



**LEVITON<sup>®</sup>**  
**Applications Cookbook**  
**Metering Solutions**

Version 9.0

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.

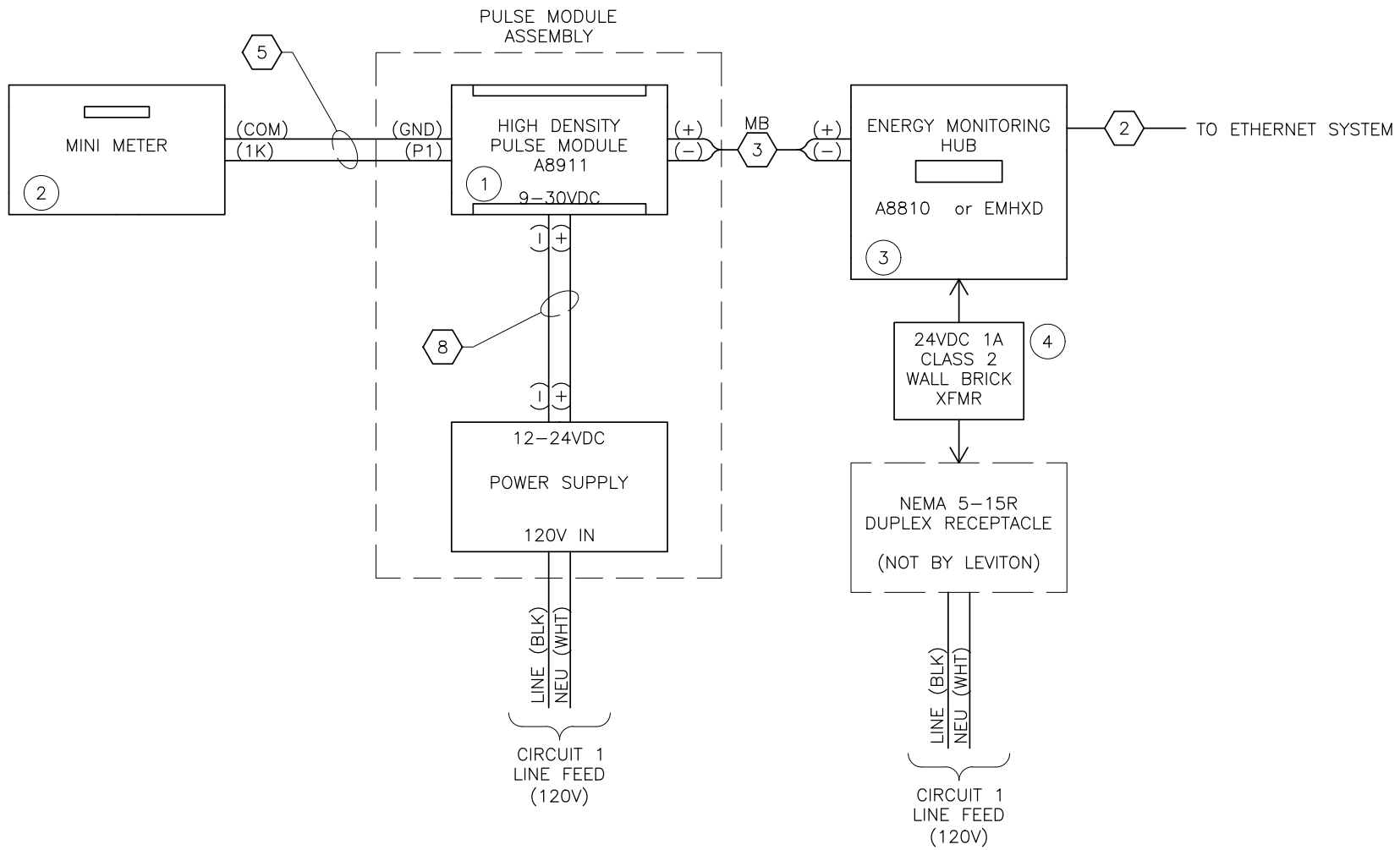
### SYMBOLS

- 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.

