Magnescale

RS-232C / Ethernet Interface Module

MG80-SC1 / MG80-SC2

Read all the instructions in the manual carefully before use and strictly follow them.
Keep the manual for future references.

Conenection Manual (for PLC Link)

<Contents>

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- In no event will Magnescale Co., Ltd. or its suppliers be liable to you for any consequential or inconsequential damages, including any lost profits or lost savings or any claims made by a third party arising out of use of the hardware system and its software described in this manual.
- The specification of the product and its software may be changed without prior notice.
- This software has been confirmed to operate with Windows 10 version 20H2. Operation is not guaranteed with regards to future Windows 10 updates.

1. Introduction

This manual describes the operation methods needed to establish PLC link connections with the PLC of Mitsubishi Electric Corporation, OMRON Corporation, and Keyence Corporation when introducing the MG80-SC, MG80-CM, and digital gauges.

For basic information about PLC, refer to the various manuals of each PLC manufacturer.

2. Applicable PLC

The applicable PLC for PLC link connection are as follows. Check the manual of the corresponding PLC manufacturer to see whether the PLC to be used supports the target protocol.

PLC manufacturer	Applicable PLC series	Connection	Protocol
Mitsubishi Electric Corporation	MELSEC-F, MELSEC-L, MELSEC-Q, MELSEC iQ-F, MELSEC iQ-R	RS-232C	MC protocol 1C frame format 4
			MC protocol 3C frame format 4
		Ethernet	MC protocol 1E frame
			MC protocol 3E frame
OMRON Corporation	CP/CJ1/CJ2/ CS1/NSJ	RS-232C	C-mode Commands
		Ethernet	FINS Commands
Keyence Corporation	KV-8000/ 7000/5000/ 3000/1000/ 700/KV Nano	RS-232C	KV Host Link Mode
		Ethernet	Host-link

3. Download the Setting Application for Windows PC

1. Visit the Magnescale website at https://www.magnescale.com and select the following:
   Product Information
   → Digital Gauge
   → MG80-SC MG80-CM
   → Software
   Download the setting application from “Setting application for Windows PC.”

2. Save the file to the desired location on the PC and extract it with decompression software.

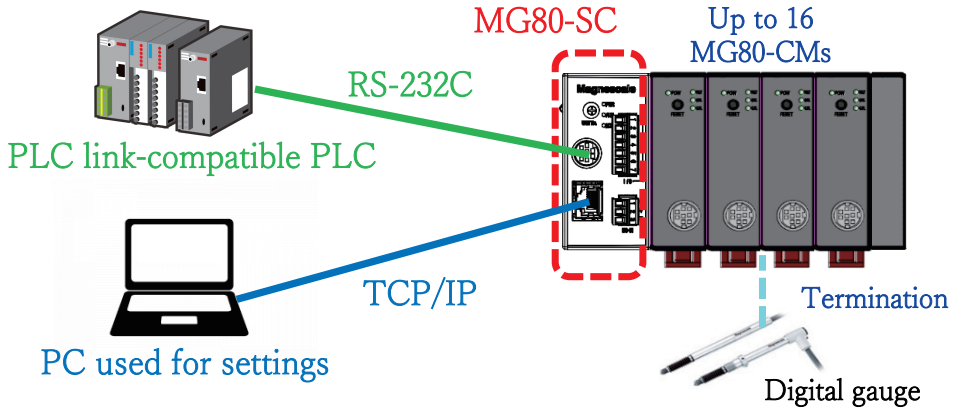
4. Mitsubishi Electric Corporation MC Protocol 1C Frame (RS-232C)

4.1. Items to be Prepared

Prepare the following items.

No	Product	Preparation
1	MG80-SC / MG80-CM / Digital gauge set	
2	PLC	PLC that supports MC protocol 1C frame format 4 The example here uses the following PLC. FX3U-16MT/ES + FX3U-232-BD
3	PC	・OS : Windows 10 ・Setting tool “MG80-SC_SettingTool” installed * Download the setting tool from the website.
4	RS-232C cable	The example here uses the DZ252 cable (sold separately).
5	LAN cable	Category 5 or higher

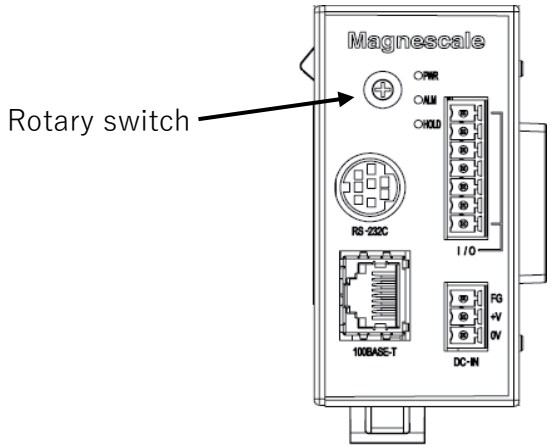
Connect the components as illustrated below.



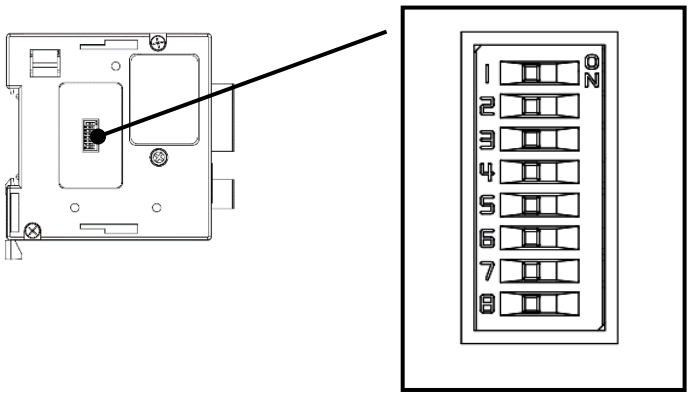
4.2. MG80-SC Switch Settings

Use a screwdriver or other tool to configure the unit ID setting with the rotary switch.
Setting range: 0 to F

The MG80-SC has an IP address of 192.168.0.100 and a subnet mask of 255.255.255.0 as default values, but the settings can be changed. If the assigned IP address has been forgotten, set the switch to F to start up with the default value.



Configure the RS-232C communication setting DIP switches of the MG80-SC.
* For details of the settings, refer to the operating manual.

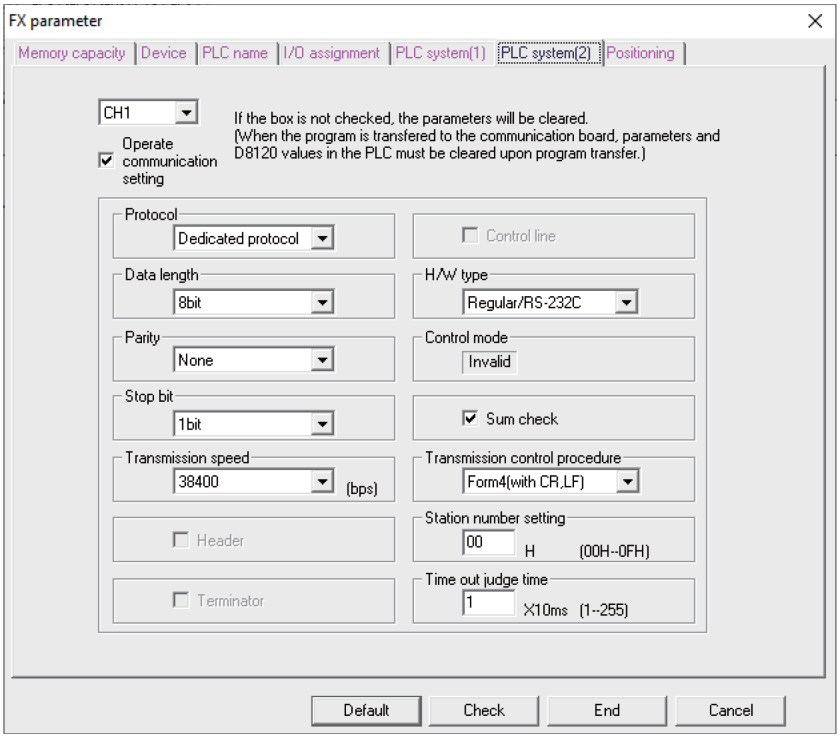


The example here uses the following settings.

Setting item	Setting contents	Switch no.							
		1	2	3	4	5	6	7	8
Delimiter	CR+LF	-	OFF	-	-	-	-	-	-
Parity	OFF	-	-	OFF	OFF	-	-	-	-
Stop bit	1bit	-	-	-	-	OFF	-	-	-
Data length	8bit	-	-	-	-	-	OFF	-	-
Communication speed setting	38400	OFF	-	-	-	-	-	ON	ON

4.3. PLC RS-232C Settings

Configure the settings as follows to match the MG80-SC settings.



4.4. PC Network Settings

Set the IP address on the PC where the “Setting application for Windows PC” was installed. Set the IP address of the PC so that it is on the same network as the IP address of the MG80-SC.

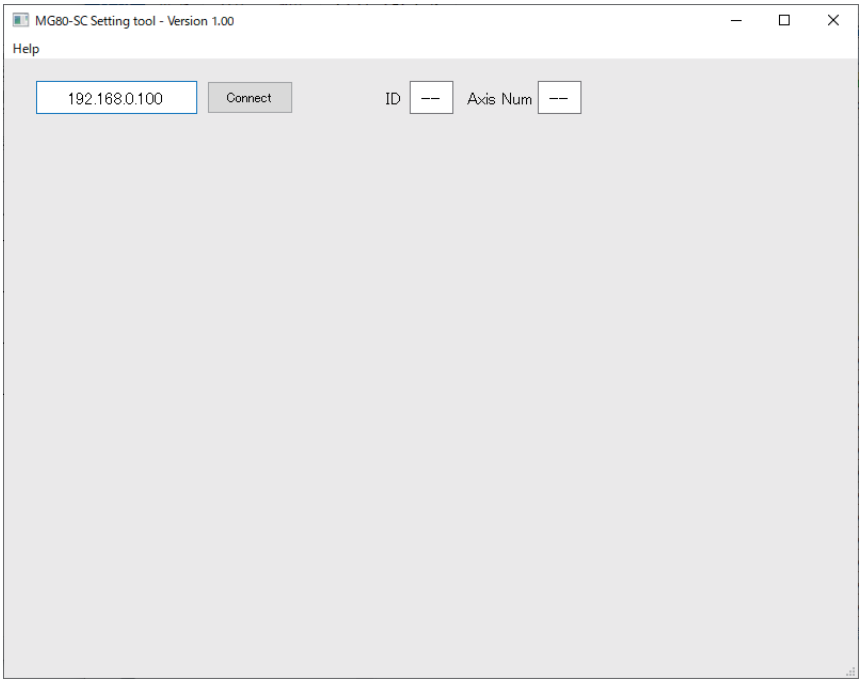
In the example here, the MG80-SC uses the default IP address of 192.168.0.100 and subnet mask of 255.255.255.0, and the IP address of the PC is as follows.

IP address : 192.168.0.50
Subnet mask : 255.255.255.0

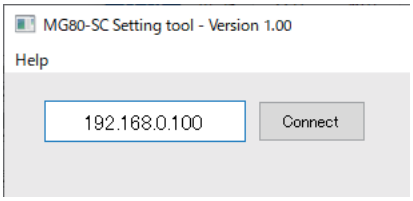
4.5. MG80-SC Settings

Start up the setting tool “MG80-SC_SettingTool” that was installed on the PC.

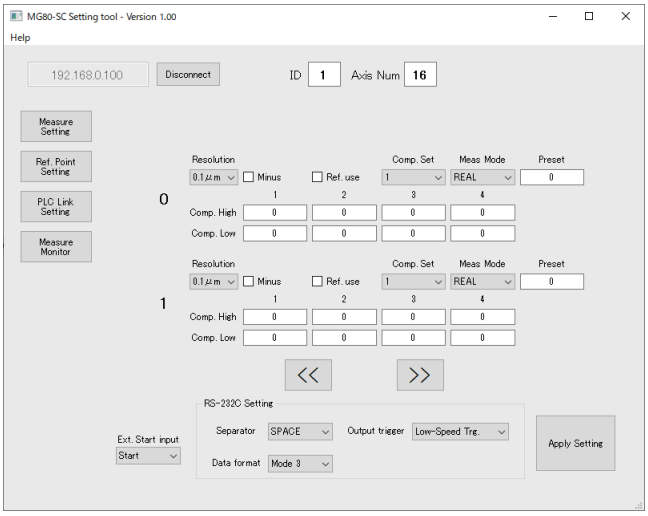
When the program starts up, the following window appears.



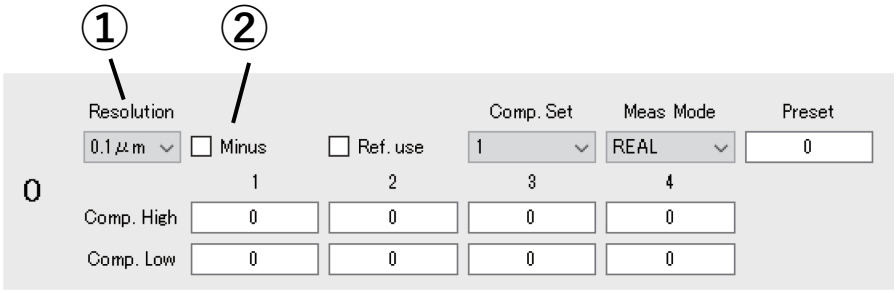
Enter the IP address of the MG80-SC and click the [Connect] button.



Once connected, the following window appears. If the connection cannot be made, turn off the power of the MG80-SC, exit the setting application, and start over from the beginning.



When setting the MG80-SC for the first time, the input resolution and direction (input polarity) need to be set for all the measuring units to be connected.

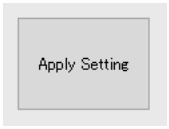


①Specify the input resolution setting from the following options.

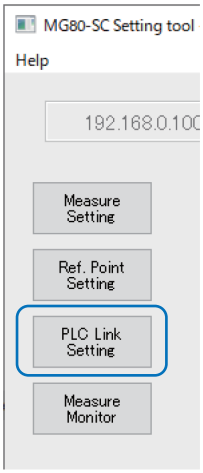
・0.1μm
・0.5μm
・1μm
・5μm
・10μm

②Specify the direction (input polarity) of the measuring unit. When this is selected, the direction is reversed.

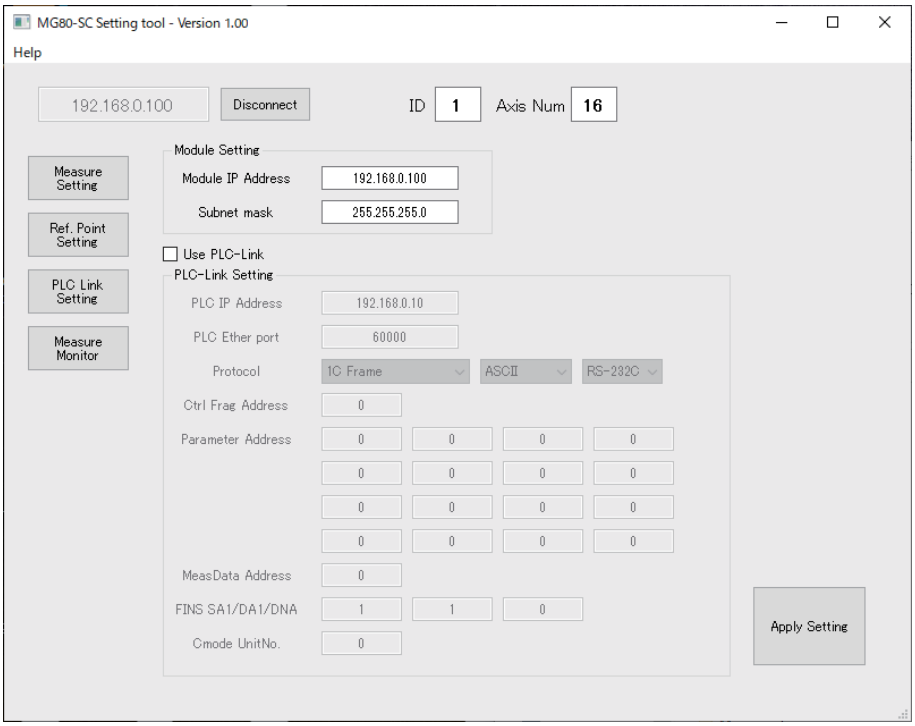
If settings have been changed, click the [Apply Setting] button to apply the settings made to the MG80-SC.



Click the [PLC Link Setting] button.



The following window appears.



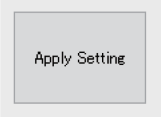
Select “Use PLC-Link” and configure the settings as follows.

Note

The following example uses the data registers from D100 to D519. Set an area not used by the PLC.

Setting item	Setting value		
PLC IP Address	Not used (Leave as the default value.)		
PLC Ether port	Not used (Leave as the default value.)		
Protocol	1C Frame	ASCII	RS-232C
Ctrl Flag Address	100		
Parameter Address	200, 220, 240, 260, 280, 300, 320, 340, 360, 380, 400, 420, 440, 460, 480, 500 * Set a number of parameter addresses equivalent to the number of connected MG80-CM.		
MeasData Address	120		
FINS SA1/DA1/DNA	Not used (Leave as the default value.)		
Cmode Unit No.	Not used (Leave as the default value.)		

If settings have been changed, click the [Apply Setting] button to apply the settings made to the MG80-SC.



Turn the power of the MG80-SC off and then on again to start PLC link.

4.6. Ladder Creation

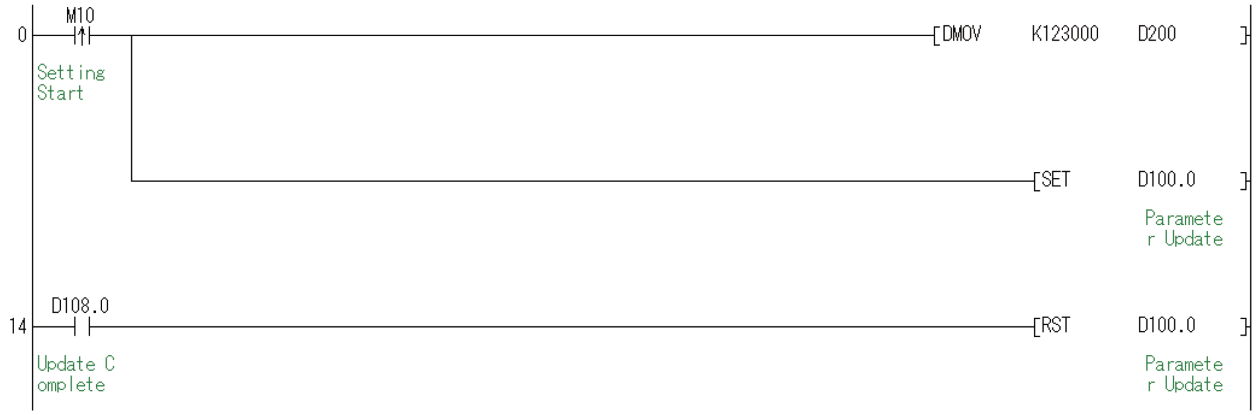
①Example of changing parameters

This example describes the case when changing the preset value of the measuring unit with a counter module ID of 0 (the MG80-CM closest to the MG80-SC main module) to 12.3 mm.

The starting address of the setup parameters for counter module ID: 0 is the D200 set in “Parameter Address” by “MG80-SC_SettingTool.” Preset value has an offset of 0x0000 and 0x0001, so the preset value addresses are D200 and D201. The value to be set depends on the resolution of the measuring unit. For example, if the resolution is 0.5 μm, 0.1 μm is set as 1.　* Refer to the operating manual.

