

MULTI POWER TRANSDUCER
MODEL LSMT2
MODEL & SUFFIX CODE SELECTION
LSMT2-□□□□□□-□
MODEL
CONFIGURATION

- 1** : 3-phase / 3-wire (See P. 5/10)
2 : Single-phase / 2-wire (See P. 7/10)
3 : Single-phase / 3-wire (See P. 8/10)
4 : 3-phase / 4-wire (See P. 9/10)

VOLTAGE INPUT

- 0** : None
1 : 110V AC
2 : 220V AC
4 : 380V AC
A : 100V / 200V AC

CURRENT INPUT

- 0** : None
1 : 1A AC
5 : 5A AC

ZERO-PHASE VOLTAGE INPUT

- 0** : None
1 : 110V AC
2 : 190V AC

DC OUTPUT

- | Current | Voltage |
|------------------------|-----------------------|
| A : 4 – 20mA DC | 4 : 0 – 10V DC |
| G : 0 – 1mA DC | 5 : 0 – 5V DC |
| | 6 : 1 – 5V DC |

PULSE / NETWORK OUTPUT

- 0** : None (with zero-phase voltage input selected)
1 : Watthours
M : Modbus

AUXILIARY POWER SUPPLY

- | AC Power | DC Power |
|-------------------------|--------------------|
| M : 85 – 264V AC | R : 24V DC |
| | V : 48V DC |
| | P : 110V DC |

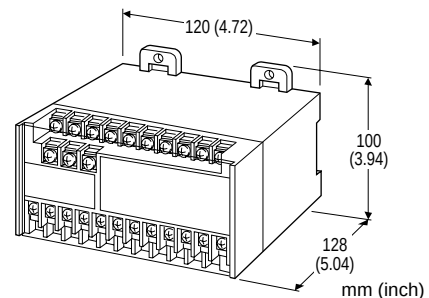
ORDERING INFORMATION

See later pages of this data sheet for detailed information about availability of the functions for each input configuration.

The unit is configured at the factory according to the user's specifications, however, measuring items can be freely selected and assigned to up to 10 output channels via the front panel control switches, except V_0 : zero-phase voltage or MV_0 : max. zero-phase voltage which require specific hardware to be ordered.

The measuring items are listed below:

- | | |
|-------------------------------------|---------------------------|
| A = Line current | V = Line voltage |
| W = Watt, active power | var = var, reactive power |
| PF = Power factor | Hz = Frequency |
| V_0 = Zero-phase voltage | |
| MV_0 = Maximum zero-phase voltage | |


Functions & Features

- Converting all major factors required for power management into DC outputs
- Compact design
- 10 analog outputs and 1 Wh pulse output or Modbus output
- Saving wiring space
- DIN rail mounting
- Free selection of measuring items, assigned to any output channel
- Transducer input range is selectable with Watt, Var, Power Factor or Frequency
- Linear output for bidirectional current for Var and Power Factor
- Output characteristics can be changed according to Lag/Lead for Var and Power Factor

Typical Applications

- Monitoring panels

GENERAL SPECIFICATIONS

Construction: stand-alone; terminal access at the front
Connection

Input and aux. supply: M4 screw terminals

Output: M3.5 screw terminals

Screw terminals: nickel-plated brass (torque 0.8 N·m)

Housing material: flame-resistant resin (black)

Isolation: voltage input to current input to DC output or pulse (network) output to aux. supply; negatives common to all outputs

Computation: digital processor

Output range: approx. 0 – 100% at 1 – 5V

Zero/span adjustments: $\pm 4\%$ independently adjustable for each measuring item

Address setting: 0 – 249 selectable (front; default 001)

Overrange output limit: high 101%, low -1% (resettable)

Sampling rate: approx. 500 μ sec.

(DO NOT connect directly to inverters.)

MODBUS COMMUNICATION

Standard: Conforms to RS-485, EIA

Baud rate: 1200, 2400, 4800, 9600, 19.2k bps
selectable (front)

Communication: Half-duplex, asynchronous, no
procedure

Protocol: Modbus RTU

Transmission distance: 500 meters max.

Transmission media: shielded twisted-pair cable
(CPEV-S 0.9 dia.)

Refer to the Modbus Protocol Reference Guide (EM-5650) for supported functions.

