

ORDERING INFORMATION

MODEL : L53U

PLEASE FILL IN THIS SECTION



Model

Company

Name

P/O No.

FACTORY USE ONLY



Job No.

Ser No.

Sales

Approved by
(Sales office)

Issued by
(Sales office)

Approved by
(Factory)

Set by
(Factory)

Specify the items you want to change. Default setting will be used if not 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 2400 bps 4800 bps 9600 bps 19200 bps 38400 bps	38400		☐ Checked
Parity bit	None Odd Even	Odd		☐ Checked
Stop bit	1 bit 2 bits	1		☐ Checked
T1.5 timer length	0 to 6.0, in 0.1 increments (Modbus protocol standard: 1.5)	1.5		☐ Checked
T3.5 timer length	0 to 6.0, in 0.1 increments (Modbus protocol standard: 3.5)	3.5		☐ Checked
Long register (32-bit words assignments)	Normal: (Lower digit word at the lower address) 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 1P3W:Single-phase/3-wire 3P3W-B:3-phase/3-wire, balanced load 3P3W-UB:3-phase/3-wire, unbalanced load 3P4W-B:3-phase/4-wire, balanced load 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 (≤277V for single phase/2-wire and single phase/3-wire)	110 V	*1	☐ Checked
	AC frequency		U1N:Voltage 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 (*) Energy count Alarm status	(*)		☐ Checked
		Contact type	N-O:Normal open N-C:Normal closed	N-O		☐ Checked
	Discrete output 2 (Contact output)	Function	No function (*) Energy count Alarm status	(*)		☐ Checked
		Contact type	N-O:Normal open N-C:Normal closed	N-O		☐ Checked
	Discrete input (Contact input)	Function	No function (*) Update demand value Reset energy count Alarm reset Switch tariff	(*)		☐ Checked
		Contact type	N-O:Normal open 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 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 (*) 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)	CH 1	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
	CH 2	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
	CH 3	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
	CH 4	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 requires setting.

*2. Use following parameter to convert input actual value to input value [%].

For active power and reactive power

$$\text{INPUT} [\%] = \left(\frac{\text{INPUT}}{\text{ENERGY}^{(1)} \times 2} + 0.5 \right) \times 100 \quad (1) \quad \begin{array}{l} \text{P: Active power} = \text{VT primary rating} \times \text{CT primary rating} \times n \\ \text{Q: Reactive power} = \text{VT primary rating} \times \text{CT primary rating} \times n \end{array}$$

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

For apparent power

$$\text{INPUT} [\%] = \left(\frac{\text{INPUT}}{\text{ENERGY}^{(1)}} \right) \times 100 \quad (1) \quad \text{S: Apparent power} = \text{VT primary rating} \times \text{CT primary rating} \times n$$

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

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

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

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

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)

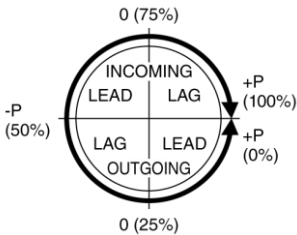
*1 When choose measurand of low tariff, set “Tariff switching” of “Energy setting” to “Enable.”

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	$CT1 \times VT1 \times n$ $n=1P2W: 1, 1P3W: 2, 3P3W: \sqrt{3}, 3P4W: 3$

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	$\pm P$	✓	✓	✓	✓	✓	✓
Q	Reactive power	$\pm P$	✓	✓	✓	✓	✓	✓
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	$\pm(VT1 \times CT1)$	✓	✓			✓	✓
P2	Active power, Phase 2	$\pm(VT1 \times CT1)$		✓			*	✓
P3	Active power, Phase 3	$\pm(VT1 \times CT1)$					*	✓
Q1	Reactive power, Phase 1	$\pm(VT1 \times CT1)$	✓	✓			✓	✓
Q2	Reactive power, Phase 2	$\pm(VT1 \times CT1)$		✓			*	✓
Q3	Reactive power, Phase 3	$\pm(VT1 \times CT1)$					*	✓
S1	Apparent power, Phase 1	0 to $(VT1 \times CT1)$	✓	✓			✓	✓
S2	Apparent power, Phase 2	0 to $(VT1 \times CT1)$		✓			*	✓
S3	Apparent power, Phase 3	0 to $(VT1 \times CT1)$					*	✓
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 for bidirectional current		✓	✓	✓	✓	✓	✓

ID	DEFINITION	RANGE (0 to 100%)	1P2W	1P3W	3P3W-B	3P3W-UB	3P4W-B	3P4W-UB
T-PF	Power factor for bidirectional current	1.0000 (75%) INCOMING LEAD LAG 0.0000 (50%) LAG LEAD OUTGOING 0.0000 (100%) 0.0000 (0%) -1.0000 (25%)	✓	✓	✓	✓	✓	✓

✓: Measurable

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