Magnescale

Accessory

AC20-B100

Thank you for purchasing this Magnescale product.
Read all the instructions in the manual carefully before use and strictly follow them.
Be sure to keep this manual for future reference.

This instruction manual corresponds to the special software Ver. 01.05.02.

Instruction Manual

Trademarks

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Intel® Core™i3 is the registered trademark of Intel Corporation.
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Note

The text and display screens of this instruction manual, with some exceptions, assume the use of a computer running Windows 11 / Windows 10. For other operating systems, there might be cases such as restricted functionalities and or different displays.

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Release notes

Special software MGS Monitoring System

Version	Notes	Date
01.05.02	FANUC and Mitsubishi detection alarm added for RS97 series. Supported models updated.	2025/07/30
01.05.01	Device identification function and Service mode supported. SQ scale specification change supported, supported models updated.	2025/07/30
01.05.00	SmartSCALE GUI revised. Supported models updated, SmartSCALE incremental models excluded.	2021/09/02
01.04.00	Scale alarm display supported. Supported models updated.	2021/04/15
01.03.00	SmartSCALE incremental models added. GUI changed.	2019/09/15
01.02.04	Supported SmartSCALE models added.	2019/05/20
01.02.03	SmartSCALE Siemens model supported. GUI changed.	2018/05/25
01.02.00	SmartSCALE GUI changed.	2017/08/28
01.01.00	SmartSCALE supported.	2017/04/03
01.00.00	1st Release	2017/03/31

1. Outline

1-1. Introduction

The AC20-B100 is a monitoring tool used to perform scale failure analysis and to check scale operation after installing or replacing scales. This tool is used by connecting it to a computer to which the special software Ver. 01.05.02[*1] has been installed and a compatible scale.

[*1]: Download the special software from the Magnescale website. This product is used to check the scale failure status and installation status, and does not guarantee scale functions or performance. Refer to the respective instruction manuals for the scale operation method.

1-2. Major functions and features of the software

Monitoring of Lissajous signals, scale alarms, and signal adjustment levels

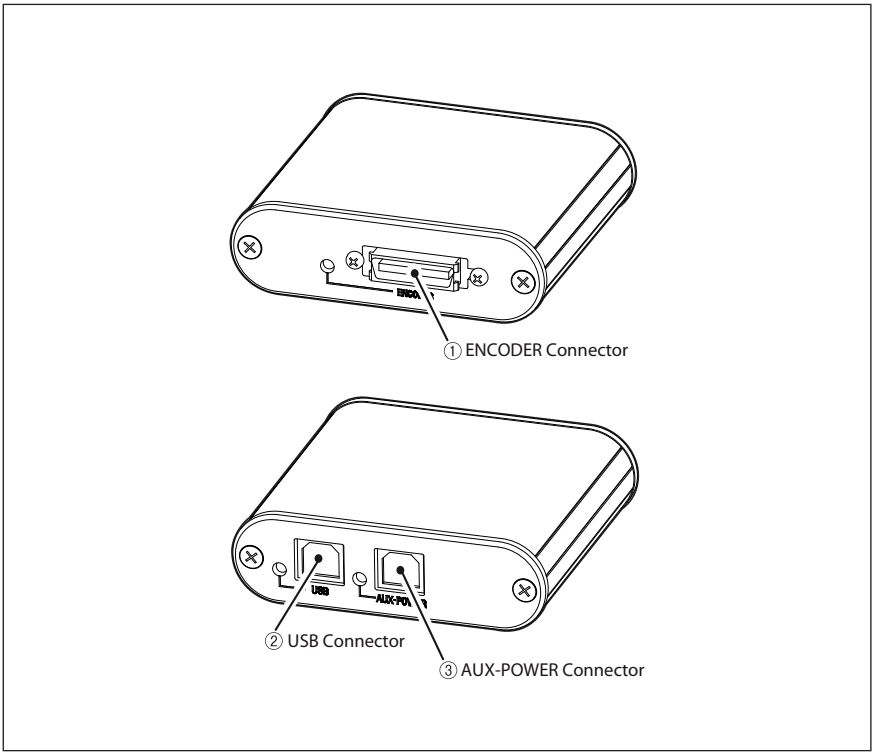
- SR/RU monitoring function
- RS monitoring function
- SQ monitoring function

Refer to "3-1-1. Compatible scales" for scales that can be connected.

1-3. Product configuration

AC20-B100	
Special software	MGS Monitoring System (Download from the Magnescale website.)
USB cable	× 2 (accessory)
Adaptor cable (sold separately)	CE35-02 (compatible controller: Mitsubishi Electric Corporation)
	CE36-02 (compatible controller: FANUC Corporation)
	CE37-02 (compatible controller: SIEMENS AG)
	CE28-050NJT01 (compatible controller: FANUC Corporation, Mitsubishi Electric Corporation, YASKAWA Electric Corporation)
	CE36-02T01 (compatible controller: YASKAWA Electric Corporation dedicated cable for Molex 6P connector)
Special cable	A separate, special cable is required for special specification products and SR77/SR87.
	SR77/SR87 direct-connection cable: CH33-05NPT05
	For other cables, contact our sales representative.

2. Names and functions of each part



Name	Description
① ENCODER Connector	Connects to the scale using the adaptor cable (sold separately.)
② USB Connector	Connects to the computer using the supplied USB cable.
③ AUX-POWER Connector	Connects to the computer using the supplied USB cable to supply auxiliary power when power supply to the scale is insufficient. This connector cannot be used for communication. (An external DC 5 V power supply adaptor can also be connected.)

3. System environments and setup

3-1. Compatible system environments

3-1-1. Compatible scales

The following scales are compatible.

SR27A, SR67A	Linear scale (unit-type)
SR77, SR87	Linear scale (unit-type)
SQ47, SQ57	Linear scale (separated type)
RU97, RU77	Rotary scale (unit-type)
RS97	Rotary scale (separated type, dual head)

A special cable is required for special specification products and SR77/SR87. Contact our sales representative.

3-1-2. Computer environment

This software is guaranteed to work in the following computer environment, to be prepared by users.

Item	Environment
CPU	Intel Core i3 or higher recommended*1
RAM	4 GB or higher recommended*1
OS	Windows 11 (64bit of each edition) Windows 10 (32bit/64bit of each edition)
Display	1280 × 800 pixels or higher recommended*1
USB	2.0 or higher

*1 : It must satisfy the requirements of the OS.

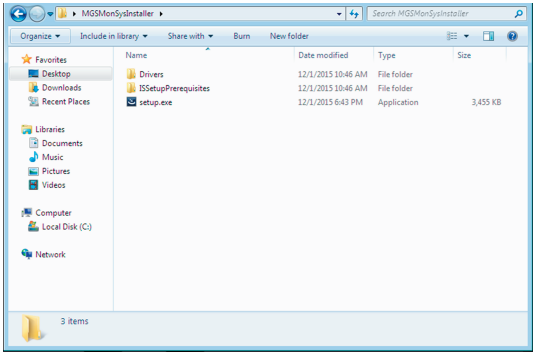
3-2. Software installation

Note : If a different version is already installed, be sure to uninstall it before installing this software. (Refer to "3-4. Software uninstallation.")
Installation requires administrator rights.

