

MULTI POWER MONITOR (4 digital displays, LonWORKS)	MODEL	54UL
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BEFORE USE

Thank you for choosing M-System. Before use, please check contents of the package you received as outlined below. If you have any problems or questions with the product, please contact M-System's Sales Office or representatives.

■ PACKAGE INCLUDES:

Multi power monitor
(body + mounting bracket × 2 + gasket)(1)
Neuron ID label(2)

■ MODEL NO.

Confirm Model No. marking on the product to be exactly what you ordered.

■ OPERATING MANUAL

This manual describes necessary points of caution when you use this product, including installation, connection, basic maintenance procedures, and detailed operations.

The 54UL is programmable either by using the front control buttons or the PC Configurator Software. For detailed information on the PC configuration, refer to the PMCFG users manual. The XIF files and the PMCFG PC Configurator Software are downloadable at M-System's web site.

<http://www.m-system.co.jp>

Availability of certain functions explained in this manual depends upon hardware options and firmware versions. Those limited ones are identified with the following markings.

MARKING	LIMITATION
DO	Discrete input option
DI	Discrete input option
3P4W	3-phase / 4-wire system option
3.00	Ver.3.00 or later versions

POINTS OF CAUTION

■ AUXILIARY POWER SUPPLY RATING & OPERATIONAL RANGE

- Locate the auxiliary power supply rating marked on the product and confirm its operational range as indicated below.

100 – 240V AC rating: 85 – 264V AC, 50/60 Hz, < 8VA

110 – 240V DC rating: 99 – 264V DC, < 4W

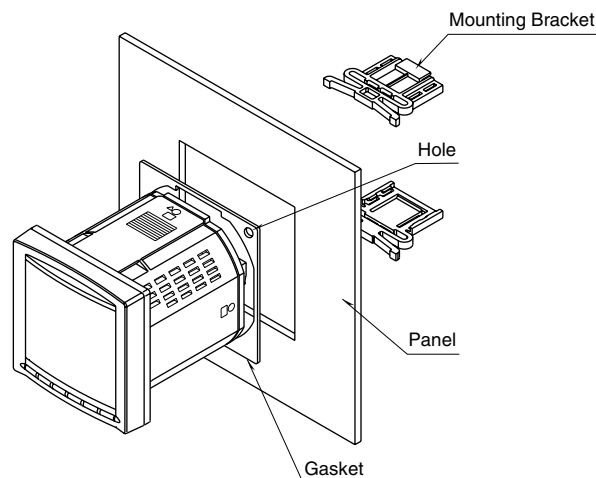
■ GENERAL PRECAUTION

- Before you remove or mount the unit, turn off the power supply and input signal for safety.

■ ENVIRONMENT

- Indoor use.
- Do not install the unit where it is directly exposed to rain, water droplets or sunlight.
- When heavy dust or metal particles are present in the air, install the unit inside proper housing with sufficient ventilation.
- Do not install the unit where it is subjected to continuous vibration. Do not subject the unit to physical impact.
- Environmental temperature must be within -10 to +55°C (14 to 131°F) with relative humidity within 90% RH in order to ensure adequate life span and operation.
- Contrast of the LCD screen depends upon viewing angles. Choose the height and angle where it is the most legible.

- Do not apply physical impact to the front face.
- To ensure the designated ingress protection, insert the gasket before attaching the mounting brackets.
- When using the mounting brackets, remove the mounting screws and turn back the gasket as shown below.



■ WIRING

- Wiring to the unit must be conducted by qualified service personnel.
- Do not install cables close to noise sources (relay drive cable, high frequency line, etc.).
- Do not bind these cables together with those in which noises are present. Do not install them in the same duct.

■ AND

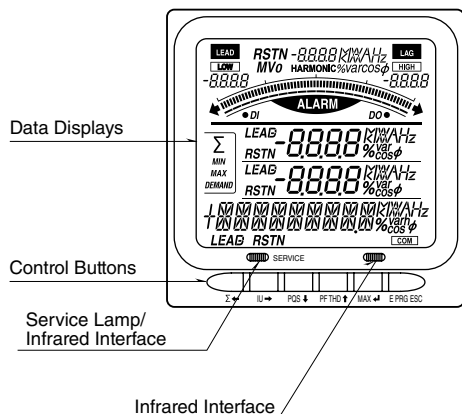
- The unit is designed to function as soon as power is supplied, however, a warm up for 10 minutes is required for satisfying complete performance described in the data sheet.
- Altitude up to 2000 meters.
- The equipment must be mounted inside a panel.

LIGHTNING SURGE PROTECTION

M-System offers a series of lightning surge protector for protection against induced lightning surges. Please contact M-System to choose appropriate models.

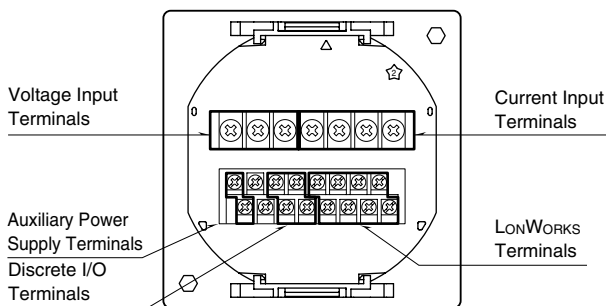
COMPONENT IDENTIFICATION

FRONT VIEW

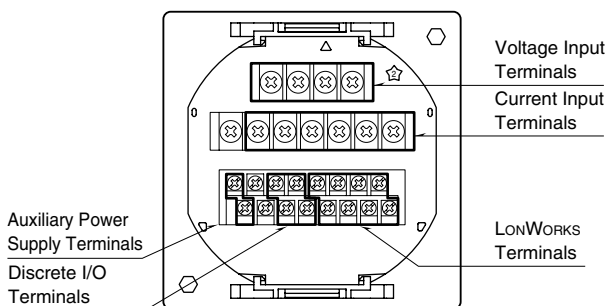


REAR VIEW

Configuration Code 1



Configuration Code 2

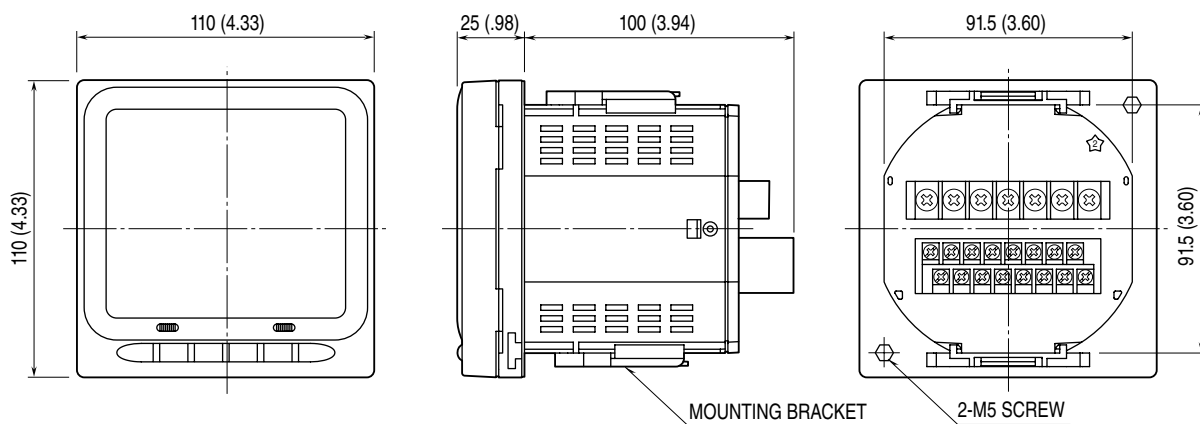


CONTROL BUTTON OPERATIONS

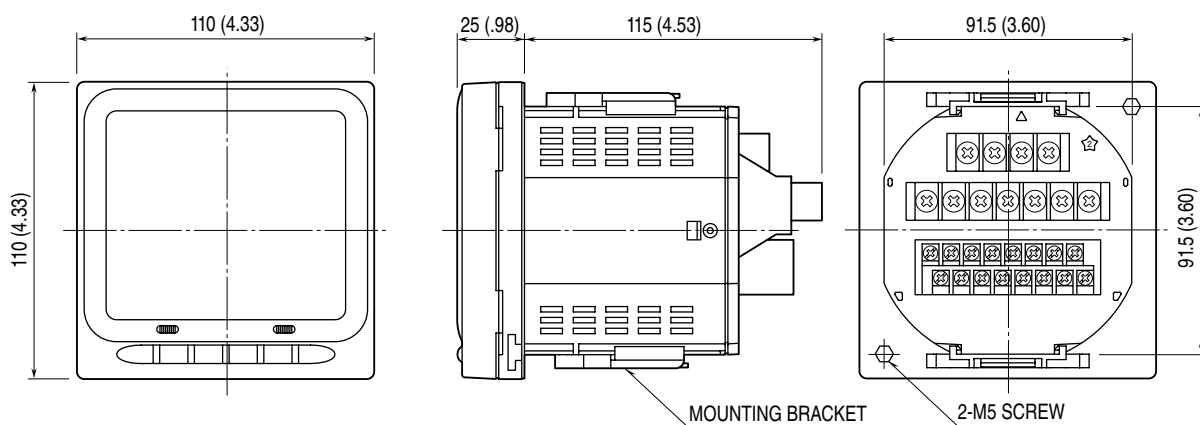
BUTTON OPERATION	FUNCTIONS	
	NORMAL MODE	SETTING MODE
Σ ←	Indicates Σ values	Go Left
IU →	Indicates Voltage or Current	Go Right
PQS ↓	Indicates Power	Go Down
PF THD ↑	Indicates Power Factor or THD	Go Up
MAX ↵	Indicates totalized values (max., min., average/demand)	Selects menu; Enables setting changes
E PRG ESC	Switches Energy readings	Cancels setting changes
Σ ← Hold down	Switches to My Default mode	----
E PRG ESC Hold down	Switches to Setting mode	----
IU → + PF THD ↑ Hold down	Indicates nth Harmonic distortion	----
Σ ← + E PRG ESC Hold down	Switches Energy reading units	----
IU → Hold down	Switches to Infrared Communication mode	----
PQS ↓ Hold down	Indicates the shortcut menu	----
PF THD ↑ Hold down	LONWORKS Service Pin	----

EXTERNAL DIMENSIONS unit: mm (inch)

■ CONFIGURATION CODE: 1

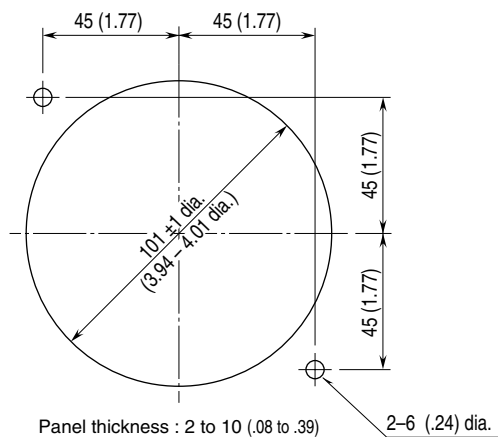


■ CONFIGURATION CODE: 2

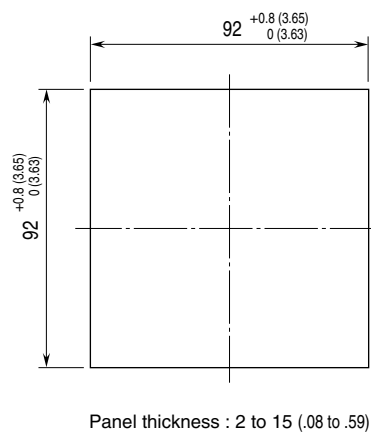


■ PANEL CUTOUT unit: mm (inch)

- USING MOUNTING SCREWS
Remove the mounting brackets.

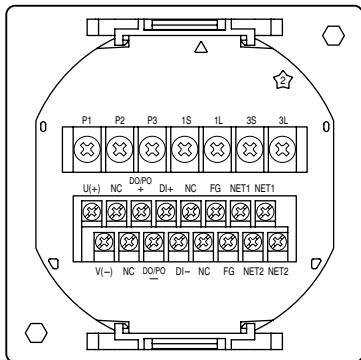


- USING MOUNTING BRACKETS
Remove the mounting screws.



