



User Guide

Scanner Fieldbus Interface Electronics

IPG Photonics



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Preface:

Please take time to read and understand this User's Guide in its entirety and familiarize yourself with the operating and maintenance instructions that we have compiled for you before you use the product. We strongly recommend that all operators of the product read and pay particular attention to all safety information contained herein prior to operating the product.

This User's Guide should stay with the product to provide you and all future operators, users and owners of the product with important operating, safety and other information.

For technical assistance concerning the product, contact IPG Customer Service.

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1 Safety Information

1.1 Safety Conventions

IPG Photonics use various words and symbols in this User's Guide that are designed to call your attention to hazards or important information. These include:

WARNING:  

Refers to a potential *personal* hazard. ( **Electrical**) ( **Laser radiation**) It requires a procedure that, if not correctly followed, may result in bodily harm to you and/or others. Do not proceed beyond the WARNING sign until you completely understand and meet the required conditions.

CAUTION: 

Refers to a potential *product* hazard. It requires a procedure that, if not correctly followed, may result in minor personal injury or damage or destruction to the product or components. Do not proceed beyond the CAUTION sign until you completely understand and meet the required conditions.

IMPORTANT

Refers to any information regarding the operation of the product. Please do not overlook this information.

1.2 General Safety Instructions

WARNING:  

This product is intended to be used with a laser. Read and observe all safety instructions provided with the laser.

1.3 Electrical Safety

CAUTION: 

The Scanner Fieldbus Interface Electronics operates on 24V DC input.

Do not open the SFIE enclosure as there may be hazardous switching voltages inside. Do not operate SFIE in a wet environment.

2 Scope of Document

This document covers the connection, configuration, calibration, and safe use of the Scanner Fieldbus Interface electronics box.

3 Product Description

The Scanner Fieldbus Interface is used to transfer status and control information between a customer's Fieldbus device and IPG's Scanner Controller. This allows customers to run jobs previously stored on a Scan Controller and monitor the status of those jobs via a Fieldbus interface. The format of these status and control i/o packets is specified in a separate document: "Scanner Fieldbus Interface Guide".

3.1 Definition of Terms

SFI: Scanner Fieldbus Interface.

SFIE: Scanner Fieldbus Interface Electronics.

3.2 Connections

The Scanner Fieldbus Interface Electronics has connections to both a Scan Controller and to customer equipment. Refer to the Block Diagram in section 3.3.

3.2.1 Connections to the Scan Controller

The Scanner Fieldbus Interface Electronics connects to the Scan Controller electronics with a high flex cable (20m standard length).

- Data Signal: M12x4 position female to a serial interface adapter (#CEKBASY0000106PX).

3.2.2 Connections to Customer Components

The customer supplies 24 VDC to the SFIE via 3W3 connector. In addition, there is a user Ethernet connector and a Field Bus Ethernet connector.

- User Ethernet: RJ45 connection used for diagnostics.
- Field Bus Ethernet: RJ45 connection used for field bus communication (PROFINET, Ethernet I/P or EtherCAT).
- Power: +24VDC, return, and earth ground on 3W3 connector. (connector and pins provided)
- Ground lug: A screw is provided on the side panel for earth ground attachment
- Analog IO: (this connector is not used)
- Digital IO: (this connector is not used)

3.3 Block Diagram

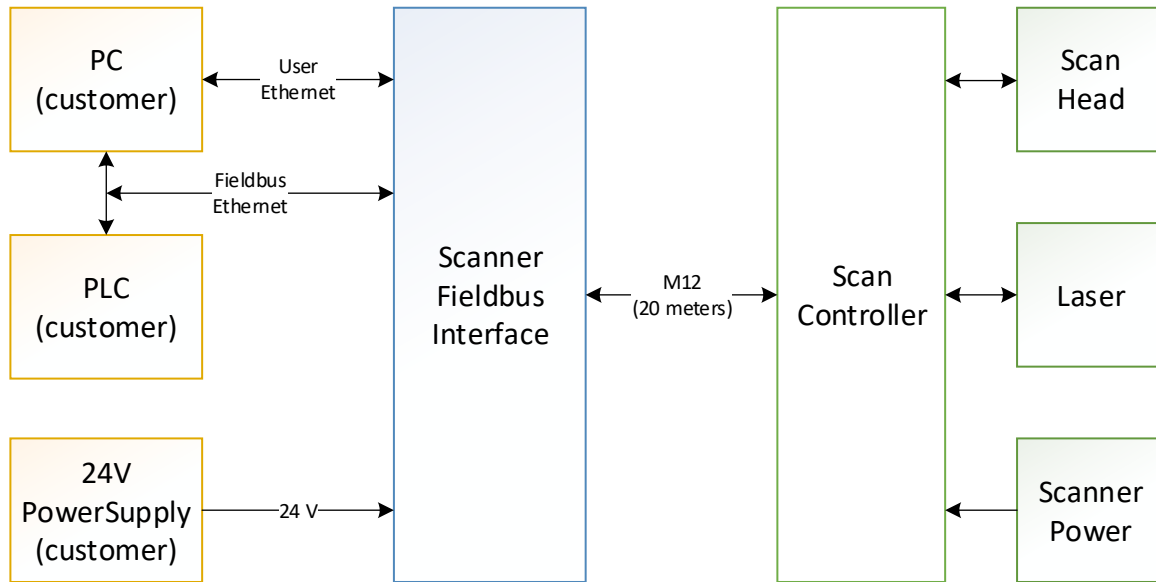


Figure 1: Scanner Fieldbus Interface, Customer components, Scan Controller

3.4 Product Views

Views of Scanner Fieldbus Interface Electronics Enclosure



Figure 2: Scanner Fieldbus Interface enclosure.

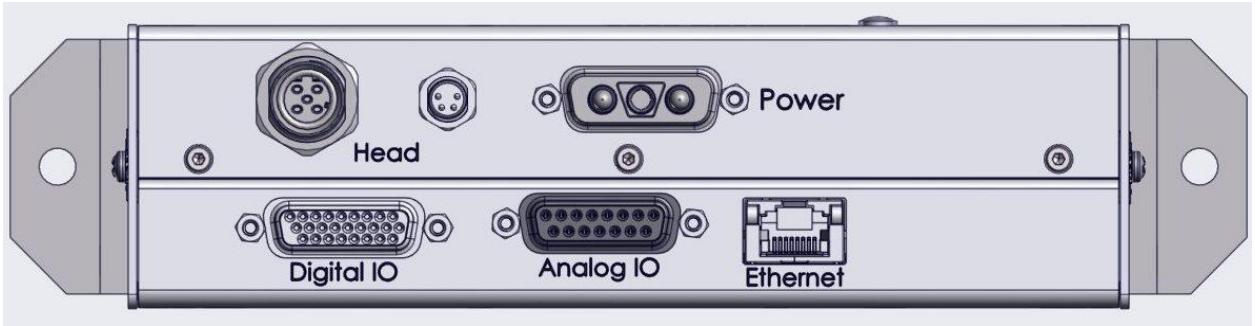


Figure 3: Front view showing various connectors.

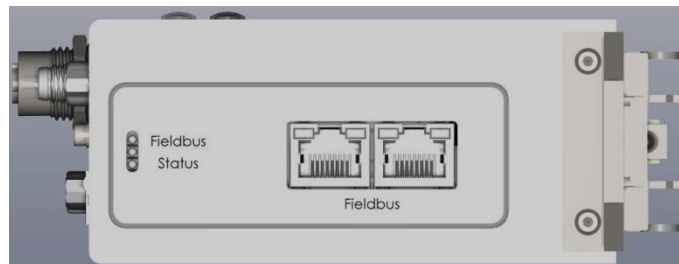


Figure 4: Top view showing status LEDs and Field Bus Ethernet connectors.