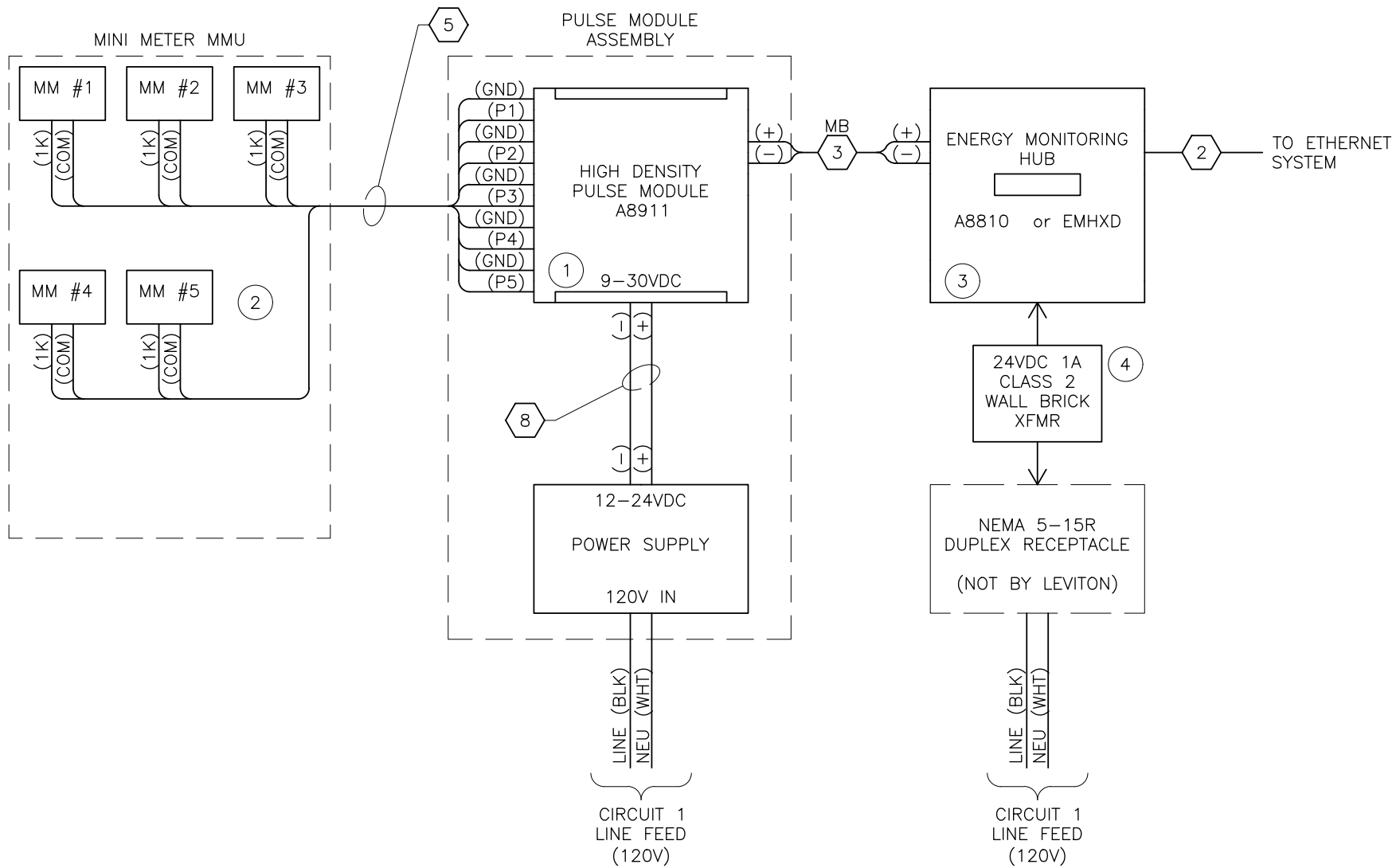
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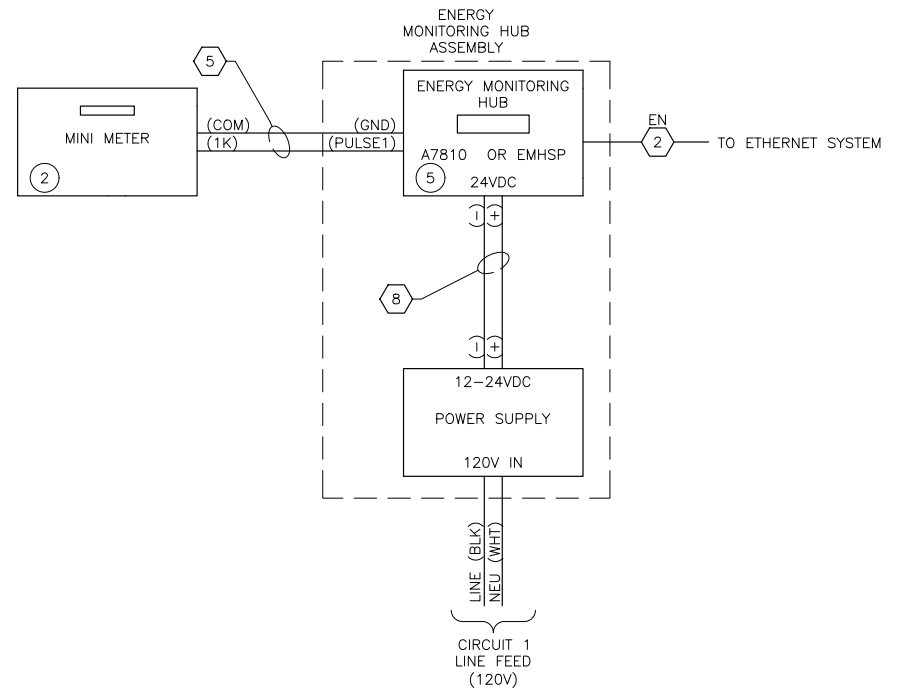
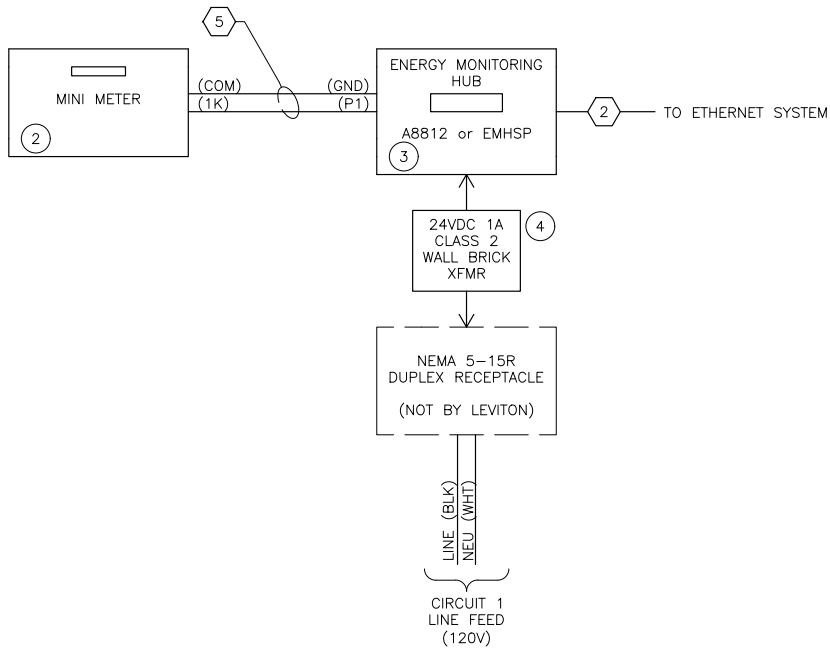
# INDIVIDUAL MINI METER TO HIGH DENSITY PULSE MODULE, MONITORING SYSTEM