INPUT & OUTPUT

INPUT

• **Voltage Input** (must be balanced for 3-phase)

Operational range

Voltage & active/reactive power: 0 – 110% of rating

Power factor & frequency: 90 – 110% of rating

Overload capacity: 200% of rating for 10 sec.,
120% continuous

Input burden: $\leq 0.2\text{VA/phase}$ for 110V AC
 $\leq 0.3\text{VA/phase}$ for 220V AC
 $\leq 0.5\text{VA/phase}$ for 380V AC

• **Current Input** (can be unbalanced for 3-phase)

Operational range

Current & active/reactive power: 0 – 120% of rating

Power factor: 20 – 120% of rating

Overload capacity: 4000% of rating for 1 sec., 2000%
for 4 sec., 120% continuous

Input burden: $\leq 0.3\text{VA/phase}$

OUTPUT

• **DC Current**

Load resistance

4 – 20mA : 600 (Ω maximum)
0 – 1mA : 10k

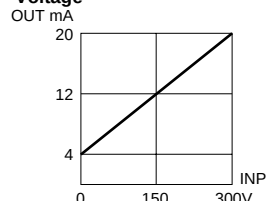
• **DC Voltage**

Load resistance

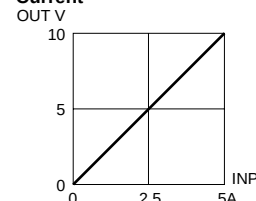
0 – 10V : 1000 (Ω minimum)
0 – 5V : 1000
1 – 5V : 1000

I/O CHARACTERISTICS

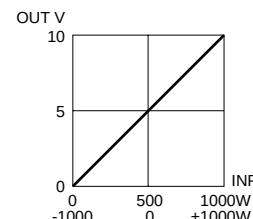
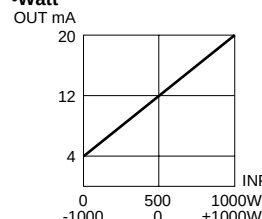
• **Voltage**



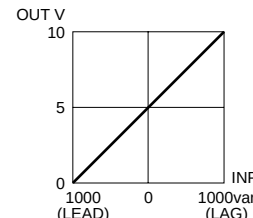
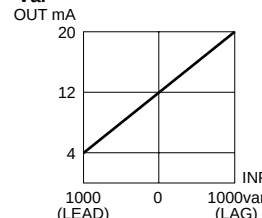
• **Current**



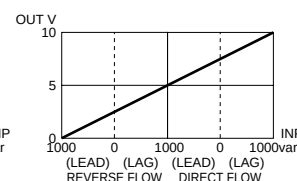
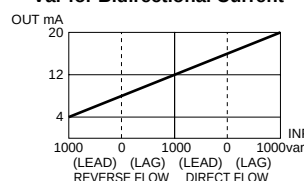
• **Watt**



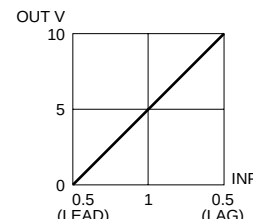
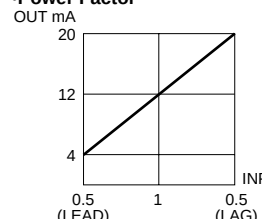
• **Var**



• **Var for Bidirectional Current**

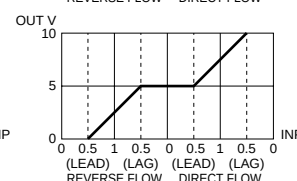
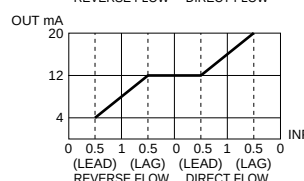
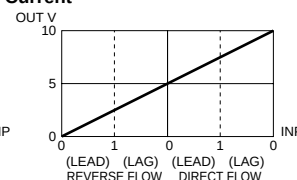
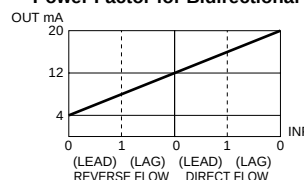


• **Power Factor**



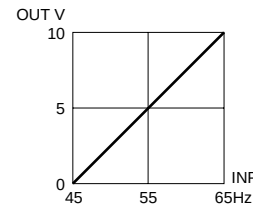
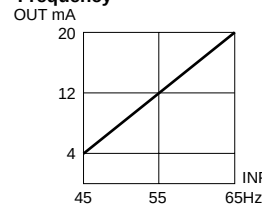
When the input voltage is zero or the current is the twentieth or less of the rating, the output is either equivalent to power factor 1 or 0% or less (selectable).

