OP987-V03

MX300-1-C-CE
Operating Instructions



SPECIFICATIONS

DISPLAY
1 row of 4 digits to show electrical parameters
7 segment LED display
Digit integrated with parameter units.

INDICATIONS
R2 :Relay
K :Kilo
M :Mega
V :Voltage
A :Current
W :Active Power
VA :Apparent Power
Var :Reactive power
TRIP :When trip condition occurs
Hz :Frequency
PF :Power factor
⇌ :Communication in progress

RATED INPUT VOLTAGE
20 to 300V AC (L-N)
34 to 519V AC (L-L)
Installation Category II

FREQUENCY RANGE
45-65 Hz

RATED INPUT CURRENT
Nominal 5A AC (Min-40mA, Max-7A)

BURDEN
0.1 VA@5A

CT PRIMARY
1A / 5A to 10,000A (Programmable for any value)
Note: 1A to 10,000A if CT secondary is 1 else
5A to 10,000A

CT SECONDARY
1A or 5A (Programmable)

PT PRIMARY
100V to 500kV (Programmable for any value)

PT SECONDARY
100V to 500V AC (L-L)
(Programmable for any value)

DISPLAY UPDATE TIME
0.5 sec. for all parameters

DISPLAY SCROLLING
Automatic or Manual (Programmable)

POWER CONSUMPTION
Less than 8VA

OUTPUT SPECIFICATION
Relay: 1 NC (SPST)

ENVIRONMENTAL CONDITIONS
- Indoor
- Altitude of up to 2000m
- Pollution degree II

Temperature: Operating: -10°C to 55°C
Storage : -20°C to 75°C
Humidity : Up to 85% non-condensing

MOUNTING
Panel mounting

WEIGHT
198gms

ORDER CODE INFORMATION

Product	Supply	Certification
MX300-1-C-CE	85V to 300V AC/DC	CE

SERIAL COMMUNICATION

Interface standard and protocol	RS485 and MODBUS RTU
Communication address	1 to 255
Transmission mode	Half duplex
Data types	Float and Integer
Transmission distance	500m maximum
Transmission Speed	300, 600,1200, 2400, 4800, 9600,19200 (in bps)
Parity	None, Odd, Even
Stop bits	1 or 2
Response time	500 ms (max and independent of baud rate)

ACCURACY

Measurement	Accuracy
Voltage V_{L-N}	±0.5% of Full scale
Current	±0.5% of Full scale
Frequency	±0.1% For L-N voltage : ≥50V For L-L voltage : ≥87V
Power Factor	±0.01
Active Power	1%
Reactive Power	2%
Apparent power	---
Trip Time	±5%

NOTE : 1) For Voltage, Current and Power resolution is automatically adjusted.
2) For power factor, resolution is 0.001

Resolution

Power Value (W)	Display (W)
<10K	9999
<100K	99.99k
<1M	999.9k
<10M	9999K
<100M	99.99M
<1000M	999.9M
<10000M	9999M

SAFETY PRECAUTIONS

All safety related codifications, symbols and instructions that appear in this operating manual or on the equipment must be strictly followed to ensure the safety of the operating personnel as well as the instrument.

If the equipment is not used in a manner specified by the manufacturer it might impair the protection provided by the equipment.

- Do not use the equipment if there is any mechanical damage.
- Ensure that the equipment is supplied with correct voltage.

⚠ CAUTION :

1. Read complete instructions prior to installation and operation of the unit.
2. Risk of electric shock.
3. The equipment in its installed state must not come in close proximity to any heating sources, oils, steam, caustic vapors or other unwanted process byproducts.

WIRING GUIDELINES

⚠ WARNING :

1. To prevent the risk of electric shock, power supply to the equipment must be kept OFF while doing the wiring arrangement.
2. Wiring shall be done strictly according to the terminal layout. Confirm that all connections are correct.
3. Use lugged terminals.
4. To reduce electromagnetic interference use of wires with adequate ratings and twists of the same in equal size shall be made with shortest connections.
5. Layout of connecting cables shall be away from any internal EMI source.
6. Cable used for connection to power source, must have a cross section of 0.5mm^2 to 2.5mm^2 (20 to 14AWG; 75°C(min)). These wires shall have current carrying capacity of 7A.