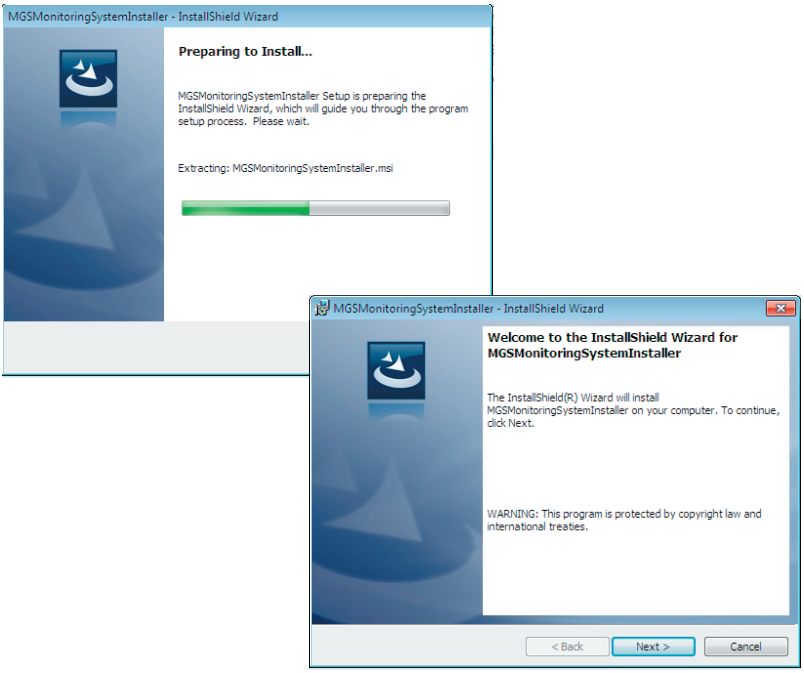
1 Download the MGS Monitoring System from the Magnescale website.
URL : www.magnescale.com
Magnescale Products

When downloading the software, enter the ID and password included with the AC20-B100.

2 Extract the compressed file that was downloaded.
The extracted files are displayed.
If a folder is displayed, double-click it.



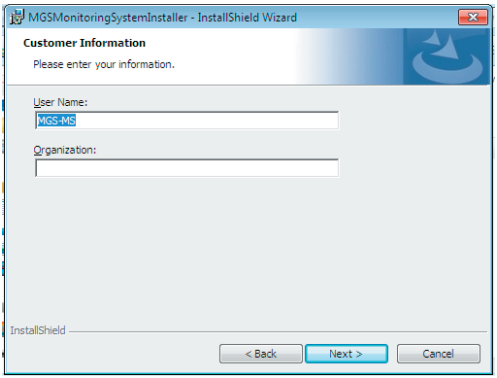
3 Double-click “setup.exe.”



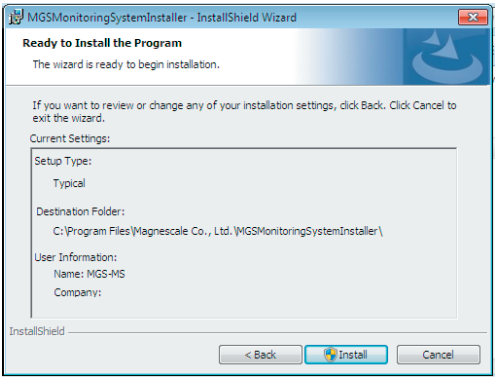
4 Click “Next >.”
The Software License Agreement appears.

5 If you agree to the displayed license conditions, select “I accept the terms in the license agreement” and then click “Next >.”

6 Enter the following items when the Customer Information dialog box appears.
User Name : User name
Organization: Company name

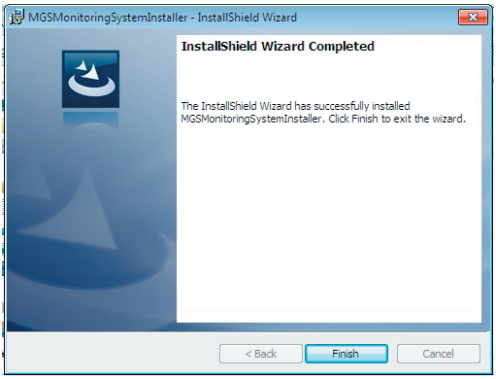


7 Click “Next >.”
A dialog box appears notifying that installation is ready.



8 Click “Install.”
Installation starts.

9 When the dialog box shown below appears, click “Finish.”



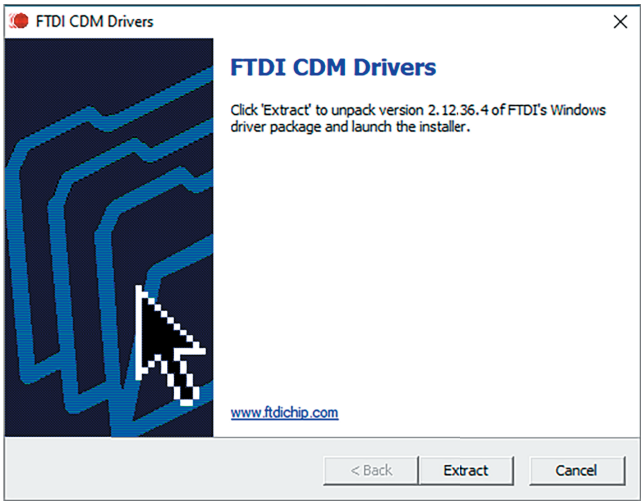
10 Confirm that the “MGSMonitoringSystem” icon appears on the computer desktop.

The installation is complete.

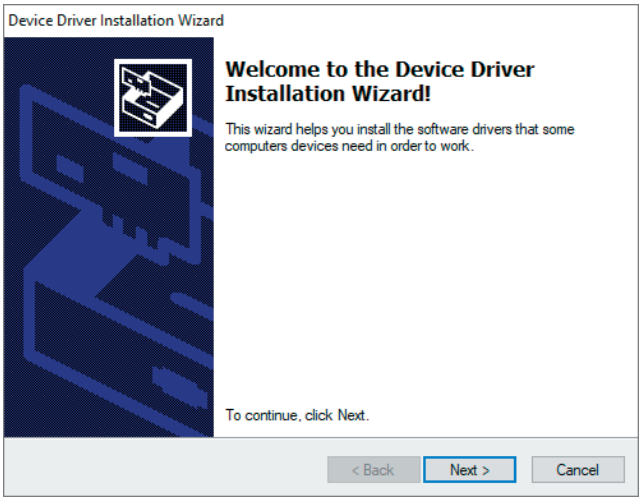
3-3. Driver installation

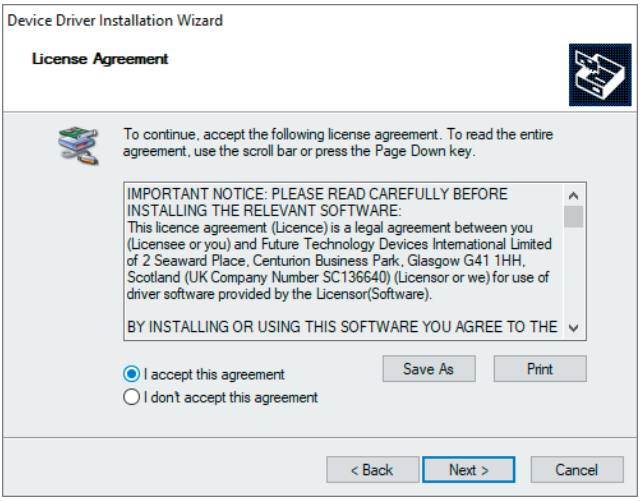
1 Double-click the “Drivers” folder in the file extracted in step 2 of section 3-2.

2 Double-click “CDM212364_Setup.exe.”

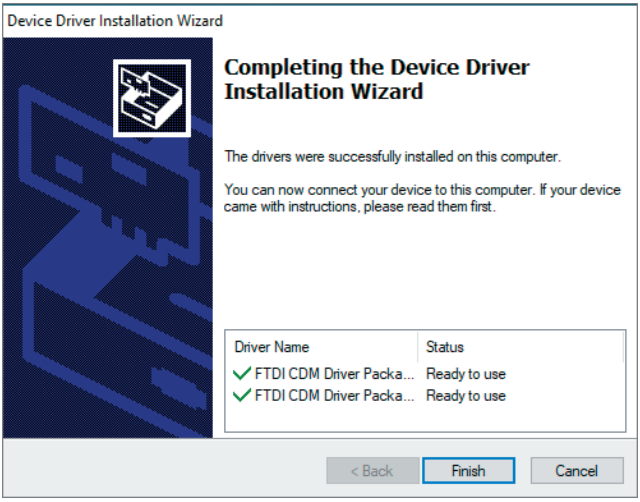


Follow the prompts to proceed with the installation.





