

Kvaser Air Bridge Light HS User's Guide



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<https://www.kvaser.com>

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Contents

| | | |
|----------|---|-----------|
| 1 | About this manual | 4 |
| 2 | Introduction | 5 |
| 2.1 | Welcome to Kvaser Air Bridge Light HS | 5 |
| 2.2 | Major Features | 6 |
| 3 | Kvaser Air Bridge Light HS hardware | 7 |
| 3.1 | Hardware installation | 7 |
| 3.2 | CAN channel | 7 |
| 3.3 | Power supply | 8 |
| 3.4 | LED Indicators | 8 |
| 3.5 | Autobaud Detection | 9 |
| 4 | Appendices | 10 |
| 4.1 | Technical data | 10 |
| 4.2 | CAN Connectors | 11 |
| 4.3 | CAN bus termination | 12 |
| 5 | Safety Instructions | 13 |
| 5.1 | Intended Use | 13 |
| 5.2 | Usage Warning | 13 |
| 6 | Disposal and Recycling Information | 15 |
| 7 | Legal acknowledgements | 17 |
| 7.1 | EU Regulatory Compliance | 17 |
| 7.2 | FCC Regulatory Compliance | 19 |
| 7.3 | Patents, Copyrights and Trademarks | 23 |
| 8 | Document Revision History | 24 |

1 About this manual

This manual is intended for Kvaser Air Bridge Light HS users. This document contains a description of the hardware's properties and general instructions on how to use the Kvaser Air Bridge Light HS.

Two complementary documents are available:

- Kvaser Air Bridge Installation Guide
- Kvaser Air Bridge System Integration Guide

The Kvaser Air Bridge Installation Guide provides installation advice for end-users who use Kvaser Air Bridge Light HS and want to optimize radio performance and reach.

The Kvaser Air Bridge System Integration Guide provides design-in advice for system integrators who use Kvaser Air Bridge Light HS as a system component and want to make the most of its data bridging capability, not least in scenarios where multiple Kvaser Air Bridge Light HSs are to be employed.

2 Introduction

This section describes the functions and features of the Kvaser Air Bridge Light HS.

2.1 Welcome to Kvaser Air Bridge Light HS



Figure 1: Kvaser Air Bridge Light HS

Kvaser Air Bridge Light HS is a small, yet advanced, wireless CAN bridge that can be used as a CAN system gateway between two CAN networks. The Kvaser Air Bridge Light HS consists of a preconfigured pair of plug and play units.

This guide applies to Kvaser Air Bridge Light HS devices listed in Table 1.

| Device | Product Number |
|--------------------------------------|------------------|
| Kvaser Air Bridge Light HS | 73-30130-00808-3 |
| Kvaser Air Bridge Light HS M12 | 73-30130-01141-0 |
| Kvaser Air Bridge Light HS (FCC) | 73-30130-01008-6 |
| Kvaser Air Bridge Light HS M12 (FCC) | 73-30130-01148-9 |

Table 1: Kvaser Air Bridge Light HS devices and their EAN numbers.

The (00808-3 and 01141-0) Kvaser Air Bridge Light HS is approved for the European Union, while (01008-6 and 01148-9) Kvaser Air Bridge Light HS (FCC) is optimized for the US. They both share the same functionality but have different radio transmitting schemes due to regulatory differences.

Throughout this document, we use the name Kvaser Air Bridge Light HS to mean any one of the different Kvaser Air Bridge Light HS products listed in Table 1, unless otherwise stated.

2.2 Major Features

- Supports both CAN 2.0A and CAN 2.0B active, 11-bit and 29-bit identifiers.
- High-Speed CAN connection (compliant with ISO 11898-2), up to 1 Mbit/s.
- Compatible with J1939, CANopen, NMEA 2000[®] and DeviceNet.
- Plug and play, driver-free and configuration-free.
- 2.4 GHz proprietary protocol for high robustness, instant connection, and very low latency.
- Internal antenna design with polarization diversity.
- Power supplied through the CAN bus interface.
- Automatic baud rate detection and bit rate conversion when required.
- IP65-rated, dust and water-resistant, aluminium housing.
- IP67-rated M12 connector for cabling with extra dust and water-tightness, suitable for outdoor installation.
- Extended operating temperature range.

