

Anybus .NET Bridge

Message Mode and Streamer Mode

STARTUP GUIDE

SP2292 1.3 en-US ENGLISH



Important User Information

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Table of Contents

Page

1	Preparation	3
1.1	About This Document	3
1.2	Trademarks.....	3
1.3	Document Conventions.....	4
1.4	Product Description	5
1.5	Prerequisites	7
2	Installation	8
2.1	Product Overview	8
3	Mechanical Installation.....	11
3.1	DIN Rail Mounting	11
3.2	Connecting to IT Network	12
3.3	Connecting to Industrial Network	12
3.4	Connecting to Power	13
4	.NET and PLC Application Development	14
5	Configuration	15
5.1	Configuring the .NET Bridge.....	15
5.2	IT Network Settings	15
5.3	Industrial Network Settings	16
6	Check Operating Status	17
7	Technical Specifications	19
A	TCP/IP Configuration	21
A.1	Installing the IPconfig Utility	21
A.2	Scanning for Connected Devices	21
A.3	Ethernet Configuration	22
A.4	IPconfig Settings	24

B	PROFIBUS Node Address Settings.....	26
C	LED Guide	27
C.1	LED Description	27
C.2	Operation State LED Status	31

1 Preparation

1.1 About This Document

This Startup Guide covers how to install and configure the .NET Bridge.

For more information on developing applications compatible with the .NET Bridge Message mode and Streamer Mode, refer to the .NET Bridge User Manuals, available at www.anybus.com/support.

1.2 Trademarks



EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

1.3 Document Conventions

The following formatting conventions are used in this document to indicate safety information and other content of specific importance:



WARNING

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



Caution

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



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.



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

1.4 Product Description

The .NET Bridge enables factory-floor data to be presented to .NET software applications.

Data sent from a PLC system can be used in .NET applications for statistics, analysis or maintenance.

Data can also be sent from the .NET environment to the PLC for use in daily operation.

The .NET Bridge is a state-of-the-art IT/OT bridge, easily bridging the gap between the operational technology (OT) and the information technology (IT).

The .NET Bridge can be used with a wide range of use cases, such as simple transfer of KPI values, advanced messages with structured data types and transfer of I/O data for big data.

The .NET Bridge acts as a translator between a function block in a PLC and a .NET object in a computer.

The .NET Bridge has two different modes:

Message Mode

A tag data structure is used and the communication is synchronized with handshake.

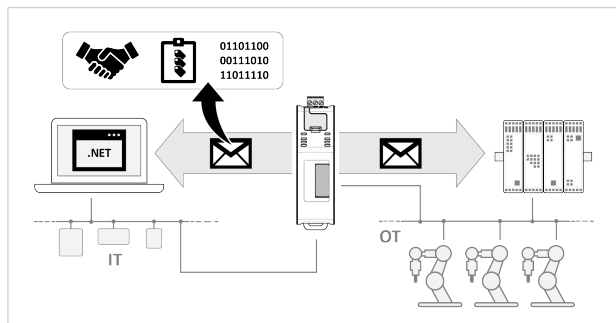


Fig. 1 Message Mode data exchange

Streamer Mode

Raw data is sent between the PLC and the .NET application.

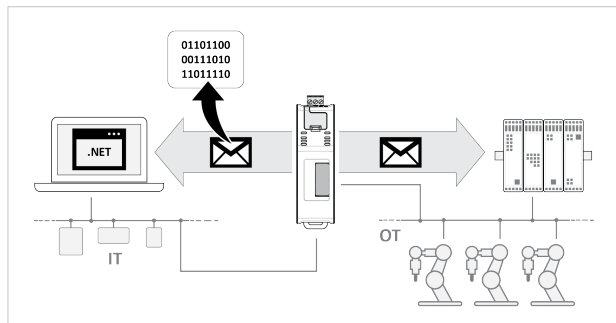


Fig. 2 Streamer Mode data exchange

1.5 Prerequisites

1.5.1 Wall Mount Option



When the .NET Bridge is used in an environment exposed to vibration, increased stability is required.

Use the *Wall-Mount Accessory Kit* and mount the device on a wall instead of a DIN rail.

The *Wall-Mount Accessory Kit* is ordered separately, please visit www.anybus.com for more information.

1.5.2 Required HMS Software

The following HMS software are required:

- Anybus .NET Bridge Setup: Includes Windows-based software needed during the message structure design process and to simulate the .NET application and the PLC application.
- IPconfig: A Windows-based software for configuration of TCP/IP settings in HMS devices.