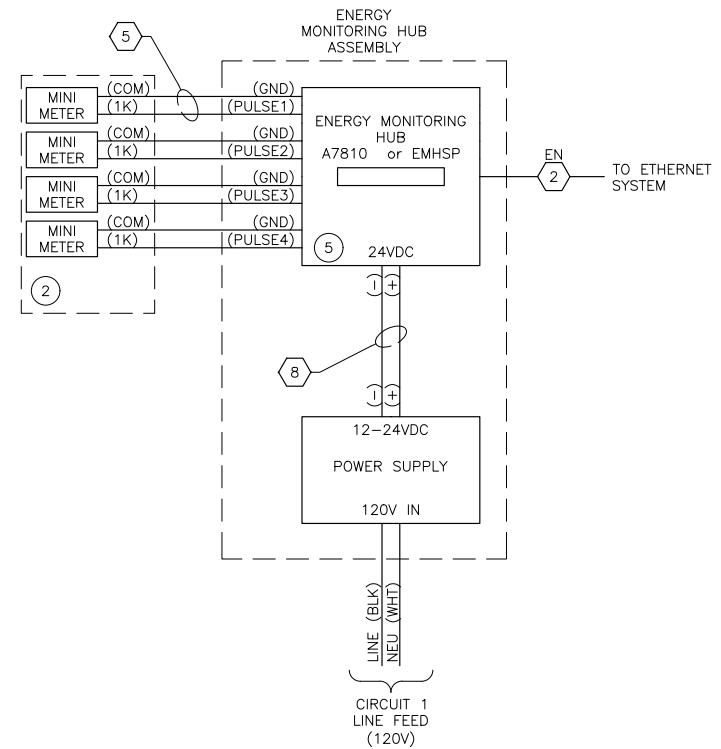
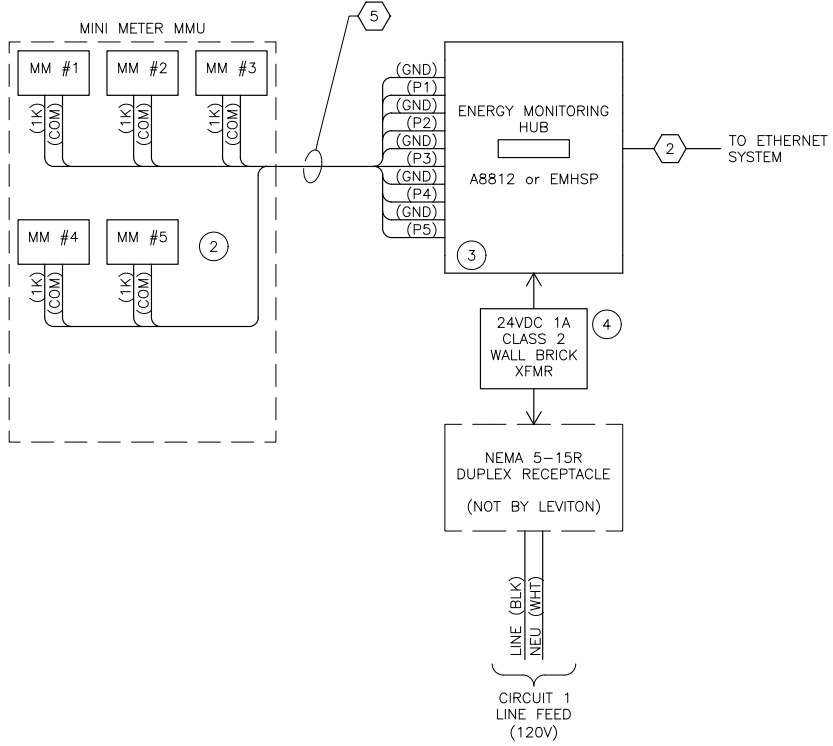
# MINI METER MMU TO HIGH DENSITY PULSE MODULE, MONITORING SYSTEM



