

Contact us

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www.abb.com/lowvoltage/directives

Warning! Installation by person with
electrotechnical expertise only.

1. FEATURES

- STAR (Wye)/ DELTA/1 Phase Programmable
- Universal Auxiliary (80 - 300 VAC/DC) supply
- PT ratio / CT ratio Programmable including CT secondary
- "OLD" register to store the previously cleared energy value
- 6 digit 4 Rows LED/display with Auto Scaling & Auto Scrolling
- Voltage Range (80 - 515 VAC L-L, 300 VAC Max L-N), and Current Range (50mA to 6A)
- Two Energy readings in single page
- User configurable (editable) password
- Clearance & Creepage distance meets IEC 61010 standard

2. UNIQUE FEATURES

- True RMS measurements
- Simultaneous sampling of volts & amps
- Best parameters grouping /bright displays
- High/ low V, A, Hz, W, VA, PF, VAR value storage
- Real time clock (RTC)
- Auto-scaling of Kilo, Mega & Giga decimal point
- THD Measurement
- Individual harmonics display upto 31st level (M1M30B)

3. KEY FUNCTIONS		
Key	In SET (Programming) mode	In RUN (Measurement) mode
RIGHT/ Energy	To select the value and to accept the value	To scroll energy pages to look at different parameters
UP/power	To edit the value/ system types upward in edit mode and scroll through the parameters	To scroll power pages to look at different parameters
DOWN/ Basic	To edit the value/ system types upward in edit mode and scroll through the parameters	To scroll power pages to look at different parameters
OPTION	Jumps to save page	To see the desired option (if any)



M1M 30B | M1M 20B



4. WIRING DIAGRAM

4.1. Star connection (3E) 3 phase 4 wire system

4.2. Delta connection (2E) 3 phase 3 wire system

4.3. Single phase connection

Note: Wiring should be in accordance with the National Electrical Code and/or the Canadian Electrical Code, Part I.

WARNING: When using a modem interface between the host computer and any remote device(s), ensure that the host computer is not used to set the BAUD RATE parameter of any selected device outside the working range of the modem. Doing so will cause that meter to cease communicating. Re-establishing communication with that meter is possible through performing the following:

1. Reset the baud rate of the remote device from its front panel to a value within the working range of the modem.
2. Set the computer to communicate at the baud rate at which the remote device has been set to communicate.

5. LED INDICATIONS

LED Status	Display status	Meaning
K - ON	K	Kilo
M - ON	M	Mega
K & M - ON	G	Giga
K & M - OFF	without K, M & G	Direct reading
Minus (-) ON	L	Lag/Minus
Minus (-) OFF	C	Lead/Plus
	ON	Pulse LED
COM	ON	Communication ON

6. DISPLAY OF PARAMETERS:

DISPLAY	Meaning
LL	Voltage line to line
L n	Voltage line to neutral
rY	Voltage L1L2 phase
yb	Voltage L2L3 Phase
br	Voltage L3L1 Phase
A	Current Average
F	Frequency
An	Neutral Current
rPn	Revolution per Minute (RPM)
UPhAng	Voltage phase angle
APhAng	Current phase angle
UnBALV	Unbalance Voltage
UnBALA	Unbalance Current
Uthd	Voltage THD
Ah	Amps average received
Athd	AMPS THD
Athd03	AMPS THD phasewise up to 31st level
f.FACTV	K-Factor V
f.FACTA	K-Factor A
Wh	Watts Total
VA	Total VA
VAR	Total VAR
PF	Power Factor
Wh	Active Energy Received
UArhL	Apparent Energy
UArhC	Reactive Inductive Energy
AUG	Reactive Capacitive Energy
LdHr	Average
L	Load Hour
Lntcr	Lagging Power Factor
Uthd03	Number of Interrupts
OnHr	Voltage THD phasewise up to 31st level
O	On hour
CLr	Old
rd	Clear
Fd	Rising Demand
nd	Forecast demand
AL	Maximum Demand
Et	Additional Load
Hl	Elapse Time
Lo	High Level of Parameter
bA	Low Level of Parameter
dU	Baud Rate
c	Device ID
cLoc	Leading Power Factor
	Real time clock