INSTALLATION GUIDELINES

⚠ CAUTION :

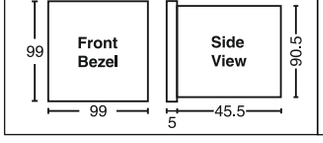
1. This equipment being built-in-type, normally becomes a part of main control panel and in such case the terminals do not remain accessible to the end user after installation and internal wiring.
2. Conductors must not come in contact with the internal circuitry of the equipment or else it may lead to a safety hazard that may in turn endanger life or cause electrical shock to the operator.
3. Circuit breaker or mains switch must be installed between power source and supply terminals to facilitate power 'ON' or 'OFF' function. However this switch or breaker must be installed in a convenient position normally accessible to the operator.
4. Before disconnecting the secondary of the external current transformer from the equipment, make sure that the current transformer is short circuited to avoid risk of electrical shock and injury.
5. The equipment shall not be installed in environmental conditions other than those mentioned in this manual.
6. The equipment does not have a built-in-type fuse. Installation of external fuse of rating 300V AC / 0.5Amp for electrical circuitry / battery is highly recommended.

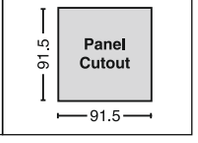
MECHANICAL INSTALLATION

For installing the meter -

1. Prepare the panel cutout with proper dimensions as shown below.
2. Push the meter into the panel cutout. Secure the meter in its place by fitting the clamp on the rear side. Fit clamps on both sides in diagonally opposite location for optimum fitting.

OUTLINE Dimensions (in mm)	PANEL CUTOUT Dimensions (in mm)

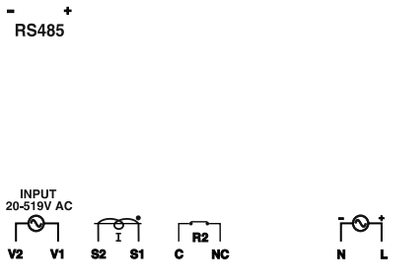




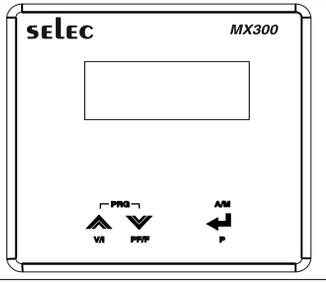
MAINTENANCE

1. The equipment should be cleaned regularly to avoid blockage of ventilating parts.
2. Clean the equipment with a clean dry or damp cloth. Do not use any cleaning agent other than water.

TERMINAL CONNECTIONS



FRONT PANEL DESCRIPTION



ONLINE PAGE DESCRIPTION

Key press	Online page description	
	1P2W	
∧	Page1	Displays Phase Voltage
∧	Page2	Displays Phase Current
∨	Page1	Displays Power Factor
∨	Page2	Displays Frequency
↵	Page1	Displays Active Power
↵	Page2	Displays Reactive Power
↵	Page3	Displays Apperant Power

SERIAL NUMBER DESCRIPTION

Press ∧ key for 10 sec. to display 8 digit serial number only for 5 sec.

AUTOMATIC / MANUAL MODE DESCRIPTION

Press ↵ key for 5 seconds to toggle between automatic and manual mode. DIP page configuration must be kept 000 to turn this function ON.

Note : By default unit operates in automatic mode. In automatic mode online pages scroll automatically at the rate of 5 seconds per page. In automatic mode when any key is pressed, unit temporarily switches to manual mode and the appropriate page is displayed, also if any key is not pressed for 5 sec, unit resumes automatic mode.

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CONFIGURATION

There are three dedicated keys with symbol ▲ ▼ ↵

Note : Setting should be done by professional, after going through this user manual and having understood the application situation.

For the configuration setting mode :

- Use ▲▼ key for 3 sec to enter and exit from configuration menu.
- Use ▲ key to increment the value .
- Use ▼ key to edit the value and shift the cursor for next digit to edit .
- Press ↵ key to save value and go to next page.

TRIP CONDITION DESCRIPTION

1. To check the trip condition, long press the ▼ key for 3 sec. And to come out of from trip condition status mode, again long press the same ▼ key for 3 sec
2. To check whether multiple trip conditions are occurred or not, user must enter into trip condition status mode and press ▲ key.
3. When unit is satisfying the trip condition for set trip time, then TRIP symbol will blink & once trip time is over, it will trip and symbol will be continuously ON.

