Your Expert Partner for **Human Machine Interfaces**

HMI System
Seat Reservation System

Innovative, flexible and efficient.

www.eao.com

HMI System

Seat Reservation System.

The customised display can be easily connected to the passenger information system, creating a bright, energy-efficient display element – *for early recognition of seat reservation status on public transport.*

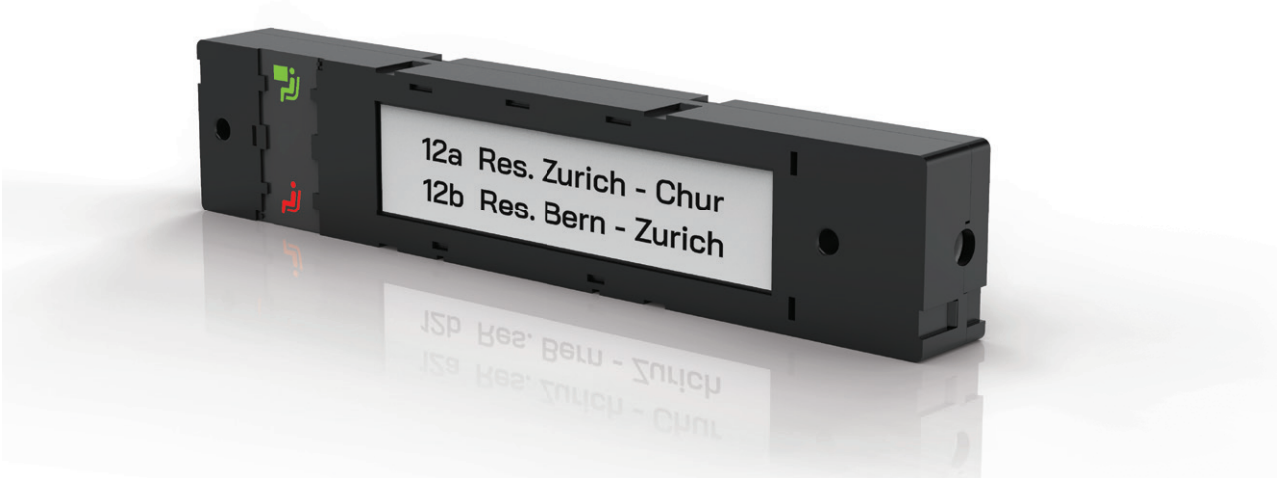
Megatrends of the future, such as mobility and urbanisation, pose new challenges for railway transport. It is becoming increasingly important to optimise the flow of passengers so that they are routed efficiently in the highly connected and dynamic world of rail transport. EAO supports this need with the latest generation of seat reservation system and, with a standardised platform, that offers maximum flexibility in terms of customer-specific design and system adaptations. Not only can the system be easily and seamlessly integrated into the passenger information system but thanks to the innovative display technology and bright, clear, seat status indicators; passengers can easily locate a free seat, or find their prebooked seat reservation.

The EAO seat reservation system includes a modern, CAN bus-based, high-resolution display (SRD) and a matching gateway (SRG), which enables connection to the passenger information system (PIS) via Ethernet.

Powerful indicators for displaying reservations
The seat reservation display has three LED indicators to show the reservation status. Train interior designers can incorporate green, red or orange status indicators into their system. The indicators are homogeneously illuminated and have a luminosity of at least 1000 cd/m² – so passengers can recognise from a distance whether a seat is free or reserved. The LEDs can be used as stand-alone illuminated surfaces or can be used to back illuminate customised symbols or letters using insert strips.

Innovative, energy-efficient display technology
Our energy-efficient display features the latest display technology to ensure high contrast with maximum readability and minimum power consumption. Text can be displayed in white on a black background or in black on a white background. If required, the backlighting can be activated depending on lighting conditions, to ensure readability in all conditions. The number of seats to be displayed as well as general display content are shown on the full graphic display using customised software, which enables maximum flexibility. Thanks to this modern display technology, the display only requires energy when the content is changed – a highlight in terms of cost and energy efficiency.

