

M50L Series
Super-mini Dual Output Signal Conditioners
PC CONFIGURATOR SOFTWARE
Model: M50CFG

Users Manual

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1. INTRODUCTION

1.1. GENERAL DESCRIPTION

The M50CFG is used to program parameters for M50L Super Mini Dual Output Signal Conditioners (referred hereunder as 'device'). The following major functions are available:

- Edit parameters online (connected to the device) in real time
- Edit parameters offline (not connected to the device)
- Download parameters to the device, upload parameters from the device
- Save parameters as files, read parameters from files
- Compare parameters edited on the screen with the ones stored in the device

1.2. APPLICABLE DEVICES

The M50CFG is applicable to the following products:

Function	M50L Model	Symbol	Version
Signal Transmitter	M50LVS	VS	1.0 or later
Current Loop Supply	M50LDYS	DYS	1.0 or later

The lowest software version applicable to each hardware model is indicated in the above table. Confirm that the software you have is compatible with the hardware you have.

The latest version of the M50CFG is downloadable at our web site if you need higher version software.

In this manual, descriptions given with the above symbols are applied only to the models those symbols are assigned to. Other descriptions with no specific symbol are applied to all models.

1.3. PC REQUIREMENTS

The following PC performance is required for adequate operation of the M50CFG.

OS	Windows 11 (64-bit) Operation has not been verified on Windows 11 (ARM). The software may not operate adequately in certain conditions.
CPU	Must meet the relevant Windows' requirements.
Memory	Must meet the relevant Windows' requirements.
Network port	USB port

One of the dedicated cables as listed below is also required to connect the transmitter device to the PC.

Port	PC Configurator Cable Model No.
USB	COP-US

1.4. INSTALLING & DELETING THE PROGRAM

INSTALL

The program is provided as compressed archive. Decompress the archive and execute 'setup.msi' to start up the M50CFG installer program. Follow instructions on the Windows.

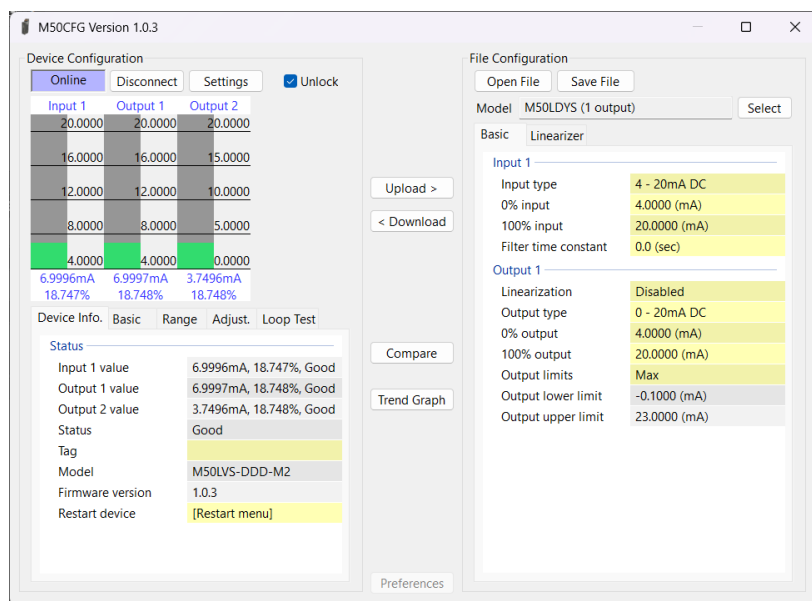
Administrator privileges are required to install the software. Log on as a user with administrator privileges to install.

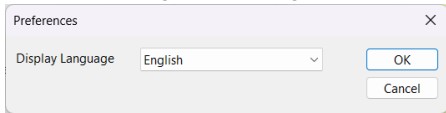
UNINSTALL

Open Settings from Start menu > Apps > Installed apps. Select the [...] of M50CFG from the program list and click [Uninstall] button. Follow the instructions on the screen to uninstall the program.

2. GETTING STARTED

2.1. SCREEN COMPONENT IDENTIFICATION



ITEM	DESCRIPTION
(1) Device Configuration	Shows the parameters of the device presently connected online. You can edit these parameters in real time.
(2) File Configuration	Used to create and edit parameter sets on the PC. You can upload a parameter set from a device, edit it and download it to the device again.
(3) Upload / Download	Used to read parameter setting in the device and to write one to the device.
(4) Compare	Opens Compare window to compare edited parameters from actual setting.
(5) Trend Graph	Opens Trend Graph window to show a trend graph for the connected device
(6) Preferences	Button to change the settings of this software. Click the button to open the following screen.  Switch the language (Japanese/English). The program starts up in English mode as initial state when the OS is other than Japanese version. You can switch to Japanese only when the OS supports Japanese language.

2.2. CONNECTING TO THE DEVICE

By connecting to the device, indicating device's information and editing and adjusting basic parameters are possible.

