## 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)

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

## **3.** Download the Setting Application for Windows PC

Visit the Magnescale website at <u>https://www.magnescale.com</u> and select the following:

Product Information

- $\rightarrow$  Digital Gauge
- $\rightarrow$  MG80-SC MG80-CM
- $\rightarrow$  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

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
		<ul> <li>Setting tool "MG80-SC_SettingTool" installed</li> </ul>
		* 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

Prepare the following items.

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		Switch no.						
	contents	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	38400	OFF	-	-	-	-	-	ON	ON
speed setting									

#### 4.3. PLC RS-232C Settings

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

FX parameter	×
Memory capacity Device PLC name 1/0 assignment PL	C system(1) PLC system(2) Positioning
CH1 If the box is not checked, th Operate communication setting	e parameters will be cleared. ered to the communication board, parameters and ust be cleared upon program transfer.)
Protocol Dedicated protocol	Control line
Data length Bbit	H/W type Regular/RS-232C ▼
Parity None	Control mode
Stop bit	I Sum check
Transmission speed 38400 <b>(</b> bps)	Transmission control procedure Form4(with CR,LF)
Header	Station number setting 00 H (00H0FH)
Terminator	Time out judge time 1 X10ms (1255)
	,
Default	Check End Cancel

#### 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.

I MG80-SC Setting tool - Version 1.00	-	×
Help		
192.168.0.100 Connect ID Axis Num		

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

MG80-SC Setting tool - Version 1.00						
Help						
	192.168.0.100	Connect				

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.

192.168.0	Disc	onnect I	D 1 Axis	Num 16			
Measure Setting							
Ref. Point		Resolution		Comp. Set	Meas Mode	Preset	
Setting		0.1 $\mu$ m $\vee$ 🗌 Minus	Ref. use	1 ~	REAL $\sim$	0	
PLC Link	0	1	2	3	4		
Setting		Comp. High 0	0	0	0		
Measure Monitor		Comp. Low 0	0	0	0		
		Resolution		Comp. Set	Meas Mode	Preset	_
		0.1µum ∨ 🔲 Minus	Ref. use	1 ~	REAL ~	0	
	1	1	2	3	4		
		Comp. High U	0				
		Comp. Low 0	0				
			<<	>>			
		RS-232C Setting					
	Ext. Start input Start ~	Separator SPAC	E V Outpu	t trigger Low-Sp	eed Trg. $\sim$	Apply	Setting

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.

192.168.	0.100 Disconnect	ID	1	Axis Num	16	
	Module Setting					
Measure Setting	Module IP Address	192.168.0.100				
Pof Point	Subnet mask	255.255.255.0				
Setting	Use PLC-Link					
PLC Link Setting	PLC-Link Setting PLC IP Address	192.168.0.10				
Measure	PLC Ether port	60000				
Monitor	Protocol	1C Frame	~	ASCII $\sim$	RS-232C $\sim$	
	Ctrl Frag Address	0				
	Parameter Address	0	0	0	0	
		0	0	0	0	
		0	0	0	0	
		0	0	0	0	
	MeasData Address	0				
	FINS SA1/DA1/DNA	1	1	0		
	Cmode UnitNo.	0				Apply Setting

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 va	lue.)			
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	of parameter addr	esses 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.

Apply Setting

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  $\mu$ m, 0.1  $\mu$ m 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

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
		<ul> <li>Setting tool "MG80-SC_SettingTool" installed</li> </ul>
		* Download the setting tool from the website.
4	Switching hub	
5	LAN cable	Category 5 or higher

Prepare the following items.

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.

TI F	X3U-EN	ET-L C	Configuratio	on Tool (Unset file) - [Ethern	et settings] —	- 🗆	×
<u>F</u> ile	<u>V</u> iew	<u>H</u> elp					
	i 🛱	9					
		Γ	Ethernet Mo	dule settings			
				Module None	<b>•</b>		
				Operational settings			
				Initial settings			
				Open settings			
				Router relay parameter			
				E-mail settings			
		L					
N	lecessar	y settin	ng( No sett	ing / Already set )	Default		
5	Set if it is	needeo	d( No sett	ing / Already set )	Check		
_ Or	nline —						
	Tra	nsfer s	etup	PLC remote operation	Diagnostics		
		Write		Read	Verify		
Ready	1				FX3U-ENET-L	NUM	11