Customer specific adaptations
The housing of the display can be customised according to individual application requirements. This guarantees a seamless integration into any train design. The software



Advantages.

- Early recognition of seat reservations thanks to bright LED indicators
- Increased passenger flow efficiency
- Energy-efficient, cost-effective and high-contrast display technology
- One display solution for flexible installation situations
- Seamless integration thanks to versatile customisation options

specifications can also be tailored to individual requirements during the course of the project. Thanks to flexible display content, reservations can be shown for both single and double seats. Depending on installation requirements, the display can be rotated by 180° so that the cable can exit to the left or right. Depending on individual needs, the design of the display insert strips can be supplemented with various symbols – so not only can aisle or window seats be clearly identified, but special areas, for example, those for bicycles.

Integration into passenger information systems

The gateway to the seat reservation system easily connects the CAN bus-based displays with the passenger information system – via the Ethernet network of the train. This ensures that the displays always receive the reservation information from the passenger information system and remain up-to-date and flexible. This connection to the passenger information system and the corresponding requirements for our software are defined individually according to the needs identified during the course of the project.

Standards and approvals

- EN 50155:2022-06
- EN 45545-2:2020+A1:2023

EAO's seat reservation system was developed for the rail market and fulfils specific norms and standards. Overall, the EAO seat reservation system represents a comprehensive solution for the requirements of rail transport. From straightforward installation to flexible adaptation to different seating arrangements and design requirements and with a focus on efficiency, we are setting new standards for the future railway travel experience.

Contact us for your customised seat reservation system or find more information at www.eao.com/srs

Display for Seat Reservation System.

Electrical characteristics, ambient conditions.

Electrical characteristics

Description	Min.	Typ	Max.	Unit
Operating voltage	16.8	24	31.2	V
Power consumption	-	26	58	mA
Power input	-	-	2	W

Ambient conditions

Description	Min.	Typ	Max.	Unit
Design temperature		+25		°C
Operating temperature	–10		+70 [1]	°C
Storage temperature	–20		+80	°C
Storage and operating humidity	10		90/60 [2]	% RH
Protection degree		IP20		

[1] >70 °C display limited, no defect

[2] 90 % RH if ambient temperature <40 °C, 60 % RH if >40 °C

Display

Description	Value
Resolution	480 x 100 px
Display range	106.07 x 23.99 mm
Contrast	>0.7 according to Michelson
Backlight	White, 250 cd/m² (can be switched on in the dark)
Number of characters	Depending on the selected font size (standard approx. 30 characters per line)
Colours	2 (bw/wb)
Rotation	The display content can be rotated by 180° using the software command (e.g. left/right side in the quad compartment).
Number of seats	The number of seats to be displayed can be selected using the software command (1 – 3 seats).

Display representation

The display can show the information in both black on white.

Fig. 1: Display with white background, black font (top).
Display with black background, white font (down).

Interface, indicators, insert strips.

Interface

Description	Value
Type	CAN
Protocol	SRSCAN
Data rate	250 kB/s
CAN address	Adjustable via rotary coding switch on the rear side of the housing
Terminating resistor	Not integrated, termination plug at the last node
Display quantity	80 per Gateway

Indicators

The display has three indicators to show the reservation status. This allows passengers to recognise reserved or free seats from a distance. The indicators are homogeneously illuminated and have a luminosity of at least 1000 cd/m². Thanks to these three indicators, the display can be used for up to three seats or special areas. Symbols or only illuminated areas are possible.