TERMINAL CONNECTIONS

■ CONFIGURATION CODE: 1

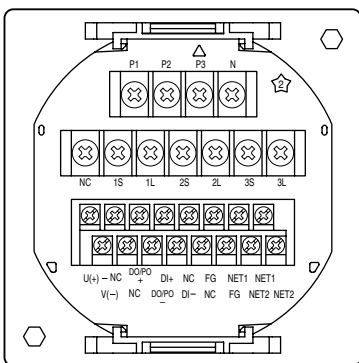


System / Application	Terminal
Single-phase / 2-wire	<p>Two diagrams for single-phase 2-wire systems. The first shows terminals P1, P2, 1S, 1L connected to source lines 1 and 2. The second shows terminals P1, P2, 1S, 1L connected to source lines 1 and 2, with a ground connection to terminal 1L.</p>
Three-phase / 3-wire, balanced load	<p>Two diagrams for three-phase 3-wire balanced load systems. The first shows terminals P1, P2, P3, 1S, 1L connected to source lines 1, 2, and 3. The second shows terminals P1, P2, P3, 1S, 1L connected to source lines 1, 2, and 3, with a ground connection to terminal 1L.</p>

System / Application	Terminal
Single-phase / 3-wire	<p>Two diagrams for single-phase 3-wire systems. The first shows terminals P1, P2, P3, 1S, 1L, 3S, 3L connected to source lines 1, N/2, and 2/3. The second shows terminals P1, P2, P3, 1S, 1L, 3S, 3L connected to source lines 1, N/2, and 2/3, with a ground connection to terminal 1L.</p>
Three-phase / 3-wire, unbalanced load (2CT)	<p>Two diagrams for three-phase 3-wire unbalanced load (2CT) systems. The first shows terminals P1, P2, P3, 1S, 1L, 3S, 3L connected to source lines 1, N/2, and 2/3. The second shows terminals P1, P2, P3, 1S, 1L, 3S, 3L connected to source lines 1, N/2, and 2/3, with a ground connection to terminal 1L.</p>

Note: For low voltage circuit, grounding is not required.

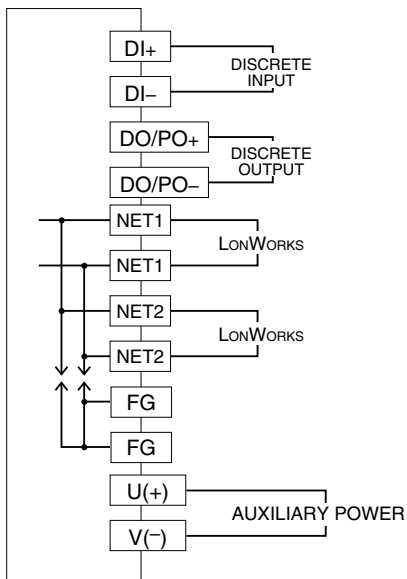
■ CONFIGURATION CODE: 2



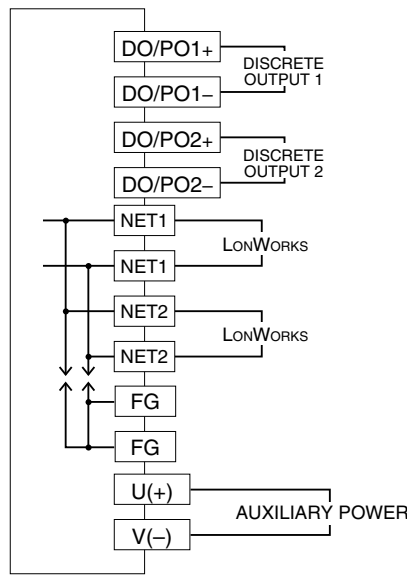
System / Application	Terminal	System / Application	Terminal
Single-phase / 2-wire		Single-phase / 3-wire Three-phase / 3-wire, unbalanced load (2CT)	
Three-phase / 3-wire, balanced load		Three-phase / 4-wire, balanced load	
Three-phase / 3-wire, unbalanced load (3CT)		Three-phase / 4-wire, unbalanced load	

Note: For low voltage circuit, grounding is not required.

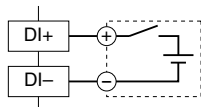
■ EXTERNAL INTERFACE CODE: 1



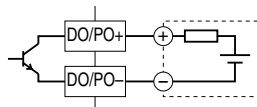
■ EXTERNAL INTERFACE CODE: 2



• Discrete Input Connection E.g.



• Discrete Output Connection E.g.



WIRING INSTRUCTIONS

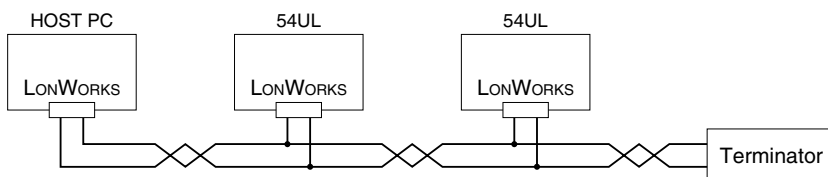
■ M3 Screw (discrete input, discrete output, LonWorks, auxiliary power)

Torque: 0.6 N·m

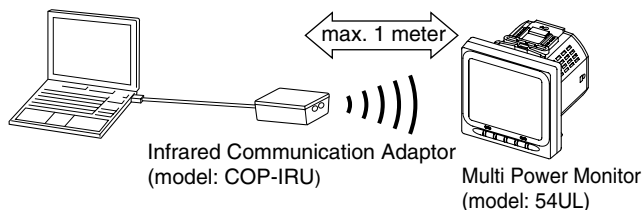
■ M4 Screw (voltage input, current input)

Torque: 1.4 N·m

COMMUNICATION CABLE CONNECTION



CONFIGURATION VIA INFRARED COMMUNICATION



Note 1: Hold down IU button to enter to Infrared Communication mode (IR-READY on the display).
 Hold down IU button to exit Infrared Communication mode.
 During Infrared Communication mode, data update via LONWORKS or reset and other control functions by Input Network Variables are not available.

Note 2: COP-IRU communicates with one 54UL.
 DO NOT set more than one 54UL to Infrared Communication mode simultaneously.

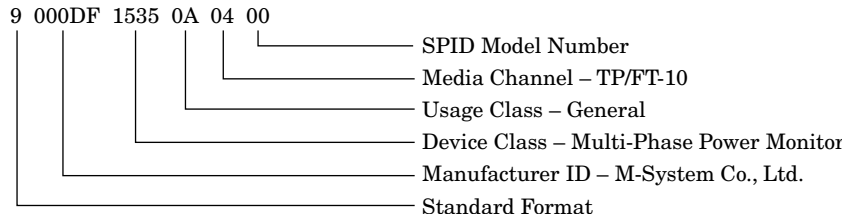
LonWorks COMMUNICATION

■ DEVICE INTERFACE FILE (external interface)

A dedicated Device File '54UL_XXX.XIF (XXX = Version)' is required to set up the 54UL using an integration tool such as Lon Maker.

On-line download is available for Device Image files at <http://www.m-system.co.jp>.

■ TRANSMISSION SPECIFICATIONS

Transmission Mode	LonTalk
Interface	TP/FT-10 Neuron chip: FT3150 Transceiver: FT-X1 (equivalent to FTT-10A)
Transfer Rate	78 kbps
Program ID	9 00DF 1535 0A 04 00 
Address Table	15
Alias Table	13
Domain Table	2

■ FUNCTIONAL BLOCKS

The following five Functional Blocks are available. One Object for each block is available.

OBJECT ID	FUNCTIONAL BLOCK
0	NodeObject
1	InstObject
2	EnergyObject
3	DemandObject
4	StatisticsObject

■ SUPPORTED NETWORK VARIABLE TYPES

Supported Network Variable Types and their effective range, resolution are as follows:

TYPE	VARIABLE	EFFECTIVE RANGE	RESOLUTION
SNVT_amp_f	Current	0.000 – 20 000.000 A	0.001 A
SNVT_vol_f	Voltage	0.00 – 400 000.00 V	0.01 V
SNVT_power_f	Power	-2 000 000 000 – +2 000 000 000 (W or var)	1 (W or var)
SNVT_freq_f	AC frequency	0.00 or 45.00 – 65.00 Hz	0.01 Hz
SNVT_pwr_fact_f	Power factor	-1.0000 to +1.0000 cos ϕ	0.0001 cos ϕ
SNVT_elec_kwh_l	Energy	0.0 – 99 999 999.9 (kWh or kvarh) Version 3.22 or earlier: Reset to 0 when exceeding the max. value, count is continued. Counter pulse output is stopped. Version 3.23 or later: Reset to 0 when exceeding the max. value, count is continued. Counter pulse output is continued.	0.1 (kWh or kvarh)
SNVT_lev_percent	Harmonic distortion	0.0 – 163.8 %	0.1 (%)

■ SERVICE PIN & RESET

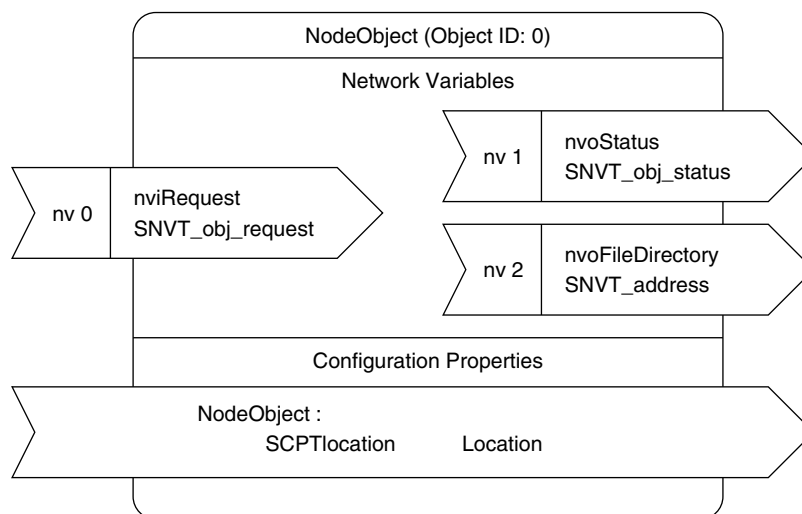
Refer to "SHORTCUT MENU" in "OPERATION FLOWCHART" section of this manual for Service Pin and Reset operations. Service Pin operation is possible also by pressing/holding button.

■ WINK

When WINK command is received, the front display backlight blinks for 5 seconds.