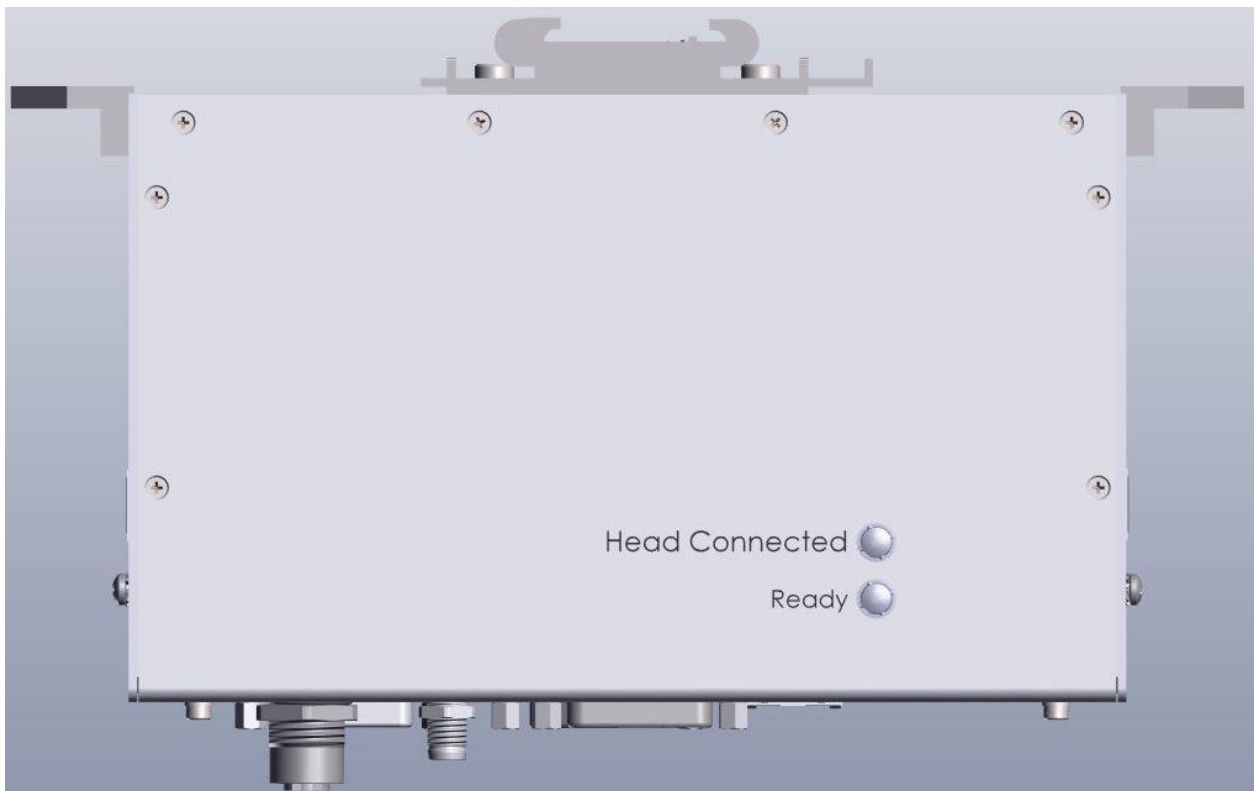


Figure 5: Left side view showing two status lights, Ready and Head Connected.

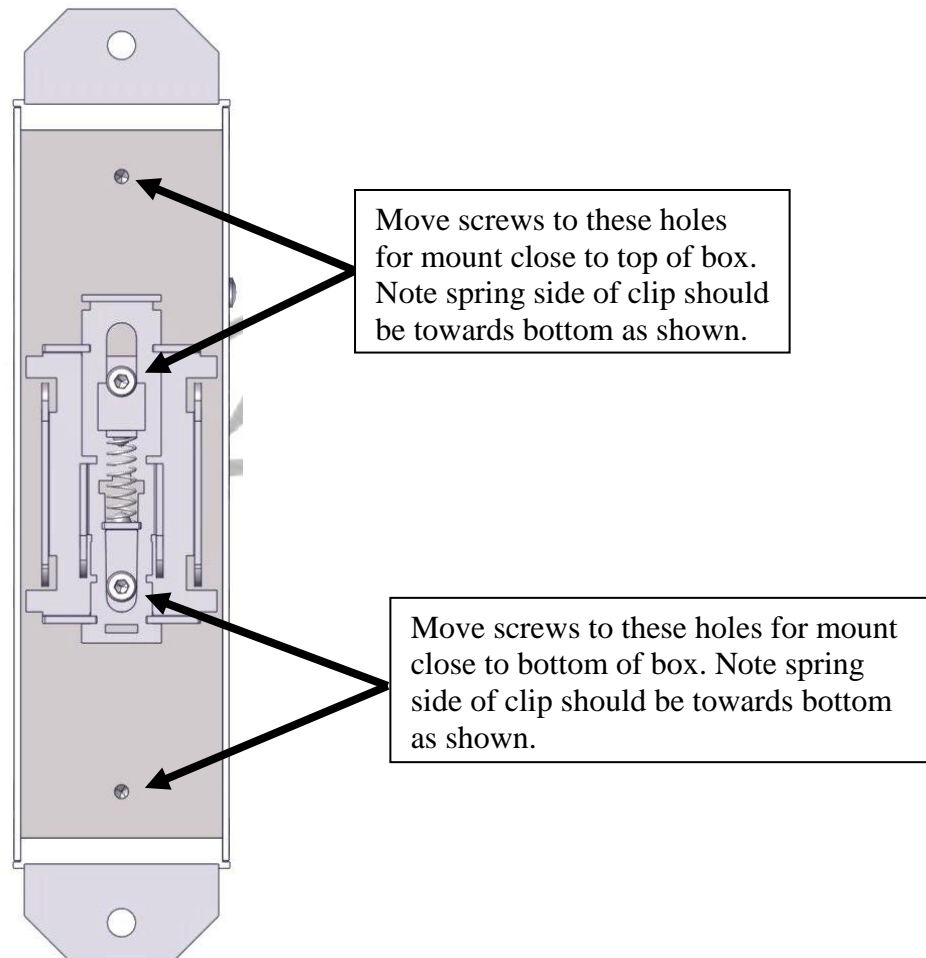


Figure 6 View of rear of base. DIN Rail Mount comes centered but may be adjusted higher or lower by inserting screws in lower or upper set of holes instead of center holes.