V1: LED green/red/yellow
Status window position/aisle position (depending on installation)
V2: LED green/red/yellow
Status window/aisle seat for single seat version or bicycle reservation
V3: LED green/red/yellow
Status aisle seat/window seat (depending on installation)

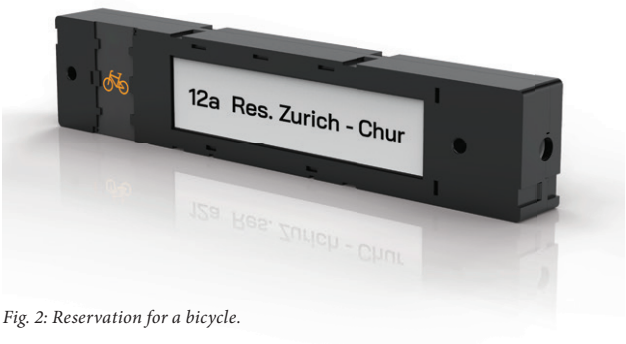


Fig. 2: Reservation for a bicycle.

Insert strips for indicators

The insert strip for the symbols is specifically manufactured for each project. Any symbols or letters with a size of up to 9 x 12.5 mm are possible. The insert strip is inserted into the enclosure and locked into place. It can be used for both installation options (cable outlet left/right). The insert strips can be replaced with new versions at any time.

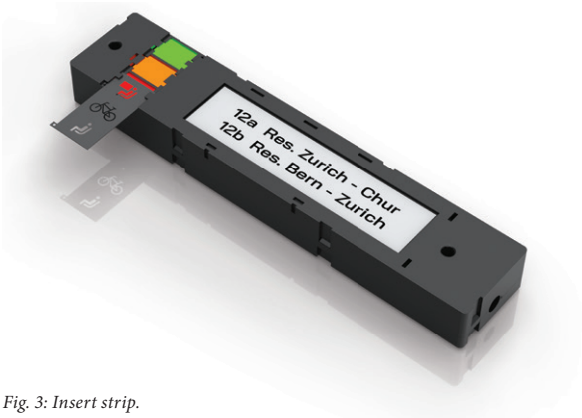


Fig. 3: Insert strip.

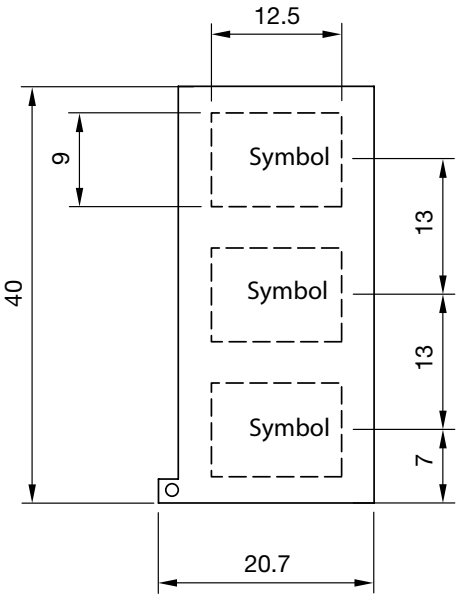


Fig. 4: Dimensions (mm) insert strip.

Housing clip attachment.

Housing
The display enclosures are designed and manufactured according to the customer‘s or project‘s specifications in order to enable optimum integration on customer‘s side. Three possible enclosure variants are listed below.

Clip attachment
In this version, the enclosure is pressed onto a customer profile by means of two spring steel clips and thus fixed. On the front side, a small frame is provided which fits into the customer‘s profile cut-out to prevent it from slipping sideways.

