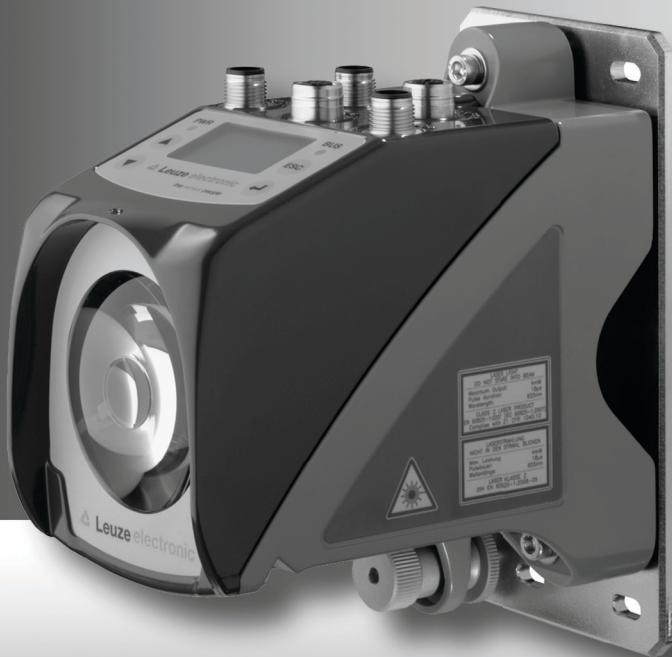


**AMS 348*i***  
Optical Laser Measurement System  
PROFINET



## Sales and Service

### Germany

#### Sales Region North

Phone 07021/573-306  
Fax 07021/9850950

#### Postal code areas

20000-38999  
40000-65999  
97000-97999

### Sales Region South

Phone 07021/573-307  
Fax 07021/9850911

#### Postal code areas

66000-96999

### Sales Region East

Phone 035027/629-106  
Fax 035027/629-107

#### Postal code areas

01000-19999  
39000-39999  
98000-99999

### Worldwide

#### AR (Argentina)

Condelectric S.A.  
Tel. Int. + 54 1148 361053  
Fax Int. + 54 1148 361053

#### AT (Austria)

Schmachtl GmbH  
Tel. Int. + 43 732 7646-0  
Fax Int. + 43 732 7646-785

#### AU + NZ (Australia + New Zealand)

Balluff-Leuze Pty. Ltd.  
Tel. Int. + 61 3 9720 4100  
Fax Int. + 61 3 9738 2677

#### BE (Belgium)

Leuze electronic nv/sa  
Tel. Int. + 32 2253 16-00  
Fax Int. + 32 2253 15-36

#### BG (Bulgaria)

ATICS  
Tel. Int. + 359 2 847 6244  
Fax Int. + 359 2 847 6244

#### BR (Brasil)

Leuze electronic Ltda.  
Tel. Int. + 55 11 5180-6130  
Fax Int. + 55 11 5180-6141

#### CH (Switzerland)

Leuze electronic AG  
Tel. Int. + 41 41 784 5656  
Fax Int. + 41 41 784 5657

#### CL (Chile)

Imp. Tec. Vignola S.A.I.C.  
Tel. Int. + 56 3235 11-11  
Fax Int. + 56 3235 11-28

#### CN (China)

Leuze electronic Trading  
(Shenzhen) Co. Ltd.  
Tel. Int. + 86 755 862 64909  
Fax Int. + 86 755 862 64901

#### CO (Colombia)

Componentes Electronicas Ltda.  
Tel. Int. + 57 4 3511049  
Fax Int. + 57 4 3511019

#### CZ (Czech Republic)

Schmachtl CZ s.r.o.  
Tel. Int. + 420 244 0015-00  
Fax Int. + 420 244 9107-00

#### DK (Denmark)

Leuze electronic Scandinavia ApS  
Tel. Int. + 45 48 173200

#### ES (Spain)

Leuze electronic S.A.  
Tel. Int. + 34 93 4097900  
Fax Int. + 34 93 49035820

#### FI (Finland)

SKS-automatio Oy  
Tel. Int. + 358 20 764-61  
Fax Int. + 358 20 764-6820

#### FR (France)

Leuze electronic Sarl.  
Tel. Int. + 33 160 0512-20  
Fax Int. + 33 160 0503-65

#### GB (United Kingdom)

Leuze electronic Ltd.  
Tel. Int. + 44 14 8040 85-00  
Fax Int. + 44 14 8040 38-08

#### GR (Greece)

UTEKO A.B.E.E.  
Tel. Int. + 30 211 1206 900  
Fax Int. + 30 211 1206 999

#### HK (Hong Kong)

Sensortech Company  
Tel. Int. + 852 26510188  
Fax Int. + 852 26510388

#### HR (Croatia)

Tipteh Zagreb d.o.o.  
Tel. Int. + 385 1 381 6574  
Fax Int. + 385 1 381 6577

#### HU (Hungary)

Kvaik Automatika Kft.  
Tel. Int. + 36 1 272 2242  
Fax Int. + 36 1 272 2244

#### ID (Indonesia)

PT. Babestindo Mitra Utama  
Tel. Int. + 62 21 92861859  
Fax Int. + 62 21 6451044

#### IL (Israel)

Galoz electronics Ltd.  
Tel. Int. + 972 3 9023456  
Fax Int. + 972 3 9021990

#### IN (India)

M + V Marketing Sales Pvt Ltd.  
Tel. Int. + 91 124 4121623  
Fax Int. + 91 124 434223

#### IT (Italy)

Leuze electronic s.r.l.  
Tel. Int. + 39 02 26 1106-43  
Fax Int. + 39 02 26 1106-40

#### JP (Japan)

C. Illies & Co., Ltd.  
Tel. Int. + 81 3 3443 4143  
Fax Int. + 81 3 3443 4118

#### KE (Kenia)

Profa-Tech Ltd.  
Tel. Int. + 254 20 828095/6  
Fax Int. + 254 20 828129

#### KR (South Korea)

Leuze electronic Co., Ltd.  
Tel. Int. + 82 31 3828228  
Fax Int. + 82 31 3828522

#### MK (Macedonia)

Tipteh d.o.o. Skopje  
Tel. Int. + 389 70 399 474  
Fax Int. + 389 23 174 197

#### MX (Mexico)

Movitren S.A.  
Tel. Int. + 52 81 8371 8616  
Fax Int. + 52 81 8371 8598

#### MY (Malaysia)

Ingenmark (M) SDN BHD  
Tel. Int. + 60 360 3427-88  
Fax Int. + 60 360 3421-88

#### NG (Nigeria)

SABROW HI-TECH E. & A. LTD.  
Tel. Int. + 234 80333 86366  
Fax Int. + 234 80333 84463518

#### NL (Netherlands)

Leuze electronic BV  
Tel. Int. + 31 418 65 35-44  
Fax Int. + 31 418 65 39-08

#### NO (Norway)

Elteco A/S  
Tel. Int. + 47 35 56 20-70  
Fax Int. + 47 35 56 20-99

#### PL (Poland)

Balluff Sp. z o.o.  
Tel. Int. + 48 71 338 49 29  
Fax Int. + 48 71 338 49 30

#### PT (Portugal)

LA2P, Lda.  
Tel. Int. + 351 21 4 447070  
Fax Int. + 351 21 4 447075

#### RO (Romania)

O BOYLE S.R.L.  
Tel. Int. + 40 2 56201346  
Fax Int. + 40 2 56221036

#### RS (Republic of Serbia)

Tipteh d.o.o. Beograd  
Tel. Int. + 381 11 3131 057  
Fax Int. + 381 11 3018 326

#### RU (Russian Federation)

ALL IMPLEX 2001  
Tel. Int. + 7 495 9213012  
Fax Int. + 7 495 6462092

#### SE (Sweden)

Leuze electronic Scandinavia ApS  
Tel. Int. + 45 48 173200

#### SG + PH (Singapore + Philippines)

Balluff Asia Pte Ltd  
Tel. Int. + 65 6252 43-84  
Fax Int. + 65 6252 90-60

#### SI (Slovenia)

Tipteh d.o.o.  
Tel. Int. + 386 1200 51-50  
Fax Int. + 386 1200 51-51

#### SK (Slovakia)

Schmachtl SK s.r.o.  
Tel. Int. + 421 2 58275600  
Fax Int. + 421 2 58275601

#### TH (Thailand)

Industrial Electrical Co. Ltd.  
Tel. Int. + 66 2 642 6700  
Fax Int. + 66 2 642 4250

#### TR (Turkey)

Leuze electronic San ve Tic.Ltd.Sti.  
Tel. Int. + 90 216 456 6704  
Fax Int. + 90 216 456 3650

#### TW (Taiwan)

Great Colux Technology Co., Ltd.  
Tel. Int. + 886 2 2983 80-77  
Fax Int. + 886 2 2985 33-73

#### UA (Ukraine)

SV Altera OOO  
Tel. Int. + 38 044 4961888  
Fax Int. + 38 044 4961818

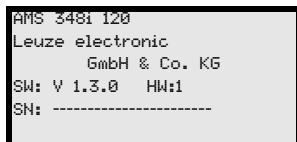
#### US + CA (United States + Canada)

Leuze electronic, Inc.  
Tel. Int. + 1 248 486-4466  
Fax Int. + 1 248 486-6699

#### ZA (South Africa)

Countpulse Controls (PTY) Ltd.  
Tel. Int. + 27 116 1575-56  
Fax Int. + 27 116 1575-13

The main menus

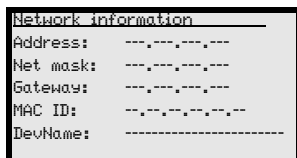


**Device information - main menu**

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**

Under this menu item, you will find detailed information on the network addresses.

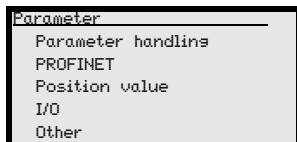
No entries can be made via the display.



**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 37.



**Parameter - main menu**

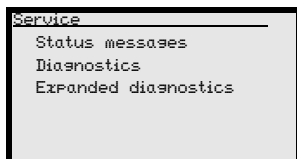
Configuration for PROFI NET is carried out via the modules of the GSDML file.



**Language selection - main menu**

- Selection of the display language.

See "Language selection menu" on page 47.



**Service - main menu**

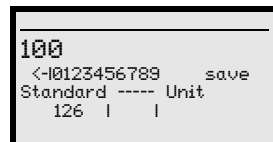
- Display of status messages.
- Display of diagnostic data.

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 +  Save input

<b>1</b>	<b>General information</b>	<b>5</b>
1.1	Explanation of symbols	5
1.2	Declaration of conformity	5
1.3	Description of functions AMS 348i	6
<b>2</b>	<b>Safety notices</b>	<b>7</b>
2.1	General safety notices	7
2.2	Safety standards	7
2.3	Intended use	7
2.4	Working safely	8
<b>3</b>	<b>Fast commissioning / operating principle</b>	<b>10</b>
3.1	Mounting the AMS 348i	10
3.1.1	Mounting the device	10
3.1.2	Mounting the reflector	10
3.2	Connecting the voltage supply	11
3.3	Display	11
3.4	AMS 348i on the PROFINET	11
<b>4</b>	<b>Specifications</b>	<b>12</b>
4.1	Specifications of the laser measurement system	12
4.1.1	General specifications AMS 348i	12
4.1.2	Dimensioned drawing AMS 348i	14
4.1.3	Type overview AMS 348i	15
<b>5</b>	<b>Installation and mounting</b>	<b>16</b>
5.1	Storage, transportation	16
5.2	Mounting the AMS 348i	17
5.2.1	Optional mounting bracket	19
5.2.2	Mounting distances	20
5.3	Mounting the AMS 348i with laser beam deflector unit	21
5.3.1	Mounting the laser beam deflector unit with integrated mounting bracket	21
5.3.2	Dimensioned drawing of US AMS 01 deflector unit	22
5.3.3	Mounting the US 1 OMS deflector unit without mounting bracket	23

<b>6</b>	<b>Reflectors</b> .....	<b>24</b>
6.1	General information .....	24
6.2	Description of the reflective tape .....	24
6.2.1	Specifications of the self-adhesive foil .....	25
6.2.2	Specifications of the reflective tape on a metal plate .....	25
6.2.3	Dimensioned drawing of reflective tape on a metal plate .....	26
6.2.4	Specifications of heated reflectors .....	27
6.2.5	Dimensioned drawing of heated reflectors .....	28
6.3	Selecting reflector sizes .....	29
6.4	Mounting the reflector .....	30
6.4.1	General information .....	30
6.4.2	Mounting the reflector .....	30
6.4.3	Table of reflector pitches .....	33
<b>7</b>	<b>Electrical connection</b> .....	<b>34</b>
7.1	Safety notices for the electrical connection .....	34
7.2	PWR – voltage supply / switching input/output .....	35
7.3	PROFINET BUS IN .....	35
7.4	PROFINET BUS OUT .....	36
7.5	Service .....	36
<b>8</b>	<b>Display and control panel AMS 348i</b> .....	<b>37</b>
8.1	Structure of the control panel .....	37
8.2	Status display and operation .....	37
8.2.1	Indicators in the display .....	37
8.2.2	LED status displays .....	39
8.2.3	Control buttons .....	41
8.3	Menu description .....	42
8.3.1	The main menus .....	42
8.3.2	Parameter menu .....	44
8.3.3	Language selection menu .....	47
8.3.4	Service menu .....	47
8.4	Operation .....	48

<b>9</b>	<b>PROFINET interface</b> . . . . .	<b>50</b>
9.1	General information on PROFINET . . . . .	50
9.2	Identification & Maintenance Functions . . . . .	50
9.3	PROFINET – Star topology . . . . .	51
9.4	PROFINET – Linear topology . . . . .	51
9.5	PROFINET – General information on wiring . . . . .	52
9.6	PROFINET – Cable lengths and shielding . . . . .	52
9.7	PROFINET - Electrical connection . . . . .	53
9.8	PROFINET – Commissioning and configuration . . . . .	54
9.8.1	PROFINET implementation of the AMS 348 <i>i</i> . . . . .	54
9.8.2	Measures to be performed prior to the initial commissioning . . . . .	55
9.8.3	Starting the device . . . . .	55
9.8.4	Configuration steps for a Siemens Simatic S7 control . . . . .	56
9.9	PROFINET GSD file . . . . .	62
9.9.1	General information on the GSD file . . . . .	62
9.9.2	Overview of the GSD modules . . . . .	64
9.9.3	Detail description of the modules . . . . .	66
<b>10</b>	<b>Diagnostics and troubleshooting</b> . . . . .	<b>92</b>
10.1	Service and diagnostics in the display of the AMS 348 <i>i</i> . . . . .	93
10.1.1	Status messages . . . . .	93
10.1.2	Diagnostics . . . . .	93
10.1.3	Expanded diagnostics . . . . .	94
10.2	General causes of errors . . . . .	94
10.2.1	Power LED . . . . .	95
10.3	Interface errors . . . . .	95
10.3.1	BUS LED . . . . .	95
10.4	Status display in the display of the AMS 348 <i>i</i> . . . . .	96
<b>11</b>	<b>Type overview and accessories</b> . . . . .	<b>97</b>
11.1	Type key . . . . .	97
11.2	Type overview AMS 348 <i>i</i> (PROFINET) . . . . .	97
11.3	Overview of reflector types . . . . .	98
11.4	Accessories . . . . .	98
11.4.1	Accessory mounting bracket . . . . .	98
11.4.2	Accessory deflector unit . . . . .	98
11.4.3	Accessory M12 connector . . . . .	98

11.4.4 Accessory ready-made cables for voltage supply ..... 99

11.4.5 Accessory ready-made cables for PROFINET ..... 100

**12 Maintenance ..... 102**

12.1 General maintenance information ..... 102

12.2 Repairs, servicing ..... 102

12.3 Disassembling, packing, disposing ..... 102

## 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 personnel 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 348*i* absolute measuring optical laser measurement system was designed and manufactured in accordance with applicable European directives and standards.

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



**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 348*i***


The AMS 348*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 348*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.


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


- 



**AMS 304*i***
- 


**AMS 348*i***
- 


**AMS 355*i***
- 



**AMS 358*i***
- 

**AMS 335*i***
- 

**AMS 338*i***
- 

**AMS 308*i***
- 

**AMS 384*i***
- 

**AMS 301*i***
- 


**AMS 300*i***

## 2 Safety notices

### 2.1 General safety notices

#### **Documentation**

All entries in this technical description must be heeded, in particular those in section "Safety notices". Keep this technical description in a safe place. It should be available at all times.

#### **Safety regulations**

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

#### **Repair**

Repairs must only be carried out by the manufacturer or an authorized representative.

### 2.2 Safety standards

The devices of the series AMS 348*i* were developed, manufactured and tested in accordance with the applicable safety standards. They correspond to the state of the art.

### 2.3 Intended use

The AMS 348*i*... device series is an absolute measuring system based on laser technology. The devices use a visible optical laser to measure distances of up to 300m contactlessly. The laser is designed so that distance measurements are made against a reflector.



#### **Attention!**

*The protection of personnel and the device is guaranteed only if the device is operated in a manner corresponding to its intended use.*

#### **Areas of application**

The AMS 348*i*... is suitable for the following areas of application:

- Distance measurements for determining the position of automated, moving plant components such as:
  - Travel and lifting axes of high-bay storage devices
  - Gantry crane bridges and their trolleys
  - Repositioning units
  - Lifts
  - Electroplating plants

## 2.4 Working safely

**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.

**Safety regulations**

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

**Attention!**

The AMS 348i... is not a safety module acc. to EU machinery directives.

**Qualified personnel**

Mounting, commissioning and maintenance of the device must only be carried out by qualified personnel. Electrical work must be carried out by a certified electrician.

**Attention, laser radiation!**

The AMS 348i operates with a red light laser of class 2 acc. to EN 60825-1. If you look into the beam path over a longer time period, the retina of your eye may be damaged!

