



# Applications Cookbook

## Metering Solutions

Version 8.0

FOR REFERENCE ONLY

# METERING SOLUTIONS COOKBOOK NOTES

## Measurement & Verification - Data Collection

### GENERAL NOTES

- REFER TO INSTALLATION INSTRUCTIONS FOR DEVICE SPECIFIC TERMINATIONS.
- REFER TO DEVICE DATA SHEETS FOR DEVICE SPECIFIC DATA TRANSFER TYPES.
- INSTALL CURRENT TRANSFORMERS (CT), VOLTAGE SENSORS, AND OTHER REQUIRED HARDWARE ASSOCIATED WITH THE PROPER OPERATION OF THE METERING EQUIPMENT PER NEC AND BEST PRACTICES.
- CURRENT TRANSFORMERS AND VOLTAGE SENSORS NOT SHOWN FOR CLARITY.
- MAXIMUM CURRENT TRANSFORMER LEAD RUN LENGTH DETERMINED BY CT TYPE. REFERENCE CT DOCUMENTATION PRIOR TO LAYING OUT EQUIPMENT.
- LEVITON RECOMMENDS THE FOLLOWING USE OF ISOLATED PULSE OUTPUTS:
  - TENANT BILLING
    - USE kWh (1000) OUTPUT IN MOST APPLICATIONS.
    - IF 15 MINUTE INTERVAL DEMAND DATA IS REQUIRED, USE 10 WATT-HOUR OUTPUT. FOR HIGH ENERGY APPLICATIONS, (METERS RATED 800A OR HIGHER), USE kWh PULSE OUTPUT.
  - ENERGY MONITORING
    - USE 10Wh PULSE OUTPUT FOR MOST APPLICATIONS. THIS WILL PROVIDE BETTER DATA RESOLUTION WHEN USING PULSE ACCUMULATIONS TO TRACK 15 MINUTE INTERVAL DEMAND.
    - FOR HIGH ENERGY APPLICATIONS, (METERS RATED 800A OR HIGHER), USE kWh PULSE OUTPUT.
- AN ENERGY MONITOR HUB AND SERIES 4000/4100 METERS MAY BE ON THE SAME MODBUS RTU LOOP. ONE TYPE PER LOOP SHOWN FOR SIMPLICITY.
- MAXIMUM NUMBER OF CONNECTED DEVICES ON A MODBUS RTU LOOP IS 32.
- BACNET MS/TP AS IT RELATES TO METERS SHOWN. MEDIA CONVERSION AND TRANSPORT ARE PART OF FACILITY BAS/BMS SYSTEM, NOT SHOWN FOR CLARITY.
- FACILITY ETHERNET MAY INCLUDE MEDIA CONVERSION BETWEEN DEVICES. UTP SHOWN FOR SIMPLICITY. INDUSTRY STANDARD DISTANCES APPLY.
- MODBUS IP AND BACNET IP ARE TRANSPORTED VIA ETHERNET.
- REFER TO SPECIFIC METER DATA SHEETS FOR POLARITY REQUIREMENTS OF PULSE OUTPUT WIRES.

### WIRE RUNS BY SYMBOL












- LINE: 15AMP, 120VAC, 2 WIRE PLUS GROUND, 60HZ DIRECT FROM SERVICE PANEL, DO NOT SWITCH.
- (1) ETHERNET CABLE EQUAL TO BELDEN 2412, LABELED PER DRAWING. TERMINATIONS PER EIA/TIA 568B. PASS-THROUGH CONNECTORS PROHIBITED.
- (1) MODBUS RTU CABLE EQUAL TO BELDEN 1120A, LABELED PER DRAWING. MAXIMUM LENGTH 1200M (3935 FT).
- (1) BACNET MS/TP CABLE: EIA-485 COMPLIANT CABLE, WIRING IN COMPLIANCE WITH ANSI/ASHRAE 135-2004.
- COMMUNICATION WIRE: EQUAL TO (2) #18-22 AWG THHN PER METER. MAXIMUM 200 FT.
- CT WIRE HARNESS AS NOTED BY MANUFACTURER AND AS SCHEDULED. MAX RUN LENGTH PER CT DOCUMENTATION.
- REFERENCE AND POWER CIRCUIT: (1) 3-PHASE, 4-WIRE, PLUS GROUND CIRCUIT AT THE METERED VOLTAGE. FEED FROM DEDICATED 15A 3-POLE BREAKER.
- POWER WIRE: BY FACTORY.
- COMMUNICATION WIRE: BY FACTORY

### NOTES BY SYMBOL



- CONFIGURE HIGH DENSITY PULSE MODULE TO ASSOCIATED DEVICE(S). MAXIMUM 23 METERS.
- CONFIGURE METER TO ASSOCIATED LOADS. REFERENCE GENERAL NOTE 5 FOR RECOMMENDED USE AND PANEL SCHEDULES FOR MONITORED LOADS.
- CONFIGURE ENERGY MONITORING HUB (EMH) OR ENERGY MONITORING HUB AS REQUIRED. THE EMH HAS EIGHT (8) ON BOARD PULSE INPUT CHANNELS. EMB HUB HAS NO PULSE INPUT CHANNELS.
- POWER SUPPLY, CORD AND PLUG PROVIDED AS A COMPLETE ASSEMBLY.
- CONFIGURE HUBLITE AS REQUIRED. HUBLITE HAS FOUR (4) ON-BOARD PULSE INPUT CHANNELS.
- MANAGED ETHERNET SWITCH, 10/100/1000.
  - PROVIDE MINIMUM TWO (2) SPARE PORTS. ASSUME AT LEAST ONE (1) BILLING COMPUTER PER SWITCH IN CALCULATIONS.
  - SWITCH SHALL HAVE A LINK FEATURE.
  - MULTIPLE SWITCHES SHALL BE LINKED TOGETHER.
- CONFIGURE MODHOPPERS AS REQUIRED. MODHOPPER HAS (2) ON BOARD PULSE INPUT CHANNELS.
- CONFIGURE EMH+ AS REQUIRED.
- CONFIGURE DCAP AS REQUIRED.
- CONFIGURE WIRELESS METERING DATA TRANSCEIVER TO ASSOCIATED DEVICE(S). MAXIMUM 1 OR 2 DEVICES DEPENDANT ON MODEL.

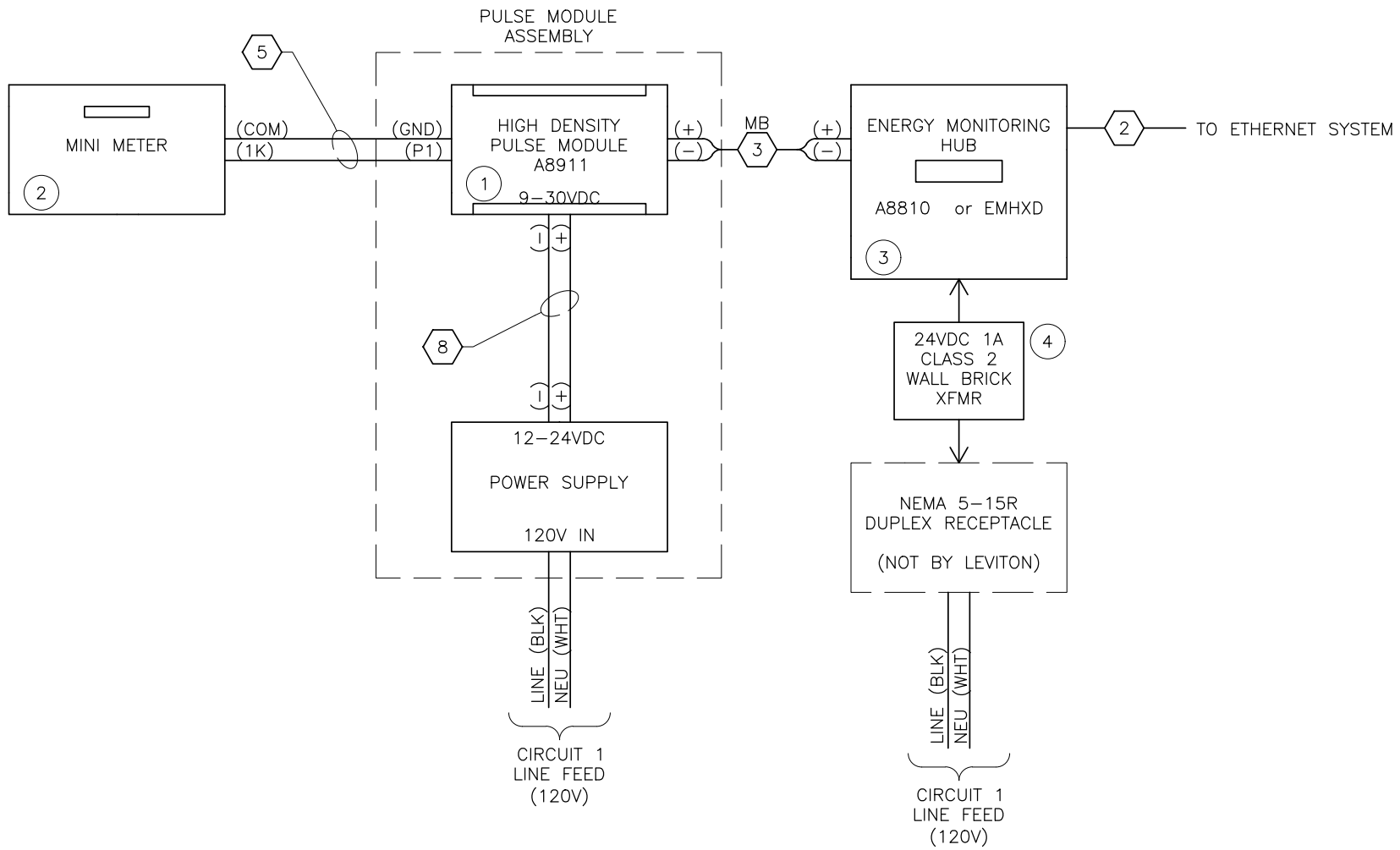
### SYMBOLS

-  CONNECTOR BODY – FEMALE [CABLE MT'G]
-  PLUG – MALE [CABLE MT'G]
-  CROSSING WIRES, NO CONNECTION
-  CONNECTED WIRES
-  SEPARATE WIRES AS PART OF A BUNDLE
-  RECEPTACLE – FEMALE [PANEL MT'G]
-  INLET – MALE [PANEL MT'G]
-  WIRE RUNS NOT BY LEVITON
-  REFERENCE TO NOTES. DOES NOT TRANSCEND DRAWINGS.