FUNCTIONAL BLOCKS

■ NodeObject FUNCTIONAL BLOCK



• NodeObject Network Variable

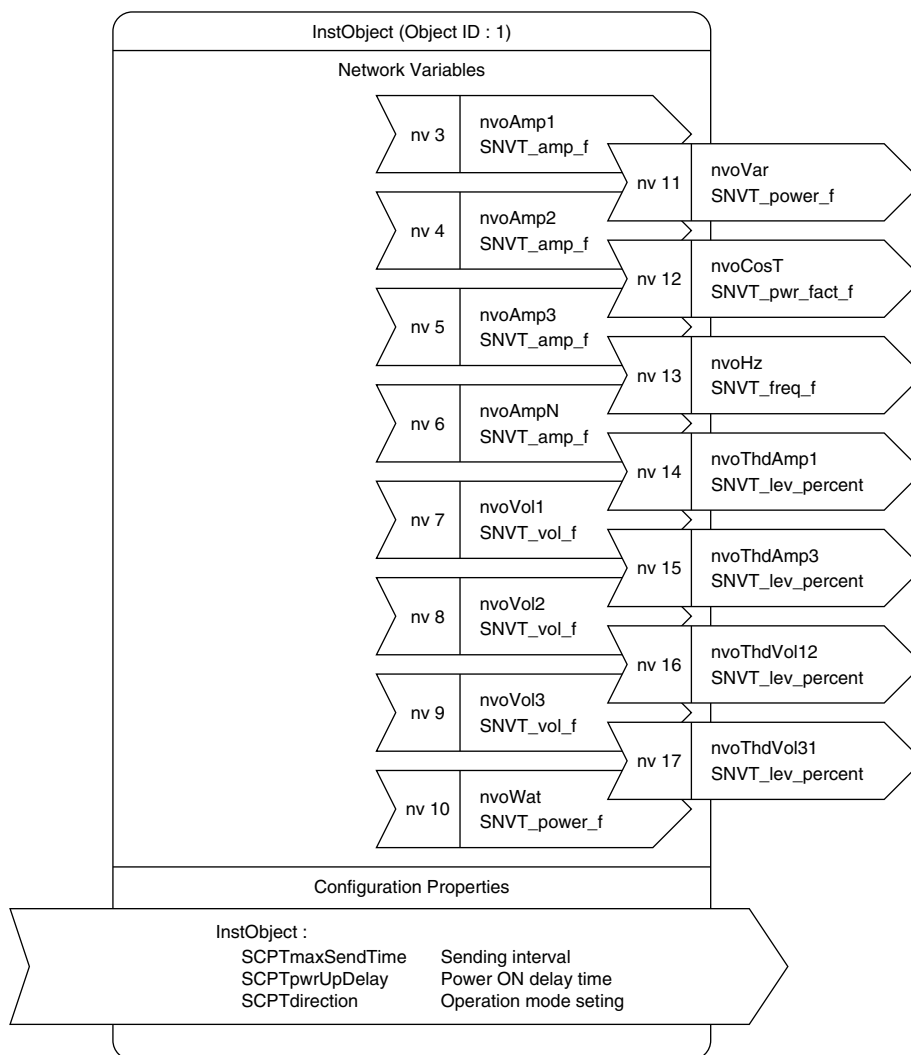
NETWORK VARIABLE	TYPE	EXPLANATIONS		
nviRequest	SNVT_obj_request	A request is provided through Object ID (object_id) and Request (object_request) and its result is output through nvoStatus. Usable object_id and object_request are as follows:		
		<table border="1"> <tr> <td>object_id</td> <td> 0 : All objects 1 : InstObject 2 : EnergyObject 3 : DemandObject 4 : StatisticsObject Other : Invalid_id </td> </tr> <tr> <td>object_request</td> <td> RQ_NORMAL Used to return the 54UL to normal status. Disabled objects are enabled. RQ_ENABLE Used to enable disabled objects. RQ_DISABLE Used to disable a specified object. Disabled objects stop sending or resetting network variables. RQ_REPORT_MASK Used to set 1 at supported status values and output to nvoStatus. RQ_UPDATE_STATUS Used to obtain a specified object status. If all objects are specified, OR result of individual status values is set at nvoStatus. RQ_CLEAR_STATUS Used to clear error counter and others. The following Requests are NOT supported. RQ_SELF_TEST RQ_OVERRIDE RQ_RMV_OVERRIDE RQ_UPDATE_ALARM RQ_CLEAR_ALARM RQ_CLEAR_RESET RQ_RESET </td> </tr> </table>	object_id	0 : All objects 1 : InstObject 2 : EnergyObject 3 : DemandObject 4 : StatisticsObject Other : Invalid_id
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NETWORK VARIABLE	TYPE	EXPLANATIONS																																																						
nvoStatus	SNVT_obj_status	The result of a request entered at nviRequest is output with Object ID and status value.																																																						
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nvoFileDirectory	SNVT_address	Used by integration tools.																																																						

• NodeObject Configuration Property

CONFIGURATION PROPERTY	TYPE {Range} {Default}	EXPLANATIONS
SCPTlocation	SNVT_str_asc {ascii 31 characters} { "" }	Subsystem information required for use with network recovery tools. Max. 31 ASCII characters including terminating null character.

■ InstObject FUNCTIONAL BLOCK



• InstObject Network Variable

NETWORK VARIABLE	TYPE	EXPLANATIONS
nvoAmp1	SNVT_amp_f	Current, Line 1
nvoAmp2	SNVT_amp_f	Current, Line 2
nvoAmp3	SNVT_amp_f	Current, Line 3
nvoAmpN	SNVT_amp_f	Neutral current Valid only with single-phase/3-wire (3.00), 3-phase/4-wire unbalanced or 3-phase/3-wire unbalanced (3CT) system. Always 0 with other systems.
nvoVol1	SNVT_vol_f	Voltage 1 *1
nvoVol2	SNVT_vol_f	Voltage 2 *1
nvoVol3	SNVT_vol_f	Voltage 3 *1
nvoWat	SNVT_power_f	Active power
nvoVar	SNVT_power_f	Reactive power
nvoCosT	SNVT_pwr_fact_f	Power factor
nvoHz	SNVT_freq_f	AC frequency
nvoThdAmp1	SNVT_lev_percent	Current total harmonic distortion, Line 1
nvoThdAmp3	SNVT_lev_percent	Current total harmonic distortion, Line 3
nvoThdVol12	SNVT_lev_percent	Delta voltage total harmonic distortion, 1 – 2
nvoThdVol31	SNVT_lev_percent	Delta voltage total harmonic distortion, 3 – 1

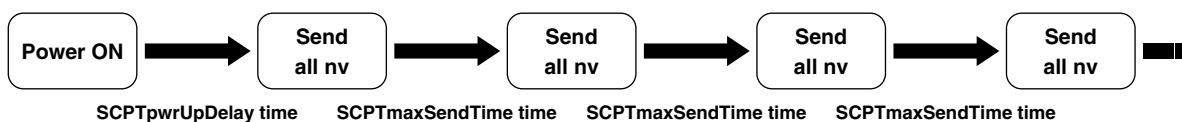
*1. Assignments depend upon system configuration.

Single-phase/2wire	Voltage 1: Phase 1	Voltage 2: 0	Voltage 3: 0
Single-phase/3-wire	Voltage 1: Phase 1	Voltage 2: Delta 3 – 1	Voltage 3: Phase 3
Three-phase/3-wire	Voltage 1: Delta 1 – 2	Voltage 2: Delta 2 – 3	Voltage 3: Delta 3 – 1
Three-phase/4-wire	Voltage 1: Phase 1	Voltage 2: Phase 2	Voltage 3: Phase 3

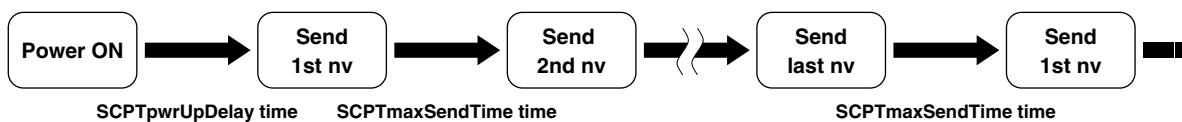
• InstObject Configuration Property

CONFIGURATION PROPERTY	TYPE {Range} {Default}	EXPLANATIONS
SCPTmaxSendTime	SNVT_time_sec {0.0-6553.4} {3.0}	Sending time intervals of output network variables. The 54UL does not send out network variables when 6553.4 (sec.) is set. Used for polling.
SCPTpwrUpDelay	SNVT_time_sec {0.0-6553.4} {0.0}	Delay time to start sending network variables after the power is turned on.
SCPTdirection	SNVT_state {0 or 1} {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}	Bit 0 (first bit) determines the network variable's sending pattern by each sending cycle. See the figure below. 0 = All bound variables are sent. 1 = Bound variables are sent one by one.

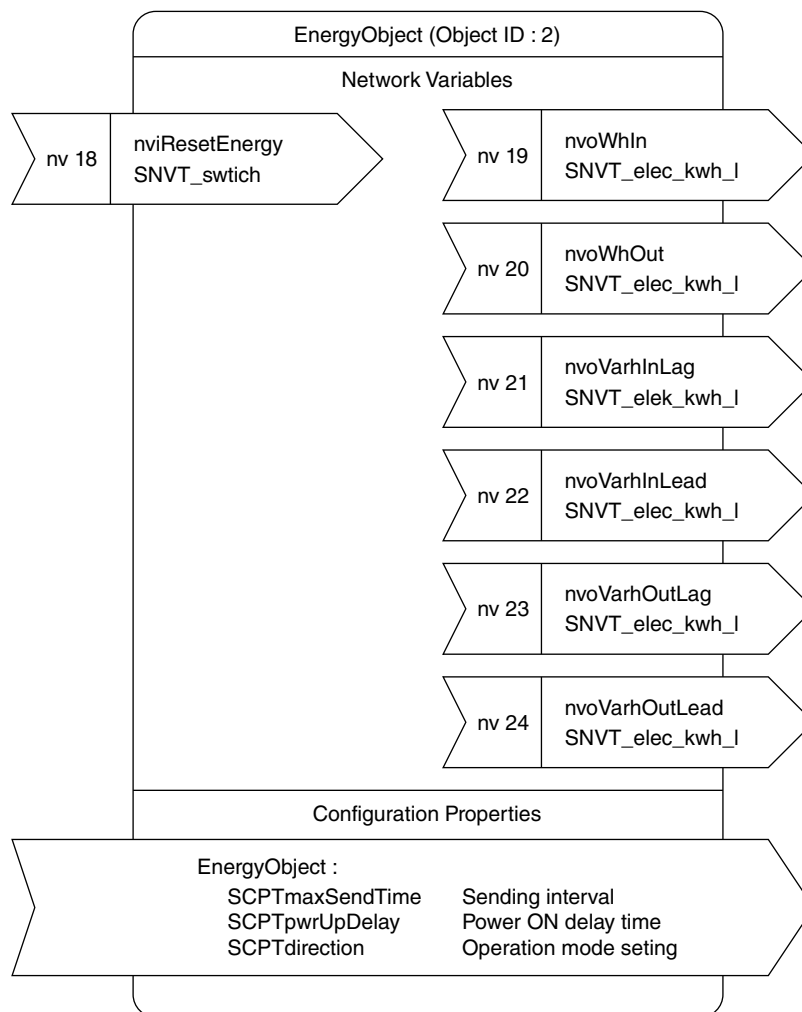
• SCPTdirection bit 0 = 0



• SCPTdirection bit 0 = 1



■ EnergyObject FUNCTIONAL BLOCK



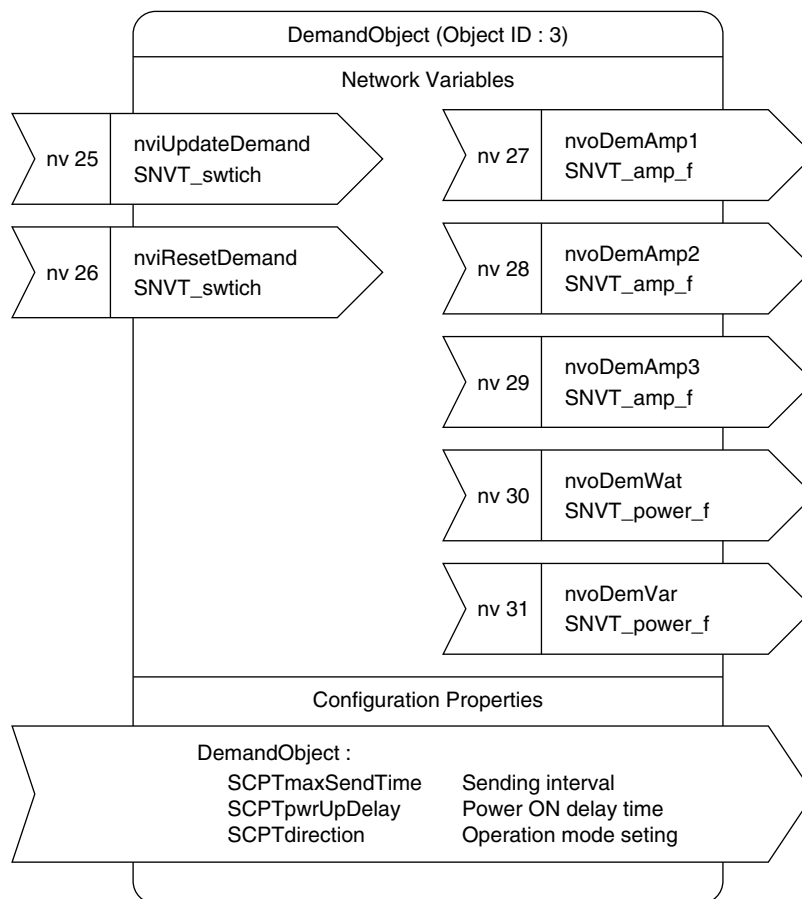
• EnergyObject Network Variable

NETWORK VARIABLE	TYPE	EXPLANATIONS
nviResetEnergy	SNVT_switich	Energy value is reset (clear to 0) when {*. * 1} is entered. (*.* = numeric other than 0.0) Be aware that the value is reset every time {*. * 1} is entered even continuously.
nvoWhIn	SNVT_elec_kwh_l	Active energy, incoming
nvoWhOut	SNVT_elec_kwh_l	Active energy, outgoing
nvoVarInLag	SNVT_elec_kwh_l	Active energy, incoming/LAG
nvoVarInLead	SNVT_elec_kwh_l	Active energy, incoming/LEAD
nvoVarOutLag	SNVT_elec_kwh_l	Active energy, outgoing/LAG
nvoVarOutLead	SNVT_elec_kwh_l	Active energy, outgoing/LEAD

• EnergyObject Configuration Property

CONFIGURATION PROPERTY	TYPE	EXPLANATIONS
SCPTmaxSendTime	SNVT_time_sec	Common with SCPTmaxSendTime for InstObject.
SCPTpwrUpDelay	SNVT_time_sec	Common with SCPTpwrUpDelay for InstObject.
SCPTdirection	SNVT_state	Common with SCPTdirection for InstObject.

