power LED green

- AMS 3004*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

PWR



Orange continuous light

Power LED orange

- Parameter enable active
- No data on the host interface

BUS LED

BUS



Off

BUS LED off

- No supply voltage (Power)
- PROFIBUS deactivated?

BUS



Green continuous light

BUS LED green

- AMS 3004*i* PROFIBUS communication active, bus ok

BUS



Flashing green

BUS LED flashes green

- AMS 3004*i* not on the bus

BUS



Flashing red

BUS LED flashes red

- configuration failed ("parameter failure")
- DP error
- No data exchange

BUS



Red continuous light

BUS LED red

- Bus failure, no DP protocol established to the master ("no data exchange")

8.2.3 Control buttons



Up

Navigate upward/laterally.



Down

Navigate downward/laterally.



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  .

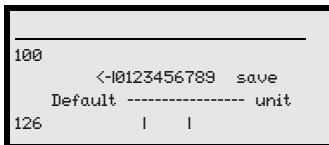
The selected menu item is activated with the enter button .

Press the ESC button  to move up one menu level.

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

Setting values

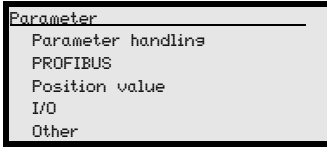
If input of a value is possible, the display looks like this:



 +  Delete character

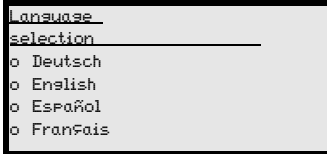
... +  Enter digit

save +  Save



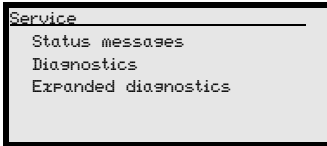
Parameter - main menu

- 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.



Notice!

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 3004i to default settings.

Table 8.1: Parameter handling submenu

Level 3	Level 4	Level 5	Selection/configuration option Description	Standard
Parameter enabling			ON / OFF The standard setting (OFF) prevents unintended parameter changes. With parameter enabling 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 enabling must be activated. If a password is assigned, changes to the AMS 3004i can only be made after the password is entered. The master password 2301 bridges the individually set password.	OFF
	Password entry		Configuration option of a four-digit numerical password	

Table 8.1: Parameter handling submenu

Level 3	Level 4	Level 5	Selection/configuration option Description	Standard
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.

PROFIBUS submenu

Table 8.2: PROFIBUS submenu

Level 3	Level 4	Level 5	Selection/configuration option Description	Standard
Activation			ON / OFF Activates or deactivates the AMS 3004i as a PROFIBUS participant.	ON
Address			Value from 0 to 126 The PROFIBUS permits an address range from 0 to 126. Address 126 must not be used for data communication. It may only be used temporarily for commissioning. The default address is 126. The address must be assigned separately for each AMS 3004i.	126

Position value submenu

Table 8.3: Position value submenu

Level 3	Level 4	Level 5	Selection/configuration option Description	Standard
Measurement unit			Metric/Inch Specifies the units of the measured distances	Metric
Count 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 "Resolution position" and is entered in mm or inch/100. The offset value is effective immediately following entry. If the preset value is activated, this has priority over the offset. Preset and offset are not offset against each other.	0mm
Preset			The preset value is accepted by means of teach pulse. The teach pulse can be applied to a hardware input of the M 12 PWR connector. The hardware input must be appropriately configured. See also configuration of the I/Os.	0mm

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 error" parameter or the last valid position value for the configured error delay time.	ON/100 ms
Position value in the case of error			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/preset teach/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/preset teach/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
		Limit value input	Value input in mm or inch/100	0
	Upper pos. limit 2	Activation	ON / OFF	OFF
		Limit value input	Value input in mm or inch/100	0
Lower pos. limit 2	Activation	ON / OFF	OFF	

Table 8.4: I/O submenu

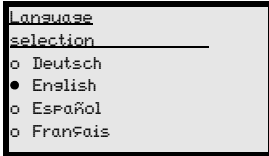
Level 3	Level 4	Level 5	Selection/configuration option Description	Standard
		Limit value input	Value input in mm or inch/100	0
	Max. speed	Activation	ON / OFF	OFF
		Max. speed	Value input in mm/s or inch/100s	0

Other submenu

Table 8.5: Other submenu

Level 3	Level 4	Level 5	Selection/configuration option Description	Standard
Display illumination			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 values. The contrast can subsequently be adapted using the three levels.	Medium
Service RS232	Baud rate		57.6kbit/s / 115.2kbit/s The service interface is only available to Leuze internally.	115.2kbit/s
	Format		8,e,1 / 8,n,1 The service interface is only available to Leuze internally.	8,n,1

8.3.3 Language selection menu



5 display languages are available:

- German
- English
- Spanish
- French
- Italian

The AMS 3004*i* is delivered from the factory with the display preset to English.

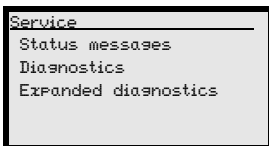


Notice!

*When operating the AMS 3004*i* on the PROFIBUS, the language configured in the GSD file is used in the display.*

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

8.3.4 Service menu



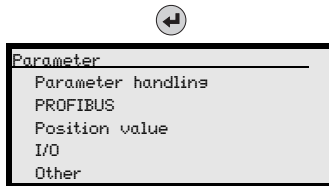
A more detailed description of the individual functions can be found in chapter 10.

8.4 Operation

Described here is an operating process using parameter enabling as an example.

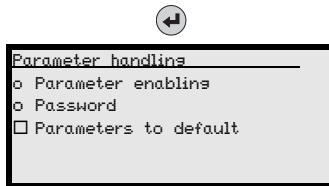
Parameter enabling

During normal operation parameters can only be viewed. 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:



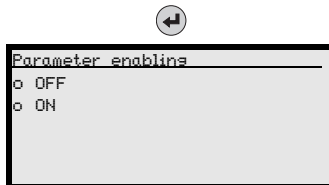
In the main menu, press the enter button to enter the Parameter menu.

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 switch on parameter enabling.

The PWR LED illuminates 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 enabling is activated, the entire AMS 3004i display is inverted.

As long as parameter enabling is activated, communication between control and AMS 3004i is interrupted. The continued networking via BUS OUT is retained.

**Notice!**

If a password was stored, parameter enabling is not possible until this password is entered, see "Password for parameter enabling" below.

**Notice!**

Parameters which are defined in a GSD file have priority. After deactivation of parameter enabling on the AMS 3004i, the parameter defined in the control are reactivated. The address setting is not overwritten.

Password for parameter enabling

Parameter entry on the AMS 3004i can be protected with a password. With the AMS 3004i, the password is determined via the PROFIBUS GSD file. Thus, the password cannot be changed by means of display entry.

To activate parameter enabling via the display (e.g., for changing an address), the password defined in the GSD file must be entered. If parameter enabling has been activated after successfully entering the password, parameters can temporarily be changed via the display.

After parameter enabling is deactivated, all changes made on the display are overwritten by the GSD file. Even a possibly newly assigned password. Only a changed address remains unchanged after entry via the display.

**Notice!**

The **master password 2301** can enable the AMS 3004i at any time.

9 PROFIBUS interface

9.1 General information on PROFIBUS

The AMS 3004*i* is designed as a PROFIBUS DP device for cyclical (V0) as well as acyclic (V1) data exchange.

