Mitutoyo

Quick Start Guide
No. 99MBC146B4

Interface Unit for EJ Counter

USB
CC-Link
PROFINET
EtherNet/IP
EtherCAT

This document is a simplified version. Before using the product, access Mitutoyo's web site (either directly or using the provided QR code), download the User's Manual, and study it carefully. After reading, retain it close at hand for future reference. This English language version of the document contains the original instructions.

- **Interface Unit USB User's Manual No. 99MBC142**
- **Interface Unit CC-Link User's Manual No. 99MBC141**
- **Interface Unit PROFINET User's Manual No. 99MBC143**
- **Interface Unit EtherNet/IP User's Manual No. 99MBC144**
- **Interface Unit EtherCAT User's Manual No. 99MBC158**

▶ https://manual.mitutoyo.co.jp

Safety Precautions

When using this product, be sure to observe all precautions regarding indicated specifications, functions and use. Using this product in any other manner may be detrimental to safety.
In the event that the product is damaged, take all appropriate measures to avoid accidents and maintain safety.

⚠CAUTION

Do not disassemble or modify this product. Otherwise you may be subject to electric shock, and there is a risk of breakage or fire due to a short circuit caused by metallic powders that have gotten inside the product.

Electromagnetic Compatibility (EMC)

This product complies with the EMC Directive and the UK Electromagnetic Compatibility Regulations; however, if this receives electromagnetic interference that exceeds these requirements, it will be out of warranty and require appropriate measures.
This product is an industrial product, and is not intended to be used in residential environment. If this product is used in residential environment, this product may cause electromagnetic interference with other instruments. In such a case, it is required to take appropriate measures for preventing such electromagnetic interference.

Export Control Compliance

This product falls into the Catch-All-Controlled Goods and/or Catch-All-Controlled Technologies (including Programs) under Category 16 of Appended Table 1 of Export Trade Control Order or under Category 16 of Appended Table of Foreign Exchange Control Order, based on Foreign Exchange and Foreign Trade Act of Japan.
If you intend re-export of the product from a country other than Japan, re-sale of the product in a country other than Japan, or re-providing of the technology (including Programs), you shall observe the regulations of your country.
Also, if an option is added or modified to add a function to this product, this product may fall under the category of List-Control Goods, List-Control Technology (including Programs) under Category 1 - 15 of Appended Table 1 of Export Trade Control Order or under Category 1 - 15 of Appended Table of Foreign Exchange Control Order, based on Foreign Exchange and Foreign Trade Act of Japan. In that case, if you intend re-export of the product from a country other than Japan, re-sale of the product in a country other than Japan, or re-providing of the technology (including Programs), you shall observe the regulations of your country. Please contact Mitutoyo in advance.

Disposal of Old Electrical & Electronic Equipment (Applicable in the European Countries with Separate Collection Systems)

This symbol on the product or on its packaging is based on WEEE Directive (Directive on Waste Electrical and Electronic Equipment), and this symbol indicates that this product shall not be treated as household waste.
To reduce the environmental impact and minimize the volume of landfills, please cooperate in reuse and recycle.
For how to dispose of the product, please contact the agent where you purchased the product or a Mitutoyo sales office.

China RoHS Compliance Information

This product meets China RoHS requirements. See the table below.

产品中有害物质的名称及含量

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
本体	×	○	○	○	○	○
配件	○	○	○	○	○	○

本表格依据 SJ/T 11364 的规定编制。
○：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。
×：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。

环保使用期限标识是根据《电器电子产品有害物质限制使用管理办法》以及《电子电气产品有害物质限制使用标识要求 (SJ/T11364－2014)》制定的，适用于中国境内销售的电子电气产品的标识。
电器电子产品只要按照安全及使用说明内容在正常使用情况下，从生产日期算起，在此期限内产品中含有的有毒有害物质不致发生外泄或突变，不致对环境造成严重污染或对其人身、财产造成严重损害。
产品使用后，要废弃在环保使用年限内或者刚到年限的产品，请根据国家标准采取适当的方法进行处置。
另外，此期限不同于质量／功能的保证期限。

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For the UK Regulation
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Joule Road, West Point Business Park, Andover, Hampshire SP10 3UX, UNITED KINGDOM

1. Unpacking and Verification of Package Components

Before using the product, verify that the following items are present.
Please note that items actually included in the package will vary according to the model purchased.