## > Operational settings

FX3U-ENET-L Configuration Tool (Unset file) - [Ethernet operational settings]	_		×
<u>F</u> ile <u>V</u> iew <u>H</u> elp			
Communication data code     Initial timing     Do not wait for OPEN ( Communications     impossible at STOP time )     Always wait for OPEN ( Communication     possible at STOP time )			
Paddress Send frame setting			
(• Ethernet(V2.0)			
IP address 192 168 0 10 C IEEE802.3			
TCP Existence confirmation setting © Use the KeepAlive © Use the Ping End Cancel			
Ready	FX3U-ENET-L	NUM	- //

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

#### > Open settings

#### •For TCP

. TE F	FX3U-ENET-L Configuration Tool (Unset file) - [Ethernet open settings]											_		×			
<u>F</u> ile	<u>File V</u> iew <u>H</u> elp																
		Protoo	ol	Open system		Fixed buffer	Fixed buffer communication procedure		Pairin open	9	Existence confirmatio	n	Host station Port No. (DEC.)	Transmission target device IP address	Transm target de Port N (DEC	ission evice o. C.)	
	1		•		•	-		•		•		•					
	2	TCP	-	Unnessive(MC)	-			-		-	No confirm	-	50000				
	4		+		+	-		• •		•		+					
							End	j	Са	nce	1				<b>T</b> 1	NUL	

#### •For UDP

📜 FX3U	III FX3U-ENET-L Configuration Tool (Unset file) - [Ethernet open settings]										_		×			
<u>F</u> ile <u>V</u> ie	<u>F</u> ile <u>V</u> iew <u>H</u> elp															
		_		-			_		_					_		
	Protoc	хоI	Open system		Fixed buffer	Fixed buffer communication procedure		Pairin oper	9	Existence confirmation	r	Host station Port No. (DEC.)	Transmission target device IP address	Transmis target dev Port No (DEC.)	sion /ice )	
1		•		•	•		•		•		•					
2	UDP	-	MC Protocol	-	-		• •		-	No confirm	-	50000	192.189 0.100	5	0000	
4	00.	•		Ŧ	-		Ŧ		• •		Ŧ		132.108. 0.100			
						End		Са	nce							
Ready													FX3U-ENE	T-L	NUM	11.

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.

I MG80-SC Setting tool - Version 1.00	-	×
Help		
192.168.0.100 Connect ID Axis Num		

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

MG80-SC Setting tool - Version 1.00							
Help	0						
	192.168.0.100	Connect					

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.

MG80-SC Setting to	ol - Version 1.00					-		×
192.168.0.1	00 Disc	onnect	ID <b>1</b> Axis	Num 16				
Measure Setting								
Ref. Point Setting		Resolution		Comp. Set	Meas Mode	Preset	_	
PLC Link Setting	0	0.12 m V Minus 1 Comp. High 0	2 0	3	4 0	0		
Measure Monitor		Comp. Low 0	0	0 Comp. Set	0 Meas Mode	Preset		
		0.1 µ m 🗸 🗌 Minus	Ref. use	1 ~	REAL $\sim$	0		
	1	1 Comp. High 0 Comp. Low 0	2 0 0	3 0 0 >>	4 0			
	Ext. Start input Start v	RS-232C Setting Separator SPA Data format Mod	CE v Outpu a 3 v	t trigger Low-Sp	eed Trg. 🗸	Apply	Setting	

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.

192.168.	0.100 Disconnect	ID	1	Axis Nu	m <b>16</b>			
	Module Setting							
Measure Setting	Module IP Address	192.168.0.100						
Def. Deint	Subnet mask	255.255.255.0						
Setting	Use PLC-Link PLC-Link Setting							
Setting	PLC IP Address	192.168.0.10						
Measure	PLC Ether port	60000						
Monitor	Protocol	1C Frame	$\sim$	ASCII	~ RS-232	c ~		
	Ctrl Frag Address	0						
	Parameter Address	0	0	0		0		
		0	0	0		0		
		0	0	0		0		
		0	0	0		0		
	MeasData Address	0						
	FINS SA1/DA1/DNA	1	1	0				
	Cmode UnitNo	0					App	ly Setting

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	TCP or UDP					
		* Match the PLC	* Match the PLC					
		setting.	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 p	arameter addresses e	equivalent to the					
	number of connec	ted 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

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
		<ul> <li>Setting tool "MG80-SC_SettingTool" installed</li> </ul>
		* 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

Prepare the following items.

