EM35xx Series

Compact Power and Energy Meter (Pulse, Modbus, BACnet)

Quick Install Guide
Z206079-0A
11114

RoHS Compliant

CE

c UL us

Schneider Electric

Additional Resources

Go to www.schneider-electric.com for the Installation Guide and additional power meter information.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Follow safe electrical work practices. See NFPA 70E in the USA or applicable local codes.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Read, understand, and follow the instructions before installing this product.
- Turn off all power supplying equipment before working on or inside the equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Do not depend on this product for voltage indication.
- Only install this product on insulated conductors.
- Install device in an appropriate electrical and fire enclosure per local regulations.
- ESD sensitive equipment. Ground yourself and discharge any static charge before handling this device.
- Any covers that may be displaced during the installation must be reinstalled before powering the unit.
- Do not install on the load side of a Variable Frequency Drive (VFD), aka Variable Speed Drive (VSD) or Adjustable Frequency Drive (AFD).

Failure to follow these instructions will result in death or serious injury.

For use in a Pollution Degree 2 or better environment only. A Pollution Degree 2 environment must control conductive pollution and the possibility of condensation or high humidity. Consider the enclosure, the correct use of ventilation, thermal properties of the equipment, and the relationship with the environment. Installation category: CAT II or CAT III

Provide a disconnect device to disconnect the meter from the supply source. Place this device in close proximity to the equipment and within easy reach of the operator, and mark it as the disconnecting device. The disconnecting device shall meet the relevant requirements of IEC 60947-1 and IEC 60947-3 and shall be suitable for the application. In the US and Canada, disconnecting fuse holders can be used. Provide overcurrent protection and disconecting device for supply conductors with approved current limiting devices suitable for protecting the wiring. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the device may be impaired.

FCC PART 15 INFORMATION

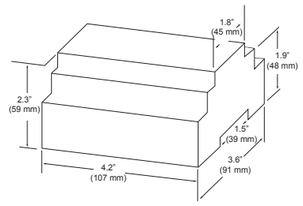
NOTE: This equipment has been tested by the manufacturer and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area may cause harmful interference in which case the user will be required to correct the interference at his own expense. Modifications to this product without the express authorization of the manufacturer nullify this statement.

Specifications

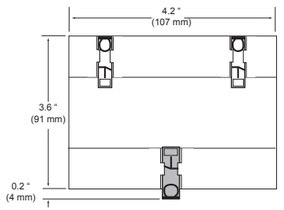
Measurement Accuracy:	
Real Power and Energy	IEC 62053-22 Class 0.5S, ANSI C12.20 0.5%
Input Voltage Characteristics:	
Measured AC Voltage	Minimum 90V $_{L-N}$ (156V $_{L-L}$) for stated accuracy; UL Maximums: 600V $_{L-L}$ (347V $_{L-N}$) CE Maximums: 300V $_{L-N}$ (520V $_{L-L}$)
Impedance	2.5 MΩ $_{L-N}$ /5 MΩ $_{L-L}$
Frequency Range	45 to 65 Hz
Input Current Characteristics:	
Measurement Input Range	0 to 0.333VAC or 0 to 1.0VAC (+20% over-range)
Impedance	10.6kΩ (1/3 V mode) or 32.1kΩ (1 V mode)
Control Power:	
AC	5VA max.; 90V min. UL Maximums: 600V $_{L-L}$ (347V $_{L-N}$) CE Maximums: 300V $_{L-N}$ (520V $_{L-L}$)
DC*	3W max.; UL and CE: 125 to 300VDC
Ride Through Time	100 msec at 120VAC
Mechanical Characteristics:	
IP Degree of Protection (IEC 60529)	IP40 front display; IP20 Meter
Terminal Block Screw Torque	3.5 in·lb (0.4 N·m) nominal/4.4 in-lb (0.5 N·m) max.
Terminal Block Wire Size	14 to 24 AWG
Rail	T35 (35mm) DIN Rail per EN50022
Environmental Conditions:	
Operating Temperature	-30° to 70°C
Storage Temperature	-40° to 85°C
Humidity Range	<95% RH (non-condensing)
Altitude of Operation	3 km max.
Metering Category:	
North America	CAT III; for distribution systems up to 347 V $_{L-N}$ /600VAC $_{L-L}$
CE	CAT III; for distribution systems up to 300 V $_{L-N}$
Dielectric Withstand	Per UL 508, EN61010
Conducted and Radiated Emissions	FCC part 15 Class B, EN55011/EN61000 Class B (residential and light industrial)
Conducted and Radiated Immunity	EN61000 Class A (heavy industrial)
Safety:	
US and Canada (cULus)	UL508 (open type device)/CSA 22.2 No. 14-05
Europe (CE)	EN61010-1:2001

* External DC current limiting is required, see fuse recommendations.

