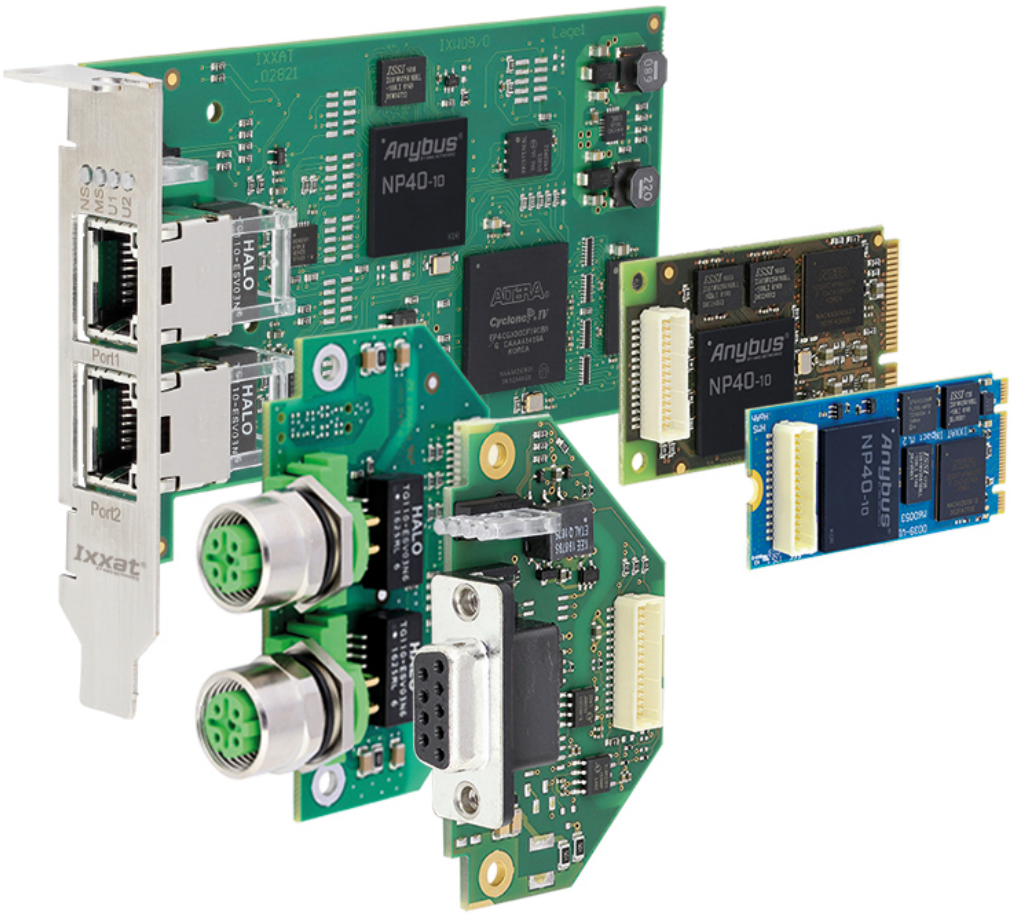
Ixxat®
BY HMS NETWORKS

INpact Slave PCIe

Industrial Ethernet PCIexpress Interface

USER MANUAL

4.01.0320.20000 2.0 en-US ENGLISH



HMS Connecting Devices™

Important User Information

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Table of Contents

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1 User Guide

Please read the manual carefully. Make sure you fully understand the manual before using the product.

1.1 Target Audience

This manual addresses trained personnel who are familiar with the protocols in use and the applicable standards. Only ESD trained staff is authorized to install the interface. The contents of the manual must be made available to any person authorized to use or operate the product.

1.2 Related Documents

Document	Author
Installation Guide *VCI Driver*	HMS
Startup Guide *INpact Slave PCIe How to Update Card and Protocol*	HMS
Anybus CompactCom 40 Software Design Guide (see www.anybus.com)	HMS
Anybus CompactCom 40 Network Guides	HMS
INpact Slave Getting Started	HMS

1.3 Document History

Version	Date	Description
1.0	March 2016	First release
1.1	April 2016	Added INpact CE Slave PCIe Mini
1.2	June 2016	Adjusted FCC Compliance Statement
1.3	October 2016	Integration of measurements and manufacturer address
1.4	March 2017	Added variant BCU ETH M12
1.5	July 2017	Additional information about firmware update, structural changes
1.6	September 2017	Minor corrections firmware update and boot up sequence
1.7	March 2018	Added M.2 version
1.8	May 2019	Layout changes
1.9	September 2019	Added information about Startup Guide *INpact Slave PCIe How to Update Card and Protocol*
2.0	February 2020	Added information about configuration file for Master

1.4 Trademark Information

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1.5 Conventions

Instructions and results are structured as follows:

- ► instruction 1
- ► instruction 2
  - → result 1
  - → result 2

Lists are structured as follows:

- item 1
- item 2

Bold typeface indicates interactive parts such as connectors and switches on the hardware, or menus and buttons in a graphical user interface.

```
This font is used to indicate program code and other
kinds of data input/output such as configuration scripts.
```

This is a cross-reference within this document: *Conventions, p. 4*

This is an external link (URL): www.hms-networks.com

Safety advice is structured as follows:

> **!** Cause of the hazard!
>
> Consequences of not taking remediate action.
>
> How to avoid the hazard.

Safety signs and signalwords are used dependent on the level of the hazard.

This is additional information which may facilitate installation and/or operation.

> **!** This instruction must be followed to avoid a risk of reduced functionality and/or damage to the equipment, or to avoid a network security risk.

> **Caution**
> This instruction must be followed to avoid a risk of personal injury.

> **WARNING**
> This instruction must be followed to avoid a risk of death or serious injury.

2 Safety Instructions

2.1 Information on EMC

> **!** Risk of interference to radio and television if used in office or home environment!
>
> Use exclusively included accessories. Use exclusively shielded cables.
>
> Make sure shield of interface is connected with device plug and plug on other side.

2.2 General Safety Instructions

- Protect product from moisture and humidity.
- Protect product from too high or too low temperature (see *Technical Data, p. 27*).
- Protect product from fire.
- Do not paint the product.
- Do not modify or disassemble the product. Service must be carried out by HMS Industrial Networks.
- Store products in dry and dust-free place.

2.3 Intended Use

The interfaces are used to connect computer systems to industrial Ethernet networks. They are intended for the installation in computer systems with closed housings.