■ DemandObject FUNCTIONAL BLOCK



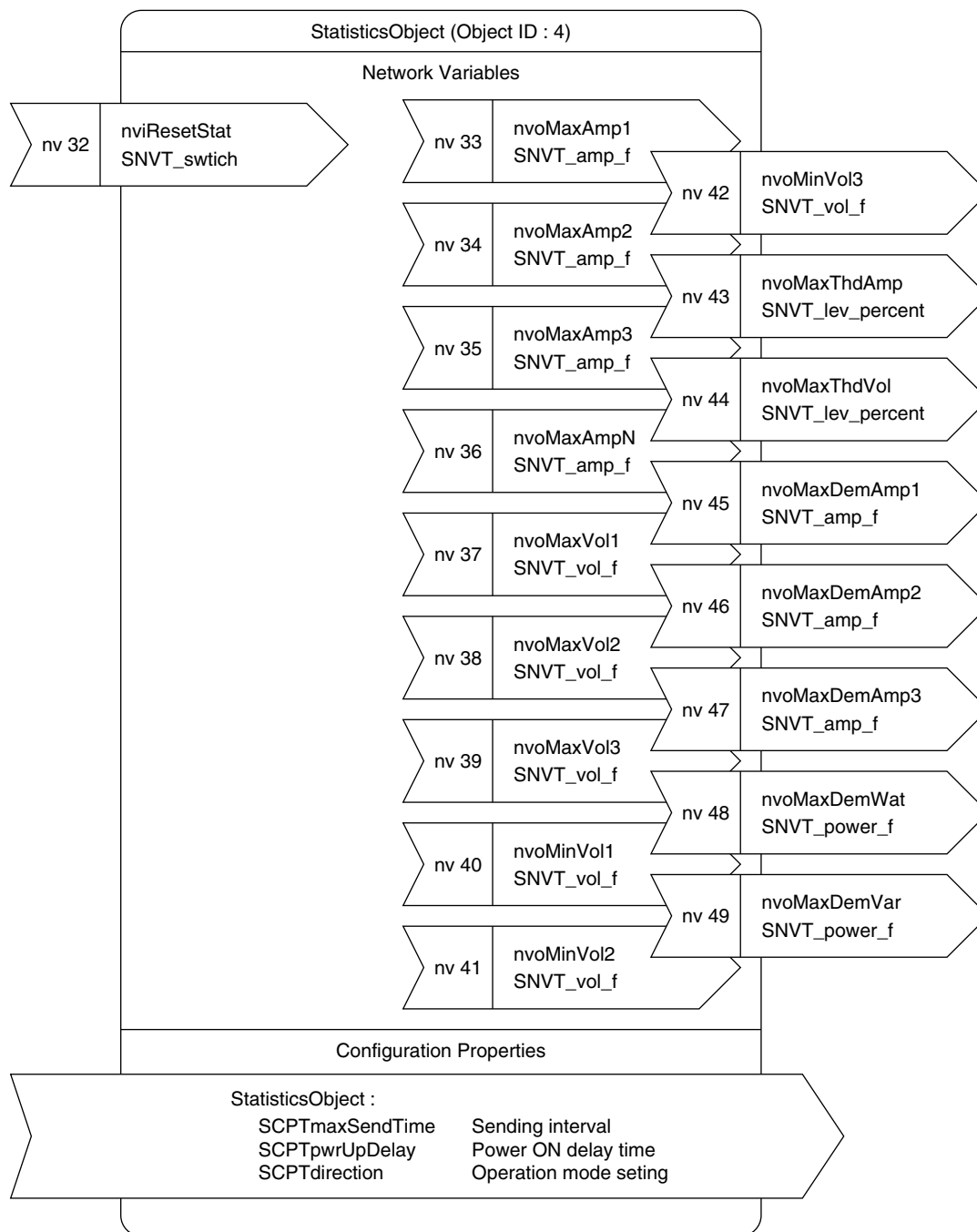
• DemandObject Network Variable

NETWORK VARIABLE	TYPE	EXPLANATIONS
nviUpdateDemand	SNVT_switch	Average (demand) interval time is reset (clear to 0) when {*. * 1} is entered. Average value for the relevant variable during the interval time period is calculated and updated. (*. * = numeric other than 0.0) Average values are updated regardless of nviUpdateDemand status by automatic updating setting. Forcibly updated regardless of nviUpdateDemand status or automatic updating setting if there is no update for 100 minutes. Be aware that the value is reset every time {*. * 1} is entered even continuously.
nviResetDemand	SNVT_switch	Average values are reset (clear to 0) when {*. * 1} is entered. (*. * = numeric other than 0.0) Be aware that the value is reset every time {*. * 1} is entered even continuously.
nvoDemAmp1	SNVT_amp_f	Current AVG, Line 1
nvoDemAmp2	SNVT_amp_f	Current AVG, Line 2
nvoDemAmp3	SNVT_amp_f	Current AVG, Line 3
nvoDemWat	SNVT_power_f	Active power AVG
nvoDemVar	SNVT_power_f	Reactive power AVG

• DemandObject Configuration Property

CONFIGURATION PROPERTY	TYPE	EXPLANATIONS
SCPTmaxSendTime	SNVT_time_sec	Common with SCPTmaxSendTime for InstObject.
SCPTpwrUpDelay	SNVT_time_sec	Common with SCPTpwrUpDelay for InstObject.
SCPTdirection	SNVT_state	Common with SCPTdirection for InstObject.

■ StatisticsObject FUNCTIONAL BLOCK



• StatisticsObject Network Variable

NETWORK VARIABLE	TYPE	EXPLANATIONS
nviResetStat	SNVT_switch	Max/Min values are reset (set with present value) when {*. * 1} is entered. (*.* = numeric other than 0.0) Be aware that the value is reset every time {*. * 1} is entered even continuously.
nvoMaxAmp1	SNVT_amp_f	Current MAX, Line 1
nvoMaxAmp2	SNVT_amp_f	Current MAX, Line 2
nvoMaxAmp3	SNVT_amp_f	Current MAX, Line 3
nvoMaxAmpN	SNVT_amp_f	Neutral current MAX
nvoMaxVol1	SNVT_vol_f	Voltage MAX 1 *1
nvoMaxVol2	SNVT_vol_f	Voltage MAX 2 *1
nvoMaxVol3	SNVT_vol_f	Voltage MAX 3 *1
nvoMinVol1	SNVT_vol_f	Voltage MIN 1 *1
nvoMinVol2	SNVT_vol_f	Voltage MIN 2 *1
nvoMinVol3	SNVT_vol_f	Voltage MIN 3 *1

NETWORK VARIABLE	TYPE	EXPLANATIONS
nvoMaxThdAmp	SNVT_lev_percent	Current total harmonic distortion MAX *2
nvoMaxThdVol	SNVT_lev_percent	Voltage total harmonic distortion MAX *2
nvoMaxDemAmp1	SNVT_amp_f	Current MAX AVG, Line 1
nvoMaxDemAmp2	SNVT_amp_f	Current MAX AVG, Line 2
nvoMaxDemAmp3	SNVT_amp_f	Current MAX AVG, Line 3
nvoMaxDemWat	SNVT_power_f	Active power MAX AVG
nvoMaxDemVar	SNVT_power_f	Reactive power MAX AVG

*1. Assignments depend upon system configuration.

Single-phase/2wire	Voltage 1: Phase 1	Voltage 2: 0	Voltage 3: 0
Single-phase/3-wire	Voltage 1: Phase 1	Voltage 2: Delta 3 – 1	Voltage 3: Phase 3
Three-phase/3-wire	Voltage 1: Delta 1 – 2	Voltage 2: Delta 2 – 3	Voltage 3: Delta 3 – 1
Three-phase/4-wire	Voltage 1: Phase 1	Voltage 2: Phase 2	Voltage 3: Phase 3

*2. Maximum value among the following is assigned depending upon system configuration.

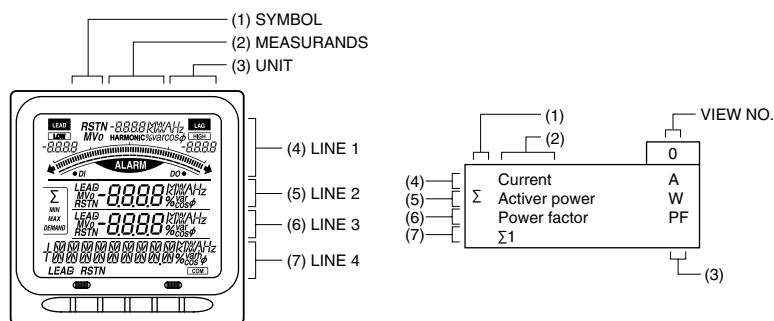
Single-phase/2wire	Voltage: Phase 1	Current: Line 1
Single-phase/3-wire	Voltage: Phase 1 or 3	Current: Line 1 or 3
Three-phase/3-wire balanced (1CT)	Voltage: Delta 1 – 2, 2 – 3 or 3 – 1	Current: Line 1
Three-phase/3-wire unbalanced (2CT)	Voltage: Delta 1 – 2, 2 – 3 or 3 – 1	Current: Line 1 or 3
Three-phase/3-wire unbalanced (3CT)	Voltage: Delta 1 – 2, 2 – 3 or 3 – 1	Current: Line 1, 2 or 3
Three-phase/4-wire balanced (1CT)	Voltage 1: Phase 1	Current: Line 1
Three-phase/4-wire unbalanced (3CT)	Voltage 1: Phase 1, 2, or 3	Current: Line 1, 2 or 3

• StatisticsObject Configuration Property

CONFIGURATION PROPERTY	TYPE	EXPLANATIONS
SCPTmaxSendTime	SNVT_time_sec	Common with SCPTmaxSendTime for InstObject.
SCPTpwrUpDelay	SNVT_time_sec	Common with SCPTpwrUpDelay for InstObject.
SCPTdirection	SNVT_state	Common with SCPTdirection for InstObject.

