# Model LSMT4 Multi Power Transducer PC CONFIGURATOR SOFTWARE Model: LSCFG Ver. 1.1

# **USERS MANUAL**

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# **1. INTRODUCTION**

## **1.1 GENERAL DESCRIPTION**

M-System LSCFG is used to program parameters for the model LSMT4 Multi Power Transducer (referred hereunder as 'device'). The following major functions are available:

• Edit parameters

- 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 PC REQUIREMENTS**

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

OS	Windows 10 (32-bit, 64-bit) Windows 11 (64-bit) The software may not function adequately in certain conditions.
Communication port	A COM port (RS-232-C) or USB port is required.

For connecting the device to a PC, the M-System's PC configurator cable detailed in the table below is required.

PORT	REQUIRED CABLE MODEL NO.	
RS-232-C	MCN-CON	
USB	COP-US	

## **1.3 INSTALLING & DELETING THE PROGRAM**

#### 1.3.1 TO INSTALL THE PROGRAM

The program is provided as compressed archive.

Decompress the archive and execute 'setup.exe'.

Follow the instructions on the screen to install the program.

Note that it is required to log on as administrator to install the program.

'User Account Control' window appears to clarify your administrative right before proceeding.

Click 'Yes' to complete installation.

User Account Control Do you want to allow this changes to your device?	imes app to make
LSCFG	
Verified publisher: M-SYSTEM CO., L File origin: Hard drive on this compu	TD. Iter
Show more details	
Yes	No

### 1.3.2 TO DELETE THE PROGRAM

For Windows 10, open Settings from Start menu > Apps > Apps & features. Select the LSCFG from the program list and click [Uninstall] button. Follow the instructions on the screen to uninstall the program. For Windows 11, open Settings from Start menu > Apps > Installed apps. Select the [...] of LSCFG from the program list and click [Uninstall] button. Follow the instructions on the screen to uninstall the program.

# 2. BASIC OPERATIONS

## 2.1 STARTING THE LSCFG

Open Program > M-System > Configurator > LSCFG to start it up on a Windows PC. The following window appears on the screen. (The display may depend on the LSCFG version.)

Uploa	ad	Download	Protect Report	Save File Open Fi	le Languag
Mode	I	LSMT4-2 V	1 480V, 3P4W, 4-20mA x1	0, Do x2 👻	▼
nput				Option	
Syste	m	3-phase / 4-wire	unbalanced (3CT)	Passcode	Modbus Others
VT ra	ting		CT rating		
Prima	ry	110 V	Primary 5 4	λ	
Secor	ndary	110 V	Secondary 5	Pulse Output	
Rang	e	150 V		Po1	Po2
nalog	Output	:			
-	Acci	gnment	Input Scaling		Output Range
СН	Maai	-			
CH 1	II /	- Current, Line 1	0.0~5.0 (A) [0.00~100	.00 (%)]	4.00~20.00 (mA)
CH 1 2	I1/ I2/	Current, Line 1 Current, Line 2	0.0~5.0 (A) [0.00~100 0.0~5.0 (A) [0.00~100	0.00 (%)] 0.00 (%)]	4.00~20.00 (mA) 4.00~20.00 (mA)
CH 1 2 3	I1/ I2/ I3/	Current, Line 1 Current, Line 2 Current, Line 3	0.0~5.0 (A) [0.00~100 0.0~5.0 (A) [0.00~100 0.0~5.0 (A) [0.00~100	0.00 (%)] 0.00 (%)] 0.00 (%)]	4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA)
CH 1 2 3 4	HSS I1 / I2 / I3 / U12	Current, Line 1 Current, Line 2 Current, Line 3 / Delta voltage	0.0~5.0 (A) [0.00~100 0.0~5.0 (A) [0.00~100 0.0~5.0 (A) [0.00~100 0.0~150.0 (V) [0.00~10	0.00 (%)] 0.00 (%)] 0.00 (%)] 00.00 (%)]	4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA)
CH 1 2 3 4 5	I1 / I2 / I3 / U12 U23	Current, Line 1 Current, Line 2 Current, Line 3 / Delta voltage	0.0~5.0 (A) [0.00~100 0.0~5.0 (A) [0.00~100 0.0~5.0 (A) [0.00~100 0.0~150.0 (V) [0.00~1 0.0~150.0 (V) [0.00~1	0.00 (%)] 0.00 (%)] 0.00 (%)] 00.00 (%)] 00.00 (%)]	4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA)
CH 1 2 3 4 5 6	II / I2 / I3 / U12 U23 U31	Current, Line 1 Current, Line 2 Current, Line 3 / Delta voltage / Delta voltage	0.0~5.0 (A) [0.00~100 0.0~5.0 (A) [0.00~100 0.0~5.0 (A) [0.00~100 0.0~150.0 (V) [0.00~1 0.0~150.0 (V) [0.00~1 0.0~150.0 (V) [0.00~1	0.00 (%)] 0.00 (%)] 0.00 (%)] 00.00 (%)] 00.00 (%)] 00.00 (%)]	4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA)
CH 1 2 3 4 5 6 7	II / I2 / I3 / U12 U23 U31 P //	Current, Line 1 Current, Line 2 Current, Line 3 / Delta voltage / Delta voltage / Delta voltage	0.0~5.0 (A) [0.00~100 0.0~5.0 (A) [0.00~100 0.0~5.0 (A) [0.00~100 0.0~150.0 (V) [0.00~1 0.0~150.0 (V) [0.00~1 0.0~150.0 (V) [0.00~1 0~1500 (W) [0.00~100	0.00 (%)] 0.00 (%)] 0.00 (%)] 00.00 (%)] 00.00 (%)] 00.00 (%)]	4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA)
CH 1 2 3 4 5 6 7 8	High           I1/           I2/           I3/           U12           U23           U31           P//           Q/	Current, Line 1 Current, Line 2 Current, Line 3 / Delta voltage / Delta voltage / Delta voltage Active power Reactive power	0.0~5.0 (A) [0.00~100 0.0~5.0 (A) [0.00~100 0.0~5.0 (A) [0.00~100 0.0~150.0 (V) [0.00~1 0.0~150.0 (V) [0.00~1 0.0~150.0 (V) [0.00~10 0~1500 (W) [0.00~100 LEAD -1500~LAG 1500	0.00 (%)] 0.00 (%)] 0.00 (%)] 00.00 (%)] 00.00 (%)] 00.00 (%)] 0.00 (%)] (var) [-100.00~100.00 (%)]	4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA)
CH 1 2 3 4 5 6 7 8 9	II / I2 / I3 / U12 U23 U31 P / / Q / PF /	Current, Line 1 Current, Line 2 Current, Line 3 / Delta voltage / Delta voltage / Delta voltage Active power Reactive power Power factor	0.0~5.0 (A) [0.00~100 0.0~5.0 (A) [0.00~100 0.0~5.0 (A) [0.00~100 0.0~150.0 (V) [0.00~10 0.0~150.0 (V) [0.00~10 0.0~150.0 (V) [0.00~10 0~1500 (W) [0.00~100 LEAD -1500~LAG 1500 LEAD 0.50~LAG 0.50 (c	0.00 (%)] 0.00 (%)] 0.00 (%)] 00.00 (%)] 00.00 (%)] 00.00 (%)] 0.00 (%)] (var) [-100.00~100.00 (%)] 0.00 (%)]	4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA)