Config. page	Function	Range or Selection	Factory Setting	Description	Display
–	Password	0000 to 9998	1000		PSWd
1	Change Password	No / Yes	No		CPWd
1.1	New Password	0000 to 9998	0		nPWd
2	CT Secondary	1 / 5A	5		Ct.SE
3	CT Primary	1, 5 to 10,000A	5		Ct.Pr
4	PT Secondary	100V to 500V	350		Pt.SE
5	PT Primary	100V to 500kV	350		Pt.Pr
6	Slave Id	1 to 255	1		SL Id
7	Baud Rate	300/600/1200/2400/ 4800/9600/19200(bps)	9600		bAUd
8	Parity	None/Odd/Even	None		PrtY
9	Stop Bit	1 or 2	1		StPb
10	Voltage Enable	Yes / No	No	The sub pages of this parameter will be displayed only if voltage enable is selected as yes. If selected no then directly current enable page will be displayed.	UtEn
10.1	Over Voltage	Yes / No	No	If over voltage setting is enabled then on next page the value of over voltage can be set. If disabled then directly under voltage page will be displayed.	OvtG
10.1.1	Over Voltage Setting	(20 to 120)% of PT Primary (20 to 600kv)	20% of PT Primary	If the measuring voltage become greater than over voltage value,relay will trip after set voltage relay trip time.	OvSt
10.2	Under Voltage	Yes / No	No	If under voltage setting is enable then on next page the value of under voltage can be set. If disabled then directly voltage hysteresis page will be displayed.	UvtG
10.2.1	Under Voltage Setting	(0 to 100)% of PT Primary (0 to 500kv)	80% of PT Primary	If the measuring voltage become lesser than under voltage,relay will be trip after set voltage relay trip time.	UvSt
10.3	Voltage Hysteresis	(0 to 10)% of PT Primary (0 to 50kv)	10% of PT Primary	If relay is triped due to over/under voltage for set trip time, relay recovery will takes place depending upon voltage hysteresis value.	vHyt
10.4	Voltage Trip Time	0 to 999 sec	10 sec	If the measuring voltage become greater/lesser than set over/under voltage, relay will be tripped only if the condition sustains for the time set in trip time.	vtrP
11	Current Enable	Yes / No	No	The sub pages of this parameter will be display only if current enable is selected as yes. If selected no then directly Frequency enable page will be display.	CrEn
11.1	Over Current	Yes / No	No	If over current setting is enable then on the next page value of over current can be set. If disabled then directly under current page will be displayed.	OCur
11.1.1	Over Current Setting	(20 to 120)% of CT Primary (0.5 to 1.2k)	20% of CT Primary	Over current of CT secondary will be set as over current value. If the measuring current become greater than over current value relay will trip after set current relay trip time.	OCSt
11.2	Under Current	Yes / No	No	If under current setting is enable then on next page value of under current can be set. If disabled then directly current hysteresis page will be displayed.	UCur
11.2.1	Under Current Setting	(0 to 100)% of CT Primary (0 to 9999)	80% of CT Primary	If the measuring current become lesser than set lower current,relay will be tripped after set trip time duration.	UCSt
11.3	Current Hysteresis	(0 to 10)% of CT Primary (0 to 9999)	10% of CT Primary	If relay is triped due to over/under current after set trip time, Relay recovery will takes place depending up on value of current hysteresis value. Current Hysteresis Value =	iHyt
11.4	Current Trip Time	0 to 999 sec	10 sec	If the measuring current become greater/lesser than set over/under current, relay will be tripped only if the condition sustains for the time set in trip time.	itrP
12	Frequency Enable	Yes / No	No	The Sub pages of this parameter will be display only if frequency enable is selected as yes. If selected no then directly under Factory default page will be display.	FrEn
12.1	Over Frequency	Yes / No	No	If over frequency setting is enable then on the next page value of over frequency can be set. If disabled then directly under frequency page will be displayed.	OFr9
12.1.1	Over Frequency Setting	45Hz to 65 Hz	60	If measuring frequency become greater than over frequencyrelay will trip after set frequency relay trip time .	OFSt
12.2	Under Frequency	Yes / No	No	If under frequency setting is enable then on the next page value of under frequency can be changed. If disabled then directly frequency hysteresis page will be displayed.	UFr9
12.2.1	Under Frequency Setting	45Hz to 65 Hz	50	If measuring frequency become lesser than under frequencyrelay will trip after set frequency relay trip time .	UFSt
12.3	Frequency Hysteresis	0 to 5Hz	2	If relay is trip due to over/under frequency for set trip time, relay recovery will takes place depending upon frequency hysteresis value.	FHyt
12.4	Frequency Trip Time	0 to 999 sec	No	If measuring frequency become greater/lesser than set over/under frequency, relay will be tripped only if the condition sustains for the time set in trip time.	FtrP
13	Endianess	LSRF,MSRF	MSRF	Change Endianess.	End1
14	Mode	Trip or Alarm	Trip	Change in Mode of Operation of Relay	nOdE
15	Factory Default	Yes / No	NO	If factory default is enable then all parameters value get set to default values.	FdFt