**Never look directly into the beam path!**

**Do not point the laser beam of the AMS 348i at persons!**

**When mounting and aligning the AMS 348i, avoid reflections of the laser beam off of reflective surfaces!**

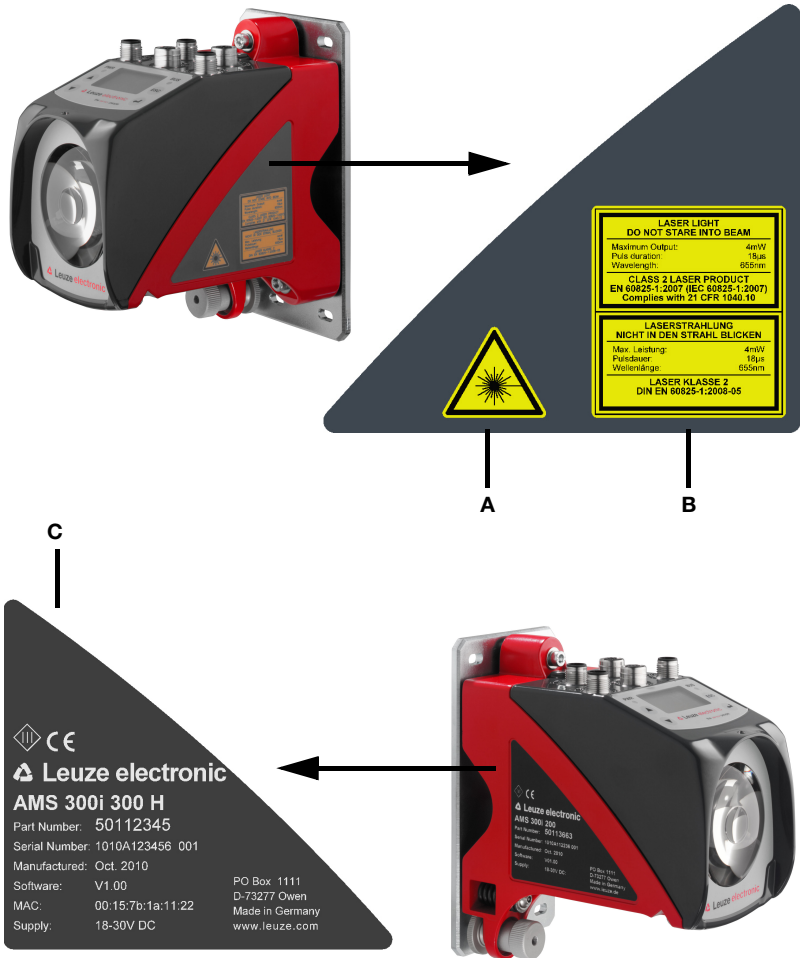
**Heed the laser safety regulations according to DIN EN 60825-1 in their most current version! The output power of the laser beam at the reading window is at most 4.0mW acc. to EN 60825-1. The average laser power is less than 1mW in accordance with laser class 2 as well as CDRH class 2.**

**The AMS 348i uses a laser diode with low power in the visible red light range with an emitted wavelength of 650 ... 690nm.**

**Attention!**

**CAUTION! The use of operating and adjusting devices other than those specified here or carrying out of differing procedures may lead to dangerous exposure to radiation.**

The housing of the AMS 348*i* has been provided with the following labeling:



- A** Hazard warning & logotype
- B** Warning and certification plate
- C** Name plate with part no., version no., date of manufacture and serial no.  
 For EtherNet-based devices, the MAC ID is specified on the name plate.  
 Please note that the shown name plate is for illustration purposes only; the contents do not correspond to the original.

Figure 2.1: Location of the name plate on the AMS 348*i*

### 3 Fast commissioning / operating principle

**Notice!**

Below, you will find a **short description for the initial commissioning** of the AMS 348*i*. Detailed explanations for the listed points can be found throughout the handbook.

#### 3.1 Mounting the AMS 348*i*

The AMS 348*i* and the corresponding reflector are mounted on two mutually opposing, plane-parallel, flat walls.

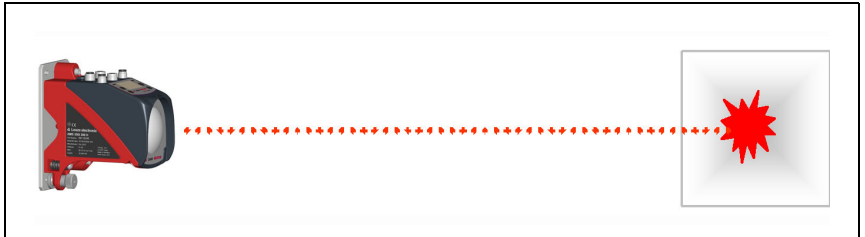


Figure 3.1: Schematic illustration of mounting

**Attention!**

For error-free position measurement, there must be an unobstructed line-of-sight between the AMS 348*i* and the reflector.

##### 3.1.1 Mounting the device

The laser is mounted on a vertical wall 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 on a vertical wall with 4 screws (M5). The reflector is angled using the included shims. 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 (18 ... 30VDC). 2 freely programmable switching inputs/outputs for individual adaptation to the respective application are also available here.

**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.

**Detailed information can be found in chapter 8.**

### 3.4 AMS 348*i* on the PROFINET

Install the GSDML file associated with the AMS 348*i* in the PROFINET Manager of your control. Activate the desired modules (at least one module).

The network address for PROFINET is assigned via the PROFINET Manager.

#### ***Standalone operation in PROFINET***

During standalone operation of the AMS 348*i*, the PROFINET network is connected to BUS IN. BUS OUT requires no terminating resistor.

#### ***Network operation in PROFINET***

In network mode the AMS 348*i* is connected to PROFINET via BUS IN. Further PROFINET participants can be connected to the integrated switch of the AMS 348*i* via the BUS OUT connection.

#### ***Commissioning of the AMS 348*i****

The procedures described below are for the configuration of an AMS 348*i* with a Siemens Simatic S7 PLC.

- Switching on the supply voltage.  
The AMS 348*i* displays the "**Status and measurement values**" main menu.
- Installation of the corresponding GSD file in the Simatic Hardware Manager.
- Projection of the PROFINET network including the AMS 348*i* GSD file. Definition of the IP addresses, sub-network mask and definition of a device name assigned to the IP address.
- Download of the project to the connected Siemens control.

Further information regarding the individual commissioning steps is provided in see chapter 9.8.4 "Configuration steps for a Siemens Simatic S7 control".

**Detailed information can be found in chapter 9.**

## 4 Specifications

### 4.1 Specifications of the laser measurement system

#### 4.1.1 General specifications **AMS 348i**

Measurement data	<b>AMS 348i 40 (H)</b>	<b>AMS 348i 120 (H)</b>	<b>AMS 348i 200 (H)</b>	<b>AMS 348i 300 (H)</b>
Measurement range	0.2 ... 40m	0.2 ... 120m	0.2 ... 200m	0.2 ... 300m
Accuracy	± 2mm	± 2mm	± 3mm	± 5mm
Consistency <sup>1)</sup>	0.3mm	0.5mm	0.7mm	1.0mm
Light spot diameter	≤ 40mm	≤ 100mm	≤ 150mm	≤ 225mm
Measurement value output	1,7ms			
Integration time	8ms			
Resolution	adjustable, see chapter of the individual interfaces			
Temperature drift	≤ 0.1mm/K			
Ambient temperature sensitivity	1ppm/K			
Air pressure sensitivity	0.3ppm/hPa			
Traverse rate	≤ 10m/s			
<b>Electrical data</b>				
Supply voltage $V_{in}$ <sup>2)</sup>	18 ... 30VDC			
Current consumption	without device heating: ≤ 250mA / 24VDC with device heating: ≤ 500mA / 24VDC			
<b>Optical data</b>				
Transmitter	laser diode, red light, wavelength 650 ... 690nm			
Laser class	2 acc. to EN 60825-1, CDRH			
Laser life expectancy <sup>3)</sup>	average temperature / year			50°C: 23.000h 25°C: 60.000h 20°C: 75.000h 10°C: 120.000h
<b>Interfaces</b>				
Interface type	PROFINET-RT with integrated switch for BUS IN and BUS OUT			
Protocol	PROFINET-RT communication			
Conformance Class	B			
<b>Operating and display elements</b>				
Keyboard	4 buttons			
Display	monochromatic graphical display, 128 x 64 pixels			
LED	4 LEDs, 2 of which are used to display the PROFINET connection			

## 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
Protection class	IP 65 acc. to EN 60529 <sup>4)</sup>

## Environmental conditions

Operating temperature	
without device heating	-5 °C ... +50 °C
with device heating	-30 °C ... +50 °C <sup>5)</sup>
Storage temperature	-30 °C ... +70 °C
Air humidity	max. 90% rel. humidity, non-condensing

## Mechanical/electrical loading capacity

Vibrations	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 <sup>6)</sup>

- 1) Statistical error: 1 sigma; minimum switch-on time: 2min.
- 2) For UL applications: only for use in "Class 2" circuits acc. to NEC.
- 3) Switching off the laser diode during system downtime can considerably extend the life expectancy of the device. The laser life expectancy is calculated using a failure rate of 1%.
- 4) With screwed-on M12 plugs or mounted caps.
- 5) With devices with heating, the switch on/off area of the internal heating can be extended to prevent condensation from forming. A 100% prevention of the formation of condensation cannot be guaranteed due to the limited heating capacity of the AMS 348*i*.
- 6) This is a Class A product. In a domestic environment this product may cause radio interference, in which case the operator may be required to take adequate measures.



The AMS 348*i* is designed in accordance with safety class III for supply with PELV (protective extra-low voltage).



**4.1.2 Dimensioned drawing AMS 348*i***

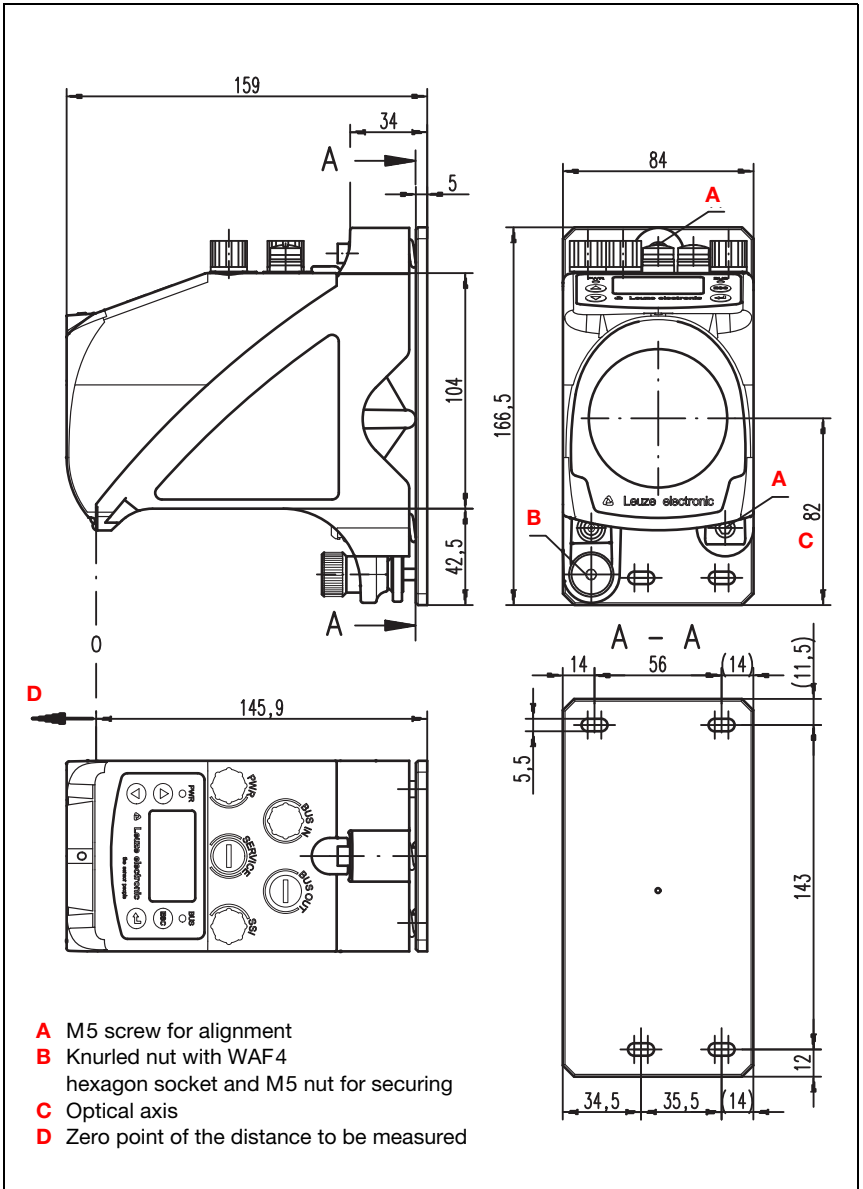


Figure 4.1: Dimensioned drawing AMS 348*i*

### 4.1.3 Type overview AMS 348*i*

#### **AMS 348*i* (PROFINET)**

Type designation	Description	Part No.
AMS 348 <i>i</i> 40	40m operating range, PROFINET interface	50113709
AMS 348 <i>i</i> 120	120m operating range, PROFINET interface	50113710
AMS 348 <i>i</i> 200	200m operating range, PROFINET interface	50113711
AMS 348 <i>i</i> 300	300m operating range, PROFINET interface	50113712
AMS 348 <i>i</i> 40 H	40m operating range, PROFINET interface, integrated heating	50113713
AMS 348 <i>i</i> 120 H	120m operating range, PROFINET interface, integrated heating	50113714
AMS 348 <i>i</i> 200 H	200m operating range, PROFINET interface, integrated heating	50113715
AMS 348 <i>i</i> 300 H	300m operating range, PROFINET interface, integrated heating	50113716

Table 4.1: Type overview AMS 348*i*

## 5 Installation and mounting

### 5.1 Storage, transportation



**Attention!**

When transporting or storing, package the device so that it is protected against collision and humidity. Optimum protection is achieved when using the original packaging. 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 nameplate
  - Brief manual

The name plate provides information as to what AMS 348*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 300*i* 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 348*i*

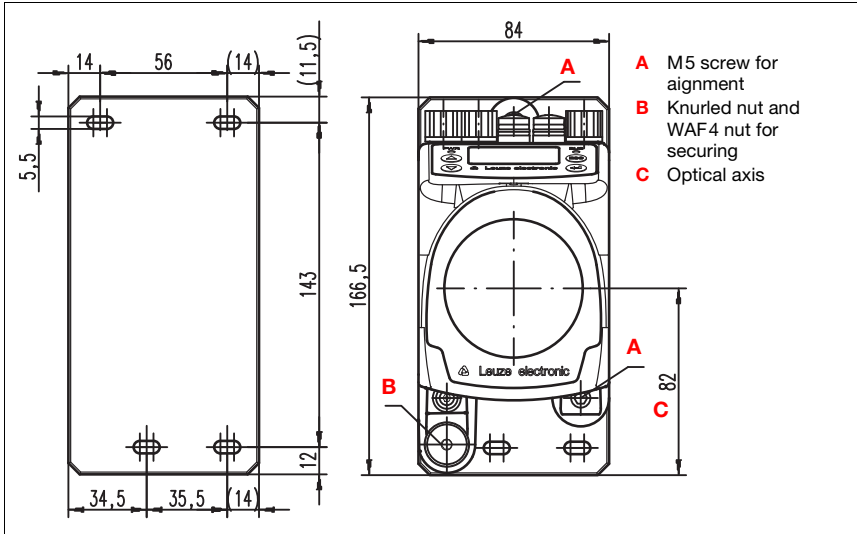


Figure 5.2: Mounting the device

The AMS 348*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 348*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 WAF4 nut ("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 348*i* on a flat, horizontal surface is available as an optional accessory.

Type designation: MW OMS/AMS 01

Part No.: 50107255

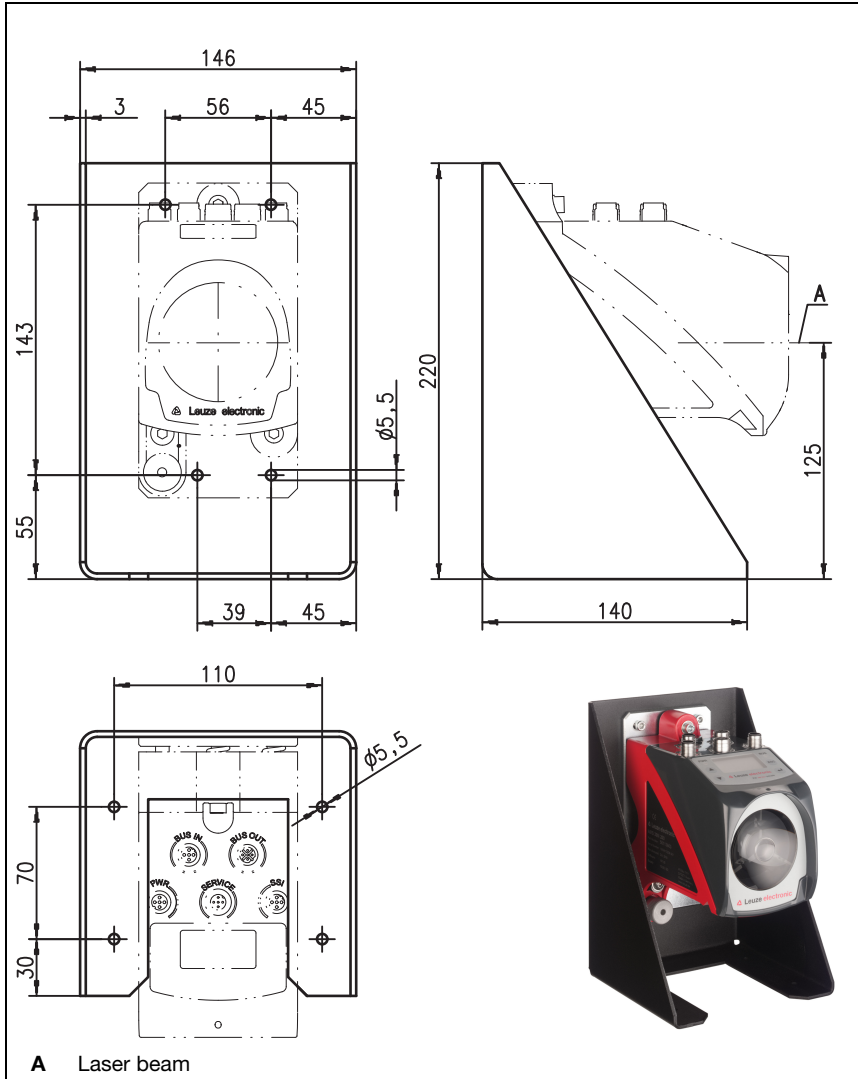


Figure 5.3: Optional mounting bracket

## 5.2.2 Mounting distances

### **Minimum parallel spacing between adjacent AMS 348i**

The smallest-possible parallel spacing between adjacent AMS 348i is determined by the maximum measured distance as well as by the properties of the reflector. To prevent adjacent devices from interfering with each other the parallel distance of the laser light spots on the reflector is crucial.