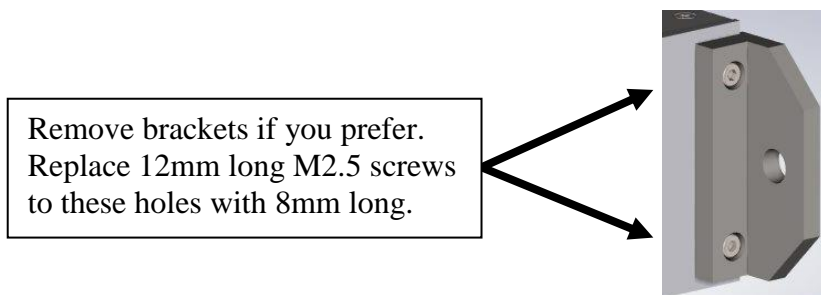
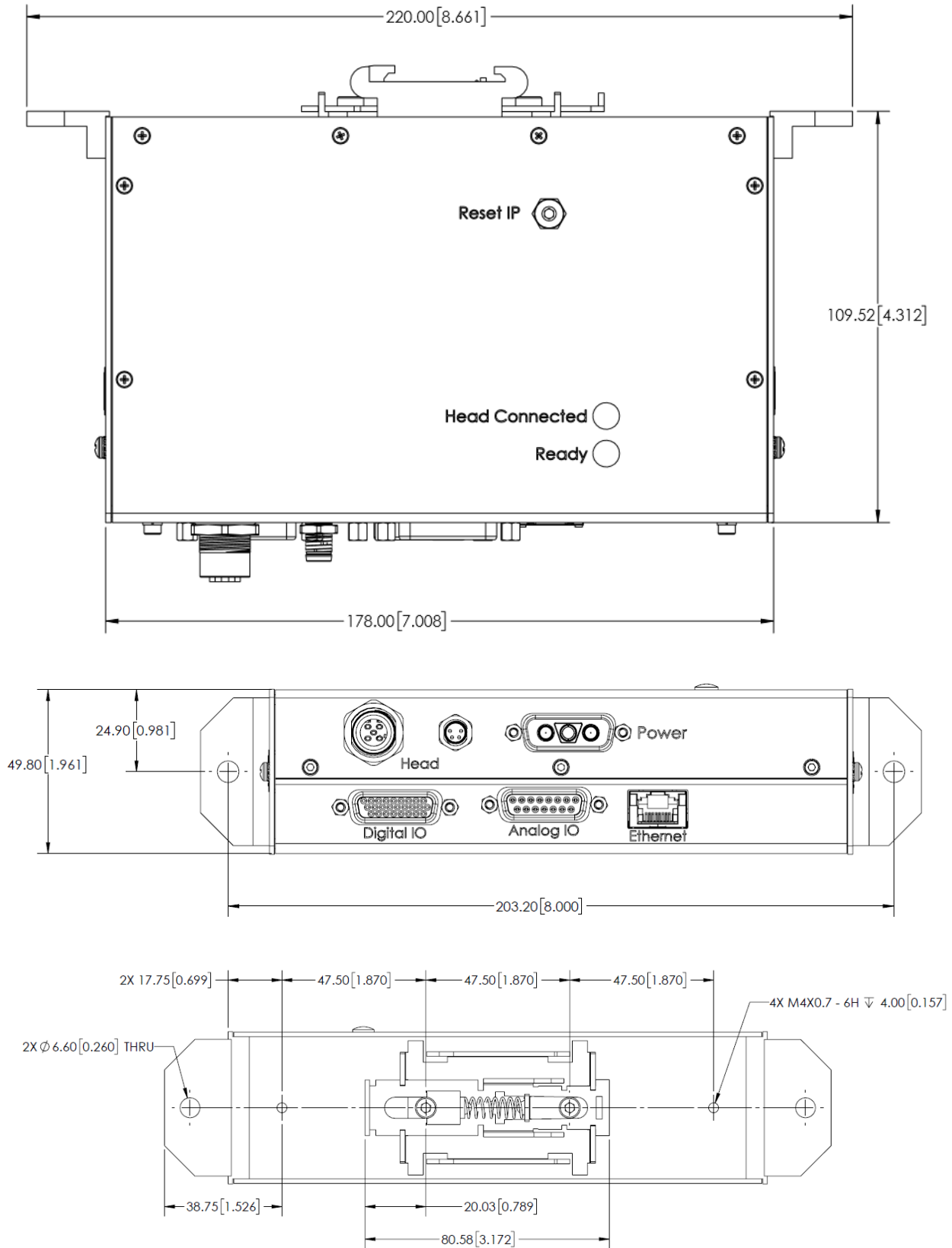


Figure 7: Two mounting tabs may be removed if not used to reduce footprint. Remove the bracket and replace the M2.5 x 12 screws with M2.5 x .45 x 8 screws (not provided).

3.5 Dimensions



3.6 Status LEDs

3.6.1 Ready

The Ready light located on the left side panel is lit when the base is in READY state- Powered up and no alarms. Note alarms must be cleared after correction for Ready to return. Alarms may be cleared by command, web page, or digital input.

3.6.2 Head Connected

The Head Connected light located on the left side panel shows the status of communication with the Scan Controller.

Light	Description	D50 Head	Compact Head
On Solid	Head connected	Yes	Yes
Slow Blink	Base is not communicating with Head	Yes	Yes
Fast Blink	Base is communicating with Head Controller, but there is an issue with height sensor board connection to head controller.	Yes	Not Applicable
Off	No power to base or base failure	Yes	Yes

3.6.3 Ethernet

There are two small LEDs on the diagnostic Ethernet connector.

LED on Left is Green when there is power to the board.

LED on Right is Yellow when connected to host computer.

3.6.4 Fieldbus

There are LEDs on the Fieldbus Ethernet Connectors and three LEDs to the left of the connector.

Ethernet Connectors have Link and Active LEDs

	Fieldbus Type		
	EtherCAT	PROFINET	Ethernet/IP
Top LED	ERR	BF	NS
Middle LED	RUN	SF	MS
Bottom LED	SYS	SYS	SYS

4 Installation, Configuration and Operation

4.1 Maximum cable lengths

Connection from SFIE to Customer

Cable	Type	Maximum length
User Ethernet	RJ45-RJ45	23m (75 ft)
Fieldbus Ethernet	RJ45-RJ45	23m (75 ft)
Power	DB 3W3	5m (16 ft)

Connection from SFIE to Scan Controller

Cable	Type	Maximum length
Data	M12	20m (65 ft)

4.2 Installation: SFIE Connections

- Turn off power to SFIE.
- Turn off power to the Scan Controller.
- Connect the M12 cable from the SFIE to the Scan Controller.
- Connect the User Ethernet cable from the SFIE to the customer's PC.
- Connect the Fieldbus Ethernet cable from the SFIE to the customer's PLC.
- Make up a 3 wire power cable for 24VDC, return, and ground using supplied 3W3 connector. Connect this power cable from the power supply to the SFIE.

4.3 User Ethernet Interface

The User Ethernet Interface connector is provided to allow bidirectional communication with the SFIE from a Customer supplied Laptop or Computer. The SFIE Web Interface is accessed by browsing to the SFIE IP Address. The SFIE uses a fixed IP address that may be later changed by the user to a different fixed address. Adding a second Ethernet interface to your PC (such as USB to Ethernet adapter) to connect with the SFIE, will allow the computer to still be on a network if desired. The SFIE may be operated without using the User Ethernet.

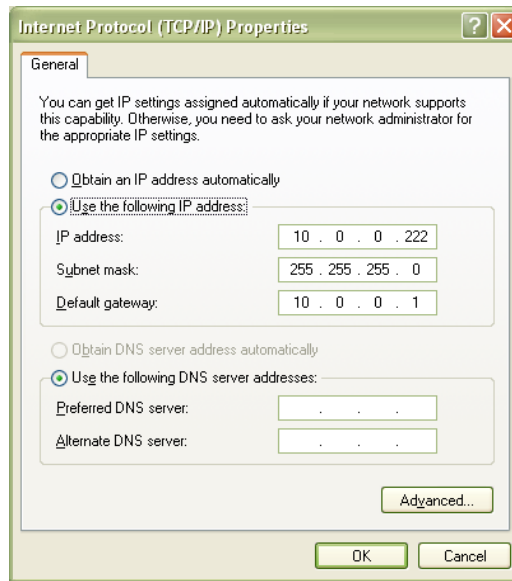
Plug the Ethernet connector from the computer into the "Ethernet" RJ-45 jack and not the optional Ethernet based Field Bus connectors.

4.3.1 User Ethernet Interface Setup

The SFIE User Ethernet has a default fixed IP address of 10.0.0.20 and it is recommended that you use that address unless you need to change it. The process for changing the SFIE IP address to a different IP address is covered in section 4.3.2.

Configure the Ethernet interface of the host computer or laptop Internet Protocol (TCP/IP) properties to have a fixed IP address of 10.0.0.xxx where xxx can be any number between 50 and 230. Example:

IP address:	10.0.0.222
Subnet Mask	255.255.255.0
Default gateway	10.0.0.1



Note a second Ethernet Adapter such as a USB to Ethernet adapter may be necessary or convenient should you want to retain a network connection using the primary port.