Conversions of alphabets used n̄ (M) u (W) f (K)

7. CONFIGURE (SETUP MODE)

Step	Actions	Display	Range/Options/ Comments
1	Press RIGHT & UP Keys together to enter SETUP	 [SETUP]	
2	Press DOWN Key	Row 1: [PASWD] Row 2: 0000with first digit "0" blinking.	Password page is displayed
3	Press UP Key once to increment the first digit to "1"	PASSWORD =1000 (default/factory set)	If any other password is already set, press up and down key to set the correct password
4	Press RIGHT key four times to accept the password.	ROW 1: [ELEMENT] Row 2: [STAR] Displays last programmed system type	Element: Defines the power systems configuration. Options: STAR / DELTA/ 1.Phase
5	Press RIGHT Key to Select required system type	Row 1: Element Row 2: Blinks StAr/dELtA/1 Phase	
6	Press UP/DOWN Key to select required system type	Row 1: Element Row 2: StAr/dELtA 1 Phase	(Selected system mode blinks)
7	Press RIGHT Key to Accept	Row 1: Element Row 2: Selected System type stabilizes	
8	Press DOWN Key	Row 1: [Pt.Pri.] Row 2: 415.0	PT Primary (415.0 -default/ factory set)
9	Press RIGHT Key to set the PT primary value	Row 1:PY Primary Row 2: 415.0 First digit blinking	Value can be edited using UP/DOWN Key.
10	Press RIGHT Key to Accept the for first digit.	Row 1: PT Primary Row 2: Second digit Blinking, can be edited using UP/DOWN Key. Press RIGHT Key to accept the edited value. Continue the same method till fourth digit.	Program Range for PT Primary : 100V to 999KV
11	Press RIGHT Key	Row 1: PT Primary Row 2: Decimal Point blinking. Can be set at appropriate location using UP/DOWN key. Ascertain the correct scale (Kilo/ Mega/Giga) is selected. Press RIGHT Key to Accept the edited value.	Eg: To set 11.00KV set First four digits (1100) as explained above press UP/ DOWN key to Place decimal point at appropriate location. Letter K/M will indicate the Kilo/ Mega. M & K LED Will glow for Giga
12	Press DOWN Key	Row: 1 [Pt.Sec.] Row 2: 415.0 (Follow the Procedure as described in steps 9 to 11)	PT Secondary Range:80V to 515V
13	Press DOWN Key	Row 1: [Cr.Pri.] Row 2: 5.000 (Repeat Steps 9 to 11 to Change the settings)	CT Primary Range: 0.5A to 99KA
14	Press DOWN Key	Row 1: [Ct.Sec.] Row 2 : 5.000 (Repeat Steps 9 to 11)	CT Secondary Range: 0. 5A to 6A