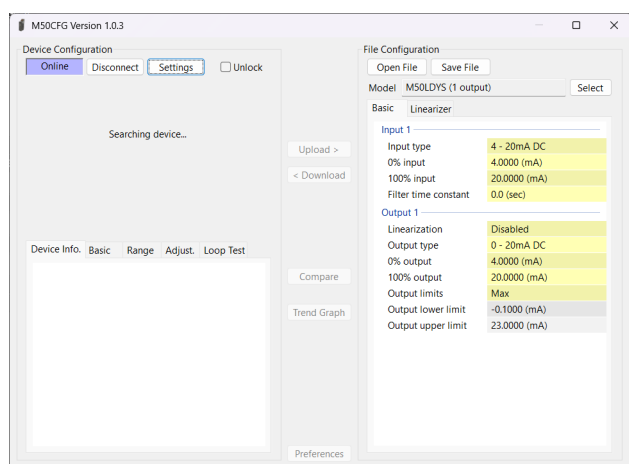
Click [Settings] button and choose the COM port number to which the device is to be connected.



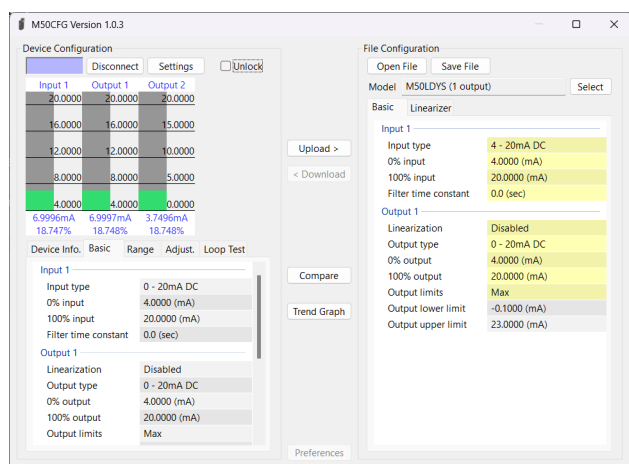
When using COP-US, check the “Auto detect USB connection cable (COP-US)” checkbox (default: checked).

The COM port will be detected automatically.

Click [Connect] button to start connecting with the device.



Connecting the compatible device to the PC via the configurator connection cable, the device model will be automatically recognized and the device information will be displayed as shown below.



The I/O levels of the device are displayed in a bar graph. Various operations can be performed from the each tab, “device information,” “basic settings,” “range setting,” fine adjustment” and “loop test”

When the cable is disconnected, the device info returns to blank status and the PC Configurator is ready to be connected to another device. In order to continue, just connect a new device. Clicking [Connect] button is unnecessary.

2.3. DEVICE INFO – DEVICE INFORMATION

Shows the present I/O data and status, model number and other information.

Device Info.	Basic	Range	Adjust.	Loop Test
Status				
Input 1 value	6.9996mA, 18.747%, Good			
Output 1 value	6.9997mA, 18.748%, Good			
Output 2 value	3.7496mA, 18.748%, Good			
Status	Good			
Tag				
Model	M50LVS-DDD-M2			
Firmware version	1.0.3			
Restart device	[Restart menu]			

ITEM	DESCRIPTION
Input 1 value	The current input 1 value in engineering unit and in percent and the following state are shown.
	Normal The device is operating in normal parameters.
	Input out of limits The input is out of the specification range.
Output 1 value Output 2 value	The current value of output 1 and output 2 in engineering unit and in percent and the following state are shown.
	Normal The device is operating in normal parameters.
	AO saturated The output is at the output limit.
	AO fixed The device in the loop test mode, supplying a fixed output.
Status	Shows the current device status.
	Normal The device is operating in normal parameters.
	User parameter corrupted The parameters of the device have been corrupted. Reconfigure with this software. If the setting value is still corrupted after reconfiguration, device failure is suspected. Please contact us.
	Factory parameter corrupted The device have a breakdown. Please contact us.
Tag No.	Shows the device's tag name. When 'Unlock' box located above Device Info tab is checked, the tag can be modified. Enter at the maximum of 16 alphanumeric characters.
Model	Model number of the device.
Firmware	Firmware version of the device.
Reboot	Select "reboot" from the menu to reboot the device.

2.4. BASIC SETTING

Shows and changes basic I/O setting of the device.

The screenshot shows the 'Basic' tab of the device settings. It contains two sections: 'Input 1' and 'Output 1'. Each section has several parameters with their current values.

Section	Parameter	Value
Input 1	Input type	0 - 20mA DC
	0% input	4.0000 (mA)
	100% input	20.0000 (mA)
	Filter time constant	0.0 (sec)
Output 1	Linearization	Disabled
	Output type	0 - 20mA DC
	0% output	4.0000 (mA)
	100% output	20.0000 (mA)
	Output limits	Max

Parameter items on the screen may change depending upon models. When 'Unlock' box located above Device Info tab is checked, modifiable parameters are highlighted on the light orange background. Click one of such parameters or select with cursor key and press enter key, to show a drop-down list or an edit box to modify it.

For example to select the Output limits, click the value of Output limits to open the drop-down list, and click or press Enter to select.

This screenshot shows the 'Basic' tab with the 'Output limits' parameter selected. A dropdown menu is open, showing options: 'Span', 'Max', 'Specify', and 'NAMUR NE43'. The 'Max' option is currently highlighted.