The starting address of the control flag area is the D100 set in “Ctrl Flag Address” by “MG80-SC_SettingTool.” Update parameter has an offset of 0x0000, and Update parameter complete has an offset of 0x0008, so these addresses are respectively D100 and D108. Here, counter module ID: 0 corresponds to bit 0 (ID: 1 corresponds to bit 1). Bit 0 of D100 corresponds to Update parameter, and bit 0 of D108 corresponds to Update parameter complete.

In this example, when the preset value is set in D200 + D201 and bit 0 of D100 is set to 1, the MG80 sets bit 0 of D108 to 1 to complete the operation.



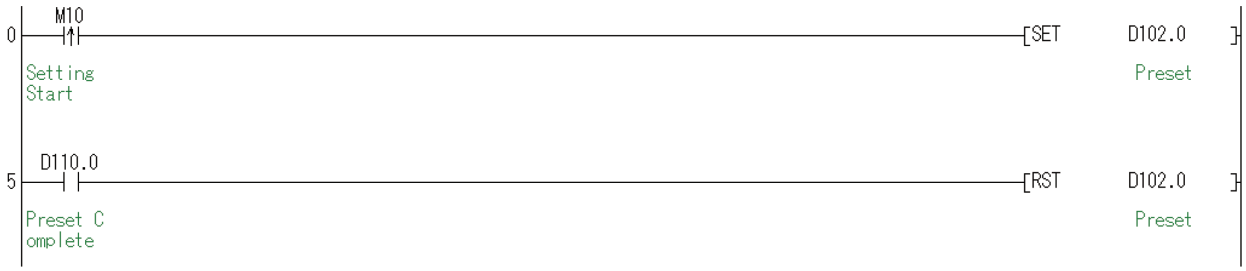
②Example of operation commands

This example describes the case when presetting the measuring unit with a counter module ID of 0 (the MG80-CM closest to the MG80-SC main module).

The starting address of the control flag area is the D100 set in “Ctrl Flag Address” by “MG80-SC_SettingTool.” Recall preset has an offset of 0x0002, and Recall preset complete has an offset of 0x000A, so these addresses are respectively D102 and D110.

Here, counter module ID: 0 corresponds to bit 0 (ID: 1 corresponds to bit 1). Bit 0 of D102 corresponds to Recall preset, and bit 0 of D110 corresponds to Recall preset complete.

In this example, when bit 0 of D102 is set to 1, the MG80 sets bit 0 of D110 to 1 to complete the operation.



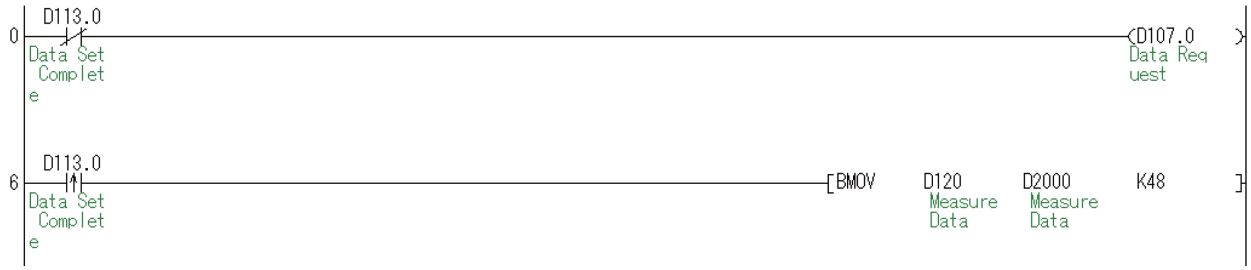
③Example of continuous sampling of measured values

This example describes the case when continuously sampling the measured values of a measuring unit.

The starting address of the control flag area is the D100 set in “Ctrl Flag Address” by “MG80-SC_SettingTool.” Request measurement data has an offset of 0x0007, and Transmit measurement data complete has an offset of 0x000D, so these addresses are respectively D107 and D113. Here, when bit 0 of Request measurement data is set to 1, the measurement data of all the counter modules is transmitted.

If bit 0 of D113 is 0 when continuously sampling measured values, set bit 0 of D107 to 1.

The starting address of the measurement data is the D120 set in “MeasData Address” by “MG80-SC_SettingTool.” When using continuously sampled measurement data, in order to assure that the high-order 2 bytes and low-order 2 bytes of the measurement data are updated at the same timing, transfer the measurement data to another address at the Transmit measurement data complete timing and then use the data. In this example, measurement data is transferred to D2000 to D2047.



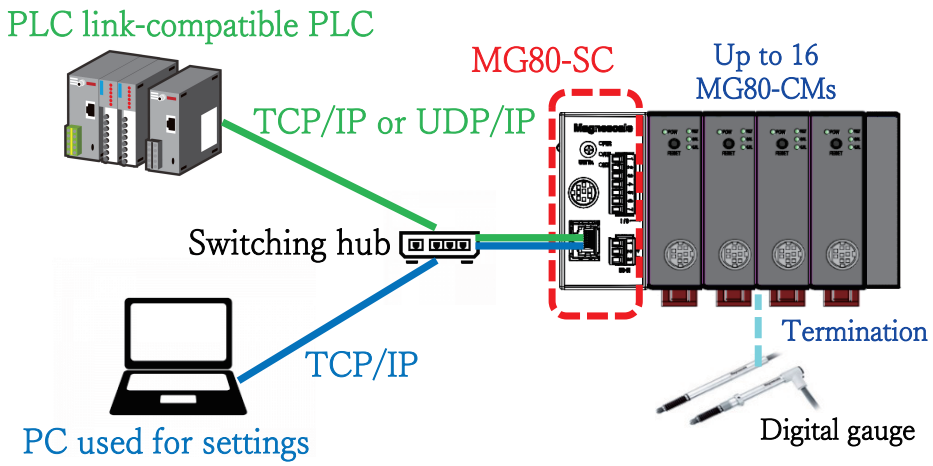
5. Mitsubishi Electric Corporation　MC Protocol 1E Frame (Ethernet)

5.1. Items to be Prepared

Prepare the following items.

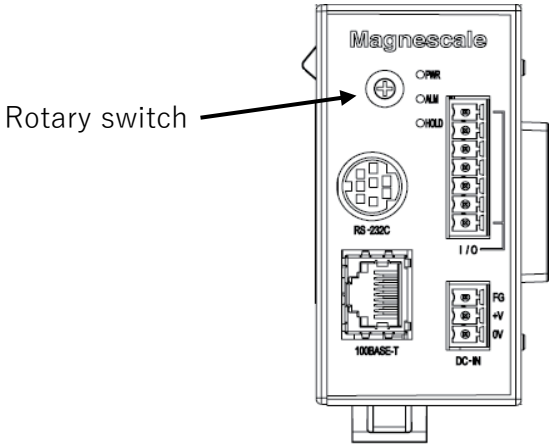
No	Product	Preparation
1	MG80-SC / MG80-CM / Digital gauge set	
2	PLC	PLC that supports MC protocol 1E frame The example here uses the following PLC. FX3U-16MT/ES + FX3U-ENET-L
3	PC	・OS : Windows 10 ・Setting tool “MG80-SC_SettingTool” installed * Download the setting tool from the website.
4	Switching hub	
5	LAN cable	Category 5 or higher

Connect the components as illustrated below.



5.2. MG80-SC Switch Settings

Use a screwdriver or other tool to configure the unit ID setting with the rotary switch.
Setting range: 0 to F
The MG80-SC has an IP address of 192.168.0.100 and a subnet mask of 255.255.255.0 as default values, but the settings can be changed. If the assigned IP address has been forgotten, set the switch to F to start up with the default value.



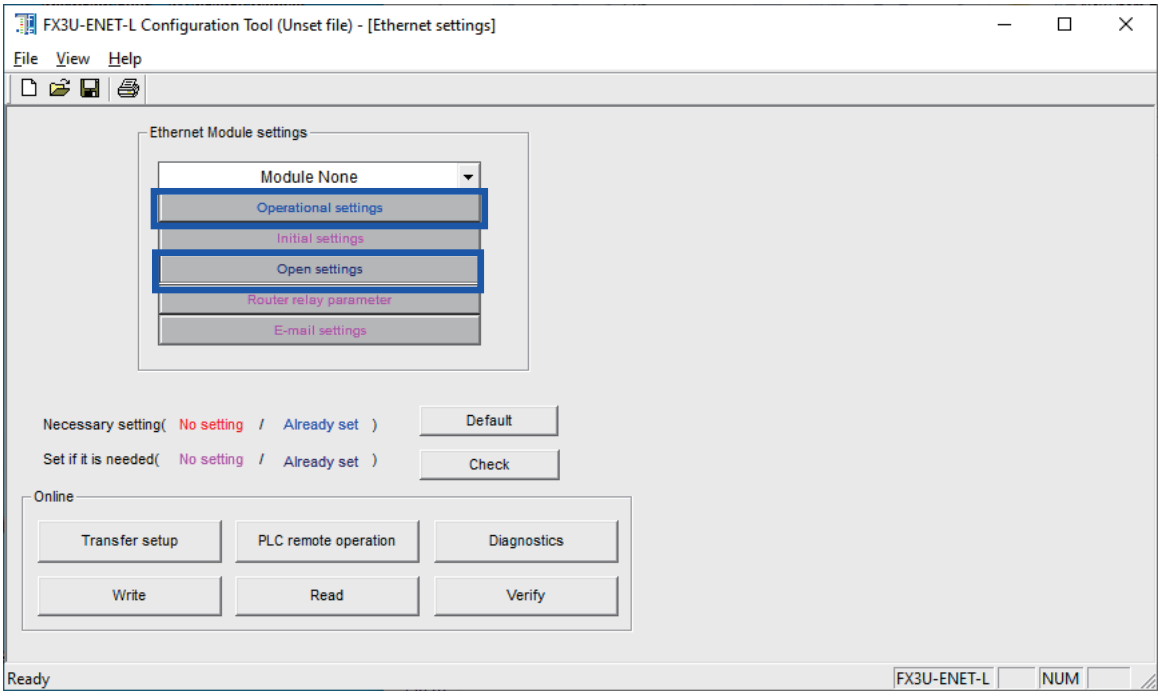
In this example, the settings are as follows.

	IP address	Subnet mask	Port number
MG80-SC	192.168.0.100	255.255.255.0	-
PLC	192.168.0.10	255.255.255.0	50000
PC used for settings	192.168.0.50	255.255.255.0	-

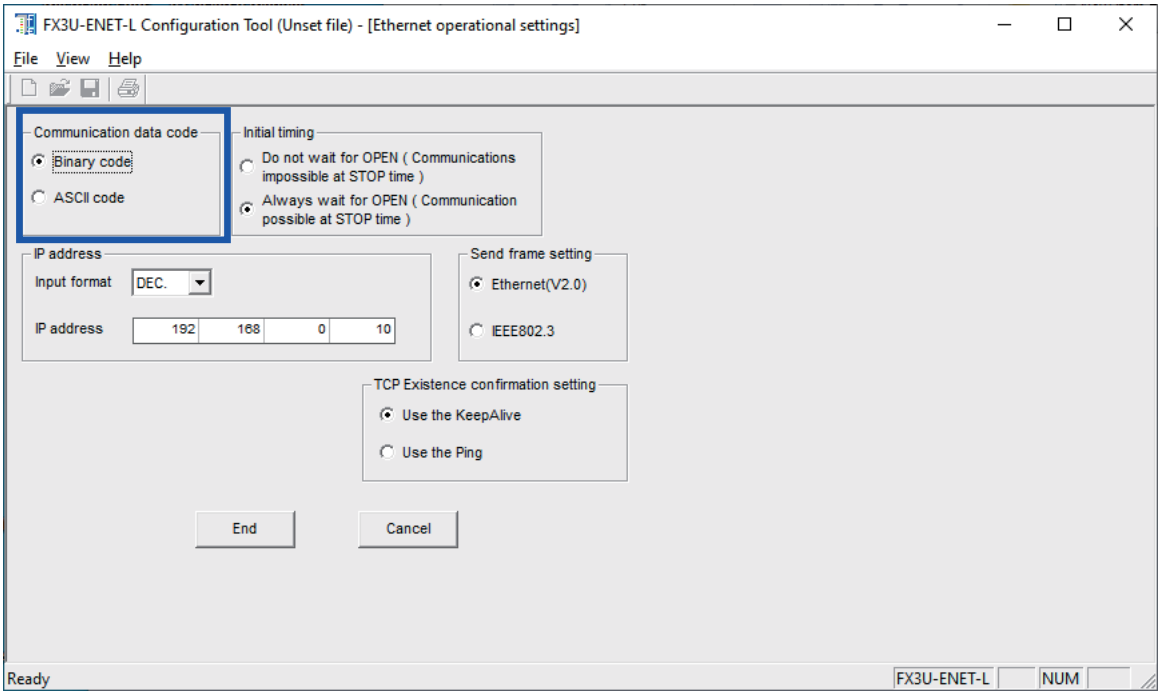
Set IP addresses that are all on the same network.

5.3. PLC Ethernet Settings

Configure the settings as follows.



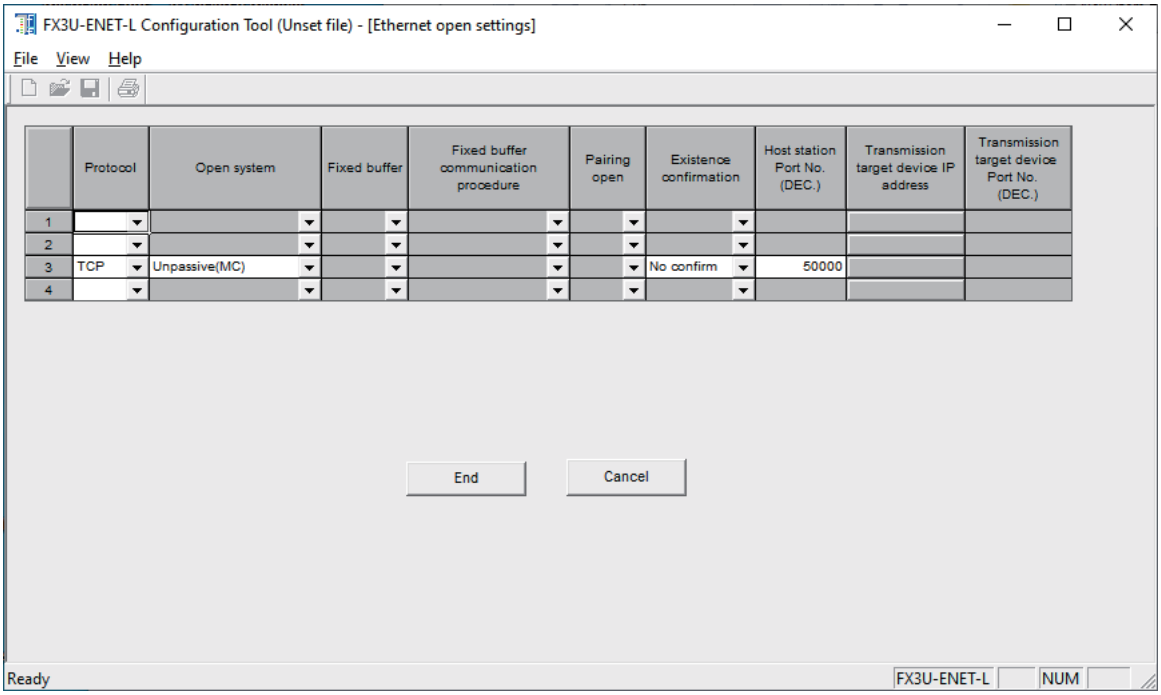
➢ Operational settings



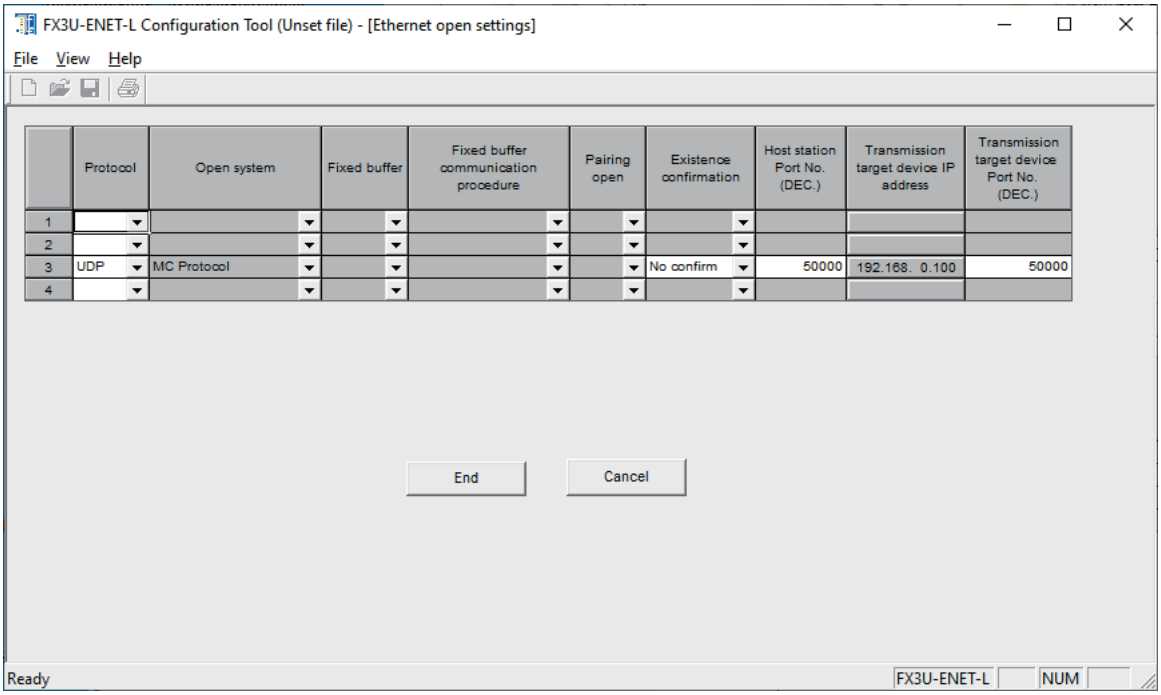
"Communication data code" must match the MG80-SC setting.

➢ Open settings

・For TCP



・For UDP

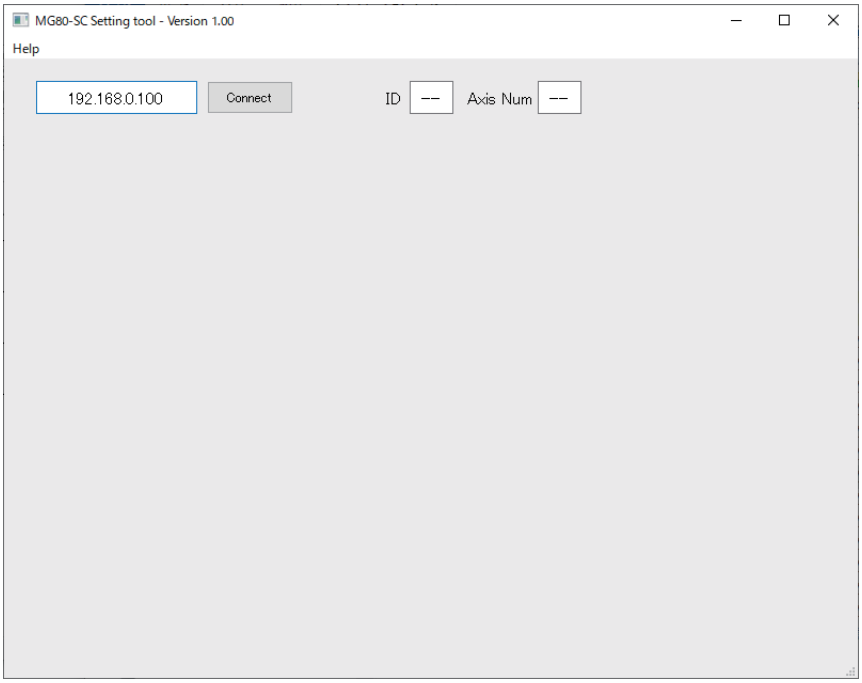


When it is necessary to set the port number of the MG80-SC side, set the same number as the port number of the PLC side.