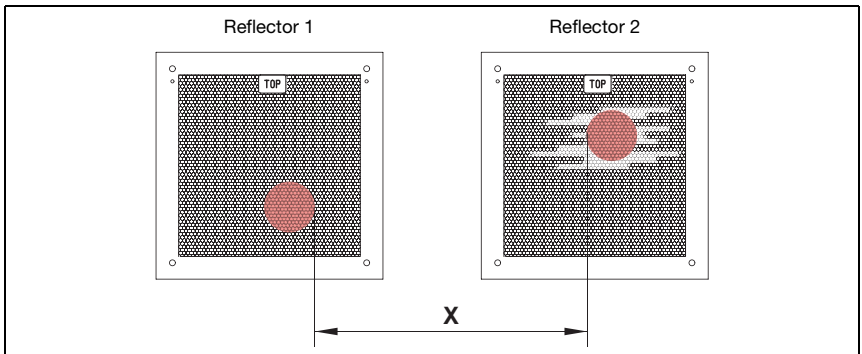


Figure 5.4: Minimum parallel spacing X between adjacent AMS 348i

Min. parallel spacing of laser light spot  $X = 100\text{mm} + (\text{max. measurement distance in mm} \times 0.01)$ .



#### **Notice!**

Please note that travel tolerances could cause the two laser light spots to move towards each other.

If both AMS 348i are optically separated from one another, e.g., if installed in different shelf alleys, the parallel spacing can be selected smaller, as there is no mutual interference in this case.

### **Minimum distance to an adjacent DDLS 200 optical data transmission device**

The optical data transceivers of the DDLS 200 series and the AMS 348i do not mutually interfere with one another. Depending on the size of the used reflector, the optical data transceiver can be mounted with a minimum mounting spacing of 100mm to the AMS 348i. The mounting spacing is independent of the distance.

### 5.3 Mounting the AMS 348*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 98.



#### 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 348*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 348*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.

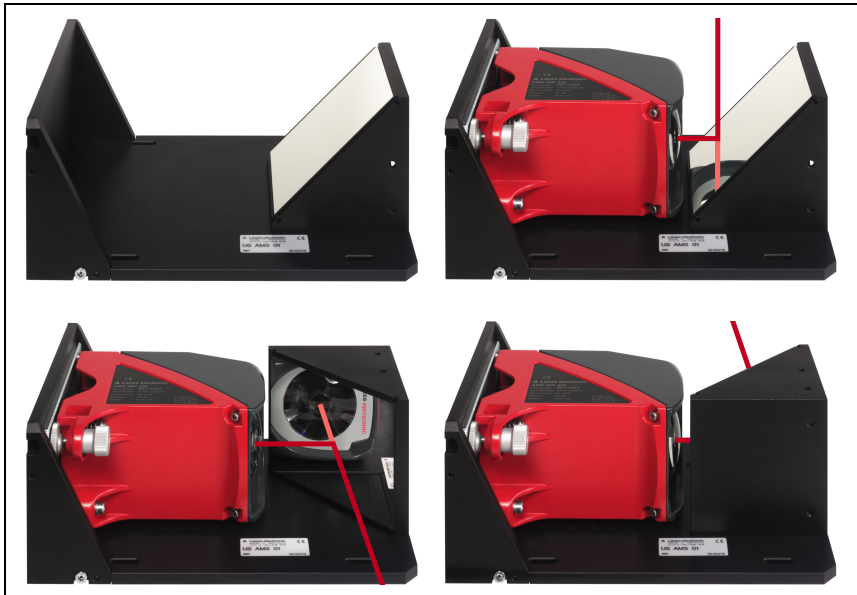


Figure 5.5: Mounting variants of the US AMS 01 laser beam deflector unit



**5.3.2 Dimensioned drawing of US AMS 01 deflector unit**

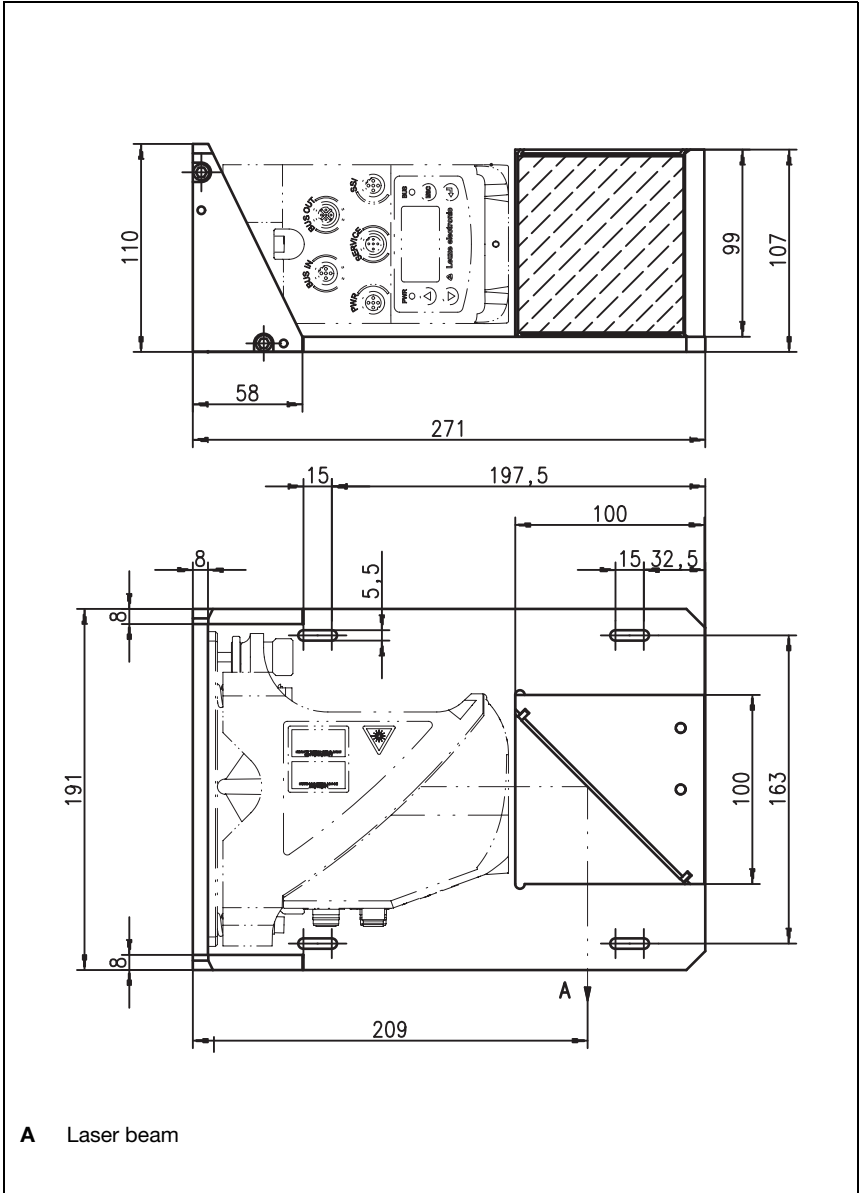


Figure 5.6: Dimensioned drawing of US AMS 01 deflector unit

### 5.3.3 Mounting the US 1 OMS deflector unit without mounting bracket

The US 1 OMS deflector unit and the AMS 348*i* are mounted separately.



**Notice!**

When mounting, make certain that the laser light spot of the AMS 348*i* is aligned in the center of the deflection mirror.

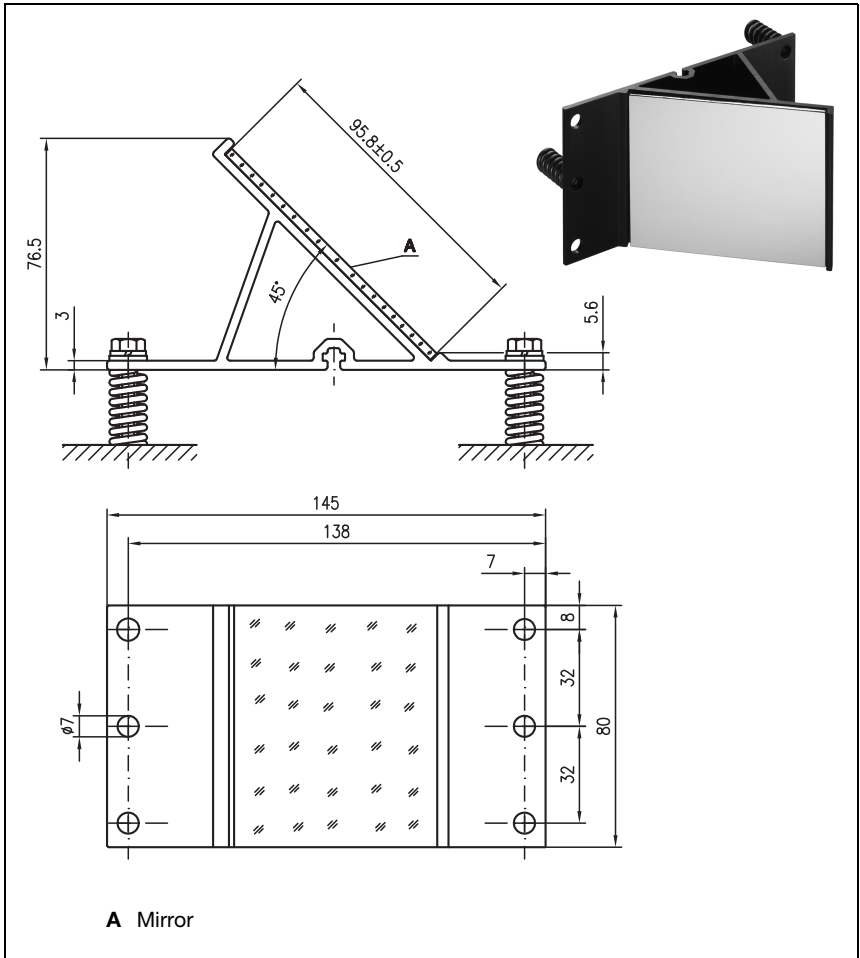


Figure 5.7: Photo and dimensioned drawing of the US 1 OMS deflector unit

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 348*i* measures distances against a reflective tape specified by Leuze electronic. All provided specifications for the AMS 348*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 348*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 33.

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	0.8 kg	4 kg	25 kg
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**

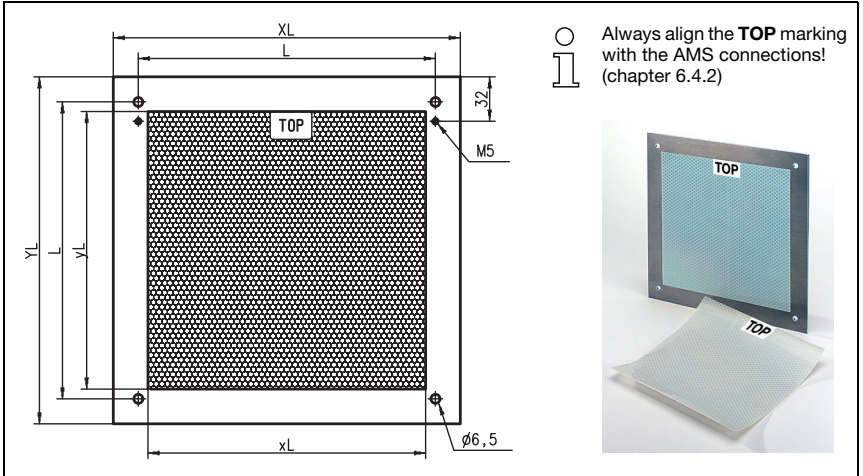


Figure 6.1: Dimensioned drawing of reflectors

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	150W	500W
Current consumption	~ 0.5A	~ 1A	~ 2.5A
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

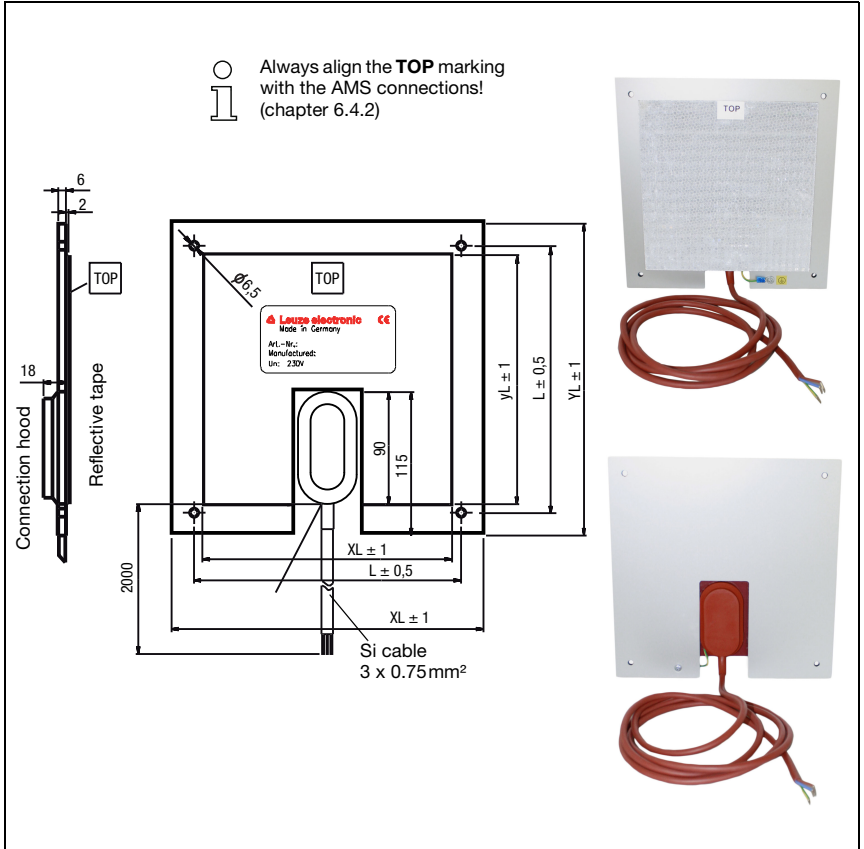


Figure 6.2: Dimensioned drawing of heated reflectors

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 348*i*. For stationary mounting of the AMS 348*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 348*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 348 <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 348 <i>i</i> 40 (max. 40m)	200x200mm	Reflective tape 200x200-S Reflective tape 200x200-M Reflective tape 200x200-H	50104361 50104364 50115020
AMS 348 <i>i</i> 120 (max. 120m)	500x500mm	Reflective tape 500x500-S Reflective tape 500x500-M Reflective tape 500x500-H	50104362 50104365 50115021
AMS 348 <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
AMS 348 <i>i</i> 300 (max. 300m)	749x914mm 914x914mm	Reflective tape 749x914-S Reflective tape 914x914-M Reflective tape 914x914-S Reflective tape 914x914-H	50104363 50104366 50108988 50115022



## 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 348*i*... (see chapter 5.2 "Mounting the AMS 348*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 348*i*.