Download the software applications at www.anybus.com/support.

1.5.3 Required Third Party Software

When developing .NET applications, the following third party software are required:

- Microsoft Excel, or equivalent software that supports the Office Open XML Workbook (xlsx) file format. Needed when using the .NET Bridge Message Mode.
- Microsoft Visual Studio
- Microsoft .NET Framework SDK version 4.5 or later.



On the production computer where the .NET application is installed, only the .NET Framework 4.5 (or later) runtime is required.



.NET Core Runtime is not supported.

2 Installation

2.1 Product Overview

2.1.1 External Parts

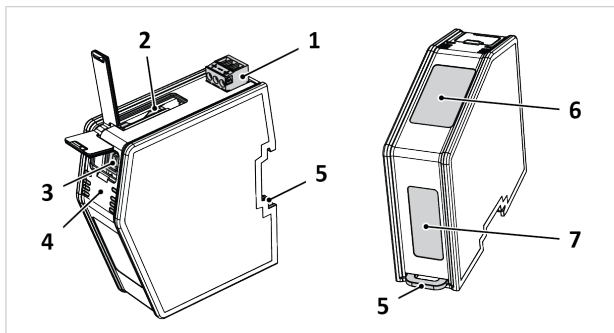


Fig. 3 .NET Bridge external parts

- | | |
|--|---|
| 1. Power Connector | 4. Status LEDs |
| 2. SD Card Slot (Currently not in use.) | 5. DIN Rail Connector |
| 3. USB Port | 6. Industrial Network Connectors |
| | 7. IT Network Connectors |

2.1.2 Network Connectors

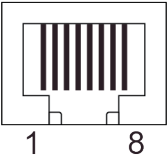
RJ45 Connector

The RJ45 Connectors located at the front of the .NET Bridge are used to connect the .NET Bridge to an industrial network.



On the .NET Bridge for PROFIBUS there is a D-sub Connector at the front.

The RJ45 Connectors located at the bottom of the .NET Bridge are used to connect the .NET Bridge to a IT network.

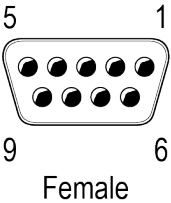
Pin No.	Description	Connector
1	TX+	
2	TX-	
3	RX+	
6	RX-	
4, 5, 7, 8	Not connected	
Housing	Shield	

D-sub Connector

The D-sub Connector is used to connect the .NET Bridge to a PROFIBUS network.

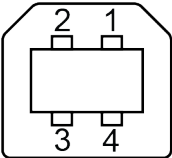


On the .NET Bridge variants for EtherCAT, PROFINET and EtherNet/IP there is an RJ45 Connector at the front.

Pin No.	Description	PROFIBUS Connector DB9F
3	B-line	
4	RTS	
5	GND bus	
6	+5 V bus out	
8	A-line	
1, 2, 7, 9	Not connected	
Housing	PE (Protective Earth)	

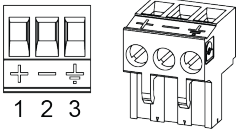
2.1.3 USB Port Type B

The USB Port Type B is used to connect a PC to the .NET Bridge to perform firmware upgrades.

Pin No.	Description	Connector
1	+5 V Input	
2	USBDM (USB communication signals)	
3	USBDP (USB communication signals)	
4	Signal GND	
Housing	Cable shield	

2.1.4 Power Connector

The Power Connector is used to connect the .NET Bridge to power and to Protective Earth (PE).

Pin No.	Description	Connector
1	+24 V DC -15% to +20%	
2	GND	
3	Protective Earth (PE)	

3 Mechanical Installation

3.1 DIN Rail Mounting

The .NET Bridge is designed to be mounted on a DIN rail.

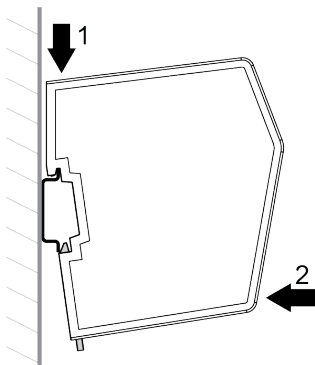
Before You Begin



The unit must be electrically grounded through the DIN rail for EMC compliance. Make sure that the unit is correctly mounted on the rail and that the rail is properly grounded.