DIP SWITCH CONFIGURATION

Key configuration			Parameter
Key-1	Key-2	Key-3	
0	0	0	Normal Mode-Auto/Manual
0	0	1	Voltage
0	1	0	Current
0	1	1	Power Factor
1	0	0	Active Power
1	0	1	Reactive Power
1	1	0	Apparent Power
1	1	1	Frequency

PT PRIMARY SETTING

Resolution of PT Primary can be changed pressing ▼ key for 3 sec

<1000	K symbol is OFF
>=1000	K symbol is ON

E.g. For setting 5000 press ▼ key for 3 sec and set value 50 with K symbol on

For setting PT primary <=1000, press ▼ key for 3 sec to change resolution in to K.

To set PT primary <1000 while resolution in K Press ▼ key for 3 sec to change resolution to normal

EXAMPLE TO READ DATA FROM INPUT REGISTER

Data format: Mid Little Endian (Default)
If Total Active Energy = 1234.12kWh
Start Address : 30090, No. Of register : 02
Hexadecimal Equivalent of 1234.12 is 0x449A43D7

	C	D
Data stored at 30090 is LSB :	43	D7

	A	B
Data Stored at 30091 is MSB :	44	9A

Data Format to be followed is C-D-A-B

Data format: Big Endian
If Total Active Energy = 1234.12kWh
Start Address : 30090, No. Of register : 02
Hexadecimal Equivalent of 1234.12 is 0x449A43D7

	A	B
Data stored at 30090 is LSB :	44	9A

	C	D
Data Stored at 30091 is MSB :	43	D7

Data Format to be followed is A-B-C-D

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MODBUS REGISTER ADDRESS LIST

Readable parameters for communication Model only: [Length (Resister): 2;Data structure:Float]

Address	Hex Address	Parameter	Range	
40000	0x00	Password	Min value : 0	Max value : 9998
40001	0x01	CT Secondary	Value : 1	Max value : 5
40002	0x02	CT Primary	Min value : 1, 5	Max value : 9999
40003	0x03	PT Secondary	Min value : 100	Max value : 500
40004	0x04	PT Primary	Min value : 100	Max value : 500k
40006	0x06	Slave Id	Min value : 1	Max value : 255
40007	0x07	Baud Rate	Value : 0x0000	Meaning : 300
			Value : 0x0001	Meaning : 600
			Value : 0x0002	Meaning : 1200
			Value : 0x0003	Meaning : 2400
			Value : 0x0004	Meaning : 4800
			Value : 0x0005	Meaning : 9600
			Value : 0x0006	Meaning : 19200
40008	0x08	Parity	Value : 0x0000	Meaning : None
			Value : 0x0001	Meaning : Odd
			Value : 0x0002	Meaning : Even
40009	0x09	Stop Bit	Value : 0x0000	Meaning : 1
			Value : 0x0001	Meaning : 2
40010	0x0A	Voltage Enable	Min Value : 0	Max Value : 1
40011	0x0B	Over Voltage Enable	Min Value : 0	Max Value : 1
40012	0x0C	Over Voltage Setting	Min Value : 20	Max Value : 600Kv
40014	0x0E	Under Voltage Enable	Min Value : 0	Max Value : 1
40015	0x0F	Under Voltage Setting	Min Value : 0	Max Value : 500Kv
40017	0x11	Voltage Hysteresis	Min Value : 0	Max Value : 50Kv
40018	0x12	Voltage Trip Time	Min Value : 0sec	Max Value : 999sec
40019	0x13	Current Enable	Min Value : 0	Max Value : 1
40020	0x14	Over Current Enable	Min Value : 0	Max Value : 1
40021	0x15	Over Current Setting	Min Value : 20	Max Value : 120
40022	0x16	Under Current Enable	Min Value : 0	Max Value : 1
40023	0x17	Under Current Setting	Min Value : 0	Max Value : 9999
40024	0x18	Current Hysteresis	Min Value : 0	Max Value : 9999
40025	0x19	Current Trip Time	Min Value : 0sec	Max Value : 999sec
40026	0x1A	Frequency Enable	Min Value : 0	Max Value : 1
40027	0x1B	Over Frequency Enable	Min Value :45	Max Value : 65
40028	0x1C	Over Frequency Setting	Min Value : 0	Max Value : 1
40029	0x1D	Under Frequency Enable	Min Value : 0	Max Value : 1
40030	0x1E	Under Frequency Setting	Min value : 45	Max value : 65
40031	0x1F	Frequency Hysteresis	Min value : 0	Max value : 5
40032	0x20	Frequency Trip Time	Min value : 0 sec	Max value : 999 sec
40033	0x21	Mode selection	Value : 0	Meaning :Trip Mode
			Value : 1	Meaning :Alarm Mode
40034	0x22	Factory Default	Min value : 0	Max value : 1
40070	0x46	Endianess	Value : 0X0000	Meaning :LSRF
			Value : 0X0001	Meaning :MSRF