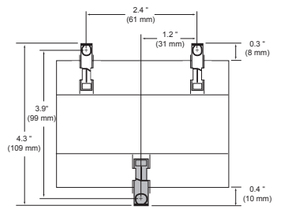
Dimensions



Bottom View (DIN Mount Configuration)



Bottom View (Screw Mount Configuration)



Product Identification

EM35xx:

02 = Unidirectional metering, pulse and alarm outputs only

50 = Unidirectional metering, Modbus full data set, pulse and alarm outputs

55 = Bidirectional metering, Modbus full data set, data logging, pulse and alarm outputs

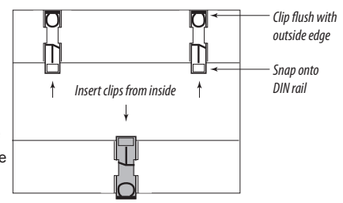
60 = Unidirectional metering, BACnet full data set, data logging, and two pulse inputs

Installation

The meter can be mounted in two ways: on standard 35 mm DIN rail or screw-mounted to the back of the enclosure.

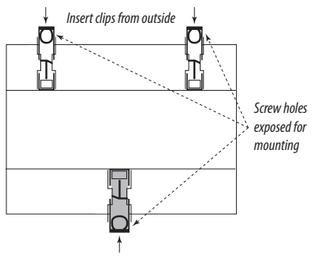
A. DIN Rail Mounting

1. Disconnect and lock out power. Use a properly rated voltage sensing device to confirm power is off.
2. Attach mounting clips to the underside of the housing by sliding them into the slots from the inside. The stopping pegs must face the housing, and the outside edge of the clip must be flush with the outside edge of the housing.
3. Snap the clips onto the DIN rail. See diagram of the underside of the meter.
4. To prevent horizontal shifting across the DIN rail, use two end stop clips.



B. Screw Mounting

1. Disconnect and lock out power. Use a properly rated voltage sensing device to confirm power is off.
2. Attach the mounting clips to the underside of the housing by sliding them into the slots from the outside. The stopping pegs must face the housing, and the screw hole must be exposed on the outside of the housing.
3. Use three #8 screws (not supplied) to mount the meter to the back of the enclosure. See diagram of the underside of the meter.



Supported System Types

	CTs		Voltage Connections			System Type		Phase Loss Measurements			Wiring Diagram
Num. of wires	Qty	ID	Qty	ID	Type	Modbus Register 130 or BACnet Analog Value object AV2	User Interface: SETUP> S SYS	VLL	VLN	Balance	Diagram number
Single-Phase Wiring											
2	1	A	2	A, N	L-N	10	1L + 1n		AN		1
2	1	A	2	A, B	L-L	11	2L	AB			2
3	2	A, B	3	A, B, N	L-L with N	12	2L + 1n	AB	AN, BN	AN-BN	3
Three-Phase Wiring											
3	3	A, B, C	3	A, B, C	Delta	31	3L	AB, BC, CA		AB-BC-CA	4
4	3	A, B, C	4	A, B, C, N	Grounded Wye	40	3L + 1n	AB, BC, CA	AN, BN, CN	AN-BN-CN & AB-BC-CA	5, 6

To avoid distortion, use parallel wires for control power and voltage inputs.

The following symbols are used in the wiring diagrams on the following pages.

Symbol	Description
	Voltage Disconnect Switch
	Fuse (installer is responsible for ensuring compliance with local requirements. No fuses are included with the meter.)
	Earth ground
X1 X2	Current Transducer
	Potential Transformer
	Protection device containing a voltage disconnect switch with a fuse or disconnect circuit breaker. The protection device must be rated for the available short-circuit current at the connection point.