#### **Example:**

*If the AMS 348*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 348*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. Avoid a downward pitch**, as additional reflections may occur on the running rails. 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**

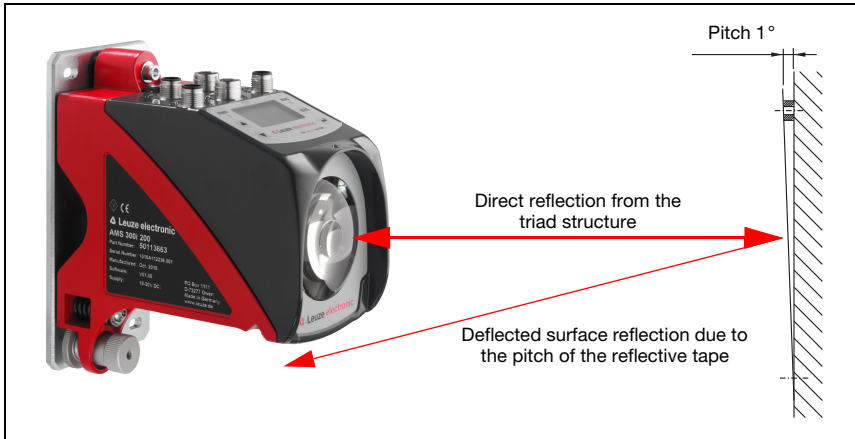


Figure 6.3: Reflector mounting

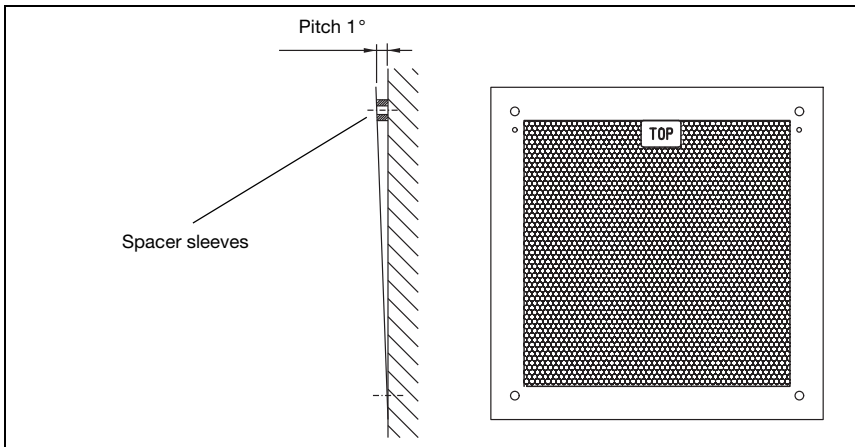


Figure 6.4: Pitch of the reflector

Reflective tapes ...-H

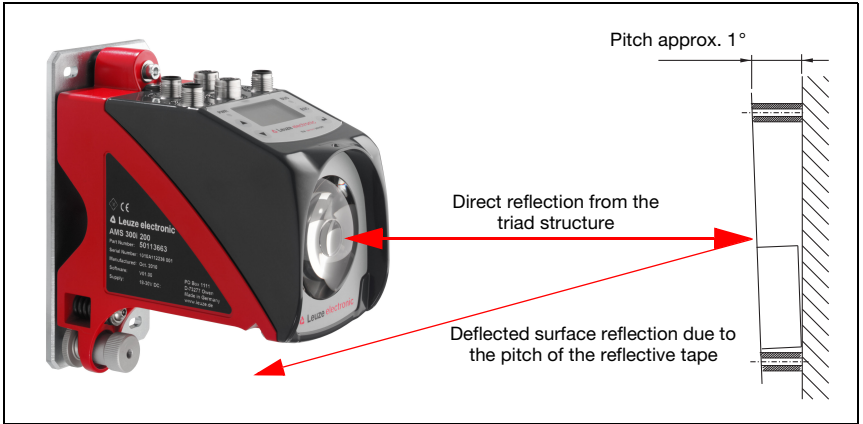


Figure 6.5: Mounting of heated reflectors

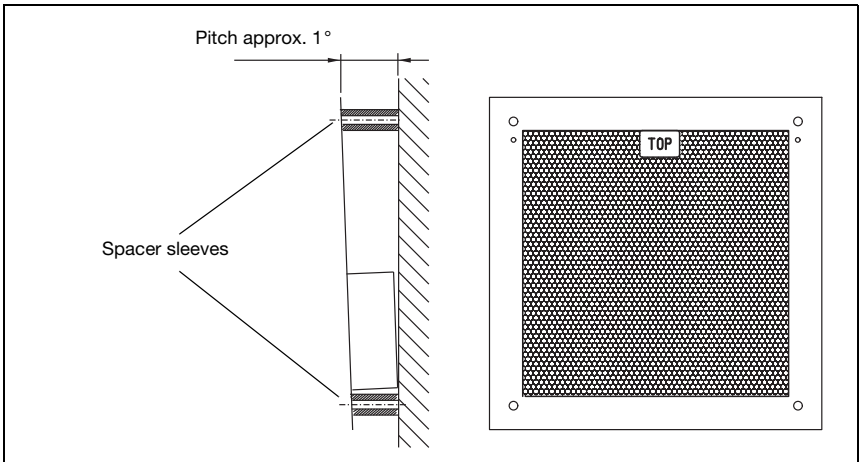


Figure 6.6: Pitch of the heated reflector

6.4.3 Table of reflector pitches

Reflector type	Pitch resulting from spacer sleeves <sup>1)</sup>	
Reflective tape 200x200-S Reflective tape 200x200-M	2 x 4 mm	
Reflective tape 200x200-H	2 x 15 mm	2 x 20 mm
Reflective tape 500x500-S Reflective tape 500x500-M	2 x 10 mm	
Reflective tape 500x500-H	2 x 15 mm	2 x 25 mm
Reflective tape 749x914-S	2 x 20 mm	
Reflective tape 914x914-S Reflective tape 914x914-M	2 x 20 mm	
Reflective tape 914x914-H	2 x 15 mm	2 x 35 mm

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 348*i* 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 348*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 348*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.



**Attention!**

For UL applications, use is permitted exclusively in Class 2 circuits according to NEC (National Electric Code).



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



**Note!**

Protection class 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**

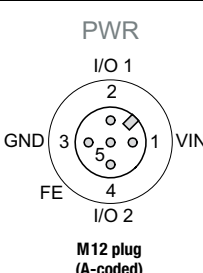
PWR (5-pin plug, A-coded)			
	Pin	Name	Remark
 <p><b>M12 plug (A-coded)</b></p>	1	VIN	Positive supply voltage +18 ... +30VDC
	2	I/O 1	Switching input/output 1 (see also module 4/5)
	3	GND	Negative supply voltage 0VDC
	4	I/O 2	Switching input/output 2 (see also module 4/5)
	5	FE	Functional earth
	Thread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

Table 7.1: Pin assignment PWR

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

**7.3 PROFINET BUS IN**

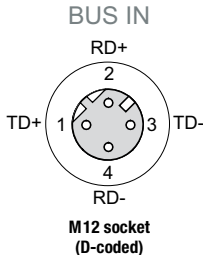
BUS IN (4-pin socket, D-coded)			
	Pin	Name	Remark
 <p><b>M12 socket (D-coded)</b></p>	1	TD+	Transmit Data +
	2	RD+	Receive Data +
	3	TD-	Transmit Data -
	4	RD-	Receive Data -
	Thread	FE	Functional earth (housing)

Table 7.2: Pin assignments for BUS IN

### 7.4 PROFINET BUS OUT

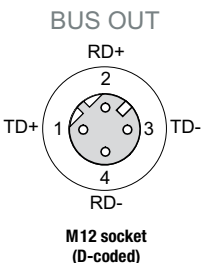
BUS OUT (4-pin socket, D-coded)			
 <p>BUS OUT</p> <p>RD+ 2</p> <p>TD+ 1 3 TD- 4</p> <p>RD- 4</p> <p>M12 socket (D-coded)</p>	Pin	Name	Remark
	1	TD+	Transmit Data +
	2	RD+	Receive Data +
	3	TD-	Transmit Data -
	4	RD-	Receive Data -
Thread	FE	Functional earth (housing)	

Table 7.3: Pin assignment BUS OUT

### 7.5 Service

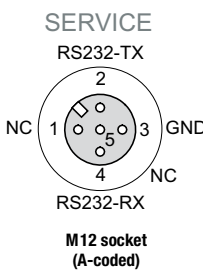
Service (5-pin socket, A-coded)			
 <p>SERVICE</p> <p>RS232-TX 2</p> <p>NC 1 3 GND 5</p> <p>RS232-RX 4</p> <p>M12 socket (A-coded)</p>	Pin	Name	Remark
	1	NC	Not used
	2	RS232-TX	Transmission line RS 232/service data
	3	GND	Voltage supply 0VDC
	4	RS232-RX	Receiving line RS 232/service data
	5	NC	Not used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

Table 7.4: Service pin assignments



**Notice!**

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

## 8 Display and control panel AMS 348i

### 8.1 Structure of the control panel

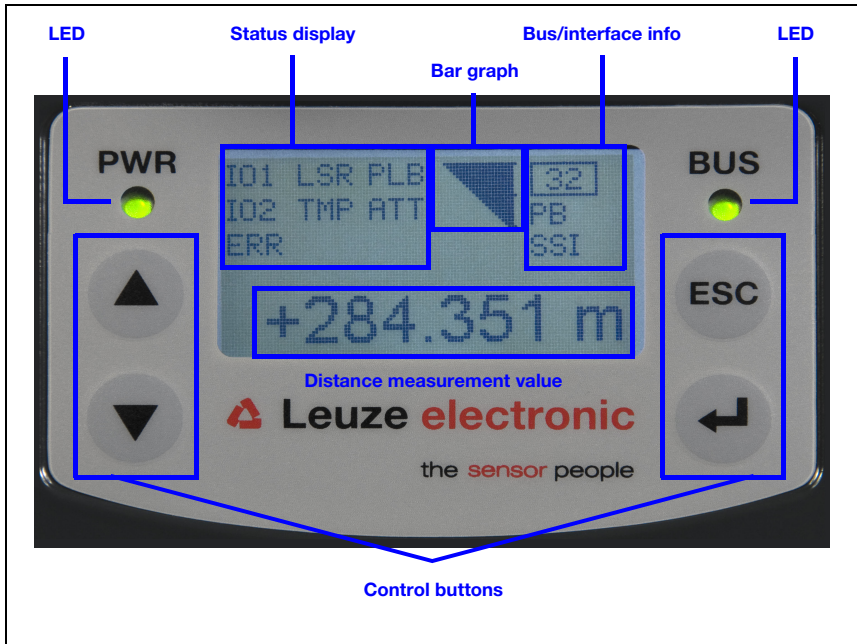


Figure 8.1: Structure of the control panel using the AMS 304i PROFIBUS device variant as an example



#### **Notice!**

The figure is for illustration purposes only and does not correspond to AMS 348i with respect to bus/interface info.

## 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.
- I02 **Input 2 or output 2 active:**  
Function depending on configuration.



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

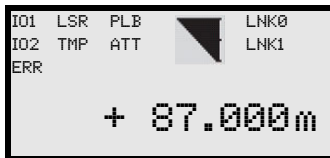
**Bar graph**



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**

"LNK0" and "LNK1" in the display indicate an existing EtherNet connection for BUS IN and BUS OUT. If the status info "LNK0" or "LNK1" is not displayed although the data line is connected, the connection is faulty.



← Display of existing EtherNet connection

← Position value

The connection status is additionally signaled by a green/orange multicolor LED below the BUS IN and BUS OUT plug connector, see chapter "LINK LED for BUS IN and BUS OUT".

**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 348*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 flashing**

**Power LED flashes orange**

- PROFINET wave function

PWR



**Orange continuous light**    **Power LED orange**

- Configuration via the display
- No data on the host interface

**BUS LED**

BUS



**Off**    **BUS LED off**

- No supply voltage (Power)
- No communication possible
- PROFINET communication not initialized or inactive

BUS



**Flashing green**    **BUS LED flashes green**

- Initialization of the AMS 348*i*, establishing communication

BUS



**Green continuous light**    **BUS LED green**

- Network operation ok
- Connection and communication to controller (PLC) established ("data exchange")

BUS



**Red flashing**    **BUS LED flashes red**

- Bus error, communication error
- Parameterization or configuration failed ("parameter failure")
- IO error
- No data exchange

BUS



**Red continuous light**    **BUS LED red**

- Bus error, network error
- No communication (protocol) to Controller established ("no data exchange")

BUS



**Orange flashing**    **BUS LED flashes orange**

- PROFINET wave function

**LINK LED for BUS IN and BUS OUT**

A green/orange multicolor LED below the BUS IN and BUS OUT connectors indicates the EtherNet/PROFINET connection status.



**Green continuous light LINK LED off**

- The link exists, the hardware connection to the next connected participant is OK. The LED signals the same status as "LNK0" and "LNK1" in the display.



**Orange flashing LINK LED flashes orange (ACT0/ACT1)**

- Data is exchanged with the connected participants.

**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  .

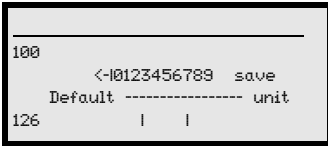
The selected menu item is activated with the enter button .

Press the ESC button  to move up one menu level.

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

**Setting values**

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



+ Delete character

... + Enter digit

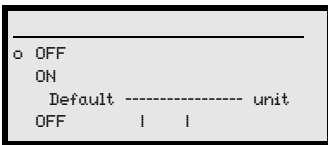
save + Save

Use the and buttons to set the desired value. An accidental, incorrect entry can be corrected by selecting and then pressing .

Then use the buttons to select Save and save the set value by pressing .

**Selecting options**

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

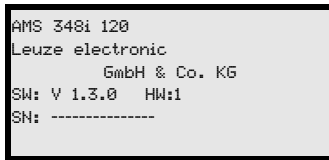


Select the desired option with the buttons. Activate the option by pressing .

**8.3 Menu description**

**8.3.1 The main menus**

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

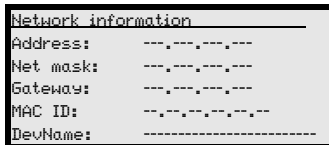


**Device information - main menu**

This menu item contains detailed information on

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

No entries can be made via the display.

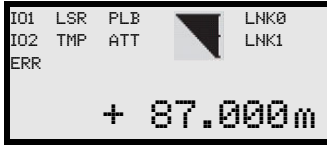


**Network information - main menu**

- Display of the network settings

No entries can be made via the display.

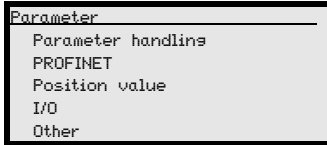




Status and measurement data - main menu

- Display of status-, warning-, and error messages.
- Status overview of the switching inputs/outputs.
- Bar graph for the reception level.
- Link.
- Measurement value.

No entries can be made via the display.  
See "Indicators in the display" on page 37.



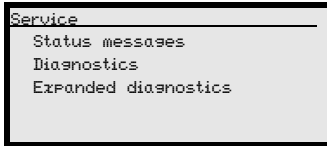
Parameter - main menu

- 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 47.



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.

A detailed description of the individual parameters can be found in the description of the PROFINET GSD modules (see chapter 9.9.2 "Overview of the GSD modules").



**Attention!**

If parameters are changed via the display during bus operation, the AMS 348i is separated from the PROFINET at the moment parameter enabling is activated via the display. Parameters set by the PROFINET are moved to the background, and changes to parameters can be made via the display. When parameter enabling is exited, the AMS 348i is automatically reconnected to the PROFINET. Upon connection to the PROFINET, the AMS 348i receives all parameters from the PROFINET Controller (PLC).

Changes made via the display are overwritten!

**Device settings for operating the AMS 348i** on the PROFINET are managed and configured exclusively by the PROFINET Controller (PLC).


**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 348*i* 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. As long as parameter enabling is activated, the AMS 348 <i>i</i> is disconnected from the PROFINET.	OFF
Password	Activate password		ON / OFF To enter a password, parameter enabling must be activated. If a password is assigned, changes to the AMS 348 <i>i</i> 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.	
Parameters to default			By pressing the enter button  after selecting <i>Parameters to default</i> , 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.

***PROFINET submenu***

Table 8.2: PROFINET submenu

Level 3	Level 4	Level 5	Selection/configuration option Description	Standard
Activation			ON / OFF Activates or deactivates the AMS 348 <i>i</i> as an PROFINET participant. If the AMS 348 <i>i</i> is deactivated as a PROFINET participant, all subsequent participants connected via the internal switch (Bus OUT) continue to be active.	ON

**Position value submenu**



**Notice!**

The parameters mentioned in the "Position value", "I/O" and "Other" sub-menus must be set via the GSDML file of the AMS 348i. For test purposes, the parameters can be changed directly on the AMS 348i via the display structure described below. After deactivation of the parameter enable, however, the parameters stored in the GSDML file continue to be valid. The parameters changed directly on the AMS 348i for test purposes are overwritten again.

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 M12 PWR connector. The hardware input must be appropriately configured. See also configuration of the I/Os.	0mm
Free resolution value			The measurement value can be resolved in increments of 1/1000 within the 5 ... 50000 value range. If, e.g., a resolution of 0.875mm per digit is required, the parameter is set to 875.	1000
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.	Null



**I/O submenu**

Table 8.4: I/O submenu

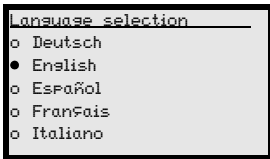
Level 3	Level 4	Level 5	Selection/configuration option Description	Standard
I/O 1	Port configuration		Input/Output Defines whether I/O 1 functions as an output or input.	Output
	Switching input	Function	No function/preset teach/laser ON/OFF	No function
		Activation	Low active/High active	Low active
	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.
	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
		Limit value input	Value input in mm or inch/100	0

**Other submenu**

Table 8.5: Other submenu

Level 3	Level 4	Level 5	Selection/configuration option Description	Standard
Heating control			Standard (10°C ... 15°C)/Extended (30°C ... 35°) Defines a switch-on/switch-off range for the heating control. The extended switch-on/switch-off range for heating may provide relief in the event of condensation problems. There is no guarantee that no condensation will occur on the optics in the extended switch-on/switch-off range due to the limited heating capacity. This parameter is available as standard, but functions only for devices with integrated heating (AMS 348i... H).	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.	10min.
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**



There are 5 display languages available:

- German
- English
- Spanish
- French
- Italian

The AMS 348i is delivered from the factory with the display preset to English.

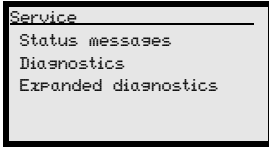


**Notice!**

When operating the AMS 348i on the PROFINET, 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



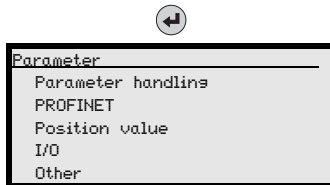
A more detailed description of the individual functions can be found in chapter 10.

## 8.4 Operation

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

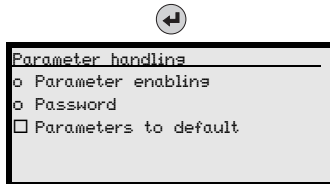
### Parameter enabling

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:



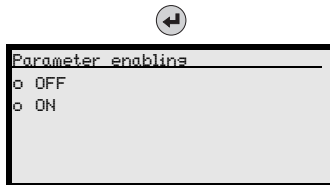
In the main menu, press the enter button to enter the Parameter menu.

Use the buttons to select the Parameter handling menu item.



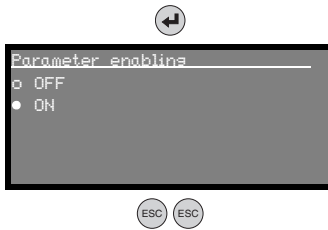
Press the enter button to enter the Parameter handling menu.

In the Parameter handling menu, use the buttons to select the Parameter enabling menu item.