3 Scope of Delivery

Included in the scope of delivery:

- INpact interface (Mini and M.2 version with bus coupling unit and connection cable)
- CD with VCI driver and example application
- Installation Guide *VCI Driver*
- User Manual *INpact Slave PCIe*
- Version M12: mounting components

4 Product Description

The Ixxat INpact Slave PCIe for Ethernet based industrial communication is designed to fulfill the high requirements of real time Ethernet protocols with big data volume and supports the most used real time industrial Ethernet protocols. The modular approach of the INpact platform allows the interface to be customized. The Ixxat INpact Slave PCIe is available as Common Ethernet variant or as pre-configured protocol specific interface. The Common Ethernet variant can be flashed with various Industrial Ethernet protocols and therefore provides instant connectivity to all major industrial networks with only one interface.

Common feature set:

- one common hardware platform for Industrial Ethernet protocols
- event-based interface method enables easy access to input and output data at any time
- fast data transfer: up to 1500 bytes of process data in each direction with very low latency
- transparent network service channel enables profile integration (Drive, Motion, Semi, Other)
- standardized hardware and software interface independent of network
- continuous product maintenance by HMS Industrial Networks
- pre-certified for full interoperability and network compliance
- realtime 2-Port-Switch
- 10/100 Mbit, Full-/Half duplex
- Standard, Low Profile, Mini and M.2 version available
- two RJ45 Ethernet ports or two M12 ports

5 Installation

5.1 Installing the Software

For the operation of the interface a driver is needed.

The VCI driver software is constantly improved and expanded! Check if a newer version is available within support area on www.ixxat.com.

Windows

► Install the VCI driver V4 (see *VCI Driver* Installation Guide).

Linux and Real-Time Operating Systems

► Observe information about supported operating systems and interfaces on www.ixxat.com.

► For information about the installation in Linux see *INpact Slave Getting Started*.

► When downloading a driver from www.ixxat.com, observe the *ReadMe* file or installation guide of the downloaded driver package.

5.2 Installing the Hardware

> **!** Risk of ESD damages caused by improper handling!
>
> Use ESD protective measures to avoid equipment damage.

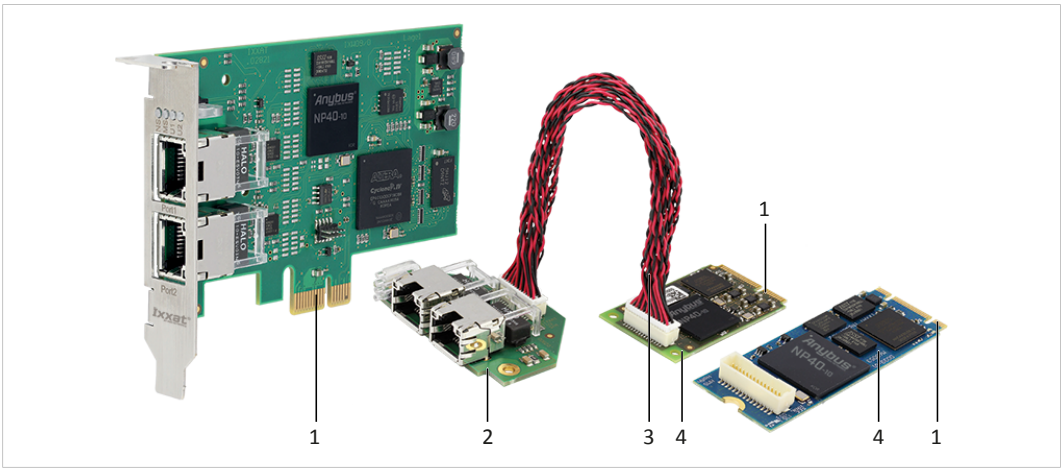


Fig. 1 Low profile and Mini version with Ethernet bus coupling unit

1	Connector
2	Bus coupling unit
3	Connection cable
4	Mini interface (or M.2 interface)

- ► Make sure that the driver is installed.
- ► Turn off the computer.
- ► Pull the power cord.
- ► Open the computer case according to instructions of the computer manufacturer.

If PCIe Mini or M.2 is used:

- ► Install the bus coupling unit (**2**).
- ► Connect the interface (**4**) and the bus coupling unit (**2**) with the connection cable (**3**).
- ► If the bus coupling unit M12 is used, connect the LED connector (see *Mounting Bus Coupling Unit M12, p. 8*).

- ► Determine the corresponding slot.
- ► Plug the connector (**1**) in the corresponding slot, without using force.
- ► Make sure that the interface is securely held in the computer.
- ► If the bus coupling unit M12 is used, fix the bus coupling unit with mounting blocks (see *Mounting Bus Coupling Unit M12, p. 8*).
- ► Close the computer case.
  - → Hardware installation is complete.

Mounting Bus Coupling Unit M12

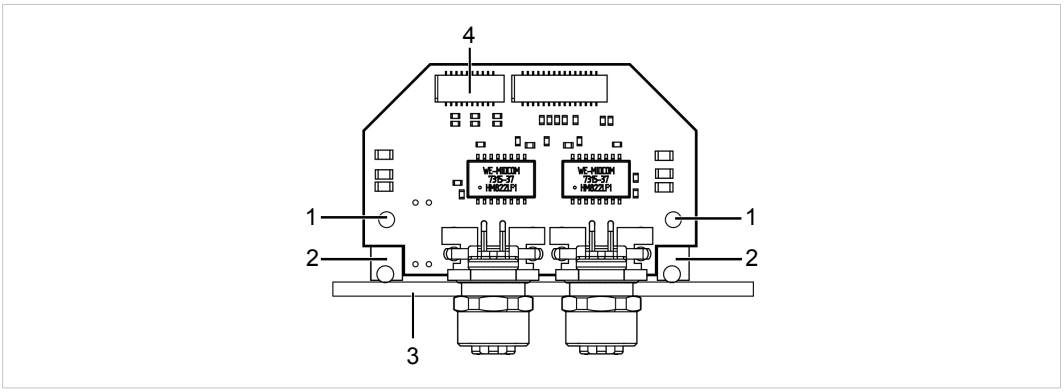


Fig. 2 Mounting guides

Tightening moment for M12 thread: 6.25 Nm

Sheet thickness: 2.0 to 3.0 mm

- ► Screw the mounting blocks (**2**) onto the bus coupling unit (**1**).
- ► Screw the sheet (**3**) onto the mounting blocks (**2**).
- ► Connect the LED connector (**4**) to the counterpart JST SHDR-20V-S-B.

The function of the LEDs corresponds to the function of the integrated LEDs of the bus coupling unit Ethernet.