Step	Actions	Display	Range/Options/Comments
15	Press DOWN Key	Row 1: [URSEL] [VA.SEL.] Row 2: [UECHAr] [UEC.HAr]	Method of VA Selection: Arithmetic/ Vector/ harmonics vector
16	Press DOWN Key	Row 1: [YEAR] [YEAR] Row 2: XXXX	Range: 2000 to 2040
17	Press DOWN Key	Row 1: [dAtE] [DATE] Row 2: xx.xx.(Mm.dd)	Month. date Jan 01 (01.01) to December 31 (12.31)
18	Press DOWN Key	Row 1: [tImE] [TIME] Row 2: [xx.xx. (HH. mm)]	Min.sec : 00.00 to 23:59 (24 Hour Format)
19	Press DOWN Key	Row 1: [dM.tYPE] [dM. TYPE] Row 2: [SLIdIn] [SLIdIn]	Demand Type Options: Sliding /block (fixed)
20	Press DOWN Key	Row 1: [dM.PAr] [dM.PAR] Row 2: [WAtTS] [Watts]	Demand Parameter options: Watts/VA/ Amps Average/VAr [Watts]
21	Press DOWN Key	Row 1: [dM.Prd] [dM.Prd] Row 2: [15.00]	Demand period Range: 5 to 30 min
22	Press DOWN Key	Row 1: [bAUd] [BAUD] Row 2: xxxx (Default: 9600)	Baud Rate: Communication speed defines the baud rate. Option :1200, 2400, 4800, 9600, 19.2k
23	Press DOWN Key	Row 1: [PAR, 4] [PARITY] Row 2: [EVEN] (Even)	Internal communication error Check Option : EVEN/odd/no (no Parity)
23	Press DOWN Key	Row 1: [dEVIId] [DEV.Id] Row 2: 1.000	Defines the (ID) communications identification number. Option: 1-247
24	Press Down Key	Row 1: [POLES] [POLES] row 2: 4.000	No. of Poles Option : 1 to 28 (For rpm)
25	Press Down Key	Row 1: [REVLOC] [REV.LOC] row 2: [no] [no.]	Reverse Lock Option: NO/YES. If YES blocks energy accumulation in case the CT polarity reverse.
26	Press Down Key	Row 1: [PASwD] [PASWD] row 2: ---	Range: 1000-9999. If password is forgotten the meter has to be reset and re-calibrated factory only.
27	Press Down Key	Row 1: [EnERGy] [ENERGY] Row 2: [RESOLU] [RESOLU]	Energy value format i.e., the energy accumulated in the meter to be displayed in resolution or counter format. Option: resolution/ counter
28	Press Down Key	Row 1: [StARtA] [START.A] Row 2: 0.400	Starting current value to be displayed in the meter. Range: (0.2% to 10% of full scale)
29	Press Down Key	Row 1: [dISPLtE] [DISP.U.R] Row 2: 1.000	Update time for Displaying parameter. Range. 1 to 5 seconds.
30	Press Down Key	Row 1: [Auto.T] [Auto.T] Row 2: 5.000	Display increment during auto scroll Range: 1 to 10 seconds

Step	Actions	Display	Range/Options/Comments
31	Press DOWN Key	Row 1:byt.Ord [byt.Ord] Row 2:FLOAt	Byte Order Option: FLOAt/biG End/LitLE.E
32	Press DOWN key	Row 1: [SAVE] [SAVE] Row 2: [blinking.] [blinking.] Row 1 : xxxxLL Row 2 : xxxxLn Row 3 : xxxx A Row 4 : xxxx F	If "n" (no) is Selected then Meter enters into Measurement mode without memorizing any edited Values in the setup

Once the required parameter is programmed press the DOWN key continuously till it reaches SAVE page or OR press the OPTIONS key to reach SAVE page directly.

7.1 The List of parameters can be configured and the range is given below			
Sl. No.	Parameters	Default setup	Range
1	Connection mode	STAR	STAR/DELTA/1.Phase
2	PT Primary	415.0	100- 999kV
3	PT Secondary	415.0	80V - 515V
4	CT Primary	5.000	0.5A - 99kA
5	CT Secondary	5.000	0.5A - 6A
6	VA Selection	VEC.HAr	Arith (Arithmetic)/ Uector/ Uec.H (Vector harmonics)
7	Baud rate	9600	1200 to 19.2K
8	Parity	Even	Even/ Odd/ no
9	Device Id	1.000	1.000 to 247.0
10	No of Poles	4.000	1.000 to 28.00
11	Reverse lock	No	Yes/no
12	Password	1000	1000 to 9999
13	Energy	Resolution	Resolution/Counter
14	Starting Current	0.400	0.2 to 10 % of full scale
15	Display update time	1.000	1 to 5 seconds
16	Display autoscroll time	5.000	1 to 10 seconds
17	Byte order	FLOAt	FLOAt/biG.End/LitLE.E
18	Year	2000	2000 - 2040
19	Date	01.01	01.01 - 12.31
20	Time	00.00	00.00 - 23.59
21	Demand Type	SLIdIn	Sliding / Block (Fixed)
22	Demand Parameter	WAtTS	Watts / VA / Amps Average / VAr
23	Demand Period	15.00	5 - 30 min

8. CLEARING PARAMETERS

To Clear parameters from the front panel UP and DOWN Keys together, and ` CLEAR` is shown on the display. Enter the Password (Default password is 1000. Set up and clear has the same password) and it will display "CLr.Int. Press UP / DOWN Key for selecting **CLr.Int** (Clear Integrator)/**CLr.H.L** (Clear max. or min value of the parameter)/**CLr.Md** (clear max. demand). once the parameter to be cleared is selected it will prompt 'y' (yes) or 'n' (no) confirm. press UP and DOWN key for changing 'y' or 'n' and Press the RIGHT key to do the operation. User can return to display mode at any time by again pressing OPTIONS button.

