# ORDERING INFORMATION MODEL : L53U

| PLEASE FILL IN THIS SECTION | M-SYSTEM USE ONLY | |
|---|---|---|
| Model | Job No. | Approved by (Sales office) |
| Company | Ser No. | Issued by (Sales office) |
| Name | Sales | Approved by (Factory) |
| P/O No. | | Set by (Factory) |

**Specify the items you want to change. Default setting will be used if not specified.**

DEFAULT shows values in case of nothing specified.

■MODBUS SETTING *1

| ITEM | AVAILABLE VALUE | DEFAULT VALUE | SET VALUE | Factory Internal check |
|---|---|---|---|---|
| Modbus node address | 1 to 247 | 1 | | ☐ Checked |
| Transfer rate | 1200 bps<br>2400 bps<br>4800 bps<br>9600 bps<br>19200 bps<br>38400 bps | 38400 | | ☐ Checked |
| Parity bit | None<br>Odd<br>Even | Odd | | ☐ Checked |
| Stop bit | 1 bit<br>2 bits | 1 | | ☐ Checked |
| T1.5 timer length | 0 to 6.0, in 0.1 increments<br>(Modbus protocol standard: 1.5) | 1.5 | | ☐ Checked |
| T3.5 timer length | 0 to 6.0, in 0.1 increments<br>(Modbus protocol standard: 3.5) | 3.5 | | ☐ Checked |
| Long register (32-bit words assignments) | Normal: (Lower digit word at the lower address)<br>Swap: (Lower digit word at the higher address) | Normal | | ☐ Checked |

*1. Setting available when Modbus is chosen for external interface code.

## ■SETTING

| ITEM | | | AVAILABLE VALUE | DEFAULT VALUE | SET VALUE | Factory Internal check |
|---|---|---|---|---|---|---|
| Input setting | Wiring configuration | | 1P2W:Single-phase/2-wire<br>1P3W:Single-phase/3-wire<br>3P3W－B:3-phase/3-wire, balanced load<br>3P3W－UB:3-phase/3-wire, unbalanced load<br>3P4W－B:3-phase/4-wire, balanced load<br>3P4W－UB:3-phase/4-wire, unbalanced load (*) | (*) | | ☐ Checked |
| | CT primary rating | | 1 to 20 000 A | 1 A or 5 A | | ☐ Checked |
| | VT primary rating | | 50 to 400 000 V | 110 V | *1 | ☐ Checked |
| | VT secondary rating | | 50 to 500 V<br>(≤277V for single phase/2-wire and single phase/3-wire) | 110 V | *1 | ☐ Checked |
| | AC frequency | | U1N:Voltage<br>I1:Current | U1N | | ☐ Checked |
| | Low-end cut out, current | | 0.0 thr. 99.9% of the rating | 1.0 % | | ☐ Checked |
| | Low-end cut out, voltage | | 0.0 thr. 99.9% of the rating | 1.0 % | | ☐ Checked |
| Discrete input/output setting | Discrete output 1 (Contact output) | Function | No function (*)<br>Energy count<br>Alarm status | (*) | | ☐ Checked |
| | | Contact type | N－O:Normal open<br>N－C:Normal closed | N－O | | ☐ Checked |
| | Discrete output 2 (Contact output) | Function | No function (*)<br>Energy count<br>Alarm status | (*) | | ☐ Checked |
| | | Contact type | N－O:Normal open<br>N－C:Normal closed | N－O | | ☐ Checked |
| | Discrete input (Contact input) | Function | No function (*)<br>Update demand value<br>Reset energy count<br>Alarm reset<br>Switch tariff | (*) | | ☐ Checked |
| | | Contact type | N－O:Normal open<br>N－C:Normal closed | N－O | | ☐ Checked |

*1. Leave blank, when single-phase / 3-wire, phase voltage 110 V (line to line 220 V) and VT is not used.