3 Kvaser Air Bridge Light HS hardware

In this section you can read more about the CAN channel, power supply and LED indicators.

3.1 Hardware installation

The Kvaser Air Bridge Light HS is a wireless CAN bridge comprising a preconfigured pair of plug- and-play units. This radio solution can be used to connect CAN based control systems and test equipment in scenarios and situations where it is desirable to replace cabling and related parts. The Kvaser Air Bridge Light HS requires no driver or cumbersome configuration. Just connect the units to their CAN segments, nothing else is required!

When connected to your system, the two units will determine the bit rate used by the attached CAN systems using Automatic Baud Rate Detection (autobaud), see Section 3.5, Autobaud Detection, on Page 9. Once the autobaud detection has completed successfully, the units will transmit CAN messages back and forth until the units are powered down.

The Kvaser Air Bridge Light HS will only forward CAN messages between the two attached CAN networks. Error frames and arbitration information will not be forwarded since this information is only applicable for the local physical network.

The recommended distance between two Kvaser Air Bridge Light HS units is 0.5 m.

3.2 CAN channel

The Kvaser Air Bridge Light HS has one CAN Hi-Speed channel with a CAN connector depending on the model. Either a 9-pin D-SUB or a 5-pin M12 Male connector is used. See Section 4.2, CAN Connectors, on Page 11 for details about the pinout.

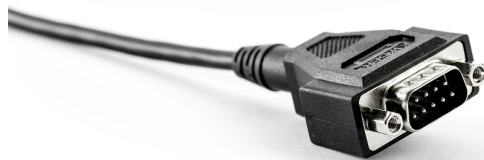


Figure 2: 9-pin Male D-SUB CAN connector



Figure 3: M12 5-pole Male CAN connector

3.3 Power supply

The Kvaser Air Bridge Light HS is powered through the CAN connector. To operate the Kvaser Air Bridge Light HS, you **must** supply 9-36 VDC power through the CAN connector.

3.4 LED Indicators

The functions of the LED indicators on the Kvaser Air Bridge Light HS are shown in Table 2.



Figure 4: LEDs on the Kvaser Air Bridge Light HS.

| LED | Description |
|---------------|---|
| CAN (Yellow) | CAN channel status, indicate received and sent messages. |
| RF (Blue) | Radio Link status, indicate received radio packets and signal strength. |
| POWER (Green) | Power indicates that the unit has been powered on and baud rates are established. |

Table 2: LEDs on the Kvaser Air Bridge Light HS.



Before power is indicated, the LEDs briefly perform an LED test, indicate states related to the establishment of the radio link and indicate state of the autobaud detection.

3.5 Autobaud Detection

The Kvaser Air Bridge Light HS provides an Autobaud Detection feature which will automatically detect and connect to any of the following CAN network bit rates:

- 1 Mbit/s
- 500 Kbit/s
- 250 Kbit/s
- 125 Kbit/s.

The Autobaud Detection is done locally, so a Kvaser Air Bridge Light HS can be used to bridge two different CAN networks operating at different bit rates. However, the amount of traffic on the networks will determine whether the system designer should allow the networks to be bridged via the Kvaser Air Bridge Light HS.



Autobaud is the process of automatically selecting the correct bus parameters for communication on the connected CAN bus based on received CAN traffic. The Autobaud Detection is driven by the reception of CAN messages on the CAN network. This means that there needs to be existing CAN traffic on the network for the Autobaud Detection to work.

If, after 15 seconds of power on, only one of the paired units have done a successful Autobaud Detection, the other unit will be configured to the same CAN network bit rate. The Autobaud Detection will continue even after 15 seconds, if none of the supported CAN system bit rates have been detected on either of the connected CAN networks.



If the Kvaser Air Bridge Light HS is used to bridge two different CAN networks operating at different bit rates, both CAN networks needs to send messages during the initial 15 seconds after power on in order for the Autobaud Detection to correctly detect the different bit rates.

For any additional/specific bit rate requirement, please contact Kvaser for more info.

4 Appendices

In this section you will find technical information about the Kvaser Air Bridge Light HS.