For this purpose, the functionality of the laser is defined via GSD parameter sets. The max. baud rate of the data to be transferred is 12Mbit/s.



Notice!

The PROFIBUS interface can be activated/deactivated via the display. To activate / deactivate the interface, parameter enabling must be activated (see chapter 8.3.2). The activated PROFIBUS interface is shown in the display; when PROFIBUS is activated, the address set is visible in the display.

9.2 PROFIBUS electrical connection

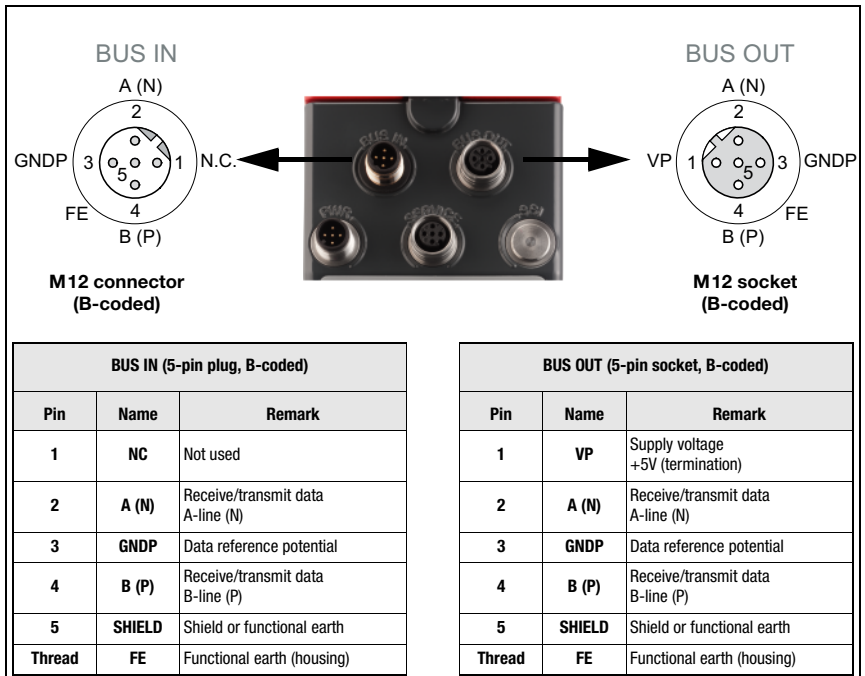


Figure 9.1: PROFIBUS - Electrical connection



Notice!

For contacting **BUS IN** and **BUS OUT**, we recommend our ready-made PROFIBUS cables (see chapter 11.4.6 "Accessory ready-made cables for PROFIBUS").



Attention!

The laser measurement system can be used to branch out the PROFIBUS network. The **continuing network** is connected via **BUS OUT**.

If the laser measurement system is the last subscriber in the network, the **BUS OUT** connection must be connected to a terminator plug, see "Accessory terminating resistor" on page 89.

9.3 PROFIBUS address entry



Notice!

Basic operation of the control panel/display is described in chapter 8.2. To set the address, parameter enabling must be activated. The display is inverted.



Attention!

The laser measurement system is deactivated on the PROFIBUS when parameter enabling is activated via the display. The device is reactivated on the PROFIBUS after parameter enabling is exited.

9.3.1 Entering the PROFIBUS addresses via the display

To do this proceed as follows:

- ↳ Activate parameter enabling.
- ↳ Select the PROFIBUS submenu.
- ↳ Select the address menu item [].
- ↳ Enter the PROFIBUS address of the laser measurement system; set to a value between 1 and 126 (default: 126).
- ↳ Deactivate parameter enabling.

9.4 PROFIBUS GSD file

9.4.1 General information on the GSD file

If the AMS 3004*i* is operated in a PROFIBUS network, configuration must be performed exclusively via the PROFIBUS. The functionality of the laser measurement system is defined via modules. The parameters and their functions are structured in the GSD file using modules. Using a user-specific configuration tool, the respective required modules are integrated and configured according to the measurement application during PLC programming.

During operation of the laser measurement system on the PROFIBUS all parameters are set to default values. If these values are not changed by the user, the device operates with the default settings set by Leuze electronic on delivery. Please refer to the following module descriptions for the default settings of the device.

**Notice!**

*At least one module in the GSD file must be activated in the configuration tool for the control, usually the **Position value module**.*

**Notice!**

*Some controls make available a so-called "universal module". This module must not be activated for the AMS 3004*i*.*

**Notice!**

For test purposes parameters can be changed via the display on a laser measurement system operated on the PROFIBUS. As soon as parameter enabling is activated on the display, the device is deactivated on the PROFIBUS. All parameters set via PROFIBUS modules remain effective. Parameter changes can now be made via the display for test purposes. If parameter enabling is deactivated via the display, only the parameters set in the PROFIBUS modules and the PROFIBUS default settings are in effect.

Parameter changes made via the display are no longer in effect on the PROFIBUS!

**Attention!**

The laser measurement system does not permanently store parameters changed via the PROFIBUS. Following Power OFF/ON the currently configured parameters are downloaded by the PROFIBUS manager. If no PROFIBUS manager is available following Power OFF/ON, the parameters set on the display apply.

**Notice!**

*All input and output modules described in this documentation are described **from the controller's perspective**:*

Described inputs (I) are inputs of the control.

Described outputs (O) are outputs of the control.

Described parameters (P) are parameters of the GSD file in the control.

**Notice!**

*You can find the current GSD file for the AMS 3004*i* on our homepage under: www.leuze.com.*

9.4.2 Overview of the GSD modules

Module	Module name	Module contents (P) = Parameter, (O) = Output, (I) = Input
M1 page 56	Position value	(I) Position value
		(P) Sign
		(P) Unit
		(P) Resolution
		(P) Count direction
		(P) Offset
M2 page 58	Static preset	(P) Preset value
		(O) Preset teach
		(O) Preset reset
M3	–	–
M4 page 59	I/O 1	(P) Output or input defined
		(P) Level/edge input/output
		(P) Function for output wiring
		(P) Function for input wiring
		(I) Signal level input/output
		(O) Output activated
M5 page 62	I/O 2	(P) Output or input defined
		(P) Level/edge input/output
		(P) Function for output wiring
		(P) Function for input wiring
		(I) Signal level input/output
		(O) Output activated
M6 page 65	Status and control	(I) Diagnosis and status of AMS 3004 <i>i</i>
(O) Laser control ON/OFF		
M7 page 67	Position limit value 1	(P) Upper and lower position limit value
M8 page 68	Position limit value 2	(P) Upper and lower position limit value
M9 page 69	Error handling procedures	(P) Position value in case of error
		(P) Position error message delay ON/OFF
		(P) Position error message delay
		(P) Velocity value in case of error
		(P) Velocity error message delay ON/OFF
		(P) Velocity error message delay
M10 page 71	Velocity	(I) Velocity value
		(P) Velocity value resolution
		(P) Velocity integration time
M11 page 73	Velocity Limit value 1	(P) Monitoring for over/under values
		(P) Monitoring direction dependent yes/no
		(P) Velocity limit value 1
		(P) Hysteresis of velocity limit value
		(P) Start of velocity monitoring range
(P) End of velocity monitoring range		

M12 page 75	Velocity Limit value 2	(P) Monitoring for over/under values
		(P) Monitoring direction dependent yes/no
		(P) Velocity limit value 2
		(P) Hysteresis of velocity limit value
		(P) Start of velocity monitoring range
		(P) End of velocity monitoring range
M13 page 77	Velocity Limit value 3	(P) Monitoring for over/under values
		(P) Monitoring direction dependent yes/no
		(P) Velocity limit value 3
		(P) Hysteresis of velocity limit value
		(P) Start of velocity monitoring range
		(P) End of velocity monitoring range
M14 page 79	Velocity Limit value 4	(P) Monitoring for over/under values
		(P) Monitoring direction dependent yes/no
		(P) Velocity limit value 4
		(P) Hysteresis of velocity limit value
		(P) Start of velocity monitoring range
		(P) End of velocity monitoring range
M15	–	–
M16 page 81	Velocity status	(I) Status of velocity monitoring
M17	–	–
M18 page 83	Other	(P) Display language selection
		(P) Display illumination
		(P) Display contrast
		(P) Activate/inhibit password
		(P) Password
M19	–	–
M20	–	–

Table 9.1: Overview of the GSD modules

9.4.3 Detail description of the modules



Notice!

