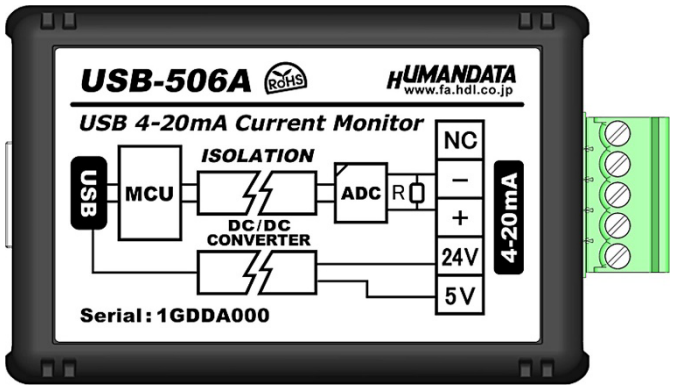
USB 4-20mA
Current Monitor (Compact)

USB-506A

User's Manual
Ver. 1.0



HuMANDATA LTD.

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Precautions

Do Not	1	This product uses ordinary off-the-shelf electronic components, and is therefore inappropriate for use in applications that require special quality or reliability and are expected to protect human lives or prevent accidents, such as safety mechanisms in fields including space, aeronautics, medicine, and nuclear power.
	2	Do not be used underwater or in high-humidity environments.
	3	Do not be used in the presence of corrosive gases, combustible gases, or other flammable gases.
	4	Do not turn on power when circuit board surface is in contact with other metal.
	5	Do not apply voltage higher than rated voltage.

Attention	6	This manual may be revised in the future without notice owing to improvements.
	7	All efforts have been made to produce the best manual possible, but if users notice an error or other problem, we ask that they notify us.
	8	Item 7 notwithstanding, HuMANDATA cannot be held liable for the consequences arising from use of this product.
	9	HuMANDATA cannot be held liable for consequences arising from using this product in a way different from the uses described herein, or from uses not shown herein.
	10	This manual, circuit diagrams, sample circuits, and other content may not be copied, reproduced, or distributed without permission.
	11	If the product emits smoke, catches fire, or becomes unusually hot, cut the power immediately.
	12	Do not install the control cables or communication cables together with the main circuit lines or power cables. In such an environment, it may result in malfunction due to noise.
	13	Be careful of static electricity.

Revision History

Date	Revision	Description
May 25, 2026	v1.0	Initial release

Product packaging

Thank you very much for purchasing the USB-506A. In this package, you will find the following items included. If there are any shortages or issues, please contact us.

- USB 4-20mA Current Monitor (Compact) USB-506A × 1
- USB cable (1.8m) × 1

Introduction

USB-506A is an isolated converter that connects to a PC or other device via USB and measures the 4-20 mA current.
By isolating the USB side from the 4-20 mA side, stable measurement can be achieved through improved noise immunity and suppression of transient phenomena. In addition, the isolation provides robust protection for connected equipment.

USB-506A includes a built-in isolated power supply for powering 4-20 mA output devices and sensors, and either 24 VDC or 5 VDC can be used.

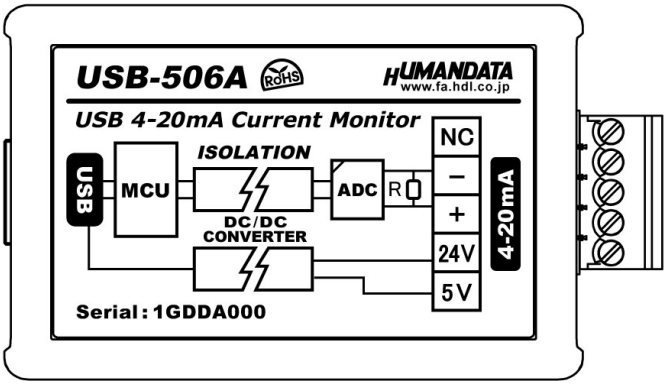
By using the dedicated application, USB-506 CV-Monitor, real-time display of measured data, scaling values, and graphs is available on a PC.

Dedicated control commands are also provided, enabling 4-20 mA measurement from user applications. For details on the control commands, refer to Chapter 6, “Control Commands.”