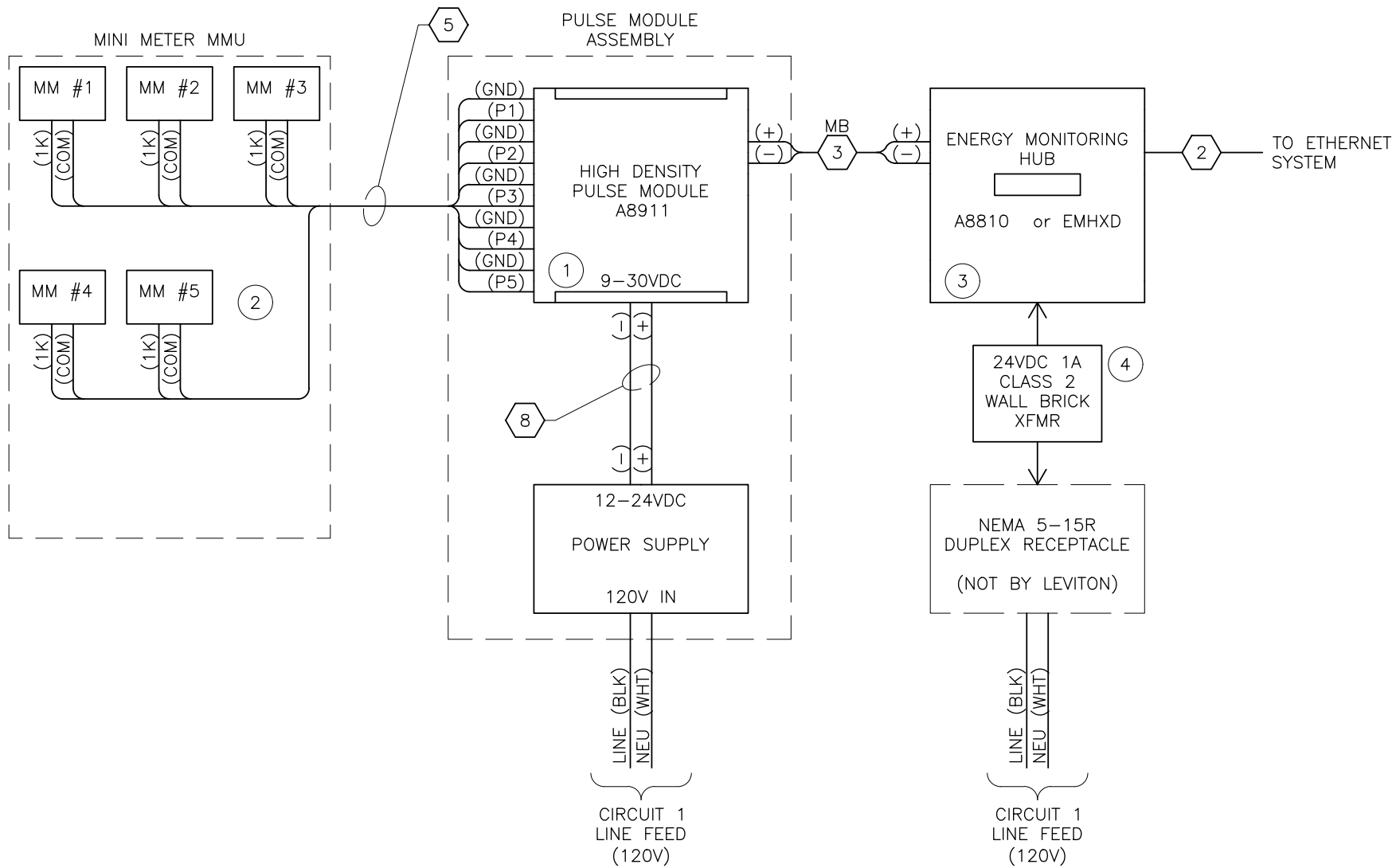
# TABLE OF CONTENTS

PAGE	DESCRIPTION
4	Individual Mini Meter to High Density Pulse Module, Monitoring System
5	Mini Meter MMU to High Density Pulse Module, Monitoring System
6	Individual Mini Meter to Energy Monitoring Hub
7	Mini Meter MMU to Energy Monitoring Hub, Monitoring System
8	Individual Series 2000 Meters to High Density Pulse Module, Monitoring System
9	Series 2000 Meter to Energy Monitoring Hub, Monitoring System
10	Individual Series 3500/Series 7000, 3-Circuit Meter to Modbus TCP/IP & Individual Series 3500/Series 7000, 3-Circuit Meter to BACnet IP
11	Individual Series 4x00/ Series 7000, 3-Circuit Meter to Modbus RTU & Individual Series 4x00/Series 7000, 3-Circuit Meter to BACnet MS/TP
12	Series 7000-7100 Meter - Modbus RTU Option, Series 7000-7100 Meter - BACnet MS/TP Option, Series 7000-7100 Meter Modbus TC/IP Option, & Series 7000-7100 Meter BACnet IP Option
13	Series 8000 Meter - Modbus RTU Option, Series 8000 Meter - BACnet IP Option, & Series 8000 Meter - Modbus TCP/IP Option
14	Pulse Meters - System Backbone - Modbus RTU to Ethernet
15	BACnet MS/TP Meters - System Backbone - BACnet MS/TP
16	System Backbone - Energy Monitoring Hubs to Ethernet
17	Meters - System Backbone - Series 3500 Meter/Series 8000 Meter/Series 7000-7100 Meter to Modbus TCP/IP
18	Meters - System Backbone - Series 3500 Meter/Series 8000 Meter/Series 7000-7100 Meter to Bacnet IP
19	Mini Meter Pulse Output to High Density Pulse Module, Modbus to ModHopper
20	Series 2000 Meter MMU Pulse Output to High Density Pulse Module, Modbus to ModHopper
21	Series 4x00/Series 7000, 3-Circuit Meter to ModHopper, Monitoring System
22	Series 8000 Meters to ModHopper, Monitoring System
23	Meters - System Backbone - ModHopper
24	Meters - System Backbone - ModHopper
25	Pulse Meters - Individual Mini Meters, Series 2000, Gas, Water to Energy Monitoring Hub
26	Individual Mini Meter, Gas, Water, Series 4x00, 7000/7100, 8000 and Series 2000 with High Density Pulse Module to Energy Monitoring Hub, Monitoring System
27	Series 7000-7100 Meters to ModHopper, Monitoring System
28	Wireless Metering Data Transceivers, DCAP, and Repeater
29	Individual Mini Meter to Single Pulse Metering Data Transceiver (MDT) & Water and Gas Meter to Dual Pulse Metering Data Transceiver (MTD)

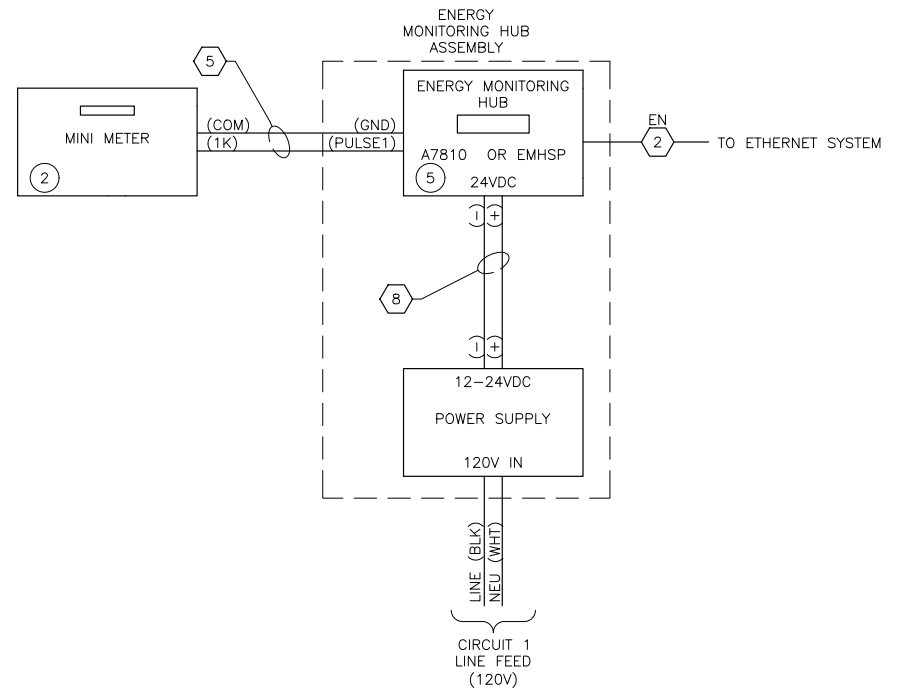
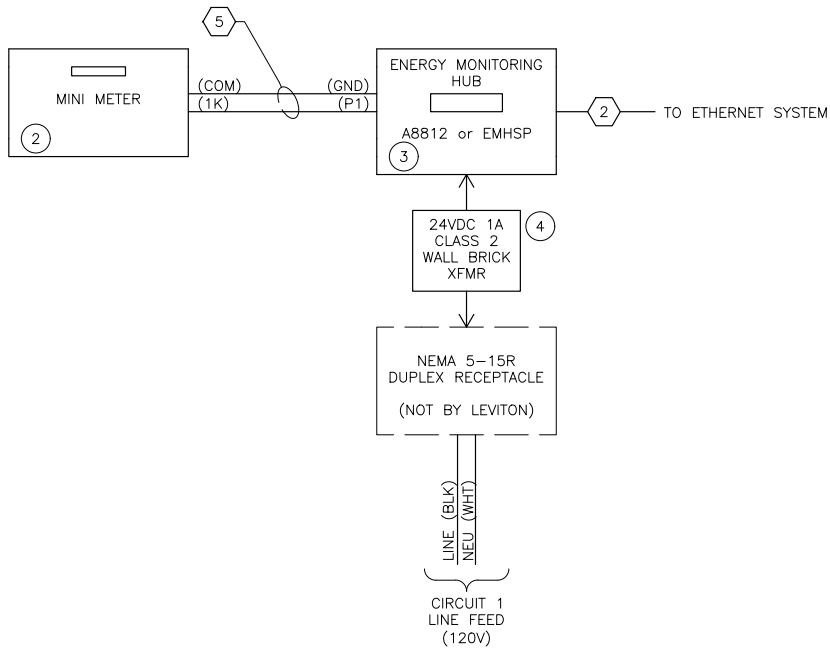
# INDIVIDUAL MINI METER TO HIGH DENSITY PULSE MODULE, MONITORING SYSTEM



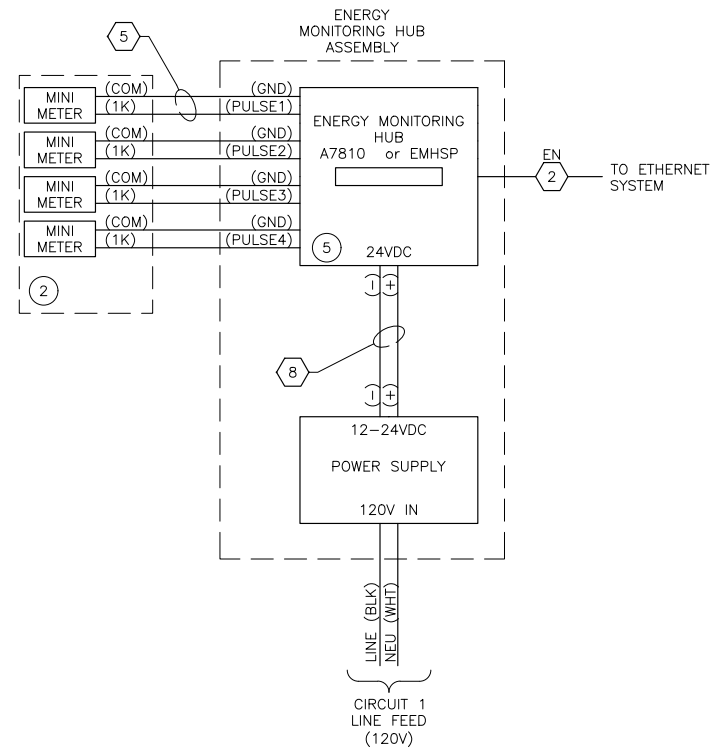
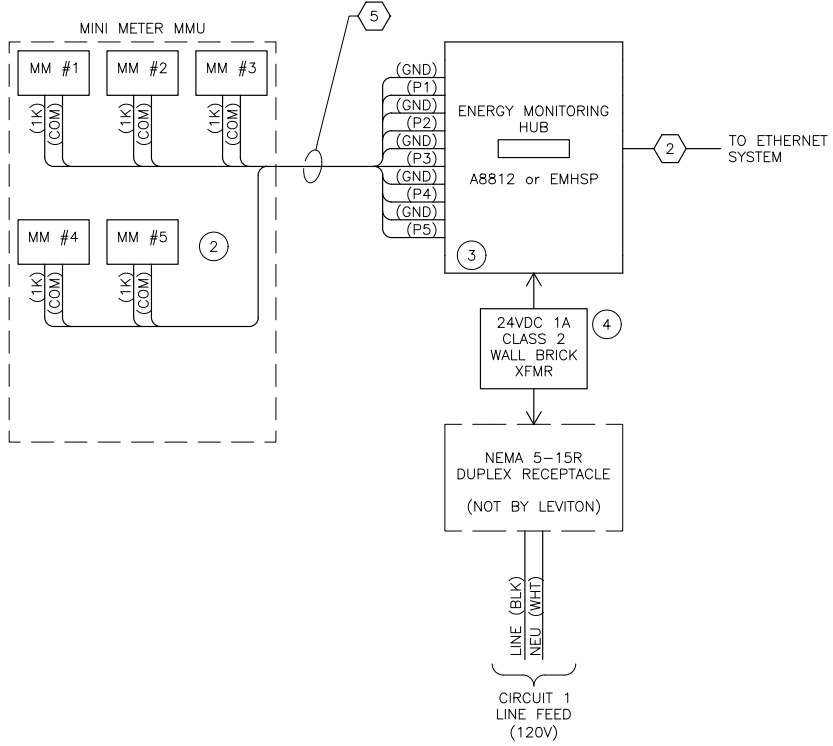
# MINI METER MMU TO HIGH DENSITY PULSE MODULE, MONITORING SYSTEM