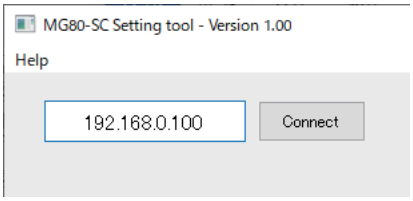
5.4. MG80-SC Settings

Start up the setting tool “MG80-SC_SettingTool” that was installed on the PC.

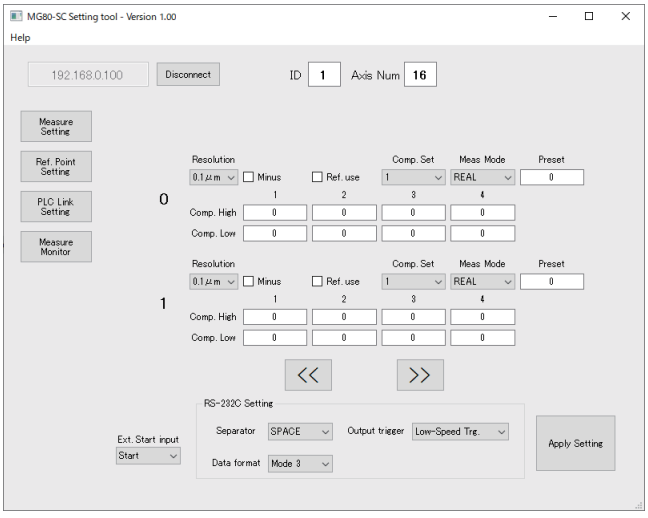
When the program starts up, the following window appears.



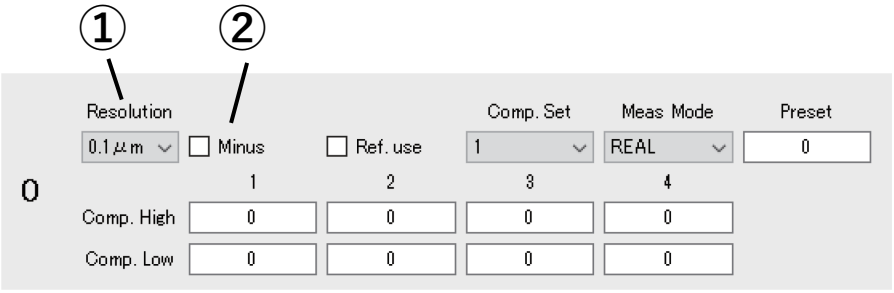
Enter the IP address of the MG80-SC and click the [Connect] button.



Once connected, the following window appears. If the connection cannot be made, turn off the power of the MG80-SC, exit the setting application, and start over from the beginning.



When setting the MG80-SC for the first time, the input resolution and direction (input polarity) need to be set for all the measuring units to be connected.

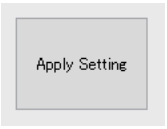


①Specify the input resolution setting from the following options.

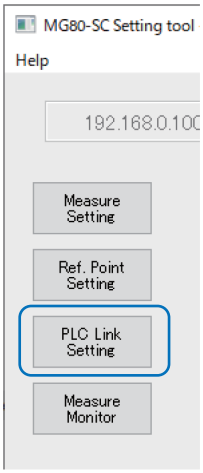
・0.1μm
・0.5μm
・1μm
・5μm
・10μm

②Specify the direction (input polarity) of the measuring unit. When this is selected, the direction is reversed.

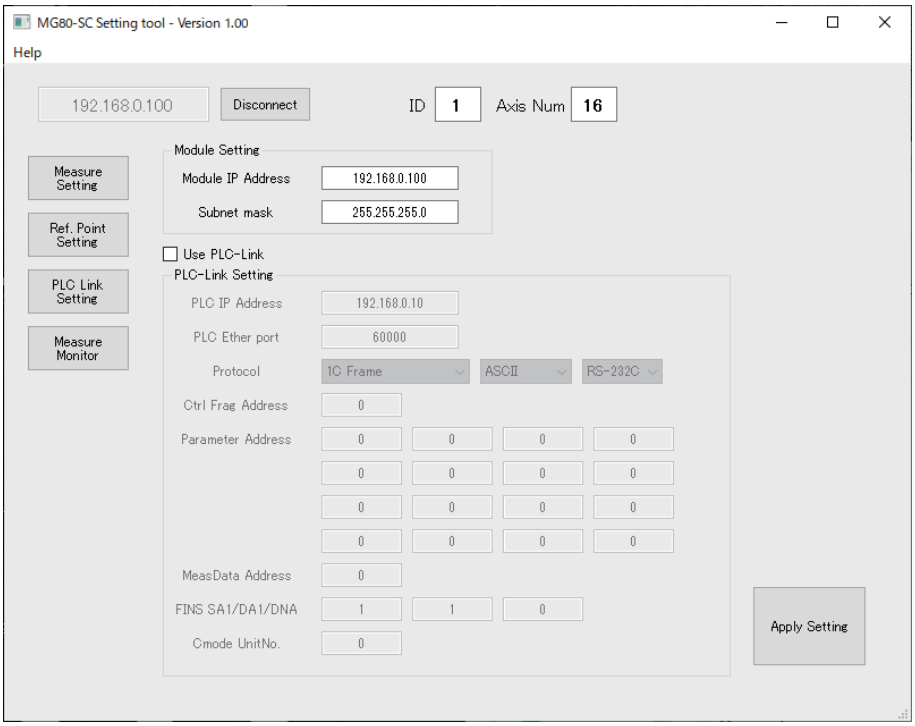
If settings have been changed, click the [Apply Setting] button to apply the settings made to the MG80-SC.



Click the [PLC Link Setting] button.



The following window appears.



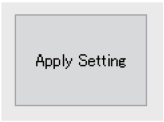
Select “Use PLC-Link” and configure the settings as follows.

Note

The following example uses the data registers from D100 to D519. Set an area not used by the PLC.

Setting item	Setting value		
PLC IP Address	192.168.0.10		
PLC Ether port	50000 * Match the port number set on the PLC side.		
Protocol	1E Frame	Binary or ASCII * Match the PLC setting.	TCP or UDP * Match the PLC setting.
Ctrl Flag Address	100		
Parameter Address	200, 220, 240, 260, 280, 300, 320, 340, 360, 380, 400, 420, 440, 460, 480, 500 * Set a number of parameter addresses equivalent to the number of connected MG80-CM.		
MeasData Address	120		
FINS SA1/DA1/DNA	Not used (Leave as the default value.)		
Cmode Unit No.	Not used (Leave as the default value.)		

If settings have been changed, click the [Apply Setting] button to apply the settings made to the MG80-SC.



Turn the power of the MG80-SC off and then on again to start PLC link.

5.5. Ladder Creation

The ladder configuration is the same as that for Mitsubishi Electric Corporation MC protocol 1C frame (RS-232C).

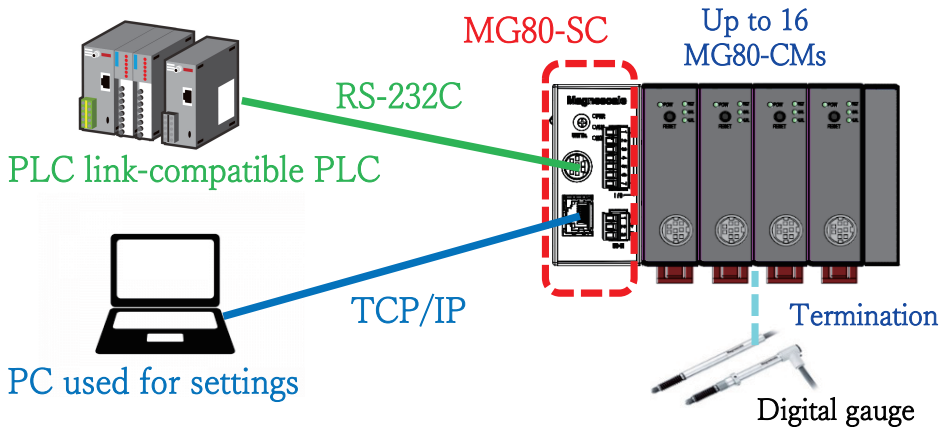
6. Mitsubishi Electric Corporation　MC Protocol 3C Frame (RS-232C)

6.1. Items to be Prepared

Prepare the following items.

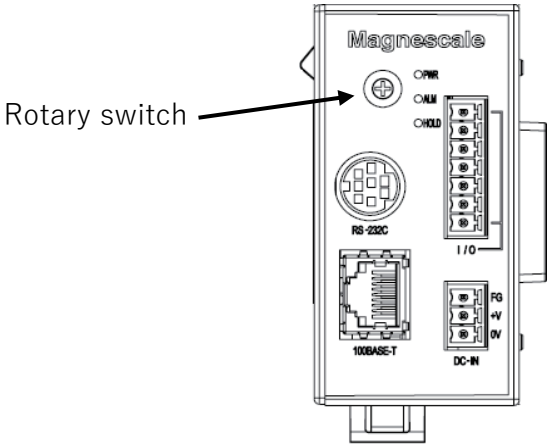
No	Product	Preparation
1	MG80-SC / MG80-CM / Digital gauge set	
2	PLC	PLC that supports MC protocol 3C frame format 4 The example here uses the following PLC. R04ENCPU + RJ71C24
3	PC	・OS : Windows 10 ・Setting tool “MG80-SC_SettingTool” installed * Download the setting tool from the website.
4	RS-232C cable	In this example, connection is made using the DZ254 cable (sold separately) according to the serial port specification of the PLC.
5	LAN cable	Category 5 or higher

Connect the components as illustrated below.

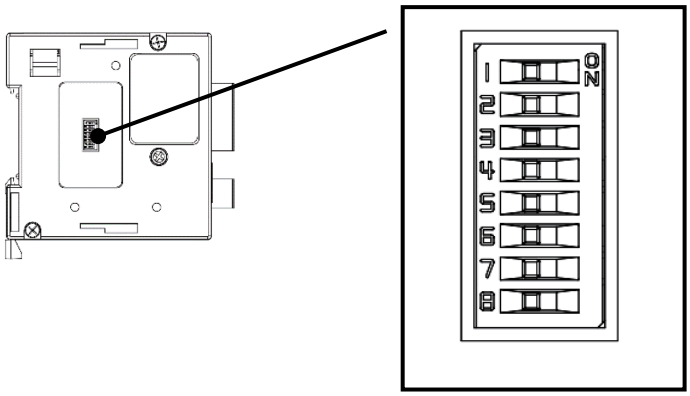


6.2. MG80-SC Switch Settings

Use a screwdriver or other tool to configure the unit ID setting with the rotary switch.
Setting range: 0 to F
The MG80-SC has an IP address of 192.168.0.100 and a subnet mask of 255.255.255.0 as default values, but the settings can be changed. If the assigned IP address has been forgotten, set the switch to F to start up with the default value.



Configure the RS-232C communication setting DIP switches of the MG80-SC.
* For details of the settings, refer to the operating manual.

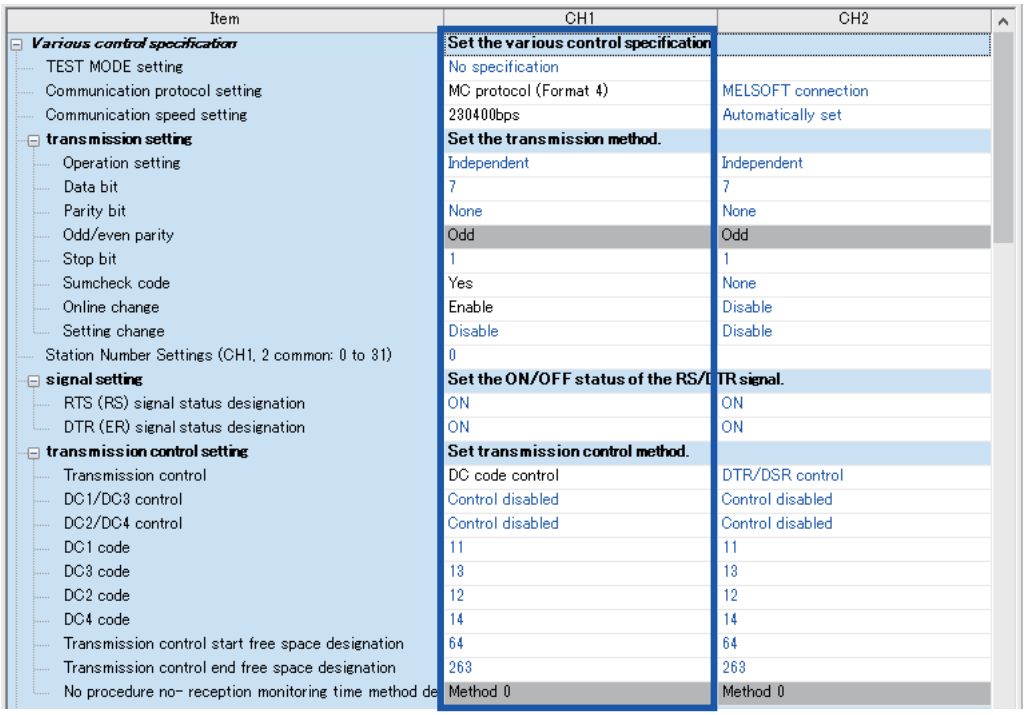


The example here uses the following settings.

Setting item	Setting contents	Switch no.							
		1	2	3	4	5	6	7	8
Delimiter	CR+LF	-	OFF	-	-	-	-	-	-
Parity	OFF	-	-	OFF	OFF	-	-	-	-
Stop bit	1bit	-	-	-	-	OFF	-	-	-
Data length	7bit	-	-	-	-	-	ON	-	-
Communication speed setting	230400	ON	-	-	-	-	-	OFF	ON

6.3. PLC RS-232C Settings

Configure the settings as follows to match the MG80-SC settings.



Item	CH1	CH2
Various control specification	Set the various control specification	
TEST MODE setting	No specification	
Communication protocol setting	MC protocol (Format 4)	MELSOFT connection
Communication speed setting	230400bps	Automatically set
transmission setting	Set the transmission method.	
Operation setting	Independent	Independent
Data bit	7	7
Parity bit	None	None
Odd/even parity	Odd	Odd
Stop bit	1	1
Sumcheck code	Yes	None
Online change	Enable	Disable
Setting change	Disable	Disable
Station Number Settings (CH1, 2 common: 0 to 31)	0	
signal setting	Set the ON/OFF status of the RS/DTR signal.	
RTS (RS) signal status designation	ON	ON
DTR (ER) signal status designation	ON	ON
transmission control setting	Set transmission control method.	
Transmission control	DC code control	DTR/DSR control
DC1/DC3 control	Control disabled	Control disabled
DC2/DC4 control	Control disabled	Control disabled
DC1 code	11	11
DC3 code	13	13
DC2 code	12	12
DC4 code	14	14
Transmission control start free space designation	64	64
Transmission control end free space designation	263	263
No procedure no- reception monitoring time method de	Method 0	Method 0

・Select “Yes” for “Sumcheck code.”

・Select “Enable” for “Online change.”

・Select “DC code control” for “Transmission control.”

6.4. PC Network Settings

Set the IP address on the PC where the “Setting application for Windows PC” was installed. Set the IP address of the PC so that it is on the same network as the IP address of the MG80-SC.

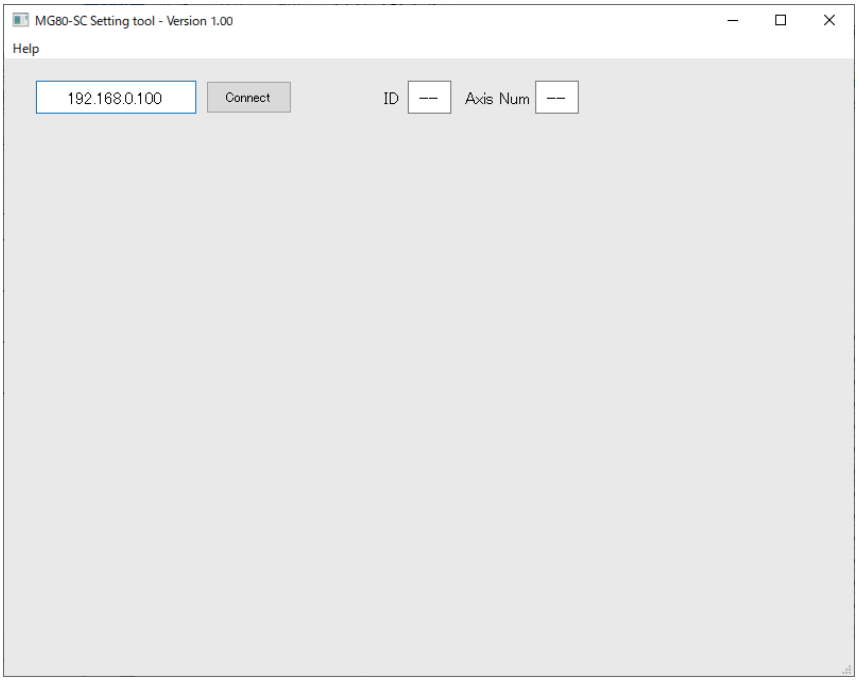
In the example here, the MG80-SC uses the default IP address of 192.168.0.100 and subnet mask of 255.255.255.0, and the IP address of the PC is as follows.

IP address : 192.168.0.50
Subnet mask : 255.255.255.0

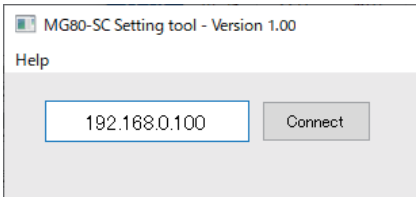
6.5. MG80-SC Settings

Start up the setting tool “MG80-SC_SettingTool” that was installed on the PC.

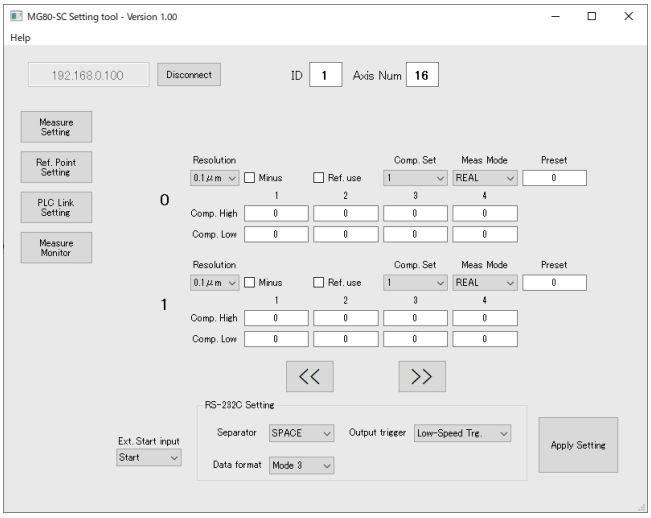
When the program starts up, the following window appears.



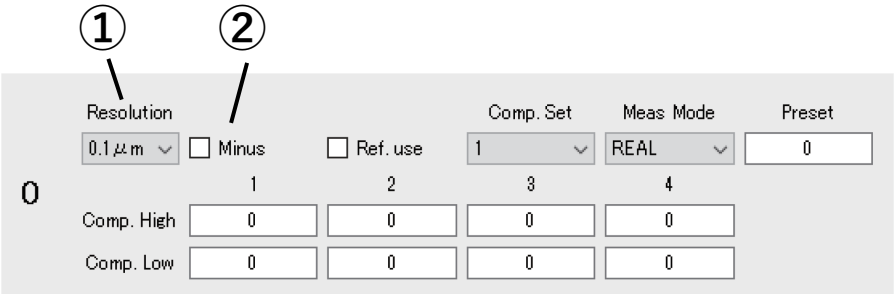
Enter the IP address of the MG80-SC and click the [Connect] button.