Section	Parameter	Value
Output 1	Linearization	Disabled
	Output type	0 - 20mA DC
	0% output	4.0000 (mA)
	100% output	20.0000 (mA)
	Output limits	Max
Output 2	Linearization	Disabled
	Output type	0 - 20mA DC

For example to edit Filter Time Constant, click the value of Filter Time Constant to show the edit box, enter an appropriate value and press Enter key.

This screenshot shows the 'Basic' tab with the 'Filter time constant' parameter selected. An edit box is active, showing the current value '0.0'.

Section	Parameter	Value
Input 1	Input type	0 - 20mA DC
	0% input	4.0000 (mA)
	100% input	20.0000 (mA)
	Filter time constant	0.0
Output 1	Linearization	Disabled
	Output type	0 - 20mA DC
	0% output	4.0000 (mA)
	100% output	20.0000 (mA)
	Output limits	Max

In any setting, press ESC key to not confirm the editing and return to the value before editing.

Refer to "5.1. PARAMETERS LIST" for details of each parameter.

2.5. RANGE SETTING

Set the input / output range on this page. For the two-output function modules, select the output channel firstly.

The image shows two screenshots of the 'Range' tab in a device configuration interface. The left screenshot shows the 'Input Range' and 'Output Range' sections, each with 'Start setting', '0%', and '100%' input/output fields and 'OK'/'Cancel' buttons. The right screenshot is identical but has a red box around the '1' radio button in the 'Output Range' section, indicating it is selected.

Click Start Setting to enable to click 0% input , 100% input, OK, and Cancel.

This screenshot shows the 'Range' tab with numerical values entered. In the 'Input Range' section, '0% input' is 4.0000 mA and '100% input' is 20.0000 mA. In the 'Output Range' section, the '0% output' and '100% output' fields are empty.

Apply 0% to the device and then click 0% input, and apply 100% and click 100% input, each input value will be displayed as the value of 0% and 100%.

For example, apply 0mA and click 0% input, and apply 10mA and click 100% input, the screen will change as following.

This screenshot shows the 'Range' tab with calculated values. In the 'Input Range' section, '0% input' is 0.0016 mA and '100% input' is 10.0003 mA. In the 'Output Range' section, the '0% output' and '100% output' fields are empty.

Set the output range in the same way. However, for the output range, set after confirming with the external measuring instrument that the output has reached the desired value.

Click OK to set the value to the device and finish range setting mode.

Click Cancel to discard the values and quit the range setting mode.

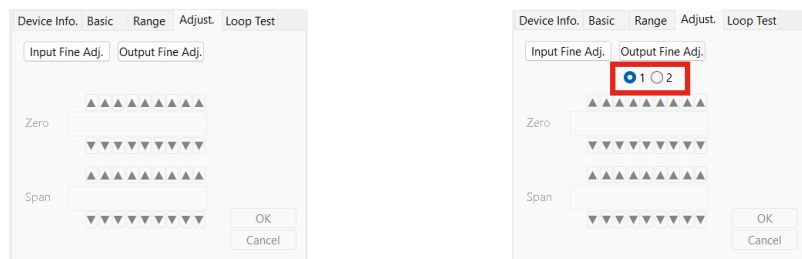
Caution!

Be sure not to forget to return the device to the normal mode after the range setting.

The range setting mode is not cancelled until the power supply to the device is turned off.

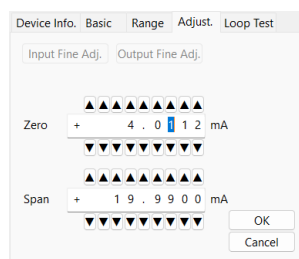
2.6. FINE ADJUSTMENTS

Fine-adjust the input and output on this page. For the two-output function modules, select the output channel firstly.



Zero is adjusted by offset adjustment, while Span is adjusted by gain adjustment.

Click Input Fine Adj. to start fine adjustment.



Press ▲ and ▼ buttons at the top and the bottom of each digit, or use up and down arrow keys on the key board to adjust the value. Use left and right arrow keys on the key board to move digits.

For input fine adjustment, adjust zero adjustment when applying 0% input, and adjust span adjustment when applying 100% input, so that the input values are 0% and 100% in the bar graph on the screen.

For output fine adjustment, the device outputs 0% output when adjusting zero adjustment, and the device outputs 100% output when adjusting span adjustment.

Click OK to set the value to the device and finish fine adjustment mode.

Click Cancel to discard the values and quit the fine adjustment mode.

Caution!

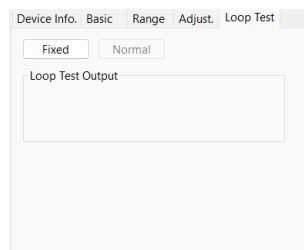
When adjusting the zero or span value in output fine adjustment, the output of the device switches to the adjusted value regardless of the input.

Be sure not to forget to return the device to the normal mode after the fine adjustment.

The fine adjustment mode is not cancelled until the power supply to the device is turned off.

2.7. LOOP TEST

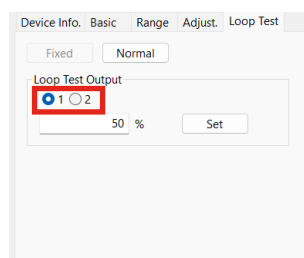
The device outputs simulate output to conduct a loop test.



