MODEL & SUFFIX CODE SELECTION

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 V₀ : zero-phase voltage or MV₀ : 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
V₀ = Zero-phase voltage
MV₀ = 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: ±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 μsec.
(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

- **VOLTAGE 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: ≤0.2VA/phase for 110V AC
    ≤0.3VA/phase for 220V AC
    ≤0.5VA/phase for 380V AC

- **CURRENT INPUT**
  - 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: ≤0.3VA/phase

- **VOLTAGE 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**

Specifications subject to change without notice.
INSTALLATION

Auxiliary power supply
AC: operational voltage range: 85 – 264V, 50/60 Hz, approx. 10VA
DC: operational voltage range: rating ±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: ±0.5%
Power factor: ±1.5%
Zero-phase voltage: ±1.0%
Max. zero-phase voltage: ±1.0%
Watthours: ±2.0% (load current 5 – 100%, power factor 1.0)
±2.5% (load current 10 – 100%, power factor 0.5, lag current)

Temp. conditioning incl. in the accuracy: 23 ±10°C (73.4 ±18°F)

Freq. conditioning incl. in the accuracy: rating ±5%
Response time (0 – 100% ±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: ≥50MΩ 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 μsec., ±6kV
(circuit to ground; voltage input terminals to output terminals)
**CONNECTION DIAGRAM, OUTPUT & AUXILIARY SUPPLY**

Output 1 through 10: Analog output
Output 11: Pulse or network output

**EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENT mm (inch)**

- 4–5 (.2) dia. HOLE
- 9.2 (.36) 13–M4 SCREW
- 64 (2.52) 120 (4.72)
- 8.2 (.32) 128 (5.04)
- 23–M3.5 SCREW
- 35.4 (1.39)

**MOUNTING REQUIREMENTS mm (inch)**

- 64 (2.52) 4–M4
- 90 (3.54)
- 125 (4.92) min.
- 35 mm wide

Specifications subject to change without notice.
MODEL & SUFFIX CODE SELECTION

**MODEL CONFIGURATION**
1 : 3-phase / 3-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
1 : 10V AC
2 : 200V 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

**INPUT RANGE**

<table>
<thead>
<tr>
<th><strong>Voltage</strong></th>
<th><strong>Rating</strong></th>
<th><strong>Range</strong></th>
<th><strong>Current</strong></th>
<th><strong>Rating</strong></th>
<th><strong>Range</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>110V</td>
<td>0 – 150V</td>
<td>-100 – +100W</td>
<td>1A</td>
<td>0 – 1A</td>
<td></td>
</tr>
<tr>
<td>220V</td>
<td>0 – 300V</td>
<td>-166.6 – +166.6W</td>
<td>5A</td>
<td>0 – 5A</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th><strong>Rating</strong></th>
<th><strong>Range</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>110V / 1A</td>
<td>0 – 100W</td>
</tr>
<tr>
<td>0 – 150W</td>
<td>0 – 166.6W</td>
</tr>
<tr>
<td>0 – 200W</td>
<td>0 – 200W</td>
</tr>
<tr>
<td>0 – 500W</td>
<td>0 – 500W</td>
</tr>
<tr>
<td>0 – 833W</td>
<td>0 – 833W</td>
</tr>
<tr>
<td>0 – 1000W</td>
<td>0 – 1000W</td>
</tr>
<tr>
<td>0 – 300W</td>
<td>0 – 300W</td>
</tr>
<tr>
<td>0 – 333.3W</td>
<td>0 – 333.3W</td>
</tr>
<tr>
<td>0 – 400W</td>
<td>0 – 400W</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th><strong>Rating</strong></th>
<th><strong>Range</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>110V / 1A</td>
<td>0 – lag 100 var lead 100 – lag 100 var</td>
</tr>
<tr>
<td>0 – lag 150 var lead 150 – lag 150 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 166.6 var lead 166.6 – lag 166.6 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 200 var lead 200 – lag 200 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 500 var lead 500 – lag 500 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 750 var lead 750 – lag 750 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 833 var lead 833 – lag 833 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 1000 var lead 1000 – lag 1000 var</td>
<td></td>
</tr>
</tbody>
</table>

**Zero-phase voltage**

<table>
<thead>
<tr>
<th><strong>Rating</strong></th>
<th><strong>Range</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>110V</td>
<td>0 – 150V</td>
</tr>
<tr>
<td>190V</td>
<td>0 – 260V</td>
</tr>
</tbody>
</table>
**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  
Input range can be changed via the front panel.