Once connected, the following window appears. If the connection cannot be made, turn off the power of the MG80-SC, exit the setting application, and start over from the beginning.



When setting the MG80-SC for the first time, the input resolution and direction (input polarity) need to be set for all the measuring units to be connected.

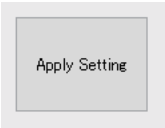


①Specify the input resolution setting from the following options.

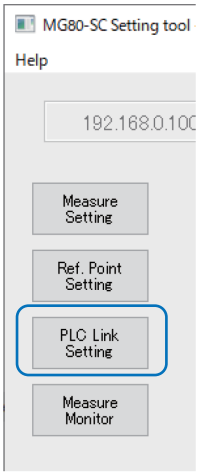
・0.1μm
・0.5μm
・1μm
・5μm
・10μm

②Specify the direction (input polarity) of the measuring unit. When this is selected, the direction is reversed.

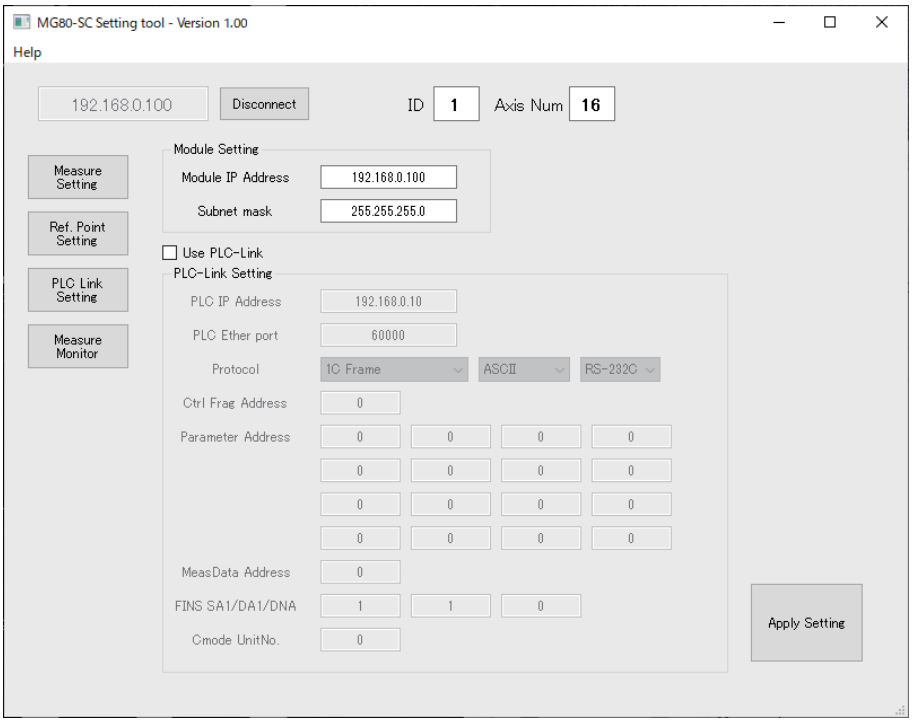
If settings have been changed, click the [Apply Setting] button to apply the settings made to the MG80-SC.



Click the [PLC Link Setting] button.



The following window appears.



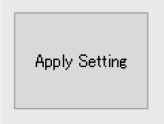
Select “Use PLC-Link” and configure the settings as follows.

Note

The following example uses the data registers from D100 to D519. Set an area not used by the PLC.

Setting item	Setting value		
PLC IP Address	Not used (Leave as the default value.)		
PLC Ether port	Not used (Leave as the default value.)		
Protocol	3C Frame	ASCII	RS-232C
Ctrl Flag Address	100		
Parameter Address	200, 220, 240, 260, 280, 300, 320, 340, 360, 380, 400, 420, 440, 460, 480, 500 * Set a number of parameter addresses equivalent to the number of connected MG80-CM.		
MeasData Address	120		
FINS SA1/DA1/DNA	Not used (Leave as the default value.)		
Cmode Unit No.	Not used (Leave as the default value.)		

If settings have been changed, click the [Apply Setting] button to apply the settings made to the MG80-SC.



Turn the power of the MG80-SC off and then on again to start PLC link.

6.6. Ladder Creation

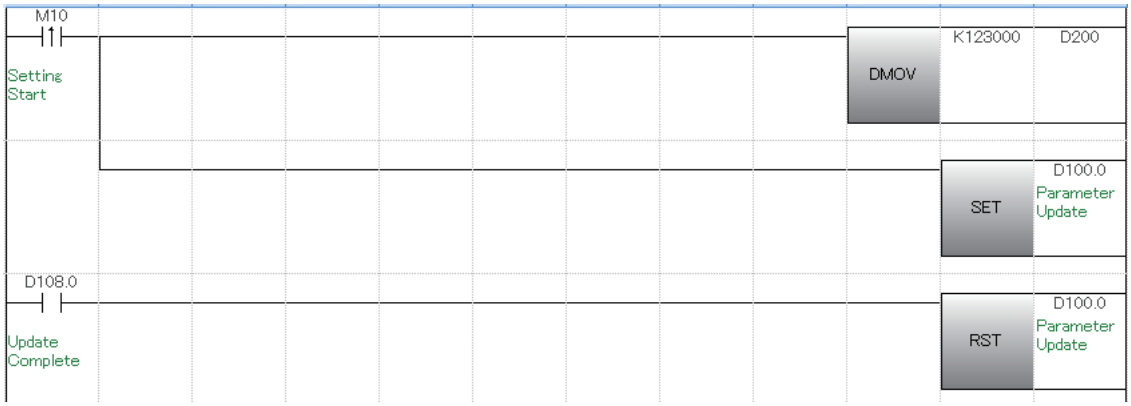
①Example of changing parameters

This example describes the case when changing the preset value of the measuring unit with a counter module ID of 0 (the MG80-CM closest to the MG80-SC main module) to 12.3 mm.

The starting address of the setup parameters for counter module ID: 0 is the D200 set in “Parameter Address” by “MG80-SC_SettingTool.” Preset value has an offset of 0x0000 and 0x0001, so the preset value addresses are D200 and D201. The value to be set depends on the resolution of the measuring unit. For example, if the resolution is 0.5 μm, 0.1 μm is set as 1.　* Refer to the operating manual.

The starting address of the control flag area is the D100 set in “Ctrl Flag Address” by “MG80-SC_SettingTool.” Update parameter has an offset of 0x0000, and Update parameter complete has an offset of 0x0008, so these addresses are respectively D100 and D108. Here, counter module ID: 0 corresponds to bit 0 (ID: 1 corresponds to bit 1). Bit 0 of D100 corresponds to Update parameter, and bit 0 of D108 corresponds to Update parameter complete.

In this example, when the preset value is set in D200 + D201 and bit 0 of D100 is set to 1, the MG80 sets bit 0 of D108 to 1 to complete the operation.



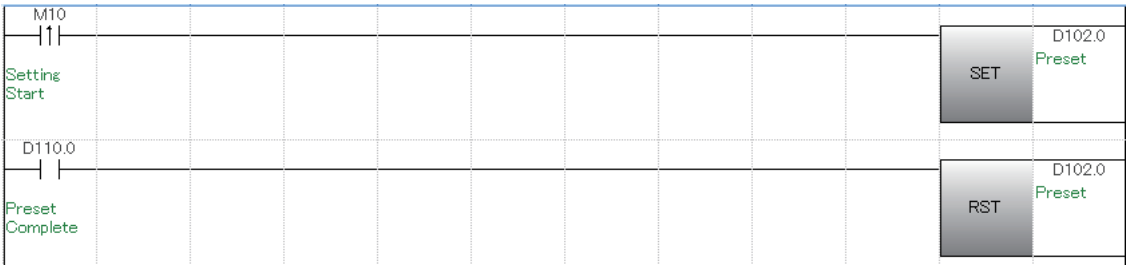
②Example of operation commands

This example describes the case when presetting the measuring unit with a counter module ID of 0 (the MG80-CM closest to the MG80-SC main module).

The starting address of the control flag area is the D100 set in “Ctrl Flag Address” by “MG80-SC_SettingTool.” Recall preset has an offset of 0x0002, and Recall preset complete has an offset of 0x000A, so these addresses are respectively D102 and D110.

Here, counter module ID: 0 corresponds to bit 0 (ID: 1 corresponds to bit 1). Bit 0 of D102 corresponds to Recall preset, and bit 0 of D110 corresponds to Recall preset complete.

In this example, when bit 0 of D102 is set to 1, the MG80 sets bit 0 of D110 to 1 to complete the operation.



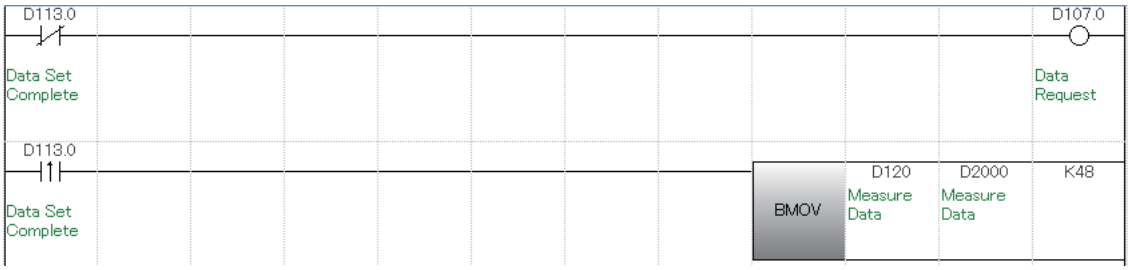
③Example of continuous sampling of measured values

This example describes the case when continuously sampling the measured values of a measuring unit.

The starting address of the control flag area is the D100 set in “Ctrl Flag Address” by “MG80-SC_SettingTool.” Request measurement data has an offset of 0x0007, and Transmit measurement data complete has an offset of 0x000D, so these addresses are respectively D107 and D113. Here, when bit 0 of Request measurement data is set to 1, the measurement data of all the counter modules is transmitted.

If bit 0 of D113 is 0 when continuously sampling measured values, set bit 0 of D107 to 1.

The starting address of the measurement data is the D120 set in “MeasData Address” by “MG80-SC_SettingTool.” When using continuously sampled measurement data, in order to assure that the high-order 2 bytes and low-order 2 bytes of the measurement data are updated at the same timing, transfer the measurement data to another address at the Transmit measurement data complete timing and then use the data. In this example, measurement data is transferred to D2000 to D2047.



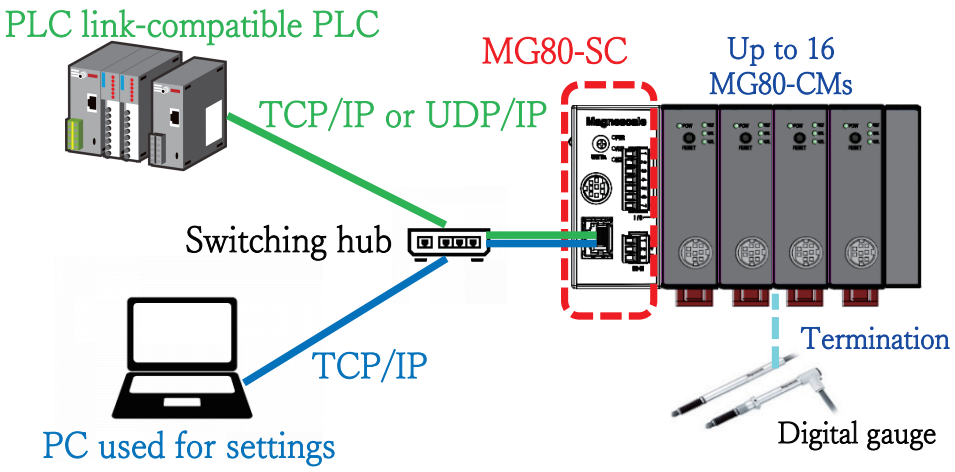
7. Mitsubishi Electric Corporation　MC Protocol 3E Frame (Ethernet)

7.1. Items to be Prepared

Prepare the following items.

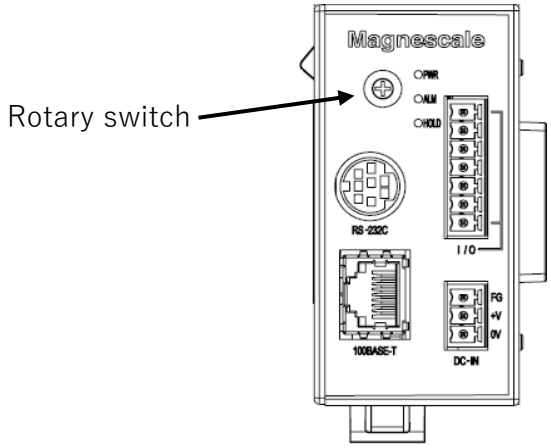
No	Product	Preparation
1	MG80-SC / MG80-CM / Digital gauge set	
2	PLC	PLC that supports MC protocol 3E frame The example here uses the following PLC. R04ENCPU
3	PC	・OS : Windows 10 ・Setting tool “MG80-SC_SettingTool” installed * Download the setting tool from the website.
4	Switching hub	
5	LAN cable	Category 5 or higher

Connect the components as illustrated below.



7.2. MG80-SC Switch Settings

Use a screwdriver or other tool to configure the unit ID setting with the rotary switch.
Setting range: 0 to F
The MG80-SC has an IP address of 192.168.0.100 and a subnet mask of 255.255.255.0 as default values, but the settings can be changed. If the assigned IP address has been forgotten, set the switch to F to start up with the default value.



In this example, the settings are as follows.

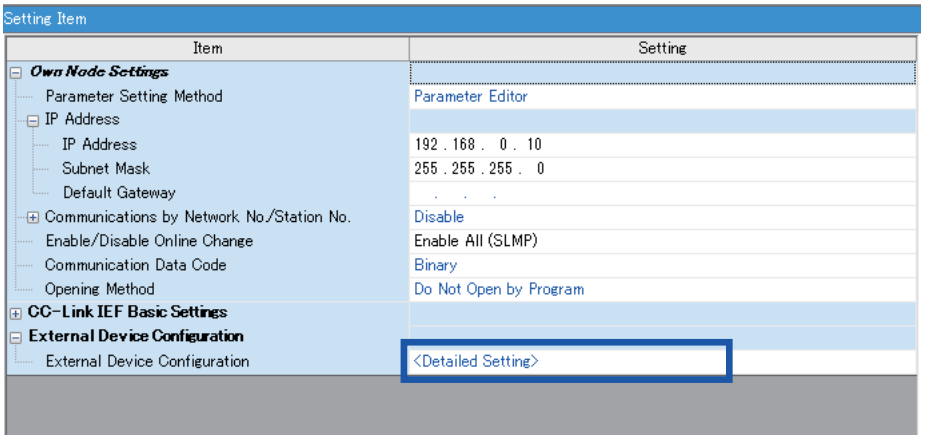
	IP address	Subnet mask	Port number
MG80-SC	192.168.0.100	255.255.255.0	-
PLC	192.168.0.10	255.255.255.0	50000
PC used for settings	192.168.0.50	255.255.255.0	-

Set IP addresses that are all on the same network.

7.3. PLC Ethernet Settings

Configure the settings as follows.

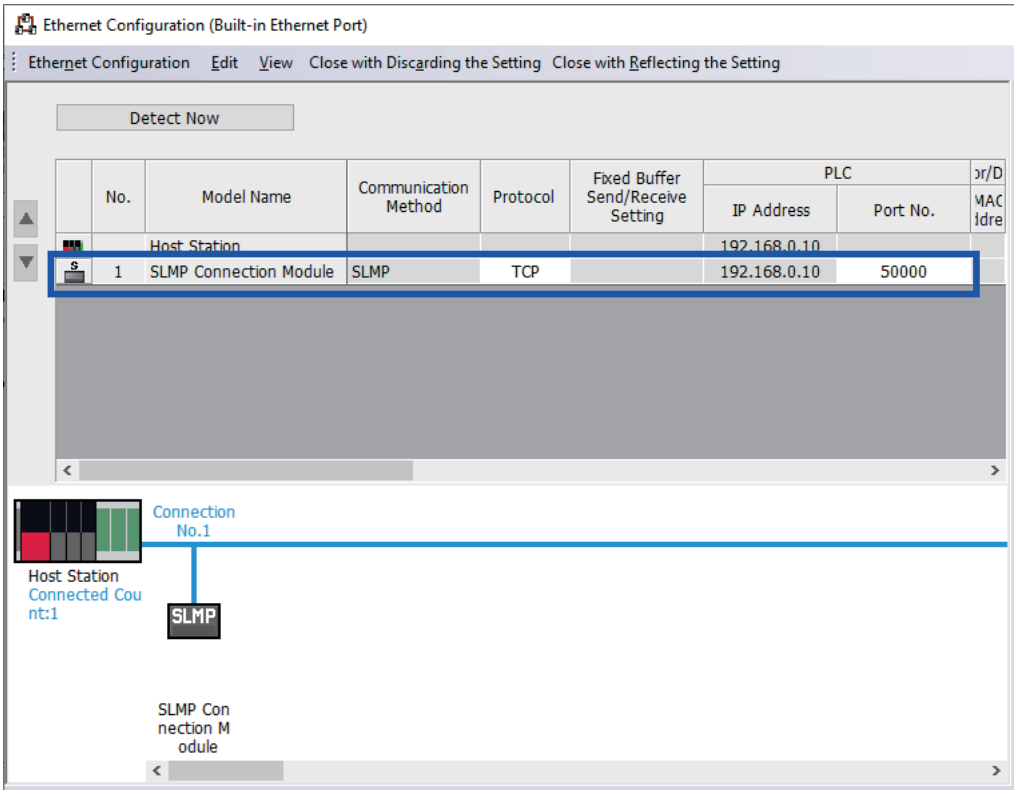
➢ Unit parameters



・Select “Enable All (SLMP)” for “Enable/Disable Online Change.”

・The “Communication Data Code” setting must match the MG80-SC setting.

➢ Detailed Setting

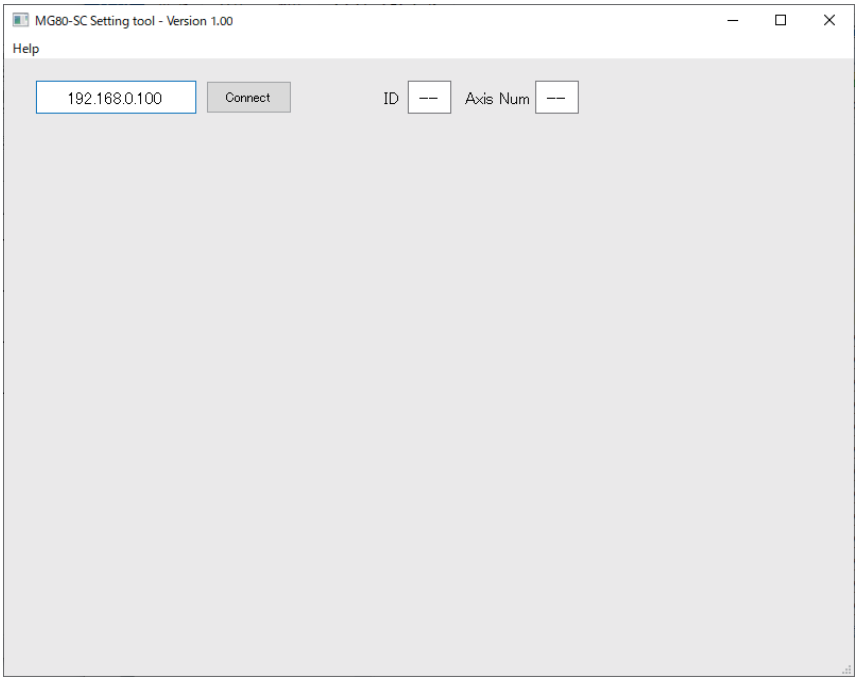


・The “Protocol” setting must match the MG80-SC setting.