| ITEM | | | AVAILABLE VALUE | DEFAULT VALUE | SET VALUE | Factory Internal check |
|---|---|---|---|---|---|---|
| Energy setting | Tariff switching | | Disable<br>Enable | Disable | | ☐ Checked |
| Energy setting *1 (Discrete output option) | Discrete output 1 | Energy count 1 | See Table 1. | 0 | | ☐ Checked |
| | | Pulse weight | 0.1 to 10 000.0 kWh／kvarh／kVAh | 1.0 | | ☐ Checked |
| | | Pulse duration | 100 to 2 000 milliseconds (in 100 msec. increments) | 100 | | ☐ Checked |
| | Discrete output 2 | Energy count 4 | See Table 1. | 0 | | ☐ Checked |
| | | Pulse weight | 0.1 to 10 000.0 kWh／kvarh／kVAh | 1.0 | | ☐ Checked |
| | | Pulse duration | 100 to 2 000 milliseconds (in 100 msec. increments) | 100 | | ☐ Checked |
| Alarm output setting *1 | Power ON delay time | | 0 thr. 999 seconds | 0 | | ☐ Checked |
| | Latching | | Disable (*)<br>Enable | (*) | | ☐ Checked |
| | Measurands | Discrete Output 1 | Assigned measurand:See Table 2. | - | | ☐ Checked |
| | | | High setpoint:See Table 2. | 0 | | ☐ Checked |
| | | | Low setpoint:See Table 2. | 0 | | ☐ Checked |
| | | | Hysteresis:0.0 thr. 99.9% | 0.0 | | ☐ Checked |
| | | | Alarm ON delay time:0 thr. 999 seconds | 0 | | ☐ Checked |
| | | Discrete Output 2 | Assigned measurand:See Table 2. | - | | ☐ Checked |
| | | | High setpoint:See Table 2. | 0 | | ☐ Checked |
| | | | Low setpoint:See Table 2. | 0 | | ☐ Checked |
| | | | Hysteresis:0.0 thr. 99.9% | 0.0 | | ☐ Checked |
| | | | Alarm ON delay time:0 thr. 999 seconds | 0 | | ☐ Checked |

| ITEM | | | AVAILABLE VALUE | DEFAULT VALUE | SET VALUE | Factory Internal check |
|---|---|---|---|---|---|---|
| Analog output setting (Analog output option) | CH1 | Assigned measurand | See Table 3 | - | | ☐ Checked |
| | | Linearization | Input 0%:-15.00 to +140.00% *2 | 0.00 | | ☐ Checked |
| | | | Output 0%:1.6 to 22.4 mA (0.4 to 5.6 V) | 4.0(1.0) | | ☐ Checked |
| | | | Input 100%:-15.00 to +140.00% *2 | 100.00 | | ☐ Checked |
| | | | Output 100%:1.6 to 22.4 mA (0.4 to 5.6 V) | 20.0(5.0) | | ☐ Checked |
| | CH2 | Assigned measurand | See Table 3. | - | | ☐ Checked |
| | | Linearization | Input 0%:-15.00 to +140.00% *2 | 0.00 | | ☐ Checked |
| | | | Output 0%:1.6 to 22.4 mA (0.4 to 5.6 V) | 4.0(1.0) | | ☐ Checked |
| | | | Input 100%:-15.00 to +140.00% *2 | 100.00 | | ☐ Checked |
| | | | Output 100%:1.6 to 22.4 mA (0.4 to 5.6 V) | 20.0(5.0) | | ☐ Checked |
| | CH3 | Assigned measurand | See Table 3. | - | | ☐ Checked |
| | | Linearization | Input 0%:-15.00 to +140.00% *2 | 0.00 | | ☐ Checked |
| | | | Output 0%:1.6 to 22.4 mA (0.4 to 5.6 V) | 4.0(1.0) | | ☐ Checked |
| | | | Input 100%:-15.00 to +140.00% *2 | 100.00 | | ☐ Checked |
| | | | Output 100%:1.6 to 22.4 mA (0.4 to 5.6 V) | 20.0(5.0) | | ☐ Checked |
| | CH4 | Assigned measurand | See Table 3. | - | | ☐ Checked |
| | | Linearization | Input 0%:-15.00 to +140.00% *2 | 0.00 | | ☐ Checked |
| | | | Output 0%:1.6 to 22.4 mA (0.4 to 5.6 V) | 4.0(1.0) | | ☐ Checked |
| | | | Input 100%:-15.00 to +140.00% *2 | 100.00 | | ☐ Checked |
| | | | Output 100%:1.6 to 22.4 mA (0.4 to 5.6 V) | 20.0(5.0) | | ☐ Checked |