• **Power Factor for Bidirectional Current**



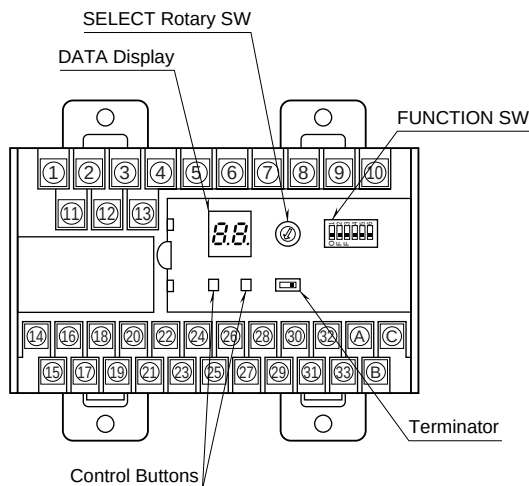
When the input voltage is zero or the current is the twentieth or less of the rating, the output is either equivalent to power factor 1 or 0% or less (selectable).

• **Frequency**



When the input voltage is the fifth or less of the rating, the output is equivalent to the input frequency – 2Hz.

FRONT PANEL CONFIGURATION



DATA display: green LED; 5 mm (.2 in)

FUNCTION SW: Used to turn the unit into SET mode and choose functions.

SELECT rotary SW: Used to choose output channels, programmable items, etc. in Set mode.

Control buttons: Used to increase (+) / decrease (–) the values, or move forward (+) / back (–) to other items in Set mode.

Continuously pressing the button increases incremental speed.

	OFF	ON
SW1	Run mode	Set mode
SW2	Output Adj. mode	Configure mode
SW3	Zero adj.	Span adj.
SW4	Measured value output	Simulated rated value output
SW5	—	—
SW6	Run mode	Assign mode

Terminator: For Modbus communication.

■PROGRAMMING PROCEDURE (example)

•Zero/Span Adjustments

SW1 : ON (Set mode)

SW2 : OFF (Output Adj. mode)

SW3 : OFF (zero) or ON (span)

Rotary SW : Choose the output channel.

Control buttons : Watching the DATA display showing adjusted value, press (+) for increasing or (–) for decreasing the value. Adjustable to $\pm 5\%$.

•Configuration Change (range, lag/lead, etc.)

SW1 : ON (Set mode)

SW2 : ON (Configure mode)

Rotary SW : Choose the item to be programmed.

Control buttons : Watching the DATA display showing data No., press (+) or (–) for changing data.

•Assigning Output Channels

SW1 : ON (Set mode)

SW6 : ON (Assign mode)

Rotary SW : Choose the output channel.

Control buttons : Watching the DATA display showing measuring item No., press (+) or (–) for changing data.

INSTALLATION

Auxiliary power supply

AC: operational voltage range: 85 – 264V, 50/60 Hz, approx. 10VA

DC: operational voltage range: rating $\pm 10\%$, or 85 – 150V for 110V rating; ripple 10% p-p max.; approx. 10W (90mA at 110V)

Operating temperature: -10 to +55°C (14 to 131°F)

Operating humidity: 40 to 85% RH (non-condensing)

Mounting: surface or DIN rail

Dimensions: W125×H100×D128 mm (4.72"×3.94"×5.04")

Weight: 600 g (1.3 lbs)

PERFORMANCE in percentage of span

Accuracy

Voltage, current, watt, var, frequency: $\pm 0.5\%$

Power factor: $\pm 1.5\%$

Zero-phase voltage: $\pm 1.0\%$

Max. zero-phase voltage: $\pm 1.0\%$

Watthours: $\pm 2.0\%$ (load current 5 – 100%, power factor 1.0)
 $\pm 2.5\%$ (load current 10 – 100%, power factor 0.5, lag current)

Temp. conditioning incl. in the accuray: $23 \pm 10^\circ\text{C}$
 $(73.4 \pm 18^\circ\text{F})$

Freq. conditioning incl. in the accuray: rating $\pm 5\%$

Response time (0 – 100% $\pm 1\%$): ≤ 1 sec.
 except for zero-phase voltage: ≤ 0.1 sec.