MODBUS REGISTER ADDRESS LIST

Readable parameters for communication Model only:
[Length (Register): 2; Data structure: Float]

Address	Hex Address	Parameter
30000	0x00	Voltage
30002	0x02	Current
30004	0x04	Active Power (kW)
30006	0x06	Reactive Power (kvar)
30008	0x08	Apparent Power (kVA)
30010	0x0A	Power Factor
30012	0x0C	Frequency
30132	0x84	Serial Number Data Type : Hex

NOTE :

1. Hysteresis & trip time is common for over - under voltage as well as over - under current, If any of these parameter is disabled then user won't be able to see hysteresis & trip time parameters.

2. Difference between under and over voltage will always be of maximum hysteresis value.
(same is applicable for current and frequency)

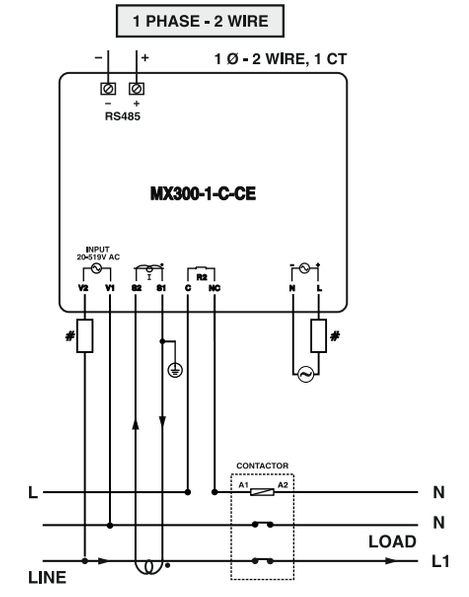
3. In configuration menu, if any key is untouched for 30 sec, unit resumes to online pages.

4. If over voltage is less than sum of minimum under voltage & max voltage hysteresis then under voltage will not be enabled

(Same applicable for current & frequency)

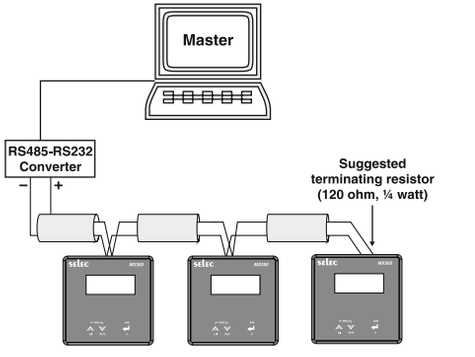
5. If under voltage is greater than difference of maximum over voltage & maximum hysteresis voltage will not be enabled.
(Same applicable for current & frequency **)**

TYPICAL WIRING DIAGRAM



CONNECTION DIAGRAM FOR COMMUNICATION

CONNECTION DIAGRAM FOR COMMUNICATION



Contact sales for PC based monitoring software to communicate with the meters.

All fuse types: 0.5A class CC UL type
0.5A fast acting 600V

(Specifications are subject to change, since development is a continuous process.)

Selec Controls Pvt. Ltd.

Factory Address :
EL-27/1, Electronic Zone, TTC Industrial Area, MIDC, Mahape, Navi Mumbai - 400 710, India.
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Email : service@selec.com