## 2.2 MODIFYING PARAMETERS

In order to modify parameters stored in the device, first (1) upload the device parameters, (2) modifying a part of or all of them on the screen, and then (3) download the new parameters to the device.

#### 2.2.1 READING PARAMETERS FROM DEVICE (UPLOAD)

Clicking [Upload] opens the Connect dialog box.

Connect		×
COM port	M-SYSTEM COP-US (COM1)	OK Cancel

Specify a COM port.

Click [OK] to start reading parameters stored in the connected device to show them on the screen.

#### 2.2.2 MODIFYING PARAMETERS ON THE SCREEN

The initial window shows only basic parameters on the screen. The buttons are used to go into more detailed settings for respective categories.

In the example shown below, the device input has been changed to: 3-phase/4-wire, unbalanced load, VT ratio 6600/110 V, CT ratio 100/5 A.

Uploa	ad Download	Protect Report Save File Open Fil	e Language	Choose from the menu option or enter appropriate values.
		1 1000, 3P 100, 1 2011A X10, 00 X2		
nput		Option		
Syste	3-phase / 4-wire, u	unbalanced (3CT)   Passcode	Modbus Others	
VT rat	iting	CT rating		
Drimou	6600 V	Drimory 100 A		
Prind	ary 0000 v	Primary 100 A		
Secon	ndary 110 V	Secondary 5 A Pulse Output		
	150 1/			
Ranne				
Kange	150 V	Pol	Po2	
- sange		Pol	Po2	
Analog	Output	Pol	Po2	
Analog CH	Output Assignment	Input Scaling	Po2 Output Range	
Analog CH	Output Assignment I1 / Current, Line 1	Po1 Input Scaling 0.0~5.0 (A) [0.00~100.00 (%)]	Po2 Output Range 4.00~20.00 (mA)	
CH 1	Output Assignment 11 / Current, Line 1 12 / Current, Line 2	Input Scaling 0.0~5.0 (A) [0.00~100.00 (%)] 0.0~5.0 (A) [0.00~100.00 (%)]	Po2           Output Range           4.00~20.00 (mA)           4.00~20.00 (mA)	
CH 1 2 3	Output Assignment 11 / Current, Line 1 12 / Current, Line 2 13 / Current, Line 3	Po1           Input Scaling           0.0~5.0 (A) [0.00~100.00 (%)]           0.0~5.0 (A) [0.00~100.00 (%)]           0.0~5.0 (A) [0.00~100.00 (%)]	Po2 Output Range 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA)	
CH CH 2 3 4	Output Assignment I1 / Current, Line 1 I2 / Current, Line 2 I3 / Current, Line 3 U12 / Delta voltage	Po1           Input Scaling           0.0~5.0 (A) [0.00~100.00 (%)]           0.0~5.0 (A) [0.00~100.00 (%)]           0.0~5.0 (A) [0.00~100.00 (%)]           0.0~150.0 (V) [0.00~100.00 (%)]	Po2 Output Range 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA) 4.00~20.00 (mA)	
Analog CH 1 2 3 4 5	Output Assignment I1 / Current, Line 1 I2 / Current, Line 2 I3 / Current, Line 3 U12 / Delta voltage U23 / Delta voltage	Po1           Input Scaling           0.0~5.0 (A) [0.00~100.00 (%)]           0.0~5.0 (A) [0.00~100.00 (%)]           0.0~5.0 (A) [0.00~100.00 (%)]           0.0~150.0 (V) [0.00~100.00 (%)]           0.0~150.0 (V) [0.00~100.00 (%)]	Po2           Output Range           4.00~20.00 (mA)           4.00~20.00 (mA)           4.00~20.00 (mA)           4.00~20.00 (mA)           4.00~20.00 (mA)	