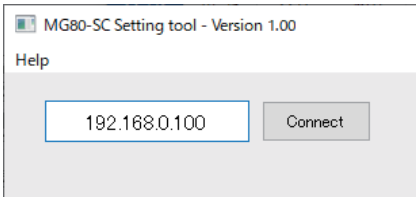
7.4. MG80-SC Settings

Start up the setting tool “MG80-SC_SettingTool” that was installed on the PC.

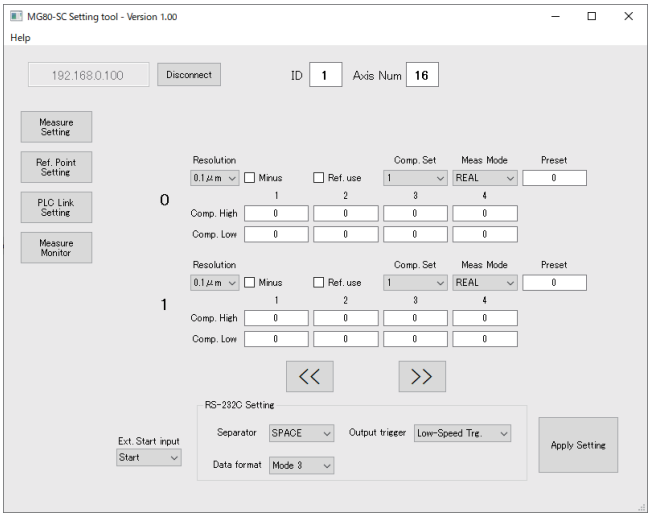
When the program starts up, the following window appears.



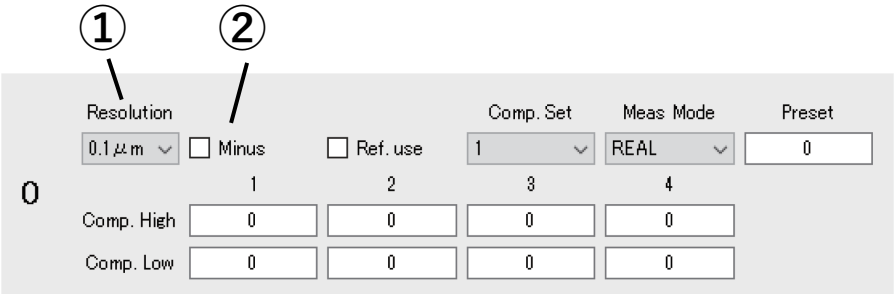
Enter the IP address of the MG80-SC and click the [Connect] button.



Once connected, the following window appears. If the connection cannot be made, turn off the power of the MG80-SC, exit the setting application, and start over from the beginning.



When setting the MG80-SC for the first time, the input resolution and direction (input polarity) need to be set for all the measuring units to be connected.

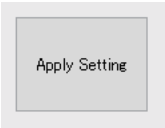


①Specify the input resolution setting from the following options.

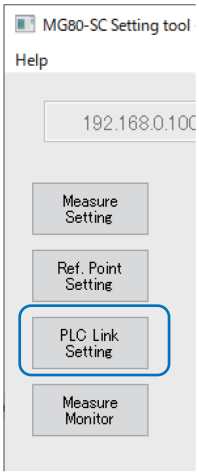
・0.1μm
・0.5μm
・1μm
・5μm
・10μm

②Specify the direction (input polarity) of the measuring unit. When this is selected, the direction is reversed.

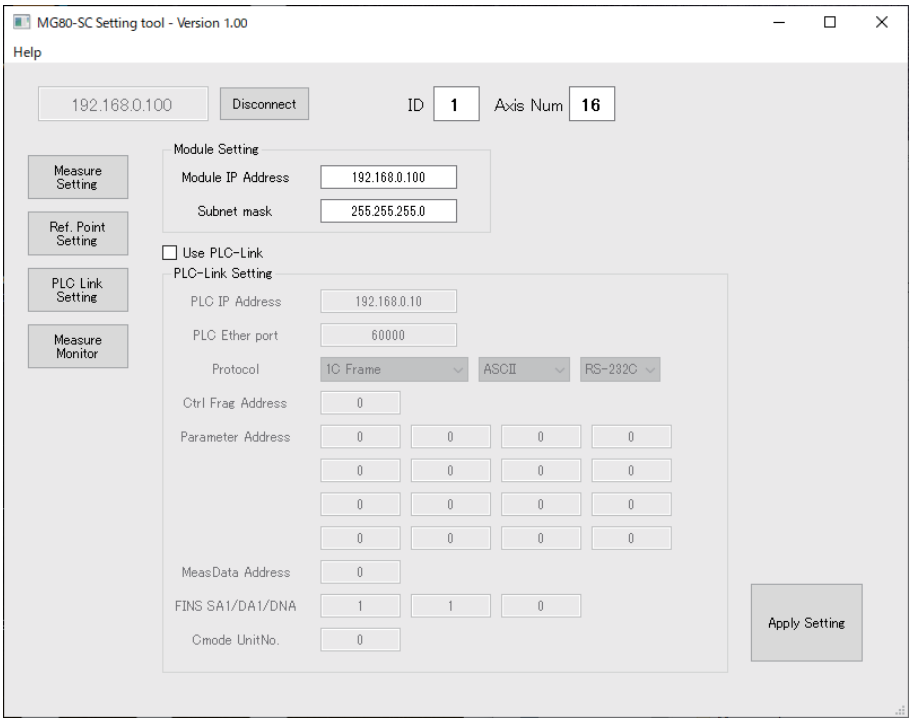
If settings have been changed, click the [Apply Setting] button to apply the settings made to the MG80-SC.



Click the [PLC Link Setting] button.



The following window appears.



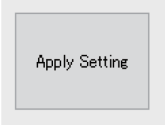
Select “Use PLC-Link” and configure the settings as follows.

Note

The following example uses the data registers from D100 to D519. Set an area not used by the PLC.

Setting item	Setting value		
PLC IP Address	192.168.0.100		
PLC Ether port	50000 * Match the port number set on the PLC side.		
Protocol	3E Frame or 3E Frame for iQ-R * For other than the iQ-R series, select “3E Frame.”	Binary or ASCII * Match the PLC setting.	TCP or UDP * Match the PLC setting.
Ctrl Flag Address	100		
Parameter Address	200, 220, 240, 260, 280, 300, 320, 340, 360, 380, 400, 420, 440, 460, 480, 500 * Set a number of parameter addresses equivalent to the number of connected MG80-CM.		
MeasData Address	120		
FINS SA1/DA1/DNA	Not used (Leave as the default value.)		
Cmode Unit No.	Not used (Leave as the default value.)		

If settings have been changed, click the [Apply Setting] button to apply the settings made to the MG80-SC.



Turn the power of the MG80-SC off and then on again to start PLC link.

7.5. Ladder Creation

The ladder configuration is the same as that for Mitsubishi Electric Corporation MC protocol 3C frame (RS-232C).

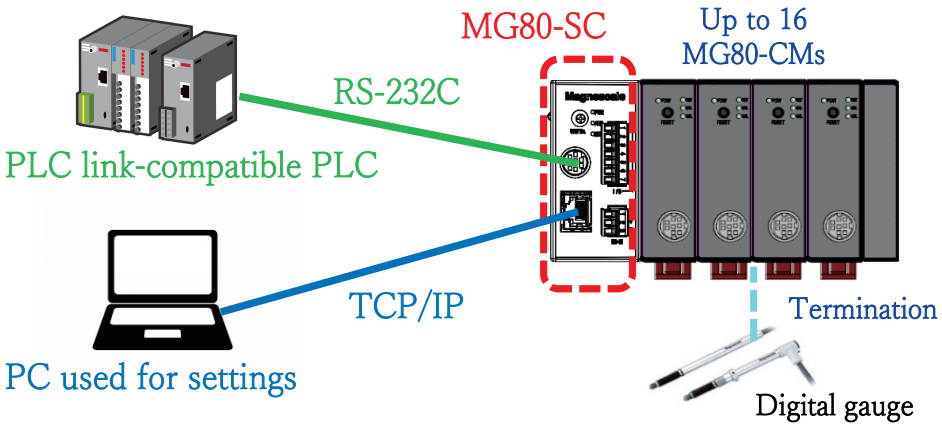
8. OMRON Corporation　C-mode Commands (RS-232C)

8.1. Items to be Prepared

Prepare the following items.

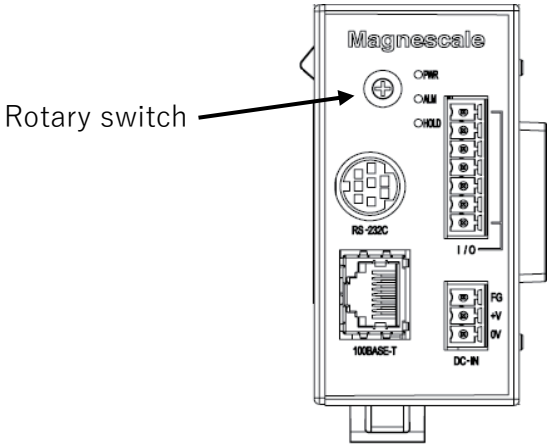
No	Product	Preparation
1	MG80-SC / MG80-CM / Digital gauge set	
2	PLC	PLC that supports C-mode commands The example here uses the following PLC. CP2E-N14DT-A + CP1W-CIF01
3	PC	・OS : Windows 10 ・Setting tool “MG80-SC_SettingTool” installed * Download the setting tool from the website.
4	RS-232C cable	In this example, connection is made using the DZ254 cable (sold separately) according to the serial port specification of the PLC.
5	LAN cable	Category 5 or higher

Connect the components as illustrated below.

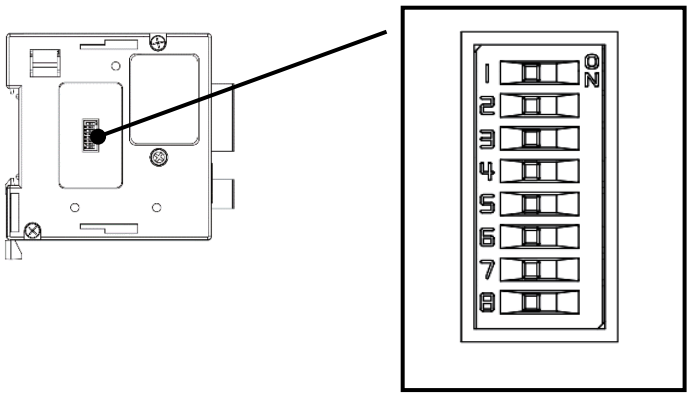


8.2. MG80-SC Switch Settings

Use a screwdriver or other tool to configure the unit ID setting with the rotary switch.
Setting range: 0 to F
The MG80-SC has an IP address of 192.168.0.100 and a subnet mask of 255.255.255.0 as default values, but the settings can be changed. If the assigned IP address has been forgotten, set the switch to F to start up with the default value.



Configure the RS-232C communication setting DIP switches of the MG80-SC.
* For details of the settings, refer to the operating manual.

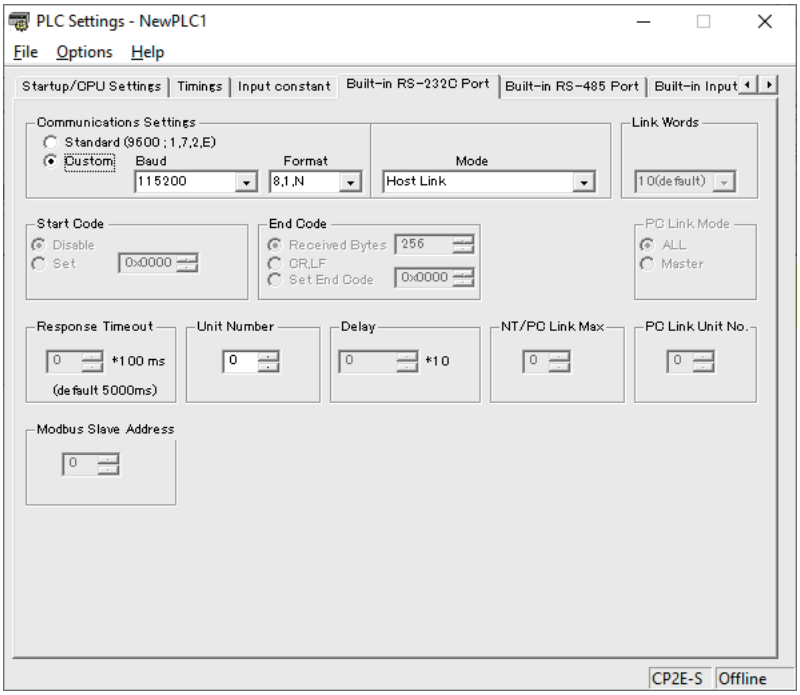


The example here uses the following settings.

Setting item	Setting contents	Switch no.							
		1	2	3	4	5	6	7	8
Delimiter	CR+LF	-	OFF	-	-	-	-	-	-
Parity	OFF	-	-	OFF	OFF	-	-	-	-
Stop bit	1bit	-	-	-	-	OFF	-	-	-
Data length	8bit	-	-	-	-	-	OFF	-	-
Communication speed setting	115200	ON	-	-	-	-	-	ON	OFF

8.3. PLC RS-232C Settings

Configure the settings as follows to match the MG80-SC settings.



8.4. PC Network Settings

Set the IP address on the PC where the “Setting application for Windows PC” was installed. Set the IP address of the PC so that it is on the same network as the IP address of the MG80-SC.

In the example here, the MG80-SC uses the default IP address of 192.168.0.100 and subnet mask of 255.255.255.0, and the IP address of the PC is as follows.

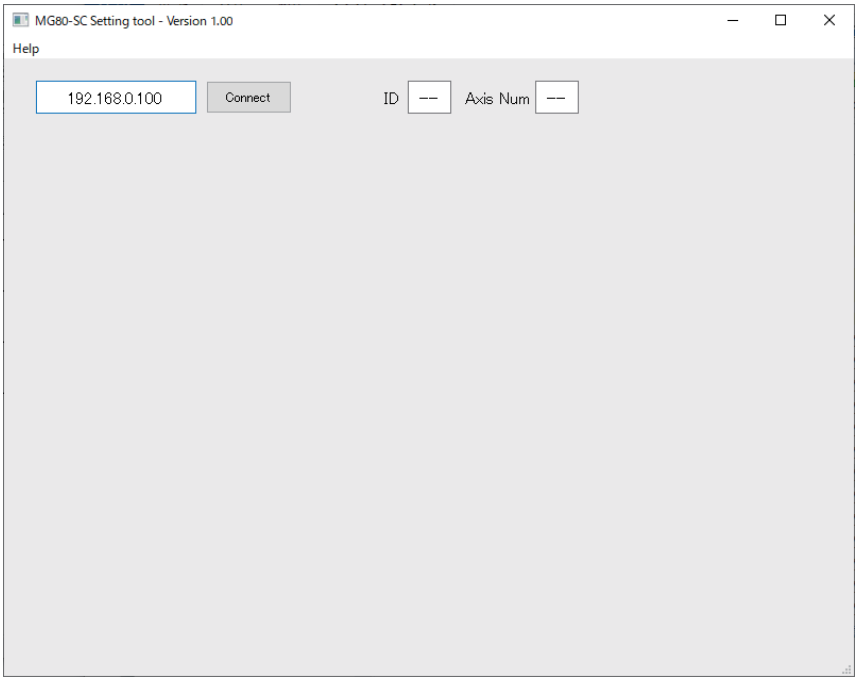
IP address : 192.168.0.50

Subnet mask : 255.255.255.0

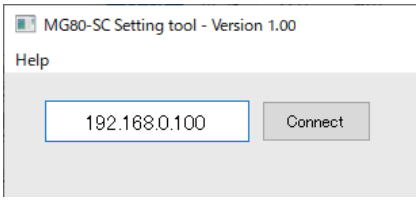
8.5. MG80-SC Settings

Start up the setting tool “MG80-SC_SettingTool” that was installed on the PC.

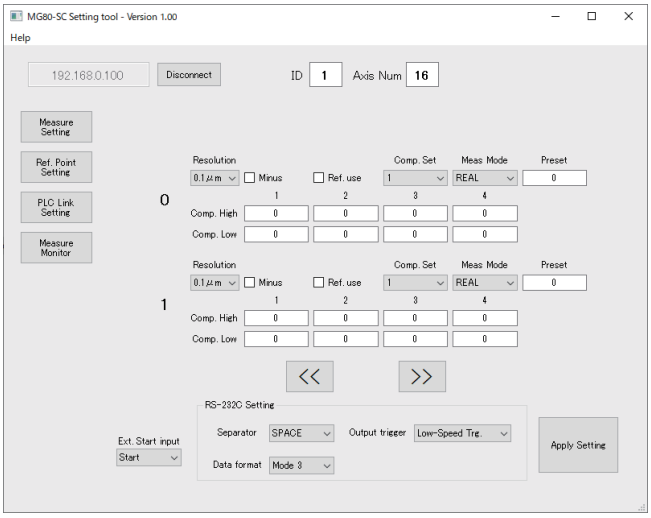
When the program starts up, the following window appears.



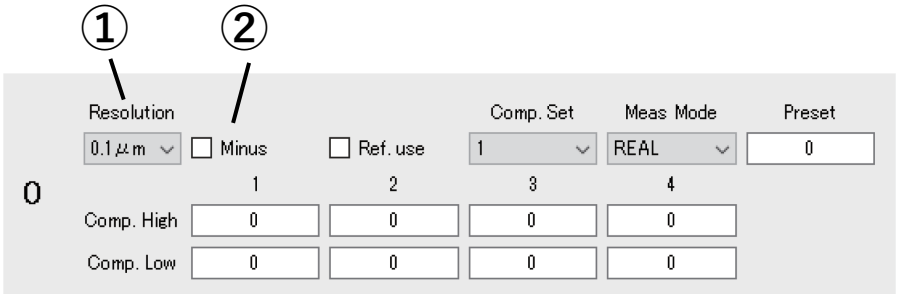
Enter the IP address of the MG80-SC and click the [Connect] button.



Once connected, the following window appears. If the connection cannot be made, turn off the power of the MG80-SC, exit the setting application, and start over from the beginning.



When setting the MG80-SC for the first time, the input resolution and direction (input polarity) need to be set for all the measuring units to be connected.



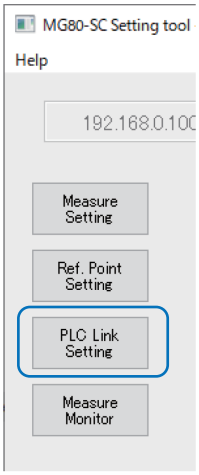
①Specify the input resolution setting from the following options.