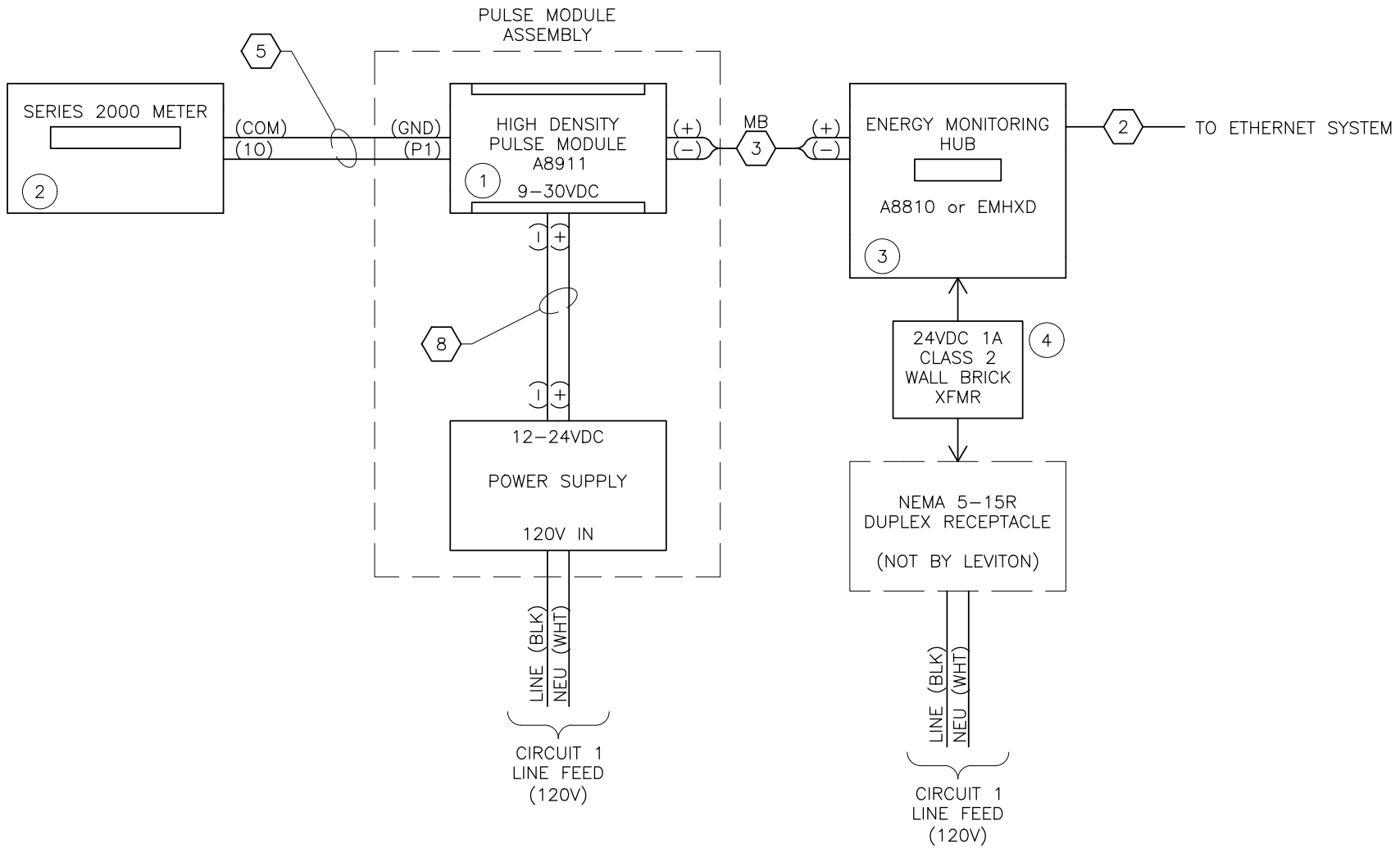
# INDIVIDUAL MINI METER TO ENERGY MONITORING HUB, MONITORING SYSTEM



# MINI METER MMU TO ENERGY MONITORING HUB, MONITORING SYSTEM

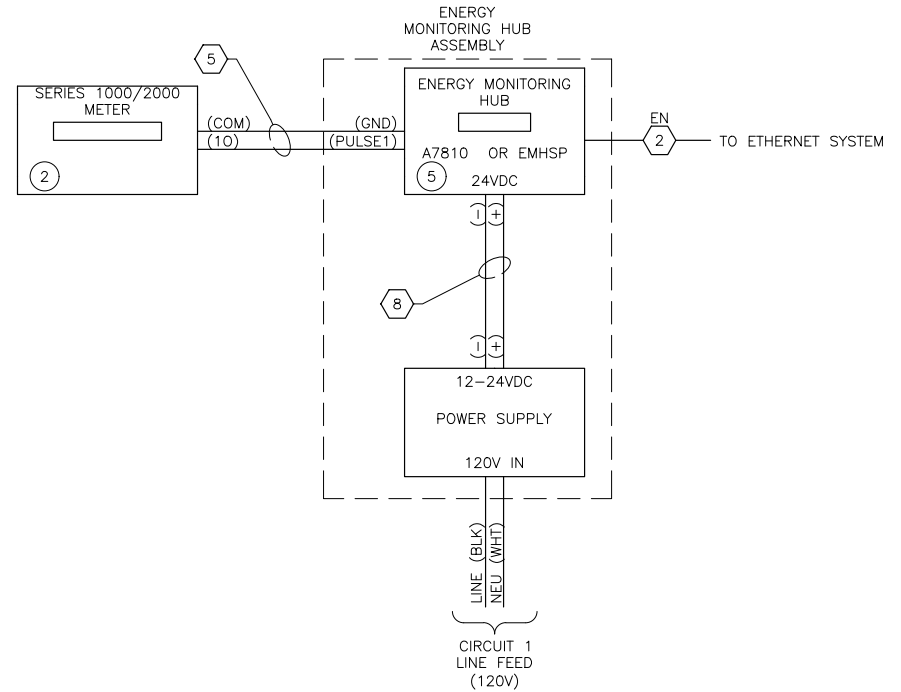
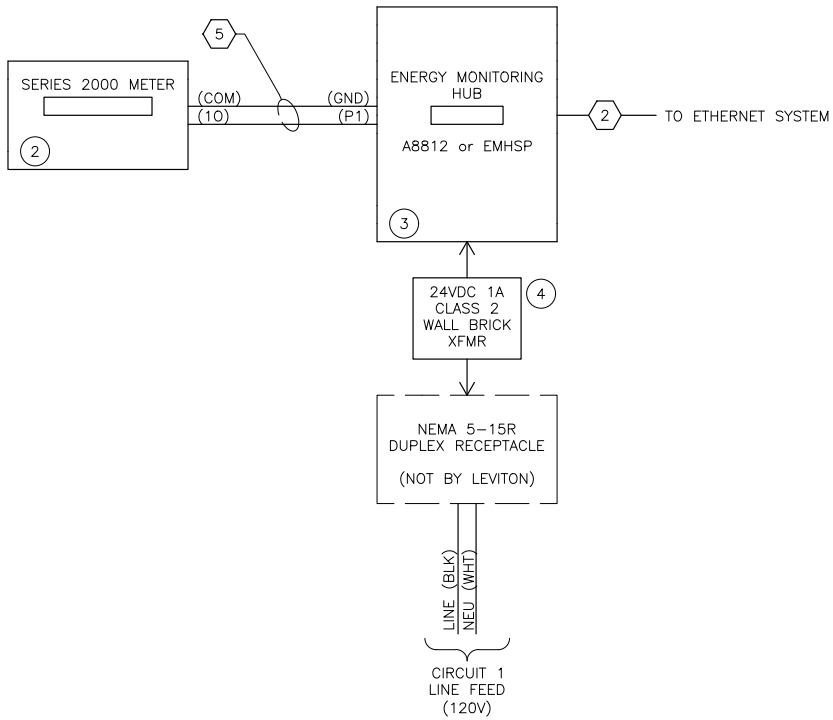


# INDIVIDUAL SERIES 2000 METERS TO HIGH DENSITY PULSE MODULE, MONITORING SYSTEM

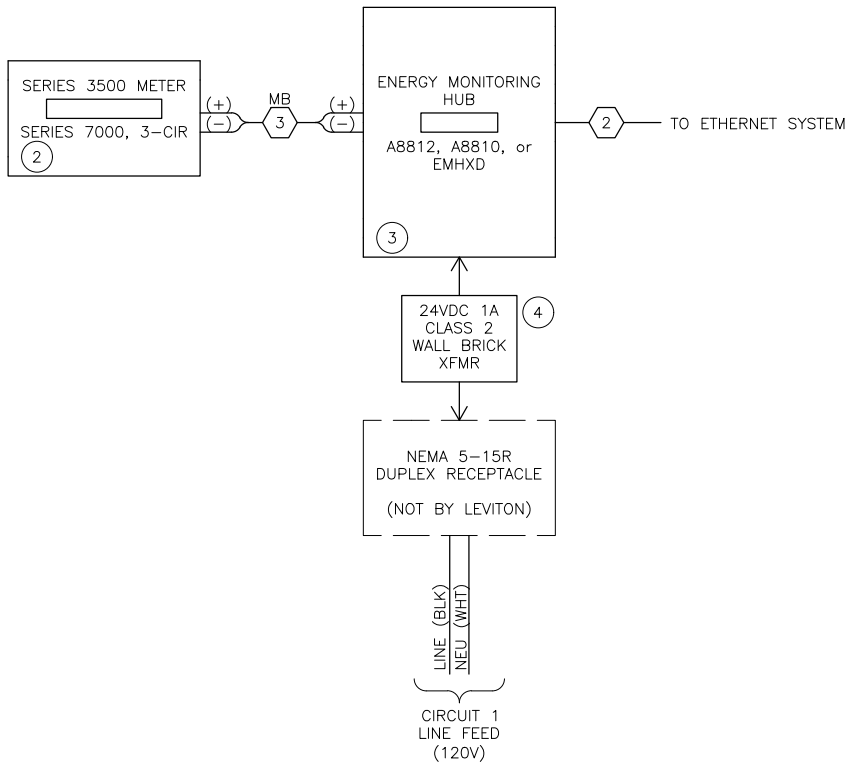




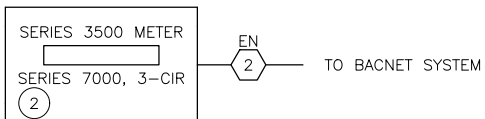
# SERIES 2000 METER TO ENERGY MONITORING HUB, MONITORING SYSTEM



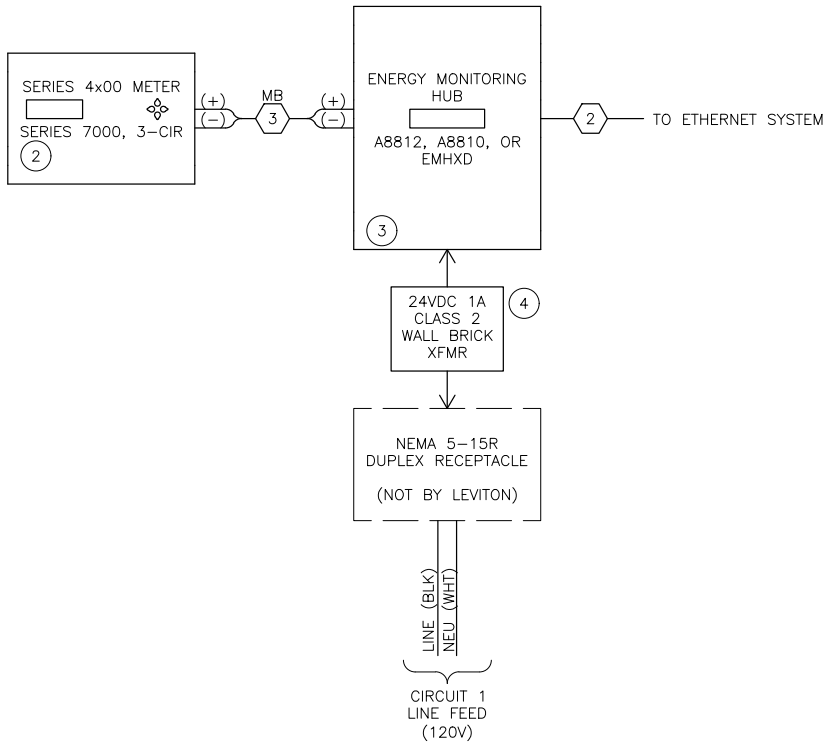
# INDIVIDUAL SERIES 3500 OR SERIES 7000, 3 CIRCUIT METER TO MODBUS TCP/IP



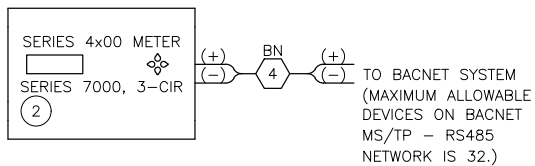
# INDIVIDUAL SERIES 3500/SERIES 7000, 3-CIRCUIT METER TO BACNET IP



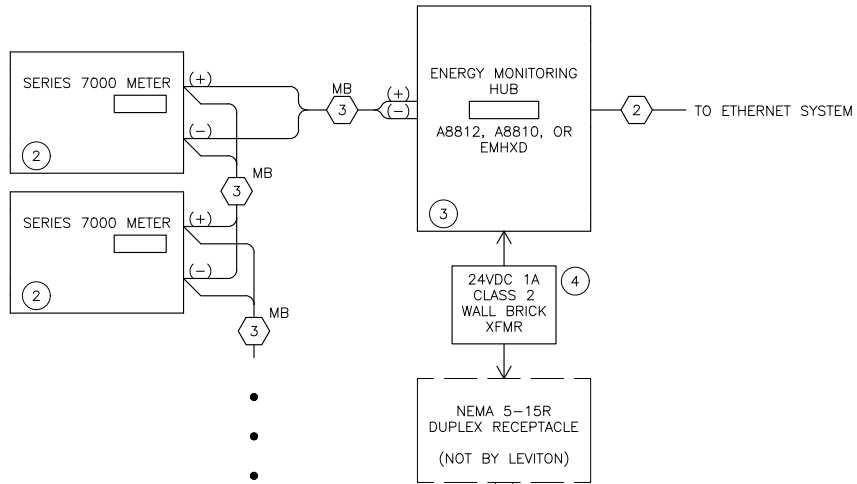
# INDIVIDUAL SERIES 4x00/SERIES 7000, 3-CIRCUIT METER TO MODBUS RTU