**CAUTIONS :** Once the data is cleared (except energy) the value will not be retained.

9. ENABLING AND DISABLING

Enabling auto scrolling: Press **UP/DOWN** Key continuously for 5 seconds or until display shows **EnABle Auto.Sc** for scrolling.
Disabling auto scrolling: Press any Key (RIGHT/ UP/ DOWN/ OPTION), display show **diSAbI Auto.Sc** and returns to normal mode.

10. MULTIPLICATION FACTOR

Energy Display programmable for counter based or Resolution based

Multiplication factor for counter based energy mode							
• Full scale kW √3 V pri LL x A pri / 1000	0.4 to 4.0	4.01 to 40	4.01 to 400	400.1 to 4,000	4Mega to 40 M	40 M to 400 M	400 M to 4000 M
• Multiplication Factor:	0.01	0.1	1.0	10	100	1000	10000
• Unit of display	KWH		MWH		GWH		

Energy Reset: 999999kVAh x Multiplication Factor

13. TECHNICAL SPECIFICATION

Auxiliary power supply	
Range	80V to 300 V AC or DC
Frequency	45 - 65Hz
Burden	5VA Max
Installation category	CAT III
Protection fuse	200mA
Measurement accuracy	
Voltage	±1.0%, ±0.5%, ±0.2%
Current	±1.0%, ±0.5%, ±0.2%
Active Power	±1.0%, ±0.5%, ±0.2%
Active Energy	±1.0%, ±0.5%, ±0.2%

Voltage measurement inputs	
Measurement range	80-515V AC (L-L), 300V Max. AC L-N
Measurement category	CAT III
Rated frequency	45 - 65Hz
Max. VT Primary	999 Kv
Burden	0.2VA Max. per phase

Current measurement inputs	
Number of current inputs	3 Phase (L1, L2, L3), 1 Phase (L, N)
CT secondary	1A or 5A
Measurement range	50mA-6A
Max. CT Primary	99 kA
Burden	0.2VA Max. per phase

User Interface	
Access to device	4 push buttons
Display type	LED display
LED Digit height	10 mm

Communication protocol (M1M 12 Modbus) - RS485	
Protocol	Modbus RTU
Communication interface	RS485 with optical isolation
Baud rate	1200 bps to 19200 bps
Parity number	Odd, Even, None
Stop bit	1/2
Device ID	1-247

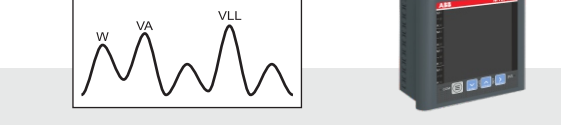
Mechanical characteristics	
Overall dimensions	96 X 96 X 58 mm (52 mm depth inside the switchboard)
IP degree of protection	IP51 (IEC 60529)
Weight	0,300 kg

Climatic conditions	
Operating temperature	-10°C to + 55°C
Storage temperature	-25°C to + 70°C
Relative humidity	5% to 95% non condensing
Pollution degree	2
Altitude	Below 2000m

Terminal characteristics	
Current inputs	6 terminals, 3 inputs, 50mA - 6A with S1 and S2 on each input
Voltage inputs	4 terminals. 80-515V L-L 2 terminals. 300V Max. L-N

Standards	
Electrical safety	IEC 61010
EMC	IEC 61000-4-2, 4-3, 4-4, 4-6, 4-8, 4-11
Accuracy	IEC 62053-21 & 22

High Low Event Recording for V,A,HZ,VA,W,VAR,PF
Protection of 3 phase system against single phasing, low & high voltage, over load, highly lagging and leading PF, Hz etc. can trap such events for future reference.