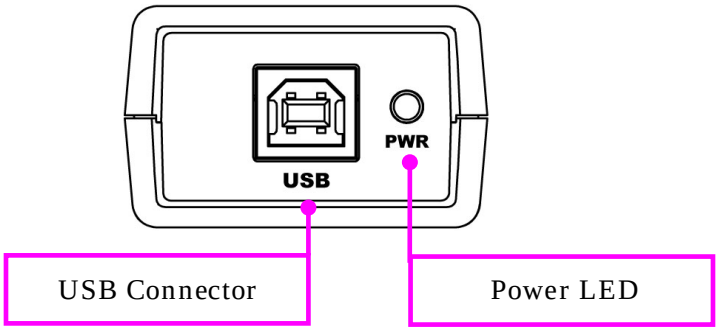
Note

Only one output power supply, either 24 VDC or 5 VDC, can be used at a time. Simultaneous use of both is not supported.

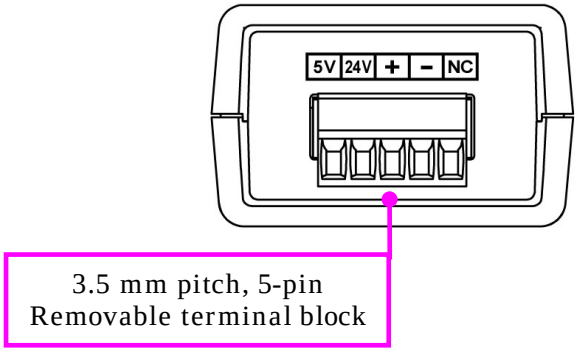
1. Overview



Nameplate



USB Host side



4-20mA side

The USB side and 4-20 mA side are isolated.

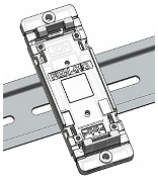
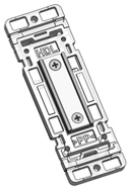
2. Specifications

2.1. Product Specification

Item	Description	Remarks
Model	USB-506A	
Input Power	5 VDC Supplied via USB cable	
Current Consumption	450 mA max. (When the built-in power supply is not used: 200 mA max.)	
HOST interface	USB 2.0 compliant (Full-Speed supported) USB-B connector	USB 1.1 compatible ESD protection ±11 KV
USB connector	Standard Type B Female	
4-20mA Connector	5-pin terminal block	Phoenix Contact Model: 1844249
Measurement Range	0-25 mA	Isolated from the USB side.
Resolution	24-bit A/D Converter (ADC)	
Measurement Accuracy	≤ ±0.25% FS	
Sampling Period	Minimum setting unit: 10 ms	Selectable by command
Shunt Resistor	200 Ω ±0.01 %	
Built-in power supply	24 VDC (±5 %) / 30 mA max. or 5 VDC (4.85 to 5.5 V) / 100 mA max.	Isolated from the USB side. Simultaneous output is not supported.
Isolation Protection	When the output power supply is not used: 2500 VDC When using the 24 VDC output power supply: 1500 VDC When using the 5 VDC output power supply: 2500 VDC	Designed value
LSI	General-purpose microcontroller 4-20 mA ADC	
LED	Power LED	
Control Method	Communication control via virtual COM port	
Operating Ambient Temp.	-20°C to 60°C (-4°F to 140°F)	No condensation permitted
Operating Ambient Humi.	30% to 85% RH	
Storage Ambient Temp.	-20°C to 60°C (-4°F to 140°F)	
Storage Ambient Humi.	30% to 85% RH	
Noise Immunity	Not specified	
Compliance Standards	Not specified	
Weight	Approx. 70 g	Only main body
Dimensions	67 x 43.5 x 27 mm (2.638" x 1.713" x 1.102")	Without projections

* There is a case to be changed to the parts of the compatibility.
* Power saving function (suspend, standby, sleep and others) is not supported.

2.2. Optional Accessories

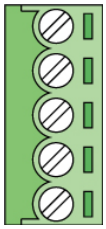
MODEL	Image	品名
PEN-003		Attachment with clamping screw JAN：4937920800709
PEN-003-DIN		Attachment for 35mm DIN rail JAN：4937920800716
PEN-003-MG		Attachment with neodymium magnet JAN：4937920801201
TB35-USB-5		Detachable 5P Terminal Connector 1840395 (Phoenix Contact) JAN：4937920801287

2.3. Main Power

USB-506A is powered through a computer's USB port (Bus-powered). When using a USB hub for branching, ensure that a stable power supply is provided to prevent voltage drops. If the voltage is insufficient, stable measurement may not be possible.