# INDIVIDUAL SERIES 4x00/SERIES 7000, 3-CIRCUIT METER TO BACNET MS/TP



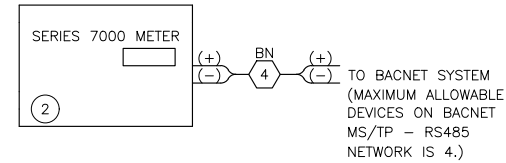
## SERIES 7000-7100 METER - MODBUS RTU OPTION



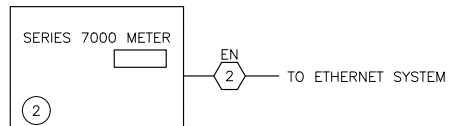
SERIES 7000 METER LIMIT PER MODBUS (RS485) CIRCUIT:

1. 48 CIRCUIT
  - 71D48 - LIMIT 4 PER VIRTUAL ELEMENT
  - 73D48 - LIMIT 30
2. 24 CIRCUIT - LIMIT 8
3. 12 CIRCUIT - LIMIT 16
4. 3 CIRCUIT - LIMIT 30
5. CONSULT FACTORY FOR ADDITIONAL DESIGN INFORMATION.

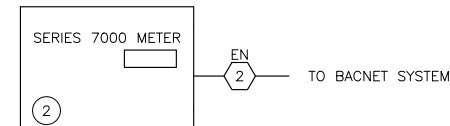
## SERIES 7000-7100 METER - BACNET/MSTP OPTION



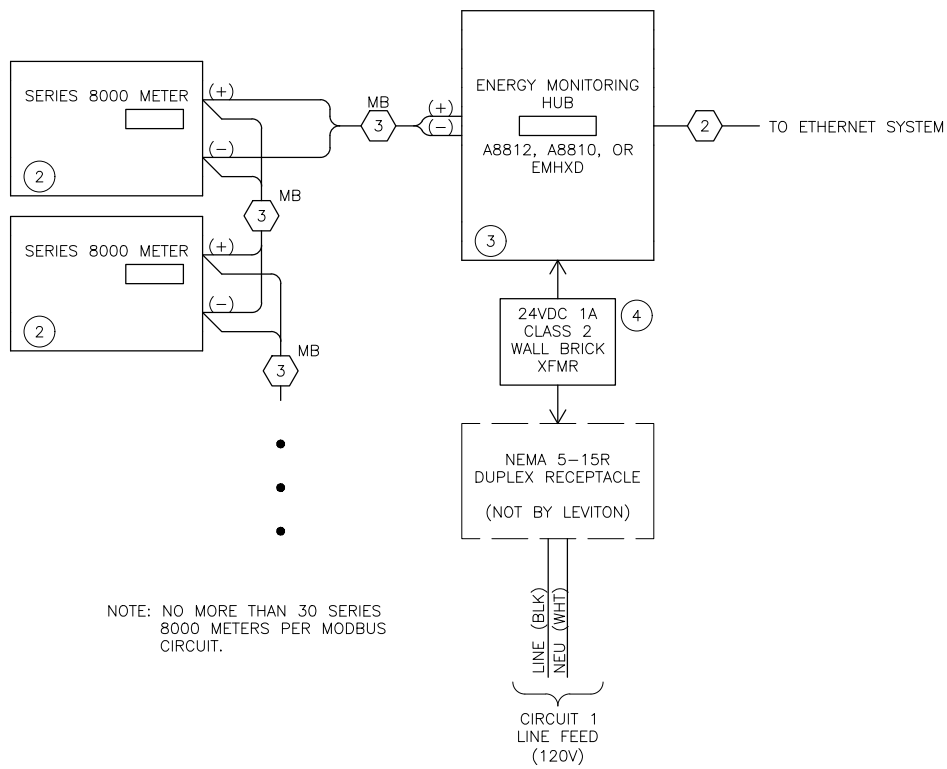
## SERIES 7000-7100 METER - MODBUS TC/IP OPTION



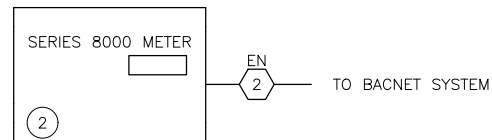
## SERIES 7000-7100 METER - BACNET IP OPTION



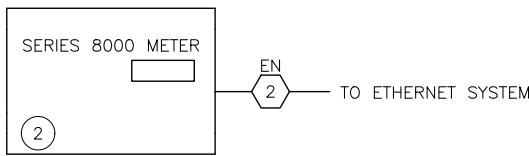
### SERIES 8000 METER — MODBUS RTU OPTION



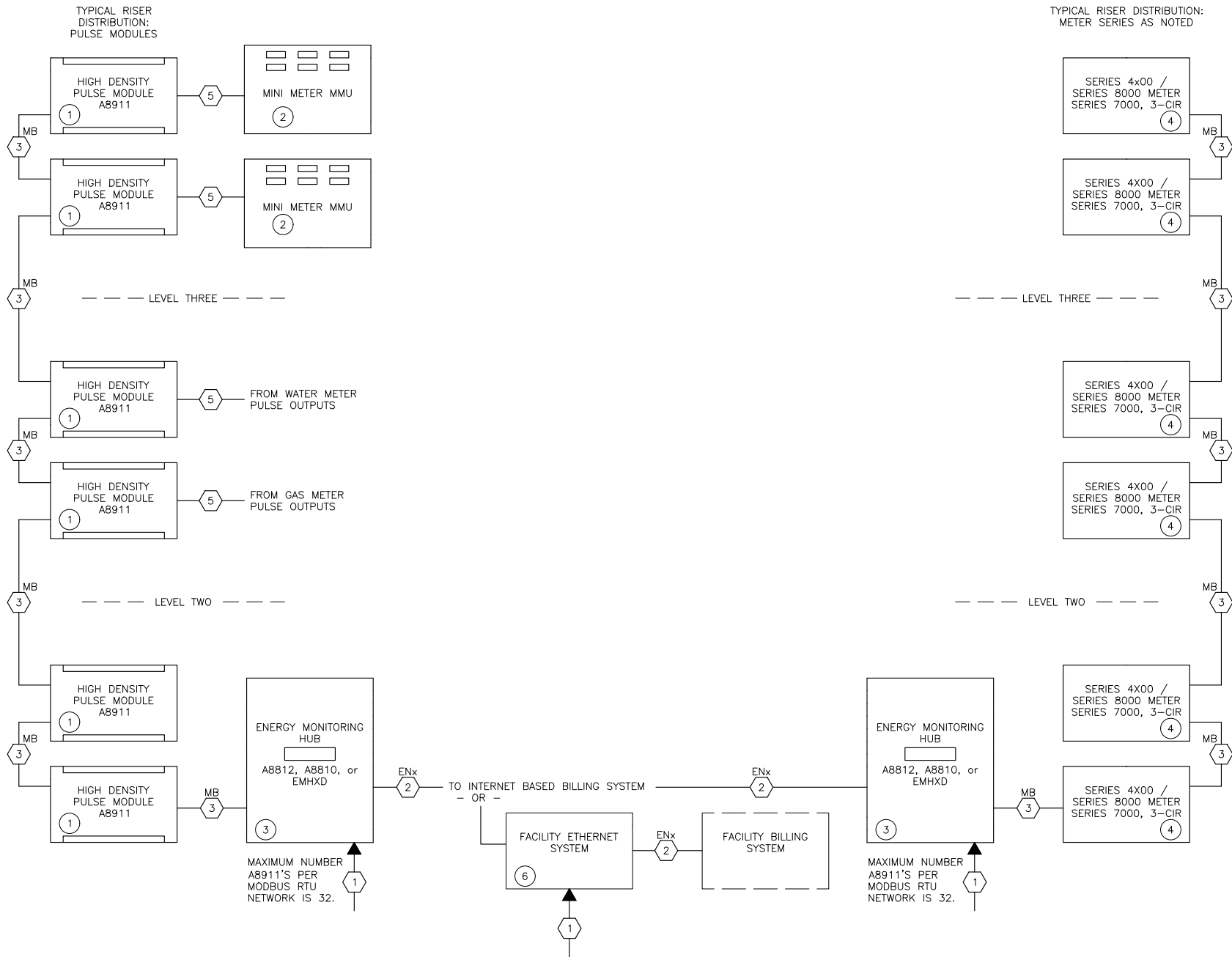
### SERIES 8000 METER — BACNET IP OPTION



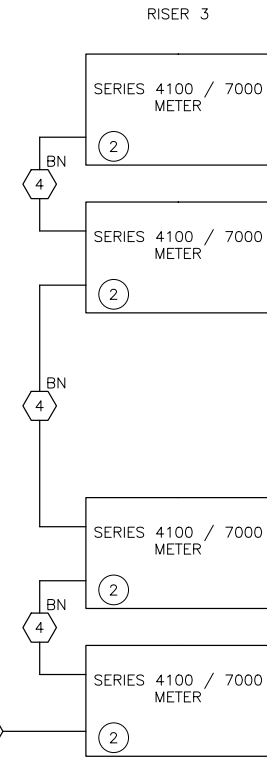
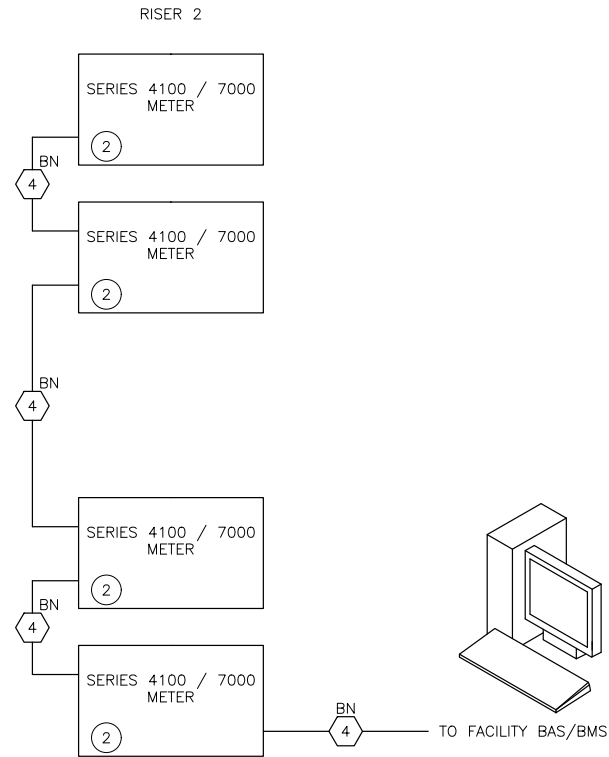
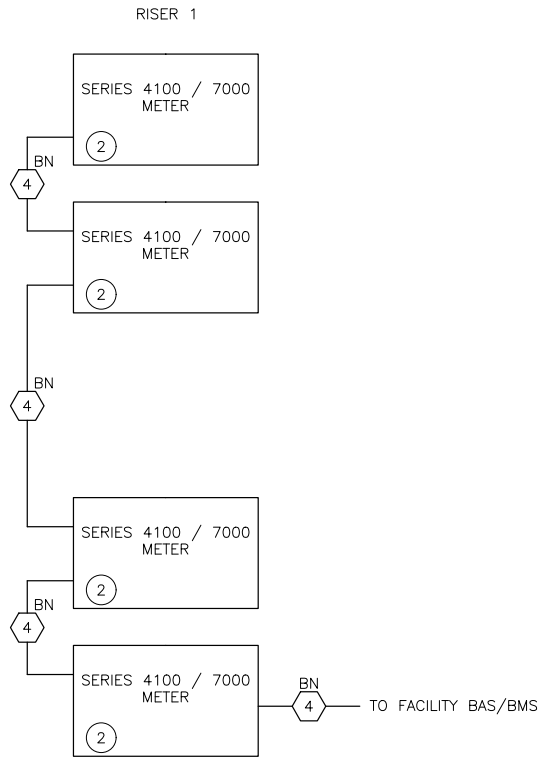
### SERIES 8000 METER — MODBUS TCP/IP OPTION