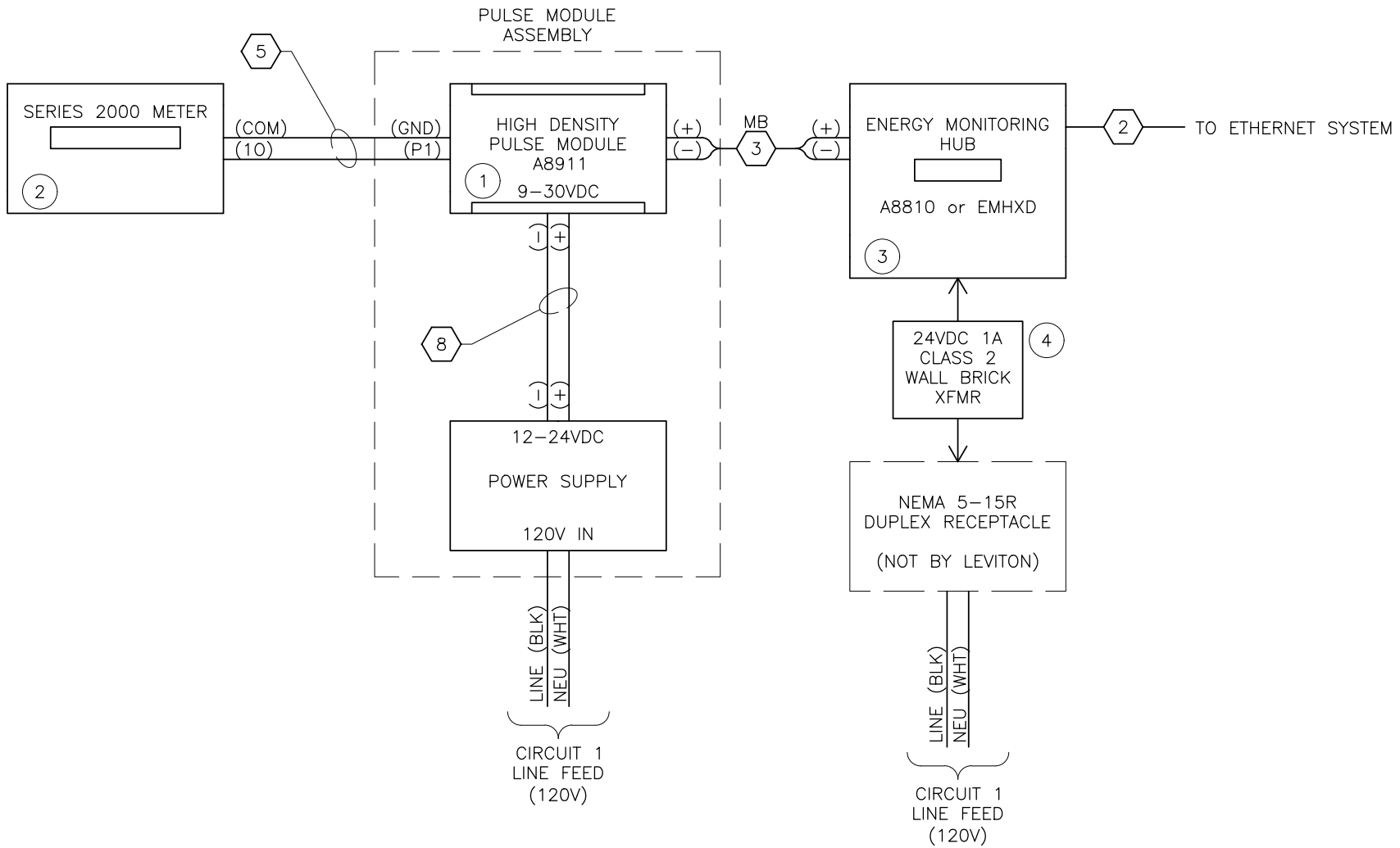
# INDIVIDUAL MINI METER TO ENERGY MONITORING HUB, MONITORING SYSTEM



# MINI METER MMU TO ENERGY MONITORING HUB, MONITORING SYSTEM

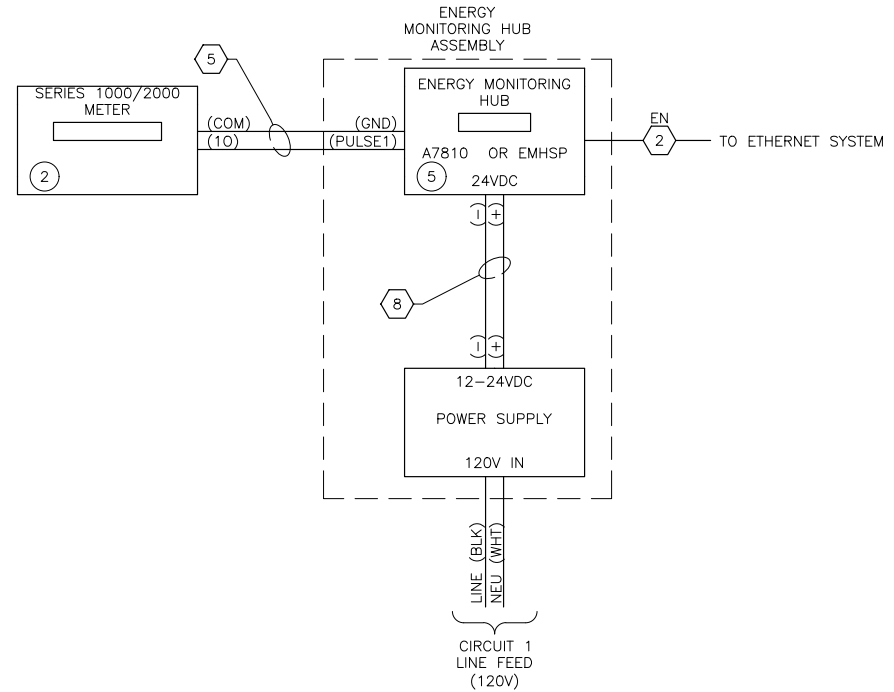
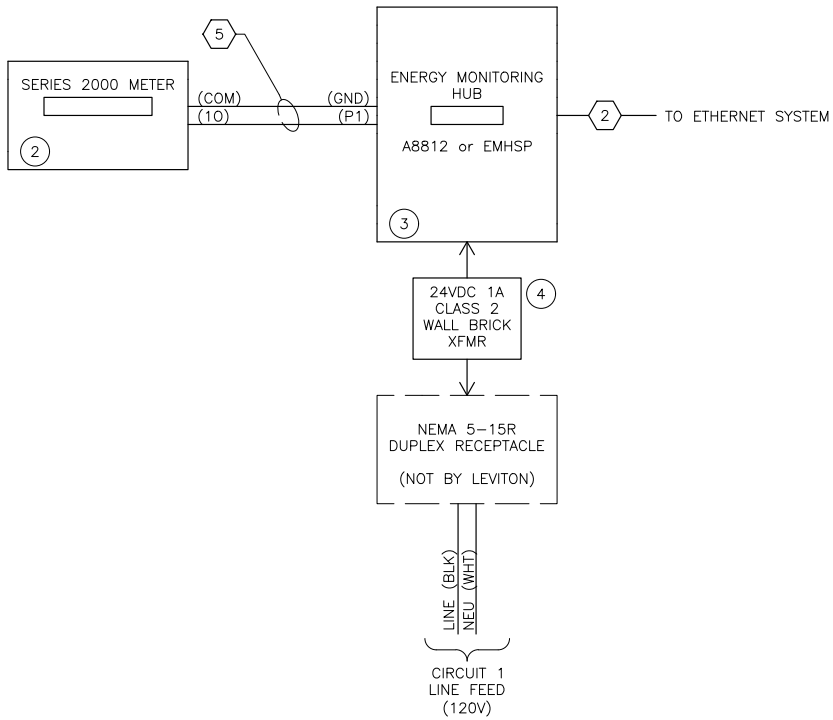