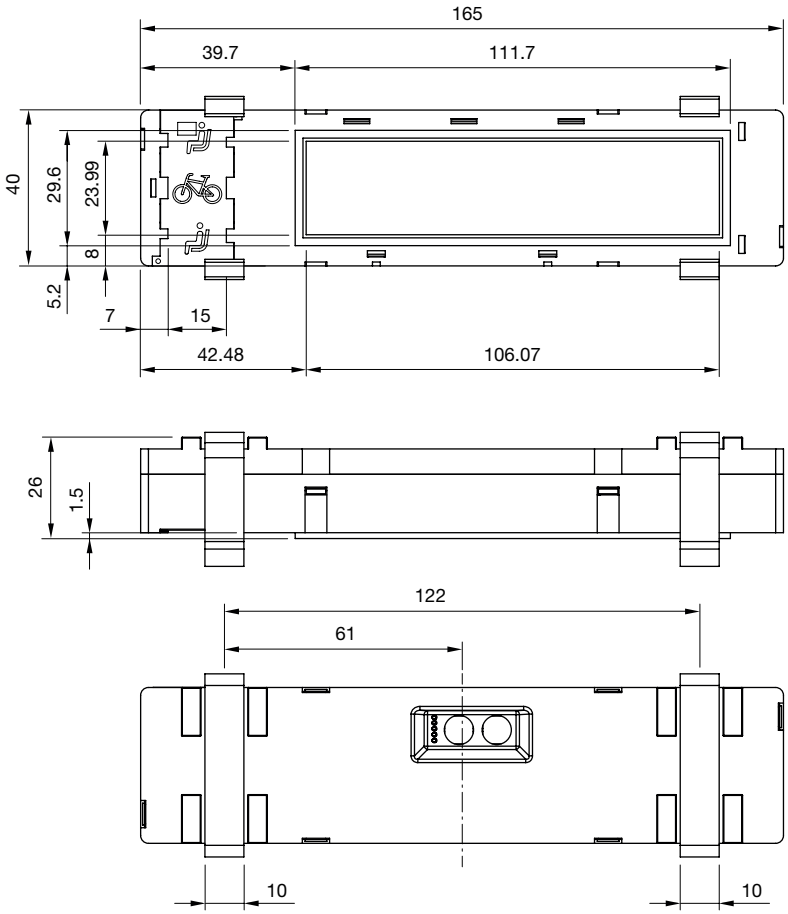


Fig. 5: Dimensions (mm) housing clip attachment.

Housing screw mounting.

With this variant, the enclosure is screwed to the customer‘s profile from behind using two M4 screws.

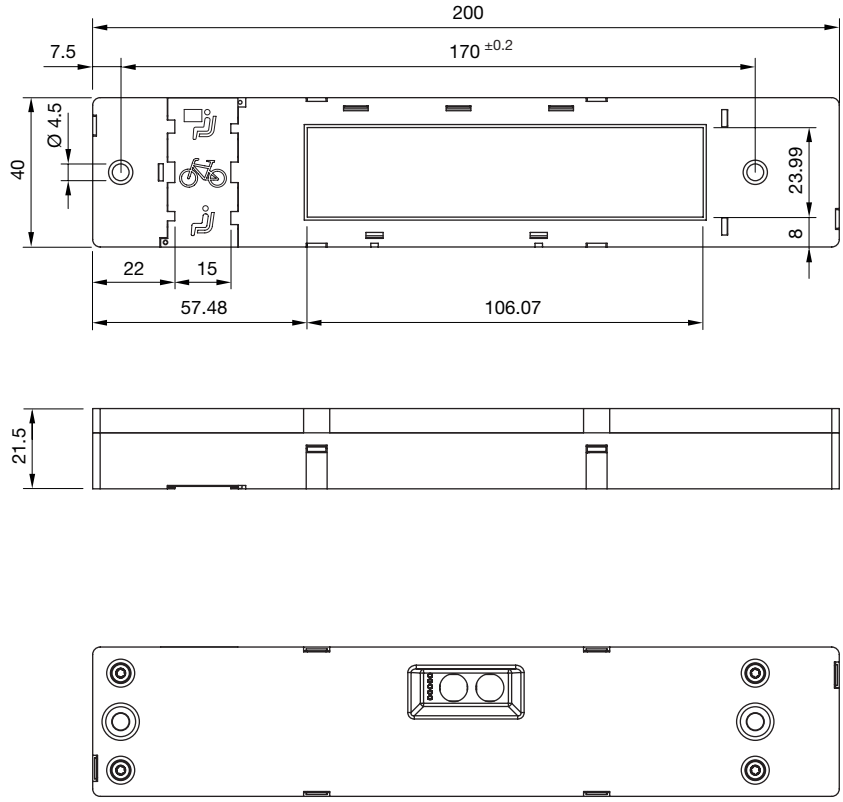


Fig. 6: Dimensions (mm) housing screw mounting.