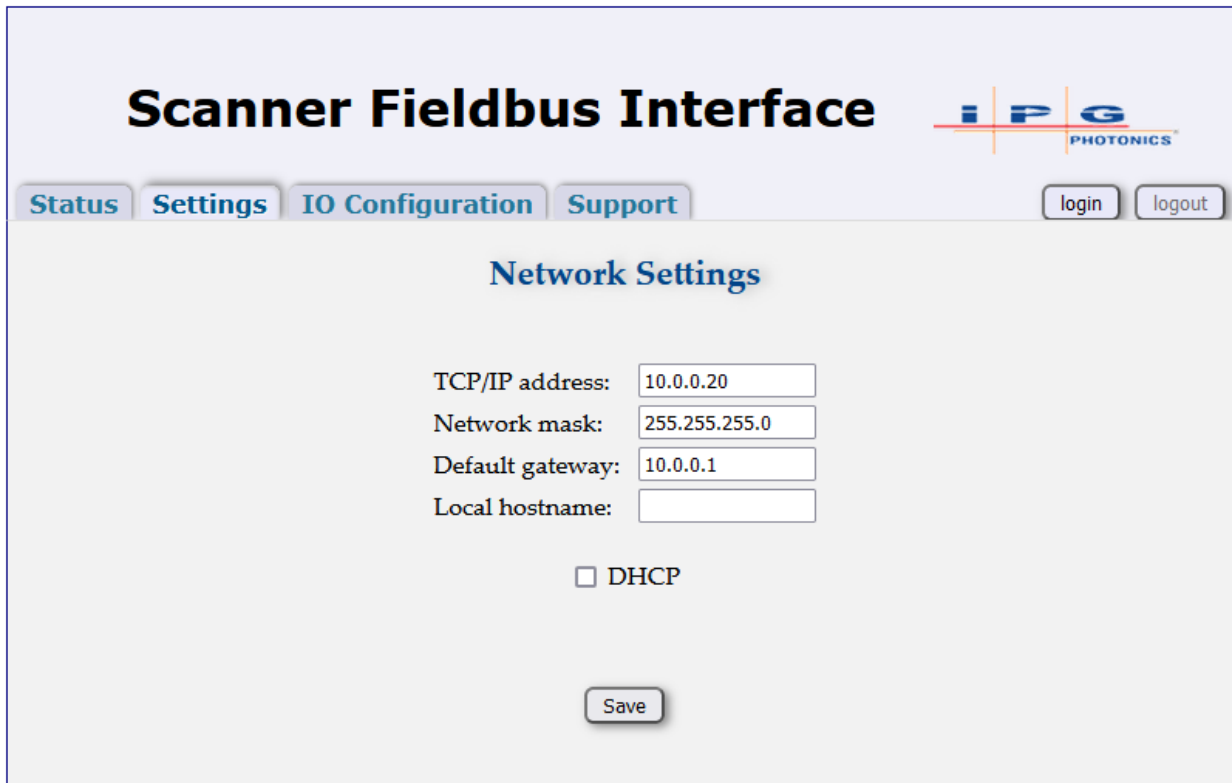
4.3.2 Configuring the SFIE User Ethernet for a different IP Address

It is recommended you stay with the default address 10.0.0.20 unless necessary to change. This section covers modifying the Ethernet address to a user selected value.

When you change the controller IP address of the you must then also change the IP address of the host computer to be in the same range of addresses.

Procedure for changing the Ethernet IP address on the Scanner Fieldbus Interface Electronics.

1. Configure PC Ethernet port to communicate with at the Current Ethernet address.
2. Connect Ethernet cable from PC to "User Ethernet" input.
3. Connect Power to controller
4. Open browser (e.g. Internet Explorer or Chrome) web page to http://10.0.0.20 or the current Ethernet Address. The current IP address of the CHCE will be shown on the CHCE display on power up. Enter the current IP address for the CHCE instead of the default 10.0.0.20 if it was previously changed.
5. The WEB server window should open.
6. Select "Settings" tab.



The screenshot shows the 'Scanner Fieldbus Interface' web page. At the top, there is a navigation bar with tabs for 'Status', 'Settings', 'IO Configuration', and 'Support'. The 'Settings' tab is selected. To the right of the navigation bar are 'login' and 'logout' buttons. Below the navigation bar, the page title is 'Network Settings'. The settings are as follows:

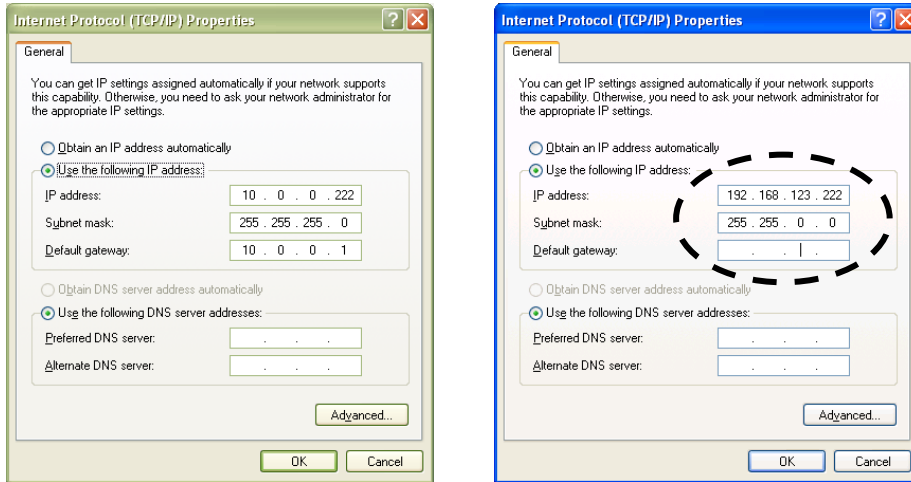
TCP/IP address:	<input type="text" value="10.0.0.20"/>
Network mask:	<input type="text" value="255.255.255.0"/>
Default gateway:	<input type="text" value="10.0.0.1"/>
Local hostname:	<input type="text"/>

Below the input fields, there is a checkbox labeled 'DHCP' which is currently unchecked. At the bottom of the settings area, there is a 'Save' button.

7. Enter new IP parameters, and press the Save button. Set the default gateway to the same as the TCP/IP address with the last digit as 1. A dialog box will open and if ok will say 'New Setting Saved'. Click OK, Exit the Browser. **YOU MUST POWER CYCLE CHCE FOR NEW IP ADDRESS TO TAKE EFFECT.**

Note: Once the IP address of the Controller has been changed via the web interface, you must update the IP address in Internet Explorer to the new address. For example, above to see the webpage after making the change you should go to http://196.168.123.89. Should you need to change IP address again you go to the current IP address for the CHCE instead of 10.0.0.20.

8. Be sure to configure the Ethernet interface of the host computer or laptop Internet Protocol (TCP/IP) properties to have a fixed IP address in the range of the newly changed CHCE address:

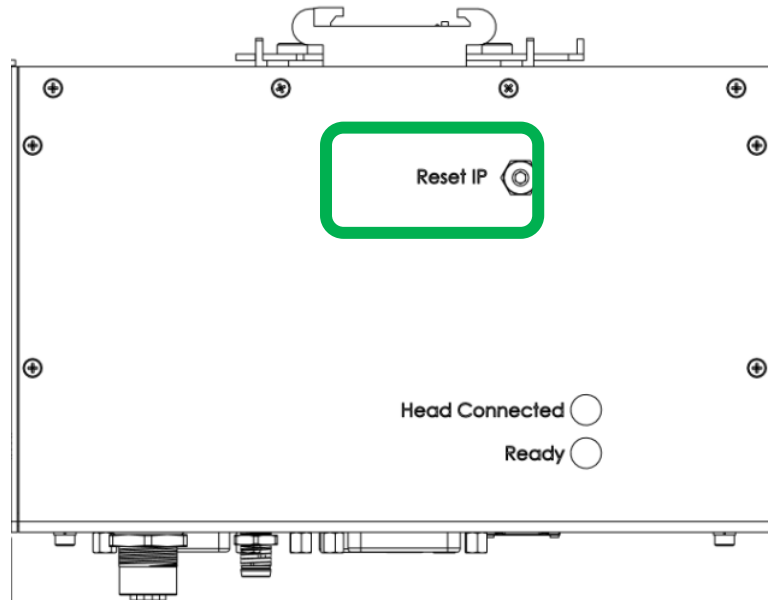


9. Power cycle the SFIE.
10. Open Web browser and enter new IP address to get back to the SFIE web page.

4.4 Resetting the IP Address to Default 10.0.0.20

If you have changed the IP address, but have forgotten what it is set to, you may reset the IP Address to the default 10.0.0.20 using the access port in the base cover (see figure):

- Remove the button head screw from the top cover of the base that is marked IP Reset.
- With power on press and hold the button on the PCB for 10 seconds (use of a small screw driver or plastic or wooden dowel inserted through the tapped hole)
- Power cycle box.
- IP is reset to 10.0.0.20; Make sure the host is in the correct domain to communicate.