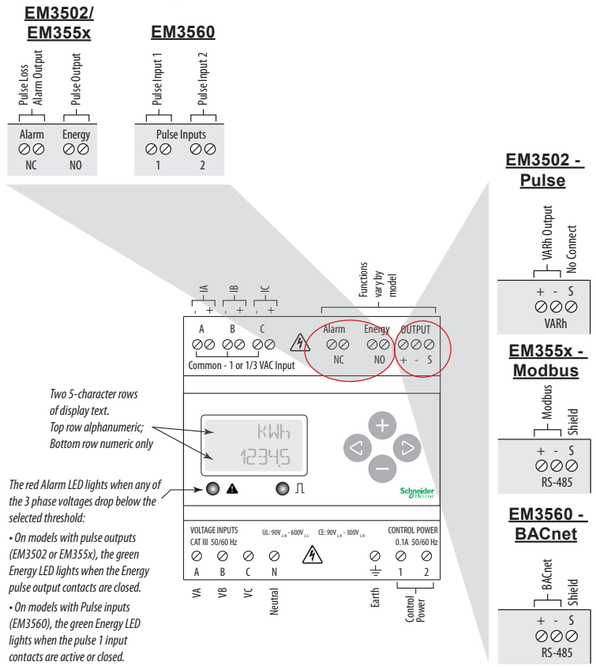
CAUTION

RISK OF EQUIPMENT DAMAGE

- This product is designed only for use with 1V or 0.33V current transducers (CTs).
- DO NOT USE CURRENT OUTPUT (e.g. 5A) CTs ON THIS PRODUCT.

Failure to follow these instructions can result in overheating and permanent equipment damage.

Product Diagram



Wiring Diagrams

⚠ WARNING ⚠

RISK OF ELECTRIC SHOCK

CT negative terminals are referenced to the meter's neutral and may be at elevated voltages
- Do not contact meter terminals while the unit is connected
- Do not connect or short other circuits to the CT terminals

Failure to follow these instructions can result in death or serious injury.

For EM3502, EM3550, EM3560 models, CTs are NOT polarity sensitive. No need to observe orientation.
For EM3555 model, CTs are polarity sensitive. Observe correct orientation as shown below.

Diagram 1: 1-Phase Line-to-Neutral 2- Wire System 1 CT

Use System Type 10 (1L + 1n)

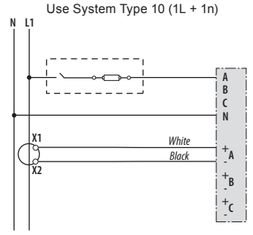


Diagram 2: 1-Phase Line-to-Line 2-Wire System 1 CT

Use System Type 11 (2L)

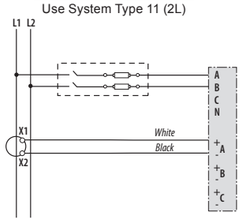


Diagram 3: 1-Phase Direct Voltage Connection 2 CT

Use System Type 12 (2L + 1n)

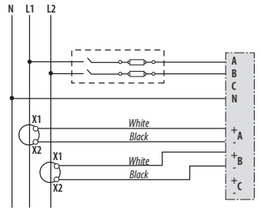


Diagram 4: 3-Phase 3-Wire 3 CT no PT

Use System Type 31 (3L)

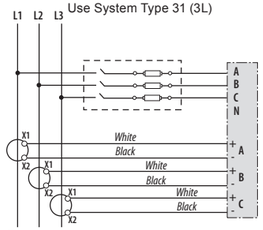


Diagram 5: 3-Phase 4-Wire Wye Direct Voltage Input Connection 3 CT

Use System Type 40 (3L + 1n)

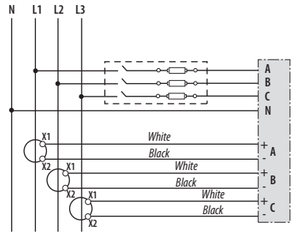
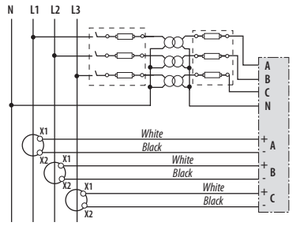


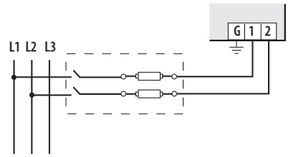
Diagram 6: 3-Phase 4-Wire Wye Connection 3 CT 3 PT

Use System Type 40 (3L + 1n)



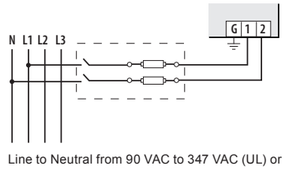
Control Power

Direct Connect Control Power (Line to Line)