2.4. 4-20mA Connector

Do not connect/disconnect while powered.

Connector	Pin Assignment	Signal
	NC	-
	-	Current Terminal (–)
	+	Current Terminal (+)
	24V	24 VDC
	5V	5 VDC

Connector: 1840395 (Phoenix Contact)

[Applicable Wires]
Solid wire: 0.14 mm² to 1.5 mm²
Stranded wire with ferrule, without plastic sleeve: 0.25 mm² to 1.5 mm²
Stranded wire with ferrule, with plastic sleeve: 0.25 mm² to 0.5 mm²

Use ferrules when using stranded wires.

Wire strip length: 7 mm
Tightening torque: 0.22 Nm to 0.25 Nm

Note

Only one output power supply, either 24 VDC or 5 VDC, can be used at a time. Simultaneous use of both is not supported.

3. CDC Class Driver Installation Guide

USB-506A uses the CDC (Communication Device Class) driver, which is included in the operating system.

Windows 10 or later:
No driver installation required. Automatically recognized as a "USB Serial Device (COM*)".

* Driver installation is required in the following cases:

- When using Windows 8.1 or earlier
- When using Windows 10 or later, so that the device is recognized by its model name in Device Manager

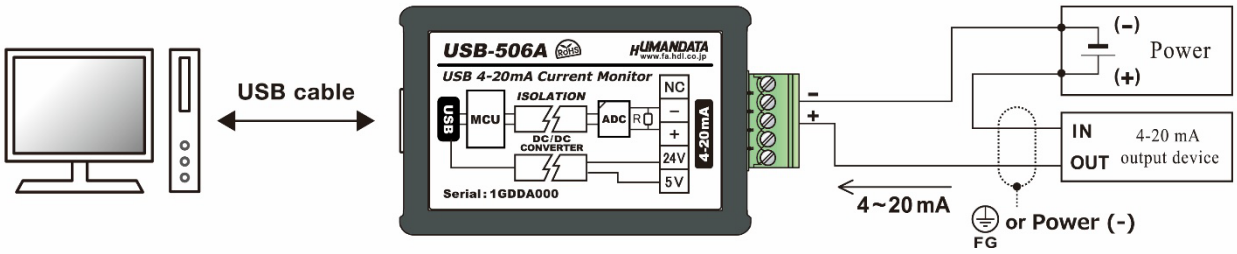
The device driver and installation manual can be downloaded from the product documentation page. Please refer to Chapter 6, “Additional Documentation and User Support.”

4. Connection Examples

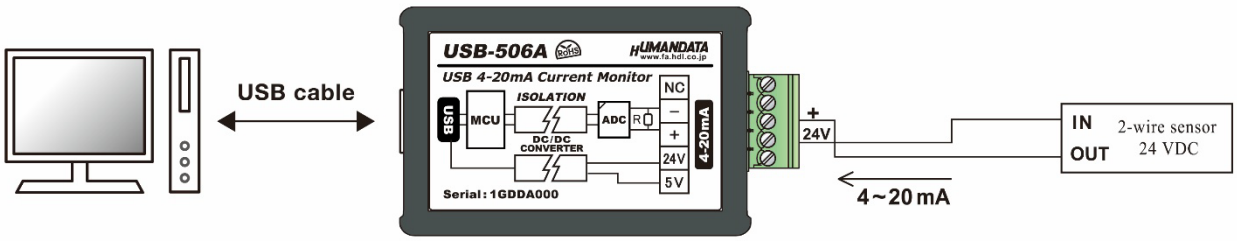
Examples of connections between the USB-506A and 4-20 mA output devices are shown below.

* If the 4-20 mA side cable is shielded, refer to the manual of the 4-20 mA output device for instructions on connecting the shield wire.