Press the enter button to enter the Parameter enabling menu.

In the Parameter enabling 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 348i display is inverted.

As long as parameter enabling is activated, communication between control and AMS 348i is interrupted. The continued networking via BUS OUT is retained.

#### Attention!

The AMS 348i is deactivated on the PROFINET if parameter enabling is activated via the display. The device is reactivated on the PROFINET after parameter enabling is exited.



#### Notice!

In the PROFINET network, configuration is performed exclusively via the PROFINET Controller.

Parameters set via the display when operating the AMS 348i on the PROFINET are overwritten by the parameters set in the GSD modules. For GSD modules not used actively on the PROFINET, the default settings of the AMS apply, see "Overview of the GSD modules" on page 64. All parameters are thus preset by the PROFINET.



#### Notice!

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

### Password for parameter enabling



#### Notice!

The **master password 2301** can enable the AMS 348i at any time.

## 9 PROFINET interface

### 9.1 General information on PROFINET

The AMS 348*i* is designed as a PROFINET-RT (Real Time) device (acc. to IEEE 802.3). It supports a transmission rate of up to 100 Mbit/s (100Base TX/FX), full duplex, as well as auto-negotiation and auto-crossover.

The functionality of the device is defined via parameter sets which are organized in modules. The modules form part of the GSD file.

Each AMS 348*i* has a unique MAC-ID which is described on the name plate. This is linked to an IP address during the course of configuration. In the Simatic Manager for creation of PROFINET networks, the IP address is also linked to a freely selectable device name which may only exist once in the network (see chapter 9.8.4.7 "Step 3 – Hardware configuration of the S7 PLC: Configuration").

### 9.2 Identification & Maintenance Functions

The AMS 348*i* supports the base record I&M0:

Contents	Index	Data type	Description	Value
Header	0	10 bytes	Manufacturer specific	-
MANUFACTURER_ID	10	UNSIGNED16	Leuze manufacturer ID	338
ORDER_ID	12	ASCII string 20 bytes	Leuze order no.	-
SERIAL_NUMBER	32	ASCII string 16 bytes	Unique device serial number	Device-dependent
HARDWARE_REVISION	48	UNSIGNED16	Hardware revision number, e.g., "0...65535"	Device-dependent
SOFTWARE_REVISION	50	1xCHAR, 3xUNSIGNED8	Software version number, e.g. V130 correspond to "V1.3.0"	Device-dependent
REVISION_COUNTER	54	UNSIGNED16	Is incremented when updating individual modules. This function is not supported.	0
PROFILE_ID	56	UNSIGNED16	PROFINET application profile number	0xF600 (Generic Device)
PROFILE_SPECIFIC_TYPE	58	UNSIGNED16	Info about subchannels and submodules. Not relevant	0x01,0x01
IM_VERSION	60	2xUNSIGNED8	Implemented I&M version V 1.1	0x01,0x01
IM_SUPPORTED	62	Bit[16]	Optional I&M records available	0

Table 9.1: Base record I&M0

### 9.3 PROFINET – star topology

The AMS 348*i* can be operated as a single device (standalone) with an individual device name in a star topology. The PLC must communicate this device name to the participant during the "device naming".

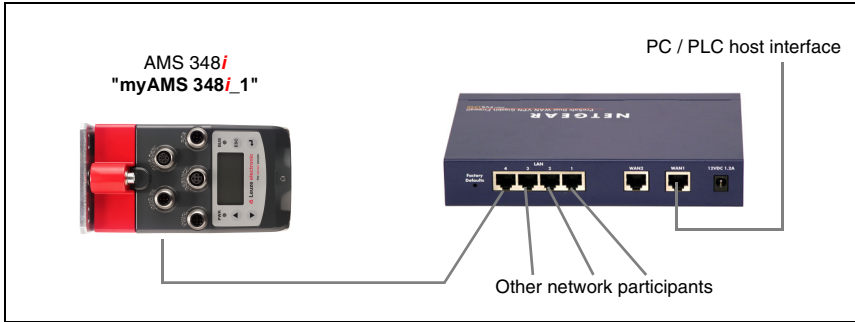


Figure 9.1: PROFINET in a star topology

### 9.4 PROFINET – linear topology

The innovative further development of the AMS 348*i* with integrated switch functionality offers the option of connecting multiple laser measurement systems of type AMS 348*i* to one another without direct connection to a switch. In addition to the classic "star topology", a "linear topology" is thus also possible.

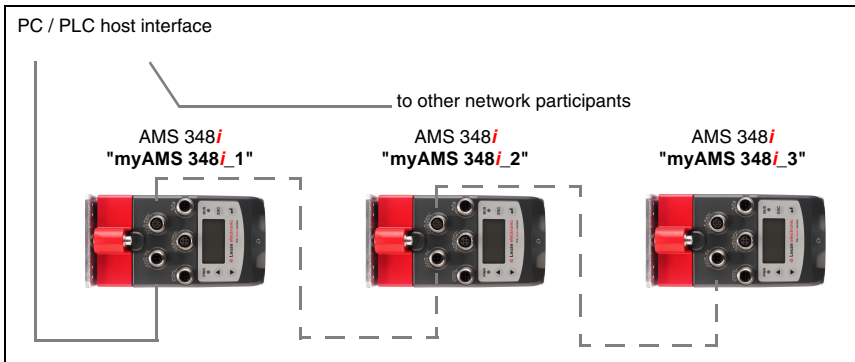


Figure 9.2: PROFINET in a linear topology

The maximum length of a segment (from the host to the furthest participant) is limited to 100m.

**9.5 PROFINET – General information on wiring**

A Cat. 5 Ethernet cable should be used for wiring.

For the connection technology transition from M12 to RJ45, a "KDS ET M12 / RJ 45 W - 4P" adapter is available that lets you connect standard network cables.

If no standard network cables are to be used (e.g. due to lacking IP... protection class), you can use the "KB ET - ... - SA" ready-made cable on the AMS 348*i*, see table 11.4.5 "Accessory ready-made cables for PROFINET" on page 100.

The individual AMS 348*i* devices in a linear topology are connected with the "KB ET - ... - SSA" cable, see table 11.4.5 "Accessory ready-made cables for PROFINET" on page 100.

For unavailable cable lengths, you can configure your cables yourself. For this purpose, Leuze electronic offers a D-coded M12 round plug connector for Bus IN and Bus Out, see table 11.4.3 "Accessory M12 connector" on page 98.

**9.6 PROFINET – Cable lengths and shielding**

*Observe the following maximum cable lengths and shielding types:*

Connection	Interface	Max. cable length	Shielding
AMS – host	PROFINET-RT	100 m	Absolutely required
Network from the first AMS to the last AMS	PROFINET-RT	The maximum segment length must not exceed 100 m for 100Base-TX Twisted Pair (min. Cat. 5)	Absolutely required

Table 9.2: Cable lengths and shielding

## 9.7 PROFINET - Electrical connection

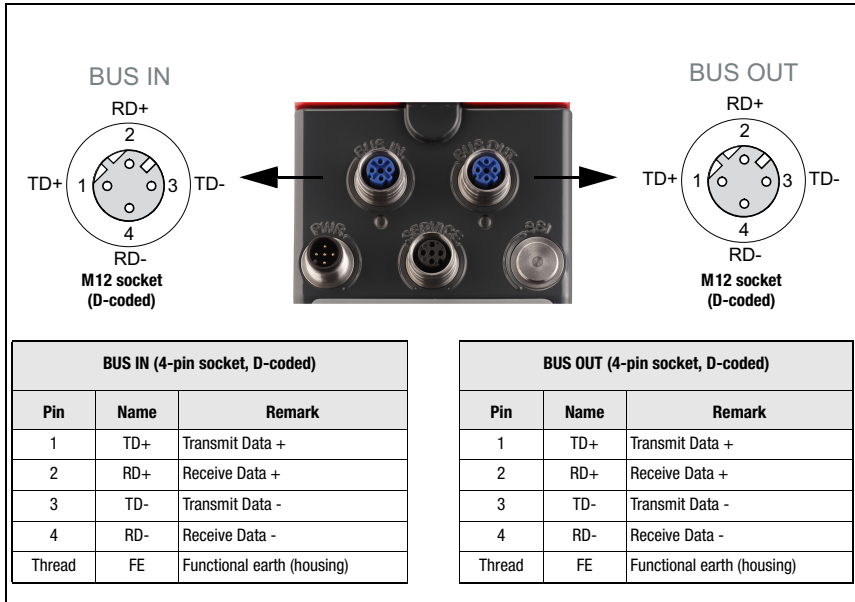


Figure 9.3: PROFINET - Electrical connection



**Notice!**

For contacting **BUS IN** and **BUS OUT**, we recommend our ready-made PROFINET cable (see chapter 11.4.5 "Accessory ready-made cables for PROFINET").

To set up a PROFINET network with other participants with linear topology, the AMS 348*i* makes available another PROFINET-RT interface. The use of this interface drastically reduces the cabling requirements, as only the first AMS 348*i* requires a direct connection to the switch, via which it can communicate with the host. All other AMS 348*i* can be connected in series to the first AMS 348*i*, see figure 9.2.

👉 For the connection of two AMS 348*i*, the "KB ET - ... - SSA" ready-made cables are preferred, see table 11.4.5 "Accessory ready-made cables for PROFINET" on page 100.

If you use user-configurable cables, note the following:



**Notice!**

The entire connection cable must be shielded. The shielding connection must be at the same potential on both ends of the data line. This prevents potential compensating currents over the shield and possible interference coupling by compensating currents. The signal lines must be stranded in pairs.

Use CAT 5 cable for the connection.



**Notice!**

For the AMS 348*i* as standalone device or as the last participant in a linear topology, termination on the BUS OUT socket is not mandatory!

## 9.8 PROFINET – Commissioning and configuration

### 9.8.1 PROFINET implementation of the AMS 348*i*

**PROFINET communication profile**

The **communication profile** defines how participants serially transmit their data via the transmission medium.

The **PROFINET** communication profile is designed for efficient data exchange on the field level. The data exchange with the devices is mainly **cyclical**. For the configuration, operation, monitoring and alarm handling, however, **acyclic** communication services are also used.

Depending on the communication requirements, PROFINET offers suitable protocols and transfer methods:

- **Real Time communication (RT)** via prioritized Ethernet frames for
  - Cyclical process data (I/O data stored in the I/O area of the control)
  - Alarms
  - Clock synchronization
  - Neighborhood information
  - Address assignment/address resolution via DCP
  
- **TCP/UDP/IP communication** via standard Ethernet TCP/UDP/IP frames for
  - Establishing communication and
  - Acyclic data exchange, and also for the transfer of various information types such as:
    - Parameters for the configuration of the modules during the establishment of the communication
    - I&M data (Identification & Maintenance functions)
    - Reading diagnostic information
    - Reading I/O data
    - Writing device data

### Conformance classes

PROFINET devices are categorized into conformance classes to simplify the evaluation and selection of the devices for the users. The AMS 348*i* can use an existing Ethernet network infrastructure and corresponds to Conformance Class B (CC-B). Thus, it supports the following features:

- Cyclical RT communication
- Acyclic TCP/IP communication
- Alarms/diagnostics
- Automatic address assignment
- I&M 0 functionality
- Neighborhood detection basic functionality
- FAST Ethernet 100 Base-TX
- Convenient device exchange without engineering tools
- SNMP support

## 9.8.2 Measures to be performed prior to the initial commissioning

- ✧ *Before commissioning, familiarize yourself with the operation and configuration of the AMS 348*i*.*
- ✧ *Before connecting the supply voltage, recheck all connections and ensure that they have been properly made.*



Figure 9.4: Connections of the AMS 348*i*

- ✧ *Check the applied voltage. It must be in the range between +18V ... 30VDC.*

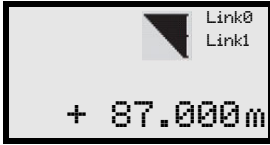
### Connecting functional earth FE

- ✧ *Ensure that the functional earth (FE) is connected correctly.*

Unimpaired operation is only guaranteed when the functional earth is connected properly. All electrical disturbances (EMC couplings) are discharged via the functional earth connection.

### 9.8.3 Starting the device

↪ Connect the supply voltage; the AMS 348*i* boots and the Status and measurement data main menu appears in the display:



This section describes how the AMS 348*i* is configured in a Siemens Simatic S7 for PROFINET.

### 9.8.4 Configuration steps for a Siemens Simatic S7 control

The following steps are necessary for commissioning with a Siemens S7 control:

1. Preparing the control system (S7 PLC)
2. Installing the GSD file
3. Hardware configuration of the S7 PLC
4. Transfer of the PROFINET configuration to the IO Controller (S7 PLC)
5. Device naming
  - Configuration of the device name
  - Device naming
  - Assigning the device names to the configured IO devices(see figure 9.9)
  - Assignment of MAC address - IP address -individual device name ((see figure 9.15))
6. Check device name

#### 9.8.4.5 Step 1 – Preparing the control system (S7 PLC)

The first step involves the assignment of an IP address to the IO Controller (PLC - S7) and the preparation of the control for consistent data transmission.



#### **Notice!**

*If an S7 control is used, you need to ensure that Simatic-Manager Version 5.4 + service pack 5 (V5.4+SP5) or higher is used.*

#### 9.8.4.6 Step 2 – Installation of the GSD file

For the subsequent configuration of the IO devices, e.g., AMS 348*i*, the corresponding GSD file must be loaded first.

#### **General information on the GSD file**

The term GSD stands for the textual description of a PROFINET device model.

For the description of the more complex PROFINET device model, the XML-based GSDML (Generic Station Description Markup Language) was introduced.

In the following, the terms "GSD" or "GSD file" always refer to the GSDML-based format.

The GSDML file can support an arbitrary number of languages in one file. Every GSDML file contains a version of the AMS 348*i* device model. This is also reflected in the file name.

### **File name structure**

The file name of the GSD file is constructed according to the following rule:

GSDML-[GSDML schema version]-Leuze-AMS348i-[date].xml

Explanation:

- GSDML schema version:  
Version identifier of the GSDML schema version used, e.g., V2.2.
- Date:  
Release date of the GSD file in the format `yyyymmdd`.  
This date doubles as the version identifier of the file.

### **Example:**

GSDML-V2.2-Leuze-AMS348i-20090503.xml

You can find the GSD file at

**[www.leuze.com](http://www.leuze.com) -> Download -> identify -> Optical distance measuring and positioning.**

All data in modules required for operating the AMS 348*i* is described in this file. These are input and output data and device parameters for the functioning of the AMS 348*i* and the definition of the control and status bits.

If parameters are changed, e.g., in the project tool, these changes are stored on the PLC side in the project, not in the GSD file. The GSD file is a certified and integral part of the device and must not be changed manually. The file is not changed by the system either.

The functionality of the AMS 348*i* is defined via GSD parameter sets. The parameters and their functions are structured in the GSD file using module. A user-specific configuration tool is used during PLC program creation to integrate the required modules and configure them appropriately for their respective use. During operation of the AMS 348*i* on the PROFINET, all parameters are set to default values. If these parameters are not changed by the user, the device functions with the default settings delivered by Leuze electronic.

For the default settings of the AMS 348*i*, please refer to the following module descriptions.

9.8.4.7 Step 3 – Hardware configuration of the S7 PLC: Configuration

The AMS 348*i* is activated by "Drag and Drop" and receives the IP address and a unique device name.

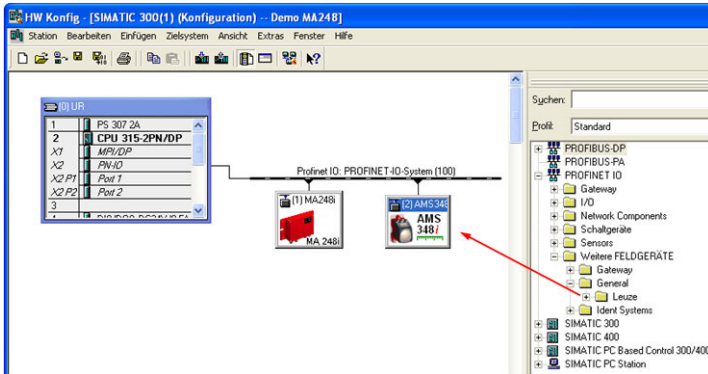


Figure 9.8: Insert AMS 348*i* into the project

Double-clicking the participant opens the properties window. Here you can assign a unique device name that exists only once in the network. If desired, an IP address can be assigned manually (not mandatory). As the assignment of the device name takes place in offline mode, unique assignment must take place between the MAC ID of the installed device and the device name assigned in offline mode during the further course of configuration, see also step 5.

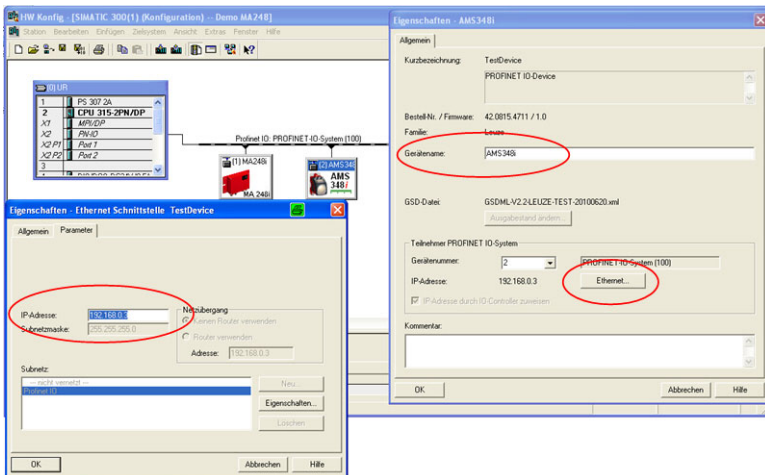


Figure 9.9: Assign unique device name in the properties window

**9.8.4.10 Step 4 – Transfer of the configuration to the IO Controller (S7 PLC)**

After the correct transfer to the IO Controller (S7 PLC), the PLC automatically carries out the following activities:

- Check device names
- Assignment of the IP addresses that were configured in the HW Config to the IO devices
- Establishment of a connection between the IO Controller and configured IO devices
- Cyclical data exchange



**Notice!**

Participants without assigned device names cannot yet be addressed at this point in time!