Housing with double display.

This is a variant with two displays which are arranged one above the other. It is attached using four lugs.

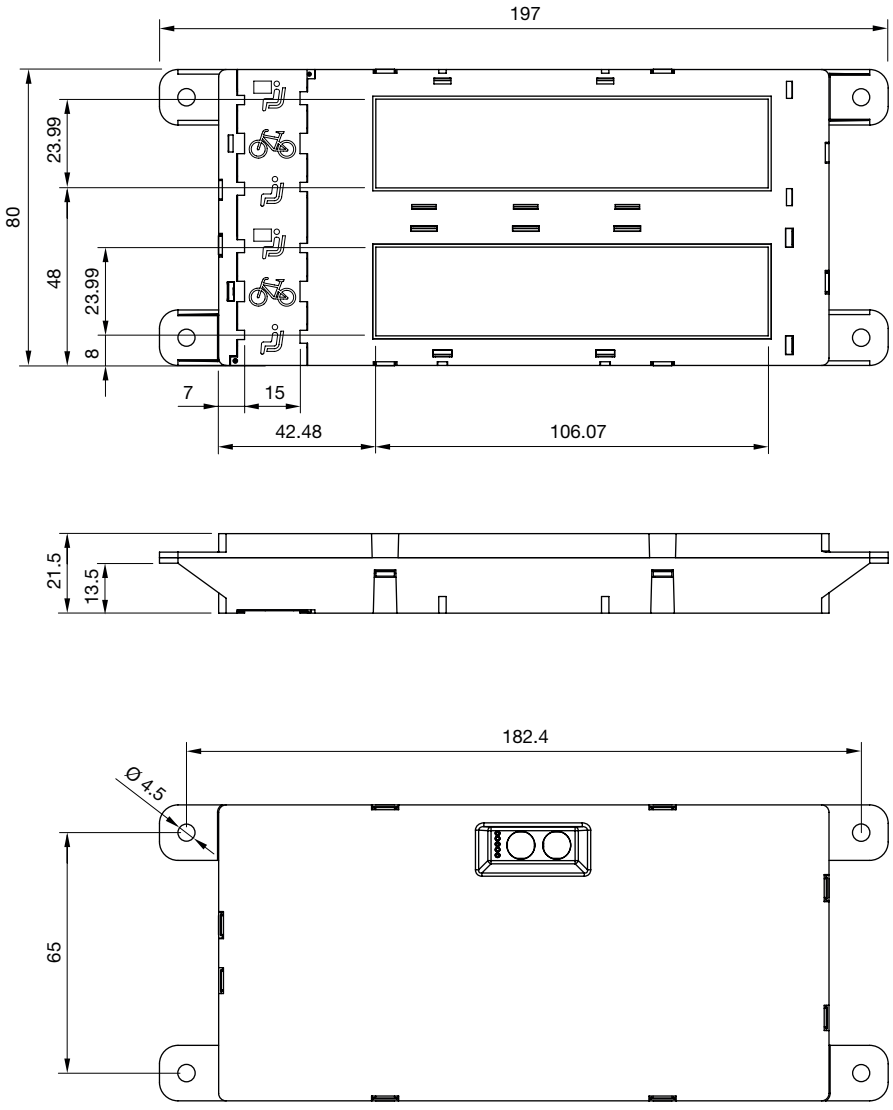


Fig. 7: Dimensions (mm) housing with two displays.

Cable outlet, coding switch.

Cable outlet

With all housing variants, it is possible to have the cable outlet on the left or right, as the housing can be rotated by 180 degrees. The display content can be rotated accordingly using the software command. Whether the display should show information for one seat or for two seats can also be configured using the software command. If a reservation is only shown for one seat, it is positioned in the centre of the display. The occupancy status indicator is then also centered.