# INDIVIDUAL SERIES 2000 METERS TO HIGH DENSITY PULSE MODULE, MONITORING SYSTEM

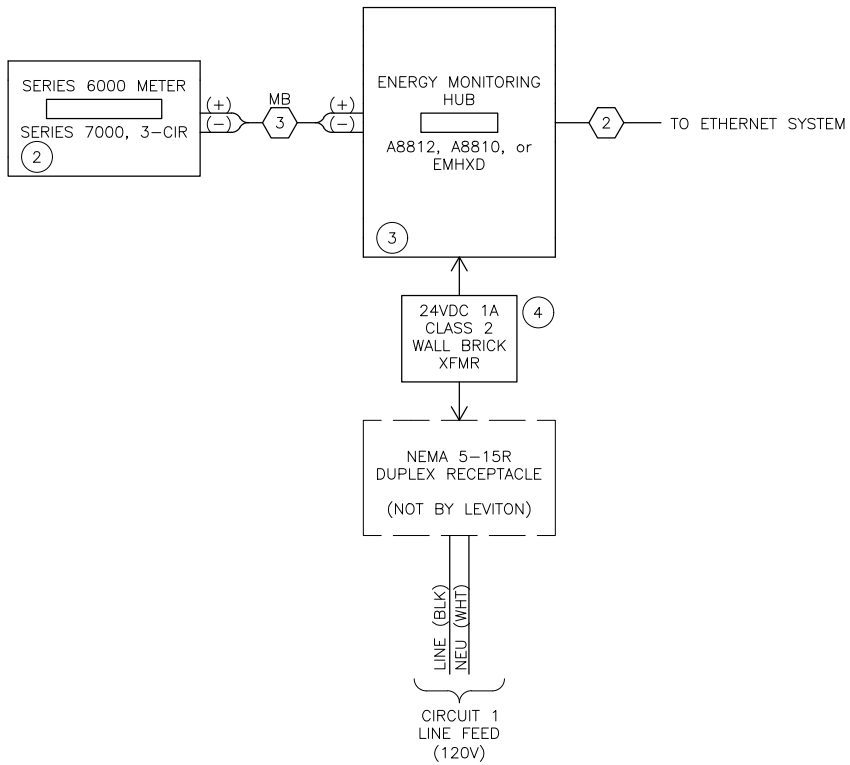




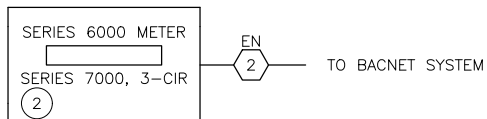
# SERIES 2000 METER TO ENERGY MONITORING HUB, MONITORING SYSTEM



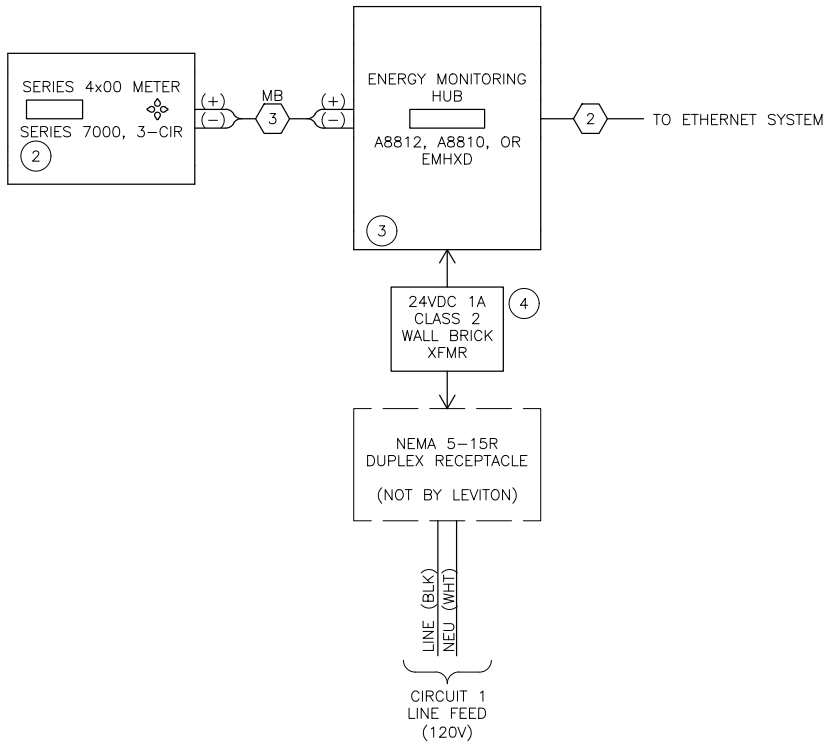
# INDIVIDUAL SERIES 6000/SERIES 7000, 3 CIRCUIT METER TO MODBUS TCP/IP



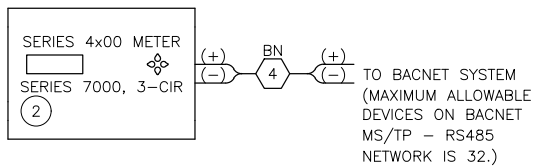
# INDIVIDUAL SERIES 6000/SERIES 7000, 3-CIRCUIT METER TO BACNET IP



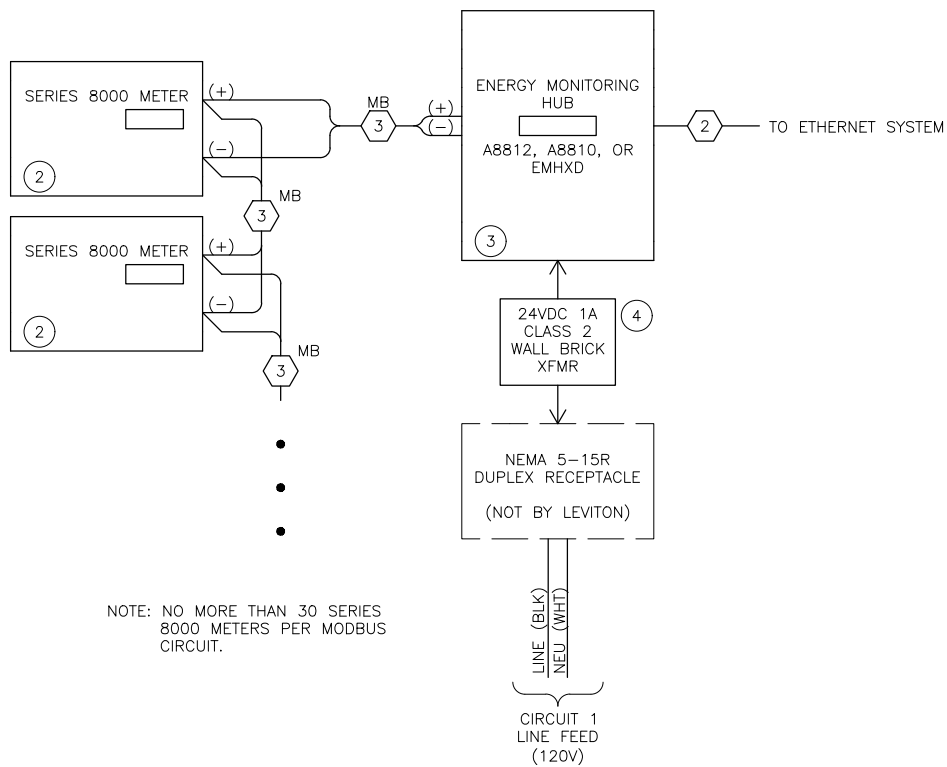
# INDIVIDUAL SERIES 4x00/SERIES 7000, 3-CIRCUIT METER TO MODBUS RTU



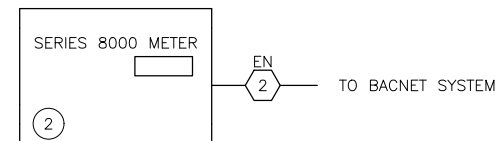
# INDIVIDUAL SERIES 4x00/SERIES 7000, 3-CIRCUIT METER TO BACNET MS/TP