Pin Assignment LED connector

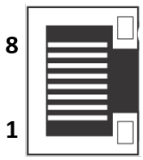
Pin	Function	Recommended color	Signal name
1	LED U1	Green	USR1_LED_GR_EXT
2	Power LED	Green	NetD100_2
3	LED U1	Red	USR1_LED_RD_EXT
4	Ground	-	GND
5	LED NS (Network Status)	Green	NW_LED1A_EXT
6	Ground	-	GND
7	LED NS (Network Status)	Red	NW_LED1B_EXT
8	Ground	-	GND
9	LED MS (Interface Status)	Green	NW_LED2A_EXT
10	Ground	-	GND
11	LED MS (Interface Status)	Red	NW_LED2B_EXT
12	Ground	-	GND
13	Port 1 Link/Activity LED	Green	NW_LED3A_EXT
14	Ground	-	GND
15	Port 1 Speed	Yellow	NW_LED3B_EXT
16	Ground	-	GND
17	Port 2 Link/Activity LED	Green	NW_LED4A_EXT
18	Ground	-	GND
19	Port 2 Speed	Yellow	NW_LED4B_EXT
20	Ground	-	GND

5.3 Connectors

5.3.1 Ethernet Port RJ45

Pin	Function
1	Tx+
2	Tx-
3	Rx+
6	Rx-
4,5,7,8	Normally unused; to ensure signal integrity pins are tied together and terminated to PE via filter circuit in interface.
Housing	Cable shield

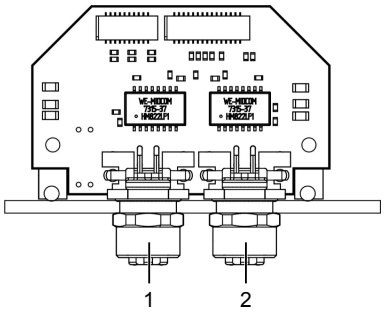
Pinning RJ45



5.3.2 M12 Port

M12 connectors on bus coupling unit M12

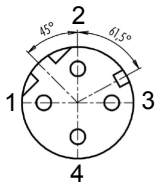
1	Port 1
2	Port 2



Pin Allocation

Pin	Function
1	Tx+
2	Rx+
3	Tx-
4	Rx-

Pinning M12 (D-coded, female)



6 Configuration

6.1 Downloading and Updating the Protocol-Specific Firmware

With the INpact Common Ethernet variant the firmware for the desired protocol must be downloaded to the interface. After the configuration of a specific protocol it is possible to switch to other protocols. To restore the Common Ethernet variant is not possible.

- For information how to update the INpact card (PCIe protocol chip) see Startup Guide *INpact Slave PCIe How to Update Card and Protocol* on www.ixxat.com/support.

6.1.1 Loading the Protocol Specific Firmware Files

To update the protocol, the latest firmware files must be loaded in the firmware repository of the Anybus Firmware Manager II.

- From www.anybus.com download and install the latest Anybus Firmware Manager II.
- Contact Ixxat support for the latest protocol specific firmware files.
- Start the Firmware Manager II and open **Firmware Repository** in the toolbar.
- Drag and drop the firmware files in the firmware repository.
- Update the protocol via Transport Provider or via Ethernet.

6.1.2 Downloading and Updating via Transport Provider

> **!** Downloading and updating the firmware via Transport Provider is only possible with Windows. With the Transport Provider only one device can be updated at a time.

> *VCI driver software is constantly improved and expanded! Check if a newer version is available within support area on www.ixxat.com.*

- Make sure, that the latest version of the VCI driver V4 is installed.
- Make sure, that the INpact interface is installed in a Windows computer.
- From www.anybus.com download and install the latest Anybus Firmware Manager II.
- Make sure, that the latest protocol specific firmware files are loaded in the firmware repository (see *Loading the Protocol Specific Firmware Files, p. 10*).
- Start the Firmware Manager II and open **Manual Update Wizard** in the toolbar.
- Select **Anybus CompactCom 40** and click button **Next**
- Select **Transport Provider** and click button **Next**.
- In window **Transport Provider Path** click button **Create**.
- Select **INpact** and name the path.
  → Window to select the INpact interface is opened.
- Select the INpact interface to be updated and click button **OK**.
  → INpact interface is created and available.
- Select the INpact interface to be updated.

- Select the desired protocol and firmware and click button **Update**.
  - → Firmware is downloaded to the interface.
  - → LED **MS** is flashing red and green.
- When the download is finished click button **Close**.
- With changed protocol, observe the protocol specific LED indications.
- If necessary relabel LED **NS** and LED **MS** to conform to specific network certification requirements.

> **!** If the download is interrupted, the download is corrupted! Use the INpact Recovery Helper to restart.

- If the download is corrupted, run the **INpact Recovery Helper** in the VCI installation folder and restart the download of the protocol firmware.
- Configure the communication with the Master (see *Configuring the Communication, p. 12*).

6.1.3 Downloading and Updating via Ethernet Connection

Via Ethernet connection downloading and updating of firmware for Linux and other real-time operating systems is possible and several interfaces can be updated simultaneously.

> **!** Powerlink can only be downloaded once via Ethernet. To update the Powerlink firmware use the Transport Provider or update via the application.

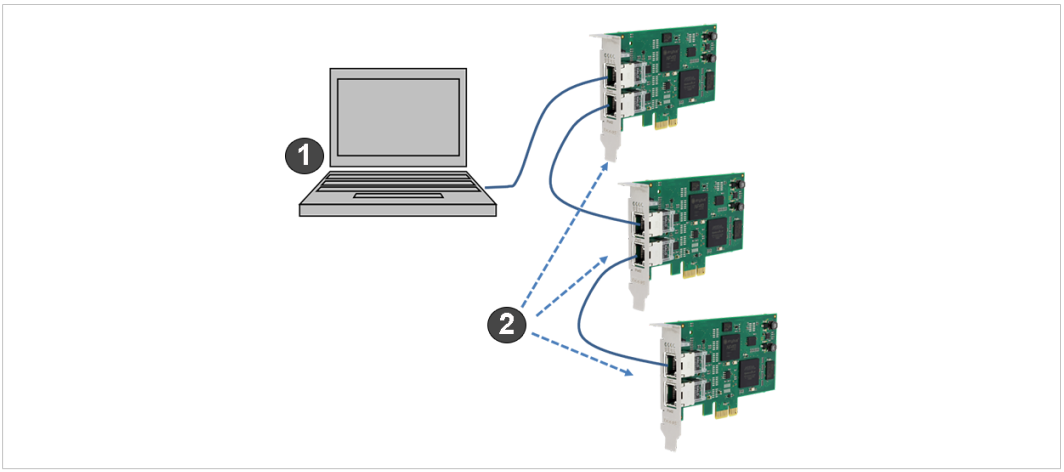


Fig. 3 Configure protocol

System conditions	
1	Windows computer with HMS firmware manager and ETH protocol files
2	Target systems with installed driver and installed INpact interface with a running application (e.g. example application described in the Ixxat *INpact Slave Getting Started*).