**Watt-hours**  
**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 & SUFFIX CODE SELECTION**

**MODEL**

- LSMT2–2❑❑❑❑

**CONFIGURATION**

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

**PULSE / NETWORK OUTPUT**

- 1 : Watthours
- M : Modbus

**AUXILIARY POWER SUPPLY**

- AC Power
  - M : 85 – 264V AC
- DC Power
  - 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**

<table>
<thead>
<tr>
<th>RATING</th>
<th>RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>110V</td>
<td>0 – 150V</td>
</tr>
<tr>
<td>220V</td>
<td>0 – 300V</td>
</tr>
</tbody>
</table>

**• Current**

<table>
<thead>
<tr>
<th>RATING</th>
<th>RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>0 – 1A</td>
</tr>
<tr>
<td>5A</td>
<td>0 – 5A</td>
</tr>
</tbody>
</table>

**• Active power**

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

<table>
<thead>
<tr>
<th>RATING</th>
<th>RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>110V / 1A</td>
<td>0 – 50W</td>
</tr>
<tr>
<td></td>
<td>-50 – +50W</td>
</tr>
<tr>
<td>110V / 5A</td>
<td>0 – 250W</td>
</tr>
<tr>
<td></td>
<td>-250 – +250W</td>
</tr>
<tr>
<td>220V / 1A</td>
<td>0 – 100W</td>
</tr>
<tr>
<td></td>
<td>-100 – +100W</td>
</tr>
<tr>
<td>220V / 5A</td>
<td>0 – 500W</td>
</tr>
<tr>
<td></td>
<td>-500 – +500W</td>
</tr>
</tbody>
</table>

**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**
SINGLE-PHASE / 3-WIRE CONNECTION

MODEL & SUFFIX CODE SELECTION

MODEL
LSMT2–3❑❑❑❑

CONFIGURATION
3 : Single-phase / 3-wire

VOLTAGE INPUT
0 : None
A : 100V / 200V 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. LSMT2-3A50A1-M). Use Ordering Information Sheet (No. ESU-1954-3).

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

<table>
<thead>
<tr>
<th>RATING</th>
<th>RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>100V</td>
<td>0 – 150V</td>
</tr>
<tr>
<td>200V</td>
<td>0 – 300V</td>
</tr>
</tbody>
</table>

• Current

<table>
<thead>
<tr>
<th>RATING</th>
<th>RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>0 – 1A</td>
</tr>
<tr>
<td>5A</td>
<td>0 – 5A</td>
</tr>
</tbody>
</table>

• Active power

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

<table>
<thead>
<tr>
<th>RATING</th>
<th>RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>100/200V / 1A</td>
<td>0 – 100W -100 – +100W</td>
</tr>
<tr>
<td></td>
<td>0 – 150W -150 – +150W</td>
</tr>
<tr>
<td></td>
<td>0 – 166.6W -166.6 – +166.6W</td>
</tr>
<tr>
<td></td>
<td>0 – 200W -200 – +200W</td>
</tr>
<tr>
<td>100/200V / 5A</td>
<td>0 – 500W -500 – +500W</td>
</tr>
<tr>
<td></td>
<td>0 – 750W -750 – +750W</td>
</tr>
<tr>
<td></td>
<td>0 – 833W -833 – +833W</td>
</tr>
<tr>
<td></td>
<td>0 – 1000W -1000 – +1000W</td>
</tr>
</tbody>
</table>

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 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

Specifications subject to change without notice.
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
• Reactive power
Input range and lag/lead can be changed via the front panel.

<table>
<thead>
<tr>
<th>RATING</th>
<th>RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>110V/1A</td>
<td>0 – lag 100 var lead 100 – lag 100 var</td>
</tr>
<tr>
<td>0 – lag 150 var lead 150 – lag 150 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 166.6 var lead 166.6 – lag 166.6 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 200 var lead 200 – lag 200 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 500 var lead 500 – lag 500 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 750 var lead 750 – lag 750 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 833 var lead 833 – lag 833 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 1000 var lead 1000 – lag 1000 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 200 var lead 200 – lag 200 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 300 var lead 200 – lag 200 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 333.3 var lead 333.3 – lag 333.3 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 400 var lead 400 – lag 400 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 1000 var lead 1000 – lag 1000 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 1500 var lead 1500 – lag 1500 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 1666 var lead 1666 – lag 1666 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 2000 var lead 2000 – lag 2000 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 350 var lead 350 – lag 350 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 525 var lead 525 – lag 525 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 583 var lead 583 – lag 583 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 700 var lead 700 – lag 700 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 1750 var lead 1750 – lag 1750 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 2625 var lead 2625 – lag 2625 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 2917 var lead 2917 – lag 2917 var</td>
<td></td>
</tr>
<tr>
<td>0 – lag 3500 var lead 3500 – lag 3500 var</td>
<td></td>
</tr>
</tbody>
</table>

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.

Wathours
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

Specifications subject to change without notice.