In the following detailed descriptions of the modules you will find in the last column of the tables **cross references (CR) to parameters and input/output data of other modules** which are directly related to the described parameter. These cross references must absolutely be observed during configuration.

The individual **modules** are numbered from **1 ... 20**.

The **parameters and input/output data** within a module are from **a ... z**.

Example:

The **a preset** parameter in module 2 becomes active only when the preset teach occurs via module 2**b**, 4**d** or 5**d**.



9.4.3.2 Module 1: Position value

Description

Outputs the current position value.

The parameters for sign, unit, resolution, count direction and offset remain adjustable.

Parameter

Parameter	Description	Rel. addr.	Data type	Value range	Default	Unit		CR to module
						metr.	Inch	
a Sign	Output mode of the sign. Sign affects position and velocity output	0.0	Bit	0: two's complement 1: sign + quantity	0	-		-
b Measurement unit	Selection of the measurement unit ¹⁾ . The parameter applies to all values with measurement units. The parameter applies to all interfaces.	0.1	Bit	0: metric 1: inch (in)	0	-		-
c Resolution	Resolution of the position value applies only to the PROFIBUS output. The resolution does not apply to: - Static preset - Offset	0.2 ... 0.4	Bit	001=1: 0.001 010=2: 0.01 011=3: 0.1 100=4: 1 101=5: 10	4	mm	in/100	-
d Count direction	Counting direction positive:  Counting direction negative:  The parameter applies to the display output as well as the output of the position and velocity on the PROFIBUS interface.	0.5	Bit	0: positive 1: negative	0	-		-
e Offset	Output value=measurement value+offset The parameter applies to all interfaces. Attention: If the preset is activated, it has priority over the offset. Preset and offset are not offset against each other. The resolution of the offset value is independent of the resolution selected in module 1. The entered offset applies immediately without any further release.	1 - 4	sign 32 bit	-999999 ... +999999	0	mm	in/100	-

Parameter length: 6 bytes

1) see following notice!



Notice!

If the unit of measurement is changed from metric to inch (or vice versa), previously entered numerical values (e.g. for offset, preset, limit values etc.) are not automatically converted. This must be performed manually!

Example:

Preset = 10000mm -> Change from metric to inch -> Preset = 10000 inch/100

Hex coding of the "position value" parameter

The value listed in the table shows the hex coding of the default settings:

Module address	Sign Unit Resolution Count direction	Offset
01	10	00 00 00 00

Input data

Input data	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
f Position value	Output of the current position.	0	sign 32 bit	-999999 ... +999999	-	scaled		9a
Input data length: 4 bytes consistently								

Output data

None

9.4.3.3 Module 2: Static preset

Description

With this module, a preset value can be specified. The specified preset value becomes active in the position in which preset teaching is performed.



Notice!

In the event of a device change the preset value is retained in the PROFIBUS manager. The activation of the preset value (preset teach) at the intended position must, however, be performed again.

Parameter

Parameter	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
a Preset	Preset value. The value is accepted during a corresponding teach event (see output data). The resolution of the preset value is independent of the resolution selected in module 1.	0	sign 32 bit	-999999 ... +999999	0	mm	in/100	2b 4d 5d
Parameter length: 4 bytes								

Hex coding of the "preset value" parameter

The value listed in the table shows the hex coding of the default settings:

Module address	Preset value
02	00 00 00 00

Input data

None

Output data

Output data	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
b Preset teach	Read in the preset value.	0.0	Bit	0→1 Preset teach	–	–	–	4d 5d
c Preset reset	Preset value is deactivated.	0.1	Bit	0→1 Preset teach	–	–	–	4d 5d
Output data length: 1 byte								

9.4.3.4 Module 4: I/O 1 Input/Output

Description

The module defines the mode of operation of the digital input/output I/O 1.

Parameter

Parameter	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
a Function	The parameter defines whether I/O 1 functions as an input or as an output.	0.0	Bit	0: Input 1: Output	1	–		4cd
b Activation	The parameter defines the level of the output when the "output" event is received. If I/O 1 is configured as an input, the response is edge-controlled.	0.1	Bit	0: Low 1-0 transition 1: High 0-1 transition	0	–		–
c Output	The parameter defines which event triggers activation of the output. The individual functions are OR-linked to one another.					–		4a
	Position limit value 1 If the position value lies outside of configured limit range 1, the output is set.	1.0	Bit	0 = OFF 1 = ON	0	–		
	Position limit value 2 If the position value lies outside of configured limit range 2, the output is set.	1.1	Bit	0 = OFF 1 = ON	0	–		
	Velocity limit value If the velocity value lies outside of the configured values, the output is set. Monitoring from modules 11 to 15 is OR-linked.	1.2	Bit	0 = OFF 1 = ON	0	–		
	Intensity (ATT) If the intensity of the received signal is less than the warning threshold, the output is set.	1.3	Bit	0 = OFF 1 = ON	0	–		
	Temperature (TMP) If the internal device temperature exceeds the set limit value, the output is set.	1.4	Bit	0 = OFF 1 = ON	0	–		
	Laser (LSR) Laser prefailure message.	1.5	Bit	0 = OFF 1 = ON	0	–		
	Plausibility (PLB) If implausible measurement values are diagnosed, the output is set.	1.6	Bit	0 = OFF 1 = ON	1	–		
c Output	Hardware (ERR) If a hardware error is diagnosed, the output is set.	1.7	Bit	0 = OFF 1 = ON	1	–		4a
	Pseudodynamic output If bit 0.0 is set in the output data, the output is set.	2.0	Bit	0 = OFF 1 = ON	0	–		
d Input	Preset The HW input is used as preset teach input (valid for static or dynamic preset). Laser The HW input is used as laser OFF.	3.0 ... 3.2	unsign 8 bit	000 = HW input no function 001 = HW input as preset teach function 010 = HW input as laser OFF function	000	–		4a
Parameter length: 4 bytes								

Hex coding of the "I/O 1 input/output" parameter

The value listed in the table shows the hex coding of the default settings:

Module address	Function Activation	Position limit value 1 Position limit value 2 Velocity limit value Intensity (ATT) Temperature (TMP) Laser (LSR) Plausibility (PLB) Hardware (ERR) Pseudodynamic output	Input Preset / Laser
04	01	00 C0	00



Notice!