OPERATION FLOWCHART

■ DISPLAY

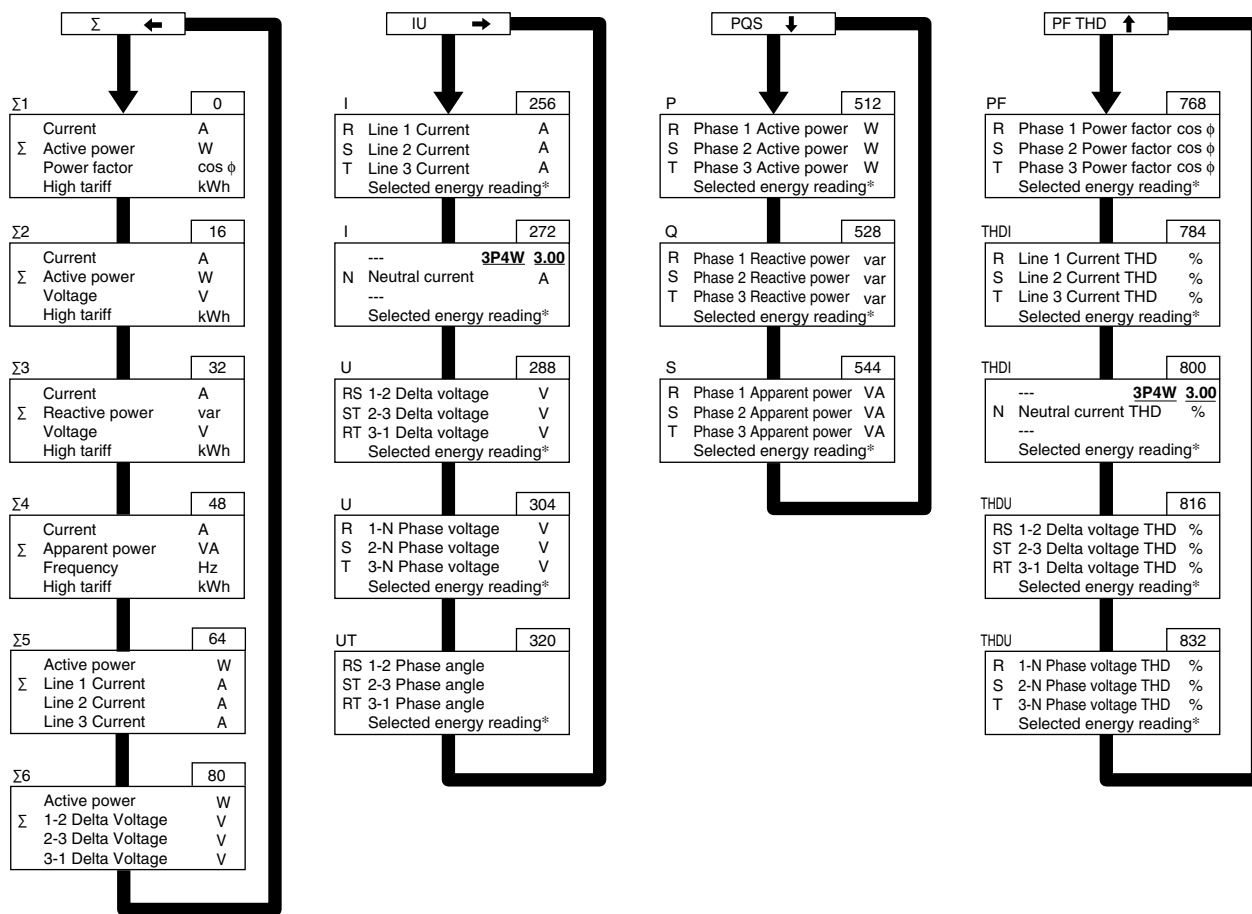


■ CONTROL BUTTON OPERATIONS

BUTTON OPERATION	FUNCTIONS	
	NORMAL MODE	SETTING MODE
Σ ←	Indicates Σ values	Go Left
IU →	Indicates Voltage or Current	Go Right
PQS ↓	Indicates Power	Go Down
PF THD ↑	Indicates Power Factor or THD	Go Up
MAX ↗	Indicates totalized values (max., min., average/demand)	Selects menu; Enables setting changes
E PRG ESC	Switches Energy readings	Cancel setting changes
Σ ← (Hold down)	Switches to My Default mode	----
E PRG ESC (Hold down)	Switches to Setting mode	----
IU → + PF THD ↑ (Hold down)	Indicates nth Harmonic distortion	----
Σ ← + E PRG ESC (Hold down)	Switches Energy reading units	----
IU → (Hold down)	Switches to Infrared Communication mode	----
PQS ↓ (Hold down)	Indicates the shortcut menu	----
PF THD ↑ (Hold down)	LONWORKS Service Pin	----

■ HOW TO SWITCH THE DISPLAY VIEWS

Pressing one of Σ \leftarrow IU \rightarrow PQS \downarrow PF THD \uparrow buttons switches the view to the one of top among those assigned to the respective button. Pressing the same button continuously switches it to more selections in turn.



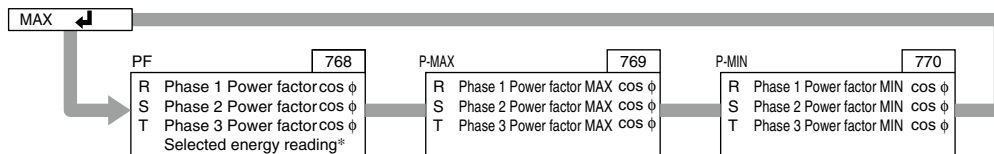
$\Sigma 1$ thr. $\Sigma 6$ views in the above figure shows the factory setting. These combinations can be changed.

MAX \leftarrow button switches the presently displayed view to its extension views if any.

Pressing the same button continuously switches it to more selections in turn.

Basic and extension views are all listed in the table in the following page.

[Example] Pressing MAX \leftarrow button on the view No. 768 (power factor) switches it to extension views as below.



*Selected with E PRG ESC button.

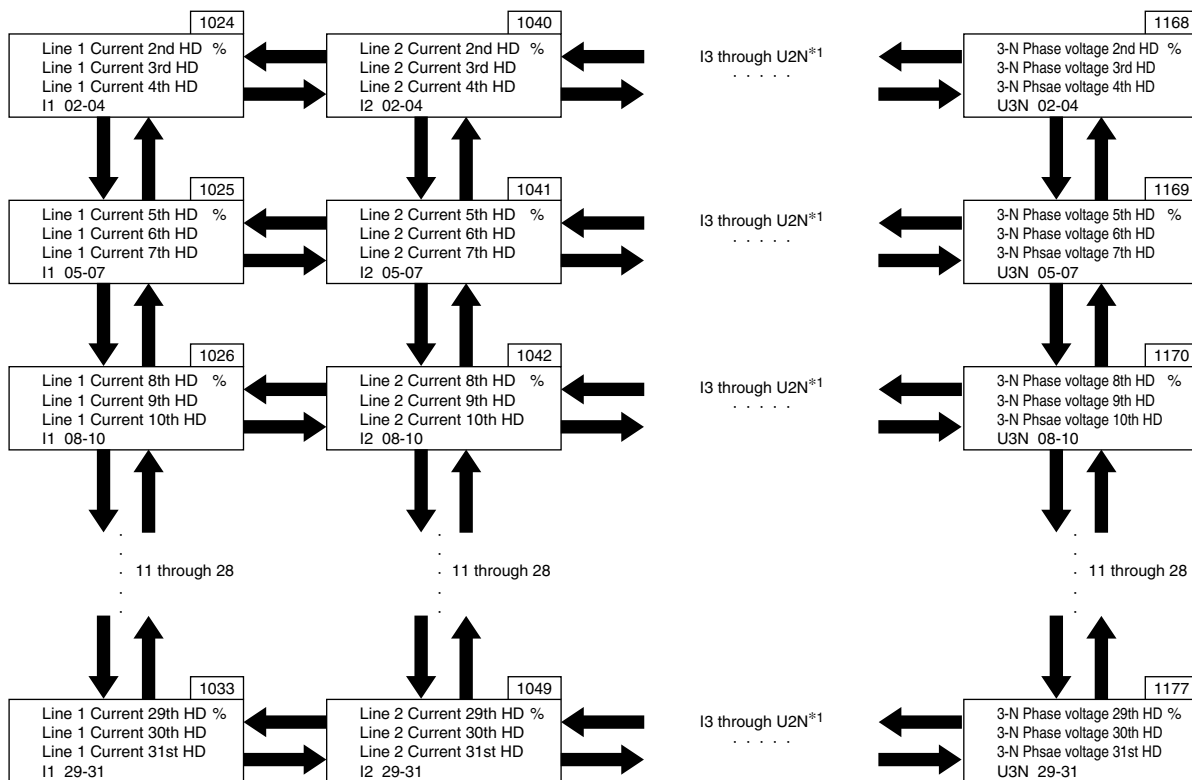
■ BASIC AND EXTENSION VIEW PARAMETERS

Σ view PRMTR	BASIC PARAMETER.	EXTENSION								
		MAX	MIN	AVE	AVE HIST1	AVE HIST2	AVE HIST3	AVE HIST4	MAX AVE	MAX AVE (out)
0	Not assigned									
1	Current	✓	✓	✓	✓	✓	✓	✓	✓	
2	Voltage	✓	✓	✓						
3	Active power	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Reactive power	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	Apparent power	✓	✓	✓	✓	✓	✓	✓	✓	
6	Power factor	✓	✓							
7	Frequency	✓	✓							
8	Current, Line 1	✓	✓	✓	✓	✓	✓	✓	✓	
9	Current, Line 2	✓	✓	✓	✓	✓	✓	✓	✓	
10	Current, Line 3	✓	✓	✓	✓	✓	✓	✓	✓	
11	Neutral current 3P4W 3.00	✓	✓	✓	✓	✓	✓	✓	✓	
12	Delta voltage, 1 – 2	✓	✓							
13	Delta voltage, 2 – 3	✓	✓							
14	Delta voltage, 3 – 1	✓	✓							
15	Phase voltage, Phase 1	✓	✓							
16	Phase voltage, Phase 2	✓	✓							
17	Phase voltage, Phase 3	✓	✓							
18	Active power, Phase 1	✓	✓							
19	Active power, Phase 2	✓	✓							
20	Active power, Phase 3	✓	✓							
21	Reactive power, Phase 1	✓	✓							
22	Reactive power, Phase 2	✓	✓							
23	Reactive power, Phase 3	✓	✓							
24	Apparent power, Phase 1	✓	✓							
25	Apparent power, Phase 2	✓	✓							
26	Apparent power, Phase 3	✓	✓							
27	Power factor, Phase 1	✓	✓							
28	Power factor, Phase 2	✓	✓							
29	Power factor, Phase 3	✓	✓							
30	THD, Current, Line 1	✓								
31	THD, Current, Line 2	✓								
32	THD, Current, Line 3	✓								
33	THD, Neutral current 3P4W 3.00	✓								
34	THD, Delta voltage, 1 – 2	✓								
35	THD, Delta voltage, 2 – 3	✓								
36	THD, Delta voltage, 3 – 1	✓								
37	THD, Phase voltage, Phase 1	✓								
38	THD, Phase voltage, Phase 2	✓								
39	THD, Phase voltage, Phase 3	✓								
40	Phase angle between phase voltages, 1 – 2									
41	Phase angle between phase voltages, 2 – 3									
42	Phase angle between phase voltages, 3 – 1									
100	Active energy, high tariff, incoming									
101	Reactive energy, high tariff, LAG									
102	Apparent energy, high tariff									
103	Active energy, high tariff, outgoing									
104	Reactive energy, high tariff, LEAD									
105	Reactive energy, high tariff, incoming/LAG									
106	Reactive energy, high tariff, incoming/LEAD									
107	Reactive energy, high tariff, outgoing/LAG									
108	Reactive energy, high tariff, outgoing/LEAD									
109	Energy count time, high tariff									
110	Active energy, low tariff, incoming									
111	Reactive energy, low tariff, LAG									
112	Apparent energy, low tariff									
113	Active energy, low tariff, outgoing									
114	Reactive energy, low tariff, LEAD									

Σ view PRMTR	BASIC PARAMETER.	EXTENSION								
		MAX	MIN	AVE	AVE HIST1	AVE HIST2	AVE HIST3	AVE HIST4	MAX AVE	MAX AVE (out)
115	Reactive energy, low tariff, incoming/LAG									
116	Reactive energy, low tariff, incoming/LEAD									
117	Reactive energy, low tariff, outgoing/LAG									
118	Reactive energy, low tariff, outgoing/LEAD									
119	Energy count time, low tariff									
210	Reactive energy, high tariff, incoming									
211	Reactive energy, high tariff, outgoing									
212	Active energy, high tariff, incoming - outgoing									
213	Reactive energy, high tariff, incoming + outgoing									
310	Reactive energy, low tariff, incoming									
311	Reactive energy, low tariff, outgoing									
312	Active energy, low tariff, incoming - outgoing									
313	Reactive energy, low tariff, incoming + outgoing									

■ HARMONIC

→ + ↑ Hold down both buttons for 1 second or more to switch from various setting mode to the harmonics.
 ← → ↓ ↑ Press triangle buttons to switch the views.



