

ORDERING INFORMATION

MODEL : L53U

PLEASE FILL IN THIS SECTION



Model
Company
Name
P/O No.

FACTORY USE ONLY



Job No.	Approved by (Sales office)
Ser No.	Issued by (Sales office)
Sales	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		<input type="checkbox"/> Checked
Transfer rate	1200 bps 2400 bps 4800 bps 9600 bps 19200 bps 38400 bps	38400		<input type="checkbox"/> Checked
Parity bit	None Odd Even	Odd		<input type="checkbox"/> Checked
Stop bit	1 bit 2 bits	1		<input type="checkbox"/> Checked
T1.5 timer length	0 to 6.0, in 0.1 increments (Modbus protocol standard: 1.5)	1.5		<input type="checkbox"/> Checked
T3.5 timer length	0 to 6.0, in 0.1 increments (Modbus protocol standard: 3.5)	3.5		<input type="checkbox"/> Checked
Long register (32-bit words assignments)	Normal: (Lower digit word at the lower address) Swap: (Lower digit word at the higher address)	Normal		<input type="checkbox"/> 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 (*)	(*)		<input type="checkbox"/> Checked	
	CT primary rating	1 to 20 000 A	1 A or 5 A		<input type="checkbox"/> Checked	
	VT primary rating	50 to 400 000 V	110 V	*1	<input type="checkbox"/> Checked	
	VT secondary rating	50 to 500 V (≤277V for single phase/2-wire and single phase/3-wire)	110 V	*1	<input type="checkbox"/> Checked	
	AC frequency	U1N:Voltage I1:Current	U1N		<input type="checkbox"/> Checked	
	Low-end cut out, current	0.0 thr. 99.9% of the rating	1.0 %		<input type="checkbox"/> Checked	
	Low-end cut out, voltage	0.0 thr. 99.9% of the rating	1.0 %		<input type="checkbox"/> Checked	
Discrete input/output setting	Discrete output 1 (Contact output)	Function	No function (*) Energy count Alarm status	(*)		<input type="checkbox"/> Checked
		Contact type	N-O:Normal open N-C:Normal closed	N-O		<input type="checkbox"/> Checked
	Discrete output 2 (Contact output)	Function	No function (*) Energy count Alarm status	(*)		<input type="checkbox"/> Checked
		Contact type	N-O:Normal open N-C:Normal closed	N-O		<input type="checkbox"/> Checked
	Discrete input (Contact input)	Function	No function (*) Update demand value Reset energy count Alarm reset Switch tariff	(*)		<input type="checkbox"/> Checked
		Contact type	N-O:Normal open N-C:Normal closed	N-O		<input type="checkbox"/> 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		<input type="checkbox"/> Checked	
Energy setting *1 (Discrete output option)	Discrete output 1	Energy count 1	See Table 1.	0	<input type="checkbox"/> Checked	
		Pulse weight	0.1 to 10 000.0 kWh/kvarh/kVAh	1.0	<input type="checkbox"/> Checked	
		Pulse duration	100 to 2 000 milliseconds (in 100 msec. increments)	100	<input type="checkbox"/> Checked	
	Discrete output 2	Energy count 4	See Table 1.	0	<input type="checkbox"/> Checked	
		Pulse weight	0.1 to 10 000.0 kWh/kvarh/kVAh	1.0	<input type="checkbox"/> Checked	
		Pulse duration	100 to 2 000 milliseconds (in 100 msec. increments)	100	<input type="checkbox"/> Checked	
Alarm output setting *1	Power ON delay time		0 thr. 999 seconds	0	<input type="checkbox"/> Checked	
	Latching		Disable (*) Enable	(*)	<input type="checkbox"/> Checked	
	Measurands	Discrete Output 1	Assigned measurand:See Table 2.	-		<input type="checkbox"/> Checked
			High setpoint:See Table 2.	0		<input type="checkbox"/> Checked
			Low setpoint:See Table 2.	0		<input type="checkbox"/> Checked
			Hysteresis:0.0 thr. 99.9%	0.0		<input type="checkbox"/> Checked
			Alarm ON delay time:0 thr. 999 seconds	0		<input type="checkbox"/> Checked
		Discrete Output 2	Assigned measurand:See Table 2.	-		<input type="checkbox"/> Checked
			High setpoint:See Table 2.	0		<input type="checkbox"/> Checked
			Low setpoint:See Table 2.	0		<input type="checkbox"/> Checked
			Hysteresis:0.0 thr. 99.9%	0.0		<input type="checkbox"/> Checked
			Alarm ON delay time:0 thr. 999 seconds	0		<input type="checkbox"/> Checked

ITEM		AVAILABLE VALUE	DEFAULT VALUE	SET VALUE	Factory Internal check	
Analog output setting (Analog output option)	CH 1	Assigned measurand	See Table 3	-		<input type="checkbox"/> Checked
		Linearization	Input 0%:-15.00 to +140.00% *2	0.00		<input type="checkbox"/> Checked
			Output 0%:1.6 to 22.4 mA (0.4 to 5.6 V)	4.0(1.0)		<input type="checkbox"/> Checked
			Input 100%:-15.00 to +140.00% *2	100.00		<input type="checkbox"/> Checked
	Output 100%:1.6 to 22.4 mA (0.4 to 5.6 V)		20.0(5.0)		<input type="checkbox"/> Checked	
	CH 2	Assigned measurand	See Table 3.	-		<input type="checkbox"/> Checked
		Linearization	Input 0%:-15.00 to +140.00% *2	0.00		<input type="checkbox"/> Checked
			Output 0%:1.6 to 22.4 mA (0.4 to 5.6 V)	4.0(1.0)		<input type="checkbox"/> Checked
			Input 100%:-15.00 to +140.00% *2	100.00		<input type="checkbox"/> Checked
	Output 100%:1.6 to 22.4 mA (0.4 to 5.6 V)		20.0(5.0)		<input type="checkbox"/> Checked	
	CH 3	Assigned measurand	See Table 3.	-		<input type="checkbox"/> Checked
		Linearization	Input 0%:-15.00 to +140.00% *2	0.00		<input type="checkbox"/> Checked
			Output 0%:1.6 to 22.4 mA (0.4 to 5.6 V)	4.0(1.0)		<input type="checkbox"/> Checked
			Input 100%:-15.00 to +140.00% *2	100.00		<input type="checkbox"/> Checked
	Output 100%:1.6 to 22.4 mA (0.4 to 5.6 V)		20.0(5.0)		<input type="checkbox"/> Checked	
	CH 4	Assigned measurand	See Table 3.	-		<input type="checkbox"/> Checked
Linearization		Input 0%:-15.00 to +140.00% *2	0.00		<input type="checkbox"/> Checked	
		Output 0%:1.6 to 22.4 mA (0.4 to 5.6 V)	4.0(1.0)		<input type="checkbox"/> Checked	
		Input 100%:-15.00 to +140.00% *2	100.00		<input type="checkbox"/> Checked	
	Output 100%:1.6 to 22.4 mA (0.4 to 5.6 V)	20.0(5.0)		<input type="checkbox"/> 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 × VT1 × n 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	✓	✓	✓	✓	✓	✓
I2	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 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	<p>1.0000 (75%)</p> <p>0.0000 (50%)</p> <p>0.0000 (100%)</p> <p>0.0000 (0%)</p> <p>-1.0000 (25%)</p>	✓	✓	✓	✓	✓	✓

✓: Measurable

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