4.5 Scanner Fieldbus Interface Web Pages

IPG provides a set of web pages with the SFIE available via User Ethernet that can be used to monitor status or configure the device.

Using a supported browser such as Internet Explorer or Chrome, the user selects the current IP address of the SFIE (the default is 10.0.0.20). To connect to the web interface:

1. Configure your Ethernet adapter as shown in section 4.3.1.
2. Start web browser – see supported browsers list.
3. Type **http://10.0.0.20/** into your browser address window

Supported Browsers for Windows:

Internet Explorer 11, Edge; Chrome V.55 and higher; Firefox V. 40 and higher.




Use of unsupported browser versions may show refresh issues or reduced functionality.

4.5.1 Status Web Page

The Status page shows the current value of the various registers comprising the Scanner Fieldbus Interface. For Registers that are bit sets, the individual bits are also shown. Bits that are illuminated are on or logic 1, bits that are grey are off or logic 0.

Scanner Fieldbus Interface



Status
Settings
IO Configuration
Support

Registers	Bits	Bits
Outputs	Scanner Status	Laser Status
Scanner Status: 0x7F000004	<input type="radio"/> Ready	<input type="radio"/> Laser Enable
Definition ID: 0	<input type="radio"/> Active	<input type="radio"/> Laser Gate
Definition: 0x0000	<input checked="" type="radio"/> Error	<input type="radio"/> Primary Modulation
Scanner Status 2: 0x000F0340	Laser Alarm	
Laser Alarm/Airflow: 0xF	<input type="radio"/> Aborting	<input type="radio"/> Guide Enable
Port C: 0x00000000	<input type="radio"/> Buffer Underrun	<input type="radio"/> Laser Focus Beam Enable
Group ID Feedback: 0	<input type="radio"/> Hardware Error	Wait Status
Job ID Feedback: 0	<input type="radio"/> Serial Bus Not Detected	<input type="radio"/> XY Position
Control Feedback: 0	<input type="radio"/> Serial Bus Comm Error	<input type="radio"/> Timer/Counter
Laser Status: 0x00000000	<input checked="" type="radio"/> Head Comm Not Detected	<input type="radio"/> Start
Laser Analog Power: 0.000000 V	<input type="radio"/> Head Comm Error	<input type="radio"/> Laser Ready
AMB Laser Analog Power: 0.000000 V	<input checked="" type="radio"/> Hardware XY Error	<input type="radio"/> Interlock OK
Window PD: -64.722908 dBμA	<input checked="" type="radio"/> Hardware Z Error	<input type="radio"/> Software Wait
Window PD: 1439 uint16	<input type="radio"/> Position XY Error	<input type="radio"/> Group Committed
Head Temperature: 3.088684 °C	<input type="radio"/> Position Z Error	<input type="radio"/> GPIO
Head Temperature: 65444 uint16	<input type="radio"/> Beam Blocked	<input type="radio"/> GPI1
Finished Frame ID: 3	<input type="radio"/> Tray Missing	<input type="radio"/> GPI2
Finished Object ID: 3	<input type="radio"/> Fiber Interlock Open	<input type="radio"/> GPI3
Finished Group ID: 0	<input checked="" type="radio"/> Laser Alarm 0/Ready	<input type="radio"/> In View X
Frames in Buffer: 0	<input checked="" type="radio"/> Laser Alarm 1/Error	<input type="radio"/> In View Y
Objects in Buffer: 0	<input checked="" type="radio"/> Laser Alarm 2/Emission On	<input type="radio"/> In View Z
Groups in Buffer: 0	<input checked="" type="radio"/> Laser Alarm 3/Airflow	<input type="radio"/> Coordination Change Done
Wait Status: 0x00000000	<input type="radio"/> Laser Not Ready	<input type="radio"/> Encoder Reset A
Inputs	<input type="radio"/> Laser Not Locked	<input type="radio"/> Encoder Reset B
Scanner Control: 0x00000003	<input type="radio"/> Stage Error A	<input type="radio"/> Encoder Reset C
Port A: 0x00000000	<input type="radio"/> Stage Error B	<input type="radio"/> Move Done A
Group ID: 0	<input type="radio"/> Stage Error C	<input type="radio"/> Move Done B
Job ID: 0	<input type="radio"/> Stage Error D	<input type="radio"/> Move Done C
Process Control: 0	<input type="radio"/> Clipping	<input type="radio"/> Move Done D
X Offset: 0	Scanner Control	
Y Offset: 0	<input checked="" type="radio"/> Start	
Rotation: 0.000000	<input checked="" type="radio"/> Enable	
Analog Input 0: <div style="width: 100px; height: 10px; background-color: green; border: 1px solid black;"></div>		
Analog Input 1: <div style="width: 100px; height: 10px; background-color: green; border: 1px solid black;"></div>		

Figure 8: Status Page

4.5.2 IO Configuration Web Page

This page is used to configure characteristics of the Scanner Fieldbus Interface. After this page displays, the top of the IO Configuration pane will indicate the Fieldbus option, namely EtherCAT, Ethernet/IP or PROFINET.

In order to specify desired Fieldbus Endianness, select either the Little or Big radio button. Endianness changes made with the radio buttons are automatically saved and take effect when the Scanner Fieldbus Interface is power-cycled.

In order to specify the desired Fieldbus Address for the SFI, enter the desired values for IP Address, Subnet Mask and Default Gateway. Note that the Fieldbus IP Address is configurable only for the Ethernet/IP and PROFINET options and it does not apply in the case of EtherCAT.

In the Ethernet/IP setup page (See Figure 10 below), there is a checkbox option available to use the 32-bit Run/Idle header in the Input Assembly Real Time Format for target devices that require this format. If the option is unchecked, the Input Assembly is treated as Modeless and no Run/Idle header is included. Changes made to this option are automatically saved and take effect when the Scanner Fieldbus Interface is power-cycled. Note that the Input Assembly Run/Idle header option applies only to Ethernet/IP.

In the PROFINET setup page (See Figure 11 below), the Station Name ID may be changed to accommodate multiple Scanner Fieldbus Interfaces configured to operate on same PROFINET Fieldbus network. Note that the Station Name ID parameter is only applicable to the PROFINET option.

Note: Please refer to Section 4.5.2.1 for more details on configuring multiple Scanner Fieldbus Interfaces for use on a common PROFINET Fieldbus network.

When done making changes, hit the Save button and then power cycle the Scanner Fieldbus Interface to have the address changes (and Station Name ID for the PROFINET option) applied.