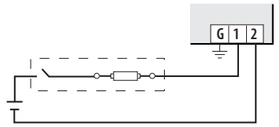
Line to Line from 90 VAC to 600 VAC (UL) (520 VAC for CE). In UL installations the lines may be floating (such as a delta). If any lines are tied to an earth (such as a corner grounded delta), see the Line to Neutral installation limits. In CE compliant installations, the lines must be neutral (earth) referenced at less than 300 VAC_{L-N}

Direct Connect Control Power (Line to Neutral)



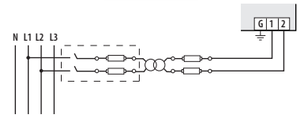
Line to Neutral from 90 VAC to 347 VAC (UL) or 300 VAC (CE)

Direct Connect Control Power (DC Control Power)



DC Control Power from 125 VDC to 300 VDC (UL and CE max.)

Control Power Transformer (CPT) Connection



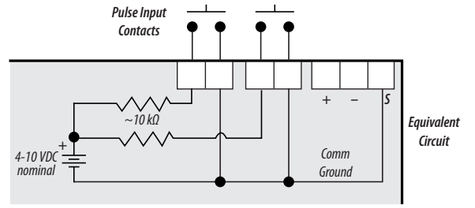
The Control Power Transformer may be wired L-N or L-L. Output to meet meter input requirements.

Fuse Recommendations:

Keep the fuses close to the power source (obey local and national code requirements). For selecting fuses and circuit breakers, use the following criteria:
- Select current interrupt capacity based on the installation category and fault current capability.
- Select over-current protection with a time delay.
- The voltage rating should be sufficient for the input voltage applied.
- Provide overcurrent protection and disconnecting means to protect the wiring. For DC installations, external circuit protection must be provided. Suggested: 0.5A, time delay fuses.
- The earth connection is required for electromagnetic compatibility (EMC) and is not a protective earth ground.

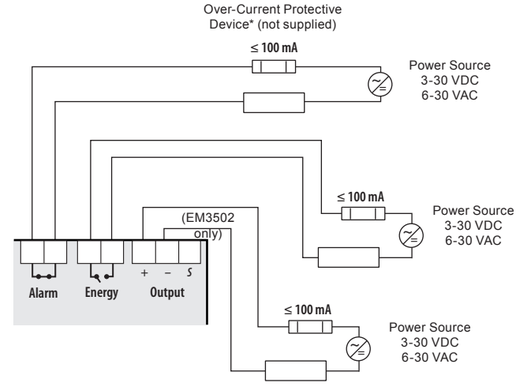
Pulse Contact Inputs (EM3560 Only)

The EM3560 has two inputs with pulse accumulators for solid state or mechanical contacts in other sensors, such as water or gas flow meters. These inputs are isolated from the measured circuits and referenced to the communication signal ground. Use with contacts that do not require current to remove oxidation.



Solid State Pulse Output (EM3502 and EM355x Only)

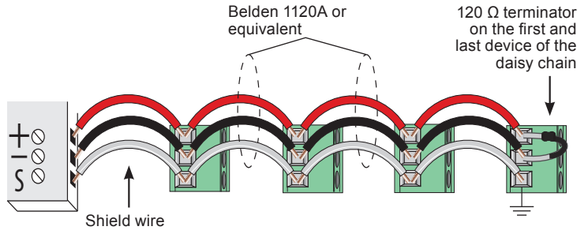
The EM3502 and EM355x have one normally open (N.O.) KY Form A output and one normally closed (N.C.) output. One is dedicated to energy (Wh), and the other to Alarm. The EM3502 also provides an additional (N.O.) reactive energy (VARh) contact. See the Setup section for configuration information.



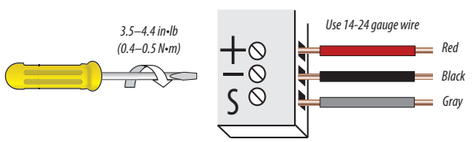
The solid state pulse outputs are rated for 30 VAC/DC nom.
Maximum load current is 100mA at 25°C. Derate 0.56 mA per °C above 25°C (e.g. 86 mA@50°C).
* The over-current protective device must be rated for the short circuit current at the connection point.

RS-485 Communications (EM355x and EM3560 Only)

Daisy-chaining Devices to the Power Meter
The RS-485 slave port allows the power meter to be connected in a daisy chain with up to 63 2-wire devices.