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		Switch no.						
	contents	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	230400	ON	-	-	-	-	-	OFF	ON
speed setting									

## 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/I	TR 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.

I MG80-SC Setting tool - Version 1.00	-	×
Help		
192.168.0.100 Connect ID Axis Num		
		.4

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

MG80-SC Setting tool - Version 1.00				
Help	)			
	192.168.0.100	Connect		

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.

MG80-SC Setting tool - Versi	on 1.00					-		
192.168.0.100	Disconnect		ID <b>1</b> Axis	Num 16				
Measure Setting								
Ref. Point	Resolu	tion		Comp. Set	Meas Mode	Preset		
Setting	0.1 µ n	i 🗸 🗌 Minus	Ref. use	1 ~	REAL $\sim$	0		
PLC Link	0	1	2	3	4			
Setting	Comp.	Hieh 0	0	0	0			
Measure Monitor	Comp.	Low 0	0	0	0			
	Resolu	tion		Comp. Set	Meas Mode	Preset		
	0.1 µ n	i 🗸 🗌 Minus	Ref. use	1 ~	REAL $\sim$	0		
	1	1	2	3	4			
	Comp.	Hieh 0	0	0	0			
	Comp.	Low 0	0	0	0			
			<<	>>				
	RS	232C Settine						
Ext. St Start	art input	Separator SPA ata format Mod	ICE v Output	trigger Low-Sp	eed Trg. 🗸 🗸	Apply S	Setting	

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.

192.168.0	D.100 Disconnect	IC	1	Axi	s Num	16				
	Module Setting									
Measure Setting	Module IP Address	192.168.0.10	0							
Pof Point	Subnet mask	255.255.255	0							
Setting PLC Link	Use PLC-Link PLC-Link Setting									
Setting	PLC IP Address	192.168.0.11	)							
Measure Monitor	PLC Ether port	60000								
Monitor	Protocol	1C Frame	$\sim$	ASCII	$\sim$	RS-232C	$\sim$			
	Ctrl Frag Address	0								
	Parameter Address	0	0		0	0				
		0	0		0	0				
		0	0		0	0				
		0	0		0	0				
	MeasData Address	0								
	FINS SA1/DA1/DNA	1	1		0					
	Cmode UnitNo.	0						Appl	ly Setting	

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	ldress 200, 220, 240, 260,					
280, 300, 320, 340,						
	360, 380, 400, 420,					
	440, 460, 480, 500					
	* Set a number of parameter addresses equivalen					
	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.

Apply Setting

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

#### 6.6. Ladder Creation

 $(\ensuremath{\mathbbm l} Example \ of \ changing \ parameters$ 

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  $\mu$ m, 0.1  $\mu$ m 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

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
		<ul> <li>Setting tool "MG80-SC_SettingTool" installed</li> </ul>
		* Download the setting tool from the website.
4	Switching hub	
5	LAN cable	Category 5 or higher

Prepare the following items.

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

Setting Item	
Item	Setting
Own Nade Settings	
Parameter Setting Method	Parameter Editor
IP Address	
IP Address	192.168. 0.10
Subnet Mask	255.255.255.0
Default Gateway	and a second
→⊕ Communications by Network No/Station No.	Disable
Enable/Disable Online Change	Enable All (SLMP)
Communication Data Code	Binary
Opening Method	Do Not Open by Program
External Device Configuration	
External Device Configuration	<detailed setting=""></detailed>

•Select "Enable All (SLMP)" for "Enable/Disable Online Change."

•The "Communication Data Code" setting must match the MG80-SC setting.

#### > Detailed Setting

<u>1</u> 2 e	therne	et Conf	iguration (Built-in Ethernet F	Port)					
i Eth	er <u>n</u> et	Config	uration <u>E</u> dit <u>V</u> iew Clos	se with Disc <u>a</u> rding th	e Setting Cl	ose with <u>R</u> eflecting	the Setting		
		D	etect Now						
				Communication		Fixed Buffer	PLC		or/D
		No.	Model Name	Method	Protocol	Send/Receive Setting	IP Address	Port No.	MAC Idre
			Host Station				192.168.0.10		
	S	1	SLMP Connection Module	SLMP	тср		192.168.0.10	50000	
	<								>
Ho Co nt:	st Sta nnect 1	tion ed Cou	SLMP Con nection M odule						
			<						>

•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.