**9.8.4.11 Step 5 – Configuration of the device name - naming the device**

Each AMS 348*i* has an individual and unique MAC ID. The MAC ID can be found on the name plate of the device.

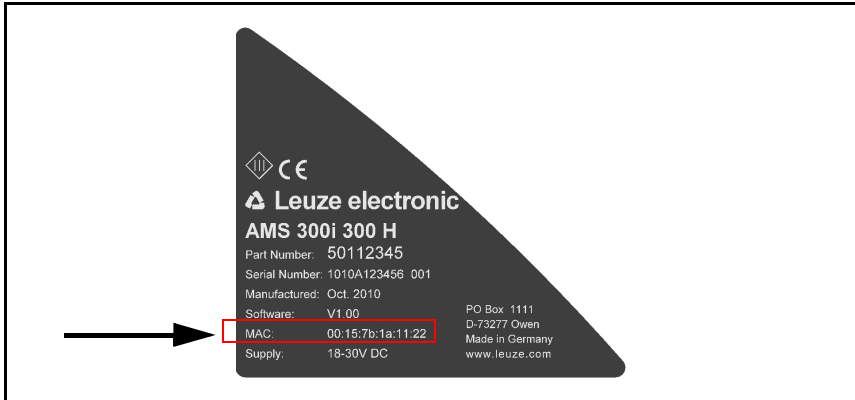
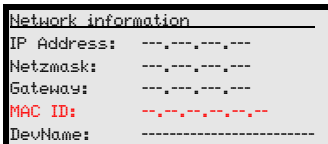


Figure 9.12: MAC ID on the name plate



**Notice!**

This figure is for illustration only and does not correspond in all details to the AMS 348*i*. The MAC ID in particular must be read separately from each individual device. The MAC ID is also shown in the display of the AMS 348*i*.



After successful naming, the device name can be read here under DEVName.e.



**Notice!**

All AMS 348i participants in a PROFINET network must be located in the same subnet!

**Device naming**

The so-called "device naming" under PROFINET is understood as the unique assignment of the device name from the PLC program generation (see step 3) to the PROFINET participant mounted in the system. The device name is linked to the MAC ID of the mounted PROFINET participant.

It is mandatory that the device name corresponds to the device name assigned in hardware configuration (step 3).

↳ Under "Target systems", select item "Edit Ethernet participant".

↳ Click "Search" to scan the connected PROFINET network for MAC addresses.

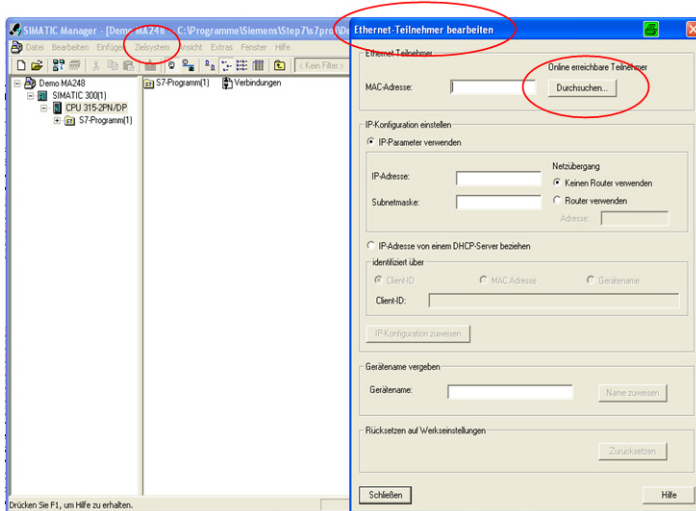


Figure 9.13: Scan the PROFINET network for connected devices (MAC addresses)

➤ Mark the desired MAC address to which you wish to assign a device name.

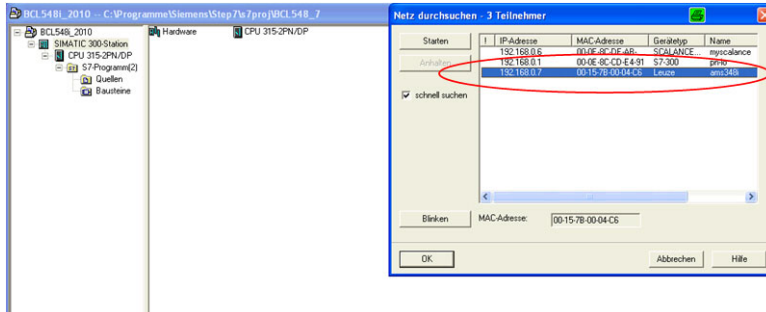


Figure 9.14: Select desired device (MAC address)



### Notice!

The Simatic Manager offers the possibility of having the found and marked participant (marking of the MAC ID in the Simatic Manager) flash/wave. The mounting location of the participant in the system can then be uniquely assigned to the MAC ID. The marked MAC ID "waves".

During flashing/waving, the Power LED and BUS LED of the AMS 348*i* flash orange.

The found MAC ID is "linked" to the device name assigned in the hardware configurator. Please be sure to pay attention that the names are the same and that the installed device is correctly assigned to the hardware configuration. This is particularly important if identical devices are installed several times in the same system.



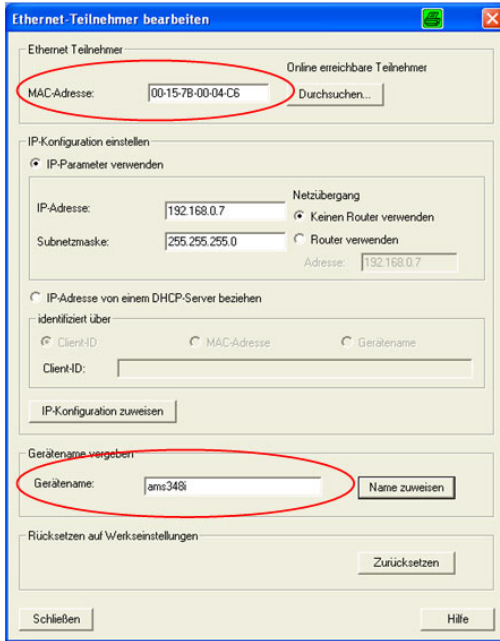


Figure 9.15: Linking of the device name to the MAC ID of the participant

The same configuration mask can be used, if necessary, to manually assign an IP address. Alternatively, the IP address can be assigned via a DHCP server.

## 9.9 PROFINET GSD file

### 9.9.1 General information on the GSD file

The functionality of the AMS 348*i* is defined via an XML-based GSD file. The GSD file is the same for all AMS 348*i* and forms a mandatory part of the device. The GSD file has a modular architecture and contains all the functions of the AMS 348*i* in modules.

The AMS 348*i* offers 17 different modules. Each of these modules can only be activated once per AMS.

The AMS 348*i* checks its max. permissible number of modules. The control also reports an error if the input and output data across all modules exceed a total length of 1024 bytes.

The specific limits of the individual modules of the AMS 348*i* are stored in the module description and in the GSD file.

**Notice!**

The current GSD file for the AMS 348*i* can be found on our homepage under: [www.leuze.de](http://www.leuze.de) -> **Download** -> **identify** -> **Optical distance measuring and positioning** -> **GSD files AMS 304i**

The participant (here AMS 348*i*) is configured via the GSD file with a user-specific configuration tool such as the Siemens Simatic Manager.

The exchange of data and the configuration of parameters is organized by means of the GSD file.

All the parameters of the AMS 348*i* are preset default values. These can be altered, depending on the application. The user activates only the modules from the GSD file whose parameters should be changed or whose input/output data are to be read.

For this purpose, the corresponding module from the GSD file is activated and configured or prepared for control and reading of inputs and outputs.

All parameters and accesses to the AMS 348*i* are thus stored in the control. If necessary, the configuration is written to the AMS according to predefined control criteria.

**Notice!**

Parameters can be changed via the display on the AMS 348*i* for test purposes. As soon as parameter enabling is activated on the display, the AMS 348*i* is deactivated on the PROFINET. All the parameters set via the GSD file initially remain active in the AMS 348*i*. Parameter changes can now be made via the display for test purposes. If parameter enabling is deactivated via the display, only the parameters entered in the PROFINET modules and the PROFINET default settings are in effect.

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

**Attention!**

The laser measurement system does not permanently store parameters changed via the PROFINET. Following power OFF/ON the currently configured parameters are downloaded by the PROFINET master. If the PROFINET master is no longer available after power OFF/ON, the default parameters are valid.

**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.**

9.9.2 Overview of the GSD modules

Module	Module name	Module contents (P) = Parameter, (O) = Output, (I) = Input
<b>M1</b> page 67	<b>Position value</b>	(I) Position value
		(P) Sign
		(P) Unit
		(P) Resolution
		(P) Count direction
		(P) Offset
<b>M2</b> page 69	<b>Static preset</b>	(P) Preset value
		(O) Preset teach
		(O) Preset reset
<b>M3</b> page 70	<b>Dynamic preset</b>	(O) Preset value
		(O) Preset teach
		(O) Preset reset
<b>M4</b> page 71	<b>I/O 1</b>	(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
<b>M5</b> page 73	<b>I/O 2</b>	(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
<b>M6</b> page 75	<b>Status and control</b>	(I) Diagnosis and status of AMS 348 <i>i</i>
		(O) Laser control ON/OFF
<b>M7</b> page 77	<b>Position limit value 1</b>	(P) Upper and lower position limit value
<b>M8</b> page 78	<b>Position limit value 2</b>	(P) Upper and lower position limit value
<b>M9</b> page 79	<b>Error handling procedures</b>	(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
<b>M10</b> page 80	<b>Velocity</b>	(I) Velocity value
		(P) Velocity value resolution
		(P) Velocity integration time

<b>M11</b> page 82	<b>Velocity limit value 1</b>	(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
<b>M12</b> page 84	<b>Velocity limit value 2</b>	(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
<b>M13</b> page 85	<b>Velocity limit value 3</b>	(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
<b>M14</b> page 86	<b>Velocity limit value 4</b>	(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
<b>M15</b> page 87	<b>Velocity Limit value Dynamic</b>	(O) Release/lock limit value control
		(P) Monitoring for over/under values
		(P) Monitoring direction dependent yes/no
		(O) Dynamic velocity limit value
		(O) Hysteresis of velocity limit value
		(O) Start of velocity monitoring range
<b>M16</b> page 88	<b>Velocity status</b>	(I) Status of velocity monitoring
<b>M18</b> page 90	<b>Other</b>	(P) Display language selection
		(P) Display illumination
		(P) Display contrast
		(P) Activate/inhibit password
		(P) Password
<b>M20</b> page 91	<b>Free resolution</b>	(P) Heating control
		(P) Position resolution
		(P) Velocity resolution

Table 9.3: Overview of the GSD modules

### 9.9.3 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.

9.9.3.16 Module 1: Position value

**PROFINET module identifier**

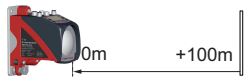
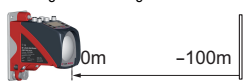
Module-ID 1001  
 Submodule-ID 1

**Description**

Outputs the current position value.

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

**Parameters**

Parameter	Description	Rel. addr.	Data type	Value range	Default	Unit		CR to module
						metr.	Inch	
<b>a</b> Sign	Output mode of the sign. Sign affects position and velocity output.	0.0	Bit	<b>0: two's complement</b> 1: sign + quantity	0	-		-
<b>b</b> Measurement unit	Selection of the measurement unit <sup>1)</sup> . The parameter applies to all values with measurement units. The parameter applies to all interfaces.	0.1	Bit	<b>0: metric</b> 1: inch (in)	0	-		-
<b>c</b> Resolution	Resolution of the position value. Affects only the PROFINET output. The resolution does not apply to: - Static preset - Dynamic preset - Offset	0.2 ... 0.4	Bit	001 = 1: 0.001 010 = 2: 0.01 011 = 3: 0.1 <b>100 = 4: 1</b> 101 = 5: 10 110 = 6: free resolution	4	mm	in/100	20a
<b>d</b> Count direction	Counting direction positive:  Counting direction negative:  The parameter applies to all interfaces. The count direction changes the sign during velocity measurement.	0.5	Bit	<b>0: positive</b> 1: negative	0	-		-
<b>e</b> Offset	Output value = measurement value+offset. The parameter applies to all interfaces. <b>Attention:</b> 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

**Input data**

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

**Output data**

None

**9.9.3.17 Module 2: Static preset**

**PROFINET module identifier**

Module-ID            1002  
 Submodule-ID        1

**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 PROFINET manager. The activation of the preset value (preset teach) at the intended position must, however, be performed again.*

**Parameters**

Parameter	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
<b>a</b> <b>Preset</b>	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
<b>Parameter length: 4 bytes</b>								

**Input data**

None

**Output data**

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



**9.9.3.18 Module 3: Dynamic preset**

**PROFINET module identifier**

Module-ID 1003  
 Submodule-ID 1

**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. The preset value can be adjusted within the control to meet plant requirements without intervening in the static parameter structure.

**Parameters**

None

**Input data**

None

**Output data**

Output data	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
<b>a</b> Preset teach	Read in the preset value.	0.0	Bit	0→1 Preset teach	–	–		4d 5d
<b>b</b> Preset reset	Preset value is deactivated. Output value=measurement value+offset.	0.1	Bit	0→1 Preset reset	–	–		4d 5d
<b>c</b> Preset	The value is accepted during a corresponding teach event, The resolution of the preset value is independent of the resolution selected in module 1.	1	sign 32 bit	-999999 ... +999999	–	mm	in/100	3a 4d 5d
<b>Output data length: 5 bytes</b>								

9.9.3.19 Module 4: I/O 1 Input/Output

**PROFINET module identifier**

Module-ID 1004  
 Submodule-ID 1

**Description**

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

**Parameters**

Parameter	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
<b>a</b> 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>b</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	–		–
<b>c</b>       Output	The parameter defines which event triggers activation of the output. The individual functions are OR-linked to one another.					–		4a
	<b>Position limit value 1</b> If the position value lies outside of configured limit range 1, the output is set.	1.0	Bit	0 = OFF 1 = ON	0	–		
	<b>Position limit value 2</b> If the position value lies outside of configured limit range 2, the output is set.	1.1	Bit	0 = OFF 1 = ON	0	–		
	<b>Velocity limit value</b> 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	–		
	<b>Intensity (ATT)</b> 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	–		
	<b>Temperature (TMP)</b> If the internal device temperature exceeds the set limit value, the output is set.	1.4	Bit	0 = OFF 1 = ON	0	–		
	<b>Laser (LSR)</b> Laser preailure message.	1.5	Bit	0 = OFF 1 = ON	0	–		
	<b>Plausibility (PLB)</b> If implausible measurement values are diagnosed, the output is set.	1.6	Bit	0 = OFF 1 = ON	1	–		

c	<b>Hardware (ERR)</b> If a hardware error is diagnosed, the output is set.	1.7	Bit	0 = OFF 1 = ON	1	–	4a
	<b>Pseudodynamic output</b> If bit 0.0 is set in the output data, the output is set.	2.0	Bit	0 = OFF 1 = ON	0	–	
d	<b>Preset</b> The HW input is used as preset teach input (valid for static or dynamic preset). <b>Laser</b> 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							



**Notice!**

**Behavior of the AMS 348i on Laser ON/OFF:**

If the laser light spot is positioned on the reflector when the laser diode is switched on, the AMS 348i 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 348i cannot calculate any distance values. If the laser beam hits the reflector at a later point in time while switched-on, the AMS 348i 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	Signal state of the input or output.	0.0	Bit	0: Input/Output at signal level <b>not active</b> 1: Input/Output at signal level <b>active</b>	–	–	–	–
Input data length: 1 byte								

**Output data**

Output data	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
f	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 <b>not active</b> 1: Output at signal level <b>active</b>	–	–	–	4c
Output data length: 1 byte								

9.9.3.20 Module 5: I/O 2 Input/Output

**PROFINET module identifier**

Module-ID 1005  
 Submodule-ID 1

**Description**

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

**Parameters**

Parameter	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
<b>a</b> Function	The parameter defines whether I/O 2 functions as an input or as an output.	0.0	Bit	0: Input 1: <b>Output</b>	1	–		5cd
<b>b</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: <b>Low</b> 1-0 transition 1: High 0-1 transition	0	–		–
<b>c</b>       Output	The parameter defines which event triggers activation of the output. The individual functions are <b>OR</b> -linked to one another.					–		
	<b>Position limit value 1</b> If the position value lies outside of configured limit range 1, the output is set.	1.0	Bit	0 = <b>OFF</b> 1 = ON	0	–		5a
	<b>Position limit value 2</b> If the position value lies outside of configured limit range 2, the output is set.	1.1	Bit	0 = <b>OFF</b> 1 = ON	0	–		
	<b>Velocity limit value</b> 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 = <b>OFF</b> 1 = ON	0	–		
	<b>Intensity (ATT)</b> If the intensity of the received signal is less than the warning threshold, the output is set.	1.3	Bit	0 = OFF 1 = <b>ON</b>	1	–		
	<b>Temperature (TMP)</b> If the internal device temperature exceeds the set limit value, the output is set.	1.4	Bit	0 = OFF 1 = <b>ON</b>	1	–		
	<b>Laser (LSR)</b> Laser prefailure message.	1.5	Bit	0 = OFF 1 = <b>ON</b>	1	–		
	<b>Plausibility (PLB)</b> If implausible measurement values are diagnosed, the output is set.	1.6	Bit	0 = <b>OFF</b> 1 = ON	0	–		

Output <sup>c</sup>	<b>Hardware (ERR)</b> If a hardware error is diagnosed, the output is set.	1.7	Bit	<b>0 = OFF</b> 1 = ON	<b>0</b>	–	5a
	<b>Pseudodynamic output</b> If bit 0.0 is set in the output data, the output is set.	2.1	Bit	<b>0 = OFF</b> 1 = ON	<b>0</b>	–	
Input <sup>d</sup>	<b>Preset</b> The HW input is used as preset teach input (valid for static or dynamic preset). <b>Laser</b> The HW input is used as laser OFF.	3.0 ... 3.2	Unsign 8 Bit	<b>000 = HW input no function</b> 001 = HW input as preset teach function 010 = HW input as laser OFF function	<b>000</b>	–	5a
Parameter length: 4 bytes							



**Notice!**

**Behavior of the AMS 348i on Laser ON/OFF:**

If the laser light spot is positioned on the reflector when the laser diode is switched on, the AMS 348i 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 348i cannot calculate any distance values. If the laser beam hits the reflector at a later point in time while switched-on, the AMS 348i 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	
State <sup>e</sup>	Signal state of the input or output.	0.0	Bit	0: Input/Output at signal level <b>not active</b> 1: Input/Output at signal level <b>active</b>	–	–	–	–
Input data length: 1 byte								

**Output data**

Output data	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
State <sup>f</sup>	The output can be activated/deactivated with this bit. The corresponding release is performed in module 5, output parameter bit 2.0.	0.0	Bit	0: Output at signal level <b>not active</b> 1: Output at signal level <b>active</b>	–	–	–	5c
Output data length: 1 byte								

**9.9.3.21 Module 6: Status and control**

**PROFINET module identifier**

Module-ID 1006  
 Submodule-ID 1

**Description**

The module signals various status information of the AMS 348*i*. The laser can be controlled via the master's output data.