Name	Quantity
Interface unit	1
Terminal unit	1
DIN rail fixing bracket (with M4 fastening screw)	2
Ground wire	1
Connector plug	1*1
Terminal resistor for CC-Link communication	1*1
Clamp filter	1*1
User's Manual (this document), 99MBC146B	1
WEEE User's Manual	1
Warranty	1

*1Included only with the Interface Unit CC-Link.

2. Overview

2.1. Product Overview

This product is an interface unit for use with the EJ Counter. This is a compact, space-saving interface unit which mounted on a DIN rail and linked to EJ Counter(s) for use.
The interface unit supports USB communication and industrial I/F communication. The type of interface provided for industrial I/F communication varies according to model purchased. For model-specific specifications and common specifications, see 📖 "6. Specifications".
With both USB communication and industrial I/F communication, measurements read by Linear Gages connected to the EJ Counter can be output along with tolerance judgment results to external devices such as a PC and PLC (programmable logic controller).
Additionally, the LG QuickSetupTool application software (freeware) is available to allow EJ Counter settings and display of measurement values to be easily made by USB communication. Please download the software from Mitutoyo's web site (https://www.mitutoyo.co.jp).

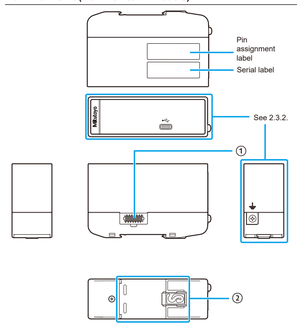
Tips

The LG QuickSetupTool is compatible with the Windows 10 operating system. No assurance is provided of full operability in any given operating environment. While use of this application is free of charge, the customer must bear communication charges incurred during download of the software.

2.2. System Configuration

2.3. Part Names

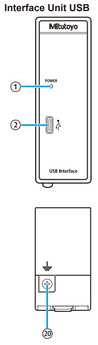
2.3.1. Main Unit (Common to All Models)



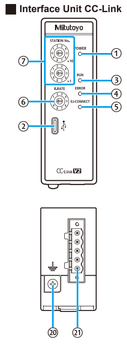
No.	Name	Description
①	Connector for linking counter	Connect to an EJ Counter.
②	DIN rail attachment point	Used for attaching this product to a DIN rail.

2.3.2. Front and Bottom Panels

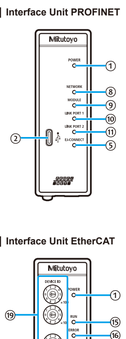
■ Interface Unit USB



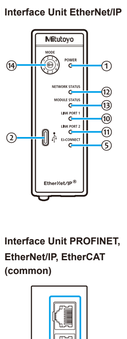
■ Interface Unit CC-Link



■ Interface Unit PROFINET



■ Interface Unit EtherNet/IP



■ Interface Unit EtherCAT

■ Interface Unit PROFINET, EtherNet/IP, EtherCAT (common)

No.	Name	Description
㉑	CC-Link communication connector	Connect to a CC-Link network using the provided connector plug and commercially-available CC-Link compliant cable.
㉒	Ethernet-type interface communication connector (RJ45 connector)	Make interface connections using commercially-available LAN cables that are compatible with communication requirements of the various interfaces.

Tips

Use LAN cables of type Cat.5e or higher.

3. Setup

This is explained using a drawing of the Interface Unit CC-Link.

3.1. Mounting

3.1.1. DIN Rail Attachment / Removal

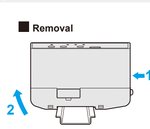
This product is attached to a DIN rail for use.

IMPORTANT

Disconnect all the cables and connectors connected to this product before attaching this product to or removing it from the DIN rail.

■ Attachment

■ Removal

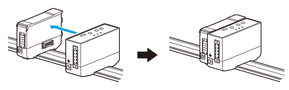


3.1.2. Linking to EJ Counters

1 Remove the protective covers from the counter linkage connectors of this product and the EJ Counter.

2 Attach this product to the DIN rail on the side facing the EJ Counter's counter linkage connector (male).

3 Link the product to the EJ Counter.
Slide the product or EJ Counter along the DIN rail to fully mate the counter linkage connector on the product (female) with the counter linkage connector (male) on the EJ Counter.