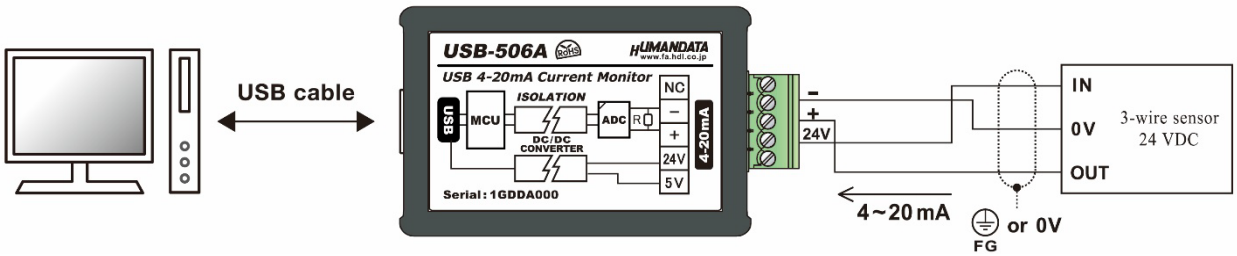
4.1. Connecting an External Power Supply



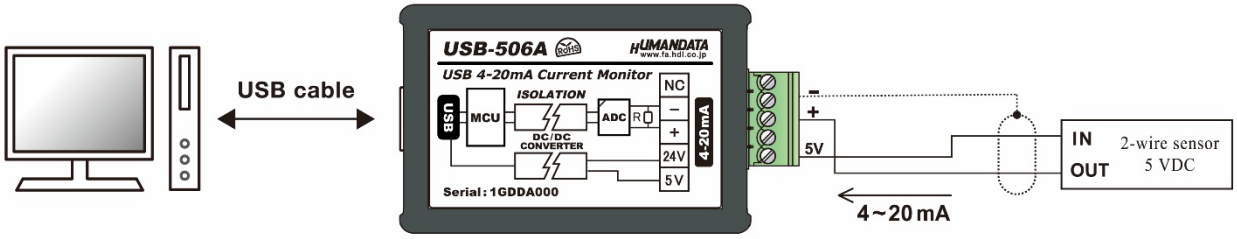
4.2. Connecting the Built-in 24 VDC Power Supply (2-Wire Sensor)



4.3. Connecting the Built-in 24 VDC Output Power Supply (3-Wire Sensor)



4.4. Connecting the Built-in 5 VDC Output Power Supply (2-Wire Sensor)



5. Control Command

5.1. Overview of Control Commands

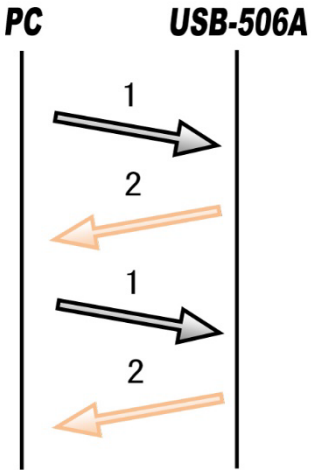
By using control commands, you can measure the 4-20 mA current from your own application.
A control command consists of a command character, sequence number, parameter(s), and an end code, separated by commas. Some commands do not require parameters.
The sequence number {SQNO} is an arbitrary string (up to 5 characters).
USB-506A returns the same sequence number in its response, allowing the host to match commands with responses.
ASCII characters are assigned to the control commands, allowing operation to be verified by keyboard input using a terminal application such as Tera Term.
Use uppercase letters for command characters.

Example

	Command {CMD}	Comma { , }	Sequence number {SQNO}	Comma { , }	Parameter {PRAM}	End code <CR>
HEX	43h 52h 44h	2Ch	31h 32h 33h	2Ch	31h 30h 30h	0Dh
ASCII	CRD	,	123	,	100	CR

5.2. Control Sequence

1. The PC sends a command to the USB-506A.
2. USB-506A detects the end code <CR> and returns a response. The PC checks this response to confirm that the command was received correctly. Refer to the command list for response formats.



When sending multiple commands, always wait for the response to the previous command before sending the next one.

If the USB-506A does not respond

The USB-506A may not be powered
- Check the USB cable connection
- Check that the PWR LED is lit

If using a USB hub
- Ensure other USB devices are not consuming too much power
- Try connecting the USB-506A directly to the PC

5.3. Control Command List

No.	Command	Function	Format
1	CST	Connection check	CST,{SQNO}<CR>
2	DR1	Read current value	DR1,{SQNO}<CR>
3	TM1	Set sampling period	TM1,{SQNO},{PRAM}<CR>
4	CR1	Continuous read current value	CR1,{SQNO},{PRAM}<CR>
5	EX1	Stop continuous read	EX1,{SQNO}<CR>
6	VER	Get firmware version	VER,{SQNO}<CR>

The commands are explained below. (The sequence number is fixed at "123".)