*1. Specify the channel which reguires setting.
*2. The input range is scaled using these parameters.

$$\text{INPUT [\%]} = \left( \frac{\text{INPUT}}{\text{ENERGY}^{(1)} \times 2} + 0.5 \right) \times 100$$

(1) P: Active power = VT primary rating × CT primary rating × n
Q: Reactive power = VT primary rating × CT primary rating × n
S: Apparent power = VT primary rating × CT primary rating × n

Single-phase/2-wire: n = 1, Single-phase/3-wire: n = 2, Three-phase/3-wire: n = $\frac{3}{\sqrt{3}}$, Three-phase/4-wire: n = 3

〈example〉
Three-phase/3-wire VT 3300 V/110 V ,CT 250 A/5 A
INPUT RANGE for -1000 to ＋1000 kW

$$\text{ENERGY "P"} = 3300 \times 250 \times \frac{3}{\sqrt{3}} = 1{,}428{,}941 = 1429 \text{ kW}$$

$$\text{INPUT } 0\text{ [\%]} = \left( \frac{-1000 \text{ kW}}{1429 \text{ kW} \times 2} + 0.5 \right) \times 100 = 15.01\text{ [\%]}$$

$$\text{INPUT } 100\text{ [\%]} = \left( \frac{1000 \text{ kW}}{1429 \text{ kW} \times 2} + 0.5 \right) \times 100 = 84.99\text{ [\%]}$$

**Table 1 Energy count type**

| SET VALUE | ID | PARAMETER |
|---|---|---|
| 0 | T-EP | Active energy, incoming (*) |
| 1 | T-EQ | Reactive energy, LAG |
| 2 | T-ES | Apparent energy |
| 3 | T-EP− | Active energy, outgoing |
| 4 | T-EQ− | Reactive energy, LEAD |
| 5 | T-EQ+LAG | Reactive energy, incoming,LAG |
| 6 | T-EQ+LEAD | Reactive energy, incoming, LEAD |
| 7 | T-EQ−LAG | Reactive energy, outgoing, LAG |
| 8 | T-EQ−LEAD | Reactive energy, outgoing, LEAD |
| 9 | ---- | Reserved. DO NOT USE. |
| 10 | T-EQ+P | Reactive energy, incoming |
| 11 | T-EQ−P | Reactive energy, outgoing |
| 12 | ---- | Reserved. DO NOT USE. |
| 13 | T-EQA | Reactive energy, (incoming + outgoing) |
| 200 | EP | Active energy, high tariff, incoming |
| 201 | EQ | Reactive energy, high tariff, LAG |
| 202 | ES | Apparent energy, high tariff |
| 203 | EP− | Active energy, high tariff, outgoing |
| 204 | EQ− | Reactive energy, high tariff, LEAD |
| 205 | EQ+LAG | Reactive energy, high tariff, incoming, LAG |
| 206 | EQ+LEAD | Reactive energy, high tariff, incoming, LEAD |
| 207 | EQ−LAG | Reactive energy, high tariff, outgoing, LAG |
| 208 | EQ−LEAD | Reactive energy, high tariff, outgoing, LEAD |
| 209 | ---- | Reserved. DO NOT USE. |
| 210 | EQ+P | Reactive energy, high tariff, incoming |
| 211 | EQ−P | Reactive energy, high tariff, outgoing |
| 212 | ---- | Reserved. DO NOT USE. |
| 213 | EQA | Reactive energy, high tariff, (incoming + outgoing) |
| 300 *1 | L-EP | Active energy, low tariff, incoming |
| 301 *1 | L-EQ | Reactive energy, low tariff, LAG |
| 302 *1 | L-ES | Apparent energy, low tariff |
| 303 *1 | L-EP− | Active energy, low tariff, outgoing |
| 304 *1 | L-EQ− | Reactive energy, low tariff, LEAD |
| 305 *1 | L-EQ+LAG | Reactive energy, low tariff, incoming, LAG |
| 306 *1 | L-EQ+LEAD | Reactive energy, low tariff, incoming, LEAD |
| 307 *1 | L-EQ−LAG | Reactive energy, low tariff, outgoing, LAG |
| 308 *1 | L-EQ−LEAD | Reactive energy, low tariff, outgoing, LEAD |
| 309 *1 | ---- | Reserved. DO NOT USE. |
| 310 *1 | L-EQ+P | Reactive energy, low tariff, incoming |
| 311 *1 | L-EQ−P | Reactive energy, low tariff, outgoing |
| 312 *1 | ---- | Reserved. DO NOT USE. |
| 313 *1 | L-EQA | Reactive energy low tariff, (incoming + outgoing) |