Image: MG80-SC Setting tool - Version 1.00				
Help				
192.168.0.100 Connect ID Axis Num				

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

MG80-SC Setting tool - Version 1.00					
Help	Help				
	192.168.0.100	Connect			

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.

MG80-SC Setting tool - Version 1.00 - 🗆 🗙					
Help					
192.168.0.100 D	192.168.0.100 Disconnect ID 1 Avis Num 16				
Measure Setting					
Ref. Point	Resolution Comp. Set Meas Mode	Preset			
aetting	0.1 µm v Minus Ref. use 1 v REAL v	0			
PLC Link 0					
Setting	Comp. High				
Measure Monitor	Comp. Low 0 0 0 0				
	Resolution Comp. Set Meas Mode	Preset			
		U	1		
1	Comp. High 0 0 0 0				
	RS-282C Setting				
Ext. Start inp Start	t Separator SPACE v Output trigger Low-Speed Trg. v Data format Mode 8 v	Apply S	etting		
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.

				_			
192.168.	0.100 Disconnect	ID	1	Axis Num	16		
	Module Setting						
Measure Setting	Module IP Address	192.168.0.100					
	Subnet mask	255.255.255.0					
Ret. Point Setting	Use PLC-Link						
PLC Link	PLC-Link Setting						
Setting	PLC IP Address	192.168.0.10					
Measure	PLC Ether port	60000					
Monitor	Protocol	1C Frame	$\sim$ 4	ASCII	RS=232C $\sim$		
	Ctrl Frag Address	0					
	Parameter Address	0	0	0	0		
		0	0	0	0		
		0	0	0	0		
		0	0	0	0		
	MeasData Address	0					
	FINS SA1/DA1/DNA	1	1	0			
	Cmode UnitNo.	0				App	ly Setting

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 nur	<sup>c</sup> Match the port number set on the PLC side.					
Protocol	3E Frame or 3E	Binary or ASCII	TCP or UDP				
	Frame for iQ-R	* Match the PLC	* Match the PLC				
	* For other than	setting.	setting.				
	the iQ-R series,						
	select "3E						
	Frame."						
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 p	arameter addresses e	quivalent to the				
	number of connec	ted MG80-CM.					
MeasData Address	120						
FINS SA1/DA1/DNA	Not used (Leave as t	the default value.)					
Cmode Unit No.	Not used (Leave as t	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

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
		<ul> <li>Setting tool "MG80-SC_SettingTool" installed</li> </ul>
		* 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

Prepare the following items.

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		Switch no.						
	contents	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	115200	ON	-	-	-	-	-	ON	OFF
speed setting									

## 8.3. PLC RS-232C Settings

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

👼 PLC Settings - NewPLC1	- [	×
<u>File Options H</u> elp		
Startup/CPU Settings   Timings   Input constant   Built-in RS-232C Port   Built-in RS-485 F	Port   Built-in	Input 🔹 🕨
Communications Settings         Standard (8600 : 1.7.2,E)         Format         Mode           Image: Standard Settings         Baud         Format         Mode           Image: Settings         Image: Settings         Image: Settings         Mode	Link Words	
Start Code C Disable C Set Dx0000 C Set Dx00	PC Link N C ALL C Master	/lode
Response Timeout Unit Number Unit Number Unit Number Unit Number Unit State NT/PC Link Max	PC Link U	Jnit No
Modbus Slave Address		
	CD25 S	Offline
	JOP 20-3	Johnne

### 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.

I MG80-SC Setting tool - Version 1.00		-	×
Help			
192.168.0.100 Connect ID Axis Nun	n		

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

MG80-SC Setting tool - Version 1.00					
Help	0				
	192.168.0.100	Connect			

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.