Ripple: 1% p-p max.

Auxiliary supply voltage effect: half the accuracy over voltage range

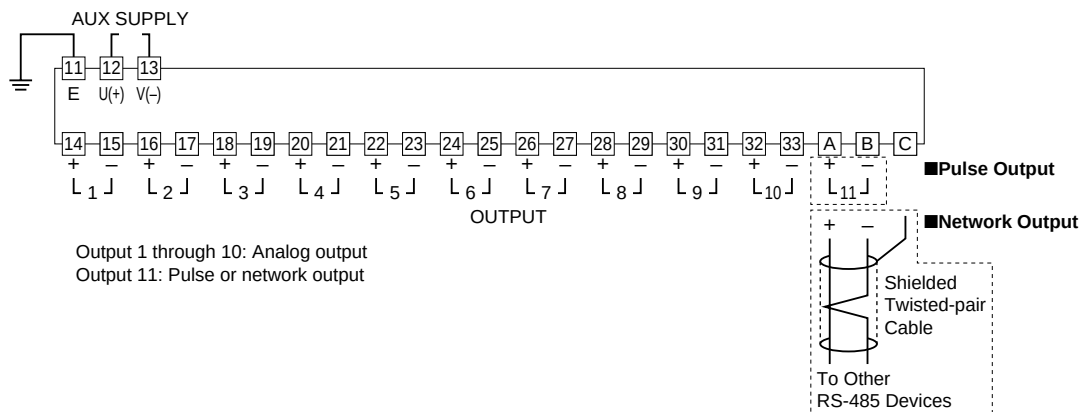
Power failure protection: VT/CT ratios, watthours, max. zero-phase voltage are stored in the non-volatile memory.

Insulation resistance: $\geq 50\text{M}\Omega$ with 500V DC
 (voltage input to current input to DC output to pulse (network) output to aux. supply to ground)

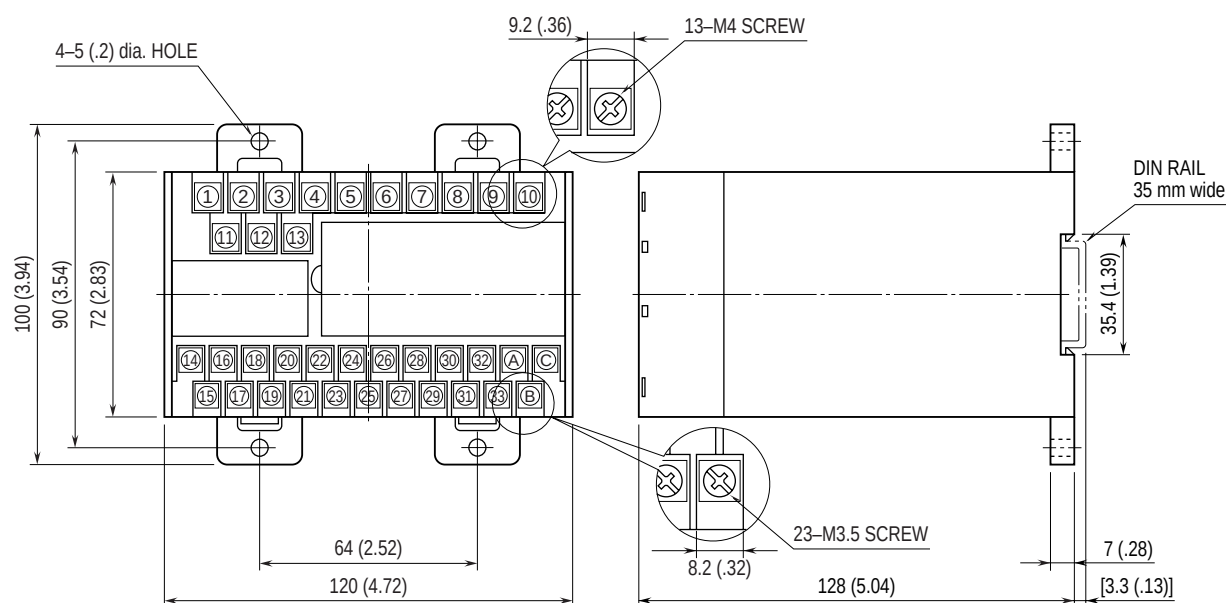
Dielectric strength: 2000V AC @1 minute
 (circuit to ground; voltage input terminals to output terminals; aux. supply to input or output terminals)
 1500V AC @1 minute
 (output terminals to ground)