Behaviour of the AMS 3004*i* on Laser ON/OFF:

If the laser light spot is positioned on the reflector when the laser diode is switched on, the AMS 3004*i* returns valid measurement values after approx. 330ms.

If the laser light spot is **not** positioned on the reflector when the laser diode is switched on, the AMS 3004*i* cannot calculate any distance values. If the laser beam hits the reflector at a later point in time while switched-on, the AMS 3004*i* 200 returns valid measurement values after the following time span:

$$t = (\text{measurement distance} / 20m) \text{ sec.}$$

Example: Corridor change of a high-bay storage device during which the laser diode is not switched off while traveling around curves.
Measurement distance 100m → t = 5sec., measurement distance 200m → t = 10sec.

Input data

Input data	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
e State	Signal state of the input or output.	0.0	Bit	0: Input/Output at signal level not active 1: Input/Output at signal level active	–	–	–	–
Input data length: 1 byte								

Output data

Output data	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
f State	The output can be activated/deactivated with this bit. The corresponding release is performed in module 4, output parameter bit 2.0.	0.0	Bit	0: Output at signal level not active 1: Output at signal level active	–	–		4c
Output data length: 1 byte								

9.4.3.5 Module 5: I/O 2 Input/Output

Description

The module defines the mode of operation of the digital input/output I/O 2.

Parameter

Parameter	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
a Function	The parameter defines whether I/O 2 functions as an input or as an output.	0.0	Bit	0: Input 1: Output	1	–		5cd
b Activation	The parameter defines the level of the output when the "output" event is received. If I/O 2 is configured as an input, the response is edge-controlled.	0.1	Bit	0: Low 1-0 transition 1: High 0-1 transition	0	–		–
c Output	The parameter defines which event triggers activation of the output. The individual functions are OR -linked to one another.					–		5a
	Position limit value 1 If the position value lies outside of configured limit range 1, the output is set.	1.0	Bit	0 = OFF 1 = ON	0	–		
	Position limit value 2 If the position value lies outside of configured limit range 2, the output is set.	1.1	Bit	0 = OFF 1 = ON	0	–		
	Velocity limit value If the velocity value lies outside of the configured values, the output is set. Monitoring from modules 11 to 15 is OR-linked.	1.2	Bit	0 = OFF 1 = ON	0	–		
	Intensity (ATT) If the intensity of the received signal is less than the warning threshold, the output is set.	1.3	Bit	0 = OFF 1 = ON	1	–		
	Temperature (TMP) If the internal device temperature exceeds the set limit value, the output is set.	1.4	Bit	0 = OFF 1 = ON	1	–		
	Laser (LSR) Laser prefailure message.	1.5	Bit	0 = OFF 1 = ON	1	–		
	Plausibility (PLB) If implausible measurement values are diagnosed, the output is set.	1.6	Bit	0 = OFF 1 = ON	0	–		
c Output	Hardware (ERR) If a hardware error is diagnosed, the output is set.	1.7	Bit	0 = OFF 1 = ON	0	–		5a
	Pseudodynamic output If bit 0.0 is set in the output data, the output is set.	2.1	Bit	0 = OFF 1 = ON	0	–		
d Input	Preset The HW input is used as preset teach input (valid for static or dynamic preset).	3.0 ...	unsign 8 bit	000 = HW input no function 001 = HW input as preset teach function 010 = HW input as laser OFF function	000	–		5a
	Laser The HW input is used as laser OFF.	3.2						
Parameter length: 4 bytes								

Hex coding of the "I/O 2 input/output" parameter

The value listed in the table shows the hex coding of the default settings:

Module address	Function Activation	Position limit value 1 Position limit value 2 Velocity limit value Intensity (ATT) Temperature (TMP) Laser (LSF) Plausibility (PLB) Hardware (ERR) Pseudodynamic output	Input Preset / Laser
05	01	00 38	00



Notice!

Behaviour of the AMS 3004*i* on Laser ON/OFF:

If the laser light spot is positioned on the reflector when the laser diode is switched on, the AMS 3004*i* returns valid measurement values after approx. 330ms.

If the laser light spot is **not** positioned on the reflector when the laser diode is switched on, the AMS 3004*i* cannot calculate any distance values. If the laser beam hits the reflector at a later point in time while switched-on, the AMS 3004*i* returns valid measurement values after the following time span:

$$t = (\text{measurement distance} / 20\text{m}) \text{ sec.}$$

Example: Corridor change of a high-bay storage device during which the laser diode is not switched off while traveling around curves.
Measurement distance 100m → t = 5sec., measurement distance 200m → t = 10sec.

Input data

Input data	Description	Ref. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
e State	Signal state of the input or output.	0.0	Bit	0: Input/Output at signal level not active 1: Input/Output at signal level active	-	-	-	-
Input data length: 1 byte								

Output data

Output data	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
f State	The output can be activated/deactivated with this bit. The corresponding release is performed in module 5, output parameter bit 2.1.	0.0	Bit	0: Output at signal level not active 1: Output at signal level active	–	–		5c
Output data length: 1 byte								

9.4.3.6 Module 6: Status and control

Description

The module supplies various AMS 3004*i* status information to the PROFIBUS master. The laser can be controlled via the master's output data.

Parameter

None

Input data

Input data	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
a Laser status	Signals the laser status.	1.0	Bit	0: Laser ON 1: Laser OFF	–	–		–
b Preset status	Status of the preset value.	1.1	Bit	0: Preset not active 1: Preset active	–	–		–
c Preset teach	This bit toggles on each teach event of a preset value.	1.2	Bit	0 or 1	–	–		–
e Intensity (ATT)	If the intensity of the received signal is less than the warning threshold, the status bit is set.	1.4	Bit	0: OK 1: Warning	–	–		–
f Temperature (TMP)	If the internal device temperature exceeds or drops below the set limit value, the status bit is set.	1.5	Bit	0: OK 1: Temperature above/below limit	–	–		–
g Laser (LSR)	Laser prefailure message.	1.6	Bit	0: OK 1: Laser warning	–	–		–
h Plausibility (PLB)	If implausible measurement values are diagnosed, the status bit is set.	1.7	Bit	0: OK 1: Implausible measurement value	–	–		–
i Hardware (ERR)	If a hardware error is diagnosed, the status bit is set.	0.0	Bit	0: OK 1: Hardware error	–	–		–
j Lower position limit value 1	Signals that the value is less than lower limit value 1.	0.4	Bit	0: OK 1: Value less than limit	–	–		–
k Upper position limit value 1	Signals that the value is greater than upper limit value 1.	0.5	Bit	0: OK 1: Value greater than limit	–	–		–
l Lower position limit value 2	Signals that the value is less than lower limit value 2.	0.6	Bit	0: OK 1: Value less than limit	–	–		–
m Upper position limit value 2	Signals that the value is greater than upper limit value 2.	0.7	Bit	0: OK 1: Value greater than limit	–	–		–
Input data length: 2 bytes								

Output data

Output data	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
n Laser	Laser control.	0.0	Bit	0: Laser ON 1: Laser OFF	-	-	-	-
Output data length: 2 bytes								

9.4.3.7 Module 7: Position limit value range 1

Description

The position limit value range 1 parameter defines a distance range with lower and upper limits. If the measured value lies outside of the configured range, the corresponding bit is set in module 6 or, if configured, an output is set.