MG80-SC Setting tool - Version 1.00	)				-		×
lp							
192.168.0.100 Di	sconnect ID	1 Axis	Num 16				
Measure Setting							
Ref. Point	Resolution		Comp. Set	Meas Mode	Preset		
Setting	0.1 $\mu$ m $\vee$ 🗌 Minus	Ref. use	1 ~	REAL $\sim$	0		
PLC Link 0	1	2	3	4			
Setting	Comp. High 0	0	0				
Measure Monitor	Comp. Low 0	0	0	0			
	Resolution		Comp. Set	Meas Mode	Preset	-	
	U.1,µm ∨ Minus	Het.use	1 ×	REAL V	U		
1	Comp. High 0	2	0	•			
	Como Love 0	0	0				
		/					
	<	<	11				
	RS-232C Setting						
Ext. Start inpu	Separator SPACE	<ul> <li>✓ Output</li> </ul>	trigger Low-Sp	eed Trg. $\vee$	Apply 3	Setting	
Start	Data format Mode 3	~					

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.

192.168.0	0.100 Disconnect	ID <b>1</b> Axis	Num 16	
	Module Setting			
Measure Setting	Module IP Address	192.168.0.100		
Def Delat	Subnet mask	255.255.255.0		
Setting PLC Link	Use PLC-Link PLC-Link Setting			
Setting	PLC IP Address	192.168.0.10		
Measure Monitor	PLC Ether port	60000		
Monitor	Protocol	10 Frame $\sim$ ASCII	$\sim$ RS-232C $\sim$	
	Ctrl Frag Address	0		
	Parameter Address	0 0	0 0	
		0 0	0 0	
		0 0	0 0	
		0 0	0 0	
	MeasData Address	0		
	FINS SA1/DA1/DNA	1 1	0	
	Cmode UnitNo.	0		Apply Setting

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	Not used (Leave as the default value.)				
PLC Ether port	Not used (Leave as	Not used (Leave as the default value.)				
Protocol	C mode Command	RS-232C				
Ctrl Flag Address	100	100				
Parameter Address	200, 220, 240, 260,					
	280, 300, 320, 340,					
	360, 380, 400, 420,					
	440, 460, 480, 500					
	* Set a number of p	arameter addresses e	equivalent to the			
	number of connec	ted 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.

Apply Setting

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

#### 8.6. Ladder Creation

 $\textcircled{1}\$  Example 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  $\mu$ m, 0.1  $\mu$ m 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.



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### 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.

W10.01	*	+	+	*	• •	
Preset Start						MOV(021)
	+	+	+	+	• •	#1
						D102
	*	*	*	*		
=(300)						MOV(021)
D110 Preset Comp		*	+	*	• •	#0
	+	+	+	*		
#1						102 טוט
			÷	+		

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.

	+	•		•	• •	
=(300)						MOV(021)
D113 Data Set Co	+	۰ · ·	b ·	¢	• •	#1
#0	+	•	•	÷	• •	D107
	÷	φ		Ŷ	• •	
=(300)						MOV(021)
D113 Data Set Co		• ·	•	6	• •	#0
#1		• •	÷ ·	÷	• •	D107
		•		•	• •	
						@XFER(070)
						&48
	*	•		•	• •	D120
	*	•		•	• •	D2000
	*					

## 9. OMRON Corporation FINS Commands (Ethernet)

## 9.1. Items to be Prepared

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
		<ul> <li>Setting tool "MG80-SC_SettingTool" installed</li> </ul>
		* Download the setting tool from the website.
4	Switching hub	
5	LAN cable	Category 5 or higher

Prepare the following items.

Connect the components as illustrated below.



# PLC link-compatible PLC

## 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.

PLC Settings - NewPLC1 File Options Holp		_	×
Built-in Input   Pulse Output 0   Pulse Ou	tout 1 Pulse Outout 2 Pulse Outout 3 Built-in E	ithernet	•
IR åddrage	IP Pouter Table		
IP Address 192.168.0.10		Ins	
Sub-net Mack 255 . 255 . 255 . 0	-	Del	
FINS Node No.	Broadcast	200	
Node No.	(• AIT (4.3BSD) () AIT (4.2B	(SD)	
TOP/IP keep-alive			
	Setting DNS Setting Clock Auto	Adjustment	
		CP2E-N-N Offli	ne
<b>↓</b>		7	
FINS/TCP	×		
FINS/TCP Port			
Default (9600)     O User defined	U		
FINS/TCP Connection Setting			
C Server/Client Destinati 1 FINS/TCP Server	Auto-allo keep-alive		
2 FINS/TCP Server			
5 FINS/TCF Server toto	0.		
Protect by IP Address (FINS/TCP ser	ver on )		
	ОК		
FINS/TCP Connection Setting	×		
FINS/TCP Connection No. 1			
	• Server C Client		
Destination IP Address			
Auto-allocated FINS node address			
	OK Cancel		