> *The step-by-step video Firmware Manager for Anybus CompactCom shows a configuration on Anybus CompactCom hardware. The steps for the INpact interface are the same.*

- From www.anybus.com download and install the latest Anybus Firmware Manager II to a windows computer (**1**).
- Make sure, that the latest protocol specific firmware files are loaded in the firmware repository (see *Loading the Protocol Specific Firmware Files, p. 10*).

- Connect all interfaces to be updated via Ethernet.
- Make sure, that an application is running on the INpact interfaces to be updated.
- Make sure via **IPconfig**, that INpact interface and network interface (**1**) are located in the same IP address domain (IP and subnet).
- Observe the step-by-step video Firmware Manager for Anybus CompactCom on www.anybus.com.
- Observe, that the displayed process in the Firmware Manager only shows the state of the download to the internal memory of the interface.
- When the protocol is downloaded to internal memory, restart the application or the computer.
- After the restart wait until the protocol is downloaded to the INpact interface. This can take up to two minutes. Do not interrupt the download.

  → LED **MS** is flashing red and green when the download is finished.
- With changed protocol, observe the protocol specific LED indications.
- If necessary, relabel LED **NS** and LED **MS** to conform to specific network certification requirements.

> **!** If the download is interrupted, the download is corrupted! Use the INpact Recovery Helper to restart.

- If the download is corrupted, run the **INpact Recovery Helper** in the VCI installation folder and restart the download of the protocol firmware.
- Observe, that the **INpact Recovery Helper** can only be run on the Windows computer with installed VCI driver.
- Configure the communication with the Master (see *Configuring the Communication, p. 12*).

6.2 Pre-Configured Protocol-Specific Variants

The communication software for the selected protocol is already downloaded to the interface.

- To update the firmware of the protocol see *Downloading and Updating the Protocol-Specific Firmware, p. 10*.
- Observe protocol specific LED indications.
- Configure the communication with the Master (see *Configuring the Communication, p. 12*).

6.3 Configuring the Communication

To be able to communicate with the INpact Slave PCIe a respective Master must be configured.

- Start the example application (for more information see the INpact Getting Started on www.ixxat.com).
- Download the device description file according to the protocol in use from www.ixxat.com.
- Configure the communication with the Master in the IDE of the target system (e.g. PROFINET, EthernNet/IP).
- Adjust the application and the device description file in the IDE of the target system.
- For generator tools for device description files of the most commonly used protocols see www.ixxat.com.

7 Operation

> **!** Risk of damage caused by turning off computer during firmware update!
>
> Do not turn off the computer when LED **MS** is flashing red and green.

7.1 Overview

7.1.1 Standard and Low Profile

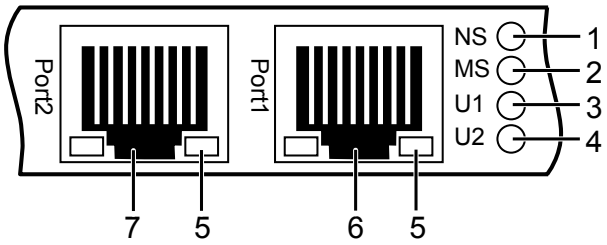


Fig. 4 Ethernet Ports and LEDs

No	LED	Description
1	LED NS (Network Status)	Indicates current network status (protocol specific).
2	LED MS (Interface Status)	Indicates current module and interface status (protocol specific).
3	LED U1	Indicates state of boot up sequence (see *Boot Up Sequence, p. 14*).
4	LED U2	–
5	Link/Activity LED	Indicates connection and communication status (protocol specific)
6	Port 1	–
7	Port 2	–

Depending on the protocol in use a test sequence of LED **NS** (**1**) and LED **MS** (**2**) is performed during the startup.

7.1.2 Bus Coupling Unit for Mini Interface and M.2 Interface

The function of the LEDs of bus coupling unit M12 corresponds to the function of the integrated LEDs of the bus coupling unit Ethernet (see Pin Assignment LED connector, p. 8).

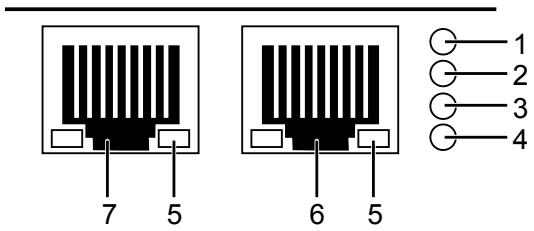


Fig. 5 Ethernet Ports and LEDs on Bus Coupling Unit Ethernet

No	LED	Description
1	LED NS (Network Status)	Indicates current network status (protocol specific).
2	LED MS (Interface Status)	Indicates current module and interface status (protocol specific).
3	LED U1	Indicates state of boot up sequence (see *Boot Up Sequence, p. 14*).
4	Power LED	Indicates if power is on or off.
5	Link/Activity LED	Indicates connection and communication status (protocol specific)
6	Port 1	–
7	Port 2	–

Depending on the protocol in use a test sequence of LED **NS** (**1**) and LED **MS** (**2**) is performed during the startup.

7.2 Boot Up Sequence

In all protocols LED **U1** shows the current boot up state and the state of the firmware start.

Boot Up State after Start or Restart of Computer	
LED U1	**Description**
Red flashing	Interface in boot manager, information about hardware can be read with the device manager, ready to start the application
Red	Error in boot up sequence, hardware issues. Contact HMS support.

Firmware State after Start of the Application	
LED U1	**Description**
Green flashing	Application firmware active
Green	High prior task uses CPU time or firmware crashed. Contact HMS support.
Red	Issues with initializing the hardware. Contact HMS support.

8 Protocol Variants

8.1 Common Ethernet

After the configuration of a specific protocol it is possible to switch to other specific protocols. To restore the Common Ethernet variant is not possible.

8.1.1 Features

The Common Ethernet interface supports the following functions:

- common hardware platform for Ethernet networks
- web server with customizable content
- FTP server
- e-mail client
- JSON functionality
- Server Side Include (SSI) functionality
- Transparent Socket Interface

8.1.2 Operation (LEDs)

Observe protocol specific LED indications.