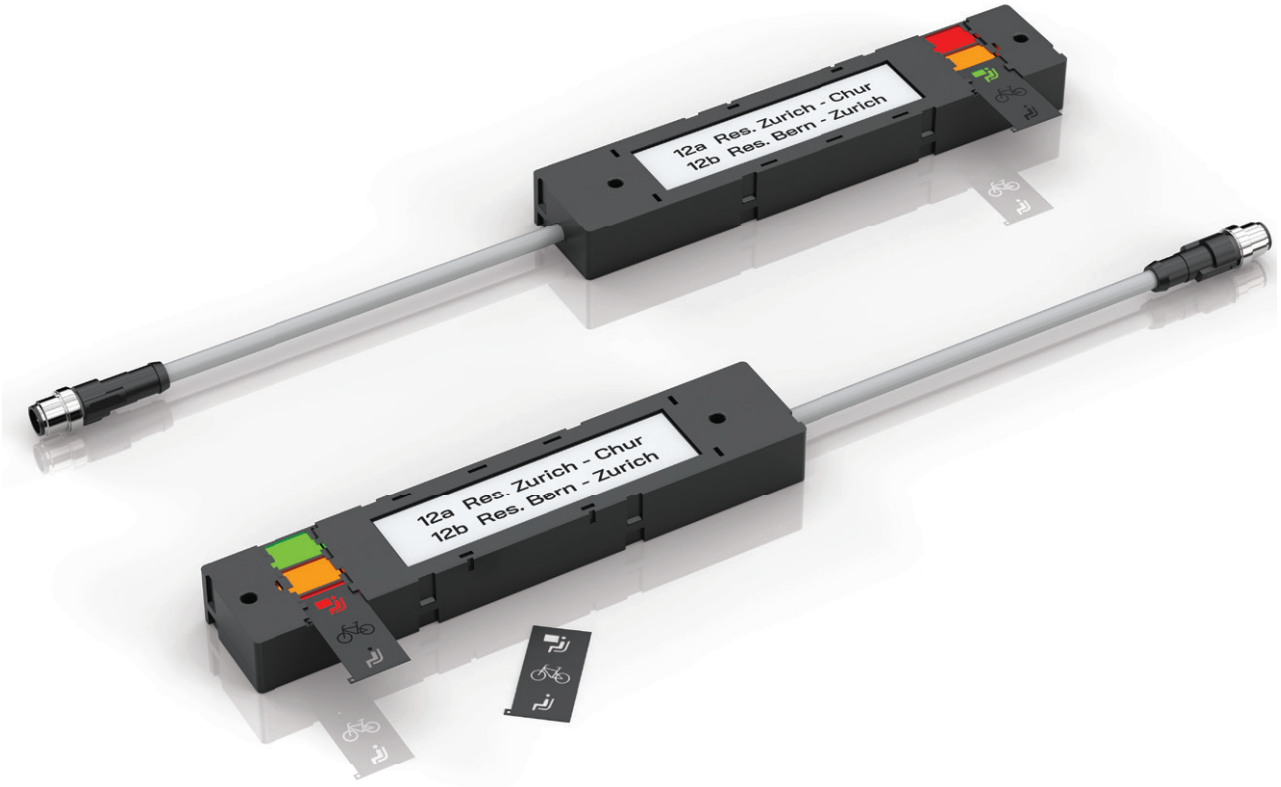


Fig. 8: Display with cable outlet left and right, with M12 connector as an example.

Gateway for Seat Reservation System.

Electrical characteristics, ambient conditions, assembly.