CH 1 2 3 4 5 6	Output Assignment I1 / Current, Line 1 I2 / Current, Line 2 I3 / Current, Line 3 U12 / Delta voltage U23 / Delta voltage U31 / Delta voltage	Po1           Input Scaling           0.0~5.0 (A) [0.00~100.00 (%)]           0.0~5.0 (A) [0.00~100.00 (%)]           0.0~5.0 (A) [0.00~100.00 (%)]           0.0~150.0 (V) [0.00~100.00 (%)]           0.0~150.0 (V) [0.00~100.00 (%)]           0.0~150.0 (V) [0.00~100.00 (%)]	Po2           Output Range           4.00~20.00 (mA)	
CH 1 2 3 4 5 6 7	Output Assignment I1 / Current, Line 1 I2 / Current, Line 2 I3 / Current, Line 3 U12 / Delta voltage U23 / Delta voltage U31 / Delta voltage P / Active power	Po1           Input Scaling           0.0~5.0 (A) [0.00~100.00 (%)]           0.0~5.0 (A) [0.00~100.00 (%)]           0.0~5.0 (A) [0.00~100.00 (%)]           0.0~150.0 (V) [0.00~100.00 (%)]           0.0~150.0 (V) [0.00~100.00 (%)]           0.0~150.0 (V) [0.00~100.00 (%)]           0.0~150.0 (V) [0.00~100.00 (%)]	Po2           Output Range           4.00~20.00 (mA)	
CH 1 2 3 4 5 6 7 8	Output Assignment I1 / Current, Line 1 I2 / Current, Line 2 I3 / Current, Line 3 U12 / Delta voltage U33 / Delta voltage D31 / Delta voltage P / Active power Q / Reactive power	Po1           Input Scaling           0.0~5.0 (A) [0.00~100.00 (%)]           0.0~5.0 (A) [0.00~100.00 (%)]           0.0~5.0 (A) [0.00~100.00 (%)]           0.0~150.0 (V) [0.00~100.00 (%)]           0.0~150.0 (V) [0.00~100.00 (%)]           0.0~150.0 (W) [0.00~100.00 (%)]           0.0~150.0 (W) [0.00~100.00 (%)]           LEAD -1500 (W) [0.00~100.00 (%)]	Po2           Output Range           4.00~20.00 (mA)	
Analog CH 1 2 3 4 5 6 7 8 9	Output Assignment II / Current, Line 1 I2 / Current, Line 2 I3 / Current, Line 3 U12 / Delta voltage U23 / Delta voltage U31 / Delta voltage P / Active power Q / Reactive power PF / Power factor	Po1           Input Scaling           0.0~5.0 (A) [0.00~100.00 (%)]           0.0~5.0 (A) [0.00~100.00 (%)]           0.0~150.0 (V) [0.00~100.00 (%)]           0.0~150.0 (V) [0.00~100.00 (%)]           0.0~150.0 (V) [0.00~100.00 (%)]           0.0~150.0 (V) [0.00~100.00 (%)]           LEAD 1500 (V) [0.00~100.00 (%)]           LEAD 0.50~LAG 1500 (var) [-100.00~100.00 (%)]           LEAD 0.50~LAG 0.50 (cosp) [-50.00~50.00 (%)]	Po2           Output Range           4.00~20.00 (mA)           4.00~20.00 (mA)	

Detailed descriptions on each parameter and control button are given in the later pages of this manual.

#### 2.2.3 WRITING PARAMETERS TO DEVICE (DOWNLOAD)

Clicking [Download] opens the Connect dialog box just as [Upload] button did. Specify the COM port.

Click [OK] to start downloading new parameters.

When the Modbus register writing protection is activated, a dialog box requesting Modbus passcode entry will appear on the screen.