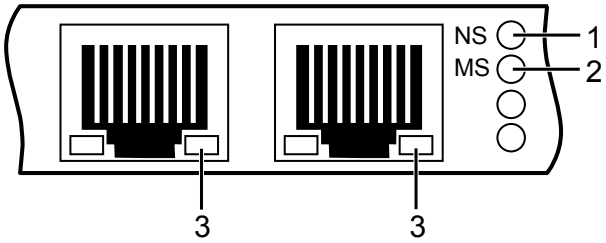


Fig. 6 LEDs Common Ethernet

1	LED NS
2	LED MS
3	Link/Activity LED

LED NS

LED state	Description
Off	Application not started
Green	IP address assigned
Green flashing	No IP address assigned
Red	IP address conflict detected, Error

LED MS

LED state	Description
Off	Not in EXCEPTION or WAIT_PROCESS state
Green	In WAIT_PROCESS state
Red	EXCEPTION error

Link/Activity LED

LED state	Description
Off	No link, no activity
Green	Link (100 Mbit/s) established
Green flashing	Activity (100 Mbit/s)
Yellow	Link (10 Mbit/s) established
Yellow flashing	Activity (10 Mbit/s)

8.2 EtherCAT

8.2.1 Features

The EtherCAT slave interface supports the following functions:

- CANopen over EtherCAT (CoE)
- support for Modular Device Profile
- DS301 compliant
- customizable identity information
- emergency support
- up to 57343 ADIs can be accessed from the network as Manufacturer Specific Objects and Device Profile Specific Objects (generic mode)
- up to 16383 ADIs can be accessed from the network as Manufacturer Specific Objects and Device Profile Specific Objects (modular device profile enabled)
- up to 1486 bytes of fast cyclic I/O in each direction
- file access over EtherCAT (FoE)
- support for process data remap from the network
- possible to implement DS402 drive profile, semi device profiles and other device profiles

8.2.2 Operation (LEDs)

Observe renamed LED NS and LED MS.

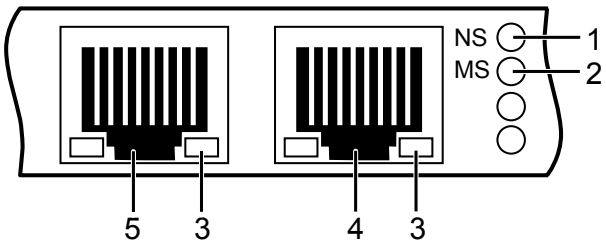


Fig. 7 LEDs EtherCAT

1	STAT LED (Status)
2	ERR LED (Error)
3	Link/Activity LED
4	EtherCAT (IN)
5	EtherCAT (OUT)

STAT LED

STAT LED (**1**) reflects status of EtherCAT communication.

LED state	Description	Comments
Off	Init	Interface in INIT state
Green	Operational	Interface in OPERATIONAL state
Green flashing	Pre-operational	Interface in PRE-OPERATIONAL state
Green single flash	Safe-operational	Interface in SAFE-OPERATIONAL state
Flickering	Boot	Interface in BOOT state
Red	If ERR LED **2** also red: fatal error	Internal error forces interface to passive state

► If **STAT** LED (**1**) and **ERR** LED (**2**) are red contact HMS Industrial Networks technical support.

ERR LED

ERR LED **2** indicates EtherCAT communications errors.

LED state	Description	Comments
Off	Not initialized	Interface in SETUP or NW_INIT state
Red blinking	Invalid configuration	State change received from master not possible due to invalid register of object settings
Red single flash	Unsolicited state change	Slave device application has changed the state autonomously
Red double flash	Application watchdog timeout	Sync manager watchdog timeout
Red	Application controller error	Interface in EXCEPTION state
Flickering	Booting error	E.g. due to firmware download failure

► If **STAT** LED (**1**) and **ERR** LED (**2**) are red contact HMS Industrial Networks technical support.

Link/Activity LED

Link/Aktivity LEDs (**3**) indicate EtherCAT link status and activity.

LED state	Description	Comments
Off	No link	No link, no communication present
Green	Link	Ethernet link established, no communication present
Green flashing	Activity	Ethernet link established, communication present

8.3 EtherNet/IP

8.3.1 Features

The EtherNet/IP slave interface supports the following functions:

- beacon based DLR (Device Level Ring) and linear network topology
- web server with customizable content
- FTP server
- e-mail client
- Server Side Include (SSI) functionality
- customizable identity information
- up to 65535 ADIs
- CIP parameter object
- expandable CIP-object implementation
- unconnected CIP routing
- Transparent Socket Interface
- modular device functionality
- QuickConnect
- multiple IO assembly instances can be created

8.3.2 Operation (LEDs)

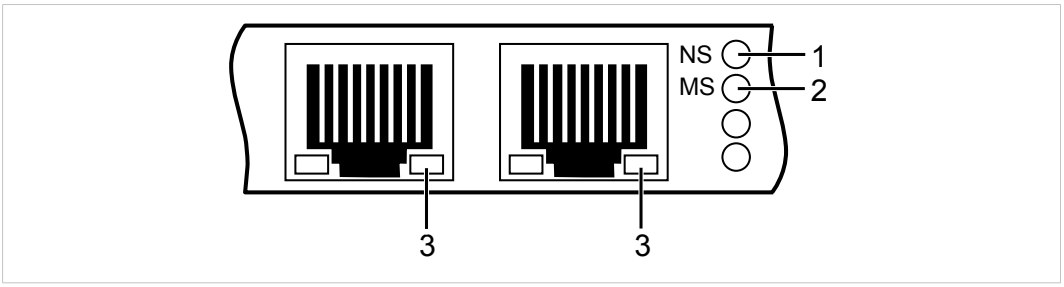


Fig. 8 LEDs EtherNet/IP

1	LED NS
2	LED MS
3	Link/Activity LED

LED NS

LED **NS** (**1**) reflects status of EtherNet/IP communication.

LED state	Description
Off	No IP address
Green	Online, one or more connections established (CIP class 1 or 3)
Green flashing	Online, no connections established
Red	Duplicate IP address, fatal error
Red flashing	One or more connections timed out (CIP class 1 or 3)

LED MS

LED state	Description
Off	Application not started
Green	Controlled by scanner in RUN state
Green flashing	Not configured or scanner in IDLE state
Red	Major error (EXCEPTION state, fatal error etc.)
Red flashing	Recoverable errors: Interface is configured but stored parameters differ from currently used parameters.

Link/Activity LED

LED state	Description
Off	No link
Green	Link (100 Mbit/s) established
Green flashing	Activity (100 Mbit/s)
Yellow	Link (10 Mbit/s) established
Yellow flashing	Activity (10 Mbit/s)

8.4 Powerlink

> **!** Powerlink can only be downloaded once via Ethernet. To update the Powerlink firmware use Transport Provider or update via application.