Click Fixed to fix the output at the current status, so that the output will not follow any change in the input.

The screen will change into following and output can be controlled.

For the two-output function modules, both outputs are fixed.



Select an output channel, enter the output value in percent into the field, and click set to change the output of the device to the entered output value in percent.

The output value in percent can be specified in the range of -10000.000 to +10000.000%, and the output value in percent will be converted to the actual output value and then output from the device.

However, even if a value outside the output range is entered for the output value in percent, the device will not output the value outside of the output range.

Refer to "4. CONVERSION OPERATION" for the calculation from output value in percent to actual output value.

Click Normal to return to the normal mode that the output follows the changes of input.

Caution!

Be sure not to forget to return the device to the normal mode after the loop test.

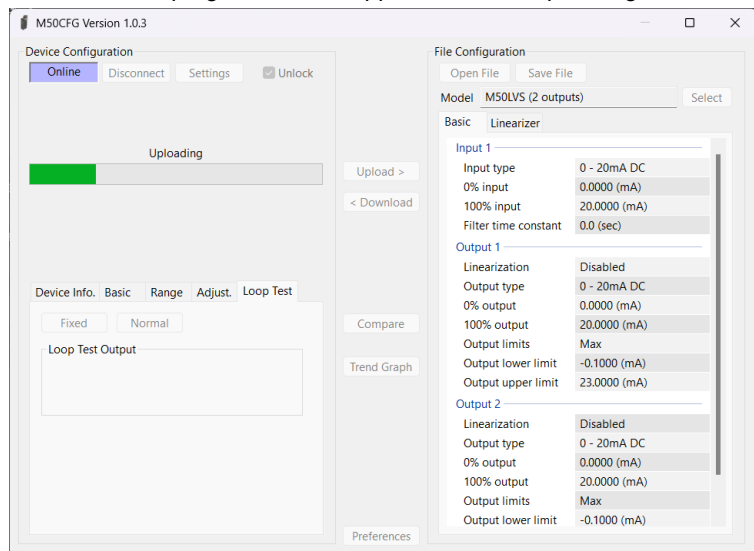
The loop test mode is not cancelled until the power supply to the device is turned off.

2.8. READING/Writing PARAMETERS

The parameters of the device can be read into the PC (upload), and the parameters edited in the PC can be written into the device (download).

■ READING PARAMETERS FROM DEVICE (UPLOAD)

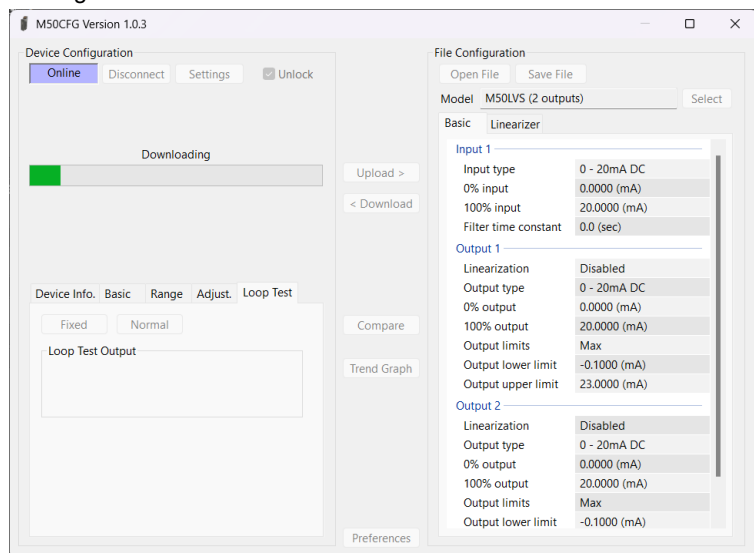
Connect the device with the configurator cable and click Connect and then the device information is displayed, click Upload. After clicked, a progress bar will appear and start uploading.



The upload will be completed in a few seconds, and the loaded parameters will be displayed in the file settings on the right side of the screen and can be edited.

■ WRITING PARAMETERS TO DEVICE (DOWNLOAD)

Connect the device with the configurator cable, click the Connect button, and with the device information and other information displayed, check Unlock, and then click the Download button. After clicked, a progress bar will appear and start downloading.



Caution!

DO NOT turn off the power supply to the device or disconnect the cable while downloading.

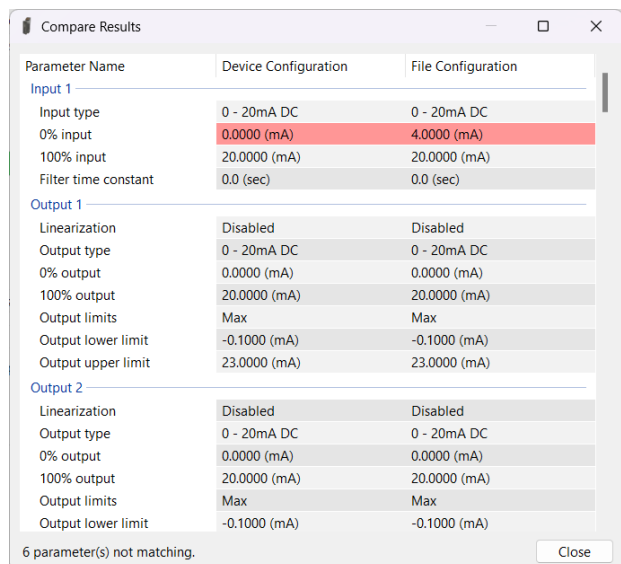
The device setting may not be complete as expected.