*1. I3 : Line 3 Current HD
 IN : Neutral current HD **3P4W 3.00**
 U12 : 1-2 Delta voltage HD
 U23 : 2-3 Delta voltage HD
 U31 : 3-1 Delta voltage HD
 U1N : 1-N Phase voltage HD
 U2N : 2-N Phase voltage HD

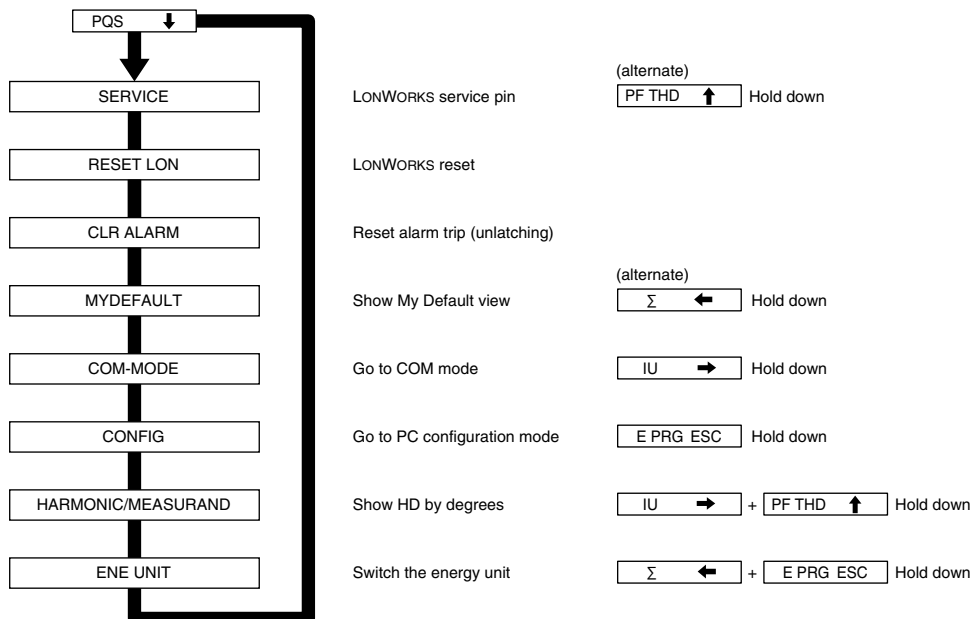
■ SHORTCUT MENU

Hold down ↓ button until the 4th line is switched to the shortcut menu.
 Resetting alarm trip and other operations are swiftly executed using this menu.

Press ↓ button one or more times to scroll the menu.

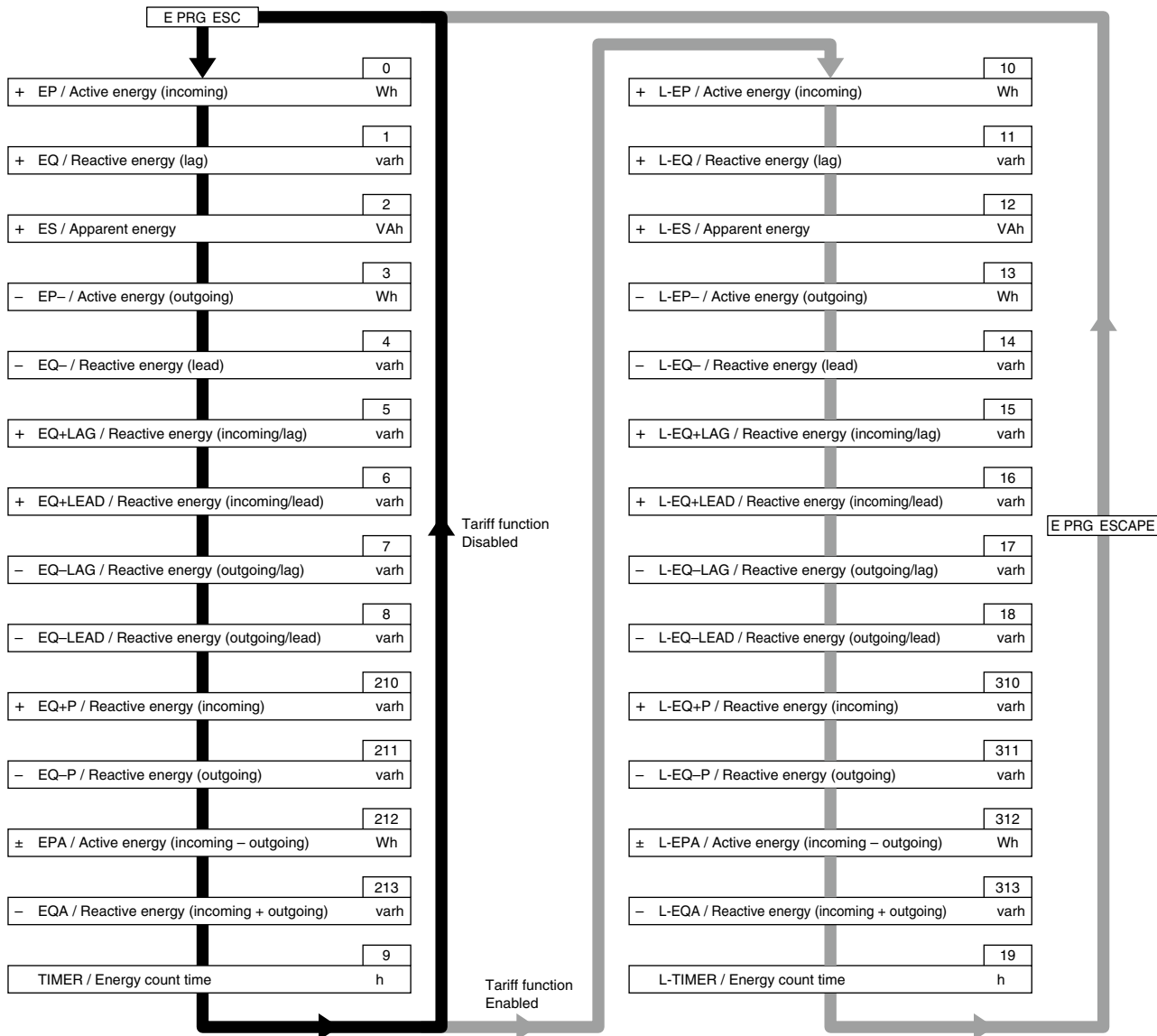
Press ↵ button to execute a menu command.

Press any other button to exit the shortcut menu.



■ HOW TO SWITCH THE DISPLAY FOR LINE 4

Σ + E PRG ESC Hold down both buttons for 1 second or more to switch the watt-hour unit with or without 'k.'