8.4.1 Features

The Powerlink slave interface supports the following functions:

- Ethernet Powerlink V2.0 Communication Profile Specification version 1.2.0 (Controlled Node)
- integrated hub
- 100 Mbit/s, half duplex operation
- ring redundancy
- customizable identity information
- 1 TPDO and 1 RPDO (each can hold 1490 bytes)
- up to 57343 ADIs
- adaptable XDD file included
- segmented SDO transfer
- Poll Response Chaining
- multiplexing

8.4.2 Operation (LEDs)

Observe renamed LED NS and LED MS.

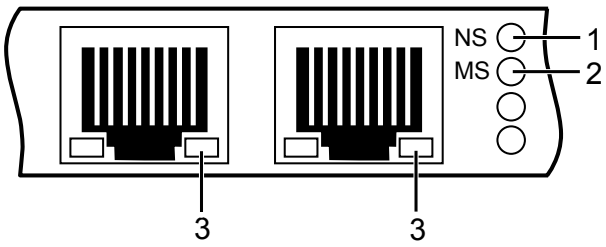


Fig. 9 LEDs Powerlink

1	STATUS LED
2	ERROR LED
3	Link/Activity LED

STATUS LED

STATUS LED (**1**) reflects status of Powerlink communication.

LED state	Description
Off	Initializing or not active
Green flashing (on 50 ms, off 50 ms)	NMT_CS_BASIC_ETHERNET Basic Ethernet state: no Powerlink traffic
Green single flash	NMT_CS_PRE_OPERATIONAL_1 only asynchronous data
Green double flash	NMT_CS_PRE_OPERATIONAL_2 asynchronous and synchronous data, no PDO data (any process data sent is declared not valid and received process data must be ignored)
Green triple flash	NMT_CS_READY_TO_OPERATE ready to operate, asynchronous and synchronous data, no PDO data (any process data sent is declared not valid and received process data must be ignored)
Green	NMT_CS_OPERATIONAL fully operational, asynchronous and synchronous data, PDO data is sent and received
Green fast flashing (on 200 ms, off 200 ms)	NMT_CS_STOPPED interface stopped (e.g. for controlled shutdown), asynchronous and synchronous data, no PDO data (any process data sent is declared not valid and received process data must be ignored)
Red	If ERROR LED (**2**) also red: fatal error

► If STATUS LED (**1**) and ERROR LED (**2**) are red contact HMS Industrial Networks technical support.

ERROR LED

LED state	Description
Off	No error
Red	Recoverable error
	If STATUS LED (**1**) also red: fatal error

► If STATUS LED (**1**) and ERROR LED **(2**) are red contact HMS Industrial Networks technical support.

Link/Activity LED

LED state	Description
Off	No link
Green	Link, no traffic
Green flashing	Link and traffic

8.5 PROFINET

8.5.1 Features

The PROFINET slave interface supports the following functions:

- up to 128 submodules in total
- up to 32767 ADIs
- 100 Mbit, full duplex
- generic and PROFINET specific diagnostic support
- complies with PROFINET IO conformance class C
- up to 1440 bytes I/O data in each direction, status bytes included
- SNMP agent
- FTP server
- e-mail client
- Server Side Include (SSI) functionality
- JSON functionality
- customizable identity information
- GSD file template provided by HMS Industrial Networks
- Media Redundancy Protocol (MRP)
- Transparent Socket Interface

8.5.2 Operation (LEDs)

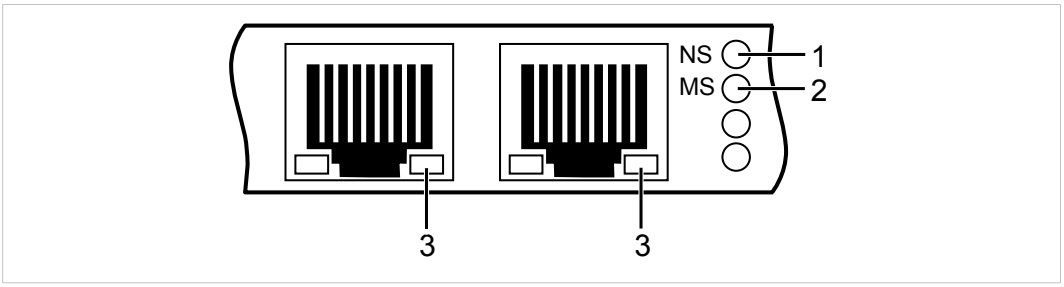


Fig. 10 LEDs PROFINET

1	LED NS
2	LED MS
3	Link/Activity LED

LED NS

LED state	Description	Comments
Off	Offline	No connection with IO controller
Green	Online (run)	Connection with IO controller established, IO controller in RUN state
Green single flash	Online (stop)	Connection with IO controller established: IO controller in STOP state, IO data bad, IRT synchronisation not finished
Green flashing	Blink	Used by engineering tools to identify node on network
Red single flash	Station name error	Station name not set
Red double flash	IP address error	IP address not set
Red triple flash	Configuration error	Expected information differs from real identification

LED MS

LED state	Description	Comments
Off	Not initialized	Interface in SETUP or NW_INIT state
Green	Operational	Interface in OPERATIONAL state
Green single flash	Diagnostic events	Diagnostic events present
Red	EXCEPTION error	Interface in EXCEPTION state
	If LED NS (**1**) also red: fatal error	Internal error
Flashing red and green	Firmware update	To avoid permanent damage, do not turn off the interface.

► If LED **NS** (**1**) and LED **MS** (**2**) are red contact HMS Industrial Networks technical support.

Link/Activity LED

LED state	Description	Comments
Off	No link	No link, no communication present
Green	Link	Ethernet link established, no communication present
Green flashing	Activity	Ethernet link established, communication present

8.6 Modbus

8.6.1 Features

The Modbus-TCP slave interface supports the following functions:

- Modbus-TCP server/slave (up to 4 simultaneous connections)
- web server with customizable content
- FTP server
- e-mail client
- JSON functionality
- Server Side Include (SSI) functionality
- customizable identity information
- Transparent Socket Interface