Procedure

Mount the .NET Bridge on DIN rail:

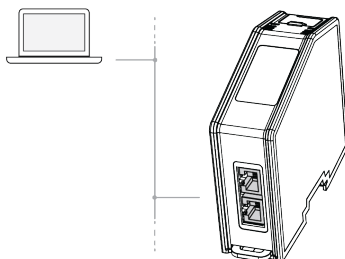


1. Hook the .NET Bridge DIN Rail Connector on the DIN rail.
2. Push the .NET Bridge against the DIN rail to make it snap on.

3.2 Connecting to IT Network

Connect the .NET Bridge to the IT network, where the device with the .NET application is installed.

Procedure

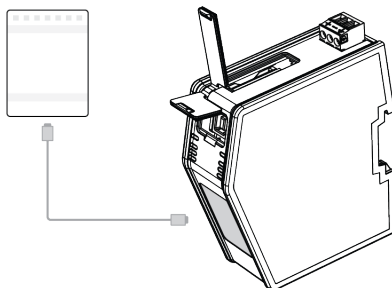


1. Connect the .NET Bridge to the IT network via the dual port switch.

3.3 Connecting to Industrial Network

Connect the .NET Bridge to the industrial network, where the PLC is installed.

Procedure



1. Connect the .NET Bridge to the PLC via the network connectors.

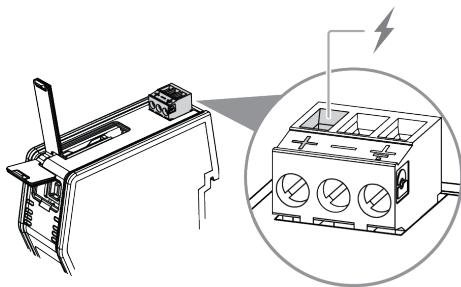
3.4 Connecting to Power

Connect the .NET Bridge to a power source.



Connecting power with reverse polarity or using the wrong type of power supply may damage the equipment. Make sure that the power supply is connected correctly and of the recommended type.

Procedure



1. Connect the .NET Bridge to a power source via the +24 V DC Power Connector.

4 .NET and PLC Application Development

The process of designing the communication between the .NET application and the PLC application and how to develop applications compatible with the .NET Bridge Message mode and Streamer Mode are described in the .NET Bridge User Manuals.

Download the .NET Bridge User Manuals from www.anybus.com/support.

5 Configuration

5.1 Configuring the .NET Bridge

The .NET Bridge must be configured before it can be connected to the IT network and the industrial network and before network settings, such as IP addresses, can be changed.

Before You Begin

The .NET Bridge comes with the default IP address *192.168.1.3* for the IT network.

Procedure

Configure the .NET Bridge:

1. Connect the .NET Bridge to the IT network,
where the PC device with the .NET application, developed for the .NET Bridge, is installed.
2. Start your .NET application.
→ The .NET application connects to the .NET Bridge and configures it.

To Do Next

Continue with the .NET Bridge IT network and industrial network settings.

5.2 IT Network Settings

The .NET Bridge comes with the default IP address *192.168.1.3* for the IT network.

Assign an IP address to the .NET Bridge, on the IT network where the .NET Bridge is installed.

Use IPconfig to assign the new IP address, refer to [TCP/IP Configuration, p. 21](#)

5.3 Industrial Network Settings

Depending on the industrial network type, assign an IP address or a node address to the .NET Bridge, on the industrial network where the .NET Bridge is installed.

Industrial Network	Settings	Software/Device/Web
EtherNet/IP	Assign an IP address to the .NET Bridge.	IPconfig
PROFINET	Assign an IP address to the .NET Bridge.	IPconfig Tip: You can use the PROFINET controller to assign the IP address.
PROFIBUS	Assign a PROFIBUS node address to the .NET Bridge.	Anybus .NET Bridge Web Interface
EtherCAT	Scan the EtherCAT network to locate the .NET Bridge using the EtherCAT PLC. The .NET Bridge is automatically assigned an node address by the PLC.	EtherCAT PLC

For information about IPconfig, refer to [IT Network Settings, p. 15](#).

For information about Anybus .NET Bridge Web Interface, refer to [PROFIBUS Node Address Settings, p. 26](#).

6 Check Operating Status

When the application development and installation are completed, verify that the .NET Bridge is in operation.

Before You Begin

Ensure that the:

- .NET application is installed on the PC device and is running.
- PLC application is downloaded on the PLC and is running.
- .NET Bridge IP settings are configured for the IT network.
- .NET Bridge IP/Node settings are configured for the industrial network.
- .NET Bridge is connected to the IT network and to the industrial network.