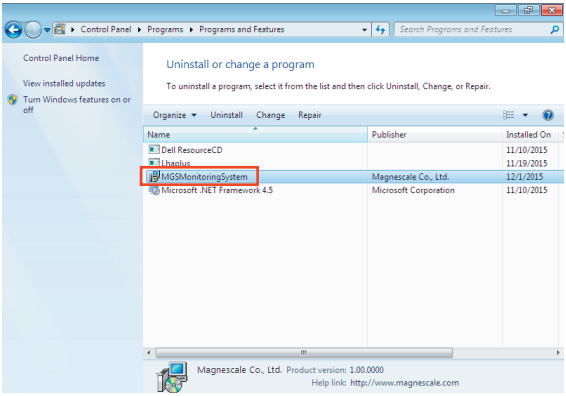
3 When the following screen appears, click "Finish."



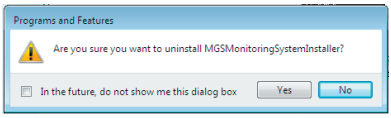
3-4. Software uninstallation

1 Click “Programs and Features” on the Control Panel of the computer.

2 Double-click “MGSMonitoringSystem” in the displayed list of software.



The dialog box shown below appears.



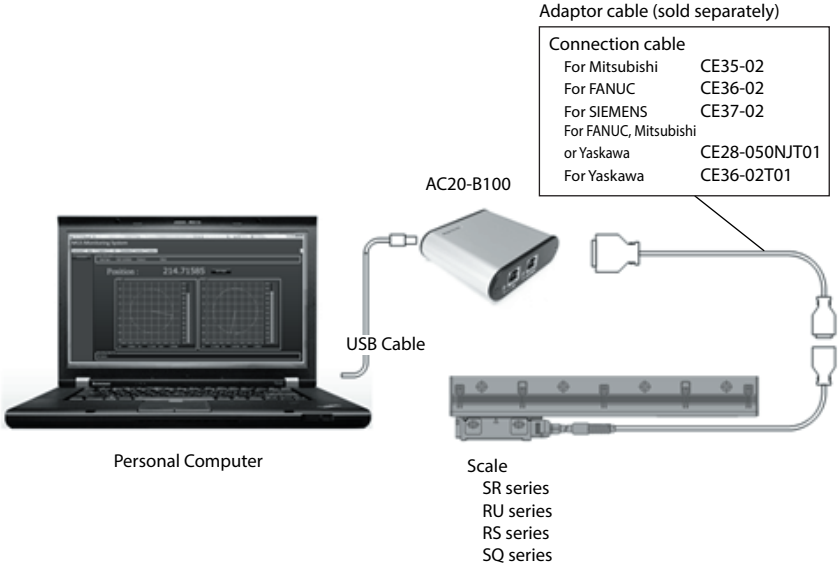
3 Confirm the message and click “Yes.”

When “MGSMonitoringSystem” disappears from within “Programs and Features”, uninstallation is complete.

3-5. Scale connection

Connect the AC20-B100 to the scale using the adaptor cable (sold separately).

* A special cable is required for special specification products and SR77/SR87. Contact our sales representative.



Checks after connection

After all the cables are connected, confirm with the LEDs on the AC20-B100 that there are no problems with the connections.

Confirm in the condition with the computer turned on.

USB connector : Lights in green

ENCODER connector : Lights in green

Reference (AC20-B100 ENCODER connector)

LED	AC20 status
Blinks in green	• Immediately after power is supplied • Communication active
Lights in green	• Power supply normal • Communication not active
Blinks in red	• Error occurred
Lights in red	• Connector not connected or cable disconnected

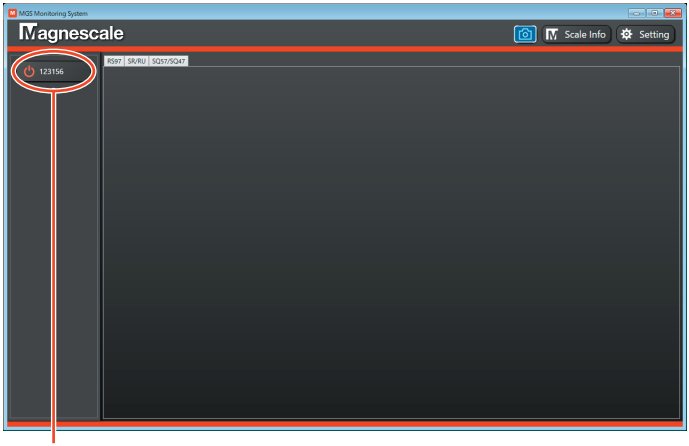
4. Starting up the software and supplying power to the scale

4-1. Starting up the software

1 Connect the AC20-B100 to the computer using the supplied USB cable.

2 Double-click the MGSMonitoringSystem icon on the computer desktop.

The software starts up.



Power button

If the AC20-B100 is connected properly to the computer, a button (Power button) showing the serial number of the connected AC20-B100 appears on the left side of the window. If the AC20-B100 is not connected when the software starts up, the button appears when the AC20-B100 is connected.
This button is used to supply power to the scale. The serial number text color indicates the power supply status.

<OFF>

<ON>

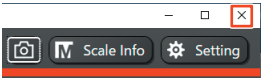
⏻ : Red, Text: white

⏻ : Green, Text: Green

4-2. Ending the software

1 Make sure that the power supply to the scale is OFF (the Power button text is white).

2 Click "× (Close)" in the upper-right corner of the software window.

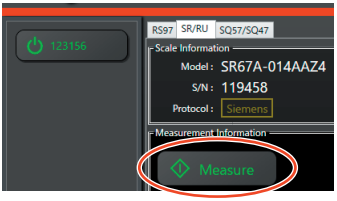


4-3. Supplying power to the scale

1 Click the Power button.
Power is supplied to the connected scale.
The Power button text changes to green.

4-4. Stopping the power supply to the scale

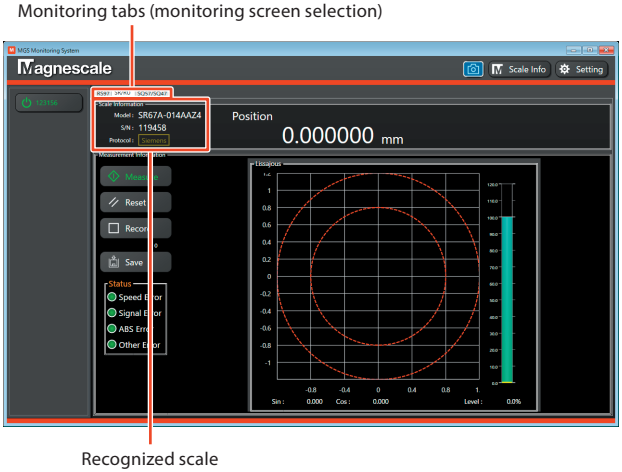
1 Make sure that the monitoring function of the scale is stopped ("Measure" button is displayed).



2 Click the Power button.
Power supply to the scale is stopped and the Power button text changes to white.

4-5. Scale recognition

When power is supplied to the scale, the system performs scale auto recognition. Once the scale is recognized, the corresponding monitoring tab (screen) is displayed.

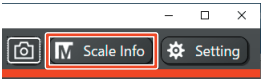


If the scale is not recognized automatically, a dialog box for entering scale information is displayed. Specify the scale information. (Refer to “4-6. Specifying scale information.”)