8.6.2 Operation (LEDs)

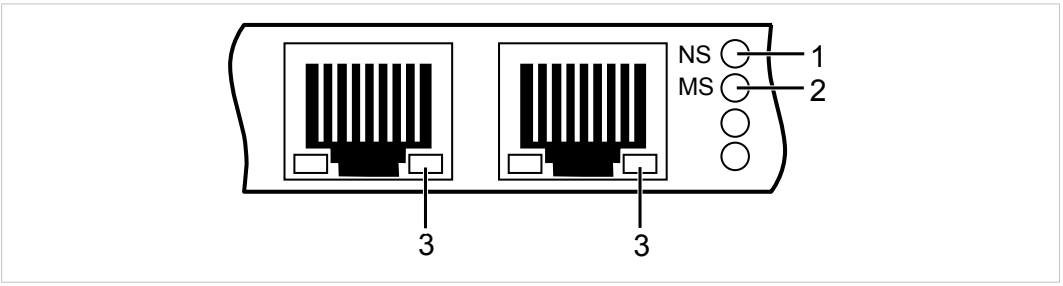


Fig. 11 LEDs Modbus

1	LED NS
2	LED MS
3	Link/Activity LED

LED NS

LED state	Description
Off	No IP address or EXCEPTION state
Green	At least one Modbus message received
Green flashing	Waiting for first Modbus message
Red	IP address conflict detected
	If LED MS (**2**) also red: fatal error
Red flashing	Connection timeout, no Modbus message received within configured process active timeout time

► If LED **NS** (**1**) and LED **MS** (**2**) are red contact HMS Industrial Networks technical support.

LED MS

LED state	Description
Off	Application not started
Green	OPERATIONAL state
Red	Error, fatal error
	If LED NS (**1**) also red: fatal error
Red flashing	Recoverable error
Flashing red and green	Firmware update from file in progress

► If LED **NS** (**1**) and LED **MS** (**2**) are red contact HMS Industrial Networks technical support.

Link/Activity LED

LED state	Description
Off	No link, no activity
Green	Link (100 Mbit/s) established
Green flashing	Activity (100 Mbit/s)
Yellow	Link (10 Mbit/s) established
Yellow flashing	Activity (10 Mbit/s)

9 Technical Specification

9.1 Technical Data

9.1.1 Standard and Low Profile

PC-Interface	PCI Express Base Specification, Rev 1.1, single lane port (x1)
Dimensions	64 x 105 mm
Weight	Approx. 52 g
Operating temperature	0 °C to +70 °C
Storage temperature	-40 °C to +85 °C
Power supply	Via PCIe socket (3.3/12 V DC)
Current consumption	Typ. 270 mA/3.3 V DC, 110 mA/12 V DC
Galvanic isolation	1,500 Vrms
Relative humidity	10 % to 95 %, no condensation

9.1.2 Mini Interface

PC-Interface	PCI Express Base Specification, Rev 1.1, single lane port (x1)
Form factor	F2: Full Mini with bottom-side keep outs
Dimensions	30 x 50.95 x 12 mm (with connected cable)
Weight	Approx. 26 g (interface, cable, bus coupling unit)
Operating temperature	-40 °C to +60 °C
Storage temperature	-40 °C to +85 °C
Power supply	Via PCIe (3.3 V DC)
Current consumption	Typ. 600 mA/3.3 V DC
Galvanic isolation	1,500 Vrms
Relative humidity	10 % to 95 %, no condensation

9.1.3 M.2 Interface

PC-Interface	PCI Express Base Specification, Rev 1.1, single lane port (x1)
Form factor	M.2 2260-D5-B-M
Dimensions	22 x 60 x 12 mm (with connected cable)
Weight	Approx. 25 g (interface, cable, bus coupling unit)
Operating temperature	-20 °C to +60 °C
Storage temperature	-40 °C to +85 °C
Power supply	Via PCIe (3.3 V DC)
Current consumption	Typ. 600 mA/3.3 V DC
Galvanic isolation	1,500 Vrms
Relative humidity	10 % to 95 %, no condensation

9.2 Ordering Information

- For ordering numbers and information see www.ixxat.com.

10 Support/Return Hardware

Observe the following information in the support area on www.ixxat.com:

- information about products
- FAQ lists
- installation notes
- updated product versions
- updates

10.1 Support

- ► For problems or support with the product request support at www.ixxat.com/support.
- ► If required use support phone contacts on www.ixxat.com.

10.2 Return Hardware

- ► Fill in the form for warranty claims and repair on www.ixxat.com/support/product-returns.
- ► Print out the Product Return Number (PRN resp. RMA).
- ► Pack product in a physically- and ESD-safe way, use original packaging if possible.
- ► Enclose PRN number.
- ► Observe further notes on www.ixxat.com.
- ► Return hardware.

11 Disposal

- ► Dispose of product according to national laws and regulations.
- ► Observe further notes about disposal of products on www.ixxat.com.

A Regulatory Compliance

A.1 EMC Compliance (CE)

The product is in compliance with the Electromagnetic Compatibility Directive. More information and the Declaration of Conformity is found at www.ixxat.com.

A.2 FCC Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

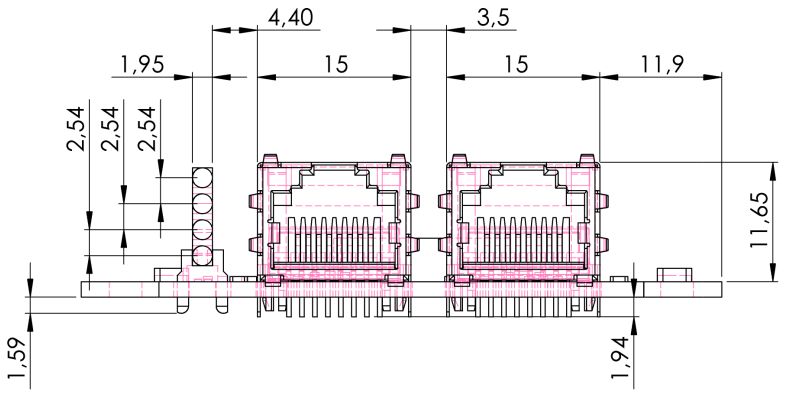
Product name	Ixxat INpact Slave PCIe
Model	CE/ETC/EIP/EIT/PIR/EPL/BCU ETH M12
Responsible party	HMS Industrial Networks Inc
Address	35 E. Wacker Dr, Suite 1700 Chicago , IL 60601
Phone	+1 312 829 0601