Electrical characteristics

Description	Min.	Type	Max.	Unit
Operating voltage	16.8	24	31.2	V
Power consumption	–	95	100	mA
Power input	–	–	3	W

Ambient conditions

Description	Min.	Type	Max.	Unit
Design temperature		+25		°C
Operating temperature	–40		+85	°C
Storage temperature	–40		+85	°C
Storage and operating humidity	10		90/60 [1]	% RH
Protection degree		IP20		

[1] 90 % RH if ambient temperature < 40 °C, 60 % RH if > 40 °C

Assembly

Mounting with four M4 screws (not included in the scope of delivery).

The front earthing bolt (M4) must be connected to the car body.

Wiring

Requirements for the customer-side cabling:

Bus length	max 250m (at one SRG)
Bus participants	max 80 (at one SRG)
Cable	min 2 x 2 x 0.5 mm² twisted and shielded

Application software

The gateway communicates with the passenger information system via the Ethernet train network.

The exact software specification is defined together with the customer during the course of the project.

Functions/Definitions

- Linux operating system
- JSON interpreter, generator
- MQTT
- and others

CAN interface

Description	Value
Plug description	X1
Plug type	M12-A coded, 5 pole, male
Bus	CAN
Protocol	Proprietary
Speed	250 kbit/s
Terminating resistor	Not integrated

PIN	X1: M12 5 pole male A coded	Comment
1	SHLD	
2	V+	+24 VDC
3	V-	CAN_GND
4	CAN_H	
5	CAN_L	

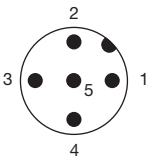


Fig. 9: Pin assignment CAN.

Ethernet interface

Description	Value
Plug description	X2
Plug type	M12-D coded, 4 pole, female
Bus	Ethernet
Protocol	MQTT
Speed	100 Mbit/s

PIN	X1: M12 4 pole female D coded	Comment
1	TD+	
2	RD+	
3	TD-	
4	RD-	

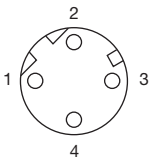


Fig. 10: Pin assignment Ethernet.

Dimensions

Housing material: aluminium natural anodised

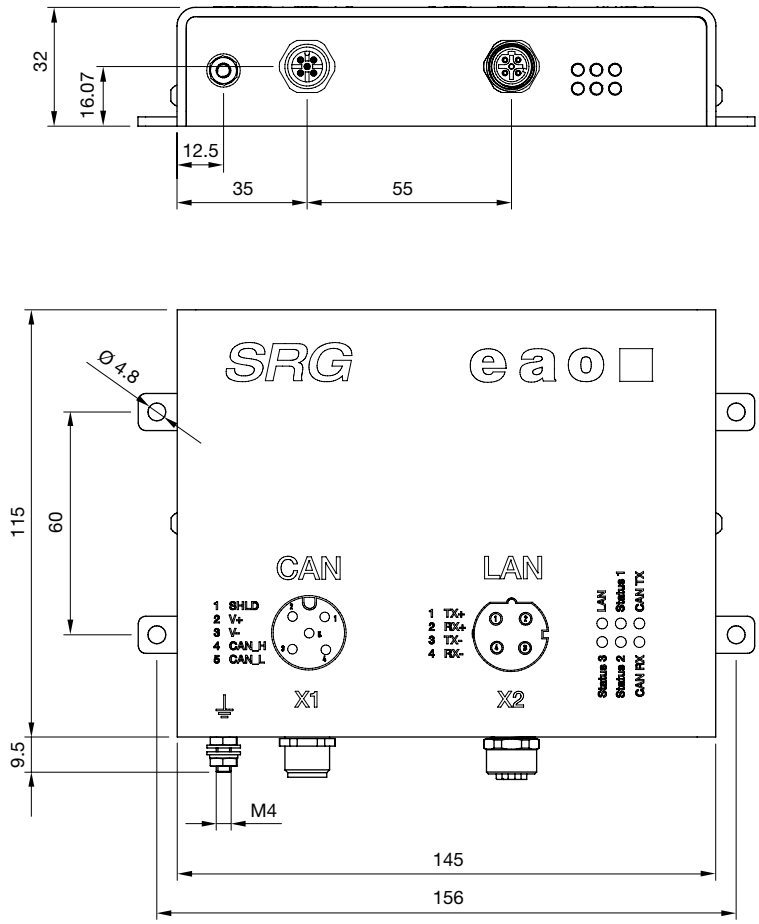


Fig. 11: Dimensions (mm) housing Gateway (SRG).