・0.1μm
・0.5μm
・1μm
・5μm
・10μm

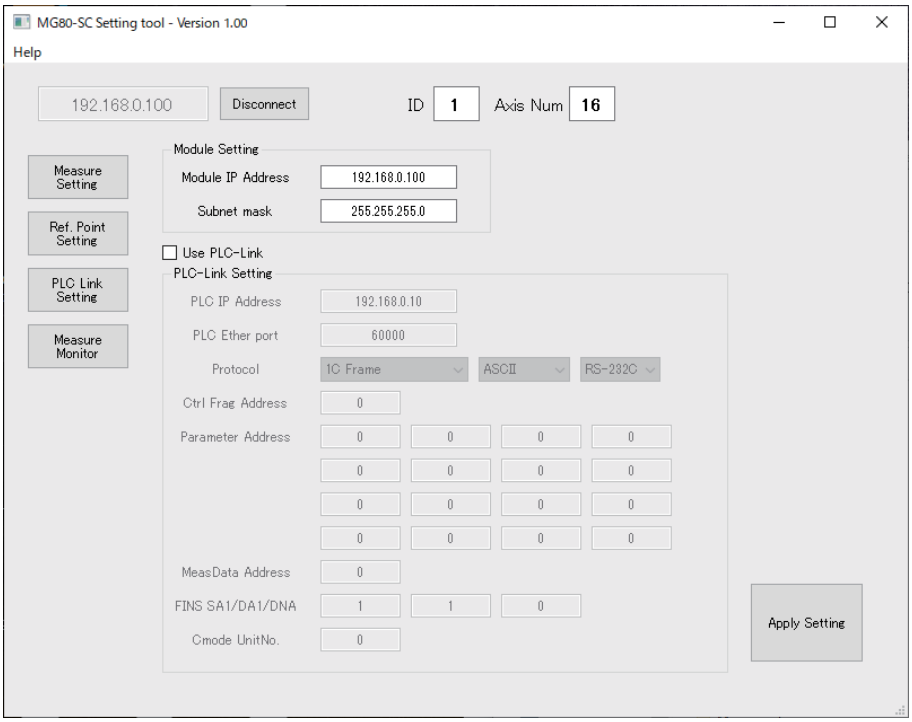
②Specify the direction (input polarity) of the measuring unit. When this is selected, the direction is reversed.

If settings have been changed, click the [Apply Setting] button to apply the settings made to the MG80-SC.

Click the [PLC Link Setting] button.



The following window appears.



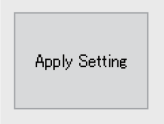
Select “Use PLC-Link” and configure the settings as follows.

Note

The following example uses the data registers from D100 to D519. Set an area not used by the PLC.

Setting item	Setting value		
PLC IP Address	Not used (Leave as the default value.)		
PLC Ether port	Not used (Leave as the default value.)		
Protocol	C mode Command	ASCII	RS-232C
Ctrl Flag Address	100		
Parameter Address	200, 220, 240, 260, 280, 300, 320, 340, 360, 380, 400, 420, 440, 460, 480, 500 * Set a number of parameter addresses equivalent to the number of connected MG80-CM.		
MeasData Address	120		
FINS SA1/DA1/DNA	Not used (Leave as the default value.)		
Cmode Unit No.	0 * Set the Unit No. of the connection destination. In this example, this is 0.		

If settings have been changed, click the [Apply Setting] button to apply the settings made to the MG80-SC.



Turn the power of the MG80-SC off and then on again to start PLC link.

8.6. Ladder Creation

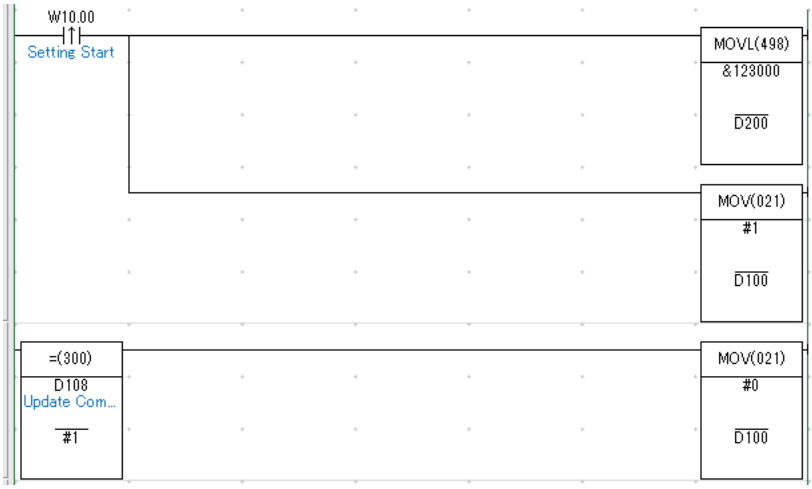
①Example of changing parameters

This example describes the case when changing the preset value of the measuring unit with a counter module ID of 0 (the MG80-CM closest to the MG80-SC main module) to 12.3 mm.

The starting address of the setup parameters for counter module ID: 0 is the D200 set in “Parameter Address” by “MG80-SC_SettingTool.” Preset value has an offset of 0x0000 and 0x0001, so the preset value addresses are D200 and D201. The value to be set depends on the resolution of the measuring unit. For example, if the resolution is 0.5 μm, 0.1 μm is set as 1.　* Refer to the operating manual.

The starting address of the control flag area is the D100 set in “Ctrl Flag Address” by “ MG80-SC_SettingTool. ” Update parameter has an offset of 0x0000, and Update parameter complete has an offset of 0x0008, so these addresses are respectively D100 and D108. Here, counter module ID: 0 corresponds to bit 0 (ID: 1 corresponds to bit 1). Bit 0 of D100 corresponds to Update parameter, and bit 0 of D108 corresponds to Update parameter complete.

In this example, when the preset value is set in D200 + D201 and bit 0 of D100 is set to 1, the MG80 sets bit 0 of D108 to 1 to complete the operation.



②Example of operation commands

This example describes the case when presetting the measuring unit with a counter module ID of 0 (the MG80-CM closest to the MG80-SC main module).

The starting address of the control flag area is the D100 set in “Ctrl Flag Address” by “MG80-SC_SettingTool.” Recall preset has an offset of 0x0002, and Recall preset complete has an offset of 0x000A, so these addresses are respectively D102 and D110. Here, counter module ID: 0 corresponds to bit 0 (ID: 1 corresponds to bit 1). Bit 0 of D102 corresponds to Recall preset, and bit 0 of D110 corresponds to Recall preset complete.

In this example, when bit 0 of D102 is set to 1, the MG80 sets bit 0 of D110 to 1 to complete the operation.

③Example of continuous sampling of measured values

This example describes the case when continuously sampling the measured values of a measuring unit.

The starting address of the control flag area is the D100 set in “Ctrl Flag Address” by “MG80-SC_SettingTool.” Request measurement data has an offset of 0x0007, and Transmit measurement data complete has an offset of 0x000D, so these addresses are respectively D107 and D113. Here, when bit 0 of Request measurement data is set to 1, the measurement data of all the counter modules is transmitted.

If bit 0 of D113 is 0 when continuously sampling measured values, set bit 0 of D107 to 1.

The starting address of the measurement data is the D120 set in “MeasData Address” by “MG80-SC_SettingTool.” When using continuously sampled measurement data, in order to assure that the high-order 2 bytes and low-order 2 bytes of the measurement data are updated at the same timing, transfer the measurement data to another address at the Transmit measurement data complete timing and then use the data. In this example, measurement data is transferred to D2000 to D2047.

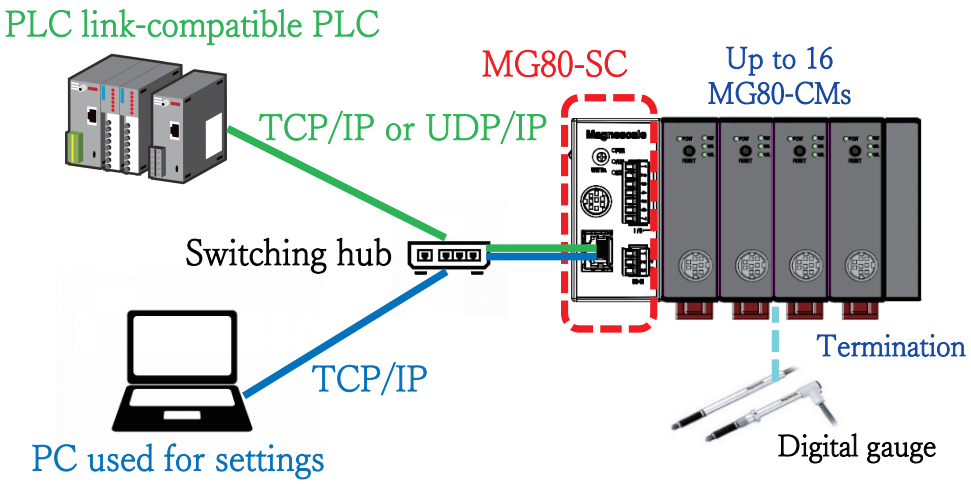
9. OMRON Corporation FINS Commands (Ethernet)

9.1. Items to be Prepared

Prepare the following items.

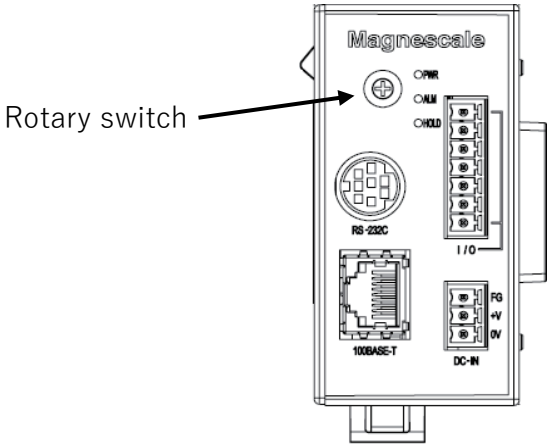
No	Product	Preparation
1	MG80-SC / MG80-CM / Digital gauge set	
2	PLC	PLC that supports FINS Commands The example here uses the following PLC. CP2E-N14DT-A
3	PC	・OS : Windows 10 ・Setting tool “MG80-SC_SettingTool” installed * Download the setting tool from the website.
4	Switching hub	
5	LAN cable	Category 5 or higher

Connect the components as illustrated below.



9.2. MG80-SC Switch Settings

Use a screwdriver or other tool to configure the unit ID setting with the rotary switch.
Setting range: 0 to F
The MG80-SC has an IP address of 192.168.0.100 and a subnet mask of 255.255.255.0 as default values, but the settings can be changed. If the assigned IP address has been forgotten, set the switch to F to start up with the default value.



In this example, the settings are as follows.

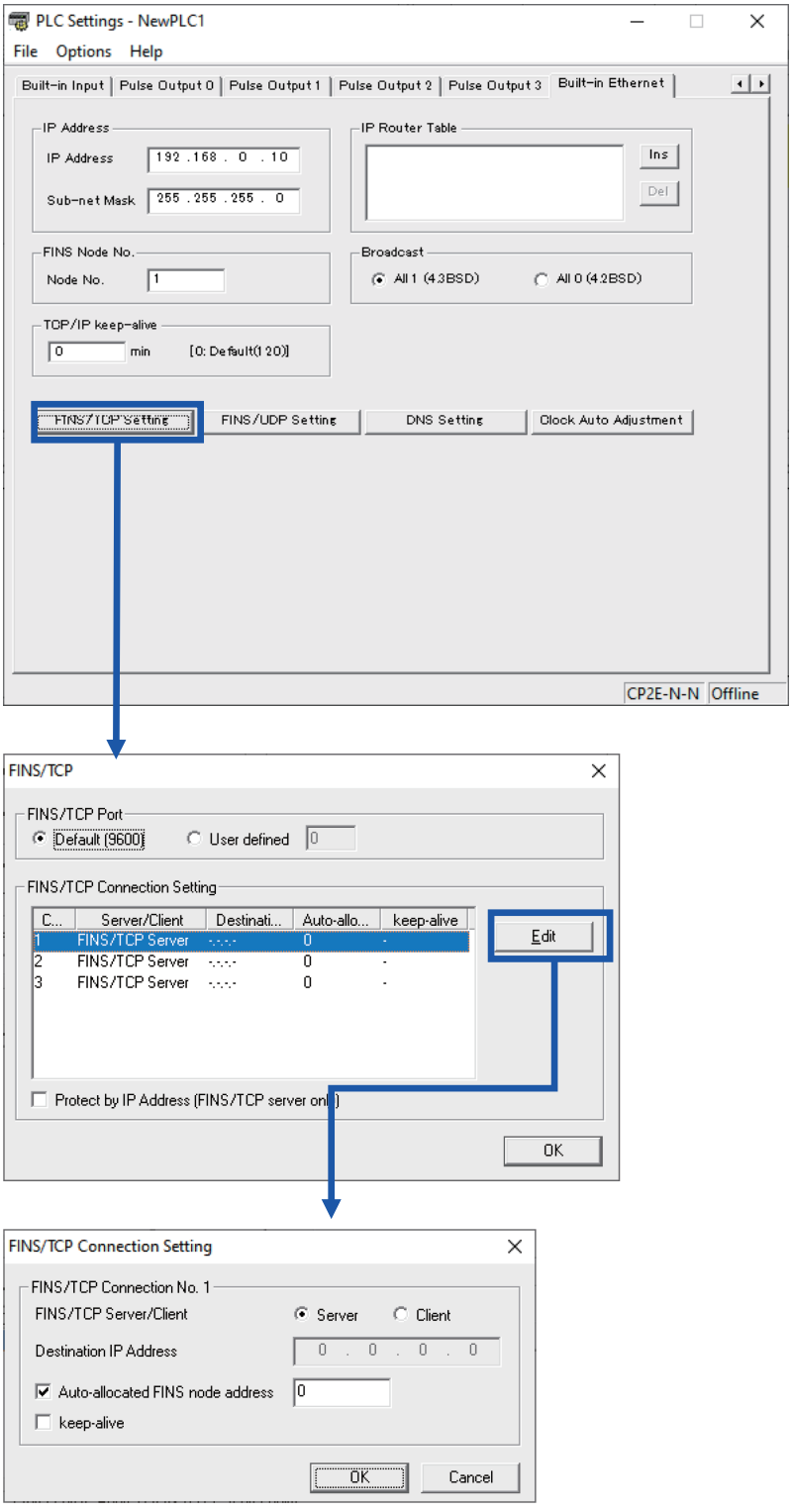
	IP address	Subnet mask	Port number
MG80-SC	192.168.0.100	255.255.255.0	-
PLC	192.168.0.10	255.255.255.0	9600
PC used for settings	192.168.0.50	255.255.255.0	-

Set IP addresses that are all on the same network.

9.3. PLC Ethernet Settings

Configure the settings as follows.

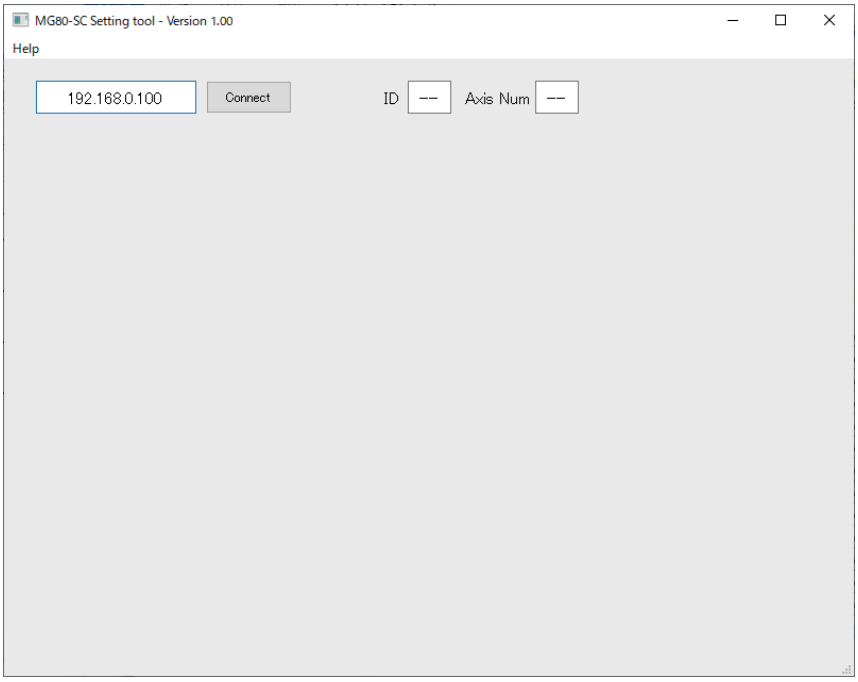
An example of TCP connection is shown below. For UDP, configure the FINS/UDP settings.



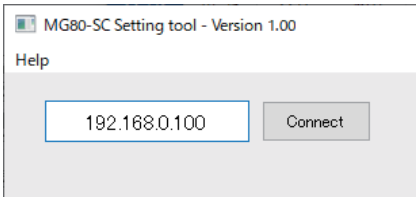
9.4. MG80-SC Settings

Start up the setting tool “MG80-SC_SettingTool” that was installed on the PC.

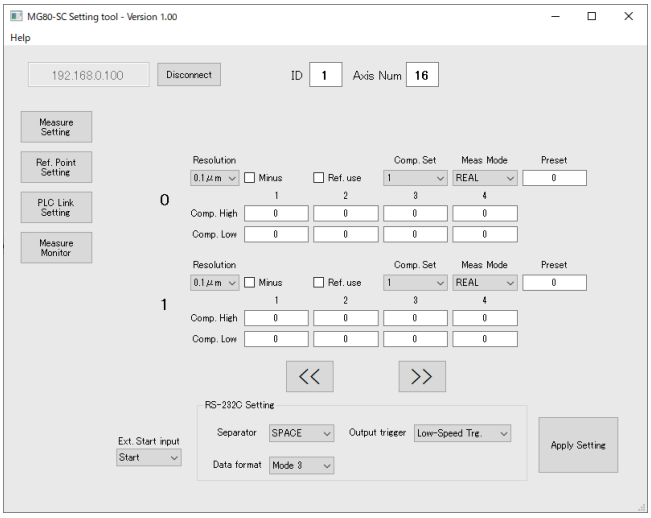
When the program starts up, the following window appears.



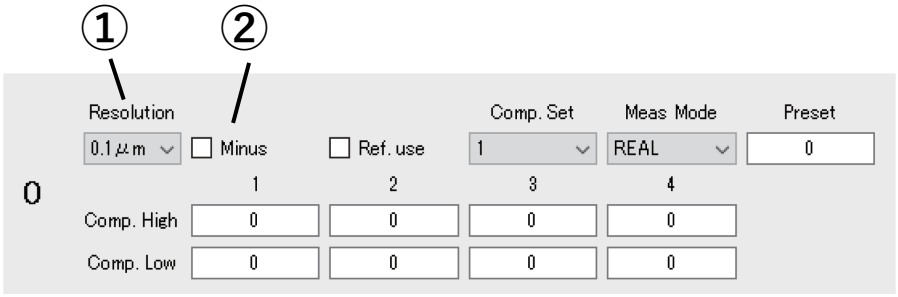
Enter the IP address of the MG80-SC and click the [Connect] button.



Once connected, the following window appears. If the connection cannot be made, turn off the power of the MG80-SC, exit the setting application, and start over from the beginning.



When setting the MG80-SC for the first time, the input resolution and direction (input polarity) need to be set for all the measuring units to be connected.

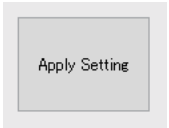


①Specify the input resolution setting from the following options.

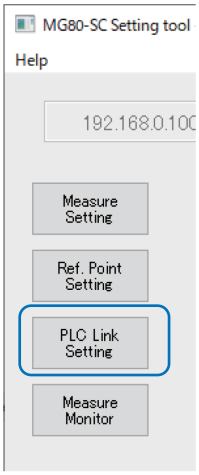
・0.1μm
・0.5μm
・1μm
・5μm
・10μm

②Specify the direction (input polarity) of the measuring unit. When this is selected, the direction is reversed.