Enter Modbus Passcode	×
The device is write protected.	OK
Enter Modbus passcode.	Cancel

Once downloading begins, a bargraph appears on the screen to indicate progress. When it disappears without any error messages, the new setting becomes valid.

## 2.3 PROTECTING PARAMETERS

In order to protect parameter changes by the front keys of the device, Passcode (4-digit number) is used.

In order to protect parameter changes via Modbus (CONFIG port), Modbus Register Writing Protection Passcode is used. The code consists of 9-digit number.

Clicking [Protect] opens the Connect dialog box just as [Upload] button did. Specify the COM port. Click [OK] to open Protect Setting dialog box.

Protect Setting		×
The device can be write (Passcode: 1 - 9999999	protected by Modbus passcode. 99)	ОК
Current passcode	•••••	Cancel
New passcode	•••••	
Confirm new passcode	•••••	

Modbus passcode is selectable between 1 and 999 999 999. In order to change, enter the current passcode and new passcode (twice). If there is no passcode setting or if you do not want to activate the protection, leave relevant field blank. Click [OK].

## **Caution!**

Once a passcode is set, no parameter changes via Modbus are available unless the correct passcode is entered. BE SURE NOT TO FORGET the passcode.

## 2.4 SAVING FILES

Parameters set on the screen can be saved as a file on the hard disk. A file can be called up on the screen. You can store backup setting data by utilizing these functions in combination with [Upload] [Download] functions.

#### 2.4.1 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.

🚽 Open					x
Look in:	\mu Settings		•	G 🦸 📂	
æ	Name		*		Date
	Setting1.cfg				 9/3/2
Recent Places	Setting2.cfg				9/3/2
Desktop					
Libraries					
Computer	•	III			•
	File <u>n</u> ame:	Setting1.cfg		•	pen
M at	Files of <u>typ</u> e:	Configuration files (*	cfg)	•	incel

#### 2.4.2 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.

Save As						X
Save in:	\mu Settings		•	G 🦻 🖻	▼ ۹	
(Ha	Name		*			Date
Recent Places	Setting1.cfg					9/3/2
Desktop						
Libraries						
Computer	•					•
	File <u>n</u> ame:	Setting2			-	Save
N at	Save as <u>t</u> ype:	Configuration files (*	cfs)	•	-	Cancel

## 2.5 REPORT

#### 2.5.1 DISPLAYING PARAMETERS

Clicking [Report] opens Report window showing all parameters presently edited on the screen.

eport			X
Output CSV		Compared to Device File	
Name	PC		-
Passcode			Ξ
Passcode	****		
Input			
System configuration	3-phase / 4-wire, unbalan		
CT rating, primary	100		
CT rating, secondary	5		
VT rating, primary	6600		
VT rating, secondary	110		
AC frequency	U1N		
Low-end cutout voltage	1.0		
Low-end cutout current	1.0		
Voltage range	150		
Calculation Option			
Power factor sign	IEC		
Reactive power sign	IEC		
Reactive power calculation	Vector method: S-P		
Apparent power calculation	Vector method: P+Q		
Power rating round	ON		
Po1			
Pulse count type	EP / Active energy, incoming		
Pulse weight	1.0		
Pulse width	100		
Po2			
Pulse count type	EQ P / Reactive energy, in		-
		Close	2

#### 2.5.2 COMPARING PARAMETERS

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

Click [Device] in order to upload the parameters in the device, or [File] to upload those in a file. Parameters are compared and listed on the screen side by side.

The rows showing differences between two sets of parameters are highlighted in red background. Cells for matching parameters are filled in white, or light gray. Gray characters show parameters not supported by the other one.

The total number of non-matching cases is mentioned in the bottom of the window frame.

#### 2.5.3 CSV FILE

The parameter list can be exported as a CSV text format file for use in another application software such as Microsoft Excel.

Click [Output CSV] button at the top left of the screen and go through standard Windows Save As procedure.



Input the file name and click [Save] button then the CSV file with the name is created. The CSV file format is in the following:

- Each row for one parameter

- Each row (parameter) consists of 3 or 4 separated data

- Data is arranged in order of 'Parameter group', 'Parameter identification', 'Parameter edited' and 'Parameter to compare'. If you have not uploaded a parameter set for comparing, 'Parameter to compare' is not exported.

[Example]

- ; Group, Name, PC, Device
- "Passcode", "Passcode", "\*\*\*\*", "\*\*\*\*"

"Input," "System configuration," "3-phase/3-wire, unbalanced (2CT)," "3-phase/3-wire, unbalanced (2CT)"

## 2.6 SWITCHING LANGUAGE

Click [Language] to switch the display language between English and Japanese.

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.

## **3. BASIC PARAMETERS**

The initial window when you start up the LSCFG contains basic parameters as described below.