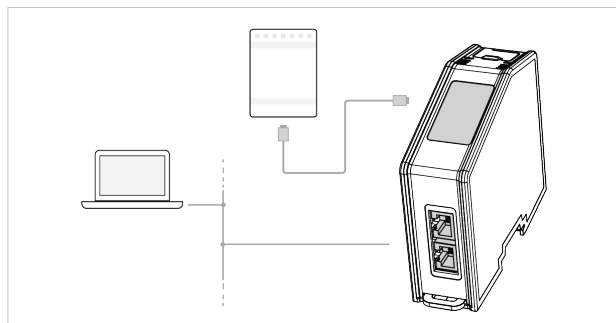


Fig. 4 .NET Bridge connected to IT network and industrial network

- .NET Bridge is connected to power.

Procedure

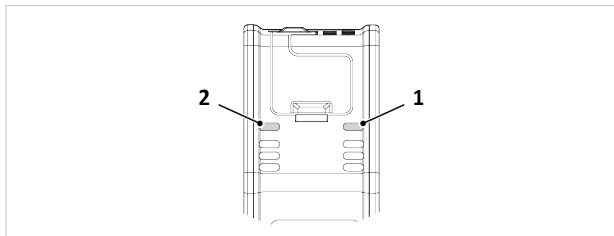


Fig. 5 IT Status LED (1) and OT Status LED (2)

IT network Operating Status

1. When the .NET Bridge is connected to the IT network:
 - The .NET application connects to the .NET Bridge.
 - The IT Status LED (1) start blinking slowly green.

Industrial network Operating Status

2. When the .NET Bridge is connected to the industrial network:
 - The PLC application connects to the .NET Bridge.
 - The IT Status LED (1) and the OT Status LED (2) turn solid green.

For more information about the LED status indicators, refer to [LED Guide, p. 27](#)

7 Technical Specifications

Order code	AB9077-C — Anybus .NET Bridge PROFINET AB9078-C — Anybus .NET Bridge EtherNet/IP AB9079-C — Anybus .NET Bridge EtherCAT AB9071-C — Anybus .NET Bridge PROFIBUS
Dimensions	110•35•101 mm, 4,33•1,38•3,98"
Weight	160 g, 0,35 lb
Operating temperature	-25 to +70 °C, -13 to +158 °F
Storage temperature	-40 to +85 °C, -13 to +185 °F
Relative Humidity	5-95% noncondensing
Protection class	IP20, NEMA rating 1
Mounting	DIN rail (35•7,5/15) or Wall mount
Current consumption	Typical: 150 mA @ 24 V DC
Power consumption	24 V DC +/- 10%
Certifications	Refer to datasheet at www.anybus.com/support .

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A TCP/IP Configuration

A.1 Installing the IPconfig Utility

IPconfig is a Windows-based tool for configuration of TCP/IP settings in HMS devices. The tool will detect all compatible and active HMS devices on the local network.

1. Download IPconfig from www.anybus.com/support.
2. Unpack the contents of the zip archive and run the installer program.

A.2 Scanning for Connected Devices

When IPconfig is started it will automatically scan all available local networks for HMS devices. Detected devices will be listed in the main window. To refresh the list, click on **Scan**.

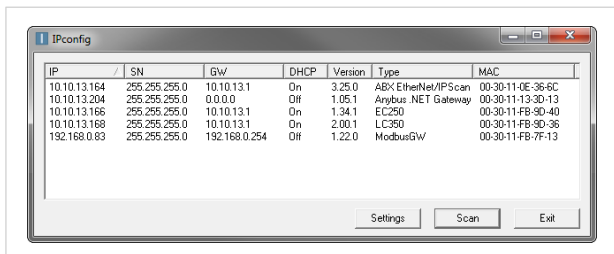


Fig. 6 IPconfig main window

IP	IP address of the device
SN	Subnet mask
GW	Default gateway
DHCP	Automatically managed IP configuration
Version	Firmware version
Type	Product name
MAC	Ethernet MAC address (System ID)

A.3 Ethernet Configuration

To change the IP settings for a device, double-click on the entry in the main window or right-click on it and select **Configuration**.