4-6. Specifying scale information

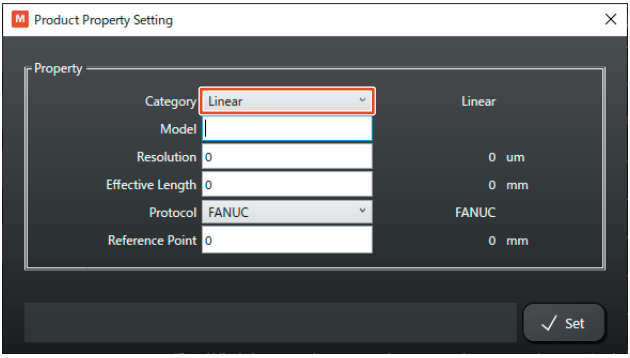
Scale information can be specified manually.
This information is saved automatically when the software is closed.

1 Click “Scale Info” in the upper right of the software window.



A dialog box for entering the scale information appears.

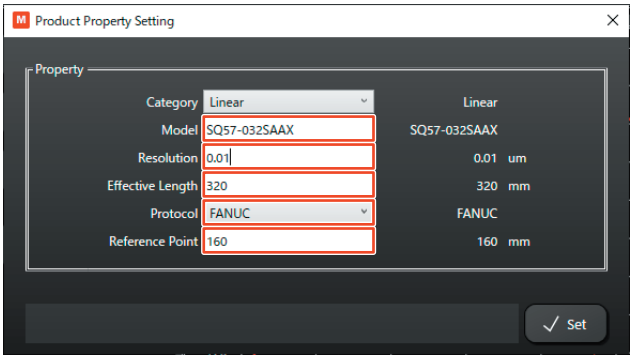
2 Select a scale category from the “Category” pull-down menu.
Linear : SR27A Series, SR67A Series, SR77 Series,
SR87 Series, SQ47 Series, SQ57 Series
Rotary: RU77 Series, RU97 Series, RS97 Series
Other : Not used



3 When "Linear" is selected

Enter the scale model name.

Enter other scale information (Resolution, Effective Length, Protocol, and Reference Point) as needed and click the "Set" button.



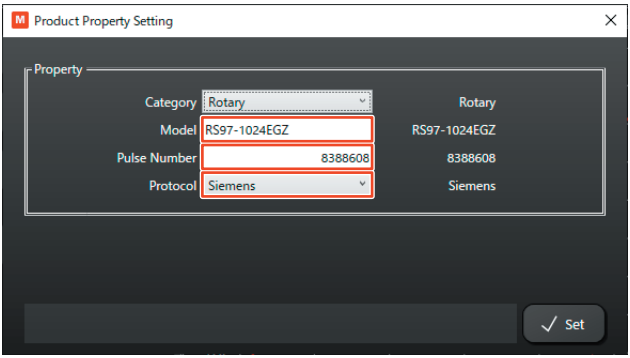
(Example above)

Category : Linear
Model : SQ57-032SAAX
Resolution : 0.01 µm
Effective Length : 320 mm
Protocol : FANUC
Reference Point : 160 mm (X : center)

Note: In case of a SQ47/SQ57 series the resolution, effective length, supported communication protocol, and reference point are automatically entered when the scale model name (Model) is entered. If the automatically entered contents are incorrect, correct the contents and then click the "Set" button.

When "Rotary" is selected

Enter the scale information (Model, Pulse Number, Protocol), and click the "Set" button.



(Example above)

Category : Rotary
Model : RS97-1024EGZ
Pulse Number : 8388608
Protocol : Siemens

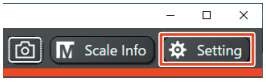
The contents entered to the scale information dialog box are held within the software, so when the same scale is connected again thereafter, it is automatically recognized.
To reset the entered contents, open the "Setting" tab and select "SystemSetting"_"Manual Scale Info". (Refer to "4-7. System settings.")

4-7. System settings

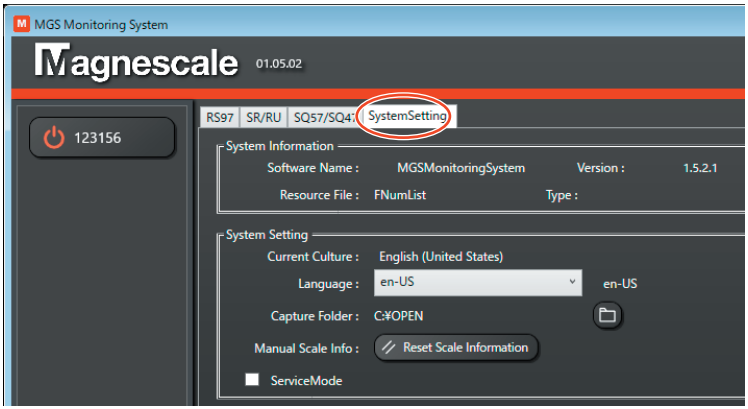
Make the software settings, such as the message language. This information is saved automatically when the software is closed.

1 Make sure that the power supply to the scale is OFF.

2 Click “Setting” at the upper-right corner of the software window.



Open the “SystemSetting” tab to display the system settings window.



System Information

Software Name : Indicates the name and version of the software.
Resource File : Indicates internal software information.

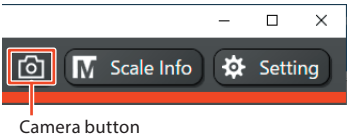
System Setting

Current Culture : Indicates the current language set for messages.
Language : Selects the message language. (Japanese / English)
The language selected here is displayed in “Current Culture.”
Capture Folder : Indicates the folder for saving screenshots, which can be set.
Manual Scale Info : Click “Reset Scale Information” to reset all manually entered scale information.
A message is displayed to confirm deletion of the entered scale information. To reset the information, click [Yes].
ServiceMode : Normally not used. Set and use only when instructed to do so by our service department.

4-8. Screenshots

The screen during monitoring can be saved as an image file.

1 Click the camera button in the upper right of the software window.



A screenshot of the software is saved as an image file.

Image file name: MonitoringSystem (n).png

Here, (n) is a number added if there are duplicate file names.

If power is supplied to the scale : [scale name]_[serial number](n).png

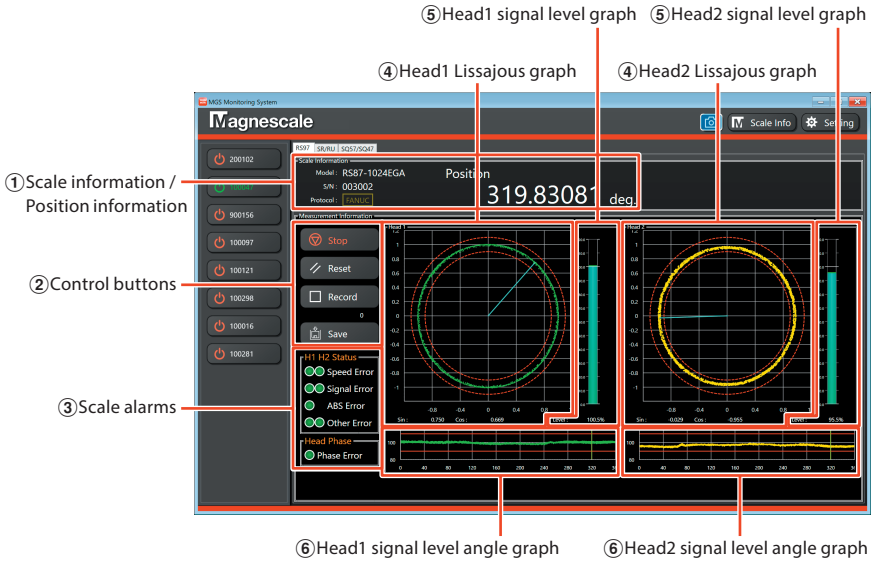
If a working memo is displayed on an SQ tab: [machine model]-[machine serial number]_[axis](n).png

The destination is indicated by “Capture Folder” in “Setting, ” where it can also be set.