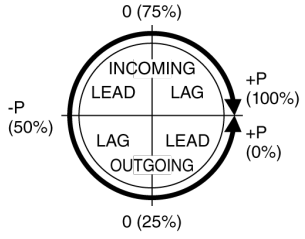
*1 When choose measurand of low tariff, set “Tariff switching” of “Energy setting” to “Enable.”

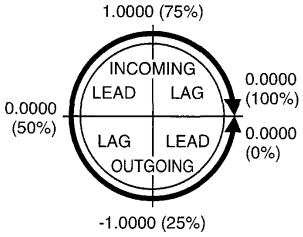
**Table 2 ALARM OUTPUT SETTING**

| ID | DEFINITION | LOW SETPOINT | HIGH SETPOINT | UNIT |
|---|---|---|---|---|
| I1-3 | Current, Line 1 thr. Line 3 | 0.000 | 20 000.000 | A |
| IN | Neutral current | 0.000 | 20 000.000 | 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) | 0.000 | 20 000.000 | 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 |
| THDI1-3 | THD, Current, Line 1 thr. Line 3 | 0.0 | 999.9 | % |
| THDIN | THD, Neutral current | 0.0 | 999.9 | % |
| THDU12-31 | THD, Delta voltage, Line 1 -2, 2 - 3, 3 - 1 | 0.0 | 999.9 | % |
| THDU1N-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 | ° |

**Table 3 PARAMETERS TO BE ASSIGNED TO ANALOG OUTPUTS**

| SYMBOL | DEFINITION |
|---|---|
| CT1 | CT primary rating |
| VT1 | VT primary rating |
| 1P2W | Single-phase/2-wire |
| 1P3W | Single-phase/3-wire |
| 3P3W-B | 3-phase/3-wire balanced |
| 3P3W-UB | 3-phase/3-wire unbalanced |
| 3P4W-B | 3-phase/4-wire balanced |
| 3P4W-UB | 3-phase/4-wire unbalanced |
| P | CT1 ×VT1 ×n<br>n=1P2W: 1, 1P3W: 2, 3P3W: √3, 3P4W: 3 |