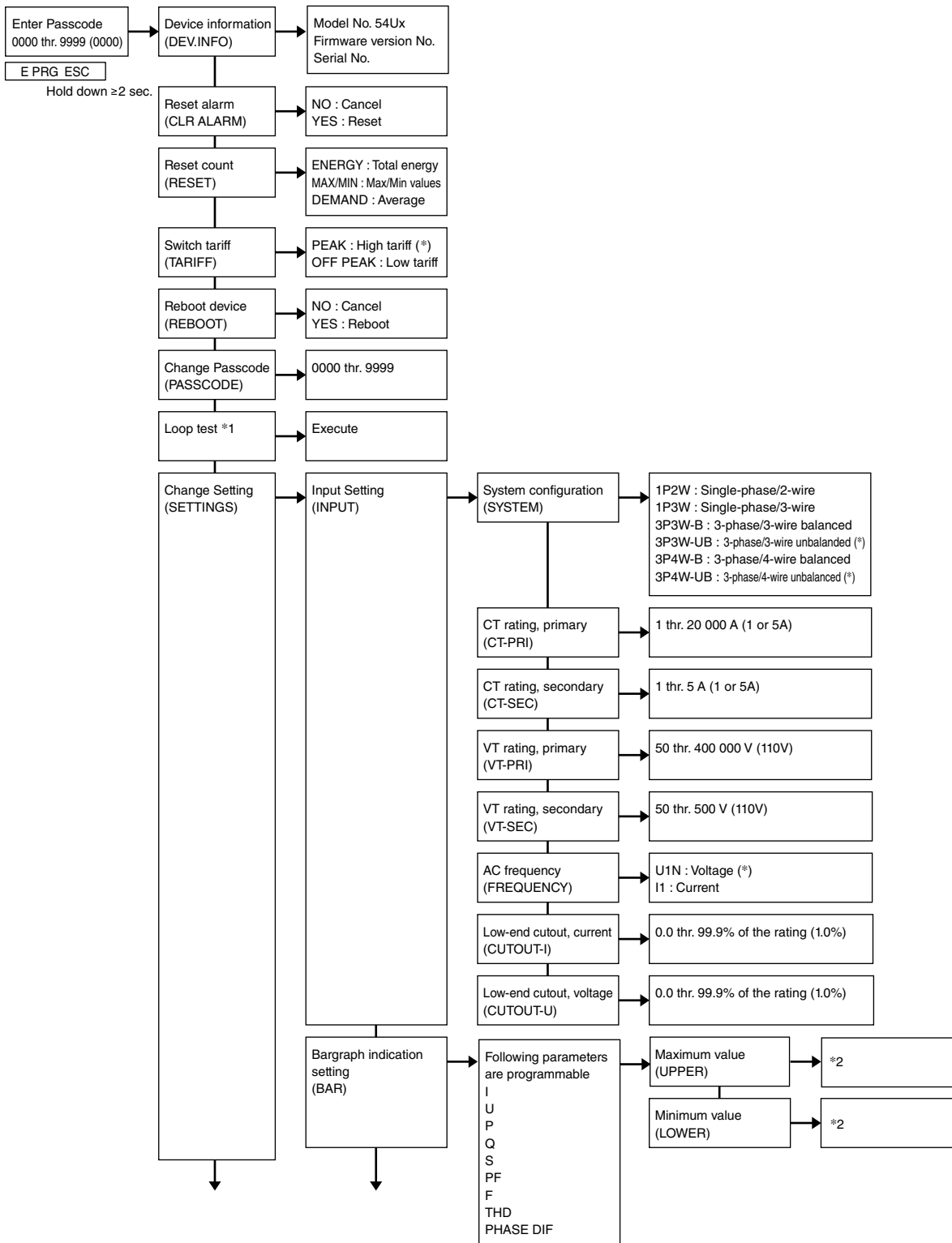
OL : Overrange input
ERR : System error

PROGRAMMING FLOWCHART

PF THD ↑ PQS ↓ : Move between menu items

MAX ← : Select

E PRG ESC : Go up one level in the chart



(*) or () : Factory setting

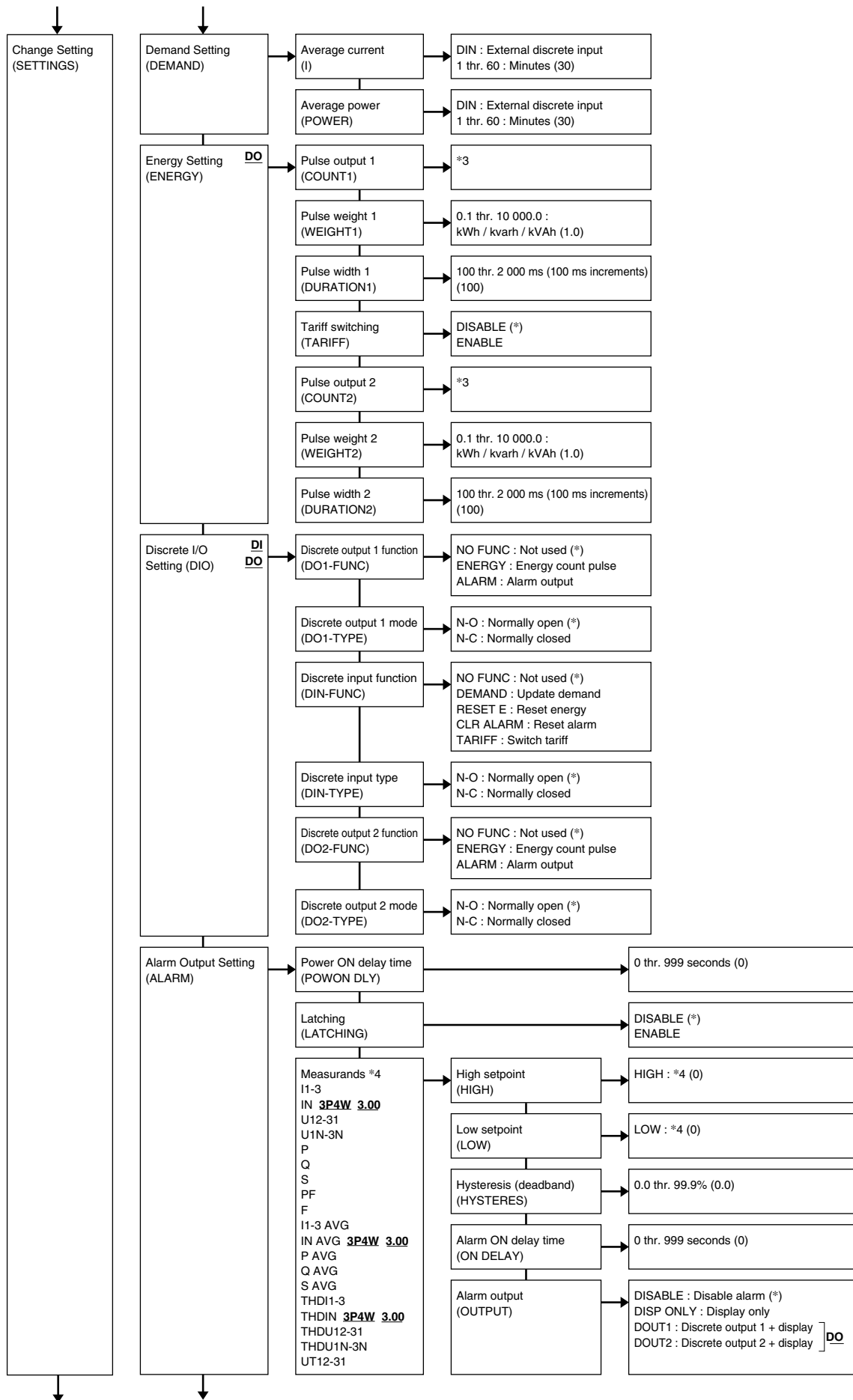
System configuration factory setting
 54UL-1: 3P3W-UB
 54UL-2: 3P4W-UB

*1. Simulated output without applying actual input signals.

[Loop Test]

Press MAX ← button to switch among outputs. Press Σ ←, IU →, PQS ↓, PF THD ↑ buttons to increase/decrease output signal or to change output status (ON or OFF).

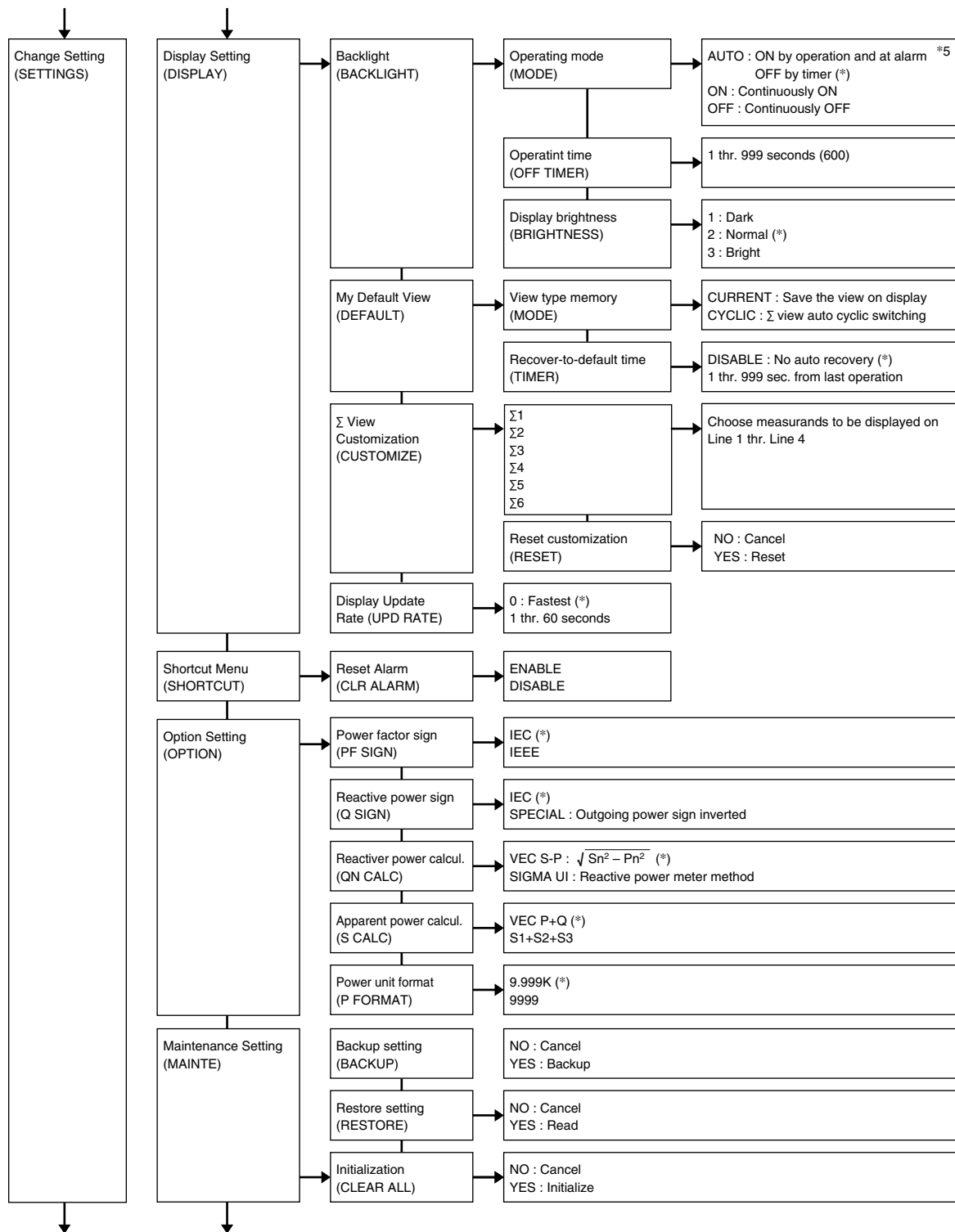
*2. Refer to "SETTING BARGRAPH INDICATION" in "SETTING EXAMPLE" section.



(*) or () : Factory setting

*3. Refer to "ENERGY COUNT TYPE" later in this section.

*4. Refer to "ALARM OUTPUT SETTING" later in this section.



(*) or () : Factory setting

*5. The backlight turns on regardless of this setting in case of alarms/errors.

■ ALARM OUTPUT SETTING

ID *1	DEFINITION	LOW SETPOINT	HIGH SETPOINT	UNIT
I1-3	Current, Line 1 thr. Line 3	0.000	20 000.000	A
IN	Neutral current 3P4W 3.00	0	20 000	A
U12-31	Delta voltage, Line 1 – 2, 2 – 3, 3 – 1	0.00	400 000.00	V
U1N-3N	Phase voltage, Phase 1 thr. Phase 3	0.00	400 000.00	V
P	Active power	-2 000 000 000	2 000 000 000	W
Q	Reactive power	-2 000 000 000	2 000 000 000	var
S	Apparent power	0	2 000 000 000	VA
PF	Power factor	-1.0000	1.0000	—
F	Frequency	45.00	65.00	Hz
I1-3 AVG	Average current, Line 1 thr. Line 3 (demand)	0.000	20 000.000	A
IN AVG	Average neutral current (demand) 3P4W 3.00	0	20 000	A
P AVG	Average active power (demand)	-2 000 000 000	2 000 000 000	W
Q AVG	Average reactive power (demand)	-2 000 000 000	2 000 000 000	var
S AVG	Average apparent power (demand)	0	2 000 000 000	VA
THD I1-3	THD, Current, Line 1 thr. Line 3	0.0	999.9	%
THD IN	THD, Neutral current 3P4W 3.00	0.0	999.9	%
THD U12-31	THD, Delta voltage, Line 1 – 2, 2 – 3, 3 – 1	0.0	999.9	%
THD U1N-3N	THD, Phase voltage, Phase 1 thr. Phase 3	0.0	999.9	%
UT12-31	Phase angle between voltages, Phase 1 – 2, 2 – 3, 3 – 1	-180	180	°

*1. Indicated while in alarm conditions.

ENERGY COUNT TYPE

ID	PARAMETER
T-EP	Active energy, incoming (*)
T-EQ	Reactive energy, LAG
T-ES	Apparent energy
T-EP-	Active energy, outgoing
T-EQ-	Reactive energy, LEAD
T-EQ+LAG	Reactive energy, incoming, LAG
T-EQ+LEAD	Reactive energy, incoming, LEAD
T-EQ-LAG	Reactive energy, outgoing, LAG
T-EQ-LEAD	Reactive energy, outgoing, LEAD
T-EQ+P	Reactive energy, incoming
T-EPA	Active energy, (incoming - outgoing)
T-EQA	Reactive energy, (incoming + outgoing)
EP	Active energy, high tariff, incoming
EQ	Reactive energy, high tariff, LAG
ES	Apparent energy, high tariff
EP-	Active energy, high tariff, outgoing
EQ-	Reactive energy, high tariff, LEAD
EQ+LAG	Reactive energy, high tariff, incoming, LAG
EQ+LEAD	Reactive energy, high tariff, incoming, LEAD
EQ-LAG	Reactive energy, high tariff, outgoing, LAG
EQ-LEAD	Reactive energy, high tariff, outgoing, LEAD
EQ+P	Reactive energy, high tariff, incoming
EQ-P	Reactive energy, high tariff, outgoing
EQA	Reactive energy, high tariff, (incoming + outgoing)
L-EP	Active energy, low tariff, incoming
L-EQ	Reactive energy, low tariff, LAG
L-ES	Apparent energy, low tariff
L-EP-	Active energy, low tariff, outgoing
L-EQ-	Reactive energy, low tariff, LEAD
L-EQ+LAG	Reactive energy, low tariff, incoming, LAG
L-EQ+LEAD	Reactive energy, low tariff, incoming, LEAD
L-EQ-LAG	Reactive energy, low tariff, outgoing, LAG
L-EQ-LEAD	Reactive energy, low tariff, outgoing, LEAD
L-EQ+P	Reactive energy, low tariff, incoming
L-EQ-P	Reactive energy, low tariff, outgoing
L-EQA	Reactive energy, low tariff, (incoming + outgoing)

(*) Factory setting

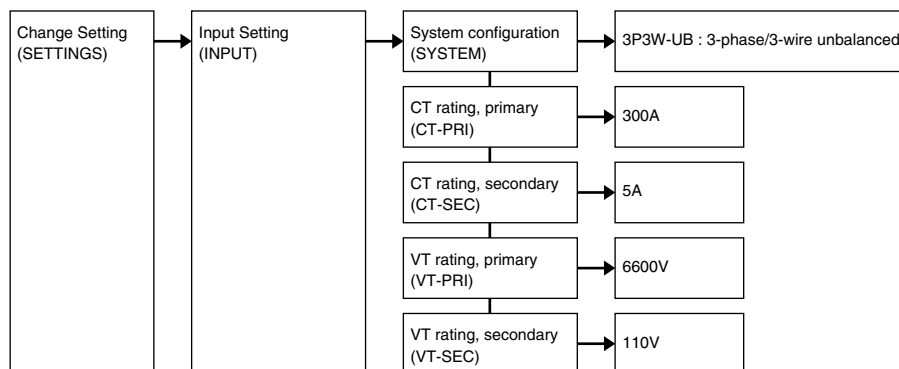
SETTING EXAMPLES

■ SETTING INPUT CONFIGURATION

Input system: Three-phase / 3-wire, unbalanced load

CT ratio: 300 A / 5 A

VT ratio: 6600 V / 110 V



■ SETTING BARGRAPH INDICATION (Refer to “PROGRAMMING FLOWCHART” in “OPERATION FLOWCHART” section.)