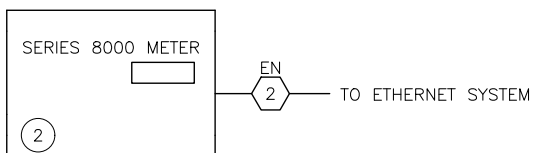
## SERIES 8000 METER — MODBUS RTU OPTION



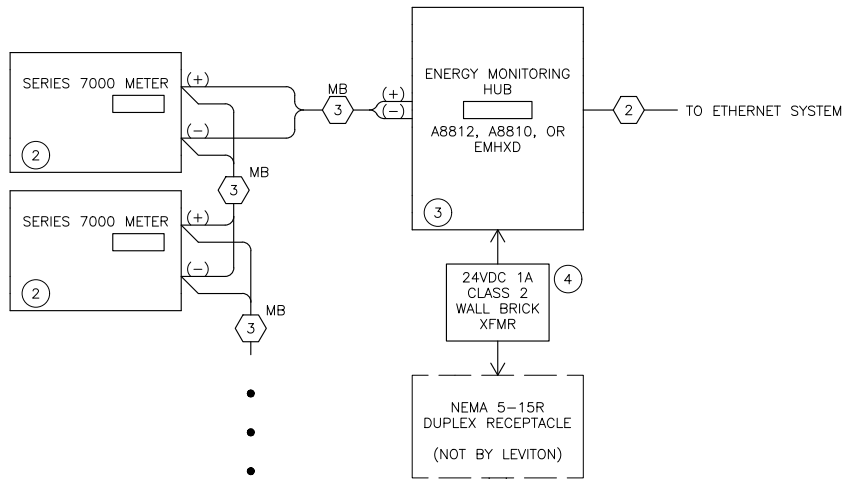
## SERIES 8000 METER — BACNET IP OPTION



## SERIES 8000 METER — MODBUS TCP/IP OPTION



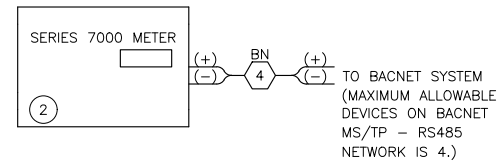
## SERIES 7000 METER - MODBUS RTU OPTION



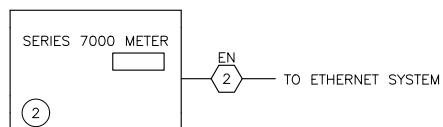
SERIES 7000 METER LIMIT PER MODBUS (RS485) CIRCUIT:

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.

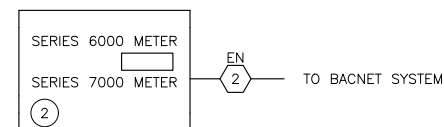
## SERIES 7000 METER - BACNET/MSTP OPTION



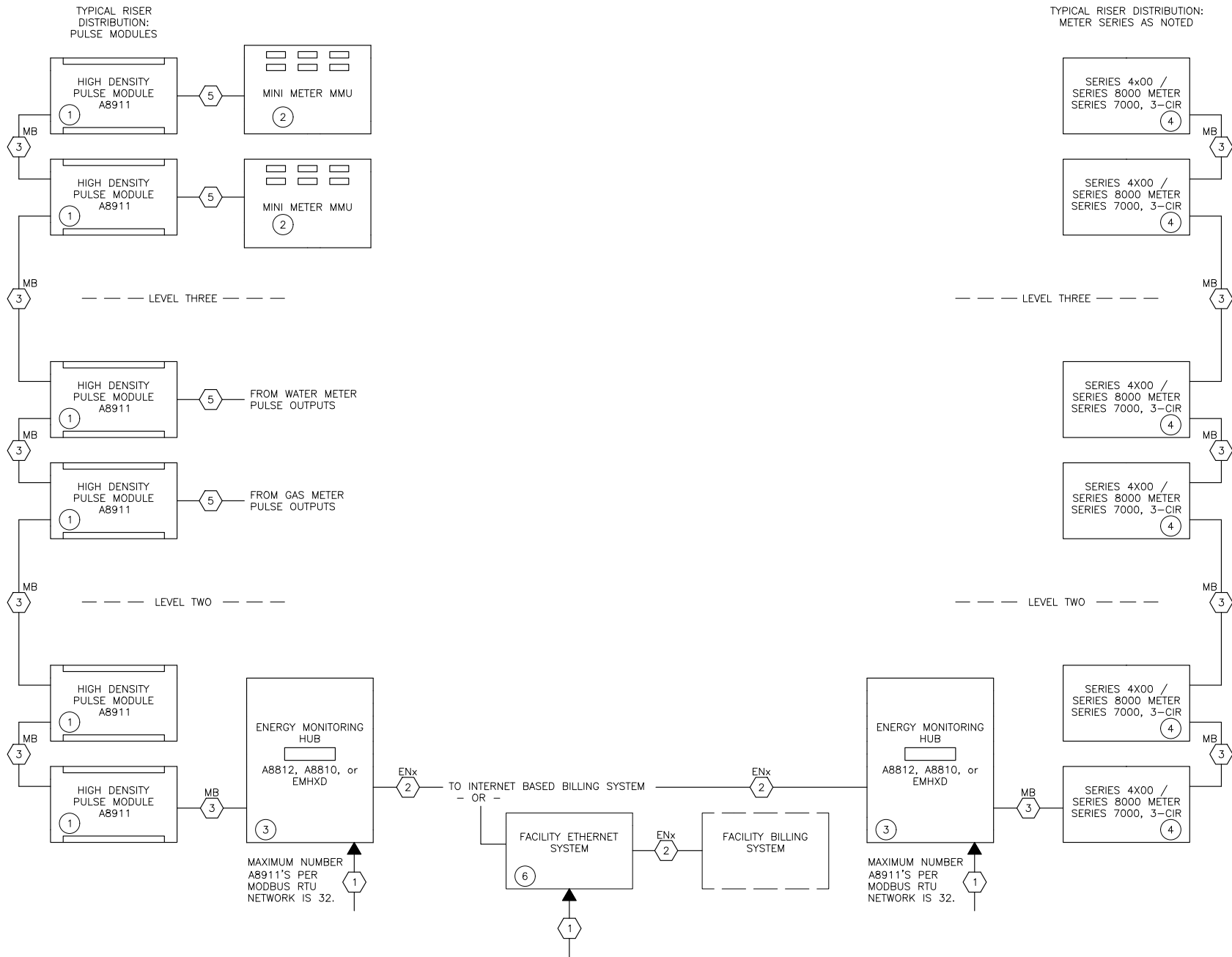
## SERIES 7000 METER - MODBUS TC/IP OPTION