5. Monitoring Lissajous signals

5-1. RS97 monitoring

5-1-1. RS series window



① **Scale information / Position information**

Shows information on connected scales (scale model name, serial number, and supported communication protocols) and scale position information.

Position display : 0°–359°

② **Control buttons**

Measure/Stop

Starts or stops monitoring. Available when power is supplied to the scale and it is recognized. Once monitoring is started, the button text changes to "Stop." Make sure that monitoring is stopped before stopping the power supply to the scale.

Reset

Discards recorded data and clears the Lissajous graph.
Any scale alarms that have occurred are also reset.

Record

Records the position data monitored (Position) and the Lissajous graph data (Head1 Cos, Head1 Sin, Head2 Cos, Head2 Sin) of both heads.
The number of sets of data recorded is indicated below the button.

Save

Saves the recorded data as a CSV file. Make sure that monitoring is stopped before saving the data.

If data is saved during recording, the system will save data up to the point "Save" was clicked.

③ Scale alarms

Alarm information for both heads (H1: Head1, H2: Head2) can be checked.

Green indicates normal, and red indicates an abnormality.

Alarms can be reset by clicking the "Reset" button, or by restarting monitoring.

Display	Details	Countermeasures
Speed Error	Excessive speed	• Check the scale feed rate. • Check the grounding. This alarm may be caused by noise.
Signal Error	Low signal level	• Check the head and scale mounting positions. • Check whether the scale or head are damaged.
ABS Error	Absolute positioning error (Note 1)	
Other Error	Other error	
Phase Error	Large mounting eccentricity of the rotor or stator (Note 2)	Check the mounting condition to confirm whether the rotor and stator eccentricity are within the allowable range.

Note 1: Head1 only in case of RS97-1024E*A/EGD or RS97-1024N*A.

Note 2: Valid from the following serial numbers onward in case of RS97-1024E*A/EGD or RS97-1024N*A.
RS97-1024E*A/EGD: 100001 or later, RS97-1024N*A: 200001 or later
Not displayed in case of RS97-1024EGZ or RS97-1024NGZ.

Compatible controller

RS97-1024E*A, RS97-1024N*A : FANUC Corporation
RS97-1024EGD : Mitsubishi Electric Corporation
RS97-1024EGZ, RS97-1024NGZ : SIEMENS AG

④ Head1/Head2 Lissajous graph

Lissajous graphs for both heads (Head1 and Head2). When the signal is inside the two red dashed lines, the signal is normal.

Sin : Sin value at current position
Cos : Cos value at current position

⑤ Head1/Head2 signal level graph

This graph displays the Lissajous signal level. (Indicated as a percentage.)

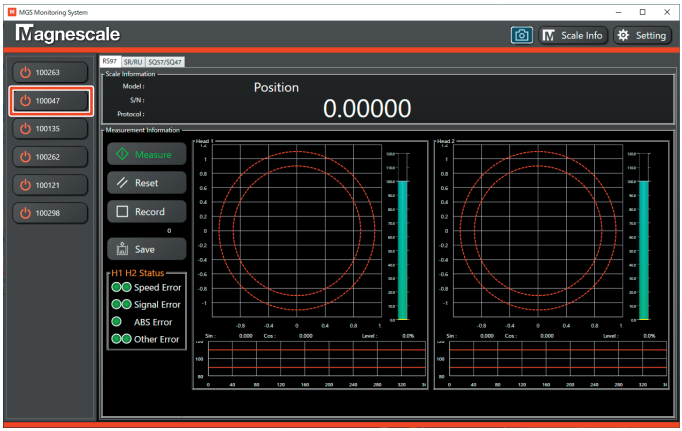
Level: Signal level at current position

⑥ Head1/Head2 signal level angle graph

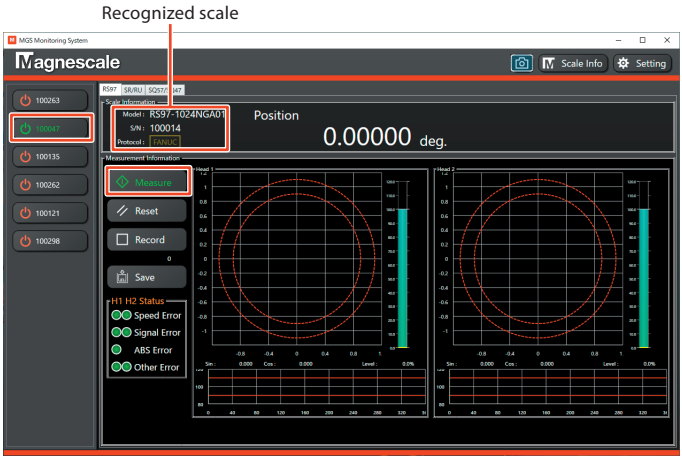
Indicates the signal level at angles from 0° to 359°.

5-1-2. Starting and stopping monitoring

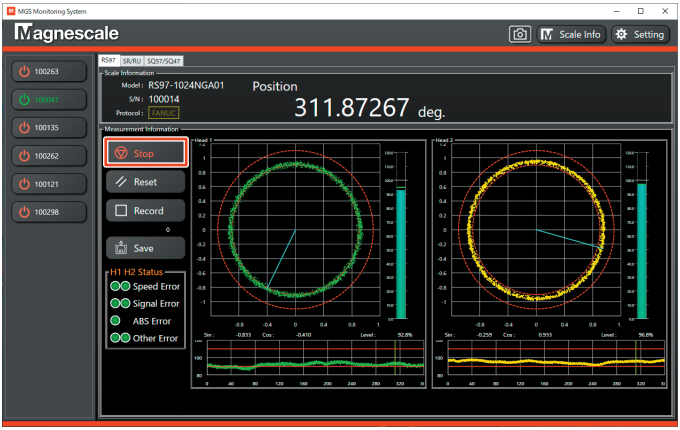
1 Click the “RS97” tab in the condition with the software started up.
The following window appears. Make sure the corresponding scale is connected, and then click the power button.



2 Confirm that power is supplied to the scale (indicated by green text on the power button) and that the corresponding scale is recognized.



3 Click the “Measure” button.
The button text changes from “Measure” to “Stop” and monitoring begins.



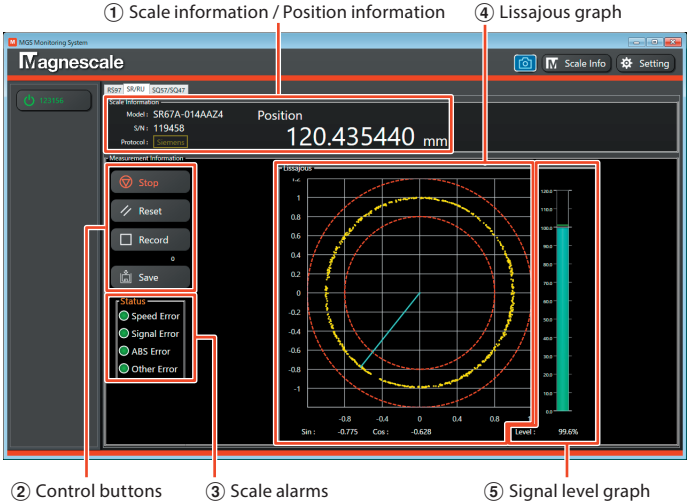
To stop monitoring, click the “Stop” button.

Note

Always stop monitoring before stopping the power supply to the scale.