Identify & record unbalance voltage and currents and helps the user to identify the root cause. Unbalance over-burdens the electrical system and affects in the form of over loading of cables, motors and switchgear.

PF Management

Lower the Avg PF higher the system inefficiency. So this enables the user to maintain a healthy PF level.

Data Logging with Time Stamp

The information is needed in all types of businesses to determine performance, quality, efficiency, cost reduction, fuel consumption monitoring and many other critical factors. This feature provides important and accurate data for analysis.

Harmonicsup to 31st level and THD

Presence of THD will urge the user to identify the polluting loads and take necessary action to mitigate harmonics through an appropriate harmonic filter and save energy and also to improve plant & equipments efficiency.



Monitors Basic, Power & Energy Parameters

Provides the complete spectrum of Electrical system and help study of load pattern.

Power Quality Check/Management

Monitoring phase angle will help the user to identify the causes such as deterioration in the distribution transformers, cables & cable termination, presence of harmonics etc.

Safety Requirments:

- The warnings, cautions & notes specified in this guide shall be followed strictly (see the all pages).
- The specified safety regulations must be observed.
- Use dedicated fuse or circuit breaker in the Voltage and auxiliary circuit in all the ABB make meters for the safe operation.
- Fuse shall be used after PT.
- Fuse / circuit breaker is not part of the instruments (refer rear side of the TB label). Recommended to use by the customer for the safety requirements.

Precautionary Measures to be taken while Wiring the Circuit:

- ☐ Turn OFF the power to the circuit, when wiring the circuit. Connecting or removing measurement cables while the power is turned ON is dangerous.
- ☐ Take special caution not to wire a current measurement circuit to the voltage input terminal or vice-versa.
- ☐ Strip the insulation cover of the measurement cable so that when it is wired to the input terminal, the conductive parts (bare wires) do not protrude from the terminal. It is recommended to use appropriate pre plug after crimping the wire. Also, make sure to fasten the input terminal screws securely so that the cable does not come loose.
- ☐ Use cables with safety terminals that cover the conductive parts for connecting to the voltage input terminals. Using a terminal with bare conductive parts is dangerous if the terminal comes loose.
- ☐ After connecting the measurement cable, attach the current input protection cover for your safety. Make sure that the conductive parts are not exposed from the protection cover.
- ☐ Use the suitable star screw driver and apply optimum torque to prevent damage to the meter terminals.

**CAUTION :** During normal operation of this instrument, hazardous voltages are present at the rear terminals, which can cause severe injury or death. These voltages are present throughout the potential transformer (PT), current transformer (CT) auxiliary supply, communication & Input / Output terminal. Installation, disconnection or removal of the meter should be carried out only by qualified, properly trained personnel, after de-energizing connected circuits. Improper installation, including improper wiring and/or improper grounding will void warranty.

TROUBLESHOOTING

Due to programming error, site conditions, some problems can cause the Meter malfunction. The fault symptoms and their remedial action for correction is given below.

- If the display does not turn ON:**
 - a) Check that there is at least 80 volts available to the power supply (L and N connections) on the Aux supply terminals. If the above steps do not solve the problem, Contact us.
- If the voltage or current readings are incorrect:**
 - a) Check that the Connection mode (star/delta) is properly programmed.
 - b) Check that the voltage and current ratios are properly set.
 - c) Check the output of the CT's and PT's being used.
- If the kW or Power Factor readings are incorrect but voltage and current readings are correct:**
 - a) Make sure that the phase relationship between voltage and current inputs are correct by comparing the wiring with the appropriate wiring diagram.
 - b) CT reversal can be observed by either seeing the phase wise kW. Negative kW is shown where the current polarity is reversed, need to be corrected. Model where kW information is not available, you may check Amps Phase angle.
- If RS-485 communication does not work:**
 - a) Check that the baud rate of the host computer/PLC is the same as Meter.
 - b) Check that the device ID of the meter are unique and should not replicate.
 - c) Check all communications wiring is complete.
 - d) Check that the number of data bits is set to 8, with one stop bit and even parity.

If the symptom persists after performing the specified steps, or if the symptom is not listed above, contact your local representative or the technical support / customer support department.