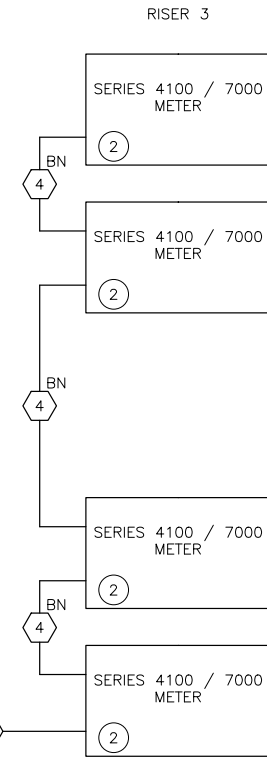
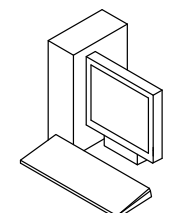
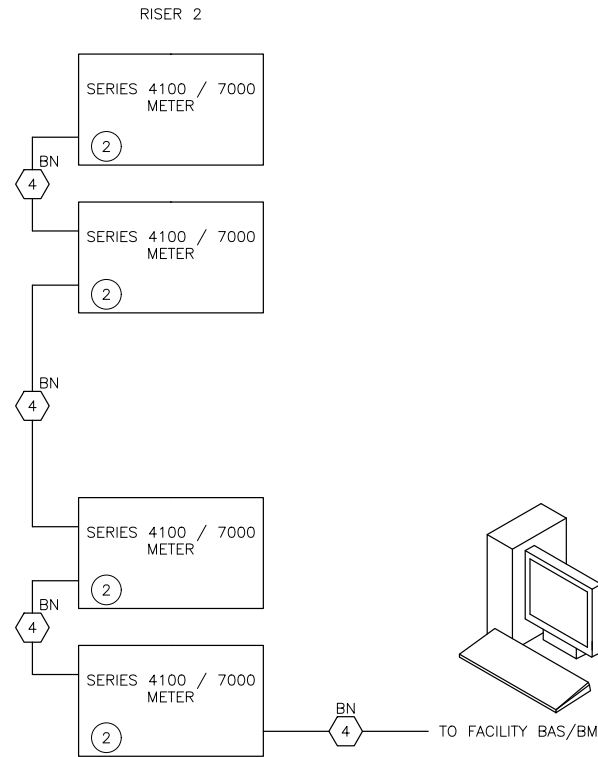
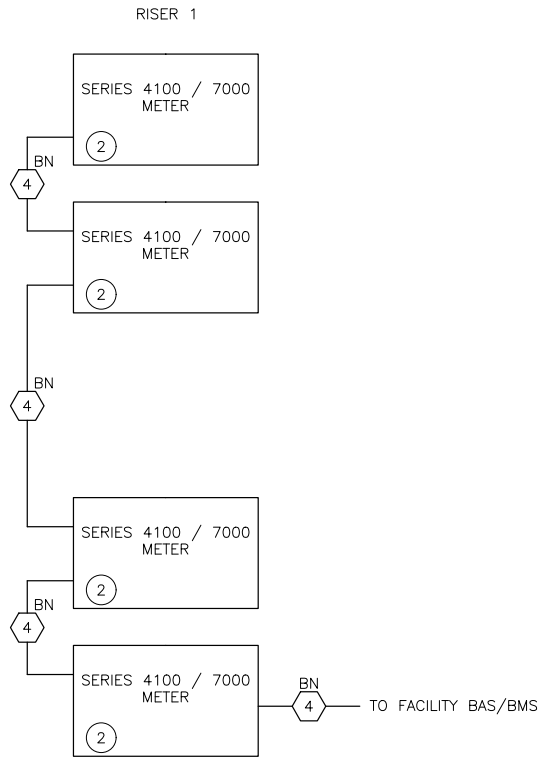
## SERIES 6000/7000 METER - BACNET IP OPTION