NOTICE Shows risks that could result in property damage.

Do not link more than eight EJ Counters together. Failure to observe this precaution may result in damage.

Tips

When sliding this product or EJ Counters along the DIN rail, move them slowly.

Tips

For details on indicators and settings, please download and refer to the User's Manual that is available at Mitutoyo's web site.

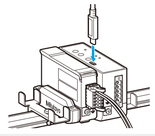
No.	Name	Description
①	[POWER] indicator	Lights when power is supplied to the unit. Flashes to indicate an error during communication with an EJ Counter (Interface Unit USB only).
②	USB connector (Type-C)	Allows USB connection to a PC.
③	[RUN] indicator	Lights when the unit is connected to a CC-Link network.
④	[ERROR] indicator	Lights or flashes to indicate a CC-Link communication error.
⑤	[EJ-CONNECT] indicator	Lights during communication between the unit and an EJ Counter. Lights off or flashes to indicate an error during communication with an EJ Counter.
⑥	[B.RATE] switch	Sets the CC-Link version and baud rate.
⑦	[STATION No.] switches	Sets the CC-Link station number.
⑧	[NETWORK] indicator	Indicates the status of communication with a PLC or other master device.
⑫	[NETWORK STATUS] indicator	
⑨	[MODULE] indicator	Indicates the Interface Unit status.
⑬	[MODULE STATUS] indicator	
⑩	[LINK PORT 1] indicator	Lights or flashes during communication through LINK PORT 1 of the Ethernet-type interface communication connector.
⑪	[LINK PORT 2] indicator	Lights or flashes during communication through LINK PORT 2 of the Ethernet-type interface communication connector.
⑭	[MODE] switch	Sets the IP address mode.
⑮	[RUN] indicator	Indicates the EtherCAT communication status of the product.
⑯	[ERROR] indicator	Flashes in the event of an EtherCAT communication error.
⑰	[L/A IN] indicator	Lights or flashes during communication through EtherCAT IN of the EtherCAT communication connector.
⑱	[L/A OUT] indicator	Lights or flashes during communication through EtherCAT OUT of the EtherCAT communication connector.
⑲	[DEVICE ID] switch	Sets the Device ID of this product (0 to 999). When the Device ID is set to 0, the product is not used.
⑳	Grounding terminal	Connects to ground using the provided ground wire.

Tips

- The provided ground wire is to be used only for connecting the ground terminal on the interface unit to the ground terminal on the EJ Counter.
- Overall grounding of coupled units is to be made using the ground wire provided with the EJ Counter.
  For details, see 📖 the separate "Compact Display Unit for Linear Gage EJ Counter User's Manual".

NOTICE Shows risks that could result in property damage.

This product requires a Type-C USB connector.
Note that connectors other than Type-C (such as miniB and microB) cannot be used.

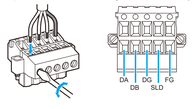


Tips

A USB cable must be provided by the customer.

3.2.2. CC-Link Connection

To connect to the CC-Link network, connect a CC-Link cable to the provided connector plug.
To connect the cable, loosen the screws on the side of the connector plug with a standard screwdriver to open the terminal holes, and then set the cable leads all the way into the terminal holes and re-tighten the screws to secure the leads.
The SLD terminal is for connecting the braided shield of the dedicated CC-Link cable, which should be twisted before connection. Cover the exposed shield with insulating tape as necessary.

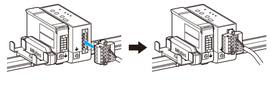


Terminal name	Insulation color, other
DA	Blue
DB	White
DG	Yellow
SLD	Shield
FG	–

1 Attach the provided clamp filter.
The clamp filter should be attached at a location that is in close proximity to the connector plug on the master device end of the cable.

2 When this product is to be the terminal device in the CC-Link network, attach the provided terminal resistor for CC-Link communication (110 Ω 1/2 W, J) across the DA and DB terminals of the connector plug.
When attaching the terminal resistor for CC-Link communication, first open the connector plug holes by loosing the terminal screws with a standard screwdriver, and then set the leads of the terminal resistor into the holes and re-tighten the screws.

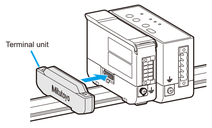
3 Attach the connector plug to this product's CC-Link communication connector, and then fasten it in place by tightening the screws on the sides of the connector plug using a standard screwdriver.