Uploa	ad	Download		Protect	Repor	rt	Save File Open Fi	le Language
Mode	I (	LSMT4-2 VA1 480V, 3P4W, 4-20mA x10, Do x2 V						
nput							Option	
Syste	m (	3-phase / 4-wire, unbalance			CT)	-	Passcode	Modbus Others
VT rat	ting	g CT rating						
Prima	rv	110	v	Primary	5	A		
						1		
Secor	ndary	110	V	Secondary	5	Α	Pulse Output	
Range	e	150	v				Po1	Po2
	Output							
nalog								
CH	Assig	Inment	_	Input Scaling	,			Output Range
CH 1	Assig	jnment Current, Line	1	Input Scaling	) ) [0.00~1	00.00 ('	%)]	Output Range 4.00~20.00 (mA)
CH 1 2	Assig I1/( I2/(	jnment Current, Line Current, Line	1	Input Scaling 0.0~5.0 (A 0.0~5.0 (A	) ) [0.00~1 ) [0.00~1	00.00 (*	%)]	Output Range 4.00~20.00 (mA) 4.00~20.00 (mA)
CH 1 2 3	Assig I1/( I2/( I3/(	jnment Current, Line Current, Line Current, Line	1 2 3	Input Scaling 0.0~5.0 (A 0.0~5.0 (A 0.0~5.0 (A	) ) [0.00~1 ) [0.00~1 ) [0.00~1	00.00 (° 00.00 (° 00.00 (°	%)] %)] %)]	Output Range           4.00~20.00 (mA)           4.00~20.00 (mA)           4.00~20.00 (mA)           4.00~20.00 (mA)
CH 1 2 3 4	Assig I1/( I2/( I3/( U12	gnment Current, Line Current, Line Current, Line / Delta voltag	1 2 3 ge	Input Scaling 0.0~5.0 (A 0.0~5.0 (A 0.0~5.0 (A 0.0~5.0 (A	) ) [0.00~1 ) [0.00~1 ) [0.00~1 (V) [0.00~	00.00 (° 00.00 (° 00.00 (° ~100.00	%)] %)] %)] (%)]	Output Range           4.00~20.00 (mA)           4.00~20.00 (mA)           4.00~20.00 (mA)           4.00~20.00 (mA)           4.00~20.00 (mA)
CH 1 2 3 4 5	Assig I1/0 I2/0 I3/0 U12 U23	nment Current, Line Current, Line Current, Line / Delta voltag / Delta voltag	: 1 : 2 : 3 ge ge	Input Scaling 0.0~5.0 (A 0.0~5.0 (A 0.0~5.0 (A 0.0~150.0 0.0~150.0	) ) [0.00~1 ) [0.00~1 ) [0.00~1 (V) [0.00~ (V) [0.00~	00.00 (° 00.00 (° 00.00 (° ~100.00 ~100.00	%)] %)] %)] (%)] (%)]	Output Range           4.00~20.00 (mA)
CH 1 2 3 4 5 6	Assig I1/( I2/( I3/( U12 U23 U31	gnment Current, Line Current, Line / Delta voltag / Delta voltag / Delta voltag	1 2 3 ge ge	Input Scaling 0.0~5.0 (A 0.0~5.0 (A 0.0~5.0 (A 0.0~150.0 0.0~150.0 0.0~150.0	) ) [0.00~1 ) [0.00~1 ) [0.00~1 (V) [0.00~ (V) [0.00~ (V) [0.00~	00.00 (° 00.00 (° - 100.00 - 100.00 - 100.00	%)] %)] %)] (%)] (%)] (%)]	Output Range           4.00~20.00 (mA)
CH 1 2 3 4 5 6 7	Assig I1/0 I2/0 I3/0 U12 U23 U31 P/A	gnment Current, Line Current, Line Current, Line / Delta voltag / Delta voltag / Delta voltag ctive power	1 2 3 ge ge	Input Scaling 0.0~5.0 (A 0.0~5.0 (A 0.0~5.0 (A 0.0~150.0 0.0~150.0 0.0~150.0 0~1500 (W	) (0.00~1 ) (0.00~1 (V) (0.00~ (V) (0.00~ (V) (0.00~ ) (0.00~1	00.00 (° 00.00 (° ~100.00 ~100.00 ~100.00 00.00 (°	%)] %)] %)] (%)] (%)] (%)]	Output Range           4.00~20.00 (mA)
CH 1 2 3 4 5 6 7 8	Assig I1/( I2/( I3/( U12 U23 U31 P/A Q/F	gnment Current, Line Current, Line Current, Line / Delta voltag / Delta voltag / Delta voltag ctive power teactive pow	: 1 : 2 : 3 ge ge ge	Input Scaling 0.0~5.0 (A 0.0~5.0 (A 0.0~5.0 (A 0.0~150.0 0.0~150.0 0.0~150.0 0~1500 (W LEAD -1500	) [0.00~1 ) [0.00~1 ) [0.00~1 (V) [0.00~ (V) [0.00~ (V) [0.00~ ) [0.00~1 ~LAG 150	00.00 (* 00.00 (* - 100.00 - 100.00 - 100.00 (0.00.00 (* 0 (var) [	%)] %)] %)] (%)] (%)] (%)] %)] (-100.00~100.00 (%)]	Output Range           4.00~20.00 (mA)
CH 1 2 3 4 5 6 7 8 9	Assig I1/0 I2/0 I3/0 U12 U23 U31 P/A Q/F PF/	gnment Current, Line Current, Line Current, Line / Delta voltag / Delta voltag / Delta voltag ctive power leactive pow Power factor	e 1 2 3 ge ge ge	Input Scaling 0.0~5.0 (A 0.0~5.0 (A 0.0~5.0 (A 0.0~150.0 0.0~150.0 0.0~150.0 0~1500 (W LEAD -1500 LEAD 0.50~	) [0.00~1 ) [0.00~1 ) [0.00~1 (V) [0.00~ (V) [0.00~ (V) [0.00~ ) [0.00~1 ~LAG 150 LAG 0.50	00.00 (° 00.00 (° -100.00 -100.00 -100.00 (00.00 (° 0 (var) [ (cosφ) [	%)] %)] %)] (%)] (%)] (%)] (%)] (%)] (-100.00~100.00 (%)] (-50.00~50.00 (%)]	Output Range           4.00~20.00 (mA)           4.00~20.00 (mA)