Parameter

Parameter	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
a Lower pos. limit 1	Specifies the lower position limit.	0...3	sign 32 bit	-999999 ... +999999	0	mm	in/100	-
b Upper pos. limit 1	Specifies the upper position limit.	4...7	sign 32 bit	-999999 ... +999999	0	mm	in/100	-
Parameter length: 8 bytes								

Hex code of the "position limit value range 1" parameter

The value listed in the table shows the hex coding of the default settings:

Module address	Lower pos. limit 1	Upper pos. limit 1
07	00 00 00 00	00 00 00 00

Input data

None

Output data

None

9.4.3.8 Module 8: Position limit value range 2

Description

The position limit value range 2 parameter defines a distance range with lower and upper limits. If the measured value lies outside of the configured range, the corresponding bit is set in module 6 or, if configured, an output is set.

Parameter

Parameter	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
^a Lower pos. limit 2	Specifies the lower position limit.	0...3	sign 32 bit	-999999 ... +999999	0	mm	in/100	-
^b Upper pos. limit 2	Specifies the upper position limit.	4...7	sign 32 bit	-999999 ... +999999	0	mm	in/100	-
Parameter length: 8 bytes								

Hex code of the "position limit value range 2" parameter

The value listed in the table shows the hex coding of the default settings:

Module address	Lower pos. limit 2	Upper pos. limit 2
08	00 00 00 00	00 00 00 00

Input data

None

Output data

None

9.4.3.9 Module 9: Error handling procedures

Description

The module makes parameters available to handle any errors should they occur.

In the event of a temporary error in the value/velocity calculation (e.g. plausibility error caused by light beam interruption) the laser measurement system transmits the last valid measurement value for a length of time xx which is to be configured.

If the configured time is exceeded, the error display or the faulty measurement value output is activated.

Parameter

Parameter	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
a Position value in the case of error	Specifies which position value is to be output in the event of an error after the position suppression time has elapsed.	0.0	Bit	0: Last valid value 1: Zero	1	mm	in/100	–
	No function.	0.1	Bit	Always 0	0	–	–	–
b Suppress position status	Specifies whether the PLB status bit is set immediately in the event of an error or if it is suppressed for the configured position suppression time.	0.2	Bit	0: OFF 1: ON	1	–	–	–
c Error delay (position)	Specifies in the event of an error whether the position value immediately outputs the value of the "position value in the case of error" parameter or outputs the last valid position value for the duration of the configured "error delay time".	0.3	Bit	0: OFF 1: ON	1	–	–	–
d Error delay time (position)	Errors which occur are suppressed for the configured time. If no valid position value can be ascertained during the configured time, the last valid position value is output. If the error persists after the time elapses, the value stored in the "position value in the case of error" parameter is output.	1...2	unsign 16 bit	100 ... 1000	100	ms	–	–
e Velocity in the case of error	Specifies which velocity is to be output in the event of an error after the velocity suppression time has elapsed.	3.0	Bit	0: Last valid value 1: Zero	1	–	–	–
	No function.	3.1	Bit	Always 0	0	–	–	–
f Suppress velocity status	Specifies whether the PLB status bit is set immediately in the event of an error or if it is suppressed for the configured velocity suppression time.	3.2	Bit	0: OFF 1: ON	1	–	–	–

<p>g</p> <p>Error delay (velocity)</p>	<p>Specifies in the event of an error whether the velocity immediately outputs the value of the "velocity in the case of error" parameter or outputs the last valid velocity for the duration of the configured "error delay time".</p>	<p>3.3</p>	<p>Bit</p>	<p>0: OFF 1: ON</p>	<p>1</p>	<p>–</p>	<p>–</p>
<p>h</p> <p>Error delay time (velocity)</p>	<p>Errors which occur are suppressed for the configured time. If no velocity position value can be ascertained during the configured time, the last valid velocity value is output. If the error persists after the time elapses, the value stored in the "velocity in the case of error" parameter is output.</p>	<p>4...5</p>	<p>unsign 16 bit</p>	<p>200 ... 1000</p>	<p>200</p>	<p>ms</p>	<p>–</p>
<p>Parameter length: 6 bytes</p>							

Hex code of the "Error handling procedures" parameter (position and velocity)

The value listed in the table shows the hex coding of the default settings:

<p>Module address</p>	<p>Position value in the case of error Suppress position status Error delay (position)</p>	<p>Position suppression time</p>	<p>Velocity output in the case of error Suppress velocity status Error delay (velocity)</p>	<p>Velocity suppression time</p>
<p>09</p>	<p>C0</p>	<p>00 64</p>	<p>C0</p>	<p>00 C8</p>

Input data

None

Output data

None

9.4.3.10 Module 10: Velocity

Description

Outputs the current velocity with the configured resolution. The unit (metric or inch) is set in module 1 (position value) and also applies to the velocity. If module 1 is not configured, the AMS 3004*i* operates with the default unit (metric).

The sign of the velocity is dependent on the count direction in module 1d.

In the default setting a positive velocity is output when the reflector moves away from the AMS 3004*i*. When the reflector moves towards the AMS 3004*i*, negative velocities are output. If the "negative" count direction is configured in module 1, the velocity signs are reversed.

Measurement value preparation averages all velocity values calculated during the selected period to yield a velocity value.

Parameter

Parameter	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
a Velocity resolution	The parameter specifies the resolution for the velocity value.	0.0 ... 0.2	Bit	001=1: 1 010=2: 10 011=3: 100 100=4: 1000	1	mm/s	(in/100)/s	20
b Average	The parameter specifies the integration time (averaging time) of the calculated velocity values.	0.3 ... 0.5	Bit	000=0: 2 001=1: 4 010=2: 8 011=3: 16 100=4: 32 101=5: 64 110=6: 128	3	ms		-
Parameter length: 2 bytes								

Hex coding of the "velocity" parameter

The value listed in the table shows the hex coding of the default settings:

Module address	Velocity resolution Average
0A	00 19

Input data

Input data	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
C Velocity	Current velocity.	0	sign 32 bit	-999999 ... +999999	0	scaled		-
Input data length: 4 bytes consistently								

Output data

None

9.4.3.11 Module 11: Static velocity limit value 1

Description

The **static velocity limit value 1** function compares the current velocity with a velocity stored in the configuration. This occurs in the configured range, which is defined by **range start** and **range end**.



Notice!

If **range start** and **range end** are identical, velocity monitoring is active over the entire traversing range.

If a direction-dependent limit value check is activated via the **direction selection** parameter, the values of **range start** and **range end** also define the direction. The check is always performed from **range start** to **range end**. For example, if the range start is "5500" and the range end is "5000", the direction-dependent check is only performed in the direction from "5500" to "5000". The limit value is not active in the opposite direction.

If the check is independent of direction, the order of **range start** and **range end** is irrelevant. Depending on the selected **switching mode**, if the value is above or below the defined limits, the limit value status in module 16 is set and, if configured, the output is appropriately set via module 4 or 5.