4 Attach the provided terminal unit to the counter linkage connector (female) on the EJ Counter.
Attach the terminal unit to the EJ Counter furthest from this product.

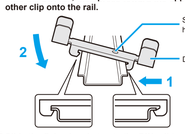
IMPORTANT

Be sure to attach the terminal unit. Normal communication between this product and EJ Counters requires attachment of the terminal unit.



3.1.3. Attaching the DIN Rail Fixing Bracket

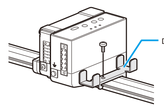
1 Hook the clip that is closer to the screw hole in the fixing bracket onto the DIN rail, then press toward the opposite side and hook the other clip onto the rail.



2 Slide the fixing bracket onto the DIN rail to where it comes in contact with this product, and then fasten the fixing bracket in place by threading the screw provided with the fixing bracket into the screw hole in the bracket, and then tightening the screw so that it presses against the DIN rail.

Tips

The screw provided with the bracket is suitable for fastening to a TH35-7.5 rail.
A different screw (M4) must be used for fastening to a TH35-15 rail.



3 Repeat step 1 through 2 to attach the other fixing bracket also to the side with the terminal unit.

3.2. Connection of External Devices

For communication settings for the different models, download and refer to the User's Manuals for individual models that are available at Mitutoyo's web site.

3.2.1. USB Connection (Common to All Models)

Use a USB cable to connect the USB connector (Type-C) on the front panel of this product to a USB connector on the PC.

IMPORTANT

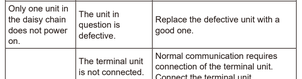
For permanent USB cable connection, fasten the cable so that it does not place any strain on the USB connectors.

3.2.3. PROFINET Connection / EtherNet/IP Connection (Common)

Connect the cable to the communication connector (LINK PORT 1 or LINK PORT 2) on this product.
When expanding the network, you can connect another device to the connector that remains open.

Tips

- Use LAN communication cables of type Cat.5e or higher. This product supports use of both straight cables and cross cables.
- For details on the settings on various interface units, download and refer to the User's Manuals for individual models that are available at Mitutoyo's web site.

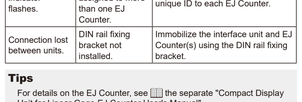


3.2.4. EtherCAT Connection

Connect the communication cable from the master device to the EtherCAT communication connector (EtherCAT IN) on this product.
When expanding the network, you can connect another device to the EtherCAT communication connector (EtherCAT OUT).

Tips

- Use STP communication cables of type Cat.5e or higher, or EtherCAT-compatible cables.
- Interface Unit EtherCAT has fixed IN and OUT communication connectors. The connector on the DIN rail side (at the bottom of the illustration) is EtherCAT IN, and the one on the front side (at the top of the illustration) is EtherCAT OUT.
- For details on the on interface unit settings, download and refer to the User's Manual that is available at Mitutoyo's web site.



3.3. Power Supply Connection

IMPORTANT

Provide a power supply with capacity sufficient to accommodate switch-on surge current.

Tips

This product is supplied with power by the connected EJ Counter.

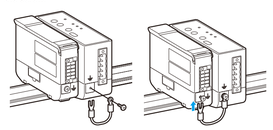
3.3.1. Ground Connection

This product is grounded through the connected EJ Counter. Use the provided ground wire for connecting this product to the EJ Counter.

Be sure to connect this product to ground before connecting it to the power supply. Failure to ground the product will make it susceptible to electrical noise.

1 Remove the ground terminal screw.

2 Pass the removed terminal screw through the hole in the ground wire's ring lug, and then loosely fasten the lug to the ground terminal. Loosen the ground terminal screw on the adjacent EJ Counter, and then slip the ground wire's fork lug under the head of the screw.



3 Firmly tighten the ground terminal screws on this product and the EJ Counter.

4 Connect the EJ Counter's ground wire.

Tips

For details on the EJ Counter's ground wire, see 📖 the separate "Compact Display Unit for Linear Gage EJ Counter User's Manual".

3.3.2. Power ON/OFF

This product is not equipped with a power switch. It is supplied with power by the connected EJ Counter.
To power the product ON/OFF, either switch the EJ Counter ON/OFF, or connect/disconnect the power cable.
When the power is turned on, an ID number is automatically assigned to the EJ Counter, and then it becomes ready for communication with this product.