2.9. COMPARING PARAMETERS

Parameters presently edited on the screen and those stored in the connected device can be compared side by side.

If the parameters have loaded from a file in advance, compare the parameters between the connected device and the file, if the parameters have loaded from another device in advance, compare the parameters between devices.

Click Compare to load parameters from device, and comparison results are shown as following.



Parameter Name	Device Configuration	File Configuration
Input 1		
Input type	0 - 20mA DC	0 - 20mA DC
0% input	0.0000 (mA)	4.0000 (mA)
100% input	20.0000 (mA)	20.0000 (mA)
Filter time constant	0.0 (sec)	0.0 (sec)
Output 1		
Linearization	Disabled	Disabled
Output type	0 - 20mA DC	0 - 20mA DC
0% output	0.0000 (mA)	0.0000 (mA)
100% output	20.0000 (mA)	20.0000 (mA)
Output limits	Max	Max
Output lower limit	-0.1000 (mA)	-0.1000 (mA)
Output upper limit	23.0000 (mA)	23.0000 (mA)
Output 2		
Linearization	Disabled	Disabled
Output type	0 - 20mA DC	0 - 20mA DC
0% output	0.0000 (mA)	0.0000 (mA)
100% output	20.0000 (mA)	20.0000 (mA)
Output limits	Max	Max
Output lower limit	-0.1000 (mA)	-0.1000 (mA)

6 parameter(s) not matching. Close

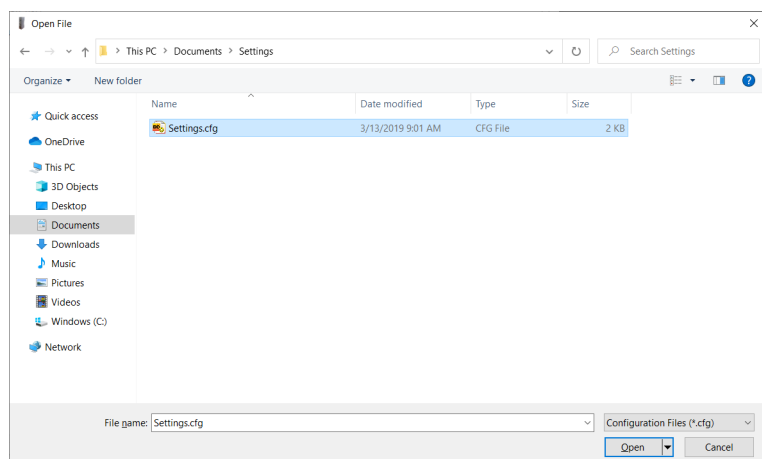
The compared parameters are displayed in the order of parameter name, device set value, and file set value for each line.

The lines where there is a difference between the device setting and the file setting are highlighted in red, and the number of differences is displayed at the bottom of the screen.

2.10. FILES

■ READING PARAMETERS SAVED AS FILE

Clicking [Open File] calls up the Windows-standard Open dialog box.

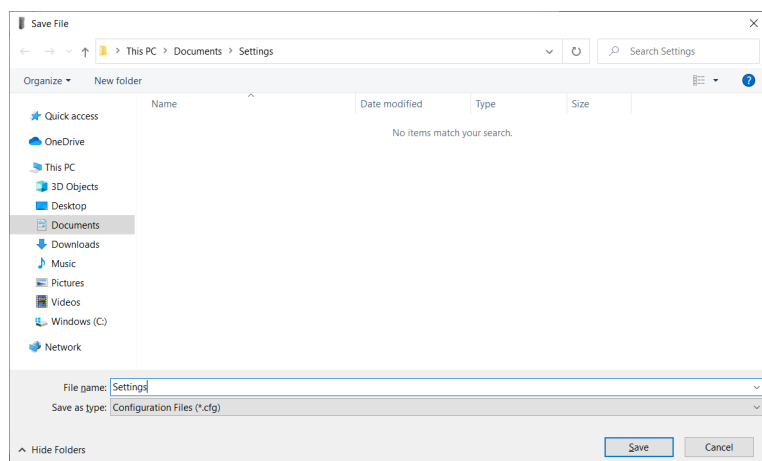


Select a parameter file to show a stored parameter setting.

In order to download the parameters to the connected device, click [Download] button.

■ SAVING PARAMETERS IN A FILE

Clicking [Save File] calls up the Windows-standard Save As dialog box.



Enter a desired file name to File Name field and click [Save] to store a parameter setting.

In order to save the parameters of the connected device, click [Upload] first and then save them as a file.

■ OFFLINE OPERATION

The parameters under File Configuration on the right side of the window can be edited freely regardless of the status of the connection or the connected device.