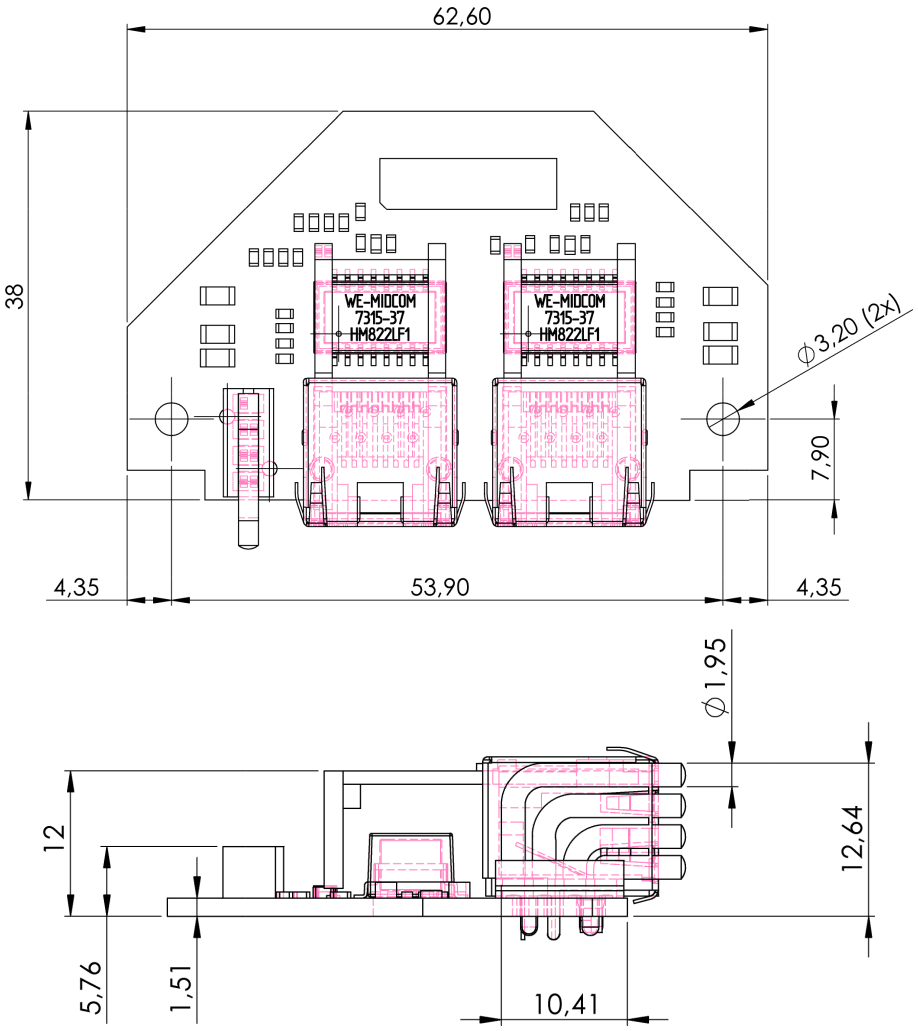
Any changes or modifications not expressly approved by HMS Industrial Networks could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

B Measurements

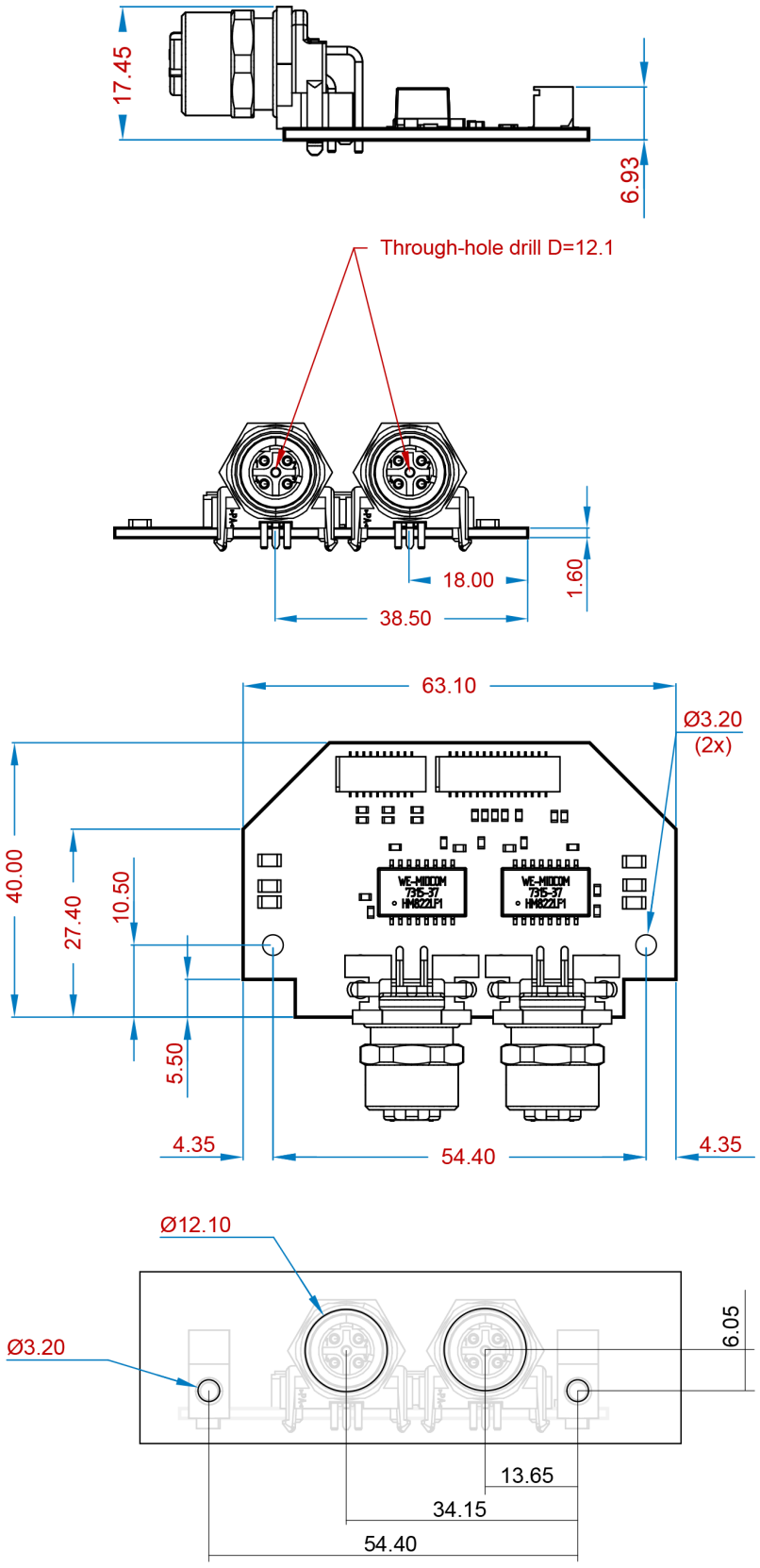
B.1 Ethernet Bus Coupling Unit





All measurements are in mm.

B.2 M12 Bus Coupling Unit



All measurements are in mm.

Box 4126
300 04 Halmstad, Sweden

info@hms.se
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