Parameter

Parameter	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
a Switching mode	Condition for the "velocity limit value 1" signal, which applies to the output (module 4/5) and the status bit (module 16).	0.0	Bit	0: Value greater than limit 1: Value less than limit	0	–		–
b Direction selection	Selection of direction-dependent or direction-independent limit value checking.	0.1	Bit	0: Direction independent 1: Direction dependent	0	–		–
c Velocity limit value 1	Limit value is compared to the current velocity.	1...2	unsigned 16 bit	0 ... 20000	0	mm/s	(in/100)/s	16d
d Velocity hysteresis 1	Relative shift to prevent signal bouncing.	3...4	unsigned 16 bit	0 ... 20000	100	mm/s	(in/100)/s	–
e Limit value 1 range start	The velocity limit value is monitored beginning at this position.	5...8	signed 32 bit	-999999 ... +999999	0	mm	in/100	–
f Limit value 1 range end	The velocity limit value is monitored up to this position.	9...12	signed 32 bit	-999999 ... +999999	0	mm	in/100	–
Parameter length: 13 bytes								

Hex code of the "static velocity limit value 1" parameter

The value listed in the table shows the hex coding of the default settings:

Module address	Switching mode Direction selection	Velocity limit value 1	Velocity hysteresis 1	Limit value 1 range start	Limit value 1 range end
0B	00	00 00	00 64	00 00 00 00	00 00 00 00

Input data

None

Output data

None

9.4.3.12 Module 12: Static velocity limit value 2

Description

The **static velocity limit value 2** function compares the current velocity with a velocity stored in the configuration. This occurs in the configured range, which is defined by **range start** and **range end**.



Notice!

If **range start** and **range end** are identical, velocity monitoring is active over the entire traversing range.

If a direction-dependent limit value check is activated via the **direction selection** parameter, the values of **range start** and **range end** also define the direction. The check is always performed from **range start** to **range end**. For example, if the range start is "5500" and the range end is "5000", the direction-dependent check is only performed in the direction from "5500" to "5000". The limit value is not active in the opposite direction.

If the check is independent of direction, the order of **range start** and **range end** is irrelevant. Depending on the selected **switching mode**, if the value is above or below the defined limits, the limit value status in module 16 is set and, if configured, the output is appropriately set via module 4 or 5.

Parameter

Parameter	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
a Switching mode	Condition for the "velocity limit value 2" signal, which applies to the output (module 4/5) and the status bit (module 16).	0.0	Bit	0: Value greater than limit 1: Value less than limit	0	–		–
b Direction selection	Selection of direction-dependent or direction-independent limit value checking.	0.1	Bit	0: Direction independent 1: Direction dependent	0	–		–
c Velocity limit value 2	Limit value is compared to the current velocity.	1...2	unsigned 16 bit	0 ... 20000	0	mm/s	(in/100)/s	16e
d Velocity hysteresis 2	Relative shift to prevent signal bouncing.	3...4	unsigned 16 bit	0 ... 20000	100	mm/s	(in/100)/s	–
e Limit value 2 range start	The velocity limit value is monitored beginning at this position.	5...8	signed 32 bit	-999999 ... +999999	0	mm	in/100	–
f Limit value 2 range end	The velocity limit value is monitored up to this position.	9 ... 12	signed 32 bit	-999999 ... +999999	0	mm	in/100	–

Parameter length: 13 bytes

Hex code of the "static velocity limit value 2" parameter

The value listed in the table shows the hex coding of the default settings:

Module address	Switching mode Direction selection	Velocity limit value 2	Velocity hysteresis 2	Limit value 2 range start	Limit value 2 range end
0C	00	00 00	00 64	00 00 00 00	00 00 00 00

Input data

None

Output data

None

9.4.3.13 Module 13: Static velocity limit value 3

Description

The **static velocity limit value 3** function compares the current velocity with a velocity stored in the configuration. This occurs in the configured range, which is defined by **range start** and **range end**.



Notice!

If **range start** and **range end** are identical, velocity monitoring is active over the entire traversing range.

If a direction-dependent limit value check is activated via the **direction selection** parameter, the values of **range start** and **range end** also define the direction. The check is always performed from **range start** to **range end**. For example, if the range start is "5500" and the range end is "5000", the direction-dependent check is only performed in the direction from "5500" to "5000". The limit value is not active in the opposite direction.

If the check is independent of direction, the order of **range start** and **range end** is irrelevant. Depending on the selected **switching mode**, if the value is above or below the defined limits, the limit value status in module 16 is set and, if configured, the output is appropriately set via module 4 or 5.

Parameter

Parameter	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
a Switching mode	Condition for the "velocity limit value 3" signal, which applies to the output (module 4/5) and the status bit (module 16).	0.0	Bit	0: Value greater than limit 1: Value less than limit	0	–		–
b Direction selection	Selection of direction-dependent or direction-independent limit value checking.	0.1	Bit	0: Direction independent 1: Direction dependent	0	–		–
c Velocity limit value 3	Limit value is compared to the current velocity.	1...2	unsign 16 bit	0 ... 20000	0	mm/s	(in/ 100) /s	16f
d Velocity hysteresis 3	Relative shift to prevent signal bouncing.	3...4	unsign 16 bit	0 ... 20000	100	mm/s	(in/ 100) /s	–
e Limit value 3 range start	The velocity limit value is monitored beginning at this position.	5...8	sign 32 bit	-999999 ... +999999	0	mm	in/ 100	–
f Limit value 3 range end	The velocity limit value is monitored up to this position.	9 ... 12	sign 32 bit	-999999 ... +999999	0	mm	in/ 100	–
Parameter length: 13 bytes								

Hex code of the "static velocity limit value 3" parameter

The value listed in the table shows the hex coding of the default settings:

Module address	Switching mode Direction selection	Velocity limit value 3	Velocity hysteresis 3	Limit value 3 range start	Limit value 3 range end
0D	00	00 00	00 64	00 00 00 00	00 00 00 00

Input data

None

Output data

None

9.4.3.14 Module 14: Static velocity limit value 4

Description

The **static velocity limit value 4** function compares the current velocity with a velocity stored in the configuration. This occurs in the configured range, which is defined by **range start** and **range end**.



Notice!

If **range start** and **range end** are identical, velocity monitoring is active over the entire traversing range.

If a direction-dependent limit value check is activated via the **direction selection** parameter, the values of **range start** and **range end** also define the direction. The check is always performed from **range start** to **range end**. For example, if the range start is "5500" and the range end is "5000", the direction-dependent check is only performed in the direction from "5500" to "5000". The limit value is not active in the opposite direction.

If the check is independent of direction, the order of **range start** and **range end** is irrelevant. Depending on the selected **switching mode**, if the value is above or below the defined limits, the limit value status in module 16 is set and, if configured, the output is appropriately set via module 4 or 5.

Parameter

Parameter	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
a Switching mode	Condition for the "velocity limit value 4" signal, which applies to the output (module 4/5) and the status bit (module 16).	0.0	Bit	0: Value greater than limit 1: Value less than limit	0	–		–
b Direction selection	Selection of direction-dependent or direction-independent limit value checking.	0.1	Bit	0: Direction independent 1: Direction dependent	0	–		–
c Velocity limit value 4	Limit value is compared to the current velocity.	1...2	unsign 16 bit	0 ... 20000	0	mm/s	(in/ 100) /s	16 g
d Velocity hysteresis 4	Relative shift to prevent signal bouncing.	3...4	unsign 16 bit	0 ... 20000	100	mm/s	(in/ 100) /s	–
e Limit value 4 range start	The velocity limit value is monitored beginning at this position.	5...8	sign 32 bit	-999999 ... +999999	0	mm	in/100	–
f Limit value 4 range end	The velocity limit value is monitored up to this position.	9 ... 12	sign 32 bit	-999999 ... +999999	0	mm	in/100	–
Parameter length: 13 bytes								

Hex code of the "static velocity limit value 4" parameter

The value listed in the table shows the hex coding of the default settings:

Module address	Switching mode Direction selection	Velocity limit value 4	Velocity hysteresis 4	Limit value 4 range start	Limit value 4 range end
0E	00	00 00	00 64	00 00 00 00	00 00 00 00

Input data

None

Output data

None

9.4.3.15 Module 16: Velocity status

Description

This module supplies the PROFIBUS master with various status information for velocity measurement.