With a device connected online, only the parameters under Basic tab can be edited in real time. In the offline state, all parameters under File Configuration including Linearizer and Option setting can be edited.

If you want to modify setting for the connected device, first upload the parameters from the device, edit them and then download them to the device.

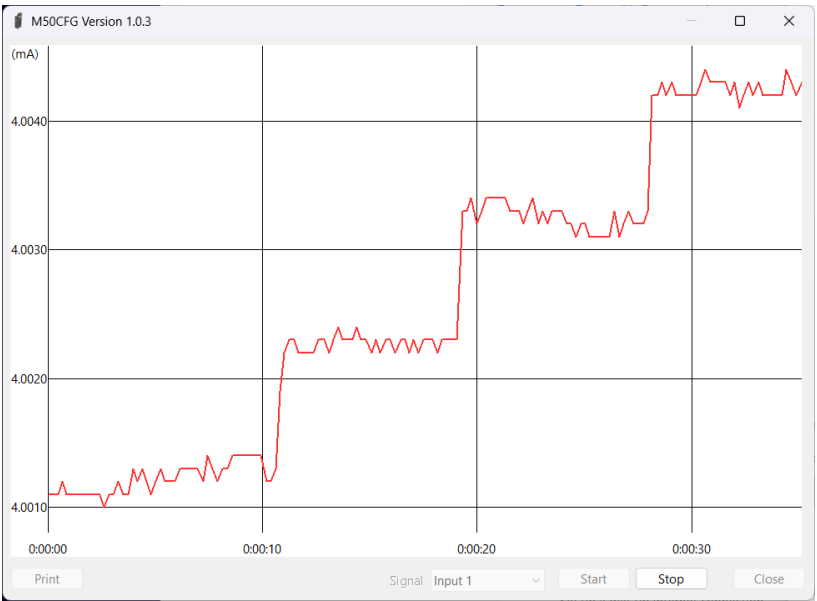
In addition to the basic parameters editable in real time in the connected status on the left side of the screen, linearizer is also editable.

Refer to "5.1. PARAMETERS LIST" for details of each parameter.

2.11. TREND GRAPH

Click Trend Graph to show the following screen.

I/O signal of the device can be monitored on a trend graph. The trend is recorded and displayed in 0.1 second intervals.



Choose the signal to record and click [Start] to start recording and displaying in real time.

Click [Stop] to stop monitoring, and the recorded trend graph can be studied more closely by scrolling and enlarging the screen:

Mouse	Screen
Press left mouse button and drag	Scrolls the screen to all directions.
Press right mouse button and drag	Forms an area on the screen to enlarge and fit it to the full-screen area when the mouse button is released.
Double-click left mouse button	Display range is reduced by half (trend curve is zoomed in).
Double-click right mouse button	Display range is doubled (trend curve is zoomed out).
Click Print button	Print the displayed graph on a printer. This button is available only when the recording is stopped by Stop button.

3. HOW TO SETUP I/O (EXAMPLE)

Basic input/output range setting is as in the following.

The M50LVS is to be configured to

input 1 range: 4 – 20 mA DC

output 1 range: 1 – 5 V DC

output 2 range: 0 – 10 V DC

3.1. CONNECTING TO THE DEVICE

Start up the M50CFG software. Choose the COM port to which the device is connected and click [Connect]. Present parameter setting is uploaded and displayed under Device Configuration on the screen. Check 'Unlock' box to change the parameters.

3.2. INPUT RANGE

For M50LVS, the input range is determined by the code number at the time of purchase and cannot be changed later.

In this example, the settings of M50LVS with 0 – 20 mA DC range will be modified.

The input range uses same unit selected with input type.

For 4 - 20 mA DC,

enter 4.0000 to 0% input value,

enter 20.0000 to 100% input value.

3.3. OUTPUT RANGE

For M50LVS, the output range is determined by the code number at the time of purchase and cannot be changed later.

In this example, the settings of M50LVS with 0 - 5 V DC range for output 1 and with 0 - 10 V DC range for output 2 will be modified.

The output range uses same unit selected with output type.

When the output 1 is 1 - 5 V DC and the output 2 is 0 - 10 V DC,

enter 1.0000 to 0% of output 1,

enter 5.0000 to 100% of output 1,

enter 0.0000 to 0% of output 2,

enter 10.0000 to 100% of output 2.

3.4. OTHER SETTING

The M50LVS has more variety of functions than explained in the previous sections, including filter time constant setting and linearization. Basic procedure is mostly the same as the above example.

Linearizer and Option setting must be edited offline. Upload the present setting to the PC (Refer to "2.8. READING/WRITING PARAMETERS"), edit the file and then download the new setting (Refer to "2.8. READING/WRITING PARAMETERS").

Refer to "5.1. PARAMETERS LIST" for details of parameter.

4. CONVERSION OPERATION

This page describes conversion operation of M50L series transmitter.