# PULSE METERS - SYSTEM BACKBONE - MODBUS RTU TO ETHERNET



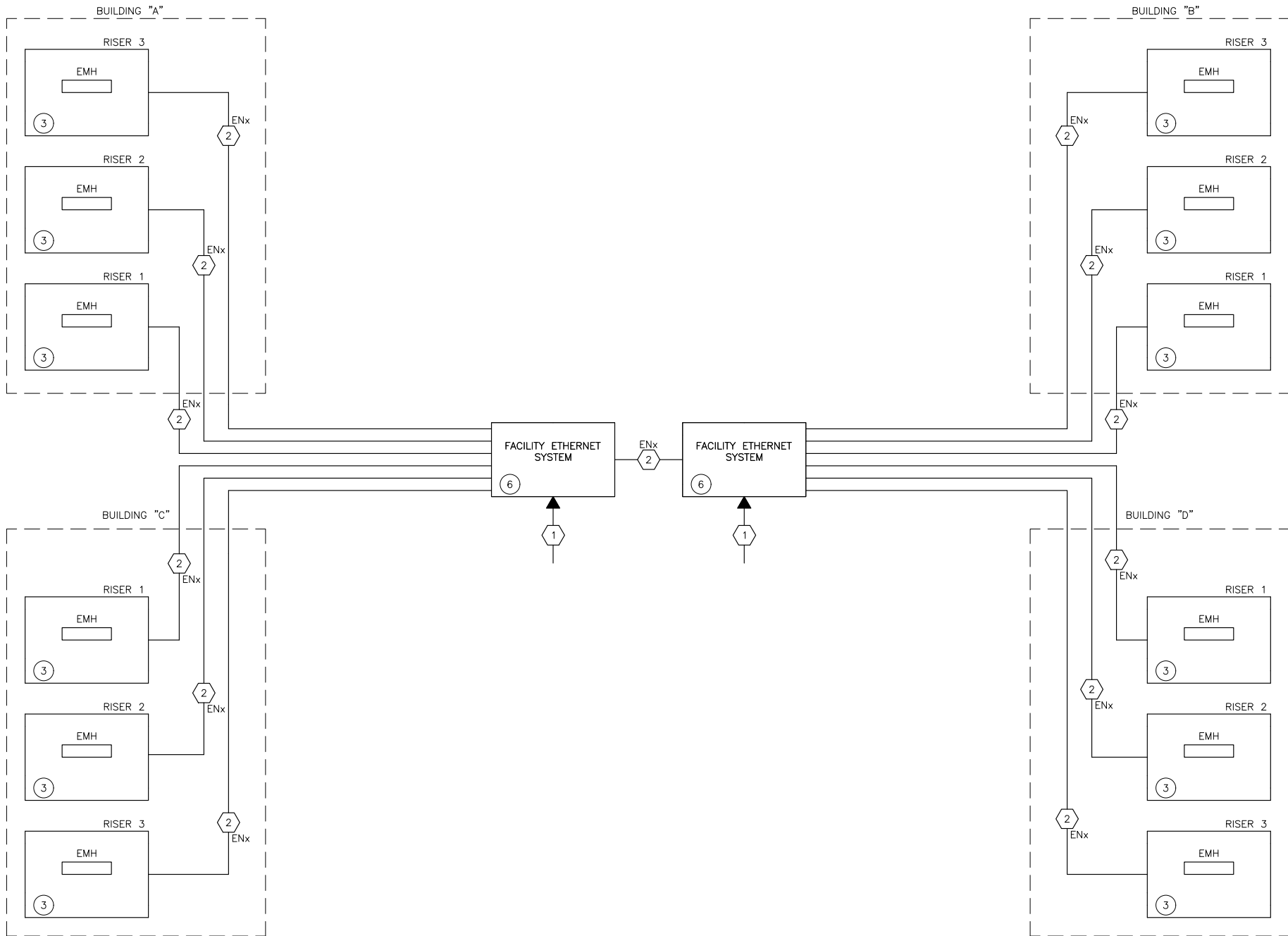
# BACNET MS/TP METERS - SYSTEM BACKBONE - BACNET MS/TP



SERIES 7000 METER LIMIT PER MODBUS (RS485) CIRCUIT:

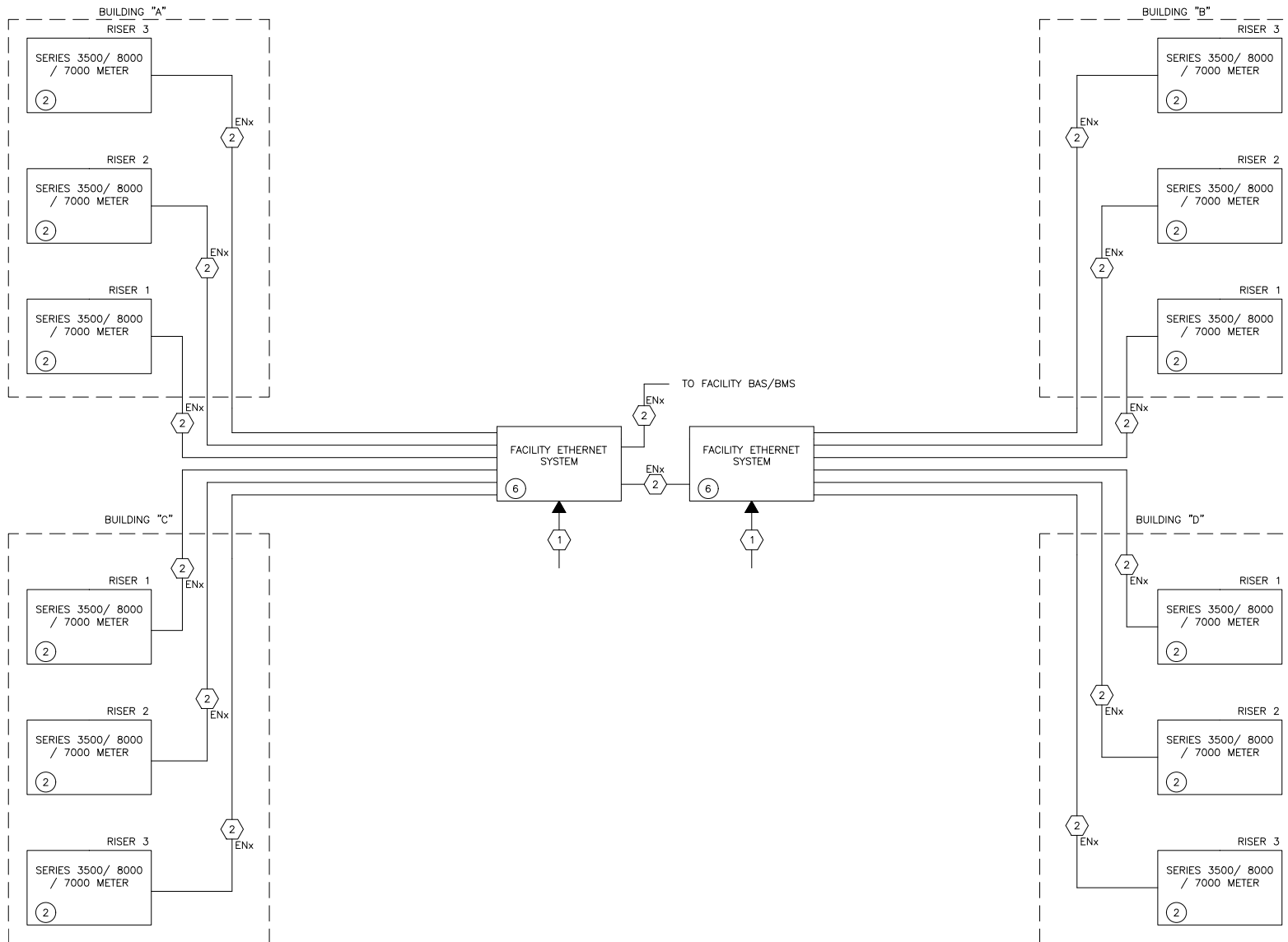
1. 48 CIRCUIT
  - 71D48 – LIMIT 4 PER VIRTUAL ELEMENT
  - 73D48 – LIMIT 30
2. 24 CIRCUIT – LIMIT 8
3. 12 CIRCUIT – LIMIT 16
4. 3 CIRCUIT – LIMIT 30
5. CONSULT FACTORY FOR ADDITIONAL DESIGN INFORMATION.