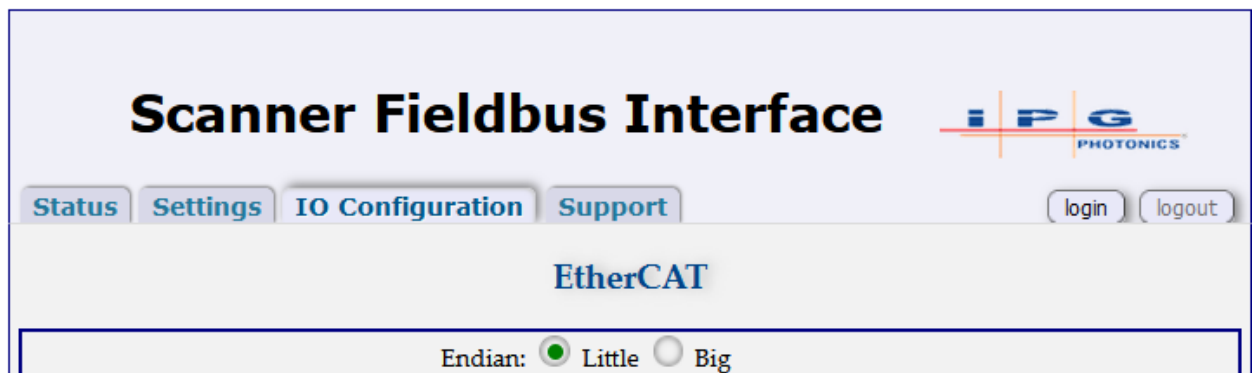


Figure 9: Configuration Page for EtherCAT

The screenshot shows the 'Scanner Fieldbus Interface' web application. At the top right is the IPG PHOTONICS logo. Below the title is a navigation menu with 'Status', 'Settings', 'IO Configuration', and 'Support'. 'IO Configuration' is selected. There are 'login' and 'logout' buttons. The main heading is 'EtherNet/IP'. The configuration area includes: 'Endian' with 'Little' selected; 'IP Address' (192, 168, 10, 2); 'Subnet Mask' (255, 255, 255, 0); 'Default Gateway' (0, 0, 0, 0); and a checkbox for 'Use 32-bit Run/Idle Header for Input Assembly Real Time Format' which is unchecked. A 'Save' button is at the bottom.

Figure 10: Configuration Page for Ethernet/IP

The screenshot shows the 'Scanner Fieldbus Interface' web application. At the top right is the IPG PHOTONICS logo. Below the title is a navigation menu with 'Status', 'Settings', 'IO Configuration', and 'Support'. 'IO Configuration' is selected. There are 'login' and 'logout' buttons. The main heading is 'PROFINET'. The configuration area includes: 'Endian' with 'Little' selected; 'IP Address' (192, 168, 10, 2); 'Subnet Mask' (255, 255, 255, 0); 'Default Gateway' (0, 0, 0, 0); and 'Station Name ID' (comx51repns-sfi-1). A 'Save' button is at the bottom.

Figure 11: Configuration Page for PROFINET

4.5.2.1 Configuring Multiple SFI Modules on a PROFINET Fieldbus Network

This section describes how to configure multiple IPG Scanner Fieldbus Interface (SFI) modules for use on a common Profinet Fieldbus network which is under the control of one PLC.

Note: Revision 2.1.0 or higher SFI firmware is required for support of the Profinet Station Name ID setup option used to specify a unique DNS-compatible Station Name string for each SFI instance.

Procedure to add an additional Profinet SFI device instance:

1. Make a copy of the default SFI Profinet device description file* shown below:

GSDML-V2.33-HILSCHER-COMX 51XX-RE PNS IPG ScannerFieldbusInterface1_2.1.0-20230721.xml

2. Rename the copy of the SFI device description file as shown below (number in bold font):

GSDML-V2.33-HILSCHER-COMX 51XX-RE PNS IPG ScannerFieldbusInterface**2**_2.1.0-20230721.xml

3. Open the *renamed* SFI device description file and search for the string “DNS_CompatibleName”:

DNS_CompatibleName="comx51repns-sfi-1"

4. Edit the DNS_CompatibleName string to match the new SFI instance (in bold):

DNS_CompatibleName="comx51repns-sfi-**2**"


5. Add this updated SFI device description file to the PLC’s list of devices to be controlled.
6. On the added SFI module’s Profinet “IO Configuration” web page (See Figure 11 above), change the Station Name ID suffix to match the DNS_CompatibleName string change made in Step 4.
7. On the added SFI module’s Profinet “IO Configuration” web page, set the IP Address field to match the IP address that the PLC assigns to this SFI device instance.
8. On the added SFI module’s Profinet “IO Configuration” web page, select the Endian option (“Big” or “Little”) that corresponds to the endianness used by the PLC.
9. On the added SFI module’s Profinet “IO Configuration” web page, press the “Save” button to store the changes in non-volatile memory.
10. Power-cycle the SFI module to get the changes made in Steps 6-8 to take effect.
11. Repeat Steps 1-10, incrementing the SFI instance number (the values in bold font) for each additional SFI instance being added to the Profinet Fieldbus configuration.

*SFI Profinet device description file must be revision **2.1.0 or higher** as shown in bold font of file’s title:

GSDML-V2.33-HILSCHER-COMX 51XX-RE PNS IPG ScannerFieldbusInterface1_**2.1.0**-20230721.xml

4.5.3 Support Web Page

The Support page displays information about the Scanner Fieldbus Interface including the current software revisions. When contacting IPG for assistance it is recommended to take a screen shot of this page.

Scanner Fieldbus Interface 

[Status](#) [Settings](#) [IO Configuration](#) [Support](#) [login](#) [logout](#)

Product Support

Package:	
Dictionary:	SWFP00143400000U_IPGP694_SFI_Dictionary_2.2.0.txt
Init table:	SWFP00143400000U_IPGP694_SFI_InitTable_2.2.0.txt
FPGA image:	SWFP00143400000U_IPGP694_SFI_FPGA_125830_2.2.0.rbf
Application:	2.2.0.147441
Bootloader:	5.2.*.52853
MAC Address:	801F123F96A3
Serial Number:	ND
Model Number:	ND
Part Number:	SWFP00069400000U

Download and Send to Tech Support
Current DICT values
[Download](#)

Figure 12: Product Support Page

5 Connection Pin Assignments and Technical Information

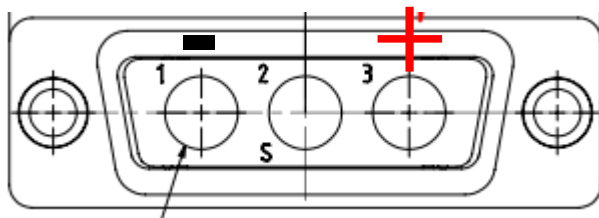
5.1 Power Input Connector

CHCE: D Sub 3W3p Male.

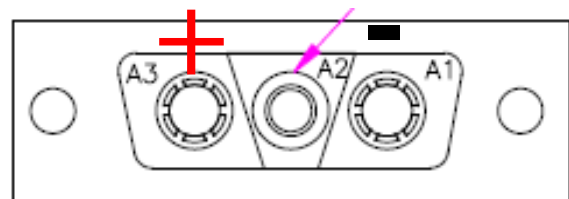
Pin	Name	Function	Current, Maximum Amps
1	Ground	Return for 24 Volts	
2	CASEGND	Earth Ground	
3	+24Volts DC	+24 VDC +/- 10%;	1 Amp maximum
Shield	CASEGND	Earth Ground	

Head should also be attached to Earth Ground.

MATING CONNECTOR: F3W3SC-K121 Molex# 1731070058



MATE CONNECTOR REAR VIEW



MATE CONNECTOR FRONT VIEW

5.2 User Ethernet

RJ-45 Connector Ethernet connection allows connection to computer browser to access web pages in SFIE. Connection requires Ethernet connection to host with fixed IP address in SFIE. See Chapter 3. Default IP address is 10.0.0.20. Maximum recommended length cable: 23 meters (75 Feet).

If there is a need to reset the IP Address to its default value, see section 4.4.