## 3.1 MODEL

Choose an appropriate device type to be configured on the LSCFG.

Selection

LSMT4-1	xA1 480V, 4-20mA x10, Do x2 x41 480V, 0-10V x10, Do x2 x51 480V, 0-5V x10, Do x2 x61 480V, 1-5V x10, Do x2
LSMT4-2	xA1 480V, 3P4W, 4-20mA x10, Do x2 x41 480V, 3P4W, 0-10V x10, Do x2 x51 480V, 3P4W, 0-5V x10, Do x2 x61 480V, 3P4W, 1-5V x10, Do x2

## 3.2 INPUT

## 3.2.1 SYSTEM

Choose an input wiring configuration from the following:

#### Selection

System 3-phase / 3-wire, balanced load (1CT) 3-phase / 3-wire, unbalanced load (2CT) 3-phase / 4-wire, balanced load (1CT) <sup>*1</sup> 3-phase / 4-wire, unbalanced load (3CT) <sup>*1</sup>	System
---	--------

#### 3.2.2 VT RATING, PRIMARY / SECONDARY

Enter VT's primary and secondary ratings when an external voltage transformer (VT) is used. The maximum selectable ratio is 400 kV/50 V, but both CT and VT ratios must be considered to satisfy the maximum measurable power value of 2 GVA.

Selection / Range

VT rating, primary	50V to 400000V
VT rating, secondary	50V to 480V

## 3.2.3 VOLTAGE RANGE

Enter voltage range for the analog output assigned to voltage.

Selection / Range

Range	50 to 480V
-------	------------

When the secondary VT rating is changed, the voltage range is automatically set as shown in the table below. Enter a value if other one is needed.

Secondary VT rating	Automatic voltage range
110	150
220	300
Others	Same as the setting value

#### 3.2.4 CT RATING, PRIMARY / SECONDARY

Enter CT's primary and secondary ratings when an external current transformer (CT) is used. The maximum selectable ratio is 20 kA/1 A, but both CT and VT ratios must be considered to satisfy the maximum measurable power value of 2 GVA.

Selection / Range

CT rating, primary	1A to 20000A
CT rating, secondary	1A to 5A

\*1) Available only with LSMT4-2.

## 4. OPTION PARAMETERS

When you click control buttons under 'Option' on the initial window of the LSCFG, you can go to detailed setting.

## 4.1 PASSCODE

4-digit passcode is needed to enter the programming mode when you use the front keys. Type in 4-digit number once and twice for confirmation and click OK.

Change Passcode	×
Enter the 4 digits for passcode.	ОК
New passcode	Cancel
Confirm new passcode	
(L	

#### Selection / Range

Passcode 0000 to 9999
-----------------------

## 4.2 OTHER SETTINGS

Other Settings			×
Input Low-end cutout Voltag AC frequency	ge 1.0 % Current	1.0 %	OK Cancel
Calculation Option			
Power factor sign	IEC	© IEEE	
Reactive power sign	IEC	When outgoing, sign reversed	
Reactive power calculation	Vector method: S-P	Reactive power meter method	
Apparent power calculation	Vector method: P+Q	Sum: S1+S2+S3	
Power rating round	ON	OFF	
Analog Output Option			
Analog limit	No limit	Cimit at -1% and +101%	

#### 4.2.1 LOW-END CUTOUT (VOLTAGE)

Specify voltage low-end cutout value in %. Actual cutout voltage is calculated from the VT's primary rating by the following equation:

Low-end cutout voltage = Setting in % x VT's primary rating

When the input signal goes below the calculated value, '0' is supplied as the input, discarding the actual input signal.

#### 4.2.2 LOW-END CUTOUT (CURRENT)

Specify current low-end cutout value in %. Actual cutout current is calculated from the CT's primary rating by the following equation:

Low-end cutout current = Setting in % x CT's primary rating

When the input signal goes below the calculated value, '0' is supplied as the input, discarding the actual input signal.