4.1 Technical data

In Table 3 below you will find the Kvaser Air Bridge Light HS's technical specifications. The physical dimensions are given in Figure 5 on Page 11.

| | |
|---|---|
| CAN Channels | 1 |
| CAN Transceivers | TJA1051T (Compliant with ISO 11898-2) |
| CAN Controller | Built into the processor |
| CAN Bit Rate | 1 Mbit/s, 500 Kbit/s, 250 Kbit/s, and 125 Kbit/s |
| Autobaud ¹ | Yes |
| Message Rate, CAN 2.0A (11-bit ID) ² | 1500 msg/s |
| Message Rate, CAN 2.0B (29-bit ID) ³ | 1100 msg/s |
| Message Latency | Typically 3-8 ms |
| Wireless Communication | 2.4 GHz Gaussian Frequency-Shift Keying (GFSK) with Frequency Hopping Spread Spectrum (FHSS) modulation |
| Frequency Range | 2400 MHz to 2483.5 MHz (2.4 GHz band) |
| Antenna Output Power | Max 18 dBm |
| Power Supply | 9-36 VDC |
| Power Consumption | Typically 2 W |
| Current Consumption (at 9 VDC) | Typically 220 mA |
| Hardware Configuration | Plug and play |
| Weight | 200 g |
| IP Rating Housing | IP65 |
| IP Rating CAN connector | IP67 Mated |
| Operating Temperature | -40 °C to +70 °C |

Table 3: Technical Specifications.

¹Automatic establishment upon start-up. Refer to Section 3.5, Autobaud Detection, on Page 9 for more information.

²Typical message rate for both directions (recommended rate 1200). Refer to "Kvaser Air Bridge System Integration Guide" for more information.

³Typical message rate for both directions (recommended rate 900). Refer to "Kvaser Air Bridge System Integration Guide" for more information.

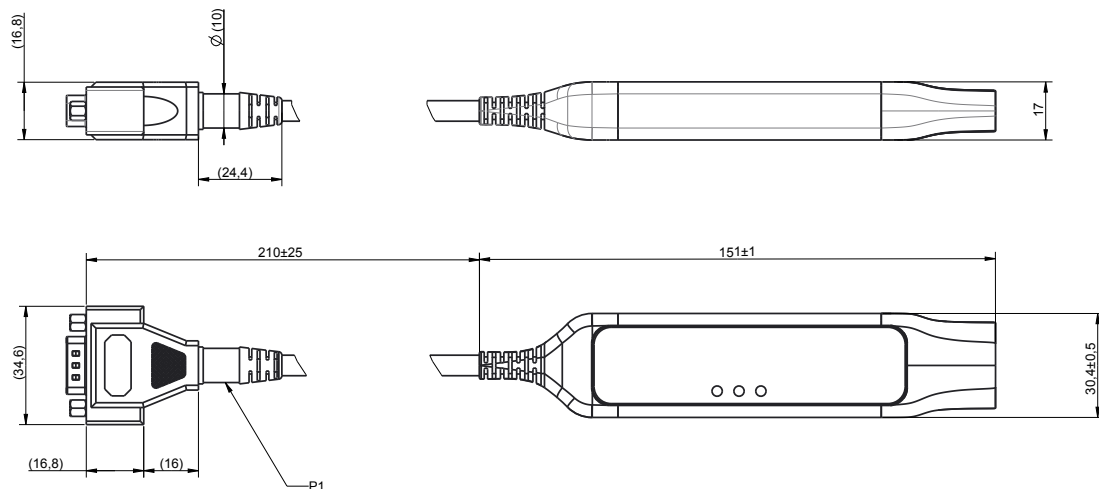


Figure 5: Physical dimensions of the Kvaser Air Bridge Light HS

4.2 CAN Connectors

Kvaser Air Bridge Light HS devices that use the 9-pin D-SUB connector (see Figure 6) have the pinning described in Table 4.

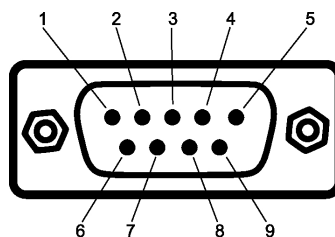


Figure 6: The D-SUB 9 connector pin numbers

| D-SUB pin number | Function |
|------------------|----------------------------|
| 1 | Not connected |
| 2 | CAN_L |
| 3 | GND |
| 4 | Reserved |
| 5 | Shield |
| 6 | Not connected |
| 7 | CAN_H |
| 8 | Not connected |
| 9 | Power supply to the device |

Table 4: Configuration of the 9-pin D-SUB

Kvaser Air Bridge Light HS devices that use the 5-pole male M12 connector have the pinning described in Table 5 on Page 12.