1. CST Command (Connection check)

Format		CST,{SQNO}<CR>
Function		This command is used to verify the connection between the PC and the USB-506A. The connection is confirmed by receiving a response.
Example	**Send**	CST,123<CR>
	Response	OK,CST,123<CR>

2. DR1 Command (Read current value)

Format		DR1,{SQNO}<CR>
Function		Read the current value and return the A/D value in hexadecimal format. Let the received A/D value converted to decimal be Adec. The current value can be calculated using the following formula. Current [mA] = (Adec × 0.298) / 200,000
Example	**Send**	DR1,123<CR>
	Response	OK,DR1,123,004F12<CR>

3. TM1 Command (Set sampling period)

Format		TM1,{SQNO},{PRAM}<CR>
Function		Set the sampling period for continuous current reading. (Sampling period = parameter × 10 ms)
Parameter Range		0-65535 (default: 0) 0: Minimum 1: 10 ms 2: 20 ms … 60000: 10 minutes
Example	**Send**	TM1,123,100<CR> * When set to 1 second
	Response	OK,TM1,123<CR>

4. CR1 Command (Continuous read current value)

Format		CR1,{SQNO},{PRAM}<CR>
Function		Continuously read the current value and return the A/D value in hexadecimal format. PRAM: number of measurements If PRAM = 0 → continues until EX1 command is received The measurement count is appended at the end of the response. When the measurement count exceeds 999999999, it returns to 1. Let the received A/D value converted to decimal be Adec. The current value can be calculated using the following formula. Current [mA] = (Adec × 0.298) / 200,000
Parameter Range		0-999,999 (default: 0)
Example	**Send**	CR1,123,100<CR> * When 100 count read
	Response	OK,CR1,123<CR> 004F15,1<CR> 004F17,2<CR> 004F18,3<CR> … 004F15,100<CR>

5. EX1 Command (Stop continuous read)

Format		EX1,{SQNO}<CR>
Function		Stop continuous reading of current.
Example	**Send**	EX1,123<CR>
	Response	OK,EX1,123<CR>

6. VER Command (Get firmware version)

Format		VER,{SQNO}<CR>
Function		Get the firmware version.
Example	**Send**	VER,123<CR>
	Response	OK,VER,123,10<CR> * When firmware version is 1.0

5.4. Error Codes

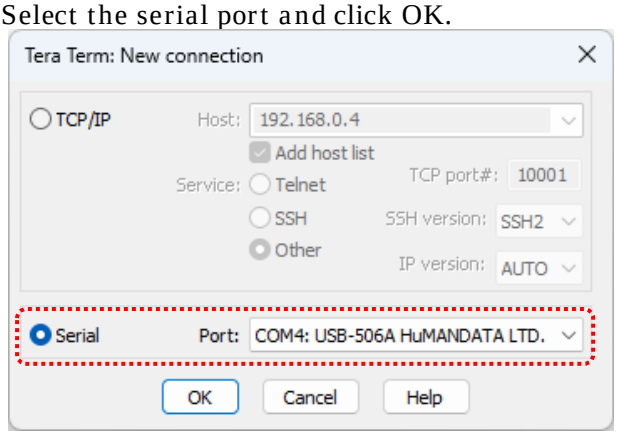
If a control command cannot be processed successfully, an error code is returned.

ER001	**Command error**	Invalid or unsupported command
	Response	ER001<CR>
ER002	**Sequence number error**	SQNO is missing or exceeds 5 characters
	Response	ER002<CR>
ER003	**Parameter setting error**	The parameter is outside the allowed range or the parameter data is missing.
	Response	ER003<CR>
ER004	**Continuous read active**	Stop continuous read before sending a new command
	Response	ER004<CR>