#### 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.

I MG80-SC Setting tool - Version 1.00		-	×
Help			
192.168.0.100 Connect ID Axis Nun	n		

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

MG80-SC Setting tool - Version 1.00					
Help					
	192.168.0.100	Connect			

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.

MG80-SC Setting tool - Version 1.00	)				-		×
lp							
192.168.0.100 Di	sconnect ID	1 Axis	Num 16				
Measure Setting							
Ref. Point	Resolution		Comp. Set	Meas Mode	Preset		
Setting	0.1 $\mu$ m $\vee$ 🗌 Minus	Ref. use	1 ~	REAL $\sim$	0		
PLC Link 0	1	2	3	4			
Setting	Comp. High 0	0	0				
Measure Monitor	Comp. Low 0	0	0	0			
	Resolution		Comp. Set	Meas Mode	Preset	-	
	U.1,µm ∨ Minus	Het.use	1 ×	REAL V	U		
1	Comp. High 0	2	0	•			
	Como Love 0	0	0				
		/					
	<	<	11				
	RS-232C Setting						
Ext. Start inpu	Separator SPACE	<ul> <li>✓ Output</li> </ul>	trigger Low-Sp	eed Trg. $\vee$	Apply 3	Setting	
Start	Data format Mode 3	~					

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.

192.168.	0.100 Disconnect	ID	1	Axis Num	16		
	Module Setting						
Measure Setting	Module IP Address	192.168.0.100					
P. ( P. ).	Subnet mask	255.255.255.0					
Setting	Use PLC-Link						
PLC Link	PLC-Link Setting						
Setting	PLC IP Address	192.168.0.10					
Measure	PLC Ether port	60000					
Morntor	Protocol	1C Frame	$\sim$ (	ASCII $\sim$	RS-232C $\sim$		
	Ctrl Frag Address	0					
	Parameter Address	0	0	0	0		
		0	0	0	0		
		0	0	0	0		
		0	0	0	0		
	MeasData Address	0					
	FINS SA1/DA1/DNA	1	1	0			
	Cmode UnitNo.	0				Apply	Setting

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.

Apply Setting

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

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
		<ul> <li>Setting tool "MG80-SC_SettingTool" installed</li> </ul>
		* 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

Prepare the following items.

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				Swite	ch no.			
	contents	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	230400	ON	-	-	-	-	-	OFF	ON
speed setting									

## 10.3. PLC RS-232C Settings

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

U	nit	д			
S	elect unit(1) Setup unit(2)				
÷	E 👎 🗅 🖻	[1] KV-XL202			
	CPU device writing	· ^			
	CPU device reading				
Ē	Port 1				
L	Operation mode	KV host link mode(*)			
L	Interface	RS-232C(*)			
L	Baudrate	230400bps			
L	Data bit length	8 bits(*)			
L	Start bit	1 bits(*)			
L	Stop bit	<pre>l bits(*)</pre>			
L	Parity	Even(*)			
L	Checksum	none(*)			
L	RS/CS flow control	OFF(*)			
L	Station No.	0(*)			
E	Port 2				
	Operation mode	KV host link mode(*)			
	Interface	RS-232C(*)			
Leading DM No. To set up the leading No. of data memories (DM) to be used in this unit.					

#### **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.

MG80-SC Setting tool - Version 1.00		-	×
Help			
192.168.0.100 Connect	ID Axis Num		
			.1

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

	MG80-SC Setting tool - Versio	on 1.00
Help	0	
	192.168.0.100	Connect

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.