Surge withstand voltage: 1.2/50 $\mu\text{sec.}$, $\pm 6\text{kV}$
 (circuit to ground; voltage input terminals to output terminals)

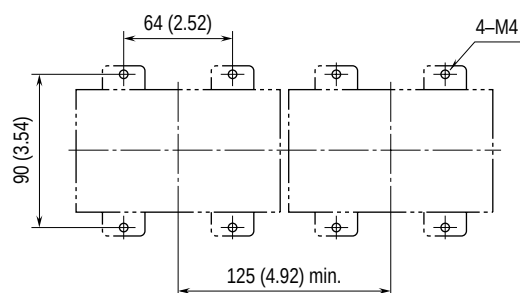
CONNECTION DIAGRAM, OUTPUT & AUXILIARY SUPPLY



EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENT mm (inch)



MOUNTING REQUIREMENTS mm (inch)



3-PHASE / 3-WIRE CONNECTION

MODEL **LSMT2-1**

MODEL & SUFFIX CODE SELECTION

LSMT2-1□□□□□-□

MODEL

CONFIGURATION

1 : 3-phase / 3-wire

VOLTAGE INPUT

0 : None

1 : 110V AC

2 : 220V AC

CURRENT INPUT *1

0 : None

1 : 1A AC

5 : 5A AC

*1: Alternative choice of V_0 or current.

ZERO-PHASE VOLTAGE INPUT (V_0) *1

0 : None

1 : 110V AC

2 : 190V AC

DC OUTPUT

Current

Voltage

A : 4 – 20mA DC

4 : 0 – 10V DC

G : 0 – 1mA DC

5 : 0 – 5V DC

6 : 1 – 5V DC

PULSE / NETWORK OUTPUT

0 : None (with zero-phase voltage input selected)

1 : Watthours

M : Modbus

AUXILIARY POWER SUPPLY

AC Power

DC Power

M : 85 – 264V AC

R : 24V DC

V : 48V DC

P : 110V DC

ORDERING INFORMATION

Specify code number and variables (e.g. LSMT2-1150A1-M). Use Ordering Information Sheet (No. ESU-1954-1).

The unit is configured at the factory according to the user's specifications, however, measuring items can be freely selected and assigned to up to 10 output channels via the front panel control switches, except that V_0 : zero-phase voltage is available only when specified in ordering.

The measuring items are listed below:

A = Line current

V = Line voltage

W = Watt, active power

var = var, reactive power

PF = Power factor

Hz = Frequency

V_0 = Zero-phase voltage

INPUT RANGE

•Voltage

RATING

RANGE

110V

0 – 150V

220V

0 – 300V

•Current

RATING

RANGE

1A

0 – 1A

5A

0 – 5A

•Active power

Input range and $\pm$ can be changed via the front panel.

RATING	RANGE	
110V / 1A	0 – 100W	-100 – +100W
	0 – 150W	-150 – +150W
	0 – 166.6W	-166.6 – +166.6W
	0 – 200W	-200 – +200W
110V / 5A	0 – 500W	-500 – +500W
	0 – 750W	-750 – +750W
	0 – 833W	-833 – +833W
	0 – 1000W	-1000 – +1000W
220V / 1A	0 – 200W	-200 – +200W
	0 – 300W	-200 – +200W
	0 – 333.3W	-333.3 – +333.3W
	0 – 400W	-400 – +400W
220V / 5A	0 – 1000W	-1000 – +1000W
	0 – 1500W	-1500 – +1500W
	0 – 1666W	-1666 – +1666W
	0 – 2000W	-2000 – +2000W

•Reactive power

Input range and lag/lead can be changed via the front panel.