EAO Contact.
Your centre of excellence.

Headquarters

EAO Holding AG
Tannwaldstrasse 88
CH-4600 Olten
Telephone +41 62 286 92 00
info@eao.com

Manufacturing Companies

Switzerland
EAO AG
Tannwaldstrasse 88
CH-4600 Olten
Telephone +41 62 286 91 11
info@eao.com

EAO Systems AG
Tannwaldstrasse 88
CH-4600 Olten
Telephone +41 62 286 91 11
sales.esy@eao.com

China
EAO (Guangzhou) Ltd.
3/F, Block G4, South China
New Materials Innovation Park
31 Kefeng Road
Guangzhou Science City
CN-Guangzhou, PRC
Telephone +86 20 3229 0390
sales.ecn@eao.com

Germany
EAO Automotive GmbH & Co. KG
Richard-Wagner-Straße 3
DE-08209 Auerbach/Vogtland
Telephone +49 3744 8264 0
sales.esa@eao.com

North America
EAO Corporation
One Parrott Drive
Shelton
US-CT 06484
Telephone +1 203 951 4600
sales.eus@eao.com

Sales Companies

China
EAO (Guangzhou) Ltd.
3/F, Block G4, South China
New Materials Innovation Park
31 Kefeng Road
Guangzhou Science City
CN-Guangzhou, PRC
Telephone +86 20 3229 0390
sales.ecn@eao.com

EAO (Shanghai) Office
Rm.401, Lihpao Plaze,
NO.159 Shenwu Road,
Minhang District,
CN-Shanghai, 201106.
PRC
Telephone +86 21 6095 0717
sales.ecn@eao.com

France
EAO France SAS
27 rue Maurice Flandin
FR-69003 Lyon
Telephone +33 426 298 588
sales.efr@eao.com

Germany, Austria, Czech Republic, Poland, Slovakia
EAO GmbH
Langenberger Straße 570
DE-45277 Essen
Telephone +49 201 8587 0
sales.ede@eao.com

Hong Kong (Asia Pacific)
EAO (Far East) Ltd.
Unit A1, 1/F, Block A
Tin On Industrial Building
777 Cheung Sha Wan Road
Lai Chi Kok, Kln
HK-Hong Kong
Telephone +852 27 86 91 41
sales.ehk@eao.com

Italy
EAO Italia S.r.l.
Centro Direzionale Summit –
Palazzo D1
Via Brescia 28
IT-20063 Cernusco sul Naviglio (MI)
Telephone +39 029 247 0722
sales.eit@eao.com

Japan
EAO Japan Co. Ltd.
Net 1 Mita Bldg. 3F
3-1-4 Mita Minato-ku
JP-Tokyo 108-0073
Telephone +81 3 5444 5411
sales.ejp@eao.com

Netherlands, Belgium
EAO Benelux B.V.
Kamerlingh Onnesweg 46
NL-3316 GL Dordrecht
Telephone +31 78 653 17 00
sales.enl@eao.com

North America
EAO Corporation
One Parrott Drive
Shelton
US-CT 06484
Telephone +1 203 951 4600
sales.eus@eao.com

Switzerland
EAO AG
Tannwaldstrasse 88
CH-4600 Olten
Telephone +41 62 286 95 00
sales.ech@eao.com

United Kingdom, Denmark, Finland, Ireland, Norway, Sweden
EAO Ltd.
Highland House
Albert Drive
Burgess Hill
GB-West Sussex RH15 9TN
Telephone +44 1444 236 000
sales.euk@eao.com

700.067.HMIS-SEAT-RES.03/02.2024