MG80-SC Setting tool - Version 1.00	)				-		×
lp							
192.168.0.100 Di	sconnect ID	1 Axis	Num 16				
Measure Setting							
Ref. Point	Resolution		Comp. Set	Meas Mode	Preset		
Setting	0.1 $\mu$ m $\vee$ 🗌 Minus	Ref. use	1 ~	REAL $\sim$	0		
PLC Link 0	1	2	3	4			
Setting	Comp. High 0	0	0				
Measure Monitor	Comp. Low 0	0	0	0			
	Resolution		Comp. Set	Meas Mode	Preset	-	
	U.1,µm ∨ Minus	Het.use	1 ×	REAL V	U		
1	Comp. High 0	2	0	•			
	Como Love 0	0	0				
		/					
	<	<	17				
	RS-232C Setting						
Ext. Start inpu	Separator SPACE	<ul> <li>✓ Output</li> </ul>	trigger Low-Sp	eed Trg. $\vee$	Apply 3	Setting	
Start	Data format Mode 3	~					

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.

192.168.	0.100 Disconnect	ID 1 Axis Num 16	
	Module Setting		
Measure Setting	Module IP Address	192.168.0.100	
Ref Point	Subnet mask	255.255.255.0	
Setting	Use PLC-Link		
PLC Link	PLC-Link Setting		
Setting	PLC IP Address	192.168.0.10	
Measure	PLC Ether port	60000	
MORITOR	Protocol	1C Frame $\sim$ ASCII $\sim$ RS-232C $\sim$	
	Ctrl Frag Address	0	
	Parameter Address	0 0 0 0	
		0 0 0 0	
		0 0 0 0	
		0 0 0 0	
	MeasData Address	0	
	FINS SA1/DA1/DNA	1 1 0	
	Cmode UnitNo.	0	Apply Setting

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,	360, 380, 400, 420,			
	440, 460, 480, 500	440, 460, 480, 500			
	* Set a number of p	arameter addresses e	quivalent to the		
	number of connec	ted MG80-CM.			
MeasData Address	120				
FINS SA1/DA1/DNA	Not used (Leave as	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.

Apply Setting

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

#### 10.6. Ladder Creation

 $(\ensuremath{\mathbbm l} Example \ of \ changing \ parameters$ 

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  $\mu$ m, 0.1  $\mu$ m 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.

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.

Main 🗙										
	1	2	3	4	5	6	7	8	9	10
00001 000000	MR010								MOV. L +123000	DM200 Preset Data
00002										DM100.0 —(SET)— Parameter U pdate
00003 000003	DM108.0									DM100.0 ( RES ) Parameter U pdate

## 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.

Main 🗙										
	1	2	3	4	5	6	7	8	9	10
00001	MR010									DM102.0
00000	 Setting Sta rt									Preset
	DM110.0									DM102.0
00002	 Preset Comp  ete									Preset

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.

Main 🗙										
	1	2	3	4	5	6	7	8	9	10
00001 000000	DM113.0 Data Set Co									DM107.0 Data Reques
00002 000002	DM113.0							BMOV DM120 Measure Dat	DM2000 Measure Dat	#48

## 11. Keyence Corporation Host Link (Ethernet)

# 11.1. Items to be Prepared

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
		<ul> <li>Setting tool "MG80-SC_SettingTool" installed</li> </ul>
		* Download the setting tool from the website.
4	Switching hub	
5	LAN cable	Category 5 or higher

Prepare the following items.

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.