Tips

When connecting to an industrial I/F network, turn on the power supply of the master device only after supplying power to this product.

4. Data Input/Output

For details, download and refer to the User's Manuals for individual models that are available at Mitutoyo's web site.

5. Troubleshooting

5.1. Troubleshooting

■ Common

Problem	Cause	Solution
Power does not go on.	The interface unit is not connected to an EJ Counter.	The interface unit draws power from an EJ Counter. Connect it to an EJ Counter.
	Power is not supplied to the EJ Counter.	The interface unit draws power from an EJ Counter. Supply power to the EJ Counter.
	Power is not properly connected to the EJ Counter's connection plug.	Properly connect the power to the EJ Counter's connection plug.
	Power supply capacity is insufficient.	Connect a noise-free power supply with a capacity of 10 V DC–27 V DC (30 W).
	You are attempting to supply power via USB.	This product is not designed to receive power via USB bus. Power must be supplied by an EJ Counter. Supply power to the EJ Counter.
	The counter or interface unit linkage connector is defective.	Replace the defective counter or interface unit with a good one.
Unit from the middle of daisy chain does not power on.	One of the daisy chain is not properly connected.	Disconnect the first unit that won't power on from the last unit that does power on, and then reconnect the units.
	The linkage connector is defective on either the unit that will power on, the unit that won't power on, or both.	Replace the defective unit with a good one.
Only one unit in the daisy chain does not power on.	The unit in question is defective.	Replace the defective unit with a good one.
The [EJ-CONNECT] indicator does not light. (No communication with the EJ Counter.)	The terminal unit is not connected.	Normal communication requires connection of the terminal unit. Connect the terminal unit.
	The interface unit was connected to the EJ Counter while the EJ Counter's power was on.	The interface unit detects the EJ Counter when its power is turned on. Turn off the power, and then turn it back on again.
	Nine or more EJ Counters are linked together.	Turn off the power and then turn it back on after reducing the number of linked EJ Counters to no more than eight.
	The counter or interface unit linkage connector is defective.	Replace the defective counter or interface unit with a good one.
The [EJ-CONNECT] indicator flashes.	When setting arbitrary IDs, the same ID was assigned to more than one EJ Counter.	Make parameter settings by key operation, taking care to assign a unique ID to each EJ Counter.
Connection lost between units.	DIN rail fixing bracket not installed.	Immobilize the interface unit and EJ Counter(s) using the DIN rail fixing bracket.

Tips

For details on the EJ Counter, see 📖 the separate "Compact Display Unit for Linear Gage EJ Counter User's Manual".

■ USB communication

Problem	Cause	Solution
Unable to connect USB connector.	The USB connector is of the wrong type.	The interface unit uses a Type-C connector. Use a Type-C compatible cable.
Unable to use USB communication.	Your device uses the wrong communication standard.	This product uses the USB 2.0 Full Speed communication standard and works with Windows 10 standard device drivers. Please verify that your device supports the USB 2.0 Full Speed standard.
	Your device has the wrong port setting.	With this interface unit, USB communication uses a virtual COM port. When making port settings on your device, check to make sure the settings work with the application use for communication.
Cannot retrieve current value data.	The EJ Counter has thrown an error, and is not counting.	Clear the error on the EJ Counter.

■ CC-Link communication

Problem	Cause	Solution
Communication not working.	Connector plug is improperly wired.	Correctly rewire the connector plug.
	The terminal resistor is not connected to the terminal device.	Install the provided CC-Link communication terminal resistor.
	The baud rate setting is incorrect.	Set the baud rate that matches that of the network.
	The baud rate setting was changed after power-on.	Turn off the power, and then turn it back on again.
Communication not working. ([ERROR] indicator lights or flashes).	Station number settings are incorrect.	Correctly reset the station numbers. The number of stations that can be occupied differs depending on the version. Make sure you are using the correct numbers.
	Station number settings were changed after power-on.	Turn off the power, and then turn it back on again.
Cannot retrieve current value data.	You are using Ver. 1.10.	Current value data can be transferred using Ver. 2.00. Use Ver. 2.00.
	The EJ Counter has thrown an error, and is not counting.	Clear the error on the EJ Counter.
The current value is not as expected.	You may be applying the wrong unit (mm/in.).	This product transfers only numeric data, which does not include the unit of measurement. Check the unit setting on the EJ Counter. **Tips** For details, see 📖 the separate "Compact Display Unit for Linear Gage EJ Counter User's Manual".
	The number of digits is wrong.	This interface unit uses a fixed minimum resolution for data transfer. (0.00001 mm or 0.0000001 in) No decimal point is included in send data. Take the above into consideration and convert data as needed.
	Negative numbers not properly converted.	This interface unit handles negative numbers as twos complements. Use a suitable method for converting data.