#### 4.2.3 AC FREQUENCY

Specify either voltage or current to monitor AC frequency.

Selection

11	11 current
U1N	U1 voltage

## 4.2.4 POWER FACTOR SIGN

Selection

Standard (IEC)	Positive in incoming active power; Negative in outgoing active power.
IEEE	Positive in LAG (inductive), Negative in LEAD (capacitive).

#### 4.2.5 REACTIVE POWER SIGN

Selection

Standard (IEC)	Positive from [PF = 1.0] to 180° in LAG direction; Negative for the other direction.
When outgoing, sign reversed	Identical to IEC method in incoming power; Positive-negative inverted in outgoing power.

### 4.2.6 REACTIVE POWER CALCULATION

Selection

Standard (Vector method: S-P)	$Qn = \sqrt{Sn^2 - Pn^2}$
Reactive power meter method (Sigma UI)	$Qn = \frac{1}{Nsmp} \sum_{i=1}^{Nsmp} (Un_i - Nn_i) I_{i+(Nsmp/4)}$

#### 4.2.7 APPARENT POWER CALCULATION

Selection

Standard (Vector method: P+Q)	$Qn = \sqrt{P^2 + Q^2}$
Sum: S1+S2+S3	S = S1 + S2 + S3

## 4.2.8 POWER RATING ROUND

Selection

Standard (ON)	After power rating is calculated by the formula below, it is rounded to the nearest inte- gral multiple of (secondary rating x 100 (W)).
OFF	Power rating is calculated by the formula below (not rounded).

#### Power rating = VT secondary rating $\times$ CT secondary rating $\times$ a

System configuration	а					
System configuration	ON	OFF				
Single phase/2-wire	1	1				
Single phase/3-wire	2	2				
3-phase/3-wire	2	√3				
3-phase/4-wire	3	3				

#### 4.2.9 ANALOG LIMIT

Selection

Standard (no limit)	No limit (output -5 to +105%)
Limit at -1% and +101%	Limit at -1 and +101%

## Note

When the linearization table is used, output is provided according to the table, disregarding the analog limit selection

# 5. PULSE OUTPUT PARAMETER

## 5.1 Po1, Po2

Define energy count parameters for pulse output.

Pulse Output Settings		×
Energy count type	EP / Active energy, incoming	ОК
Pulse weight	▼ 0.001 kWh/pulse	Cancel
Pulse width		

#### 5.1.1 ENERGY COUNT TYPE

Specify which energy parameter you want to supply to the pulse count output. Choose from the table below.

PARAMETER
Active energy, incoming
Reactive energy, LAG
Apparent energy
Active energy, outgoing
Reactive energy, LEAD
Reactive energy, incoming, LAG
Reactive energy, incoming, LEAD
Reactive energy, outgoing, LAG
Reactive energy, outgoing, LEAD
Reactive energy, incoming
Reactive energy, outgoing

#### 5.1.2 PULSE WEIGHT

Specify how much energy value corresponds to one pulse. Choose from the table below.

Selection

PARAMETER
P × 0.001 kWh / pulse
P × 0.01 kWh / pulse
P × 0.1 kWh / pulse
P × 1.0 kWh / pulse

 ${\sf P}$  is determined by n calculated from the formula shown below and the table shown below.

 $n = a \times primary rated voltage \times primary rated current \div 1000$ 

Where a is 1: Single phase/2-wire, 2: Single phase-3-wire, √3: 3-phase/3-wire, 3: 3-phase/4-wire.

n	Р
< 10	1
10 ≤ n < 100	10
100 ≤ n < 1000	100
1000 ≤ n < 10 000	1000
10 000 ≤ n < 100 000	10 000
≥ 100 000	100 000

#### 5.1.3 PULSE DURATION

Specify the output pulse width appropriate for a receiving instrument.

Selection / Range

Pulse duration

100 to 2000 milliseconds (in 100 msec. increments)

# 6. ANALOG OUTPUT PARAMETER

## 6.1 ANALOG OUTPUT ASSIGNMENT

Double-clicking an analog output row to edit opens Analog Output Settings window to configure the analog output of the device.



#### 6.1.1 ASSIGNMENT

Choose measurand from the tables in the following page.

#### 6.1.2 INPUT SCALING / OUTPUT RANGE

When 'Use the linearization table' is not selected, the output range is scaled using these parameters.

Output = Input - Input 0% Input range - Input 0% × (Output 100% - Output 0%) + Output 0%

#### Note

Input value in engineering unit is first converted into percentage of the full-scale range before provided to the above equation.

After Input range is specified, Input 0% is automatically assigned. Refer to the tables in the following page for the available setting range for input range and auto setting value for input 0%.