5-2. SR27A/SR67A/SR87/SR77/RU77/RU97 monitoring

5-2-1. SR/RU series window



① Scale information / Position information

Shows information on connected scales (scale model name, serial number, and supported communication protocols) and scale position information.

Position display

RU Series: 0°–359°

SR Series : Absolute position (unit: mm)

② Control buttons

Measure/Stop

Starts or stops monitoring. Available when power is supplied to the scale and it is recognized. Once monitoring is started, the button text changes to “Stop.” Make sure that monitoring is stopped before stopping the power supply to the scale.

Reset

Discards recorded data and clears the Lissajous graph.

Any scale alarms that have occurred are also reset.

Record

Records the position data monitored (Position) and the Lissajous graph data (Sin/Cos). The number of sets of data recorded is indicated below the button.

Save

Saves the recorded data as a CSV file. Make sure that monitoring is stopped before saving the data.

If data is saved during recording, the system will save data up to the point "Save" was clicked.

③ Scale alarms

Alarm information for the scale can be checked.

Green indicates normal, and red indicates an abnormality.

Alarms can be reset by clicking the "Reset" button, or by restarting monitoring.

Display	Details	Countermeasures
Speed Error	Excessive speed	• Check the scale feed rate. • Check the grounding. This alarm may be caused by noise.
Signal Error	Low signal level	• Check the head and scale mounting positions. • Check whether the scale or head are damaged.
ABS Error	Absolute positioning error	
Other Error	Other error	

④ Lissajous graph

This graph shows the scale's Lissajous signals. When the signal is inside the two red dashed lines, the signal is normal.

Sin : Sin value at current position

Cos : Cos value at current position

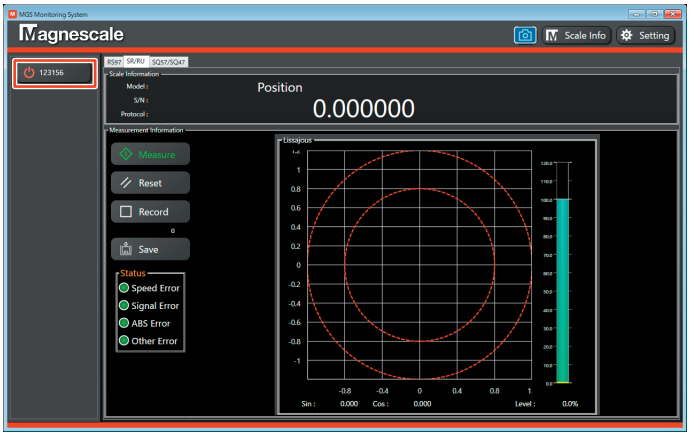
⑤ Signal level graph

This graph displays the Lissajous signal level. (Indicated as a percentage.)

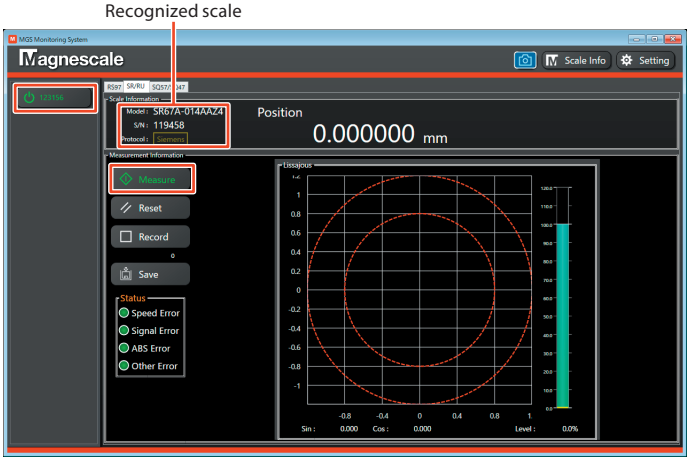
Level : Signal level at current position

5-2-2. Starting and stopping monitoring

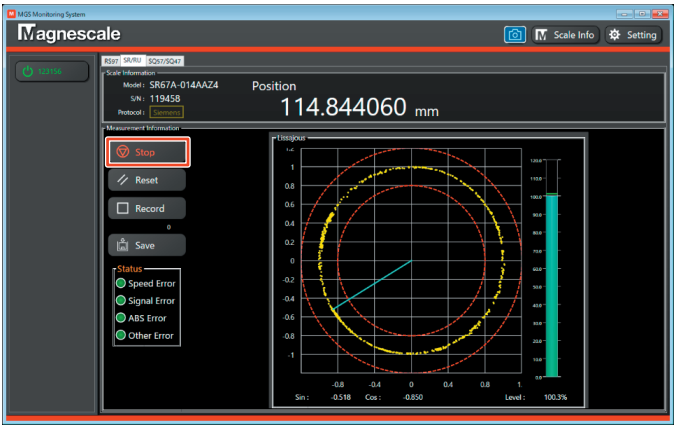
1 Click the “SR/RU” tab in the condition with the software started up.
The following window appears. Make sure the corresponding scale is connected, and then click the power button.



2 Confirm that power is supplied to the scale (indicated by green text on the power button) and that the corresponding scale is recognized.



3 Click the “Measure” button.
The button text changes from “Measure” to “Stop” and monitoring begins.



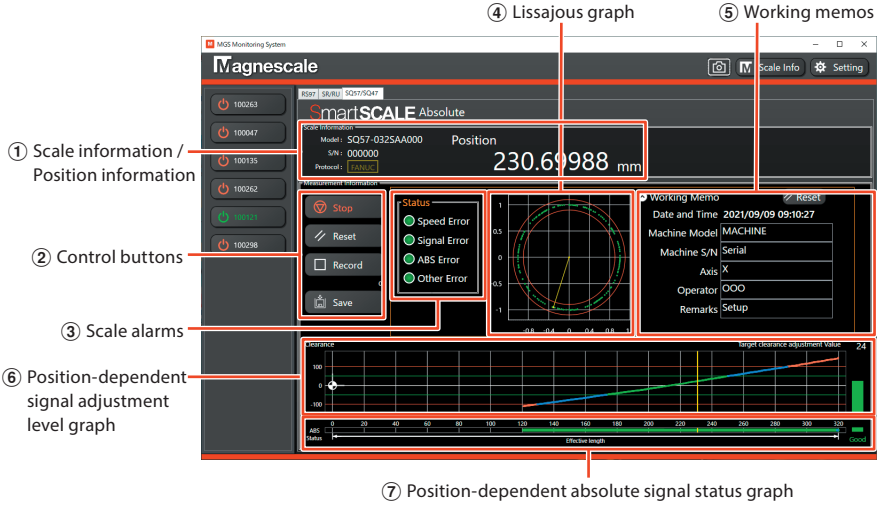
To stop monitoring, click the “Stop” button.

Note

Always stop monitoring before stopping the power supply to the scale.

5-3. SQ57/SQ47 monitoring

5-3-1. SQ series window



① Scale information / Position information

Shows information on connected scales (scale model name, serial number, and supported communication protocols) and scale position information (unit: mm).

② Control buttons

Measure/Stop

Starts or stops monitoring. Available when power is supplied to the scale and it is recognized. Once monitoring is started, the button text changes to "Stop." Make sure that monitoring is stopped before stopping the power supply to the scale.

Reset

Discards recorded data and clears the Lissajous graph and the graph of signal adjustment levels at various positions.

Any scale alarms that have occurred are also reset.

Record

Records the position data monitored (Position) and the Lissajous graph data (Sin/Cos).

The number of sets of data recorded is indicated below the button.

Save

Saves the recorded data as a CSV file. Make sure that monitoring is stopped before saving the data.

If data is saved during recording, the system will save data up to the point "Save" was clicked.

③ Scale alarms

Alarm information the scale can be checked.

Green indicates normal, and red indicates an abnormality.

Alarms can be reset by clicking the "Reset" button, or by restarting monitoring.