# SYSTEM BACKBONE - ENERGY MONITORING HUBS TO ETHERNET

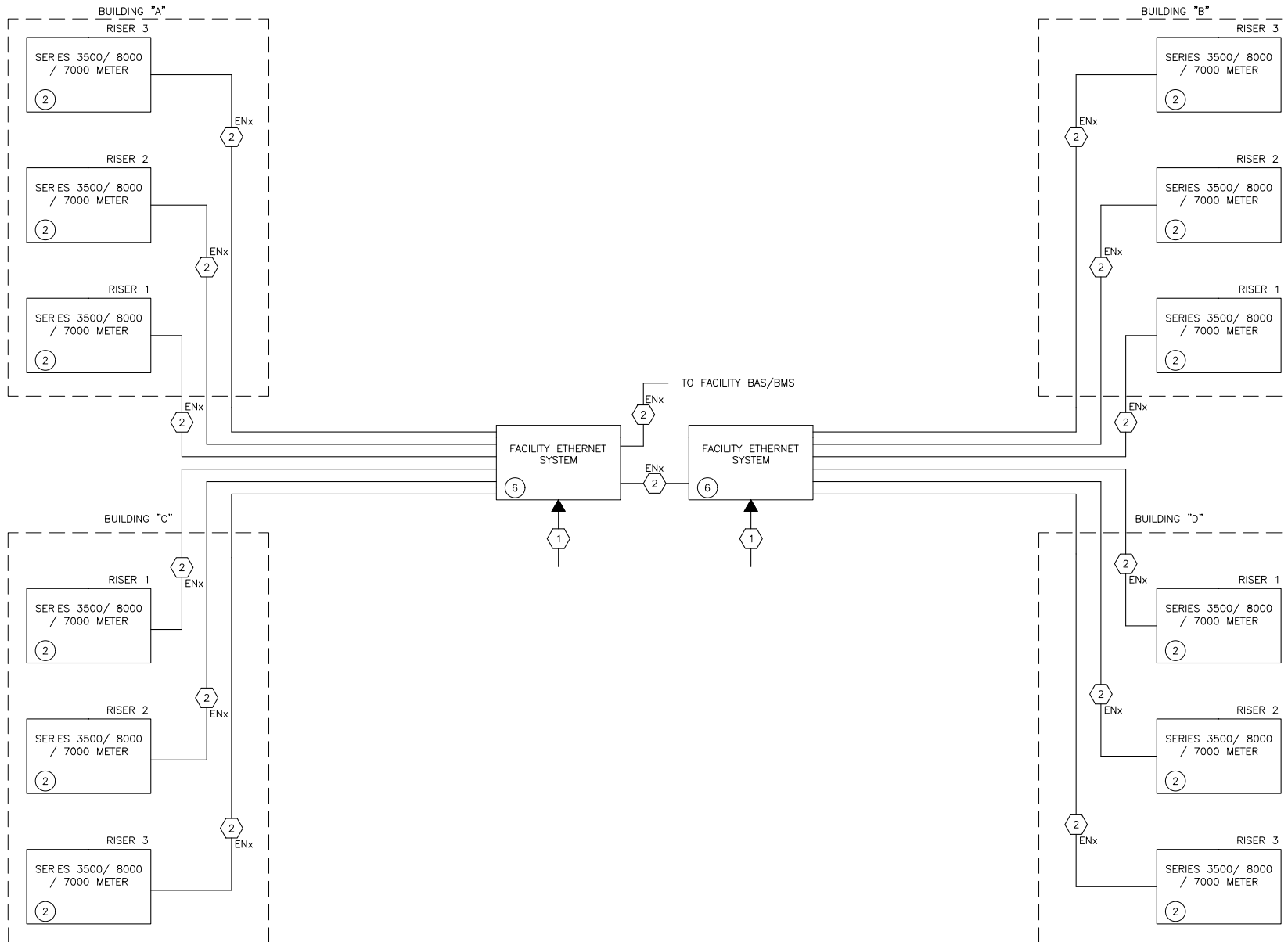




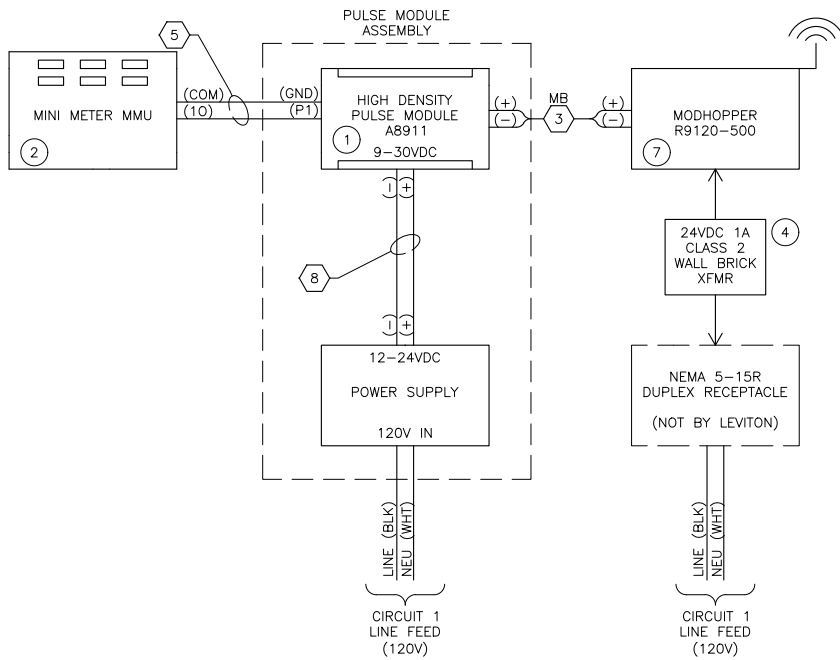
# METERS - SYSTEM BACKBONE - SERIES 3500 METER/SERIES 8000 METER/SERIES 7000-7100 METER TO MODBUS TCP/IP



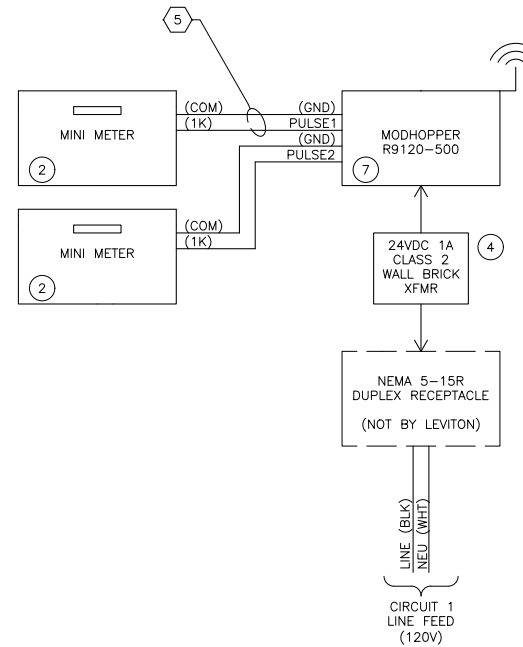
# METERS - SYSTEM BACKBONE - SERIES 3500 METER/SERIES 8000 METER/SERIES 7000-7100 METER TO BACNET IP



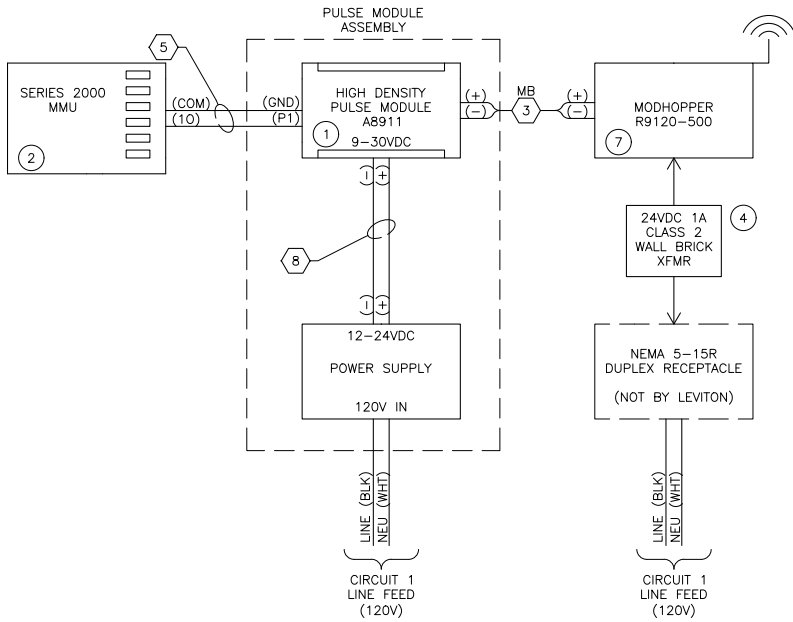
# MINI METER PULSE OUTPUT TO HIGH DENSITY PULSE MODULE, MODBUS TO MODHOPPER



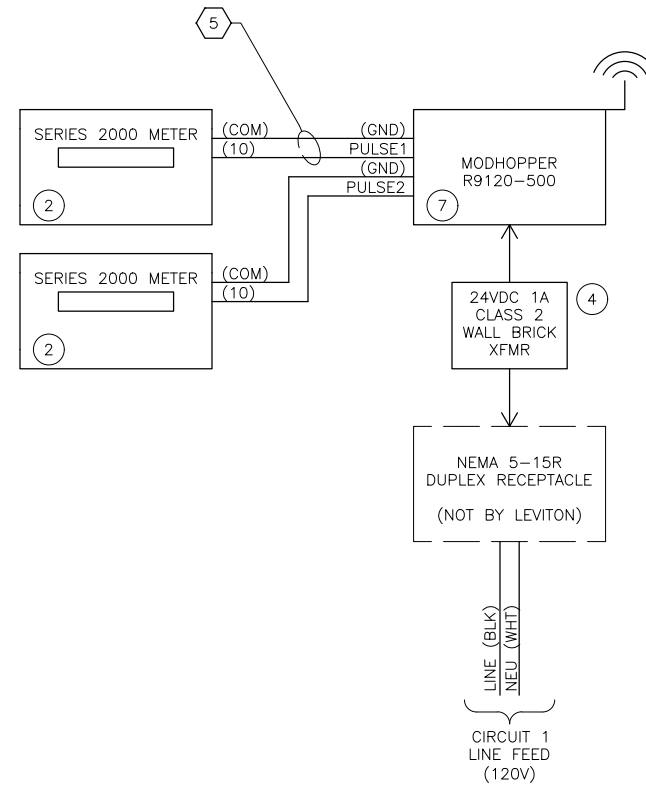
# MINI METER TO MODHOPPER ONBOARD PULSE INPUT TERMINALS



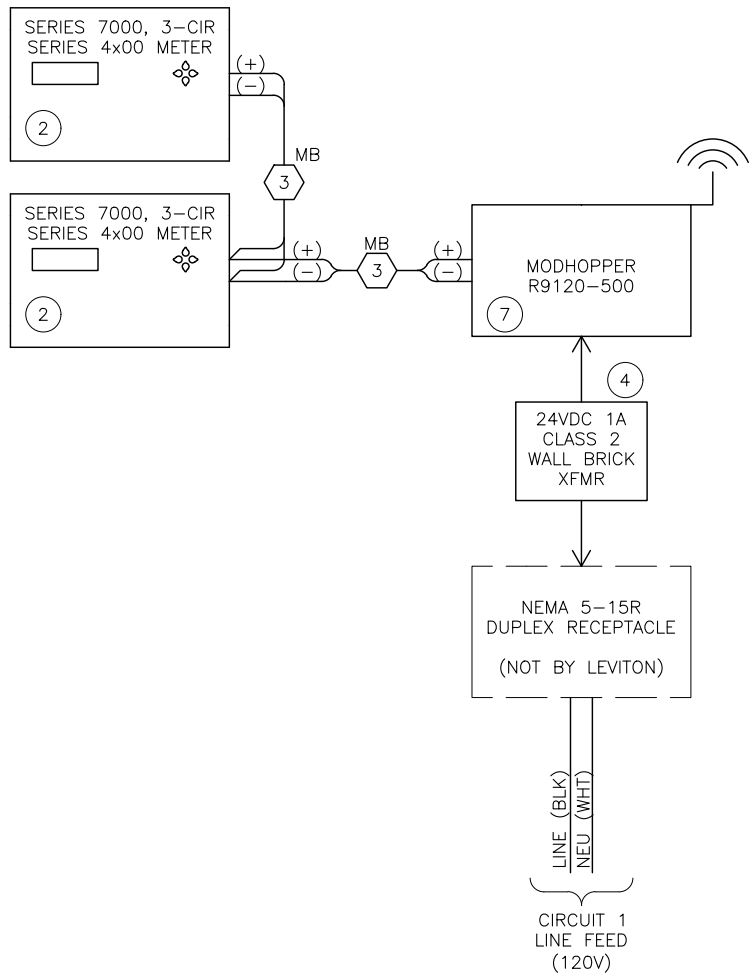
# SERIES 2000 METER MMU PULSE OUTPUT TO HIGH DENSITY PULSE MODULE, MODBUS TO MODHOPPER