Item	Description	-100%	-75%	-50%	-25%	0%	25%	50%	75%	100%	Available setting range for input range	Auto setting value for input 0 %
NONE	Not assigned										—	
1  2  3  N	Current, Line 1 Current, Line 2 Current, Line 3 Neutral current					0	СТ	⊺ seco	ndary	rating	0.00 to 120.00% [0.00 to 100.00%]	0.00
U12 U23 U31 U1N U2N U3N	Phase to phase, Line 1 - 2 Phase to phase, Line 2 - 3 Phase to phase, Line 3 - 1 Phase voltage, Phase 1 Phase voltage, Phase 2 Phase voltage, Phase 3					0		Vo	oltage	range	0.00 to 120.00% [0.00 to 100.00%]	0.00
P P1 P2 P3	Active power Active power, Phase 1 Active power, Phase 2 Active power, Phase 3	-P	(ir	ncomir	ng)	0	(o	utgoin	g)	Ρ	-120.00 to 120.00% [0.00 to 100.00%]	0.00
Q Q1 Q2 Q3	Reactive power Reactive power, Phase 1 Reactive power, Phase 2 Reactive power, Phase 3	-P		(LEAC	))	0		(LAG)		Р	-120.00 to 120.00% [-100.00 to 100.00%]	Sign inversion value of the input range
S S1 S2 S3	Apparent power Apparent power, Phase 1 Apparent power, Phase 2 Apparent power, Phase 3					0				Ρ	0.00 to 120.00% [0.00 to 100.00%]	0.00
PF PF1 PF2 PF3	Power factor Power factor, Phase 1 Power factor, Phase 2 Power factor, Phase 3	0		(LEAD	))	1		(LAG)		0	-100.00 to 100.00% [-50.00 to 50.00%]	Sign inversion value of the input range
F	Frequency					45		55		65	0.00 to 100.00% [0.00 to 100.00%]	_

Item	Description	-100 -75 -50 -25 0 25 50 75 100	Available settingAuto setting valuerange for input rangefor input 0 %
T-Q	Reactive power for bidirectional current	(incoming) -P (LEAD) 0 (LAG) P -P (LEAD) 0 (LAG) P When LEAD/LAG range of power rating is set, the unit outputs 0 to 50 % for outgoing and outputs; 50 to 100 % for incoming.	-100.00 to 100.00% [-100.00 to 100.00%] Sign inversion value of the input range
T-PF	Power factor for bidirectional current	(incoming) (LEAD) 1 (LAG) 0 (LEAD) 1 (LAG) 0 When LEAD/LAG range of power rating is set, the unit outputs 0 to 50 % for outgoing and outputs; 50 to 100 % for incoming.	-100.00 to 100.00% [-50.00 to 50.00%] Sign inversion value of the input range

#### • Calculation of P (power rating)

P (power rating) is automatically determined by rounding to the unit (CT secondary rating x 100 (W)) after calculated with following formula by system configuration and secondary rating of CT/VT.

It is available not to round with option setting.

Power rating = (CT secondary rating) x (VT secondary rating) x a

System configuration	а
Single phase/2-wire	1
Single phase/3-wire 3-phase/3-wire	2
3-phase/4-wire	3

#### Calculation example

System configuration	Rating	Power rating
Single phase/2-wire	110V / 5A 220V / 5A	500W 1000W
Single phase/3-wire	110V / 5A	1000W
3-phase/3-wire	110V / 5A 220V / 5A	1000W 2000W
3-phase/4-wire	220V / 5A	3500W

#### $\bullet$ Inversion of output 0 % to 100 %

When negative value is set to input range, output is inverted. For example, -50.00 % is set to input range of reactive power, 50.00 % is automatically set to input 0 % and then output characteristic is the figure shown below.



#### 6.1.3 LINEARIZATION TABLE

When 'Use the linearization table' is selected, the segment data table must be set. When the output is assigned to reactive power for bidirectional current or power factor for bidirectional current, the linearization table is not available. Table consists of ten (10) pairs of X (input) and Y (output) values. When the input is equal to X[n], Y[n] is provided as output.

When the input is between X[n-1] and X[n], the output is provided by the following equation.

 $Output = \frac{Input - Table X[n-1]}{Table X[n] - Table X[n-1]} \times (Table Y[n] - Table Y[n-1]) + Table Y[n-1]$ 

#### Note

Input value in engineering unit is first converted into percentage of the full-scale range before provided to the above equation.

Segment data must be arranged in ascending order, i.e. X[n] must be greater than X[n-1]. For example, if you have set X[7] smaller than X[6], Table X[7] and later values are not used. Linearization is complete with data from X[0] to X[6]. When the input value is lower than X[0], the output equals Y[0]. When the input is higher than X[max], the output equals Y[max].

#### 6.1.4 ADJUSTMENT ZERO / ADJUSTMENT SPAN

Analog output can be finely calibrated using Adjustment span and Adjustment zero by the following equation:

Analog Output = (Output Value – Analog 0%) × Adjustment span + Analog 0% + { Adjustment zero × (Analog 100% – Analog 0%) } Where Analog 0% = 4mA, 1V or 0V Analog 100% = 20mA, 5V or 10V Adjustment zero, Adjustment span 100.00% = 1.0000

Zero is adjustable within ±5.00%, while Span is adjustable from 95.00 to 105.00%.