**Parameters**

None

**Input data**

Input data	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
<b>a</b> Laser status	Signals the laser status.	1.0	Bit	0: Laser ON 1: Laser OFF	-	-	-	-
<b>b</b> Preset status	Status of the preset value.	1.1	Bit	0: Preset not active 1: Preset active	-	-	-	-
<b>c</b> Preset teach	This bit toggles on each teach event of a preset value.	1.2	Bit	0 or 1	-	-	-	-
<b>d</b> Reserved		1.3	Bit		-	-	-	-
<b>e</b> 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	-	-	-	-
<b>f</b> 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	-	-	-	-
<b>g</b> Laser (LSR)	Laser prefailure message.	1.6	Bit	0: OK 1: Laser warning	-	-	-	-
<b>h</b> Plausibility (PLB)	If implausible measurement values are diagnosed, the status bit is set.	1.7	Bit	0: OK 1: Implausible measurement value	-	-	-	-
<b>i</b> Hardware (ERR)	If a hardware error is diagnosed, the status bit is set.	0.0	Bit	0: OK 1: Hardware error	-	-	-	-
<b>j</b> 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	-	-	-	-
<b>k</b> 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	-	-	-	-

<b>l</b> <b>Lower position limit value 2</b>	Signals that the value is less than lower limit value 2.	0.6	Bit	0: OK 1: Value less than limit	-	-	-
<b>m</b> <b>Upper position limit value 2</b>	Signals that the value is greater than upper limit value 2.	0.7	Bit	0: OK 1: Value greater than limit	-	-	-
<b>Input data length: 2 bytes</b>							

**Output data**

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

### 9.9.3.22 Module 7: Position limit value range 1

#### PROFINET module identifier

Module-ID	1007
Submodule-ID	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.

#### Parameters

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

#### Input data

None

#### Output data

None



**9.9.3.23 Module 8: Position limit value range 2**

**PROFINET module identifier**

Module-ID 1008  
 Submodule-ID 1

**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.

**Parameters**

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

**Input data**

None

**Output data**

None

**9.9.3.24 Module 9: Error handling procedures**

**PROFINET module identifier**

Module-ID 1009  
 Submodule-ID 1

**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.

**Parameters**

Parameter	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
<b>a</b> 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 <b>1: Zero</b>	<b>1</b>	mm	in/100	–
	No function.	0.1	Bit	Always 0	0	–	–	–
<b>b</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 <b>1: ON</b>	<b>1</b>	–	–	–
<b>c</b> 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 <b>1: ON</b>	<b>1</b>	–	–	–
<b>d</b> 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	<b>100</b>	ms	–	–
<b>e</b> 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 <b>1: Zero</b>	<b>1</b>	–	–	–
	No function.	3.1	Bit	Always 0	0	–	–	–
<b>f</b> 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 <b>1: ON</b>	<b>1</b>	–	–	–

<b>g</b> <b>Error delay (velocity)</b>	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".	3.3	Bit	0: OFF 1: ON	1	–	–
<b>h</b> <b>Error delay time (velocity)</b>	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.	4...5	unsign 16 bit	200 ... 1000	200	ms	–
<b>Parameter length: 6 bytes</b>							

**Input data**

None

**Output data**

None

**9.9.3.25 Module 10: Velocity**

**PROFINET module identifier**

Module-ID            1010  
Submodule-ID        1

**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 348*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 348*i*. When the reflector moves towards the AMS 348*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 (averaging) to yield a velocity output value.

**Parameters**

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

**Input data**

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

**Output data**

None

9.9.3.26 Module 11: Static velocity limit value 1

**PROFINET module identifier**

Module-ID 1011  
 Submodule-ID 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 not activated.

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.



**Notice!**

The explanations given above on the "Range start" and "Range end" parameters apply analogously for modules 12-15.

**Parameters**

Parameter	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
<b>a</b> 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	<b>0: Value greater than limit</b> 1: Value less than limit	0	–		–
<b>b</b> Direction selection	Selection of direction-dependent or direction-independent limit value checking.	0.1	Bit	<b>0: Direction independent</b> 1: Direction dependent	0	–		–
<b>c</b> 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
<b>d</b> Velocity hysteresis 1	Relative shift to prevent signal bouncing.	3...4	unsigned 16 bit	0 ... 20000	100	mm/s	(in/100)/s	–

<b>e</b> Limit value 1 range start	The velocity limit value is monitored beginning at this position.	5...8	sign 32 bit	-999999 ... +999999	0	mm	in/ 100	-
<b>f</b> Limit value 1 range end	The velocity limit value is monitored up to this position.	9 ... 12	sign 32 bit	-999999 ... +999999	0	mm	in/ 100	-
<b>Parameter length: 13 bytes</b>								

***Input data***

None

***Output data***

None

9.9.3.27 Module 12: Static velocity limit value 2

**PROFINET module identifier**

Module-ID 1012  
 Submodule-ID 1

**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!**

Further explanations on the "Range start" and "Range end" parameters see chapter 9.9.3.26 "Module 11: Static velocity limit value 1".

**Parameters**

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

**Input data**

None

**Output data**

None

**9.9.3.28 Module 13: Static velocity limit value 3**

**PROFINET module identifier**

Module-ID 1013  
 Submodule-ID 1

**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!**

Further explanations on the "Range start" and "Range end" parameters see chapter 9.9.3.26 "Module 11: Static velocity limit value 1".

**Parameters**

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

**Input data**

None

**Output data**

None



9.9.3.29 Module 14: Static velocity limit value 4

**PROFINET module identifier**

Module-ID 1014  
 Submodule-ID 1

**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!**

Further explanations on the "Range start" and "Range end" parameters see chapter 9.9.3.26 "Module 11: Static velocity limit value 1".

**Parameters**

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

**Input data**

None

**Output data**

None

**9.9.3.30 Module 15: Dynamic velocity limit value**

**PROFINET module identifier**

Module-ID 1015  
 Submodule-ID 1

**Description**

The **dynamic velocity limit value** compares the current velocity with a stored velocity within the defined range. If the value is above or below the limit value, the dynamic limit value status in module 16 is set and, if configured, the output is appropriately set. **Limit value, hysteresis, range start** and **range end** are transferred with the output data of this module by the PROFINET master. The transferred values are activated by **Bit 0.0**, i.e. if this bit is set, the AMS 348*i* compares the current velocity with the new limit value conditions.



**Notice!**

Further explanations on the “Range start” and “Range end” parameters see chapter 9.9.3.26 “Module 11: Static velocity limit value 1”.

**Parameters**

None

**Input data**

None

**Output data**

Output data	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
<b>a</b> Limit value control	Controls internal processing of the transferred dynamic limit value parameters.	0.0	Bit	0: Do not process 1: Process parameter	–	–		–
<b>b</b> Switching mode	Condition for the signal change of the output/status bit.	0.1	Bit	0: Value greater than limit 1: Value less than limit	–	–		–
<b>c</b> Direction selection	Selection of direction-dependent or direction-independent limit value checking.	0.2	Bit	0: Direction independent 1: Direction dependent	–	–		–
<b>d</b> Velocity limit value	Limit value is compared to the current velocity.	1...2	unsign 16 bit	0 ... +20000	–	mm/s	(in/100)/s	16 h
<b>e</b> Velocity hysteresis	Relative shift to prevent signal bouncing.	3...4	unsign 16 bit	0 ... +20000	–	mm/s	(in/100)/s	–
<b>f</b> Limit value range start	The velocity limit value is monitored beginning at this position.	5...8	sign 32 bit	-999999 ... +999999	<b>0</b>	mm	in/100	–
<b>g</b> Limit value range end	The velocity limit value is monitored up to this position.	9...12	sign 32 bit	-999999 ... +999999	<b>0</b>	mm	in/100	–

**Output data length: 13 bytes consistently**

9.9.3.31 Module 16: Velocity status

**PROFINET module identifier**

Module-ID 1016  
 Submodule-ID 1

**Description**

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

**Parameters**

None

**Input data**

Input data	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
<b>a</b> Velocity measurement error	Signals that no valid velocity could be ascertained.	1.0	Bit	0: OK 1: Error	–	–	–	–
<b>b</b> Movement status	Signals whether a movement >0.1 m/s is currently being detected.	1.1	Bit	0: No movement 1: Movement	–	–	–	–
<b>c</b> Movement direction	When the movement status is activated, this bit indicates the direction.	1.2	Bit	0: Positive direction 1: Negative direction	–	–	–	–
<b>d</b> 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
<b>e</b> 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
<b>f</b> 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
<b>g</b> 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
<b>h</b> Dynamic velocity limit value status	Signals that the dynamic limit value has been exceeded.	1.7	Bit	0: Limit value maintained 1: Limit value violated	–	–	–	15bd
<b>i</b> 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	–	–	–	–
<b>j</b> 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	–	–	–	–

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

**Output data**

None

9.9.3.32 Module 18: Other

**PROFINET module identifier**

Module-ID 1018  
 Submodule-ID 1

**Description**

General operating parameters such as display language, lighting and contrast, password, heating control, etc. are set in this module.

**Parameters**

Parameter	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
<b>a</b> 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	<b>000=0: English</b> 001=1: German 010=2: Italian 011=3: Spanish 100=4: French	<b>0</b>	–		–
<b>b</b> Display illumination	Off after 10min. or always on.	0.3	Bit	<b>0: Off after 10min.</b> 1: Always on	<b>0</b>	–		–
<b>c</b> 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 <b>001=1: Medium</b> 010=2: Strong	<b>1</b>	–		–
<b>d</b> Password protection	Password protection on/off.	0.7	Bit	<b>0: OFF</b> 1: ON	<b>0</b>	–		–
<b>e</b> Password	Specifies the password. Password protection must be on.	1...2	unsign 16 bit	0000 ... 9999	<b>0000</b>	–		–
<b>f</b> Heating control	Defines a switch-on/switch-off range for the heating control. The extended switch-on/switch-off range for heating may provide relief in the event of condensation problems. There is no guarantee that no condensation will occur on the optics in the extended switch-on/switch-off range due to the limited heating capacity. This parameter is available as standard, but functions only for devices with integrated heating (AMS 348i... H).	3.0	Bit	<b>0 = Standard (10°C ... 15°C)</b> 1 = Extended (30°C ... 35°C)	<b>0</b>	–		–
<b>Parameter length: 4 bytes</b>								

**Input data**

None

**Output data**

None

**9.9.3.33 Module 20: free resolution**

**PROFINET module identifier**

Module-ID 1020  
 Submodule-ID 1

**Description**

Free resolution is used when the resolutions set in the standard are not appropriate. If a free resolution is used, this must be activated in module 1c for the position or in module 10a for the velocity.

Both module 20 and module 1c or 10a must be set for configuration of the free resolution.

**Parameters**

Parameter	Description	Rel. addr.	Data type	Value	Default	Unit		CR to module
						metr.	Inch	
<b>a</b> Free resolution position	This module allows the output measurement values for position and velocity to be freely scaled.	0 ... 1	unsign 16 bit	5 ... 50000	<b>1000</b>	mm/10 <sup>3</sup>	in/10 <sup>5</sup>	1c
<b>b</b> Free resolution velocity	The parameters apply to all interfaces for which the "free resolution" resolution was selected. The internal measurement value is multiplied by the set value on the basis of (mm/1000). Example: Value "3000" means that in the event of a change in the measurement value by 3 mm, the position value in the binary code changes by binary 1. Due to the free resolution in the example, an internal measurement value of 3333 mm gives an output value of "1111". The resolution of the "Offset", "Preset" and "Limit values" parameters is not affected by free resolution.	2 ... 3	unsign 16 bit	5 ... 50000	<b>1000</b>	(mm/10 <sup>3</sup> )/s	(in/10 <sup>5</sup> )/s	10a
<b>Parameter length: 4 bytes</b>								

## 10 Diagnostics and troubleshooting

For the PROFINET, there are two different options for diagnosis.

### Event-related diagnostics

PROFINET transmits events within an automation process as alarms that must be acknowledged by the application process.

The following events are possible:

- Process alarms: Events that originate from the process and are reported to the control.
- Diagnostic alarms: Events that indicate the malfunctioning of an IO device.
- Maintenance alarms: Transmission of information to avoid the failure of a device through preventative maintenance work.
- Manufacturer-specific diagnostics

To identify the alarms uniquely, they are always reported via a slot/subslot. The user can prioritize diagnostic and process alarms differently.

### State-related diagnostics

In addition, all alarms are entered into the diagnostics buffer. If required, this buffer can be read by a primary instance via acyclic read services.

A further option to report malfunctioning or status changes in a field device to a plant control is to enter low-priority diagnostic or status messages into the diagnostic buffer only instead of actively reporting them to the primary control.

This option can also be used for preventative maintenance or for low-priority warnings, for example.

The AMS 348*i* uses both the event-related diagnostics for high-prioritized events/errors as well as the state-related diagnostics for preventative maintenance and the signaling of low-prioritized events or warnings.

The following alarms and diagnostics messages are supported:

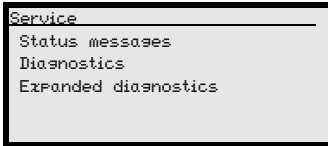
Diagnostics	Description	AMS 348 <i>i</i> category	API/ Slot/ Subslot	Type	Coming/ going	Remark
Parameter error	Error in the configuration of a module.	Error	0/n <sup>1)</sup> /0	Diagnostics alarm <sup>2)</sup>	Coming only	
Configuration error	Error in the configuration of a module.	Error	0/n/0	Diagnostics alarm	Coming only	

- 1) n = module number
- 2) Only diagnostics or process alarms actually trigger the transmission of an alarm. All other types (preventative maintenance and status messages) only lead to an entry into the diagnostics buffer and are thus part of the state-based diagnostics.

Table 10.1: AMS 348*i* alarm and diagnostics messages

## 10.1 Service and diagnostics in the display of the AMS 348*i*

In the main menu of the AMS 348*i*, expanded "Diagnostics" can be called up under the Service heading.



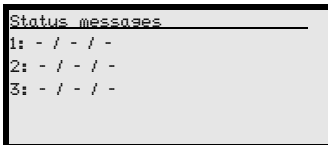
From the *Service* main menu, press the enter button (↵) to access the underlying menu level.

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 sublevel 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.



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

**Type:** Designates the message type **I** = info; **W** = warning, **E** = error.

**No:** Internal numbering

**Ref.:** Plain-text explanation of the displayed status

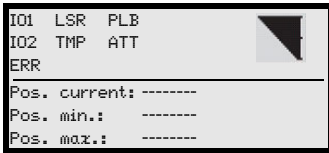
**Time:** Time stamp in the hh.mm format. The displayed time is added to the time since the last power ON. Power OFF clears the time stamp.

### 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 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 348*i*.

### 10.1.3 Expanded diagnostics

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

## 10.2 General causes of errors

### **LINK LED for BUS IN and BUS OUT**

A green/orange multicolor LED below the BUS IN and BUS OUT connectors indicates the EtherNet/PROFINET connection status.



**Green continuous light**

**Power LINK green**

- The link exists, the hardware connection to the next connected participant is OK. The LED signals the same status as "LNK0" and "LNK1" in the display.



**Orange flashing**

**LINK LED flashing orange (ACT0/ACT1)**

- Data is exchanged with the connected participants.

### 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 10.2: General causes of errors

## 10.3 Interface errors

### 10.3.1 BUS LED

Error	Possible error cause	Measure
BUS LED "OFF"	No supply voltage connected to the device	Check supply voltage.
	Device not yet recognized by the PROFINET Hardware error	Send device to customer service.
BUS LED "flashes red"	Incorrect wiring	Check wiring.
	Communication error: parameterization or configuration failed ("parameter failure")	<ul style="list-style-type: none"> <li>Check configuration, in particular with respect to address assignment (device names/IP address/MAC ID).</li> <li>Carry out a reset on the control.</li> </ul>
	IO Error: no data exchange	
BUS LED "static red"	Incorrect wiring	Check wiring.
	Communication error on the PROFINET. No communication established to the controller (no data exchange)	<ul style="list-style-type: none"> <li>Check protocol settings.</li> <li>Check configuration, in particular with respect to address assignment (device names/IP address/MAC ID).</li> </ul>
	Different protocol settings	Check protocol settings.
	Protocol not released	Activate TCP/ IP or UDP.
	Wrong device name set	<ul style="list-style-type: none"> <li>Check configuration, in particular with respect to address assignment (device names/IP address/MAC ID).</li> </ul>
	Incorrect configuration	<ul style="list-style-type: none"> <li>Check configuration, in particular with respect to address assignment (device names/IP address/MAC ID).</li> <li>Send device to customer service.</li> </ul>
Sporadic network error	Check wiring for proper contacting	Check wiring, <ul style="list-style-type: none"> <li>In particular, check wire shielding.</li> <li>Check wires used.</li> </ul>
	EMC coupling	<ul style="list-style-type: none"> <li>Observe contact quality of screwed or soldered contacts in the wiring.</li> <li>Avoid EMC coupling caused by power cables laid parallel to device lines.</li> <li>Separate laying of power and data communications cables.</li> </ul>
	Network expansion exceeded	Check max. network expansion as a function of the max. cable lengths.