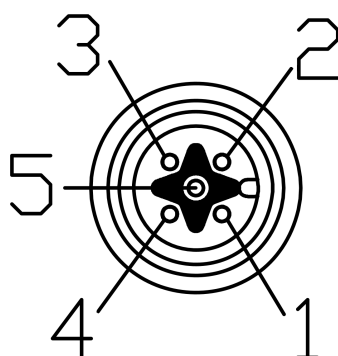


Figure 7: 5-pole male M12 Connector

| M12 pin number | Function |
|----------------|----------------------------|
| 1 | Shield |
| 2 | Power supply to the device |
| 3 | GND |
| 4 | CAN_H |
| 5 | CAN_L |

Table 5: 5-pole M12 pin configuration

4.3 CAN bus termination

Every CAN bus must be terminated with a 120 Ohm resistor at each end of the bus. The Kvaser Air Bridge Light HS does not contain any CAN bus termination, because their inclusion could cause severe disturbance in a system which is already correctly terminated.

For laboratory or testing use, the exact value of the termination resistors is not always critical. Sometimes a single terminator is sufficient. For production, proper termination is essential. If you see error frames on the bus, you should check the termination.



To save yourself a lot of trouble, always terminate the CAN bus properly.

5 Safety Instructions

5.1 Intended Use

The Kvaser Air Bridge Light HS is intended for connection of two CAN bus segments in a fixed installation.

5.2 Usage Warning



CAUTION: THE SURFACE OF THIS DEVICE MAY BECOME HOT IF IT IS EXPOSED TO FOR EXAMPLE RADIATION FROM THE SUN.

**WARNING FOR ALL USERS**

WARNING! - YOUR USE OF THIS DEVICE MUST BE DONE WITH CAUTION AND A FULL UNDERSTANDING OF THE RISKS!

THIS WARNING IS PRESENTED TO INFORM YOU THAT THE OPERATION OF THIS DEVICE MAY BE DANGEROUS. YOUR ACTIONS CAN INFLUENCE THE BEHAVIOR OF A CAN-BASED DISTRIBUTED EMBEDDED SYSTEM, AND DEPENDING ON THE APPLICATION, THE CONSEQUENCES OF YOUR IMPROPER ACTIONS COULD CAUSE SERIOUS OPERATIONAL MALFUNCTION, LOSS OF INFORMATION, DAMAGE TO EQUIPMENT, AND PHYSICAL INJURY TO YOURSELF AND OTHERS. A POTENTIALLY HAZARDOUS OPERATING CONDITION IS PRESENT WHEN THE FOLLOWING TWO CONDITIONS ARE CONCURRENTLY TRUE: THE PRODUCT IS PHYSICALLY INTERCONNECTED TO A REAL DISTRIBUTED EMBEDDED SYSTEM; AND THE FUNCTIONS AND OPERATIONS OF THE REAL DISTRIBUTED EMBEDDED SYSTEM ARE CONTROLLABLE OR INFLUENCED BY THE USE OF THE CAN NETWORK. A POTENTIALLY HAZARDOUS OPERATING CONDITION MAY RESULT FROM THE ACTIVITY OR NON-ACTIVITY OF SOME DISTRIBUTED EMBEDDED SYSTEM FUNCTIONS AND OPERATIONS, WHICH MAY RESULT IN SERIOUS PHYSICAL HARM OR DEATH OR CAUSE DAMAGE TO EQUIPMENT, DEVICES, OR THE SURROUNDING ENVIRONMENT.

WITH THIS DEVICE, YOU MAY POTENTIALLY:

- CAUSE A CHANGE IN THE OPERATION OF THE SYSTEM, MODULE, DEVICE, CIRCUIT, OR OUTPUT.
- TURN ON OR ACTIVATE A MODULE, DEVICE, CIRCUIT, OUTPUT, OR FUNCTION.
- TURN OFF OR DEACTIVATE A MODULE, DEVICE, CIRCUIT, OUTPUT, OR FUNCTION.
- INHIBIT, TURN OFF, OR DEACTIVATE NORMAL OPERATION.
- MODIFY THE BEHAVIOR OF A DISTRIBUTED PRODUCT.
- ACTIVATE AN UNINTENDED OPERATION.
- PLACE THE SYSTEM, MODULE, DEVICE, CIRCUIT, OR OUTPUT INTO AN UNINTENDED MODE.