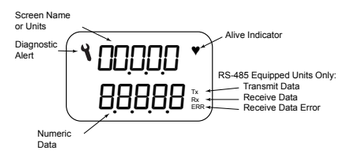


NOTES:
- The terminal's voltage and current ratings are compliant with the requirements of the EIA RS-485 communications standard.
- The RS-485 transceivers are ¼ unit load or less.
- RS-485+ has a 47 kΩ pull up to +5V, and RS-485- has a 47 kΩ pull down to Shield (RS-485 signal ground).
- Wire the RS-485 bus as a daisy chain from device to device, without any stubs. Use 120 Ω termination resistors at each end of the bus (not included).
- Shield is not internally connected to Earth Ground.
- Connect Shield to Earth Ground somewhere on the RS-485 bus.
- Use 14-24 gauge wire for all connections.
- When tightening terminals, ensure that the correct torque is applied: 3.5 - 4.4 in·lb (0.4-0.5 N·m).

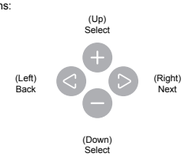


Display Screen Diagram

LCD Screen:



Buttons:



Initial Setup Instructions

These instructions assume the meter is set to factory defaults. If it has been previously configured, check all optional values. For more options and the full setup instructions, see the full installation guide for the specific model.

A. To Navigate to the Setup screens:
1. Press ⊕ or ⊖ repeatedly until SETUP screen appears.
2. Press ▷ to get to the PASSWD screen.
3. Press ▷ to move through the digits. Use the ⊕ or ⊖ buttons to enter your password (the default is 00000).
4. Press ▷ to move to the first Setup screen (S CT on EM3502, S COM on EM355x, S BAC on EM3560)
5. Use ⊕ or ⊖ to select the parameter screen you want to set.
6. After you set the parameters you want, use ⊕ or ⊖ to select the next Setup screen or ◁ to exit the Setup screens (return to SETUP).

B. To Enter Modbus communication parameters (EM355x models only):
1. Navigate to the S COM (set communications) Setup screen (see section A).
2. Press ▷ to go to the ADDR screen and through the address digits. Use ⊕ or ⊖ to select the Modbus address (default is 001).
3. Press ▷ to accept the value and go to the BAUD screen. Use ⊕ or ⊖ to select the baud rate (default is 19200).
4. Press ▷ to go to the PAR screen. Use ⊕ or ⊖ to select the parity (default is EVEn).
5. Press ▷ to go back to the S COM screen.

C. To Enter BACnet communication parameters (EM3560 models only)
1. Navigate to the S BAC (set BACnet) Setup screen (see section A).
2. Press ▷ to go to the MAC screen and through the address digits. Use ⊕ or ⊖ to select the BACnet MAC address (default is 001).
3. Press ▷ to accept the value and go to the kBAUD screen. Use ⊕ or ⊖ to select the baud rate (default is 76.8K).
4. Press ▷ to go to the ID1 screen and through the upper four digits of the Device Instance. Use ⊕ or ⊖ to select the ID digits (default is a pseudo-random number).
5. Press ▷ to accept the value and go to the ID2 screen and through the lower three digits of the Device Instance. Use ⊕ or ⊖ to select the ID digits (default is a pseudo-random number).
6. Press ▷ to accept the value and go back to the S BAC screen.

D. To Enter the CT (Current Transducer) output voltage and input current ranges:
1. Navigate to the S CT (Set Current Transducer) Setup screen (see section A).
2. Press ▷ to go to the CT V screen. Use ⊕ or ⊖ to select the voltage mode Current Transducer output voltage (default is 0.33).
3. Press ▷ to go to the CT SZ screen and through the digits. Use ⊕ or ⊖ to select the CT size in amps (default is 100).
4. Press ▷ to accept the value and go back to the S CT screen.

E. To Enter the service type to be monitored:
1. Navigate to the S SYS (Set System) Setup screen (see section A).
2. Press ▷ to go to the SYSTM screen. Use ⊕ or ⊖ to select the configuration (see wiring diagrams - default is 3L-4N).
3. Press ▷ to go back to the S SYS screen.

China RoHS Compliance Information (EFUP Table)

部件名称	产品中有毒有害物质或元素的名称及含量Substances					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯(PBB)	多溴二苯醚(PBDE)
电子线路板	X	O	O	O	O	O

O = 表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下.
X = 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T11363-2006标准规定的限量要求.

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