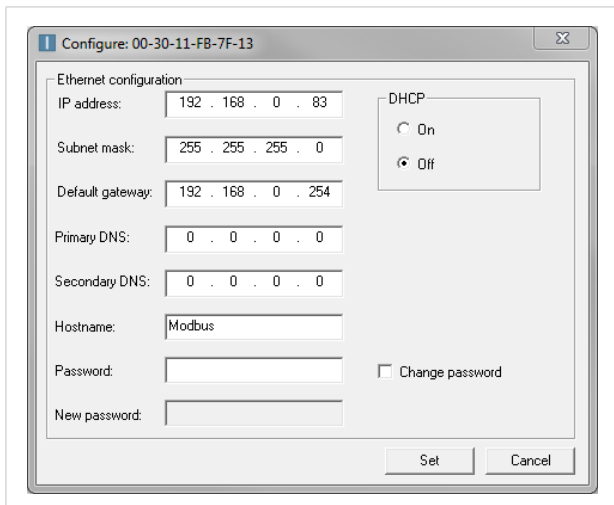


Fig. 7 Ethernet configuration

Enter static IP settings as required, or select DHCP if using dynamic IP addressing.



Do not enable DHCP if there is no DHCP server available on the network.

You can add a name for the device in the **Hostname** field. Only characters a–z, A–Z, 0–9 and _ (underscore) are allowed.

The default password for changing IP settings is blank (no password). If a password has been set for the device you must enter it to be able to change the settings.

To set a new password, check the **Change password** box and enter the current password in the **Password** field, then enter the new password in the **New password** field.



For security reasons the default password should always be changed.

Click on **Set** to save the new settings. The device will reboot automatically.

A.4 IPconfig Settings

Additional settings for IPconfig can be accessed by clicking on **Settings**.

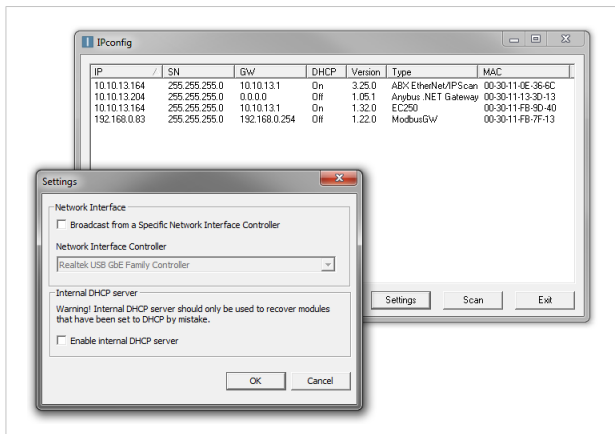


Fig. 8 IPconfig settings

Network Interface

Check this option to select a specific network interface to use when scanning for devices from a computer which has more than one interface. If this option is left unchecked, all available networks will be scanned.

Internal DHCP Server

If a device has been set to use DHCP but there is no DHCP server on the network, the device may not be detected by IPconfig. To recover access to the device an internal DHCP server in IPconfig can be temporarily activated:

1. Click the checkbox for **Internal DHCP Server**, then click **OK**. IPconfig will automatically refresh the scan and list the missing device in the main window.
2. Select the device and configure it to use static IP addressing instead of DHCP.
3. Disable the internal DHCP server.



Do not enable the internal DHCP server if there is already an active DHCP server on the network.

B PROFIBUS Node Address Settings

Use the Anybus .NET Bridge Web Interface to assign a PROFIBUS node address for the .NET Bridge, on the PROFIBUS network where the .NET Bridge is installed.

Before You Begin

Ensure that the .NET Bridge is connected to the same network as the device that is running the web browser.

Procedure

Assign a PROFIBUS node address:

1. In your web browser, type the .NET Bridge IP address and enter the Anybus .NET Bridge Web Interface start page.



Fig. 9 PROFIBUS DP-V1 Configuration pane

2. In the PROFIBUS DP-V1 Configuration pane, enter the desired PROFIBUS node address.
3. Click **Store settings**.
4. Restart the .NET Bridge.

Result

→ The change take effect after restart.

C LED Guide

C.1 LED Description

The .NET Bridge has eight LED status indicators located at the front.

The following tables describes what the different status indications mean.