Table 10.3: Bus error

**10.4 Status display in the display of the AMS 348*i***

Display	Possible error cause	Measure
<b>PLB</b> (implausible measurement values)	Laser beam interruption	Laser spot must always be incident on the reflector.
	Laser spot outside of reflector	Traverse rate < 10m/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.
<b>ATT</b> (insufficient received signal level)	Ambient temperature far outside of the permissible range (TMP display; PLB)	Select AMS with heating or ensure cooling.
	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.	
<b>TMP</b> (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.
<b>LSR</b> Laser diode warning	Laser diode prefailure message	Send in device at next possible opportunity to have laser diode replaced. Have replacement device ready.
<b>ERR</b> 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)**

<b>Device type:</b>	
<b>Company:</b>	
<b>Contact partner / department:</b>	
<b>Phone (direct):</b>	
<b>Fax:</b>	
<b>Street / No:</b>	
<b>ZIP code/City:</b>	
<b>Country:</b>	

**Leuze Service fax number:**

**+49 7021 573 - 199**

## 11 Type overview and accessories

### 11.1 Type key

AMS 3xx i **yyy** H

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

AMS Absolute Measuring System

### 11.2 Type overview AMS 348*i* (PROFINET)

Type designation	Description	Part No.
AMS 348 <i>i</i> 40	40m operating range, PROFINET interface	50113709
AMS 348 <i>i</i> 120	120m operating range, PROFINET interface	50113710
AMS 348 <i>i</i> 200	200m operating range, PROFINET interface	50113711
AMS 348 <i>i</i> 300	300m operating range, PROFINET interface	50113712
AMS 348 <i>i</i> 40 H	40m operating range, PROFINET interface, integrated heating	50113713
AMS 348 <i>i</i> 120 H	120m operating range, PROFINET interface, integrated heating	50113714
AMS 348 <i>i</i> 200 H	200m operating range, PROFINET interface, integrated heating	50113715
AMS 348 <i>i</i> 300 H	300m operating range, PROFINET interface, integrated heating	50113716

Table 11.1: Type overview AMS 348*i*

### 11.3 Overview of reflector types

Type designation	Description	Part No.
Reflective tape 200x200-S	Reflective tape, 200x200mm, self-adhesive	50104361
Reflective tape 500x500-S	Reflective tape, 500x500mm, self-adhesive	50104362
Reflective tape 914x914-S	Reflective tape, 914x914mm, self-adhesive	50108988
Reflective tape 200x200-M	Reflective tape, 200x200mm, affixed to aluminum plate	50104364
Reflective tape 500x500-M	Reflective tape, 500x500mm, affixed to aluminum plate	50104365
Reflective tape 914x914-M	Reflective tape, 914x914mm, affixed to aluminum plate	50104366
Reflective tape 200x200-H	Heated reflective tape, 200 x 200mm	50115020
Reflective tape 500x500-H	Heated reflective tape, 500 x 500mm	50115021
Reflective tape 914x914-H	Heated reflective tape, 914 x 914mm	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 348 <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 348 <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

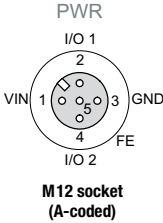
#### 11.4.3 Accessory M12 connector

Type designation	Description	Part No.
S-M12A-ET	M12 connector, EtherNet, D-coded, BUS IN, BUS OUT	50112155
KDS ET M12/RJ45 W - 4P	Converter from M12 D-coded to RJ45 socket	50109832
KD 095-5A	M12 connector, A-coded socket, Power (PWR)	50020501

Table 11.5: Accessory M12 connector

### 11.4.4 Accessory ready-made cables for voltage supply

#### Contact assignment/wire color of PWR connection cable

PWR connection cable (5-pin socket, A-coded)			
 <p>M12 socket (A-coded)</p>	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

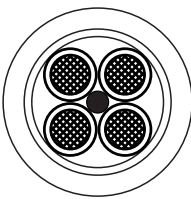
**11.4.5 Accessory ready-made cables for PROFINET**

**General**

- Cable **KB ET...** for connecting to PROFINET via M12 connector
- Standard cable available in lengths from 2 ... 30m
- Special cables on request.

**Contact assignments M12 PROFINET connection cable KB ET ...-SA**

M12 PROFINET connection cable (4-pin connector, D-coded, on both sides)			
EtherNet	Pin	Name	Core color
<p>M12 connector (D-coded)</p>	1	TD+	yellow
	2	RD+	white
	3	TD-	orange
	4	RD-	blue
	SH (thread)	FE	bare



**Wire colors**

**WH**  
**YE**  
**BU**  
**OG**

Conductor class: VDE 0295, EN 60228, IEC 60228 (Class 5)

**Accessories M12 PROFINET connection cable, open cable end**

Cable designation: KB ET - ... - SA

**Accessories PROFINET connection cable with both-sided D-coded M12 plug**

Cable designation: KB ET - ... - SSA, cable assignment 1:1, not crossed

**Accessories PROFINET connection cable, M12-/RJ45**

Cable designation: KB ET - ... - SA-RJ45



**Notice for connecting the PROFINET interface!**

The entire connection cable must be shielded. The shielding connection must be at the same potential on both ends of the data line. This prevents potential compensating currents over the shield and possible interference coupling by compensating currents. The signal lines must be stranded in pairs.

Use CAT 5 cable for the connection.

### Specifications of the PROFINET connection cable

**Operating temperature range**    in rest state: -50°C ... +80°C  
   in motion: -25°C ... +80°C  
   in motion: -25°C ... +60°C (when used with drag chains)

**Material**                                    cable sheath: PUR (green), wire insulation: PE foam,  
   free of halogens, silicone and PVC

**Bending radius**                        > 65mm, suitable for drag chains

**Bending cycles**                        > 10<sup>6</sup>, perm. acceleration < 5 m/s<sup>2</sup>

### Order codes for PROFINET connection cables

Type designation	Description	Part No.
<b>M12 plug for BUS IN, axial connector, open cable end</b>		
KB ET - 1000 - SA	Cable length 1 m	50106738
KB ET - 2000 - SA	Cable length 2 m	50106739
KB ET - 5000 - SA	Cable length 5 m	50106740
KB ET - 10000 - SA	Cable length 10 m	50106741
KB ET - 15000 - SA	Cable length 15 m	50106742
KB ET - 20000 - SA	Cable length 20 m	50106743
KB ET - 25000 - SA	Cable length 25 m	50106745
KB ET - 30000 - SA	Cable length 30 m	50106746
<b>M12 plug for BUS IN to RJ-45 connector</b>		
KB ET - 1000 - SA-RJ45	Cable length 1 m, cable 1:1, not crossed	50109879
KB ET - 2000 - SA-RJ45	Cable length 2 m, cable 1:1, not crossed	50109880
KB ET - 5000 - SA-RJ45	Cable length 5 m, cable 1:1, not crossed	50109881
KB ET - 10000 - SA-RJ45	Cable length 10 m, cable 1:1, not crossed	50109882
KB ET - 15000 - SA-RJ45	Cable length 15 m, cable 1:1, not crossed	50109883
KB ET - 20000 - SA-RJ45	Cable length 20 m, cable 1:1, not crossed	50109884
KB ET - 25000 - SA-RJ45	Cable length 25 m, cable 1:1, not crossed	50109885
KB ET - 30000 - SA-RJ45	Cable length 30 m, cable 1:1, not crossed	50109886
<b>M12 plug + M12 plug for BUS OUT to BUS IN</b>		
KB ET - 1000 - SSA	Cable length 1 m, cable 1:1, not crossed	50106898
KB ET - 2000 - SSA	Cable length 2 m, cable 1:1, not crossed	50106899
KB ET - 5000 - SSA	Cable length 5 m, cable 1:1, not crossed	50106900
KB ET - 10000 - SSA	Cable length 10 m, cable 1:1, not crossed	50106901
KB ET - 15000 - SSA	Cable length 15 m, cable 1:1, not crossed	50106902
KB ET - 20000 - SSA	Cable length 20 m, cable 1:1, not crossed	50106903
KB ET - 25000 - SSA	Cable length 25 m, cable 1:1, not crossed	50106904
KB ET - 30000 - SSA	Cable length 30 m, cable 1:1, not crossed	50106905



## 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.

#### **Note!**

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

<b>A</b>	
Accessories .....	97
Accessory deflector unit .....	98
Accessory mounting bracket .....	98
Accessory ready-made cables .....	99
Accuracy .....	12
Activation .....	71
Air humidity .....	13
Alignment .....	18
Areas of application .....	7
ATT .....	75
Average .....	81
<b>B</b>	
BUS LED .....	40
<b>C</b>	
CDRH .....	8
Cleaning .....	102
Commissioning and configuration .....	54
Commissioning steps at a glance .....	10
Configuration steps .....	56
Conformance Classes .....	54
Connections	
PROFINET BUS IN .....	35
PROFINET BUS OUT .....	36
PWR IN .....	35
Service .....	36
Control .....	64, 75
Control buttons .....	41
Control panel .....	37
Count direction .....	67
Counting direction .....	67
<b>D</b>	
Declaration of conformity .....	5
Deflector unit	
Maximum ranges .....	21
With integrated mounting bracket .....	21
Without mounting bracket .....	23
Deflector unit US 1 OMS	
Dimensioned drawing .....	23
Deflector unit US AMS 01	
Dimensioned drawing .....	22
Description of functions .....	6
Device naming .....	59, 60
Diagnostics .....	92
Dimensioned drawing of AMS 3xxi .....	14
Direction selection .....	82, 84
Display .....	37
Contrast .....	90
Illumination .....	90, 91
Distance to an adjacent DDLS 200 .....	20
Dynamic velocity comparison .....	89
Dynamic velocity limit value status .....	88
<b>E</b>	
Electrical connection .....	34
Safety notices .....	34
ERR .....	75
Error delay (position) .....	79
Error delay (velocity) .....	80
Error delay time (position) .....	79
Error delay time (velocity) .....	80
Error handling procedures .....	64, 79
Event-related diagnostics .....	92
Expanded diagnostics .....	94
Explanation of symbols .....	5
<b>F</b>	
Flashing of the participant .....	61
Free resolution .....	91
Function .....	71
<b>G</b>	
General causes of errors .....	94
GSD file .....	56, 62
GSD modules .....	64
<b>H</b>	
Hardware .....	75
Hazard warning & logotype .....	9
Heated reflectors	
Dimensioned drawing .....	28
Specifications .....	27
Heating control .....	90

<b>I</b>		
I/O 1	64	
I/O 2	64	
Identification & Maintenance Functions	50	
Input	72	
Input/output		
IO 1	71	
IO 2	73	
Installation	16	
Intended use	7	
Intensity	75	
Interface errors	95	
Interface info in display	38	
Internal hardware error	38	
<b>L</b>		
Language selection	90	
Laser	75	
Laser class	8	
Laser radiation	8	
Laser status	75	
LED LINK	41	
Limit value 1 range end	83	
Limit value 1 range start	83	
Lower position limit value	75	
LSR	75	
LSR status display	96	
<b>M</b>		
MAC ID	59	
Main menu		
Device information	42	
Language selection	43	
Network information	42	
Parameter	43	
Service	43	
Maintenance	102	
Maximum position value	64, 67, 68	
Measurement range	12	
Measurement unit	67	
Measurement value output	12	
Menus		
Language selection menu	47	
Main menu	42	
Parameter menu	44	
Service menu	47	
Mounting	17	
With laser beam deflector unit	21	
Mounting bracket(optional)	19	
Mounting distances	20	
Movement status	88	
<b>N</b>		
Name plate	9	
Name plates	16	
Network operation	11	
<b>O</b>		
Offset	67	
Operating principle	10	
Operating temperature	13	
Operation	37, 48	
Output	71, 72	
Overview of reflector types	98	
<b>P</b>		
Packaging	16	
Parallel spacing between adjacent AMS 3xxi	20	
Parameter enabling	48, 49	
Parameter menu		
I/O	45	
Other	46	
Parameter handling	44	
Position value	44	
PROFINET	44	
Password	90	
Plausibility	75	
Plausibility error.	38	
PLB	75	
Position limit value	77, 78	
Position limit value 1	64	
Position limit value 2	64	
Position value in the case of error	79	
Prefailure message	38	
Preset	69, 70	
Dynamic	64, 70	
Static	64, 69	
Preset reset	70	
Preset status	75	
Preset teach	70, 75	
PROFINET		
Cable lengths and shielding	52	
Linear topology	51	

Star topology	51	Status display	37
Wiring	52	ATT	96
PROFINET communication profile	54	ERR	96
PROFINET interface	50	PLB	96
PWR LED	39	TMP	96
<b>Q</b>		Status display in the display	96
Quality assurance	5	Status Displays	39
<b>R</b>		Status messages	93
Received signal	38	Storage	16
Reflective tape		Storage temperature	13
Dimensioned drawing	26	Supply voltage	12
Specifications	25	Suppress position status	79
Reflector	24	Suppress velocity status	79
Mounting	30	Surface reflections	31
Pitch	33	Switching mode	82, 84
Size	29	Symbols	5
Type overview	29	<b>T</b>	
Repair	7, 102	Temperature	75
Reserved	75	Temperature monitoring	38
Resolution	67	TMP	75
<b>S</b>		Transport	16
Safety notices	7	Troubleshooting	92
Sensing distance	97	Type overview	15, 97
Servicing	102	<b>U</b>	
Siemens Simatic S7 control	56	Upper position limit value	75
Sign	67	<b>V</b>	
Specifications	12	Velocity	64, 80, 81
Dimensioned drawing	14	Dynamic limit value	65, 87
General specifications	12	Limit value 1	65, 82
Reflective tapes	24	Limit value 2	65, 84
Stand-alone operation	11	Limit value 3	65, 85
State-related diagnostics	92	Limit value 4	65, 86
Status	64, 75	Status	65, 88
Status and measurement data - main menu	43		
Status- and warning messages	37		

Velocity comparison limit value 1 ..... 88  
Velocity comparison limit value 2 ..... 89  
Velocity comparison limit value 3 ..... 89  
Velocity comparison limit value 4 ..... 89  
Velocity hysteresis ..... 82, 84  
Velocity in the case of error ..... 79  
Velocity limit value ..... 82, 84  
Velocity limit value status 1 ..... 88  
Velocity limit value status 2 ..... 88  
Velocity limit value status 3 ..... 88  
Velocity limit value status 4 ..... 88  
Velocity measurement error ..... 88  
Velocity resolution ..... 81

**W**

Waving of the participant ..... 61

Level 1 ▲▼ : selection	Level 2 ▲▼ : selection ESC : back	Level 3 ▲▼ : selection ESC : back	Level 4 ▲▼ : selection ESC : back	Level 5 ▲▼ : selection ESC : back	Selection/configuration option ▲▼ : selection ↔ : activate ESC : back	Detailed information on	
Device information						page 42	
Network information						page 42	
Status- and measurement data						page 42	
Parameter	↔ Parameter handling	↔ Parameter enabling			ON / OFF	page 44	
		↔ Password	↔ Activate password		ON / OFF		
			↔ Password entry		Configuration option of a four-digit numerical password		
		↔ Parameters to default		All parameters are reset to their factory settings			
	↔ PROFINET	↔ Activation			ON / OFF	page 44	
	↔ Maximum position value	↔ Measurement unit				Metric/Inch	page 45
		↔ Count direction				Positive/Negative	
		↔ Offset				Value input:	
		↔ Preset				Value input	
		↔ Error delay				ON / OFF	
↔ Position value in the case of error					Last valid value / zero		
↔ Free resolution value					5 ... 50000		
↔ I/O	↔ I/O 1	↔ Port configuration	↔ Switching input	↔ Function	Input/Output	page 46	
				↔ Activation	No function/preset teach/laser ON/OFF		
		↔ Switching output	↔ Function	Low active/High active			
			↔ Activation	Pos. limit value 1 / Pos. limit value 2 / Velocity / Intensity (ATT) / Temp. (TMP) / Laser (LSR) / Plausibility (PLB) / Hardware (ERR)			
		↔ I/O 2	↔ Port configuration	↔ Switching input	↔ Function		Low active/High active
					↔ Activation		Low active/High active
	↔ Switching output		↔ Function	Pos. limit value 1 / Pos. limit value 2 / Velocity / Intensity (ATT) / Temp. (TMP) / Laser (LSR) / Plausibility (PLB) / Hardware (ERR)			
		↔ Activation	Low active/High active				
	↔ Limit values	↔ Upper pos. limit 1	↔ Activation	↔ Limit value input	ON / OFF		
					Value input in mm or inch/100		
		↔ Lower pos. limit 1	↔ Activation	↔ Limit value input	ON / OFF		
					Value input in mm or inch/100		
		↔ Upper pos. limit 2	↔ Activation	↔ Limit value input	ON / OFF		
					Value input in mm or inch/100		
	↔ Lower pos. limit 2	↔ Activation	↔ Limit value input	ON / OFF			
			Value input in mm or inch/100				

	Other	Heating control		Standard/extended (10°C ... 15°C/30°C ... 35°C)	page 47
		Display background		10 minutes/ON	
		Display contrast		Weak/Medium/Strong	
	Service RS232	Baud rate		57.6kbit/s / 115.2kbit/s	
		Format		8,e,1 / 8,n,1	
Language selection				Deutsch / English / Español / Français / Italiano	page 47
Service	Status messages				page 48
	Diagnostics			Exclusively for service purposes by Leuze electronic	
	Expanded diagnostics			Exclusively for service purposes by Leuze electronic	