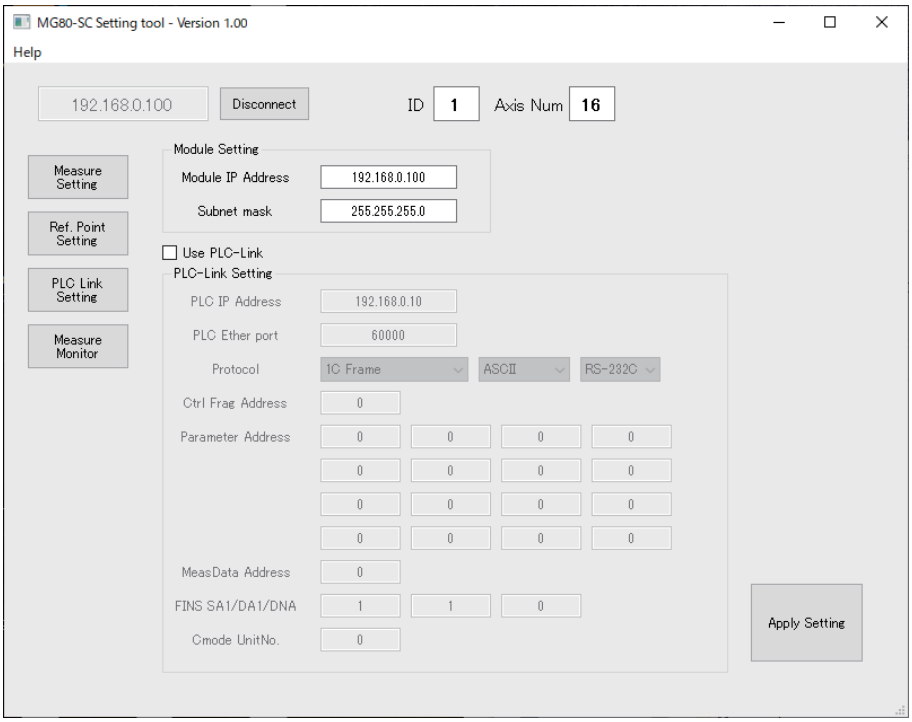
If settings have been changed, click the [Apply Setting] button to apply the settings made to the MG80-SC.



Click the [PLC Link Setting] button.



The following window appears.



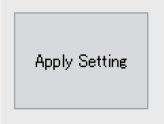
Select “Use PLC-Link” and configure the settings as follows.

Note

The following example uses the data registers from D100 to D519. Set an area not used by the PLC.

Setting item	Setting value		
PLC IP Address	192.168.0.10		
PLC Ether port	9600 * Match the port number set on the PLC side.		
Protocol	FINS command	Binary	TCP OR UDP
Ctrl Flag Address	100		
Parameter Address	200, 220, 240, 260, 280, 300, 320, 340, 360, 380, 400, 420, 440, 460, 480, 500 * Set a number of parameter addresses equivalent to the number of connected MG80-CM.		
MeasData Address	120		
FINS SA1/DA1/DNA	■For TCP SA1: Not used DA1: Not used DNA : 0 If there is only one network on the PLC side, it is usually set to 0. ■For UDP SA1 : 100 Set the low-order byte of the IP address of the MG80-SC. DA1 : 1 Set the node address of the PLC. DNA : 0 If there is only one network on the PLC side, it is usually set to 0.		
Cmode Unit No.	Not used (Leave as the default value.)		

If settings have been changed, click the [Apply Setting] button to apply the settings made to the MG80-SC.



Turn the power of the MG80-SC off and then on again to start PLC link.

9.5. Ladder Creation

The ladder configuration is the same as that for C-mode commands (RS-232C).

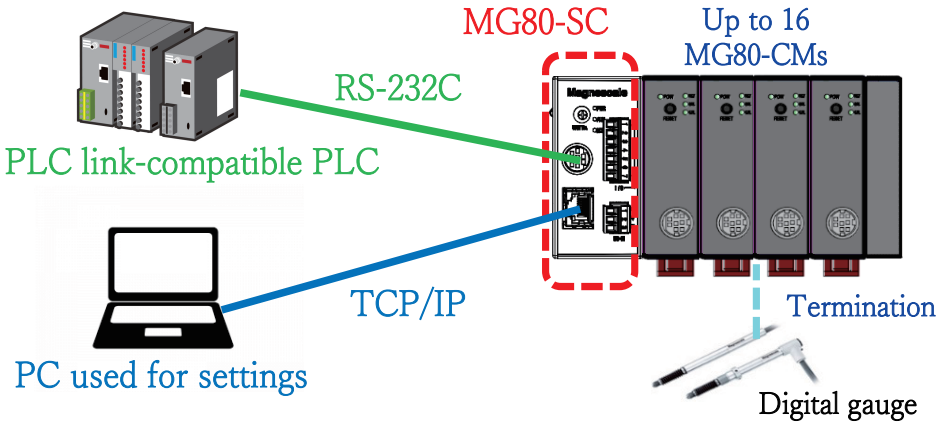
10. Keyence Corporation KV Host Link Mode (RS-232C)

10.1. Items to be Prepared

Prepare the following items.

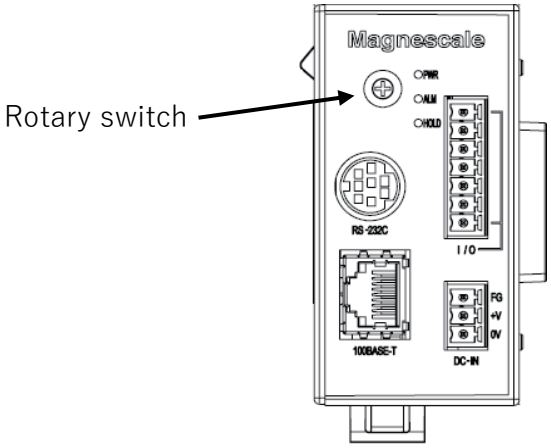
No	Product	Preparation
1	MG80-SC / MG80-CM / Digital gauge set	
2	PLC	PLC that supports KV Host Link Mode The example here uses the following PLC. KV7500 + KV-XL202
3	PC	・OS : Windows 10 ・Setting tool “MG80-SC_SettingTool” installed * Download the setting tool from the website.
4	RS-232C cable	In this example, connection is made using the DZ254 cable (sold separately) according to the serial port specification of the PLC.
5	LAN cable	Category 5 or higher

Connect the components as illustrated below.

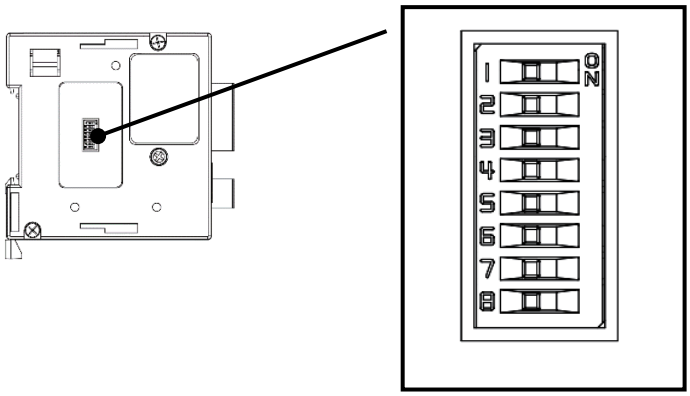


10.2. MG80-SC Switch Settings

Use a screwdriver or other tool to configure the unit ID setting with the rotary switch.
Setting range: 0 to F
The MG80-SC has an IP address of 192.168.0.100 and a subnet mask of 255.255.255.0 as default values, but the settings can be changed. If the assigned IP address has been forgotten, set the switch to F to start up with the default value.



Configure the RS-232C communication setting DIP switches of the MG80-SC.
* For details of the settings, refer to the operating manual.

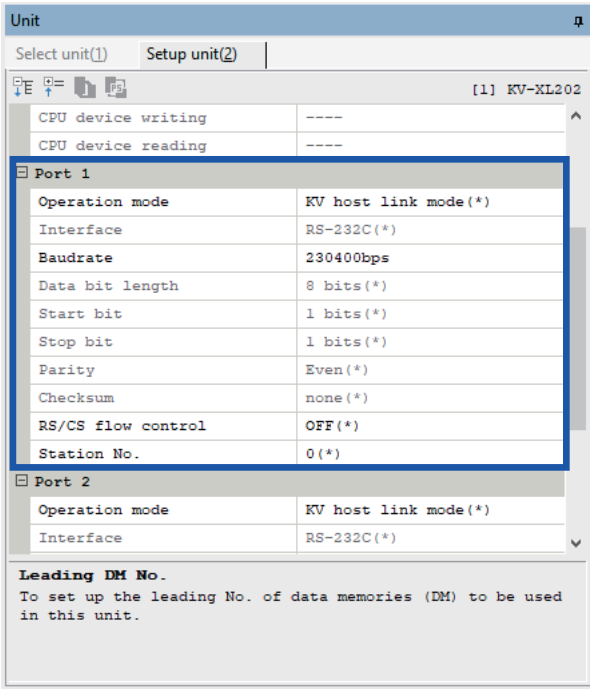


The example here uses the following settings.

Setting item	Setting contents	Switch no.							
		1	2	3	4	5	6	7	8
Delimiter	CR+LF	-	OFF	-	-	-	-	-	-
Parity	Even	-	-	ON	OFF	-	-	-	-
Stop bit	1bit	-	-	-	-	OFF	-	-	-
Data length	8bit	-	-	-	-	-	OFF	-	-
Communication speed setting	230400	ON	-	-	-	-	-	OFF	ON

10.3. PLC RS-232C Settings

Configure the settings as follows to match the MG80-SC settings.



10.4. PC Network Settings

Set the IP address on the PC where the “Setting application for Windows PC” was installed. Set the IP address of the PC so that it is on the same network as the IP address of the MG80-SC.

In the example here, the MG80-SC uses the default IP address of 192.168.0.100 and subnet mask of 255.255.255.0, and the IP address of the PC is as follows.

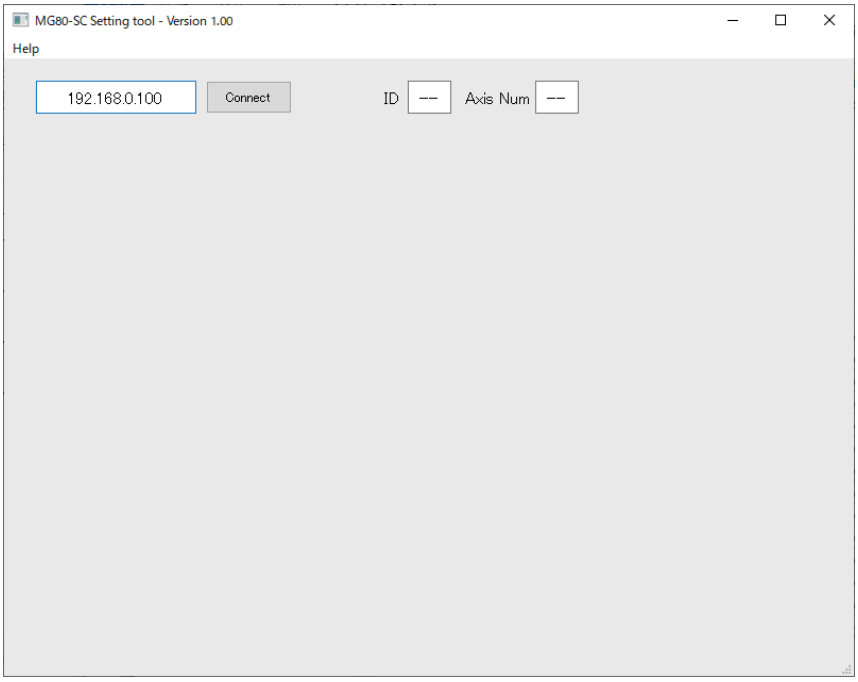
IP address : 192.168.0.50

Subnet mask : 255.255.255.0

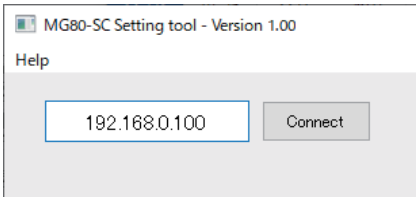
10.5. MG80-SC Settings

Start up the setting tool “MG80-SC_SettingTool” that was installed on the PC.

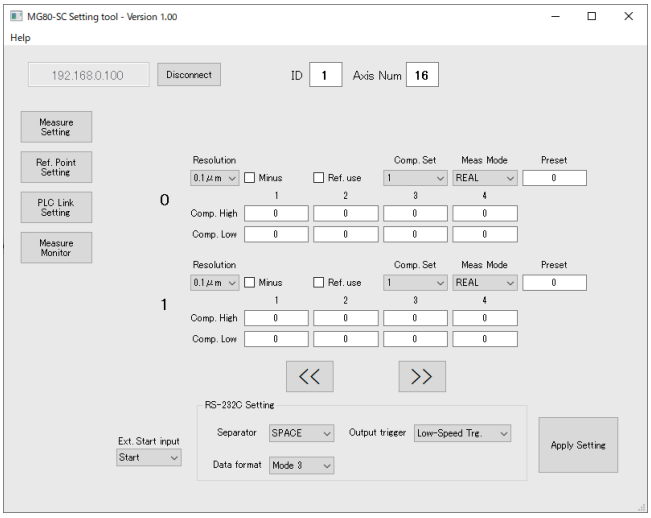
When the program starts up, the following window appears.



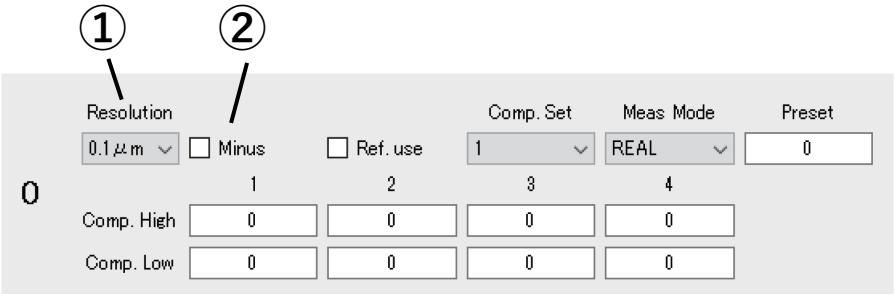
Enter the IP address of the MG80-SC and click the [Connect] button.



Once connected, the following window appears. If the connection cannot be made, turn off the power of the MG80-SC, exit the setting application, and start over from the beginning.



When setting the MG80-SC for the first time, the input resolution and direction (input polarity) need to be set for all the measuring units to be connected.

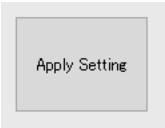


①Specify the input resolution setting from the following options.

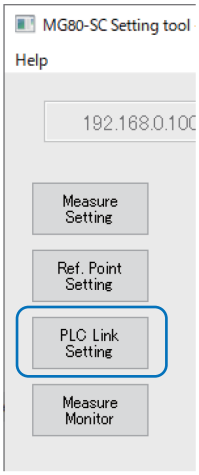
・0.1μm
・0.5μm
・1μm
・5μm
・10μm

②Specify the direction (input polarity) of the measuring unit. When this is selected, the direction is reversed.

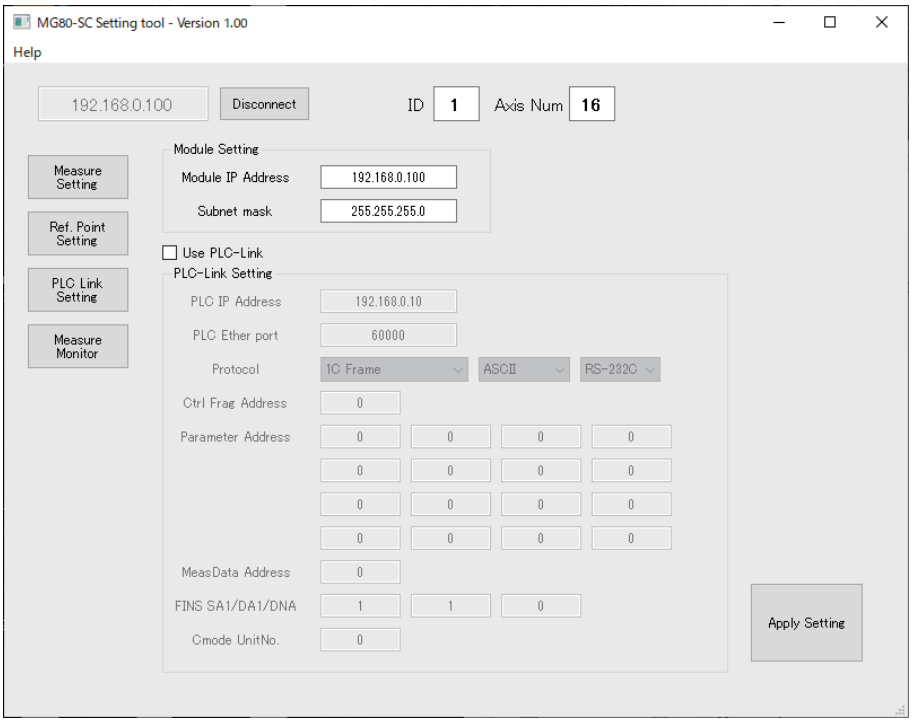
If settings have been changed, click the [Apply Setting] button to apply the settings made to the MG80-SC.



Click the [PLC Link Setting] button.



The following window appears.



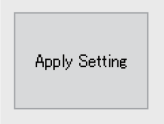
Select “Use PLC-Link” and configure the settings as follows.

Note

The following example uses the data registers from DM100 to DM519. Set an area not used by the PLC.

Setting item	Setting value		
PLC IP Address	Not used (Leave as the default value.)		
PLC Ether port	Not used (Leave as the default value.)		
Protocol	KV command	ASCII	RS-232C
Ctrl Flag Address	100		
Parameter Address	200, 220, 240, 260, 280, 300, 320, 340, 360, 380, 400, 420, 440, 460, 480, 500 * Set a number of parameter addresses equivalent to the number of connected MG80-CM.		
MeasData Address	120		
FINS SA1/DA1/DNA	Not used (Leave as the default value.)		
Cmode Unit No.	Not used (Leave as the default value.)		

If settings have been changed, click the [Apply Setting] button to apply the settings made to the MG80-SC.



Turn the power of the MG80-SC off and then on again to start PLC link.

10.6. Ladder Creation

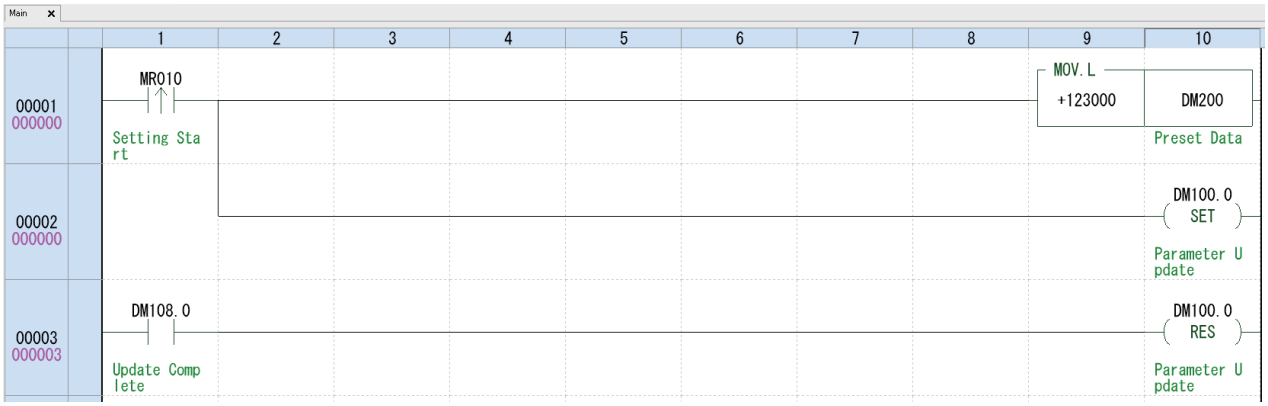
①Example of changing parameters

This example describes the case when changing the preset value of the measuring unit with a counter module ID of 0 (the MG80-CM closest to the MG80-SC main module) to 12.3 mm.