Un	it	ф.
Se	elect unit( <u>1</u> ) Setup unit( <u>2</u> )	
ŢE	: 👎 🖂 🍓 🛃 📷 👫 🔮	[0] KV-7500
Ξ	Function	^
	Socket function	Not used(*)
Ξ	Base	
	Leading DM No.	DM10000
	Number of DMs in use	230
	Leading relay No. (ch u	R30000
	Number of relays in use	640
	Baud rate	100/10Mbps automatic(*)
	Setting method of IP ad	Fixed IP address(*)
	Setting method of IP ad IP address	Fixed IP address(*) 192.168.0.10
	Setting method of IP ad IP address Subnet mask	Fixed IP address(*) 192.168.0.10 255.255.255.0
	Setting method of IP ad IP address Subnet mask Default gateway	Fixed IP address(*) 192.168.0.10 255.255.255.0 0.0.0.0
	Setting method of IP ad IP address Subnet mask Default gateway DNS server	Fixed IP address(*) 192.168.0.10 255.255.255.0 0.0.0.0 0.0.0.0
	Setting method of IP ad IP address Subnet mask Default gateway DNS server Receive timeout[s]	Fixed IP address(*) 192.168.0.10 255.255.255.0 0.0.0.0 0.0.0.0 10
	Setting method of IP ad IP address Subnet mask Default gateway DNS server Receive timeout[s] Keep Alive[s]	Fixed IP address(*) 192.168.0.10 255.255.255.0 0.0.0.0 0.0.0.0 10 600
	Setting method of IP ad IP address Subnet mask Default gateway DNS server Receive timeout[s] Keep Alive[s] Inter-unit Synchronization F	Fixed IP address(*) 192.168.0.10 255.255.255.0 0.0.0.0 0.0.0.0 10 600 unction
	Setting method of IP ad IP address Subnet mask Default gateway DNS server Receive timeout[s] Keep Alive[s] Inter-unit Synchronization F Inter-unit Synchronizat	Fixed IP address(*) 192.168.0.10 255.255.255.0 0.0.0.0 0.0.0.0 10 600 unction Not used(*)
	Setting method of IP ad IP address Subnet mask Default gateway DNS server Receive timeout[s] Keep Alive[s] Inter-unit Synchronization F Inter-unit Synchronizat Cycle Setting Value	Fixed IP address(*) 192.160.0.10 255.255.255.0 0.0.0.0 0.0.0.0 10 600 unction Not used(*) 500.0

Unit 📮						
Select unit( <u>1</u> ) Setup unit( <u>2</u> )						
TE T= 🖂 📲 💼 🖬 👫 🖏 [0] KV-750						
🗆 Inter-unit Synchronization	Function ^					
Inter-unit Synchronizat	Not used(*)					
Cycle Setting Value	500.0					
Cycle Setting Unit	us(*)					
Port No.						
Port No.(KVS,KV COM+,DB)	8500					
Port No. (host link)	50000					
Port No. (VT)	8502					
Port No. (system expans	8504					
Port No. (system expans	8506					
Simple PLC link port No	5001					
MC protocol port No. (TCP)	5000					
MC protocol port No. (UDP)	5000					
Routing settings						
Routing settings	Disable(*)					
EtherNet/IP settings						
Automatic distribution	Enable(*)					
Start No. of the distri	B0000					
Start No. of the distri	W0000 ¥					

#### 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.

MG80-SC Setting tool - Version 1.00		-	×
Help			_
192.168.0.100 Connect ID Axis N	um		

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

MG80-SC Setting tool - Version 1.00				
Help	0			
	192.168.0.100	Connect		

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.

MG80-SC Setting tool	- Version 1.00					-		×
lp								
192.168.0.100	Disco	nnect	ID 1 Axis	Num 16				
Measure Setting								
Ref. Point		Resolution		Comp. Set	Meas Mode	Preset		
Setting		0.1µm ∨ □ Minus	Ref. use	1 ~	REAL 🗸	0		
PLC Link	0	1	2	3	4			
Setting		Comp. High 0	0	0				
Measure Monitor		Comp. Low 0	0	0				
		Resolution		Comp. Set	Meas Mode	Preset	_	
		0.1,2 m V Minus	Het.use	1 V	KEAL V	U		
	1	Comp. High 0	0	0				
		Comp. Low 0	0					
					·			
			<<	>>				
		- RS-232C Setting -						
E	ext. Start input	Separator SP	ACE 🗸 Outpu	t trigger Low-Sp	eed Trg. 🗸 🗸	Apply	Setting	
1	Start $\sim$	Data format Mo	de 3 🗸					
								-

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.

192.168	0.100 Disconnect		ID 1	Axis Num	16	
	Module Setting			_		
Measure Setting	Module IP Address	192.168.0.	100			
	Subnet mask	255.255.25	i5.0			
Setting	Use PLC-Link					
PLC Link	PLC-Link Setting					
Setting	PLC IP Address	192.168.0	.10			
Measure	PLC Ether port	60000				
Monitor	Protocol	1C Frame	~	ASCII 🗸 🗸	RS-232C $\sim$	
	Ctrl Frag Address	0				
	Parameter Address	0	0	0	0	
		0	0	0	0	
		0	0	0	0	
		0	0	0	0	
	MeasData Address	0				
	FINS SA1/DA1/DNA	1	1	0		
						Apply Setting

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 nu	mber set on the PLC s	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.

Apply Setting

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).
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