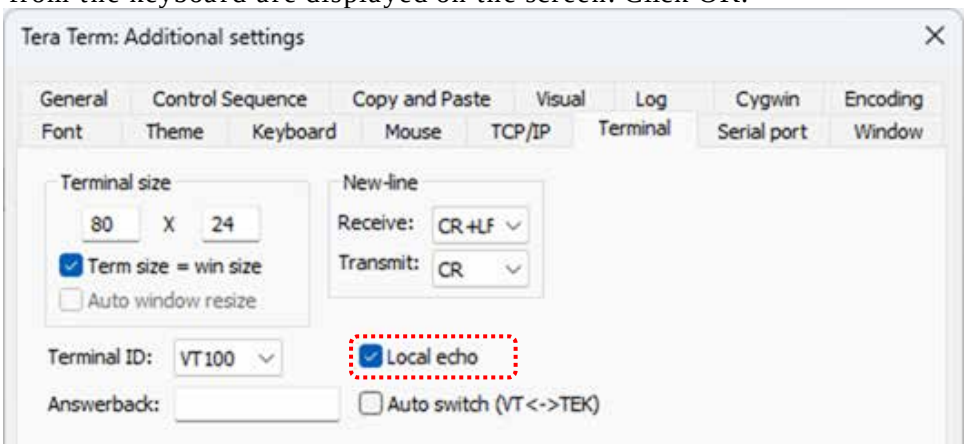
5.5. Example of Command Verification Using Communication Software

The communication software Tera Term is a terminal application for Microsoft Windows that sends characters entered from the keyboard to the connected device and displays the characters returned from the device.

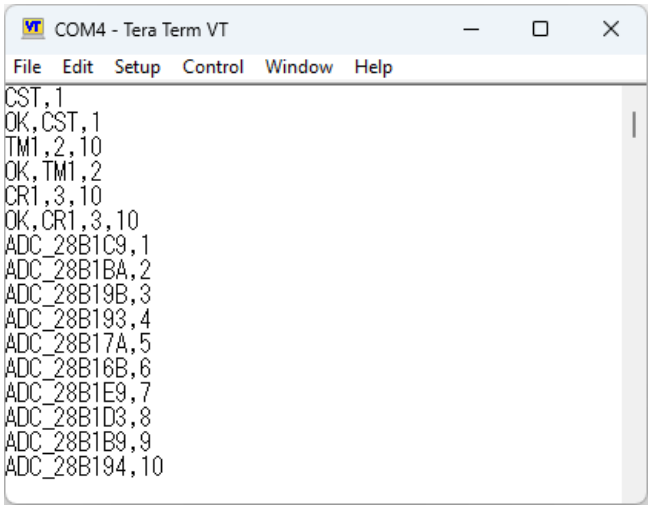
1. Connect the Device
   Connect the USB-506A to the PC. Start Tera Term and select “New connection”.
   Select the serial port and click OK.



2. Enable Local Echo
   Open Terminal Setup > Terminal... and check Local echo so that the characters entered from the keyboard are displayed on the screen. Click OK.



3. Enter Commands
   Enter commands in the terminal and confirm the operation of the USB-506A.



6. Dedicated Application (USB-506 CV-Monitor)

The dedicated application, USB-506 CV-Monitor, can be used with the USB-506A.
It can send control commands to the USB-506A, display measurement results, and perform data logging. This application software and the user's manual can be downloaded from the documentation page. Please refer to Chapter 7, "Additional Documentation and User Support."

Chart | Log

Count	Date	Time	Current[mA]	Scaling
15	2026/05/09	11:57:41.001	8.9762	224
16	2026/05/09	11:57:42.001	8.9761	224
17	2026/05/09	11:57:43.001	8.9762	224
18	2026/05/09	11:57:44.001	8.9761	224
19	2026/05/09	11:57:45.001	8.9761	224
20	2026/05/09	11:57:46.001	8.9761	224
21	2026/05/09	11:57:47.001	8.9761	224
22	2026/05/09	11:57:48.001	8.9760	224
23	2026/05/09	11:57:49.001	8.9761	224
24	2026/05/09	11:57:50.001	8.9760	224

7. Additional Documentation and User Support

The following documents and other supports are available at

https://www.hdl.co.jp/en/faspc/USB/usb-506a

- Dedicated Application (USB-506 CV-Monitor)
- User's Manual
- Outline Drawing
- Device Driver

… and more.

8. Warranty and Compensation

Please refer to the following URL for the warranty.

https://www.fa.hdl.co.jp/en/fa-warranty.html

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