Parameter

None

Input data

Input data	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
a Velocity measurement error	Signals that no valid velocity could be ascertained.	1.0	Bit	0: OK 1: Error	–	–		–
b Movement status	Signals whether a movement >0.1 m/s is currently being detected.	1.1	Bit	0: No movement 1: Movement	–	–		–
c Movement direction	When the movement status is activated, this bit indicates the direction.	1.2	Bit	0: Positive direction 1: Negative direction	–	–		–
d Velocity limit value status 1	Signals that limit value 1 has been exceeded.	1.3	Bit	0: Limit value maintained 1: Limit value violated	–	–		11c
e Velocity limit value status 2	Signals that limit value 2 has been exceeded.	1.4	Bit	0: Limit value maintained 1: Limit value violated	–	–		12c
f Velocity limit value status 3	Signals that limit value 3 has been exceeded.	1.5	Bit	0: Limit value maintained 1: Limit value violated	–	–		13c
g Velocity limit value status 4	Signals that limit value 4 has been exceeded.	1.6	Bit	0: Limit value maintained 1: Limit value violated	–	–		14c
i Velocity comparison Limit value 1	Signals whether the current velocity is compared with this limit value.	0.3	Bit	0: Comparison not active 1: Comparison active	–	–		–
j Velocity comparison Limit value 2	Signals whether the current velocity is compared with this limit value.	0.4	Bit	0: Comparison not active 1: Comparison active	–	–		–
k Velocity comparison Limit value 3	Signals whether the current velocity is compared with this limit value.	0.5	Bit	0: Comparison not active 1: Comparison active	–	–		–

<p>Velocity comparison Limit value 4</p>	<p>Signals whether the current velocity is compared with this limit value.</p>	<p>0.6</p>	<p>Bit</p>	<p>0: Comparison not active 1: Comparison active</p>	<p>–</p>	<p>–</p>	<p>–</p>
<p>Dynamic velocity comparison</p>	<p>Signals whether the current velocity is compared with this limit value.</p>	<p>0.7</p>	<p>Bit</p>	<p>0: Comparison not active 1: Comparison active</p>	<p>–</p>	<p>–</p>	<p>–</p>
<p>Input data length: 2 bytes</p>							

Output data

None

9.4.3.16 Module 18: module for display language, illumination and contrast, password

Description

Parameters for general operation are set in this module.

Parameter

Parameter	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
a Language selection	Language selection for the display. A language which was selected via the display is overwritten by this parameter.	0.0 ... 0.2	Bit	000=0: English 001=1: German 010=2: Italian 011=3: Spanish 100=4: French	0	–		–
b Display illumination	Off after 10min. or always on.	0.3	Bit	0: Off after 10min. 1: Always on	0	–		–
c Display contrast	Contrast setting of the display. The contrast changes under extreme ambient temperatures and can be adjusted with this parameter.	0.4 ... 0.5	Bit	000=0: Weak 001=1: Medium 010=2: Strong	1	–		–
d Password protection	Password protection on/off.	0.7	Bit	0: OFF 1: ON	0	–		–
e Password	Specifies the password. Password protection must be on.	1...2	unsign 16 bit	0000 ... 9999	0000	–		–

Parameter length: 4 bytes

Hex coding of the "other" parameter

The value listed in the table shows the hex coding of the default settings:

Module address	Language Display illumination Display contrast Password protection	Password
12	10	00

Input data

None

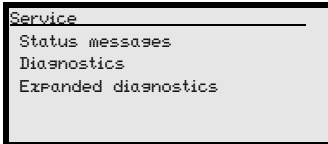
Output data


None




10 Diagnostics and troubleshooting


10.1 Service and diagnostics in the display of the AMS 3004*i*

In the main menu of the AMS 3004*i*, expanded "Diagnostics" can be called up under the Service heading.



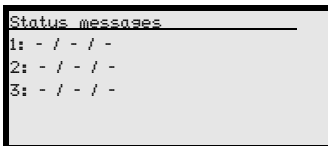
From the Service main menu, press the enter button  to access the underlying menu level.

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 .

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", since no summation occurs)

The status messages within the ring memory are selected with the up/down buttons  . The enter button  can be used to call up **detailed information** on the corresponding status messages with the following details:


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

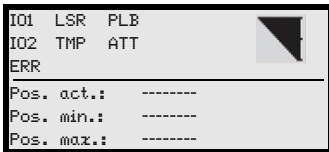
Within the detailed information, the enter button  can be pressed again to activate an **action menu** with the following functions:



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

10.1.2 Diagnostics

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

The recorded diagnostic data are displayed in 2 fields. In the upper half of the display, status messages of the AMS 30xx*i* and the bar graph are displayed. The lower half contains information that assists in a 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 the communication to the host interface and can be activated during operation of the AMS 3004*i*.

10.1.3 Expanded diagnostics

The `Expanded diagnostics` 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

Error	Possible error cause	Measure
BUS LED "OFF" (no communication via PROFIBUS)	No supply voltage connected	Check supply voltage.
	Incorrect wiring	Check wiring.
	Wrong termination	Check termination.
	Incorrect PROFIBUS address	Check PROFIBUS address.
	PROFIBUS deactivated	Activate PROFIBUS in the AMS 3004 <i>i</i> .
	Configuration error	Check configuration.
BUS-LED "flashes red"	Communication error: configuration failed ("parameter failure") DP Error: no data exchange	<ul style="list-style-type: none"> • Check configuration. • Carry out a reset on the control.
BUS-LED "red" (sporadic error at the PROFIBUS)	Incorrect wiring	Check wiring.
	Wrong termination	Check termination.
	Effects due to EMC	<ul style="list-style-type: none"> • Check shielding. • Check grounding concept and connection to FE. • Avoid EMC coupling caused by power cables laid parallel to device lines.
	Overall network expansion exceeded	Check max. network expansion as a function of the baud rate set.

Table 10.2: Bus error

10.4 Status display in the display of the AMS 3004*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 of the permissible range (TMP display; PLB)	Select AMS with heating or ensure cooling.

Display	Possible error cause	Measure
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 the reflector	Check alignment.
TMP (operating temperature outside of specification)	Protective foil on the reflector	Remove protective foil from reflector.
	Ambient temperatures outside of the 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.



Notice!