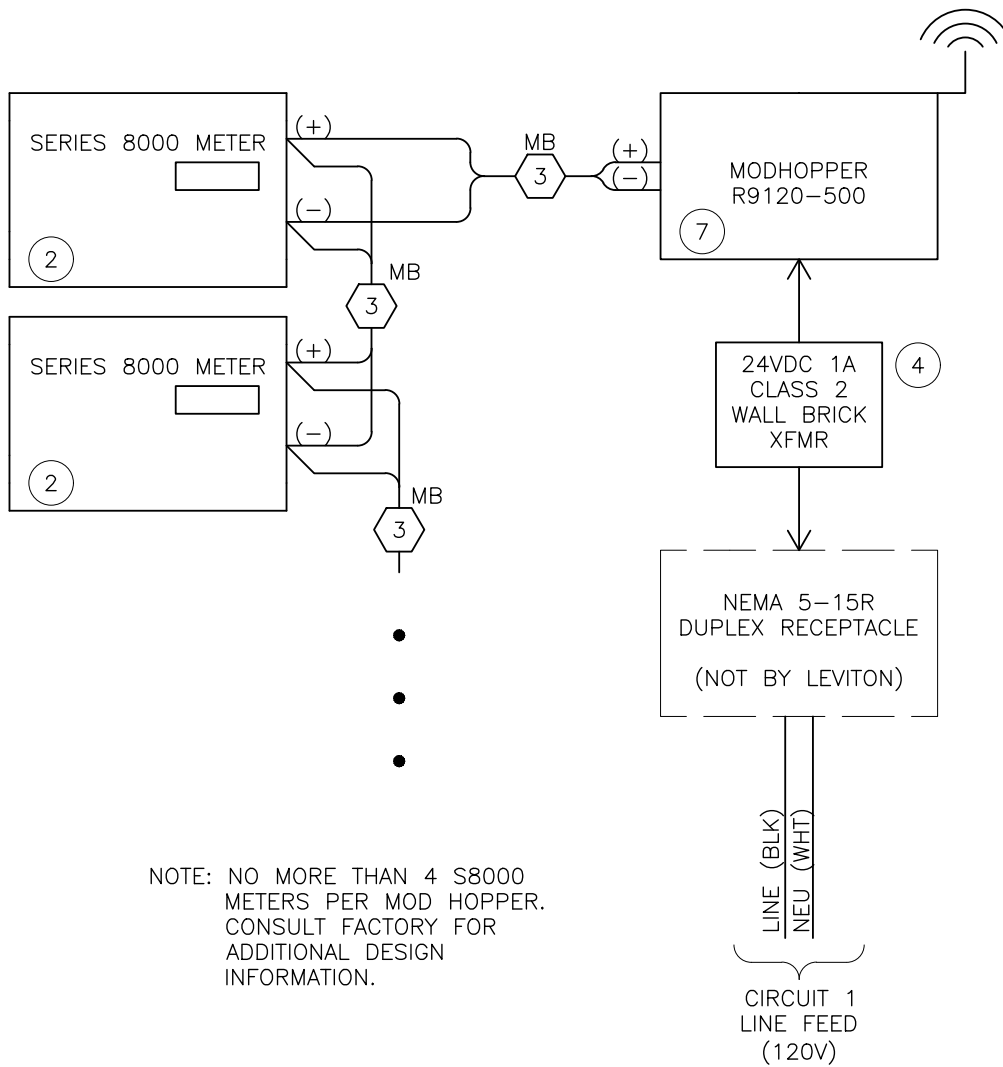
# SERIES 2000 METER TO MODSHOPPER ONBOARD PULSE INPUT TERMINALS



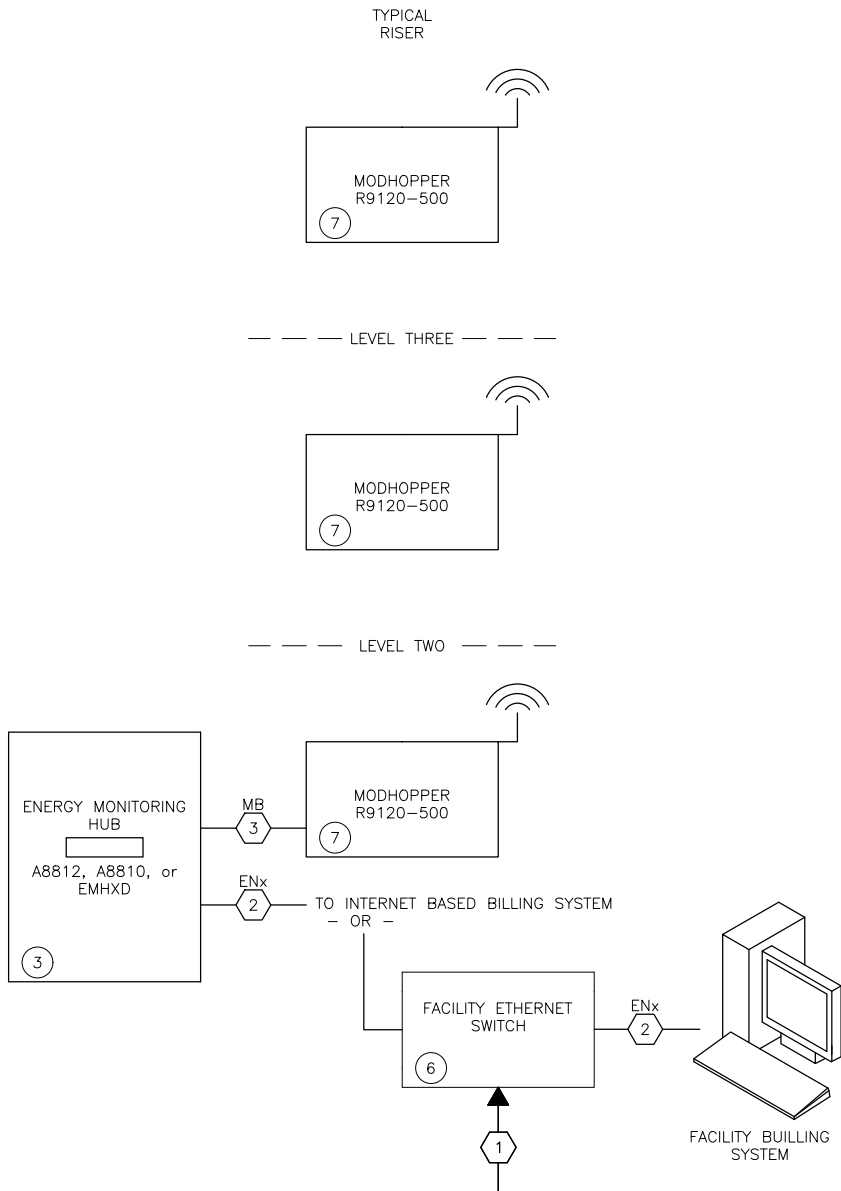
# SERIES 4x00/SERIES 7000, 3 CIRCUIT METER PULSE OUTPUT TO MODHOPPER



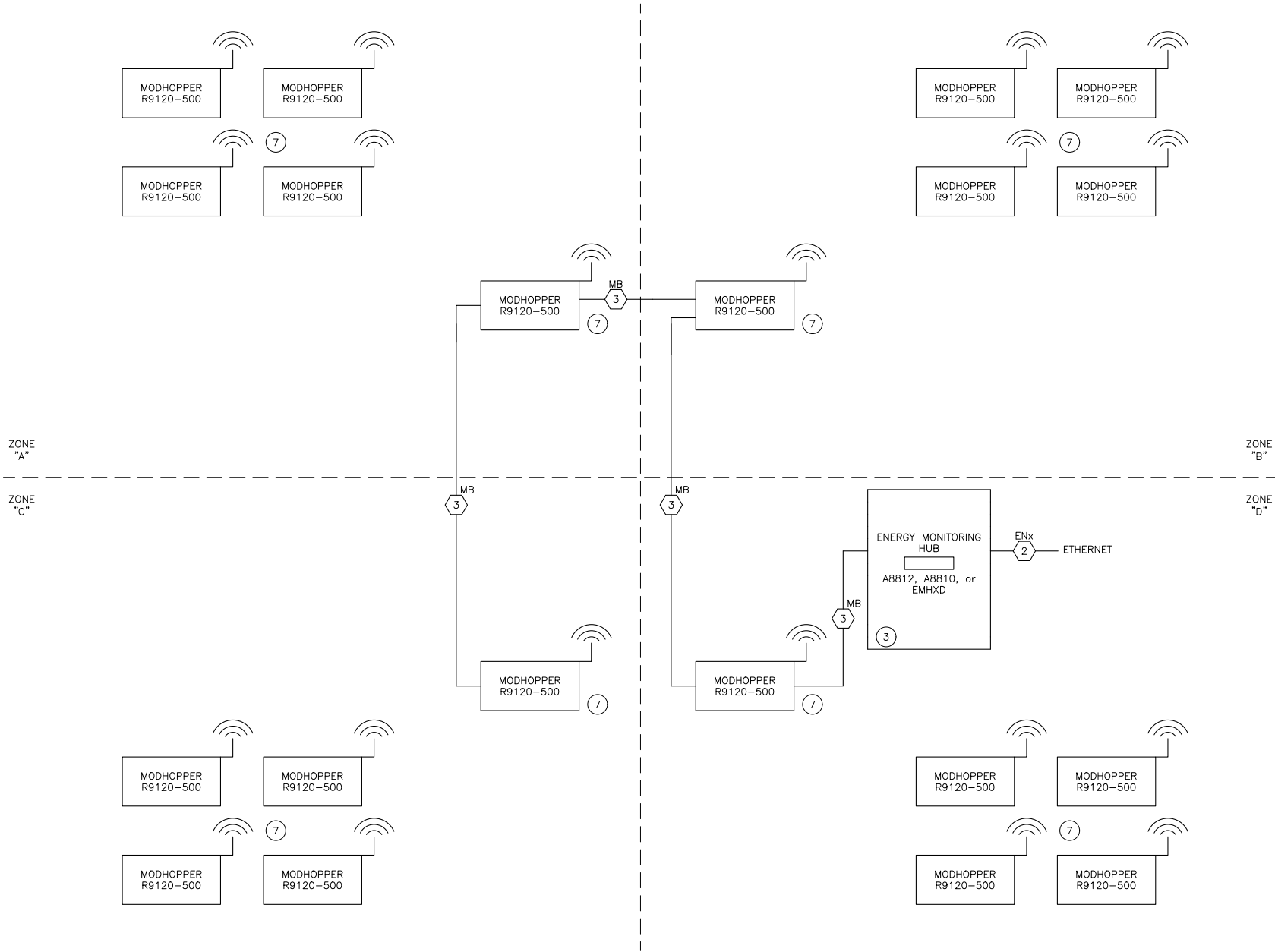
# SERIES 8000 METERS TO MODHOPPER, MONITORING SYSTEM