RATING	RANGE	
110V / 1A	0 – lag 100 var	lead 100 – lag 100 var
	0 – lag 150 var	lead 150 – lag 150 var
	0 – lag 166.6 var	lead 166.6 – lag 166.6 var
	0 – lag 200 var	lead 200 – lag 200 var
110V / 5A	0 – lag 500 var	lead 500 – lag 500 var
	0 – lag 750 var	lead 750 – lag 750 var
	0 – lag 833 var	lead 833 – lag 833 var
	0 – lag 1000 var	lead 1000 – lag 1000 var
220V / 1A	0 – lag 200 var	lead 200 – lag 200 var
	0 – lag 300 var	lead 200 – lag 200 var
	0 – lag 333.3 var	lead 333.3 – lag 333.3 var
	0 – lag 400 var	lead 400 – lag 400 var
220V / 5A	0 – lag 1000 var	lead 1000 – lag 1000 var
	0 – lag 1500 var	lead 1500 – lag 1500 var
	0 – lag 1666 var	lead 1666 – lag 1666 var
	0 – lag 2000 var	lead 2000 – lag 2000 var

•Zero-phase voltage

RATING	RANGE
110V	0 – 150V
190V	0 – 260V

Power factor: lead 0.5 – 1 – lag 0.5

lag 0.5 – 1 – lead 0.5

lead 0 – 1 – lag 0

lag 0 – 1 – lead 0

Input range and lag/lead can be changed via the front panel.

Frequency: 45 – 55 Hz, 55 – 65 Hz, 45 – 65 Hz

Input range can be changed via the front panel.

Watthours

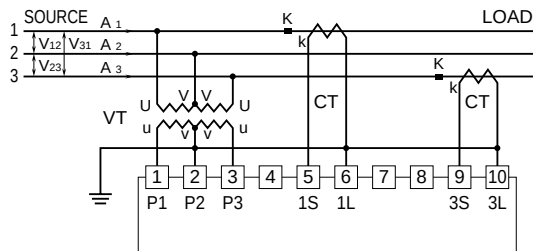
Ratio: 110V – 77kV at the VT primary

5 – 8000A at the CT primary

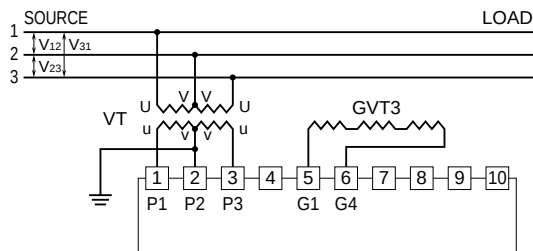
Pulse unit: 0.01, 0.1, 1, 10, 100, 1000 kWh/pulse

CONNECTION DIAGRAM, INPUT

•No Zero-phase Voltage Measuring



•With Zero-phase Voltage Measuring



SINGLE-PHASE / 2-WIRE CONNECTION

MODEL **LSMT2-2**

MODEL & SUFFIX CODE SELECTION

LSMT2-2□□0□□-□

MODEL _____
CONFIGURATION _____
2 : Single-phase / 2-wire
VOLTAGE INPUT _____
0 : None
1 : 110V AC
2 : 220V AC
CURRENT INPUT _____
0 : None
1 : 1A AC
5 : 5A AC
ZERO-PHASE VOLTAGE INPUT (V₀) _____
0 : None
DC OUTPUT _____
Current **Voltage**
A : 4 – 20mA DC **4** : 0 – 10V DC
G : 0 – 1mA DC **5** : 0 – 5V DC
 6 : 1 – 5V DC
PULSE / NETWORK OUTPUT _____
1 : Watthours
M : Modbus
AUXILIARY POWER SUPPLY _____
AC Power **DC Power**
M : 85 – 264V AC **R** : 24V DC
 V : 48V DC
 P : 110V DC

ORDERING INFORMATION

Specify code number and variables (e.g. LSMT2-2150A1-M). Use Ordering Information Sheet (No. ESU-1954-2).

The unit is configured at the factory according to the user's specifications, however, measuring items can be freely selected and assigned to up to 10 output channels via the front panel control switches.