4.1. BASIC OPERATION

1. The input is carried out AD-conversion to the input engineering value.
2. Convert the engineering value to the input value in percent by the 0% input and 100% scaling setting.
3. Linearization ON: convert the input value in percent to the output value in percent (refer to the conversion by the linearizer).
Linearization OFF: Substitute the input value in percent to the output value in percent.
4. Convert the output value in percent to the output engineering value by the 0% output and 100% scaling setting.
5. Output engineering value is carried out DA-conversion and outputs from the device.
6. The operations of step 3 to 5 are performed for each output channel.

4.2. CONVERSION EXAMPLE

A conversion example with the following conditions is shown below.

Parameter	Value
0% input	4.0000mA
100% input	20.0000mA
Linearization	Disable
0% output	1.0000V
100% output	5.0000V

Input engineering value = 14.5 mA

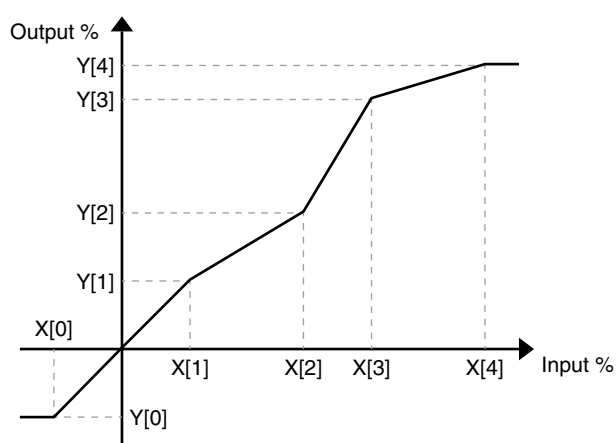
Input value in percent = $(\text{input engineering value} - 0\% \text{ input value}) \div (100\% \text{ input value} - 0\% \text{ input value}) = 0.65625$ (65.625%)

Output value in percent = input value in percent = 0.65625 (65.625%)

Output engineering value = output value in percent $\times$ (100% output value - 0% output value) + 0% output value = 3.625V

4.3. THE CONVERSION BY THE LINEARIZER

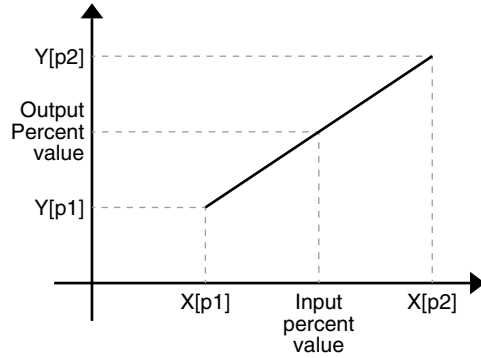
The conversion by the linearizer searches for the $X[n]$ corresponding to the input value in percent and sets the pairing $Y[n]$ as output value in percent.



If a value equal to the input % value is not set in X[n], extract the closest value in each of the positive and negative directions from the set X[n], and then linearly complete the two points as shown in the formula below to obtain the output % value.

Set the extracted points be (X[p1], Y[p1]) and (X[p2], Y[p2]),

$$\text{Output value in percent} = Y[p1] + (\text{input value in percent} - X[p1]) \frac{Y[p2] - Y[p1]}{X[p2] - X[p1]}$$



If the input value in percent is out of the table, set Y[n] that pairs to the closest X[n] as output value in percent.

5. PARAMETER DETAILS

5.1. PARAMETERS LIST

Supported parameters depend upon model types. Supported ones are marked with 'X' in the following table.

		M50LVS	M50LDYS	Page
BASIC SETTING	Input type	X	X	20
	0% input			
	100% input			
	Filter time constant	X	X	20
	Linearization			
LINE-ARIZER	Output type	X	X	20
	0% output			
	100% output			
	Output limits			
	Output low limit	X	X	20
	Output high limit			
	Number of points	X	X	21
	Linearize table			
	X[0], Y[0] ... X[100], Y[100]			

5.2. BASIC SETTING

■ INPUT TYPE, 0% INPUT , 100% INPUT

Select the input type and the scaling.

VS	DYS	INPUT TYPE	0% input, 100% input	
			Selectable range	Minimum span
X		0 – 20mA DC	-0.1000 - +23.0000mA	2.0000mA
	X	4 – 20mA DC	3.0000 - 23.0000mA	2.0000mA
X		-1000 – +1000mV DC	-1100.00 - +1100.00mV	100.00mV
X		-10 – +10V DC	-11.0000 - +11.0000V	1.0000V
X		-5 – +5V DC	-5.0000 - +5.0000V	0.5000V

For M50LVS and M50LDYS, the input type is determined by the code number at the time of purchase and cannot be changed later.

0% input must be smaller than 100% input.

Difference between 0% input and 100% input must be larger than minimum span.

■ FILTER TIME CONSTANT

Apply the filtering with the set time constant to the input engineering value. Set in the range of 0.5 to 30.0 second and set 0.0 to invalidate the filtering.

The first order lag filter is equivalent to a first-order lag low-pass filter configured in a general RC circuit. The set time constant is the time to follow until about 63.2 %, when input varies from 0 % to 100 %.

■ LINEARIZATION, OUTPUT TYPE, 0% OUTPUT, 100% OUTPUT

The linearization function allows you to choose whether to convert the input percentage to the output percentage using the linearizer table.

When "enabled" is selected, the conversion is performed using the table.