■ PROFINET communication / EtherNet/IP communication/ EtherCAT communication (common)

Problem	Cause	Solution
The cable cannot be connected.	You are attempting to use other than an RJ45 connector.	The communication connector must conform to the RJ45 standard. Obtain a cable and plug connector that supports RJ45 connection.
Communication speed is slow. Communication doesn't work.	The cable used is the wrong category.	Use STP communication cables of type Cat.5e or higher, or TCP/IP-compliant cables that conform to requirements of the various interfaces.

6. Specifications

For detailed specifications, download and refer to the User's Manuals for individual models that are available at Mitutoyo's web site.

6.1. Functions (Common to All Models)

Output data	Current value *Depends on parameter settings
EJ Counter operation/settings	Current value hold (software hold) Preset/zero set clear Peak hold clear Error clear Parameter setting/verification Tolerance judgment setting/verification Presets and zero set setting/verification

6.2. Interfaces

6.2.1 USB

Model	All models
USB	USB 2.0 Full Speed
Maximum baud rate	12 Mbps
Port used	Virtual COM port
Connector type	Type-C

6.2.2. CC-Link

Model	Part No. 21HZA186 Interface Unit CC-Link
CC-Link Ver.	Ver. 1.10/Ver. 2.00
Station type	Remote device station
Number of occupied stations	Ver. 1.10: 2 stations Ver. 2.00: 4 stations (extended cyclic, 4x)
Connector plug	Connector plug type: 1908732 (PHOENIX CONTACT)
Communication cable	CC-Link compliant cable

6.2.3. PROFINET

Model	Part No. 21HZA187 Interface Unit PROFINET
PROFINET	PROFINET RT (RT Class1)
Conformance class	Class B
Communication port	RJ45×2 ports (IP20)
Communication cable	STP communication cables of type Cat.5e or higher, or PROFINET-compatible TCP/IP cables *Compatible with both cross cables and straight cables
Maximum baud rate	100 Mbps, full duplex

6.2.4. EtherNet/IP

Model	Part No. 21HZA188 Interface Unit EtherNet/IP
Supported interfaces	EtherNet/IP
Communication port	RJ45×2 ports (IP20)
Communication cable	STP communication cables of type Cat.5e or higher, or EtherNet/IP-compatible cables that conform with TCP/IP requirements * Compatible with both cross cables and straight cables
Baud rate	Automatic switching by auto-negotiation 10 Mbps / 100 Mbps Full duplex/half duplex

6.2.5. EtherCAT

Model	Part No. 21HZA264 Interface Unit EtherCAT
Supported interfaces	EtherCAT
Communication port	RJ45×2 ports (IP20)
Communication cable	STP communication cables of type Cat.5e or higher, or EtherCAT-compatible cables
Baud rate	100 Mbps, full duplex

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

6.3. General Specifications (Common to All Models)

Protection level		IP20
Power supply specifications	Input voltage	10 V–27 V DC (supplied from EJ Counter)
	Maximum power consumption	Interface unit by itself: 3 W or less With maximum number of units linked: Less than 30W (including 8 EJ Counters and 16 Linear Gages)
Operating temperature (humidity) range		0 °C–50°C (20% RH–80% RH, without condensation)
Storage temperature (humidity) range		-10 °C–60 °C (20% RH–80% RH, without condensation)
CE marking/ UKCA marking		EMC Directive/Electromagnetic Compatibility Regulations: EN IEC 61326-1 Immunity test requirement: Clause 6.2 Table 2 Emission limit: Class A RoHS Directive/The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations : EN IEC 63000

5.2. Error Output

・For details, download and refer to the User's Manuals for individual models that are available at Mitutoyo's web site.

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