The measuring items are listed below:

A = Line current V = Line voltage
W = Watt, active power
PF = Power factor Hz = Frequency

INPUT RANGE

•Voltage

RATING	RANGE	RATING	RANGE
110V	0 – 150V	1A	0 – 1A
220V	0 – 300V	5A	0 – 5A

•Current

•Active power

Input range and $\pm$ can be changed via the front panel.

RATING	RANGE	
110V / 1A	0 – 50W	-50 – +50W
	0 – 75W	-75 – +75W
	0 – 83.3W	-83.3 – +83.3W
	0 – 100W	-100 – +100W
110V / 5A	0 – 250W	-250 – +250W
	0 – 375W	-375 – +375W
	0 – 417W	-417 – +417W
	0 – 500W	-500 – +500W
220V / 1A	0 – 100W	-100 – +100W
	0 – 150W	-150 – +150W
	0 – 166.6W	-166.6 – +166.6W
	0 – 200W	-200 – +200W
220V / 5A	0 – 500W	-500 – +500W
	0 – 750W	-750 – +750W
	0 – 833W	-833 – +833W
	0 – 1000W	-1000 – +1000W

Power factor: lead 0.5 – 1 – lag 0.5
lag 0.5 – 1 – lead 0.5
lead 0 – 1 – lag 0
lag 0 – 1 – lead 0

Input range and lag/lead can be changed via the front panel.

Frequency: 45 – 55 Hz, 55 – 65 Hz, 45 – 65 Hz

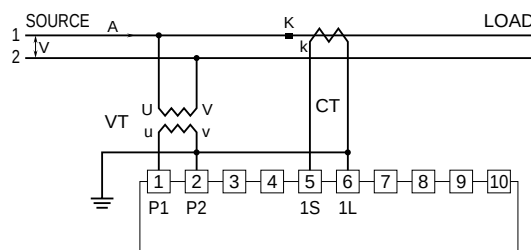
Input range can be changed via the front panel.

Watthours

Ratio: 110V – 77kV at the VT primary
5 – 8000A at the CT primary

Pulse unit: 0.01, 0.1, 1, 10, 100, 1000 kWh/pulse

CONNECTION DIAGRAM, INPUT



3-PHASE / 4-WIRE CONNECTION

MODEL **LSMT2-4**

MODEL & SUFFIX CODE SELECTION

LSMT2-4□□0□□-□

MODEL

CONFIGURATION

4 : 3-phase / 4-wire

VOLTAGE INPUT

0 : None

1 : $\frac{110V}{\sqrt{3}}$ / 110V AC

2 : $\frac{220V}{\sqrt{3}}$ / 220V AC

4 : $\frac{380V}{\sqrt{3}}$ / 380V AC

CURRENT INPUT

0 : None

1 : 1A AC

5 : 5A AC

ZERO-PHASE VOLTAGE INPUT (V₀)

0 : None

DC OUTPUT

Current

Voltage

A : 4 – 20mA DC

4 : 0 – 10V DC

G : 0 – 1mA DC

5 : 0 – 5V DC

6 : 1 – 5V DC

PULSE / NETWORK OUTPUT

1 : Watthours

M : Modbus

AUXILIARY POWER SUPPLY

AC Power

DC Power

M : 85 – 264V AC

R : 24V DC

V : 48V DC

P : 110V DC

ORDERING INFORMATION

Specify code number and variables (e.g. LSMT2-4150A1-M). Use Ordering Information Sheet (No. ESU-1954-4).

The unit is configured at the factory according to the user's specifications, however, measuring items can be freely selected and assigned to up to 10 output channels via the front panel control switches.

The measuring items are listed below:

A = Line current

V = Line voltage

W = Watt, active power

var = var, reactive power

PF = Power factor

Hz = Frequency

INPUT RANGE

•Voltage

RATING	PHASE VOLTAGE	LINE VOLTAGE
$\frac{110V}{\sqrt{3}}$	$\frac{0 - 150V}{\sqrt{3}}$	0 – 150V
$\frac{220V}{\sqrt{3}}$	$\frac{0 - 300V}{\sqrt{3}}$	0 – 300V
$\frac{380V}{\sqrt{3}}$	$\frac{0 - 450V}{\sqrt{3}}$	0 – 450V

•Current

RATING	RANGE
1A	0 – 1A
5A	0 – 5A

•Active power

Input range and ± can be changed via the front panel.