5.3 Fieldbus Ethernet

When you purchase you have a choice of EtherCAT, PROFINET, or Ethernet/IP interfaces. Each Fieldbus option includes an RJ45 connector. Refer to the IPG Scanner Fieldbus Interface Guide for the Fieldbus protocol.

5.4 SBUS Communication with Scanner

The Fieldbus base communicates with the Scanner controller via a serial cable (with twisted pair) between its M12 connector and the scanner's DB37. Pinout is listed below. User is responsible for providing the connector. An example cable assembly is Phoenix Connector PN 1569414. SBUS cable should have a length that does not exceed 20M.

Scan Controller DB37 Pin#	FieldBus Base M12 Pin#	Signal Name
17	1	SBUS_A+
36	3	SBUS_A-
18	2	SBUS_B+
37	4	SBUS_B-

6 Fieldbus Interface

IPG provides three fieldbus interface types as an option when purchasing your IPG SFI. This section of the manual provides information on the interfaces that are available along with available Fieldbus protocols. The following is a list of Fieldbus types and their associated part numbers:

- SCAN BASE ETHERCAT: #CEU45010381C00XU
- SCAN BASE ETHERNET/IP: #CEU45010381C01XU
- SCAN BASE PROFINET: #CEU45010381C02XU

Note: Fieldbus protocol is covered in a separate document: **Scanner Fieldbus Interface Guide**, which can be found at IPG's FTP site (software.ipgphotonics.com) and clicking on the folder in the following path: **ScannerCommon->Scanner Fieldbus Interface->Documents**.

6.1 EtherCAT

The SFI uses an embedded Hilscher communication module (COMX 51CA-RE) configured as a slave to provide the EtherCAT interface.

There are two EtherCAT XML file versions available on IPG's FTP site that can be used by an EtherCAT Fieldbus master when configuring the Fieldbus:

- Hilscher COMX 51XX RE ECS V4.2.X IPG ScannerFieldbusInterface_*[SFI_revision]*.xml
- Hilscher COMX 51XX RE ECS V4.6.X IPG ScannerFieldbusInterface_*[SFI_revision]*.xml

where *[SFI_revision]* is revision level of the Scanner Fieldbus Interface firmware.

To access either file, go to IPG's FTP site (software.ipgphotonics.com) and click on the folder in the following path: **ScannerCommon->Scanner Fieldbus Interface->Configuration Files->EtherCAT**

The V4.2.X variant is generally compatible with most PLC masters. The V4.6.X variant is included for compatibility when configuring Fieldbus with Hilscher PLC masters.

The Hilscher EtherCAT communication module provides diagnostic LED's to indicate the current status of the module. The diagnostic LED's are visible on the base electronics. When all three LED's are steady green, the module is communicating to the scanner/master. The LEDs are viewable on the top side of the base.

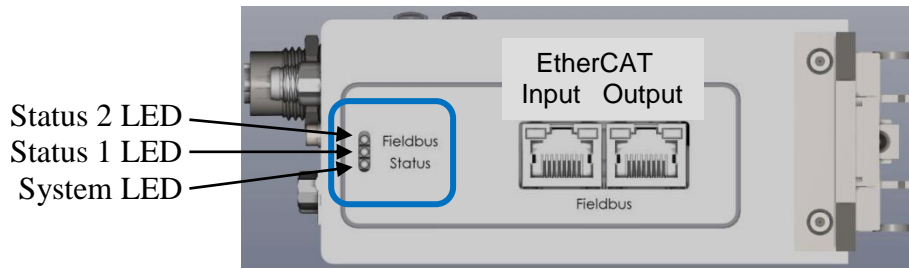


Figure 6-1 EtherCAT Diagnostic LED's

System LED Status Codes		
Color	State	Meaning
	Off	Power supply off, OR hardware defect
	On	Operating system running
	Blinking	Second stage bootloader is waiting for firmware*
	On	Second stage bootloader missing*

Table 6-1 EtherCAT System LED

EtherCAT LED status codes			
LED	Color	State	Meaning
Status 1 (Run)		Off	No Power
		On	Device is operational
		Blinking	Pre-operational state
		Flash	Safe-operational state
Status 2 (Error)		Off	No Power
		Blinking	Invalid configuration*
		1 Flash	Local Error*
RJ45		On	Ethernet connection is established
		Flashing	Device sending and receiving Ethernet frames
		Off	No Connection
RJ45			

Table 6-2 EtherCAT Status LED's

*Contact IPG for assistance

6.1.1 Notes on wiring EtherCAT

- Use the **Left RJ45 connector for Input to Base and Right side RJ45 connector for output.**
- Use shielded Ethernet cables that meet the requirements of at minimum category 5 (CAT 5) as indicated in EN50173 or ISO/IEC 11801.
- Do not use hubs in an EtherCAT network.
- Use switches only between EtherCAT master and first EtherCAT slave device (100 Mbit/s, Full Duplex).
- The cable length between two EtherCAT devices must not exceed 100 meters.

6.2 Ethernet/IP

The SFI uses an embedded Hilscher communication module (COMX 51CA-RE) configured as a slave to provide the Ethernet/IP interface.

There is an Ethernet/IP EDS file available on IPG’s FTP site that can be used by an Ethernet/IP Fieldbus master when configuring the Fieldbus:

- HILSCHER COMX 51XX-RE EIS V1.1 IPG ScannerFieldbusInterface_*[SFI_revision]*.EDS

where *[SFI_revision]* is revision level of the Scanner Fieldbus Interface firmware.

To access this file, go to IPG’s FTP site (software.ipgphotonics.com) and click on the folder in the following path: **ScannerCommon->Scanner Fieldbus Interface->Configuration Files->EthernetIP**

For devices which do not accept an EDS file, the following configuration should be used:

Parameter	Value
Output Assembly Instance	100
Output Assembly Data Type	byte
Output Assembly Length (bytes)	32
O->T (output) Real Time Format	Modeless
Input Assembly Instance	101
Input Assembly Data Type	byte
Input Assembly Length (bytes)	48
T->O (input) Real Time Format*	Modeless
Configuration Assembly Instance	1
Configuration Size (bytes)	0

*Devices which require a 32-bit Run/Idle Header in the Input Assembly Real Time Format must be configured for this option (See Figure 10 and Section 4.5.2 for details).

Fieldbus IP Address for the Ethernet/IP communication module is configurable using the Configuration Web Page described in section 4.5.2.

The Hilscher Ethernet/IP communication module provides diagnostic LED’s to indicate the current status of the module. The diagnostic LED’s are visible on the base electronics. When all three LED’s are steady green, the module is communicating to the scanner/master. The LEDs are viewable on the top side of the base.

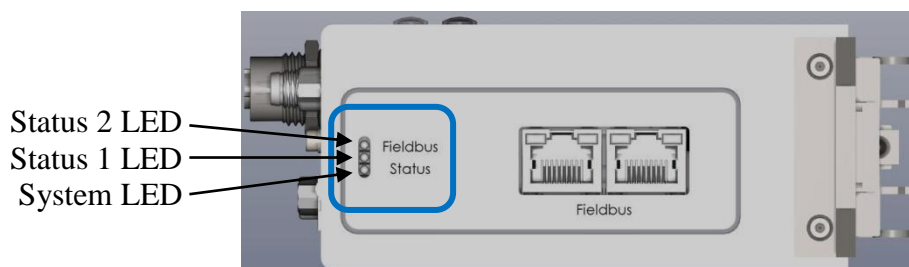


Figure 6-2 Ethernet/IP Diagnostic LED’s





System LED Status Codes		
Color	State	Meaning
	Off	Power supply off, OR hardware defect
	On	Operating system running
	Blinking	Second stage bootloader is waiting for firmware*
	On	Second stage bootloader missing*

Table 6-3 Ethernet/IP System LED
















Ethernet/IP LED status codes			
LED	Color	State	Meaning
Status 1		Off	No Power
		On	Device operational
		Flashing	Standby: Device not configured
		On	Major Fault: non-recoverable fault *
		Flashing	Minor Fault: recoverable fault
		Flashing	Self-Test: Power up test
Status 2		Off	No communication to master
		On	Connected: Device has established a network connection
		Flashing	No Connection
		On	Duplicate IP: Another device has same IP address
		Flashing	Connection timeout
RJ45 Link		On	Ethernet connection is established
		Off	No Connection
RJ45 Activity		Flashing	Transmitting and Receiving data
			

Table 6-4 Ethernet/IP Status LED's

*Contact IPG for assistance

6.3 PROFINET

The SFI uses an embedded Hilscher communication module (COMX 51CA-RE) configured as a slave to provide the PROFINET interface.