Display	Details	Countermeasures
Speed Error	Excessive speed	• Check the scale feed rate. • Check the grounding. This alarm may be caused by noise.
Signal Error	Low signal level	• Check the sensor head and scale mounting positions. • Check whether the scale or sensor head are damaged.
ABS Error	Absolute positioning error	
Other Error	Other error	

④ Lissajous graph

This graph shows the scale's Lissajous signals. When the signal is inside the two red dashed lines, the signal is normal.

⑤ Working memos

Enables input, display, and storage of information about the machine being worked on.

Memo information can be cleared by clicking "Reset."

Memos can be hidden by clicking ⌃.

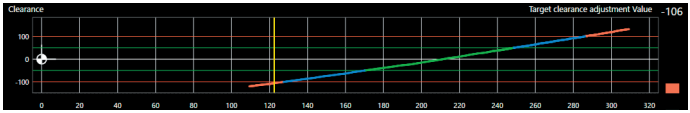
⑥ Position-dependent signal adjustment level graph

A color-coded graph of signal adjustment levels* at positions through which the sensor head has passed.

Once a graph has been generated, it remains even after monitoring is stopped. When scale monitoring is started again, a new graph is generated.

* Signal adjustment levels vary depending on target clearance adjustment values of the scale and sensor head.

Signal adjustment level display: Range in which the scale can be monitored
Pass/fail judgments at the sensor head position are shown throughout.



Green : Favorable
Blue : Within recommended range
Red : Outside recommended range
When red is displayed, recheck the sensor head and scale mounting positions.

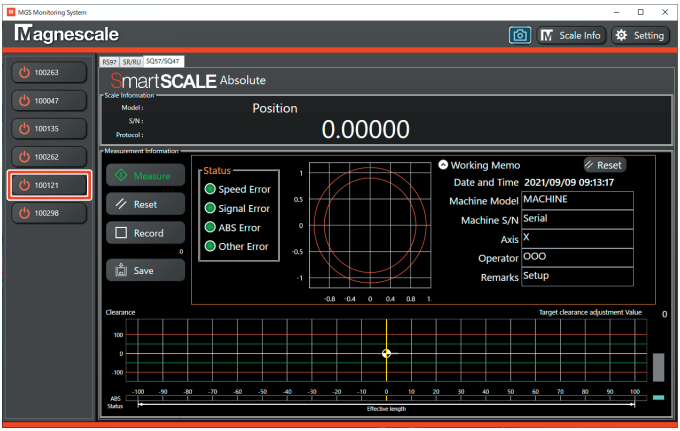
⑦ Position-dependent absolute signal status graph

A color-coded graph of absolute signal status of the scale at positions through which the sensor head has passed.

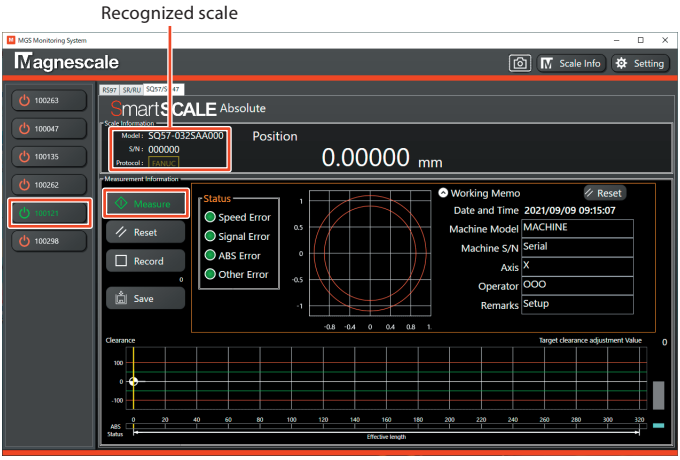
Green : Favorable (indicated as “Good”)
Blue : No abnormality (no text description)
Red : Abnormal (indicated as “Warning”)

5-3-2. Starting and stopping monitoring

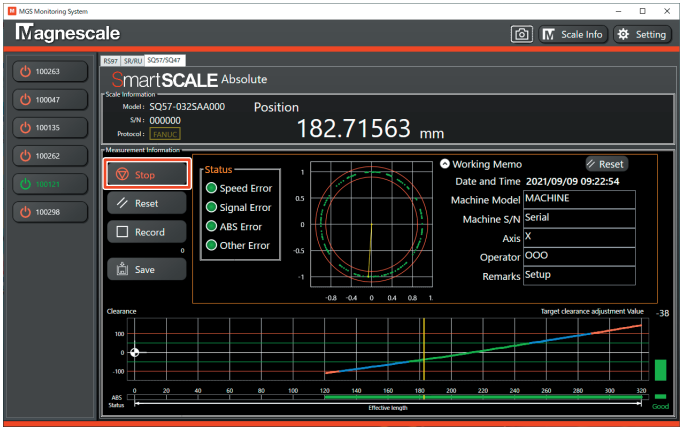
1 Click the “SQ57/SQ47” tab in the condition with the software started up.
The following window appears. Make sure the corresponding scale is connected, and then click the power button.



2 Confirm that power is supplied to the scale (indicated by green text on the power button) and that the corresponding scale is recognized.



3 Click the “Measure” button.
The button text changes from “Measure” to “Stop” and monitoring begins.



To stop monitoring, click the “Stop” button.

Note

Always stop monitoring before stopping the power supply to the scale.

6. Troubleshooting

6-1. Trouble when supplying the power

6-1-1. The Power button is not displayed.

Cause	Action
The AC20-B100 is not connected to the computer.	Check the connection. If the USB LED on the AC20-B100 lights in green, the AC20-B100 is connected properly.
The driver is not installed.	Refer to "3-3. Driver installation" and install the driver software.
The USB cable is too long.	The USB standard specifies that USB cables should be 5 m or shorter. Replace the USB cable with one that conforms to the standard.
Noise is superposed onto the USB cable.	Keep the USB cable (and the computer) as far as possible from sources of noise. If used in a noisy environment, noise may be superposed onto the USB cable and prevent normal communication.

6-1-2. Power is not supplied to the scale after the Power button is clicked.

Cause	Action
The AC20-B100 and the scale are not connected.	① Check the connection between the AC20-B100 and the adaptor cable (sold separately). If the Encoder LED on the AC20-B100 lights in green, the adaptor cable (sold separately) is connected properly to the AC20-B100. ② Check the connection between the adaptor cable (sold separately) and the scale cable. ③ Check the connection between the scale cable and the scale.
Insufficient power supply	When using a scale with high power consumption such as the RS series, bus power supply using only the USB cable from the computer or other device may be insufficient. Before supplying power, connect one end of a USB cable to the AUX-POWER port on the AC20-B100 and the other end to the computer. (In this case, two USB cables are used to connect the AC20-B100 and computer.)
The power supply was not stopped correctly during the last monitoring.	Exit the software, disconnect and reconnect the USB cable to the AC20-B100, and then restart the software before supplying power. Abruptly disconnecting the current scale while it is still on (to connect a different scale, for example) will prevent subsequent power supply.
An incompatible scale is connected.	Refer to "3-1-1. Compatible scales" for scales that are compatible with the software.
The proper cable is not used.	Special cable is required for special specification products and the SR77/SR87 series. Contact our representative.

6-2. Trouble during monitoring

6-2-1. Monitoring does not start after “Measure” is clicked.

Cause	Action
Power is not supplied to the scale.	To turn on a scale, click the power button at left in the software window. Monitoring is possible once power is supplied.
An incompatible scale tab is selected.	Communication is not possible unless the tab corresponding to the scale is selected. Select the compatible scale tab in the software window.
There is no response from the scale.	Exit the software, disconnect and reconnect the USB cable to the AC20-B100, and then restart the software before supplying power. If normal monitoring is still not possible, the scale may be inoperative. Contact our service department.