RATING	RANGE	
$\frac{110V}{\sqrt{3}}$ / 1A	0 – 100W	-100 – +100W
	0 – 150W	-150 – +150W
	0 – 166.6W	-166.6 – +166.6W
	0 – 200W	-200 – +200W
$\frac{110V}{\sqrt{3}}$ / 5A	0 – 500W	-500 – +500W
	0 – 750W	-750 – +750W
	0 – 833W	-833 – +833W
	0 – 1000W	-1000 – +1000W
$\frac{220V}{\sqrt{3}}$ / 1A	0 – 200W	-200 – +200W
	0 – 300W	-200 – +200W
	0 – 333.3W	-333.3 – +333.3W
	0 – 400W	-400 – +400W
$\frac{220V}{\sqrt{3}}$ / 5A	0 – 1000W	-1000 – +1000W
	0 – 1500W	-1500 – +1500W
	0 – 1666W	-1666 – +1666W
	0 – 2000W	-2000 – +2000W
$\frac{380V}{\sqrt{3}}$ / 1A	0 – 350W	-350 – +350W
	0 – 525W	-525 – +525W
	0 – 583W	-583 – +583W
	0 – 700W	-700 – +700W
$\frac{380V}{\sqrt{3}}$ / 5A	0 – 1750W	-1750 – +1750W
	0 – 2625W	-2625 – +2625W
	0 – 2917W	-2917 – +2917W
	0 – 3500W	-3500 – +3500W

•Reactive power

Input range and lag/lead can be changed via the front panel.

RATING	RANGE	
$\frac{110V}{\sqrt{3}} / 1A$	0 – lag 100 var	lead 100 – lag 100 var
	0 – lag 150 var	lead 150 – lag 150 var
	0 – lag 166.6 var	lead 166.6 – lag 166.6 var
	0 – lag 200 var	lead 200 – lag 200 var
$\frac{110V}{\sqrt{3}} / 5A$	0 – lag 500 var	lead 500 – lag 500 var
	0 – lag 750 var	lead 750 – lag 750 var
	0 – lag 833 var	lead 833 – lag 833 var
	0 – lag 1000 var	lead 1000 – lag 1000 var
$\frac{220V}{\sqrt{3}} / 1A$	0 – lag 200 var	lead 200 – lag 200 var
	0 – lag 300 var	lead 200 – lag 200 var
	0 – lag 333.3 var	lead 333.3 – lag 333.3 var
	0 – lag 400 var	lead 400 – lag 400 var
$\frac{220V}{\sqrt{3}} / 5A$	0 – lag 1000 var	lead 1000 – lag 1000 var
	0 – lag 1500 var	lead 1500 – lag 1500 var
	0 – lag 1666 var	lead 1666 – lag 1666 var
	0 – lag 2000 var	lead 2000 – lag 2000 var
$\frac{380V}{\sqrt{3}} / 1A$	0 – lag 350 var	lead 350 – lag 350 var
	0 – lag 525 var	lead 525 – lag 525 var
	0 – lag 583 var	lead 583 – lag 583 var
	0 – lag 700 var	lead 700 – lag 700 var
$\frac{380V}{\sqrt{3}} / 5A$	0 – lag 1750 var	lead 1750 – lag 1750 var
	0 – lag 2625 var	lead 2625 – lag 2625 var
	0 – lag 2917 var	lead 2917 – lag 2917 var
	0 – lag 3500 var	lead 3500 – lag 3500 var

Power factor: lead 0.5 – 1 – lag 0.5

lag 0.5 – 1 – lead 0.5

lead 0 – 1 – lag 0

lag 0 – 1 – lead 0

Input range and lag/lead can be changed via the front panel.

Frequency: 45 – 55 Hz, 55 – 65 Hz, 45 – 65 Hz

Input range can be changed via the front panel.

Watthours

Ratio: 110V – 77kV at the VT primary

5 – 8000A at the CT primary

Pulse unit: 0.01, 0.1, 1, 10, 100, 1000 kWh/pulse

CONNECTION DIAGRAM, INPUT