ONLY THOSE PERSONS WHO:

(A) ARE PROPERLY TRAINED AND QUALIFIED WITH RESPECT TO THE USE OF THE DEVICE,

(B) UNDERSTAND THE WARNINGS ABOVE, AND

(C) UNDERSTAND HOW THIS DEVICE INTERACTS WITH AND IMPACTS THE FUNCTION AND SAFETY OF OTHER PRODUCTS IN A DISTRIBUTED SYSTEM AND THE APPLICATION FOR WHICH THIS DEVICE WILL BE APPLIED, MAY USE THE DEVICE.

PLEASE NOTE THAT YOU CAN INTEGRATE THIS PRODUCT AS A SUBSYSTEM INTO HIGHER-LEVEL SYSTEMS. IN CASE YOU DO SO, KVASER AB HEREBY DECLARES THAT KVASER AB'S WARRANTY SHALL BE LIMITED TO THE CORRECTION OF DEFECTS, AND KVASER AB HEREBY EXPRESSLY DISCLAIMS ANY LIABILITY OVER AND ABOVE THE REFUNDING OF THE PRICE PAID FOR THIS DEVICE, SINCE KVASER AB DOES NOT HAVE ANY INFLUENCE ON THE IMPLEMENTATIONS OF THE HIGHER-LEVEL SYSTEM, WHICH MAY BE DEFECTIVE.

6 Disposal and Recycling Information



When this product reaches its end of life, please dispose of it according to your local environmental laws and guidelines.

For information about Kvaser's recycling programs, visit:
<https://www.kvaser.com/en/kvaser/recycling-policy.html>

7 Legal acknowledgements

7.1 EU Regulatory Compliance



EU Declaration of Conformity (DoC)

We

| | | | |
|-----------------|---------------|-------------------|------------------|
| Company Name: | Kvaser AB | City: | Mölndal |
| Postal address: | Aminogatan 25 | Telephone number: | +46 31 886344 |
| Postcode: | 431 53 | E-mail address: | sales@kvaser.com |

declare that the DoC is issued under our sole responsibility and belongs to the following product:

Product: Kvaser Air Bridge Light HS

Object of the declaration (identification of apparatus allowing traceability):

Product: Kvaser Air Bridge Light HS

Type: 73-30130-00808-3

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

Radio Equipment Directive (RED) 2014/53/EU (Art. 3.1a, 3.1b and 3.2)

RoHS recast Directive 2011/65/EU (Art. 4.1)

The following harmonised standards and technical specifications have been applied
(title, date of standard/specification):

| | |
|--------------------------------|-------------------------------|
| EN 203 367 (2016-03 (1.1.0)) | EN 300 328 (2016-11 (2.1.1)) |
| EN 301 489-1 (2016-11 (2.1.1)) | EN 301 489-17 (2016 (3.1.1)) |
| EN 55032 (2012) | EN 62 368-1 (2014 + AC1:2015) |
| EN 50581 (2012) | |

Signed for and on behalf of:

| | | |
|----------------|---------------|---|
| Mölndal | 2019-12-05 |  |
| Place of issue | Date of issue | Claes Haglund, Supply Chain and Quality Director |





EU Declaration of Conformity (DoC)

We

| | | | |
|-----------------|---------------|-------------------|------------------|
| Company Name: | Kvaser AB | City: | Mölndal |
| Postal address: | Aminogatan 25 | Telephone number: | +46 31 886344 |
| Postcode: | 431 53 | E-mail address: | sales@kvaser.com |

declare that the DoC is issued under our sole responsibility and belongs to the following product:

Product: Kvaser Air Bridge Light HS M12

Object of the declaration (identification of apparatus allowing traceability):

Product: Kvaser Air Bridge Light HS M12

Type: 73-30130-01141-0

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

Radio Equipment Directive (RED) 2014/53/EU (Art. 3.1a, 3.1b and 3.2)

RoHS recast Directive 2011/65/EU (Art. 4.1)