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 30 xx *i* *yyy*

Range	40	Max. operating range in m
	120	Max. operating range in m
	200	Max. operating range in m
Interface	<i>i</i>	Integrated fieldbus technology
	04	PROFIBUS DP interface
	07	SSI interface
AMS Absolute Measuring System		

11.2 Type overview AMS 3004*i* (PROFIBUS)

Type designation	Description	Part no.
AMS 3004 <i>i</i> 40	40 m operating range, PROFIBUS interface	50130193
AMS 3004 <i>i</i> 120	120 m operating range, PROFIBUS interface	50130194
AMS 3004 <i>i</i> 200	200 m operating range, PROFIBUS interface	50130195

Table 11.1: Type overview AMS 3004*i*

11.3 Overview of reflector types

Type designation	Description	Part no.
Reflective tape 200x200-S	Reflective tape, 200x200 mm, self-adhesive	50104361
Reflective tape 500x500-S	Reflective tape, 500x500 mm, self-adhesive	50104362
Reflective tape 914x914-S	Reflective tape, 914x914 mm, self-adhesive	50108988
Reflective tape 200x200-M	Reflective tape, 200x200 mm, affixed to aluminum plate	50104364
Reflective tape 500x500-M	Reflective tape, 500x500 mm, affixed to aluminum plate	50104365
Reflective tape 914x914-M	Reflective tape, 914x914 mm, affixed to aluminum plate	50104366
Reflective tape 200x200-H	Heated reflective tape, 200 x 200 mm	50115020
Reflective tape 500x500-H	Heated reflective tape, 500 x 500 mm	50115021
Reflective tape 914x914-H	Heated reflective tape, 914 x 914 mm	50115022

Table 11.2: Overview of reflector types

11.4 Accessories

11.4.1 Accessory mounting bracket

Type designation	Description	Part no.
MW OMS/AMS 01	Mounting bracket for mounting the AMS 3004 <i>i</i> to horizontal surfaces	50107255

Table 11.3: Accessory mounting bracket

11.4.2 Accessory deflector unit

Type designation	Description	Part no.
US AMS 01	Deflector unit with integrated mounting bracket for the AMS 3004 <i>i</i> . Variable 90° deflection of the laser beam in various directions	50104479
US 1 OMS	Deflector unit without mounting bracket for simple 90° deflection of the laser beam	50035630

Table 11.4: Accessory deflector unit

11.4.3 Accessory M12 connector

Type designation	Description	Part no.
KD 02-5-BA	M12 connector, B-coded socket, BUS IN	50038538
KD 02-5-SA	M12 connector, B-coded plug, BUS OUT	50038537
KD 095-5A	M12 connector, A-coded socket, Power (PWR)	50020501

Table 11.5: Accessory M12 connector

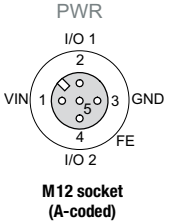
11.4.4 Accessory terminating resistor

Type designation	Description	Part no.
TS 02-4-SA	M12 terminating resistor for PROFIBUS BUS OUT	50038539

Table 11.6: Accessory terminating resistor

11.4.5 Accessory ready-made cables for voltage supply

Contact assignment/wire color of PWR connection cable

PWR connection cable (5-pin socket, A-coded)			
 PWR I/O 1 2 VIN 1 3 GND 4 I/O 2 FE 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

Specifications of the cables for voltage supply

Operating temperature range in rest state: -30°C ... +70°C
in motion: -5°C ... +70°C

Material sheathing: PVC

Bending radius > 50mm

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 5m	50104557
K-D M12A-5P-10m-PVC	M12 socket, A-coded, axial plug outlet, open cable end, cable length 10m	50104559

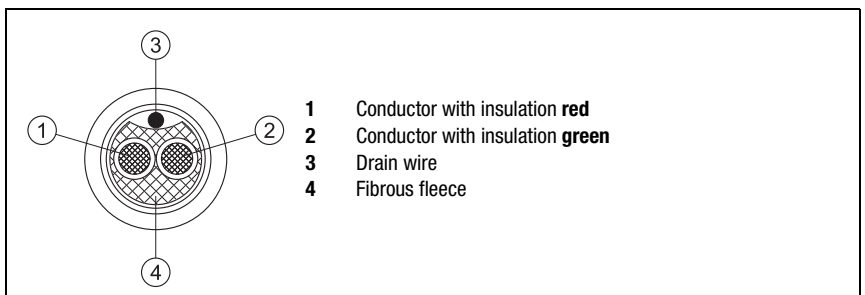
11.4.6 Accessory ready-made cables for PROFIBUS

General

- Cable **KB PB...** for connecting to the BUS IN/BUS OUT M12 connector
- Standard cables available in lengths from 2 ... 30m
- Special cables on request.

Contact assignments of PROFIBUS connection cable

PROFIBUS connection cable (5-pin socket/connector, B-coded, 2-pin cable)			
	Pin	Name	Core color
<p>M12 socket (B-coded)</p> <p>M12 connector (B-coded)</p>	1	NC	-
	2	A (N)	Green
	3	NC	-
	4	B (P)	Red
	5	NC	-
	Thread	FE	Functional earth (housing)



Specifications of the PROFIBUS connection cable

Operating temperature range in rest state: -40°C ... +80°C
in motion: -5°C ... +80°C

Material the lines comply with the PROFIBUS requirements,
free of halogens, silicone and PVC

Bending radius > 80mm, suitable for drag chains

Order codes for PROFIBUS connection cables

Type designation	Remark	Part no.
KB PB-2000-BA	M12 socket for BUS IN, axial connector, open cable end, cable length 2m	50104181
KB PB-5000-BA	M12 socket for BUS IN, axial connector, open cable end, cable length 5m	50104180
KB PB-10000-BA	M12 socket for BUS IN, axial connector, open cable end, cable length 10m	50104179
KB PB-15000-BA	M12 socket for BUS IN, axial connector, open cable end, cable length 15m	50104178
KB PB-20000-BA	M12 socket for BUS IN, axial connector, open cable end, cable length 20m	50104177
KB PB-25000-BA	M12 socket for BUS IN, axial connector, open cable end, cable length 25m	50104176
KB PB-30000-BA	M12 socket for BUS IN, axial connector, open cable end, cable length 30m	50104175
KB PB-2000-SA	M12 plug for BUS OUT, axial connector, open cable end, cable length 2m	50104188
KB PB-5000-SA	M12 plug for BUS OUT, axial connector, open cable end, cable length 5m	50104187
KB PB-10000-SA	M12 plug for BUS OUT, axial connector, open cable end, cable length 10m	50104186
KB PB-15000-SA	M12 plug for BUS OUT, axial connector, open cable end, cable length 15m	50104185
KB PB-20000-SA	M12 plug for BUS OUT, axial connector, open cable end, cable length 20m	50104184
KB PB-25000-SA	M12 plug for BUS OUT, axial connector, open cable end, cable length 25m	50104183
KB PB-30000-SA	M12 plug for BUS OUT, axial connector, open cable end, cable length 30m	50104182
KB PB-1000-SBA	M12 plug + M12 socket for PROFIBUS, axial connectors, cable length 1m	50104096
KB PB-2000-SBA	M12 plug + M12 socket for PROFIBUS, axial connectors, cable length 2m	50104097
KB PB-5000-SBA	M12 plug + M12 socket for PROFIBUS, axial connectors, cable length 5m	50104098
KB PB-10000-SBA	M12 plug + M12 socket for PROFIBUS, axial connectors, cable length 10m	50104099
KB PB-15000-SBA	M12 plug + M12 socket for PROFIBUS, axial connectors, cable length 15m	50104100
KB PB-20000-SBA	M12 plug + M12 socket for PROFIBUS, axial connectors, cable length 20m	50104101
KB PB-25000-SBA	M12 plug + M12 socket for PROFIBUS, axial connectors, cable length 25m	50104174
KB PB-30000-SBA	M12 plug + M12 socket for PROFIBUS, axial connectors, cable length 30m	50104173

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 (ATT) warning message 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. Use of such solvents could blur 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, are 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.



Notice!

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

12.3 Disassembling, packing, disposing

Repacking

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

Notice!

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

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			↵ Activation		Low active/High active		
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