6-2-2. Indicated monitoring position is different from controller position.

Cause	Action
A coordinate offset is set on the controller.	Check the controller setting value, as the basis of conversion.
Version 1.3.0 or earlier of the software is being used for the RS97 series.	Use version 1.4.0 or later.

6-2-3. Screenshots are not saved. Screenshots are delayed.

Cause	Action
This may occur depending on the computer load condition if version 1.3.0 of the software or earlier is used.	Use version 1.4.0 or later.

6-2-4. Monitoring does not stop after “Stop” is clicked.

Cause	Action
The connection cable with the AC20-B100 has become disconnected.	Click “×” in the upper-right corner of the window to force quit the software. Then, restart the software, check the connections with the AC20-B100, and perform the procedure again starting from supplying power.

6-3. Trouble when stopping the power supply

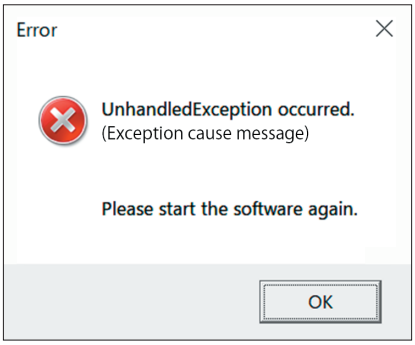
6-3-1. Stopping the power supply fails after the Power button is clicked.

Cause	Action
Monitoring is still active.	Click the "Stop" button to stop monitoring, confirm that the button text changes to "Measure," and then click the power button to stop the power supply. Note that if the button text is "Stop," monitoring is still active. Power supply can be stopped only in the condition with monitoring stopped.

6-4. Errors and warnings

Error or warning messages are displayed after certain operations are performed. Follow the instructions in the message to resolve the issue.

6-4-1. Errors when the software is running (exceptions)



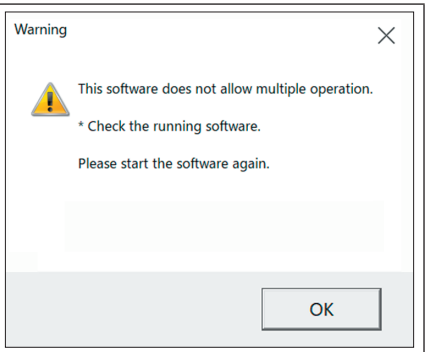
Error

UnhandledException occurred.

(Exception cause message)

Please start the software again.

6-4-2. Errors when the software is started

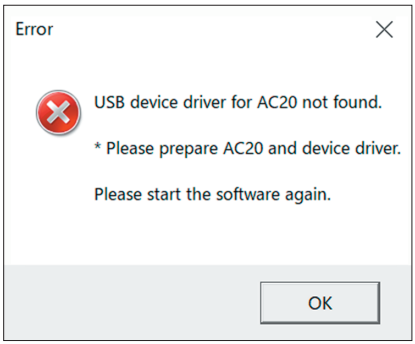


Warning

This software does not allow multiple operation.

* Check the running software.

Please start the software again.

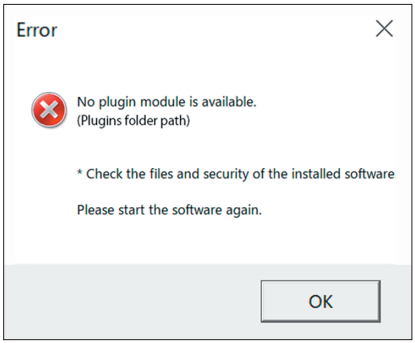


Error

USB device driver for AC20 not found.

* Please prepare AC20 and device driver.

Please start the software again.



Error

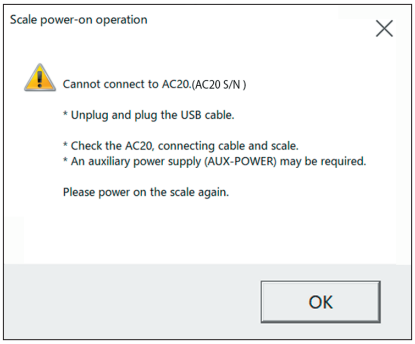
No plugin module is available.

(Plugins folder path)

* Check the files and security of the installed software.

Please start the software again.

6-4-3. Errors when power is supplied to a scale

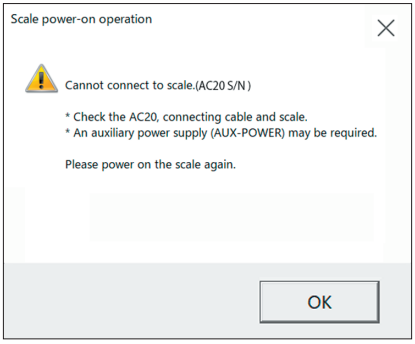


Scale power-on operation

Cannot connect to AC20. (AC20 S/N)

* Unplug and plug the USB cable.
* Check the AC20, connecting cable and scale.
* An auxiliary power supply (AUX-POWER) may be required.

Please power on the scale again.

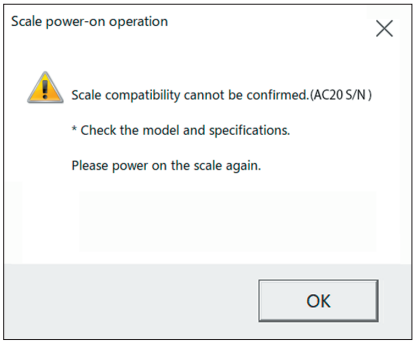


Scale power-on operation

Cannot connect to scale.(AC20 S/N)

* Check the AC20, connecting cable and scale.
* An auxiliary power supply (AUX-POWER) may be required.

Please power on the scale again.



Scale power-on operation

Scale compatibility cannot be confirmed. (AC20 S/N)

* Check the model and specifications.

Please power on the scale again.

If power cannot be supplied to a scale or if monitoring fails, stop monitoring, stop the power supply, exit the software, and then disconnect the USB cable between the computer and the AC20-B100.

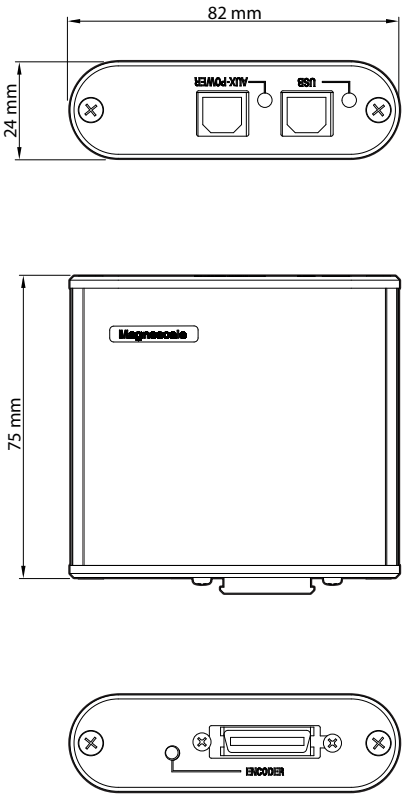
Check the cable connection between the scale and AC20-B100. Reconnect the computer and AC20-B100, restart the application, start the power supply, and then start monitoring.

7. Specifications

AC20-B100

Item	Specifications
Connection with the computer	USB 2.0
Power consumption	0.5 W max. (AC20-B100 standalone)
Input voltage range	DC 5 V ± 0.25 V (USB bus power standard)
Operating temperature range	0 °C to 40 °C (no condensation)
Storage temperature range	−10 °C to 60 °C (no condensation)
Mass	Approx. 150 g
External dimensions	Refer to “8. Dimensions”

8. Dimensions



(Unit: mm)

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AC20-B100
2-A02-396-1E

2025.12
Printed in Japan
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