The following harmonised standards and technical specifications have been applied

(title, date of standard/specification):

| | |
|--------------------------------|------------------------------|
| EN 203 367 (2016-03 (1.1.0)) | EN 300 328 (2016-11 (2.1.1)) |
| EN 301 489-1 (2016-11 (2.1.1)) | EN 301 489-17 (2016 (3.1.1)) |
| EN 55032 (2012 + AC:2013) | EN 62 368-1 (2014 + AC:2015) |
| EN 50581 (2012) | |

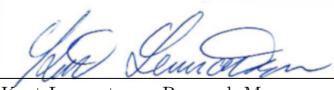
Signed for and on behalf of:

Mölndal

2023-03-22

Place of issue

Date of issue


Kent Lennartsson, Research Manager

7.2 FCC Regulatory Compliance



Federal Communications Commission (FCC) Compliance Information Statement

IDENTIFICATION OBJECT:

Product: Kvaser Air Bridge Light HS

Type: 73-30130-00808-3

APPLICABLE COMPLIANCE STATEMENTS:

CFR Title 47 Part 15 §15.107, §15.109

This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

RESPONSIBLE PARTY (IN USA) NAME:

Kvaser Inc.

23881 Via Fabricante, Suite 503

Mission Viejo, CA 92691

Internet contact: support@kvaser.com



Federal Communications Commission (FCC) Compliance Information Statement

IDENTIFICATION OBJECT:

Product: Kvaser Air Bridge Light HS M12

Type: 73-30130-01141-0

APPLICABLE COMPLIANCE STATEMENTS:

CFR Title 47 Part 15 §15.107, §15.109

This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

RESPONSIBLE PARTY (IN USA) NAME:

Kvaser Inc.

23881 Via Fabricante, Suite 503

Mission Viejo, CA 92691

Internet contact: support@kvaser.com



Federal Communications Commission (FCC) Compliance Information Statement

IDENTIFICATION OBJECT:

Product: Kvaser Air Bridge Light HS (FCC)

Type: 73-30130-01008-6

APPLICABLE COMPLIANCE STATEMENTS:

CFR Title 47 Part 15 §15.107, §15.109

This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

RESPONSIBLE PARTY (IN USA) NAME:

Kvaser Inc.

23881 Via Fabricante, Suite 503

Mission Viejo, CA 92691

Internet contact: support@kvaser.com



Federal Communications Commission (FCC) Compliance Information Statement

IDENTIFICATION OBJECT:

Product: Kvaser Air Bridge Light HS M12 (FCC)

Type: 73-30130-01148-9

APPLICABLE COMPLIANCE STATEMENTS:

CFR Title 47 Part 15 §15.107, §15.109

This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

RESPONSIBLE PARTY (IN USA) NAME:

Kvaser Inc.

23881 Via Fabricante, Suite 503

Mission Viejo, CA 92691

Internet contact: support@kvaser.com

7.3 Patents, Copyrights and Trademarks

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Adobe, the Adobe logo, and Reader are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries.

DeviceNet is a trademark of Open DeviceNet Vendor Association, Inc.

NMEA 2000 is the registered trademark of the National Marine Electronics Association, Inc.

For information about Kvaser related CAN patents, see www.kvaser.com/patent.

The products described in this document are protected by U.S. patent 5,696,911.

8 Document Revision History

Version history for document UG_98208_air_bridge_light_hs:

| Revision | Date | Changes |
|----------|------------|--|
| 1.0 | 2018-09-04 | Initial version |
| 2.0 | 2018-11-22 | Corrected IP Rating and operating temperature, updated EU Regulatory Compliance. |
| 2.1 | 2018-12-06 | Clarified CAN Bit Rate. |
| 2.2 | 2019-08-09 | Url protocol updated |
| 3.0 | 2020-05-15 | Added devices with M12 Connector, CAN bus termination chapter |
| 3.0 | 2020-05-15 | Added devices with M12 Connector, CAN bus termination chapter |
| 4.0 | 2020-08-24 | Corrected power pin of M12 Connector |
| 4.1 | 2022-04-01 | Added galvanic isolation info (N/A) to Technical data table. |
| 4.2 | 2023-03-22 | Updated the Technical data table. Added section about intended use. Minor textual changes. |