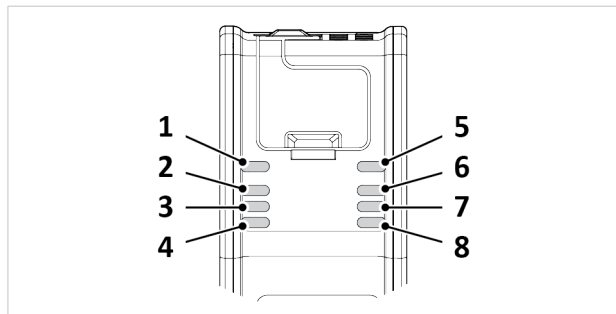


Fig. 10 .NET Bridge LED Status Indicators

General LED Status Indicators:

LED	Name	Indication	Description
1	OT OT Status	Off	Power off
		Green	Connection to PLC
2	SIM PLC Simulation	Green	Simulation started
		Green,	Simulation enabled
		blinking	Simulation mode is off
		Off	
3, 4	Network specific	-	Refer to information about network specific LED status indicators.
5	IT IT status	Off	Disconnected
		Green, fast blink	Connection to IT network
		Green, slow blink	Pre-operational. Connected to IT and OT network. No I/O data exchange.
		Green	Normal operation. I/O data exchange

General LED Status Indicators: (continued)

LED	Name	Indication	Description
		Red, blinking	If this LED and the Power LED both are red, this indicates a fatal error
6	PWR Power	Green	Power on
		Red	If this LED and the IT LED both are red, this indicates a fatal error
7, 8	LA1, LA2 Ethernet Link 1 and 2	Off	No link
		Flashing green	Receiving/transmitting Ethernet packets at 100 Mbit
		Flashing yellow	Activity, receiving/transmitting Ethernet packets at 10 Mbit
		Yellow	Boot up

Status LED indicator (3) and (4) indicates different activities depending on industrial networks.

EtherNet/IP specific LED Status Indicators:

LED	Name	Indication	Description
3	MS Module Status	Off	No power
		Green	Controlled by a scanner in Run state
		Flashing green	Not configured, or scanner in Idle state
		Red	Major fault
		Flashing red	Recoverable fault(s). Module is configured, but stored parameters differ from currently used parameters
4	NS Network Status	Off	No power or no IP address
		Green	Online, connection established
		Flashing green	Online, no connection established
		Red	Duplicate IP address, FATAL error on the OT network interface
		Flashing red	Connection timed out

EtherCAT specific LED Status Indicators:

LED	Name	Indication	Description
3	RUN	Off Green Blinking green Green, one flash Flickering Red	INIT OPERATIONAL PRE-OPERATIONAL SAFE-OPERATIONAL BOOT If RUN and ERR both turn red, this indicates a fatal event. Contact HMS support
4	ERR	Off Blinking red Red Red, one flash Red, two flashes Flickering	No error Invalid configuration Application controller failure. If RUN and ERR both turn red, this indicates a fatal event. Contact HMS support Unsolicited state change Sync manager watchdog timeout Bootling error detected

PROFIBUS specific LED Status Indicators:

LED	Name	Indication	Description
3	OP Network Status	Off Green Green, flashing Red, one flash Red, two flashes	Not online Online, data exchange Online, clear Parametrization error PROFIBUS configuration error
4	ST Module Status	Off Green Green, flashing Red	Not initialized Initialized Diagnostic event Fatal error

PROFINET specific LED Status Indicators:

LED	Name	Indication	Description
3	NS Network Status	Off	No connection
		Green	Online (RUN): Connection established, IO controller in RUN state
		Green, one flash	Online (STOP): Connection established, IO controller in STOP state
		Green, three flashes	Used to identify the slave
		Red	Fatal error
		Red, one flash	Device name error
		Red, two flashes	IP address error
		Red, three flashes	Configuration error
4	MS Module Status	Off	Not initialized
		Green	Normal operation
		Green, one flash	Diagnostic event
		Red	Fatal error
		Alternating red/ green	Firmware update

C.2 Operation State LED Status

The .NET Bridge operation state is indicated by the LED status indicators.

State	LED Status	Description
Start up	IT: Off OT: Off	The .NET Bridge is connected to power and started but not yet connected to the .NET application or the PLC.
IT connected OT not connected	IT: Fast green blink OT: Off	The .NET Bridge is connected to the .NET application and has initialized the communication interface to the PLC, but there is no communication between the .NET Bridge and the PLC.
Pre-operational	IT: Slow green blink OT: Green	The .NET application and the PLC are both connected to the .NET Bridge. No I/O data exchange.
Operational	IT: Green OT: Green	The system is fully functional. I/O data exchange.
IT Disconnected OT connected	IT: Off OT: Green	The .NET application is disconnected from the .NET Bridge, after exchanging data in Operational state. The PLC side is still active.