There is a Profinet XML file available on IPG's FTP site that can be used by a Profinet Fieldbus master when configuring the Fieldbus:

- GSDML-V2.33-HILSCHER-COMX 51XX-RE PNS IPG ScannerFieldbusInterface1_[SFI_revision]-20230721.xml

where [SFI_revision] is revision level of the Scanner Fieldbus Interface firmware.

To access this file, go to IPG's FTP site (software.ipgphotonics.com) and click on the folder in the following path: **ScannerCommon->Scanner Fieldbus Interface->Configuration Files->Profinet**

Fieldbus IP Address and Station Name ID for the PROFINET communication module are configurable using the Configuration Web Page (Figure 11) described in section 4.5.2.

The Hilscher PROFINET communication module provides diagnostic LED's to indicate the current status of the module. The diagnostic LED's are visible on the base electronics. When all three LED's are steady green, the module is communicating to the scanner/master. The LEDs are viewable on the top side of the base.

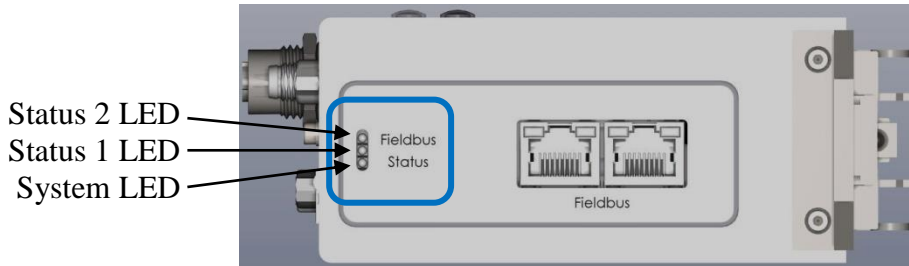


Figure 6-3 PROFINET Diagnostic LED's

System LED Status Codes		
Color	State	Meaning
	Off	Power supply off, OR hardware defect
	On	Operating system running
	Blinking	Second stage bootloader is waiting for firmware*
	On	Second stage bootloader missing*

Table 6-4 PROFINET System LED

PROFINET LED status codes			
LED	Color	State	Meaning
Status 1		Off	No error
		On	Watchdog timeout*
		Flashing	DCP signal service initiated
Status 2		Off	No error
		On	No configuration*
RJ45		On	Ethernet connection is established
		Off	No Connection
RJ45		Flashing	Device sending/receiving Ethernet packets

Table 6-5 PROFINET Status LED's

*Contact IPG for assistance

7 Regulatory Specifications

7.1 Environmental (operating, non-operating)

Operating temperature:	10 to 45 °C
Storage Temperature:	-20 to +70 °C
Humidity:	30 to 90% non-condensing

7.2 Agency Approval (Safety, EMC, RoHS)

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8.5 Product Return

Product Returns

Returns to the United States

All product returns require a Return Merchandise Authorization (RMA) from IPG.

To obtain an RMA, call the Customer Service department of IPG Photonics Corporation at 508-373-1100 (US) or +49 2736 44 20 451 (Germany).

If you return a product with a RMA, perform the following procedure:

1. Products must be carefully packed in a suitable shipping container(s). Buyer assumes all responsibility for products damaged in shipment to IPG.
2. Buyer must issue a purchase order for the value of the replaced parts/service items and IPG will issue credit or invoice when the parts/service is received. Speak to IPG Service Manager for the amount authorized under the required purchase order.
3. All requests for repair or replacement under this warranty must be made to IPG within 30 days after discovery of the defect (but not later than 7 days after warranty expiration).
4. All products returned to IPG but which meet applicable specifications, not defectively manufactured or used not in accordance with this User's Guide, will result in the Buyer being charged IPG's standard examination charge.
5. Complete packing list with product model and serial number will ensure prompt repair.
6. Be sure to include with the returned product your 'ship to' address for the return of the serviced product.

Product Returns

Returns to the United States

Shipping Instructions:

Warranty Returns

Domestic & International Buyers* pay for one-way freight costs and insurance to IPG. IPG will pay for freight return cost and insurance back to the Buyer.

Non-Warranty Returns

Domestic & International Buyers* pay for two-way freight costs and insurance to IPG. If shipment consists of returns that are both warranty and non-warranty, the shipment will be considered as non-warranty.

Shipping Address for Returns to US

IPG Photonics Corporation
50 Old Webster Road
Oxford, MA 01540
Attn: Product Returns
Tel: 508-373-1100

Returns to Germany

Shipping address for returns to Germany:

IPG Laser GmbH

Siemensstrasse 7

D-57299 Burbach, Germany

Attn: Product Returns

Tel: +49-(0)2736-44-20-451

1. IPG Laser GmbH will only accept returns for which an approved Return Material Authorization (RMA) has been issued by IPG Laser GmbH. You should address to the customer support team at +49-(0)2736-44-20-451 or support.europe@ipg-photonics.com to discuss the return and request an RMA number. You must return defective products freight prepaid and insured to IPG Laser at the address shown herein. All products which have returned to IPG Laser but which are found to meet all previously applicable specifications for such products or which indicate damage to the fiber connectors not resulting from defect manufacturing, shall be subject to IPG Laser' standard examination charge in effect at the time and these costs shall be charged to the Buyer. All products returned to IPG Laser which are not accompanied by an itemized statement of defects, shall be returned to the Buyer at the Buyer's expense and IPG Laser shall not carry out any evaluation of such products. IPG Laser warrants to Buyer that its services, labor and replacement parts, assemblies and modules will be free of defects in material and workmanship for ninety (90) days from the date of shipment or performance of services.
2. Warranty Returns - Domestic & *International Buyers should pay for one-way freight costs to IPG Laser. IPG Laser will reimburse Buyers for applicable reasonable third-party freight costs and IPG Laser will pay for freight return cost back to the Buyer.
3. Non-Warranty Returns - Domestic & *International Buyers are responsible for two-way freight costs. If shipment consists of returns that are both warranty and non-warranty, the shipment will be considered as non-warranty. Any UNAUTHORIZED shipments billed to IPG Laser without authorization will be re-invoiced to the Buyer. Confirming purchase orders are required for non-warranty returns.

Product Returns
Returns to Germany

4. *International Returns must include applicable DUTIES AND TAXES, and you must mark air bills with "RETURNED FOR REPAIR." In any event, where IPG Laser accepts a shipment, IPG Laser will invoice to the Buyer for any charges as stated above.
5. Returns for credit will not be accepted unless authorized in advance, in writing by IPG Laser, in accordance with IPG Laser' Terms and Condition, including the warranty provisions. In most cases, restocking fees will apply.
6. All returns must be packaged adequately to avoid damage during shipment.
7. Complete packing list with product model and serial number will insure prompt repair, if the other terms of this form are followed.
8. See the IPG Terms and Conditions for the applicable warranty for the products before you request the return of the products.
9. RMA number will expire 31 days after the date of issue. Thereafter, units received in under the expired RMA number will result in a longer turnaround time. Include a copy of the completed RMA form with the return of your unit(s).



To learn more, visit www.ipgphotonics.com

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