When "disabled" is selected, the output percentage is equal to the input percentage.

Select the output type and the scaling.

	OUTPUT TYPE	0% output, 100% output	
		Selectable range	Minimum span
VS/DYS	0 - 20mA DC	-0.1000 - +23.0000mA	1.0000mA
	0 - +5V DC	-0.2000 - +5.7500V	0.5000V
	0 - +10V DC	-0.2000 - +11.5000V	1.0000V

For M50LVS and M50LDYS, the output type is determined by the code number at the time of purchase and cannot be changed later.

Difference between 0% output and 100% output must be larger than minimum span.

Setting 100% output < 0% output, can reverse the output from the device.

■ OUTPUT LIMITS, OUTPUT LOWER LIMIT, OUTPUT UPPER LIMIT

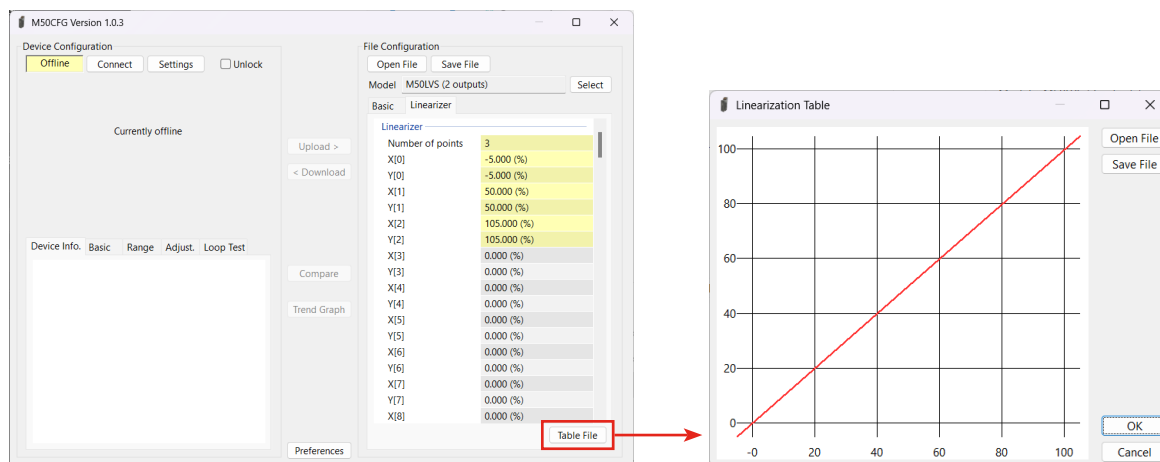
Set the output limits of the device.

SELECTABLE OUTPUT LIMIT	DESCRIPTION
Span	Outputs in the range of 0% output and 100% output. Settable range for output lower limit and output upper limit follows to the change of 0% output and 100% output.
Max.	Outputs in the selectable range of 0% output and 100% output.
Specified	Outputs in the range of specified output lower limit and output upper limit. Settable range for output lower limit and output upper limit are same as 0% output and 100% output. Be sure to set output lower limit $\leq$ 0% output and 100% output $\leq$ output upper limit. Even if the output is reversed, be sure to set output lower limit < output upper limit.
NAMUR NE43	Outputs in the range of 3.8 to 20.5 mA to conform to NAMUR NE43. Selectable only when the "0 - 20 mA DC" is selected for output type and, 0% output and 100% output are in the range of 3.8 to 20.5 mA.

5.3. LINEARIZATION

As with the other settings, in addition to entering one item at a time, the linearizer table can be loaded and saved as a table file. User's Table Linearization.

Click [Table File] to load/save the table file.



Click the [Table File] to show the screen as shown in the figure on the right.

Clicking [Open File] loads the table file, and [Save File] saves the table file.

Refer to the "6. APPENDIX" for format of the table file.

■ NUMBER OF POINTS, X[0], Y[0] ... X[100], Y[100]

The Linearizer sets the XY table for the conversion.

Both X and Y can be set in the range of -10000.000 to +10000.000%.

X must be set in ascending order from X[0], otherwise the conversion will not be accurate.

6. APPENDIX

6.1. XY TABLE FILE FORMAT

Describe the format of the XY table file handled by this software on this page.

In the XY table file, X and Y are saved in CSV format that each line is separated by commas as shown below.

A file made in Excel or other spread sheet software and saved in CSV format can be imported directly.

```
/* XY table comment */
{
    -5.000, -5.000
    0.000, 1.000
    50.000, 49.000
    105.000, 105.000
}
```

1. Same way as entering the data using this software, enter the data in the range of -10000.000 to +10000.000%, starting from X[0] and Y[0] in ascending order.
2. X[n] and Y[n] are rounded to the fourth decimal place and read as a value with three decimal places.
3. A pair of X[n] and Y[n] will be read up to a minimum of 2 points and a maximum of 101 points, and the values after the 102nd point will be ignored.
4. Lines begin with / and lines with comma-separated values will be ignored.
5. The braces {} at the beginning and end of the data may or may not be present. This software saves the data with braces.
6. Table files created by other PC configurator software can also be read without modification, but be sure that the maximum number of points differs depending on the model.