Current range: 0 – 150 A

Voltage range: 0 – 9000 V

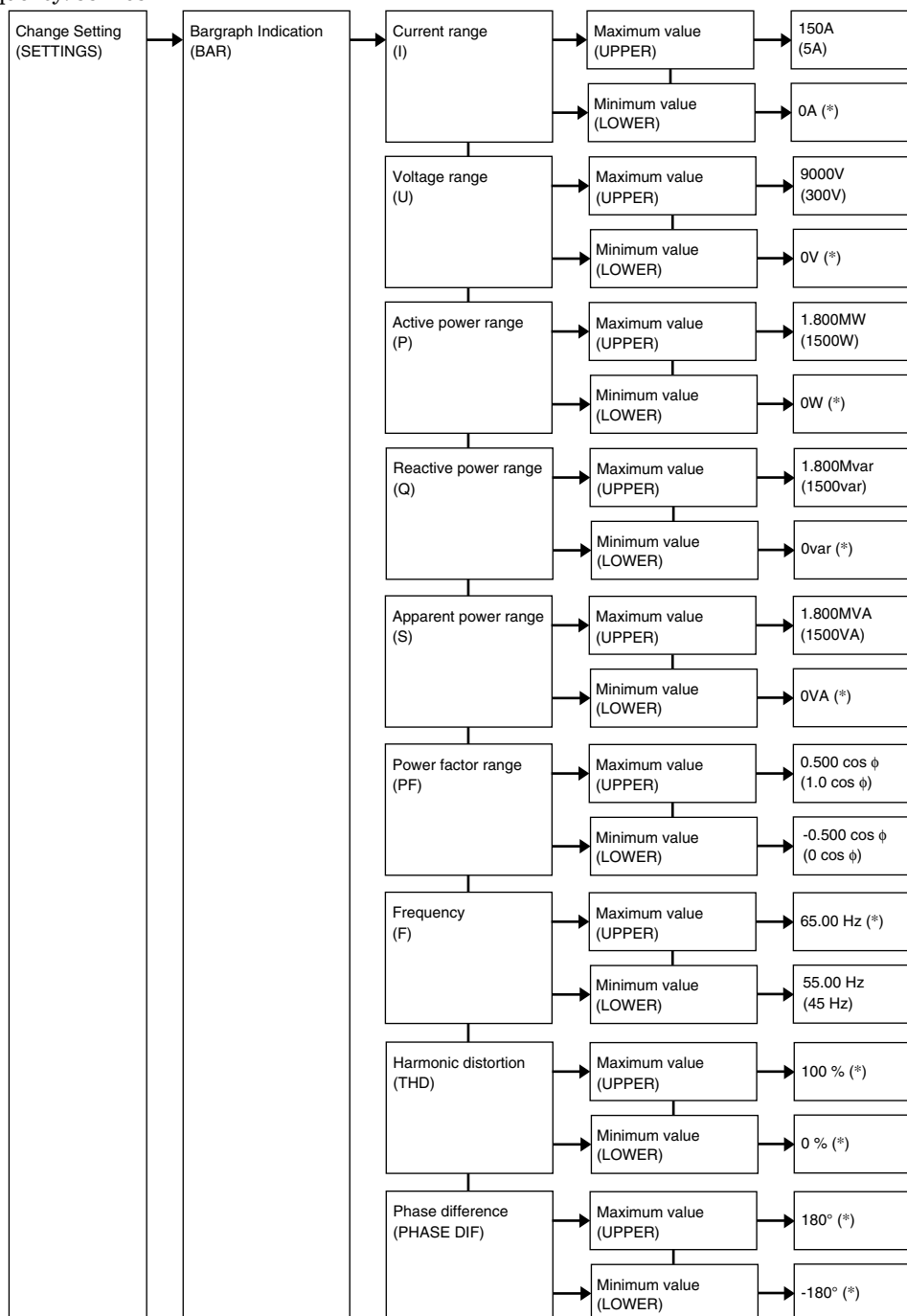
Active power range: 0 – 1.800 MW

Reactive power range: 0 – 1.800 Mvar

Apparent power range: 0 – 1.800 MVA

Power factor range: LEAD 0.5 – 1 – LAG 0.5

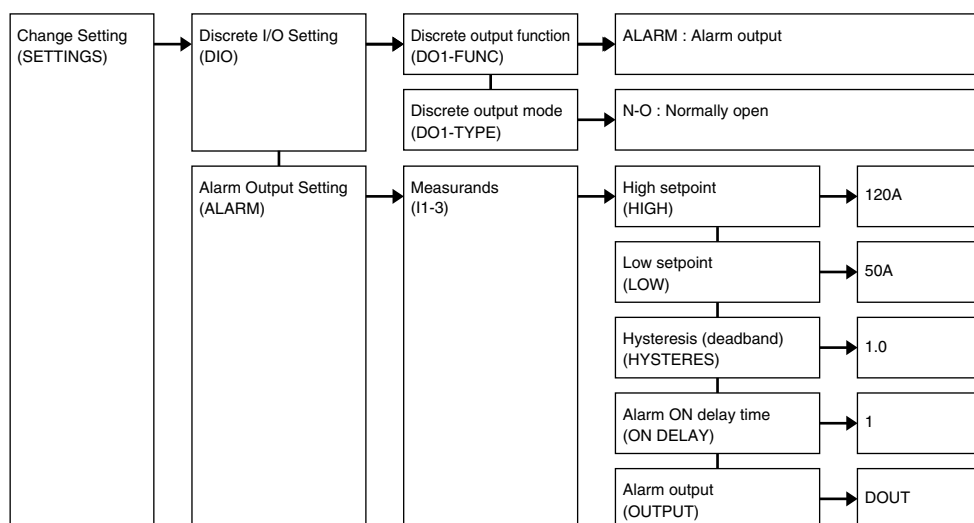
Frequency: 55 – 65 Hz



(*) or (): Factory setting

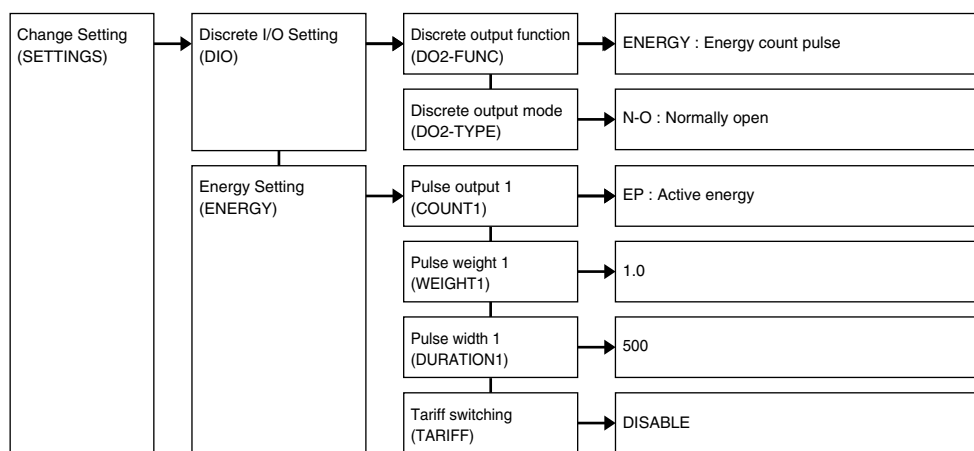
■ SETTING ALARM OUTPUT

Measurand: Current
 Low setpoint: 50 A
 High setpoint: 120 A
 Hysteresis (deadband): 1%
 Alarm ON delay time: 1 second
 Discrete output: DO1



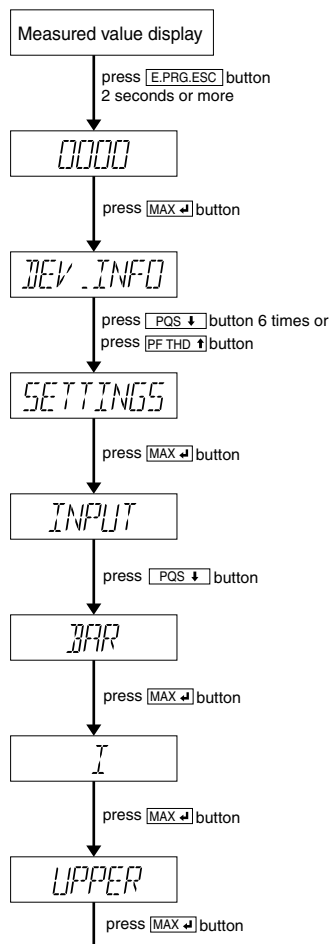
■ SETTING ENERGY COUNT OUTPUT

Measurand: Active energy
 Pulse weight: 1 kWh/count
 ON pulse width: 500 msec.
 Discrete output: DO2

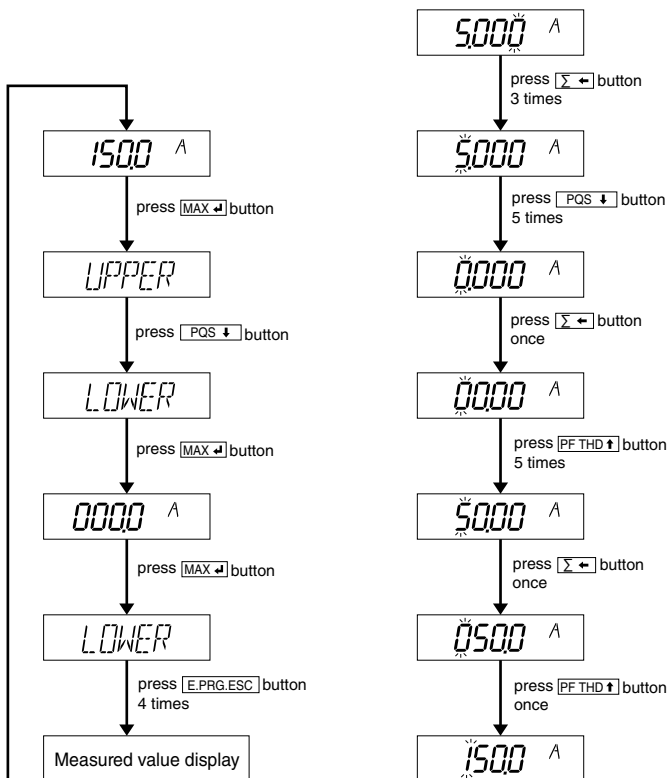


OPERATION EXAMPLES

■ HOW TO SET BARGRAPH INDICATION



■ HOW TO CHANGE VALUES (e.g. 5.000A to 150.0A)



Press [PQS ↓] [PF THD ↑] to increase or decrease the value.

Press [Σ ←] [IU →] to move between digits.

Pressing [Σ ←] at the leftmost digit shifts the value on display to the right by 1 digit.
The decimal point and unit are also switched to appropriate ones.

ERROR MESSAGES

ERR24

'ERR' followed by numerical figures means a system error. Each figure indicates a particular system error status if there are more than one digit of figures.

FIG	ERROR DIAGNOSTICS	WHAT TO DO
1	Firmware destroyed	Repair at the factory
2	Calibration data destroyed	Repair at the factory
3	System parameters destroyed System parameters stored in the device are destroyed, often due to excessive noise interference.	Initialize the system parameters and set them up again. Go to SETTINGS → MAINTENANCE → ALL CLEAR → YES
4	Energy reading data destroyed Energy reading data stored in the device are destroyed, often due to excessive noise interference.	Reset the energy readings (all energy and time count) to zero. Go to RESET → ENERGY
5	Average (demand) data destroyed Average (demand) data stored in the device are destroyed, often due to excessive noise interference.	Reset the average readings to zero. Go to RESET → DEMAND
6	Statistical data destroyed Statistical data (e.g. MAX/MIN values) stored in the device are destroyed, often due to excessive noise interference.	Reset the statistical data to zero. Go to RESET → MAX/MIN

OL FIU

'OL' followed by a space and alphabets means an input overload error. Each alphabet indicates a particular input error if there are more than one digit of alphabets.

CHR	ERROR DIAGNOSTICS	WHAT TO DO
F	Either U1N or I1 (selectable) input is lost or the input line frequency is out of measurable range (45 – 65 Hz).	Check the input signals/wiring.
I	Either of the current inputs is overload (120% or more of the rating).	Check the input signals.
U	Either of the voltage inputs is overload (120% or more of the rating).	Check the input signals.