| ID | DEFINITION | RANGE (0 to 100%) | 1P2W | 1P3W | 3P3W-B | 3P3W-UB | 3P4W-B | 3P4W-UB |
|---|---|---|---|---|---|---|---|---|
| NULL | Not assigned | ---- | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| I | Current | 0 to CT1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| U | Voltage | 0 to VT1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| P | Active power | ± P | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Q | Reactive power | ± P | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| S | Apparent power | 0 to P | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| PF | Power factor | -1.0000 to +1.0000 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| F | Frequency | 45.00 to 65.00 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| I1 | Current, Line 1 | 0 to CT1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| I | Current, Line 2 | 0 to CT1 | | ✓ | * | * | * | ✓ |
| I3 | Current, Line 3 | 0 to CT1 | | | * | ✓ | * | ✓ |
| IN | Neutral current | 0 to CT1 | | ✓ | | | | ✓ |
| U12 | Delta voltage, Line 1 – 2 | 0 to VT1 | | ✓ | ✓ | ✓ | ✓ | ✓ |
| U23 | Delta voltage, Line 2 – 3 | 0 to VT1 | | | ✓ | ✓ | ✓ | ✓ |
| U31 | Delta voltage, Line 3 – 1 | 0 to VT1 | | | ✓ | ✓ | ✓ | ✓ |
| U1N | Phase voltage, Phase 1 | 0 to VT1 | ✓ | ✓ | | | ✓ | ✓ |
| U2N | Phase voltage, Phase 2 | 0 to VT1 | | ✓ | | | * | ✓ |
| U3N | Phase voltage, Phase 3 | 0 to VT1 | | | | | * | ✓ |
| P1 | Active power, Phase 1 | ±(VT1 ×CT1) | ✓ | ✓ | | | ✓ | ✓ |
| P2 | Active power, Phase 2 | ±(VT1 ×CT1) | | ✓ | | | * | ✓ |
| P3 | Active power, Phase 3 | ±(VT1 ×CT1) | | | | | * | ✓ |
| Q1 | Reactive power, Phase 1 | ±(VT1 ×CT1) | ✓ | ✓ | | | ✓ | ✓ |
| Q2 | Reactive power, Phase 2 | ±(VT1 ×CT1) | | ✓ | | | * | ✓ |
| Q3 | Reactive power, Phase 3 | ±(VT1 ×CT1) | | | | | * | ✓ |
| S1 | Apparent power, Phase 1 | 0 to (VT1 ×CT1) | ✓ | ✓ | | | ✓ | ✓ |
| S2 | Apparent power, Phase 2 | 0 to (VT1 ×CT1) | | ✓ | | | * | ✓ |
| S3 | Apparent power, Phase 3 | 0 to (VT1 ×CT1) | | | | | * | ✓ |
| PF1 | Power factor, Phase 1 | -1.0000 to +1.0000 | ✓ | ✓ | | | ✓ | ✓ |
| PF2 | Power factor, Phase 2 | -1.0000 to +1.0000 | | ✓ | | | * | ✓ |
| PF3 | Power factor, Phase 3 | -1.0000 to +1.0000 | | | | | * | ✓ |
| THDI1 | THD, Current, Line 1 | 0.0 to 100.0 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| THDI2 | THD, Current, Line 2 | 0.0 to 100.0 | | ✓ | | | | ✓ |
| THDI3 | THD, Current, Line 3 | 0.0 to 100.0 | | | | ✓ | | ✓ |
| THDIN | THD, Neutral current | 0.0 to 100.0 | | ✓ | | | | ✓ |
| THDU12 | THD, Delta voltage, Line 1 – 2 | 0.0 to 100.0 | | ✓ | ✓ | ✓ | ✓ | ✓ |
| THDU23 | THD, Delta voltage, Line 2 – 3 | 0.0 to 100.0 | | | ✓ | ✓ | ✓ | ✓ |
| THDU31 | THD, Delta voltage, Line 3 – 1 | 0.0 to 100.0 | | | ✓ | ✓ | ✓ | ✓ |
| THDU1N | THD, Phase voltage, Phase 1 | 0.0 to 100.0 | ✓ | ✓ | | | ✓ | ✓ |
| THDU2N | THD, Phase voltage, Phase 2 | 0.0 to 100.0 | | ✓ | | | ✓ | ✓ |
| THDU3N | THD, Phase voltage, Phase 3 | 0.0 to 100.0 | | | | | ✓ | ✓ |
| T-Q | Reactive power<br>for bidirectional current |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

| ID | DEFINITION | RANGE (0 to 100%) | 1P2W | 1P3W | 3P3W-B | 3P3W-UB | 3P4W-B | 3P4W-UB |
|---|---|---|---|---|---|---|---|---|
| T-PF | Power factor<br>for bidirectional current |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

✓: Measurable

∗: Measured values calculated from the other inputs are calculated.