The starting address of the setup parameters for counter module ID: 0 is the DM200 set in “Parameter Address” by “MG80-SC_SettingTool.” Preset value has an offset of 0x0000 and 0x0001, so the preset value addresses are DM200 and DM201. The value to be set depends on the resolution of the measuring unit. For example, if the resolution is 0.5 μm, 0.1 μm is set as 1. * Refer to the operating manual.

The starting address of the control flag area is the DM100 set in “Ctrl Flag Address” by “MG80-SC_SettingTool.” Update parameter has an offset of 0x0000, and Update parameter complete has an offset of 0x0008, so these addresses are respectively DM100 and DM108. Here, counter module ID: 0 corresponds to bit 0 (ID: 1 corresponds to bit 1). Bit 0 of DM100 corresponds to Update parameter, and bit 0 of DM108 corresponds to Update parameter complete.

In this example, when the preset value is set in DM200 + DM201 and bit 0 of DM100 is set to 1, the MG80 sets bit 0 of DM108 to 1 to complete the operation.

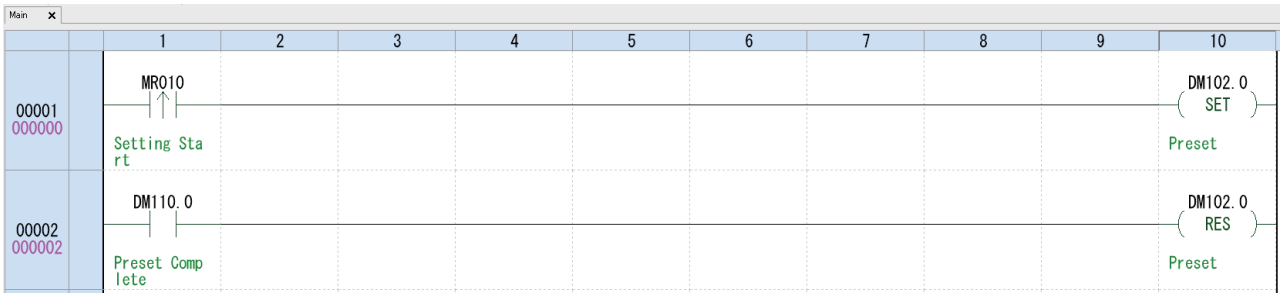


②Example of operation commands

This example describes the case when presetting the measuring unit with a counter module ID of 0 (the MG80-CM closest to the MG80-SC main module).

The starting address of the control flag area is the DM100 set in “Ctrl Flag Address” by “MG80-SC_SettingTool.” Recall preset has an offset of 0x0002, and Recall preset complete has an offset of 0x000A, so these addresses are respectively DM102 and DM110. Here, counter module ID: 0 corresponds to bit 0 (ID: 1 corresponds to bit 1). Bit 0 of DM102 corresponds to Recall preset, and bit 0 of DM110 corresponds to Recall preset complete.

In this example, when bit 0 of DM102 is set to 1, the MG80 sets bit 0 of DM110 to 1 to complete the operation.



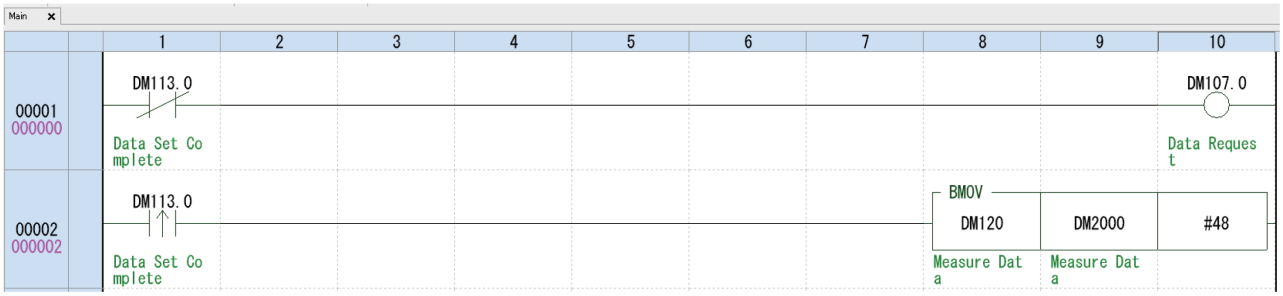
③Example of continuous sampling of measured values

This example describes the case when continuously sampling the measured values of a measuring unit.

The starting address of the control flag area is the DM100 set in “Ctrl Flag Address” by “MG80-SC_SettingTool.” Request measurement data has an offset of 0x0007, and Transmit measurement data complete has an offset of 0x000D, so these addresses are respectively DM107 and DM113. Here, when bit 0 of Request measurement data is set to 1, the measurement data of all the counter modules is transmitted.

If bit 0 of DM113 is 0 when continuously sampling measured values, set bit 0 of DM107 to 1.

The starting address of the measurement data is the DM120 set in “MeasData Address” by “MG80-SC_SettingTool.” When using continuously sampled measurement data, in order to assure that the high-order 2 bytes and low-order 2 bytes of the measurement data are updated at the same timing, transfer the measurement data to another address at the Transmit measurement data complete timing and then use the data.In this example, measurement data is transferred to DM2000 to DM2047.



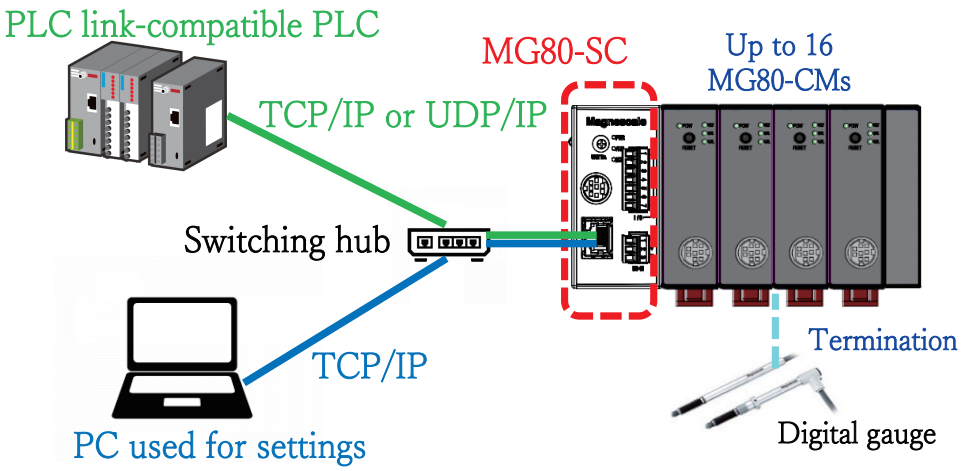
11. Keyence Corporation Host Link (Ethernet)

11.1. Items to be Prepared

Prepare the following items.

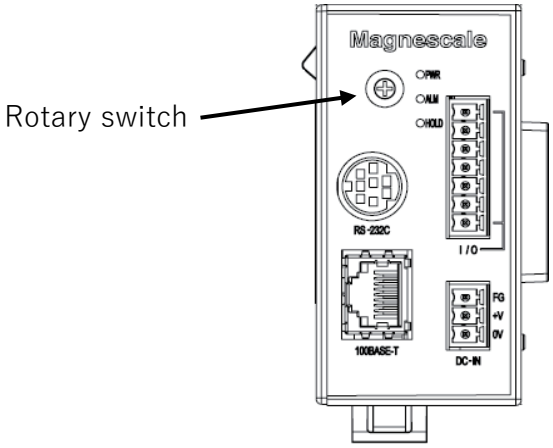
No	Product	Preparation
1	MG80-SC / MG80-CM / Digital gauge set	
2	PLC	PLC that supports host-link The example here uses the following PLC. KV7500
3	PC	・OS : Windows 10 ・Setting tool “MG80-SC_SettingTool” installed * Download the setting tool from the website.
4	Switching hub	
5	LAN cable	Category 5 or higher

Connect the components as illustrated below.



11.2. MG80-SC Switch Settings

Use a screwdriver or other tool to configure the unit ID setting with the rotary switch.
Setting range: 0 to F
The MG80-SC has an IP address of 192.168.0.100 and a subnet mask of 255.255.255.0 as default values, but the settings can be changed. If the assigned IP address has been forgotten, set the switch to F to start up with the default value.



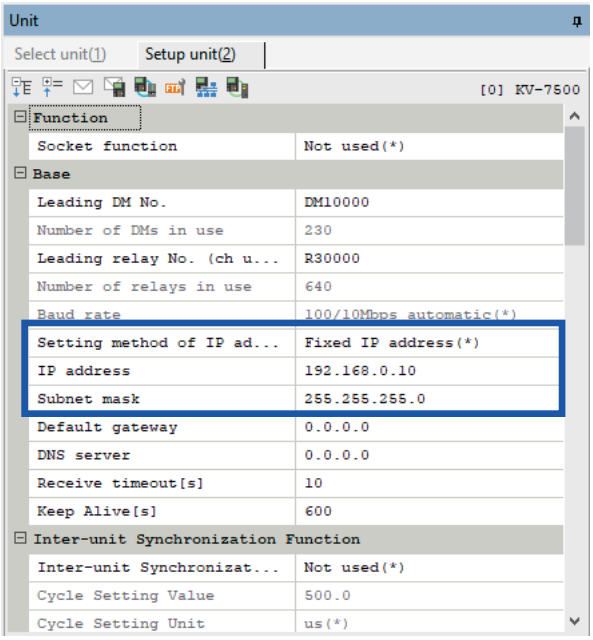
In this example, the settings are as follows.

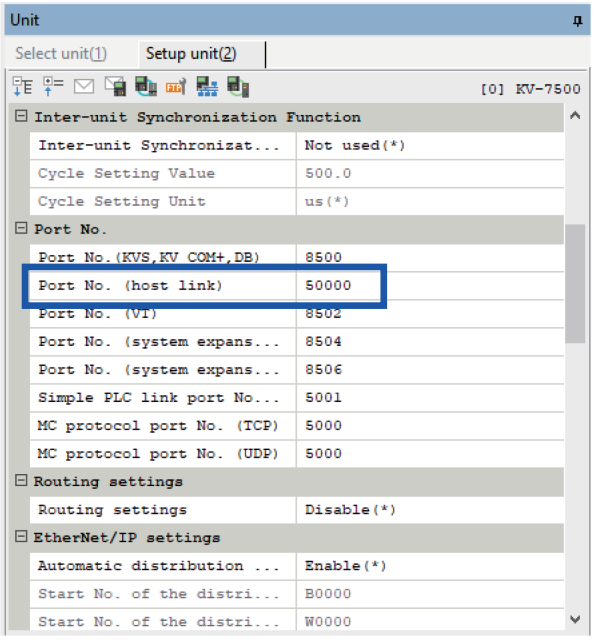
	IP address	Subnet mask	Port number
MG80-SC	192.168.0.100	255.255.255.0	-
PLC	192.168.0.10	255.255.255.0	50000
PC used for settings	192.168.0.50	255.255.255.0	-

Set IP addresses that are all on the same network.

11.3. PLC Ethernet Settings

Configure the settings as follows.

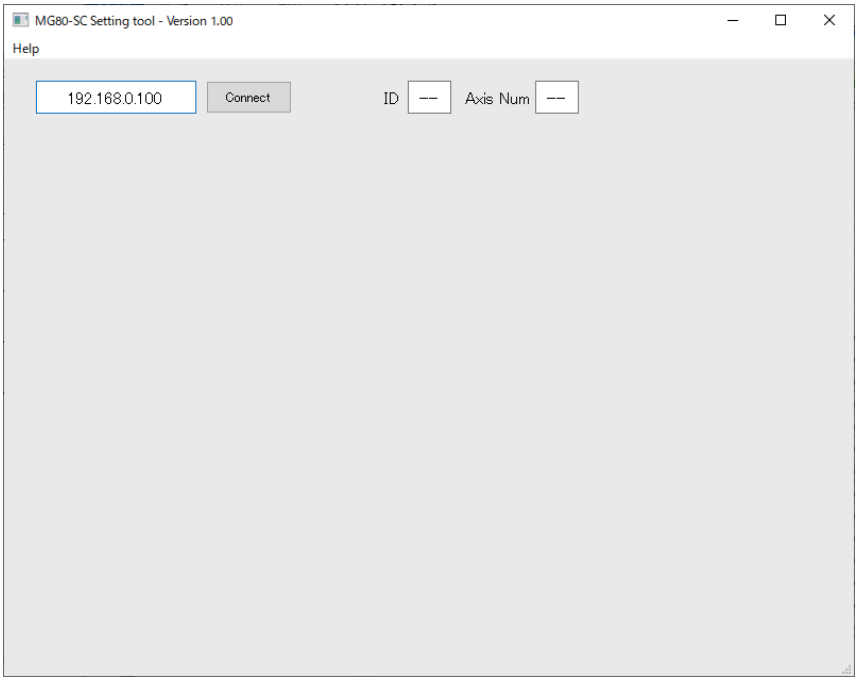




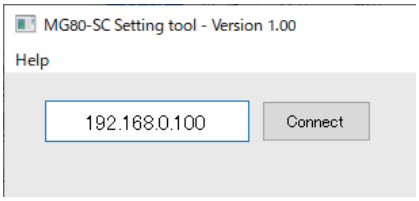
11.4. MG80-SC Settings

Start up the setting tool “MG80-SC_SettingTool” that was installed on the PC.

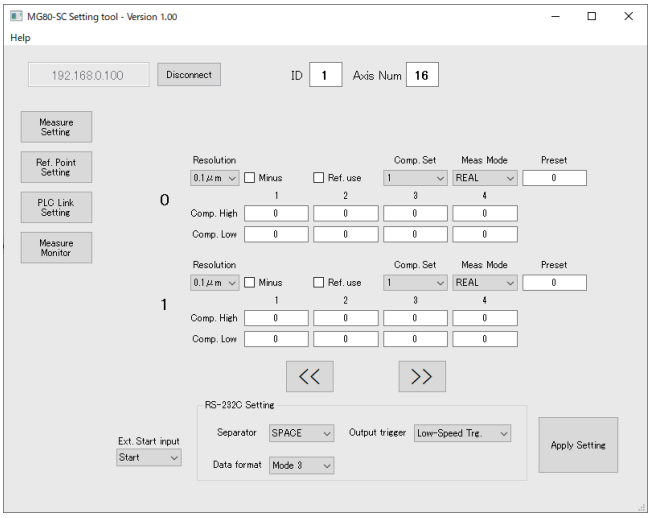
When the program starts up, the following window appears.



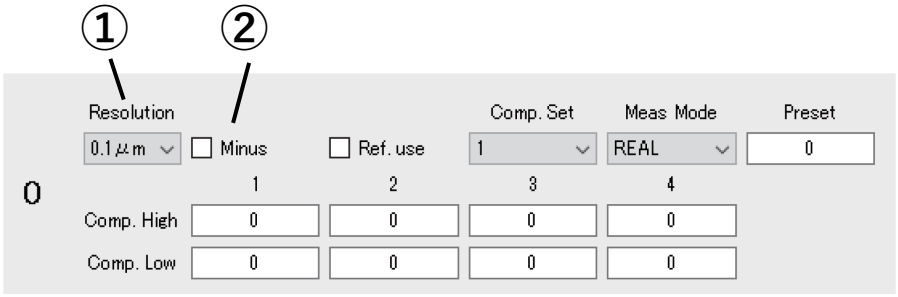
Enter the IP address of the MG80-SC and click the [Connect] button.



Once connected, the following window appears. If the connection cannot be made, turn off the power of the MG80-SC, exit the setting application, and start over from the beginning.



When setting the MG80-SC for the first time, the input resolution and direction (input polarity) need to be set for all the measuring units to be connected.



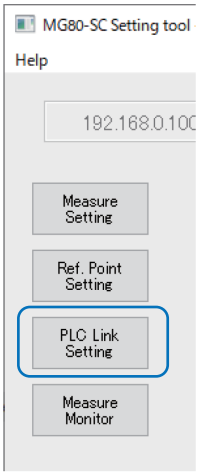
①Specify the input resolution setting from the following options.

・0.1μm
・0.5μm
・1μm
・5μm
・10μm

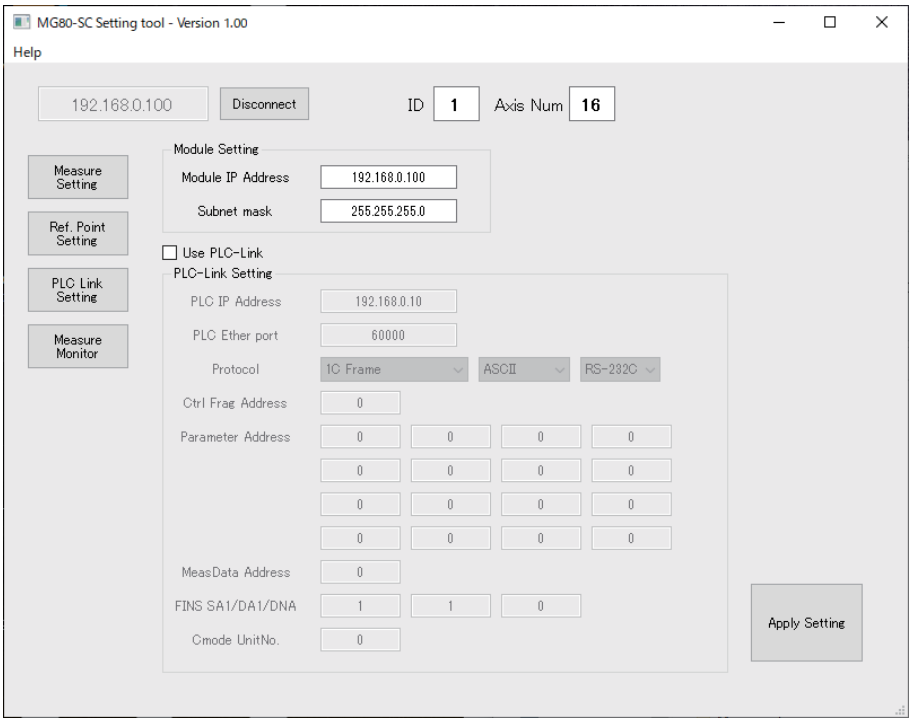
②Specify the direction (input polarity) of the measuring unit. When this is selected, the direction is reversed.

If settings have been changed, click the [Apply Setting] button to apply the settings made to the MG80-SC.

Click the [PLC Link Setting] button.



The following window appears.



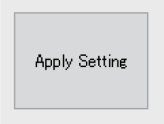
Select “Use PLC-Link” and configure the settings as follows.

Note

The following example uses the data registers from DM100 to DM519. Set an area not used by the PLC.

Setting item	Setting value		
PLC IP Address	192.168.0.10		
PLC Ether port	50000 * Match the port number set on the PLC side.		
Protocol	KV command	ASCII	TCP or UDP
Ctrl Flag Address	100		
Parameter Address	200, 220, 240, 260, 280, 300, 320, 340, 360, 380, 400, 420, 440, 460, 480, 500 * Set a number of parameter addresses equivalent to the number of connected MG80-CM.		
MeasData Address	120		
FINS SA1/DA1/DNA	Not used (Leave as the default value.)		
Cmode Unit No.	Not used (Leave as the default value.)		

If settings have been changed, click the [Apply Setting] button to apply the settings made to the MG80-SC.



Turn the power of the MG80-SC off and then on again to start PLC link.

11.5. Ladder Creation

The ladder configuration is the same as that for Keyence Corporation KV Host Link Mode (RS-232C).

日本からの輸出時における注意

本製品(および技術)は輸出令別表第1の16の項(外為令別表16の項)に該当します。キャッチオール規制による経済産業省の許可要否につきましては、輸出者様にてご確認ください。

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