# METERS — SYSTEM BACKBONE — MODHOPPER

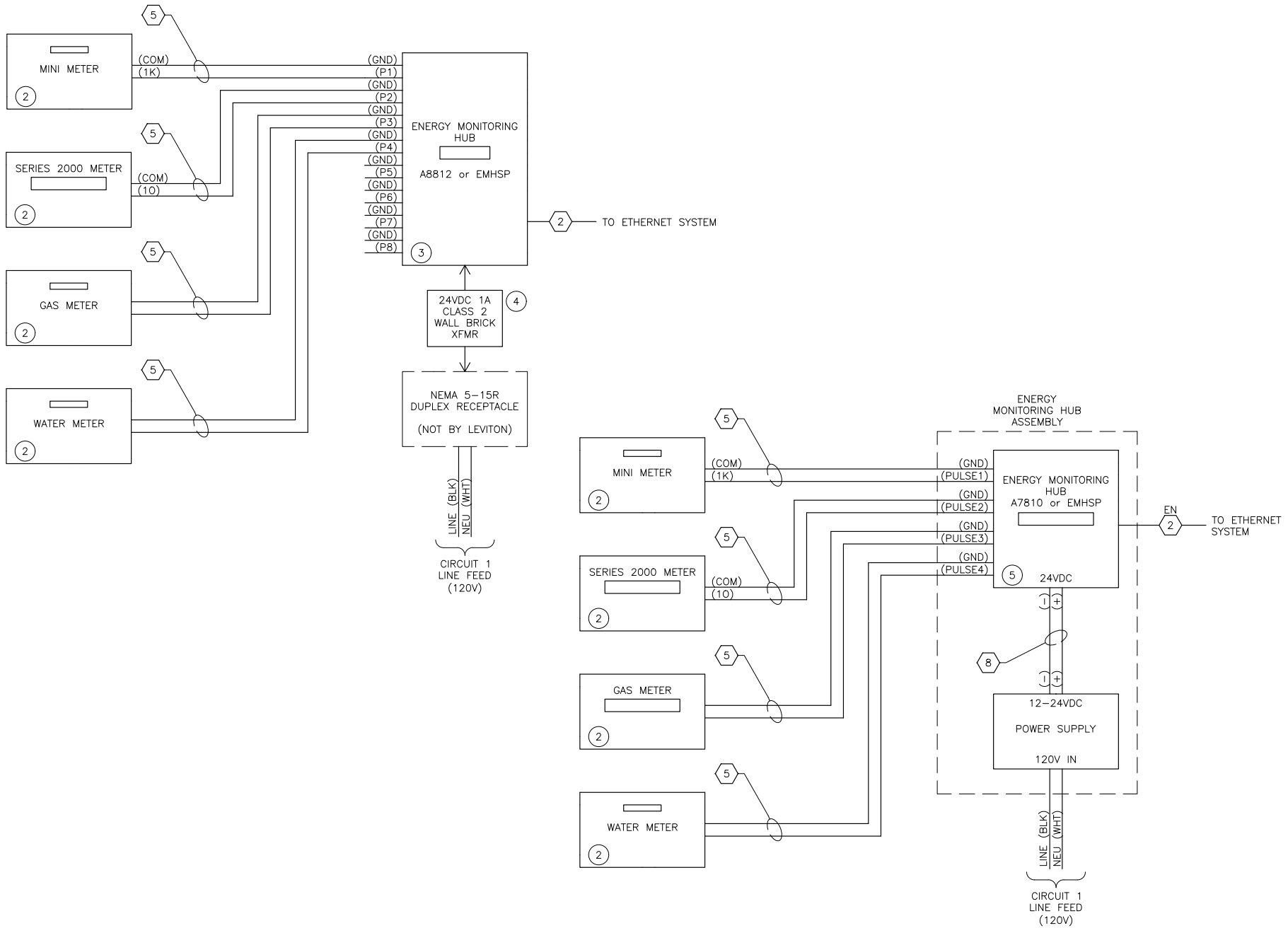


# METERS — SYSTEM BACKBONE — MODHOPPER

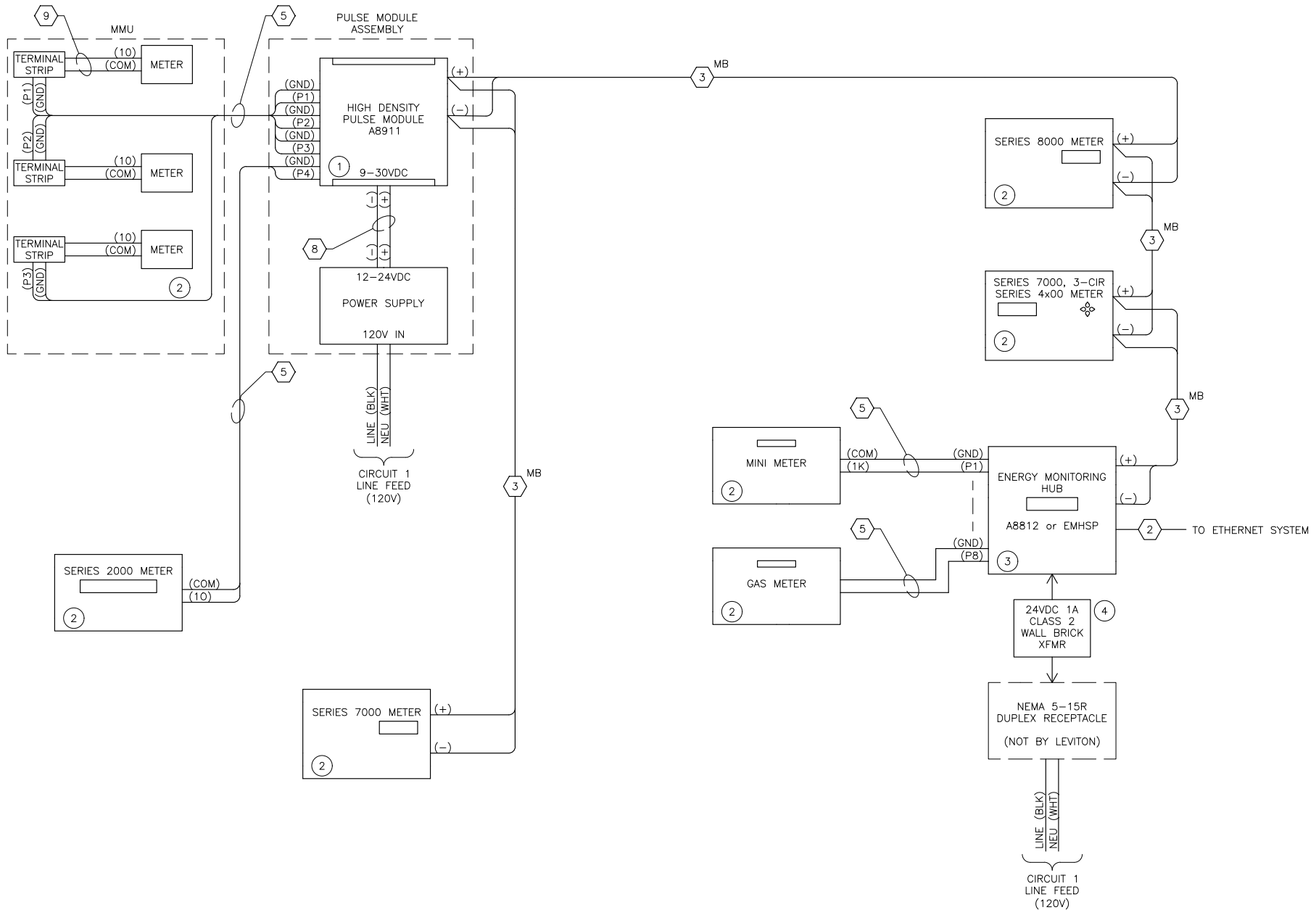




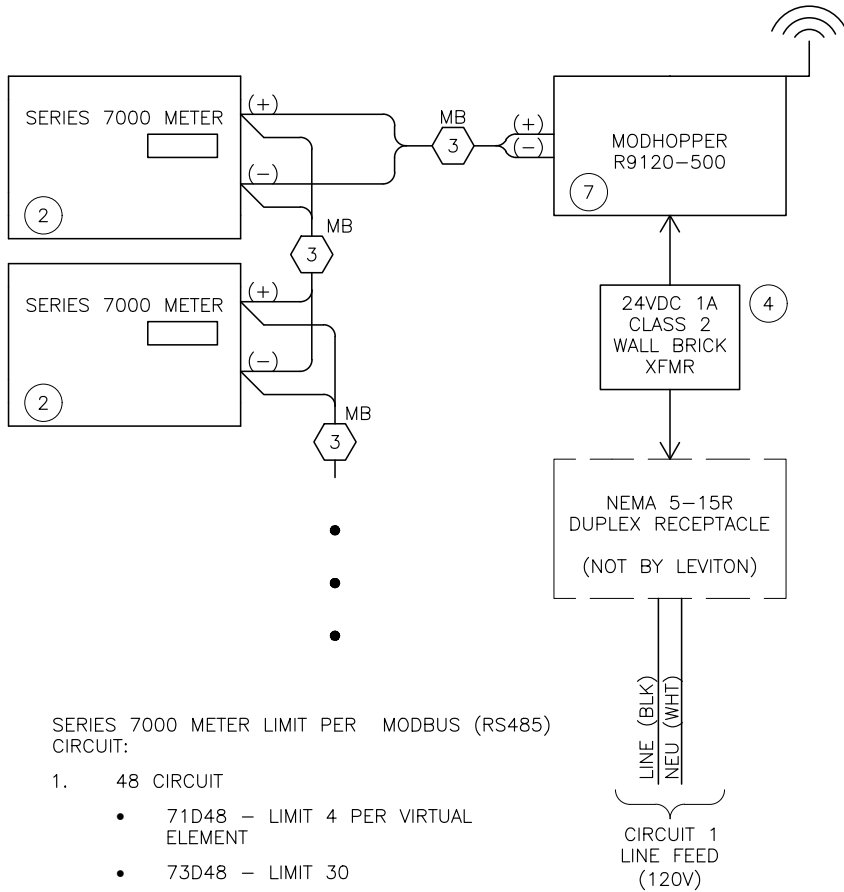
# PULSE METERS—INDIVIDUAL MINI METERS, SERIES 2000, GAS, WATER TO ENERGY MONITORING HUB



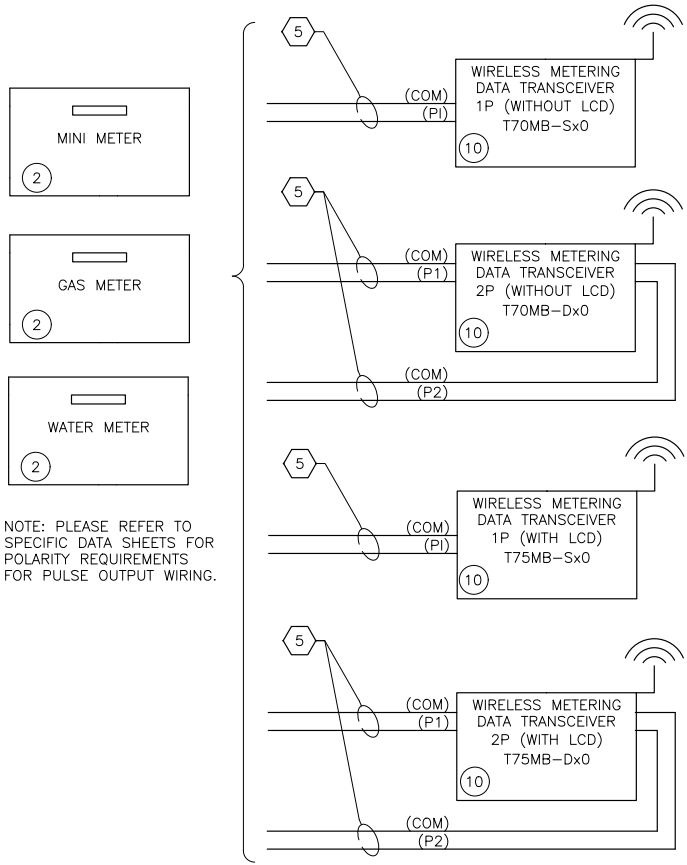
# INDIVIDUAL MINI METER, GAS, WATER, 4000/4100, 7000-7100, 8000 AND SERIES 2000 WITH HIGH DENSITY PULSE MODULE TO ENERGY MONITORING HUB, MONITORING SYSTEM



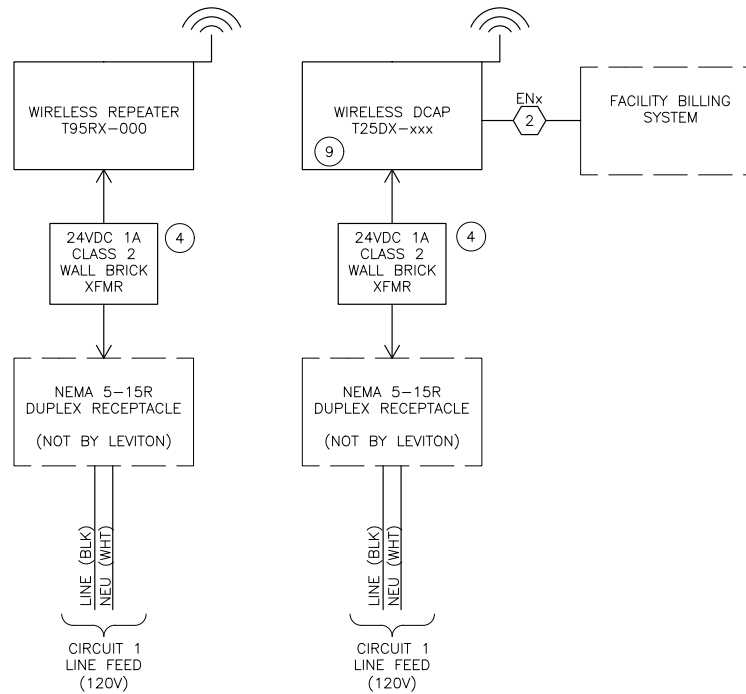
# SERIES 7000-7100 METERS TO MODHOPPER, MONITORING SYSTEM



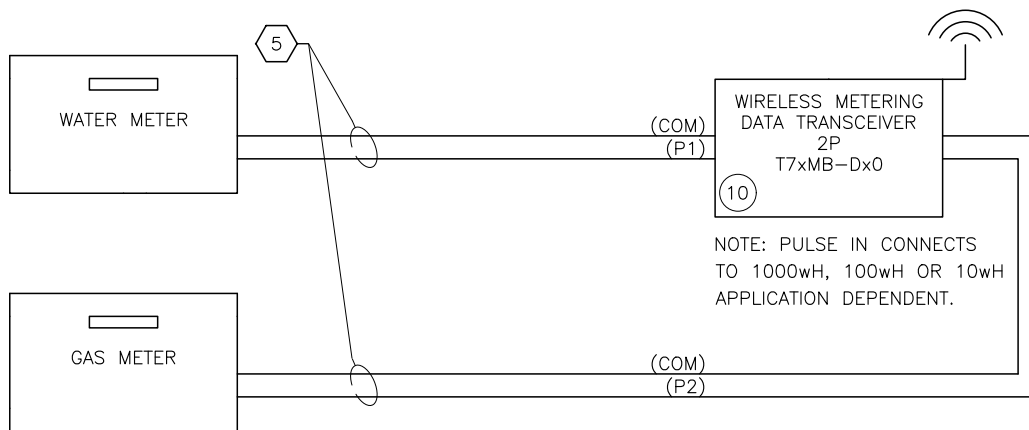
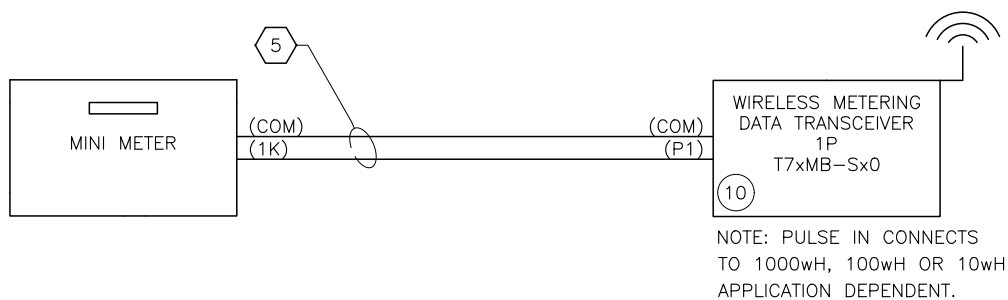
# WIRELESS METERING DATA TRANSCEVERS, DCAP, AND REPEATER



NOTE: PLEASE REFER TO SPECIFIC DATA SHEETS FOR POLARITY REQUIREMENTS FOR PULSE OUTPUT WIRING.



# INDIVIDUAL MINI METER TO SINGLE PULSE METERING DATA TRANSCEIVER (MTD), WATER AND GAS METER TO DUAL PULSE METERING DATA TRANSCEIVER (MTD)



NOTE: PLEASE REFER TO SPECIFIC DATA SHEETS FOR POLARITY REQUIREMENTS FOR PULSE OUTPUT WIRING.



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