# PULSE METERS - SYSTEM BACKBONE - MODBUS RTU TO ETHERNET



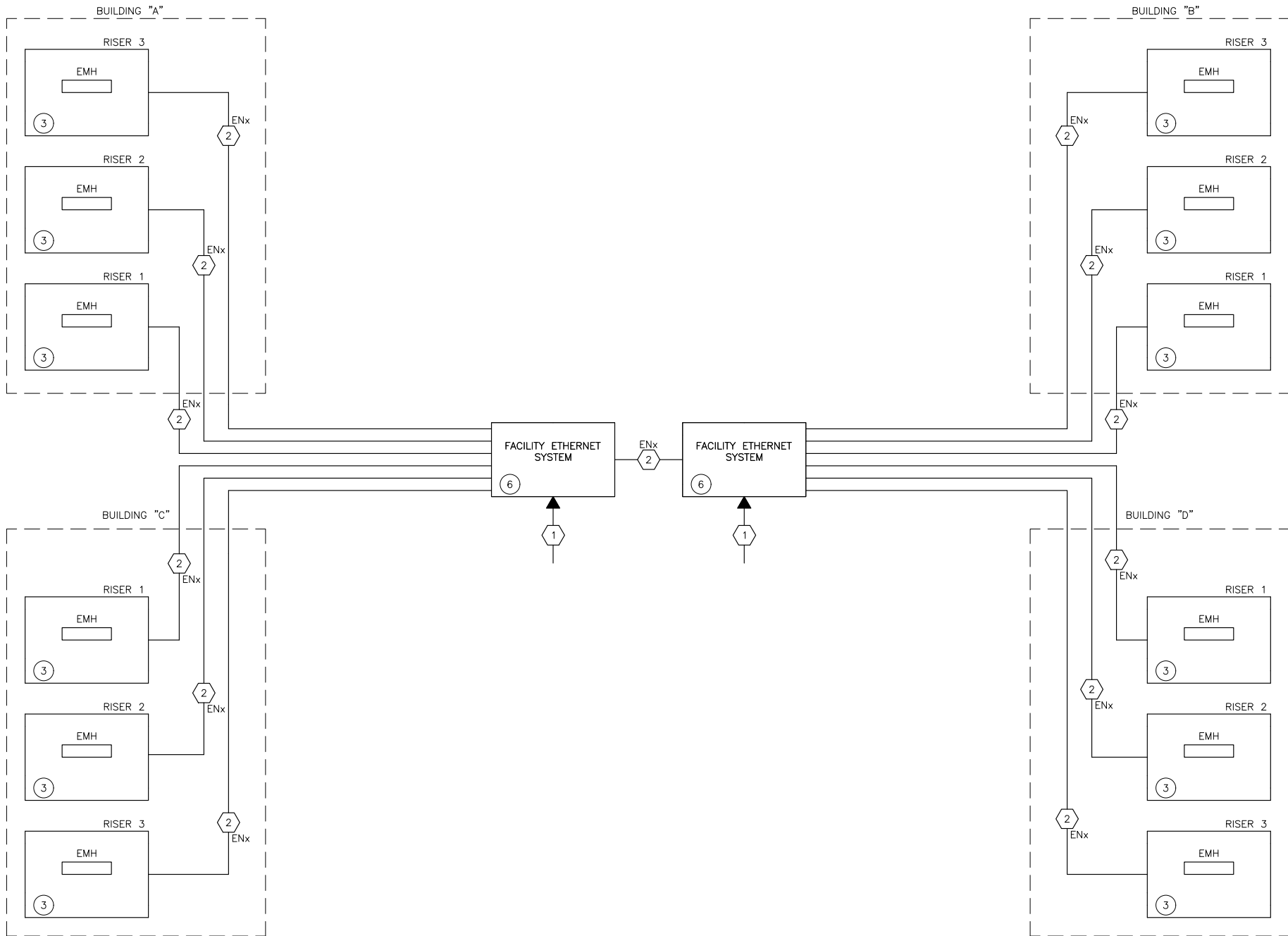
# BACNET MS/TP METERS - SYSTEM BACKBONE - BACNET MS/TP



SERIES 7000 METER LIMIT PER MODBUS (RS485) CIRCUIT:

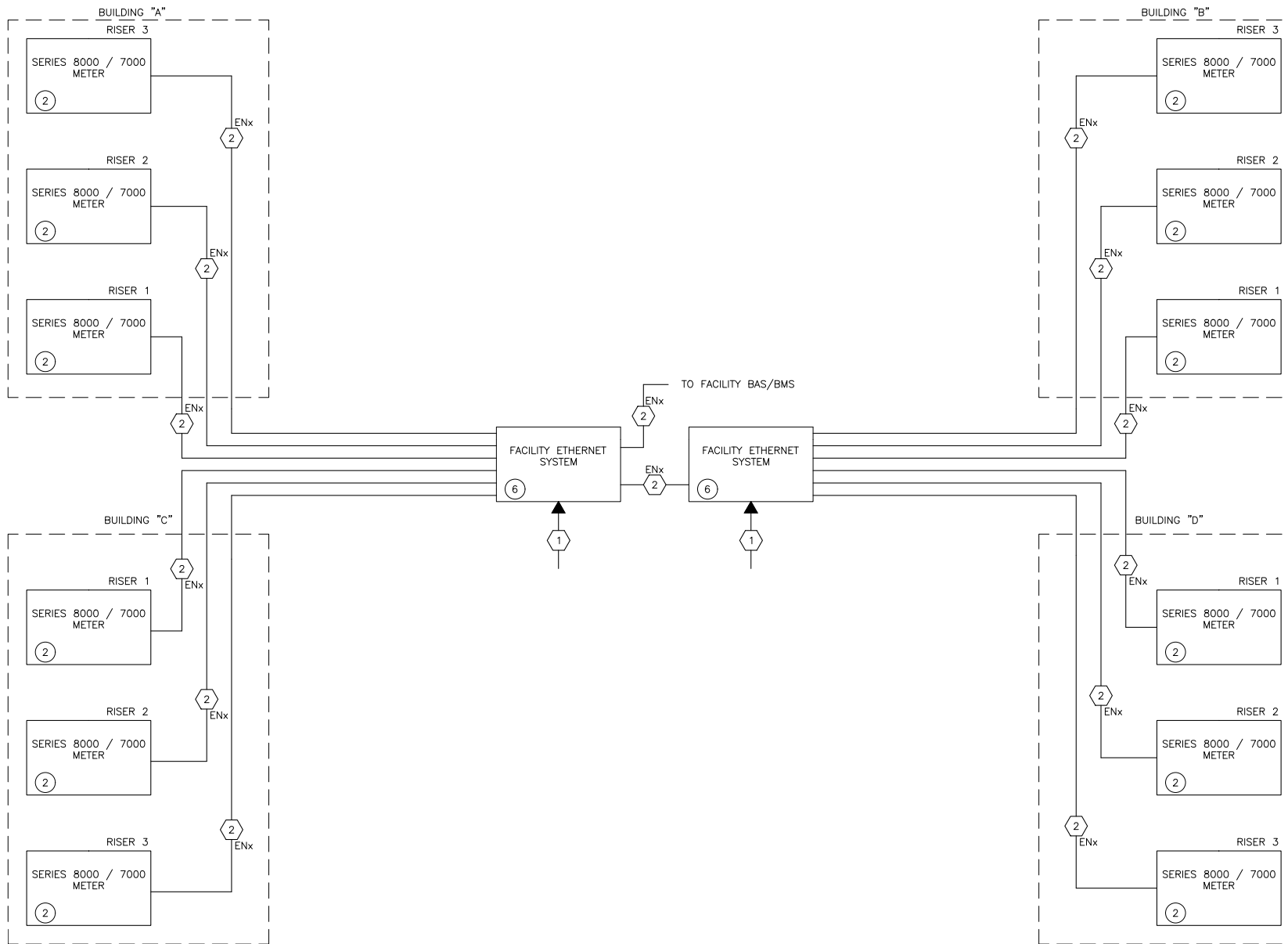
1. 48 CIRCUIT
  - 71D48 – LIMIT 4 PER VIRTUAL ELEMENT
  - 73D48 – LIMIT 30
2. 24 CIRCUIT – LIMIT 8
3. 12 CIRCUIT – LIMIT 16
4. 3 CIRCUIT – LIMIT 30
5. CONSULT FACTORY FOR ADDITIONAL DESIGN INFORMATION.

# SYSTEM BACKBONE - ENERGY MONITORING HUBS TO ETHERNET

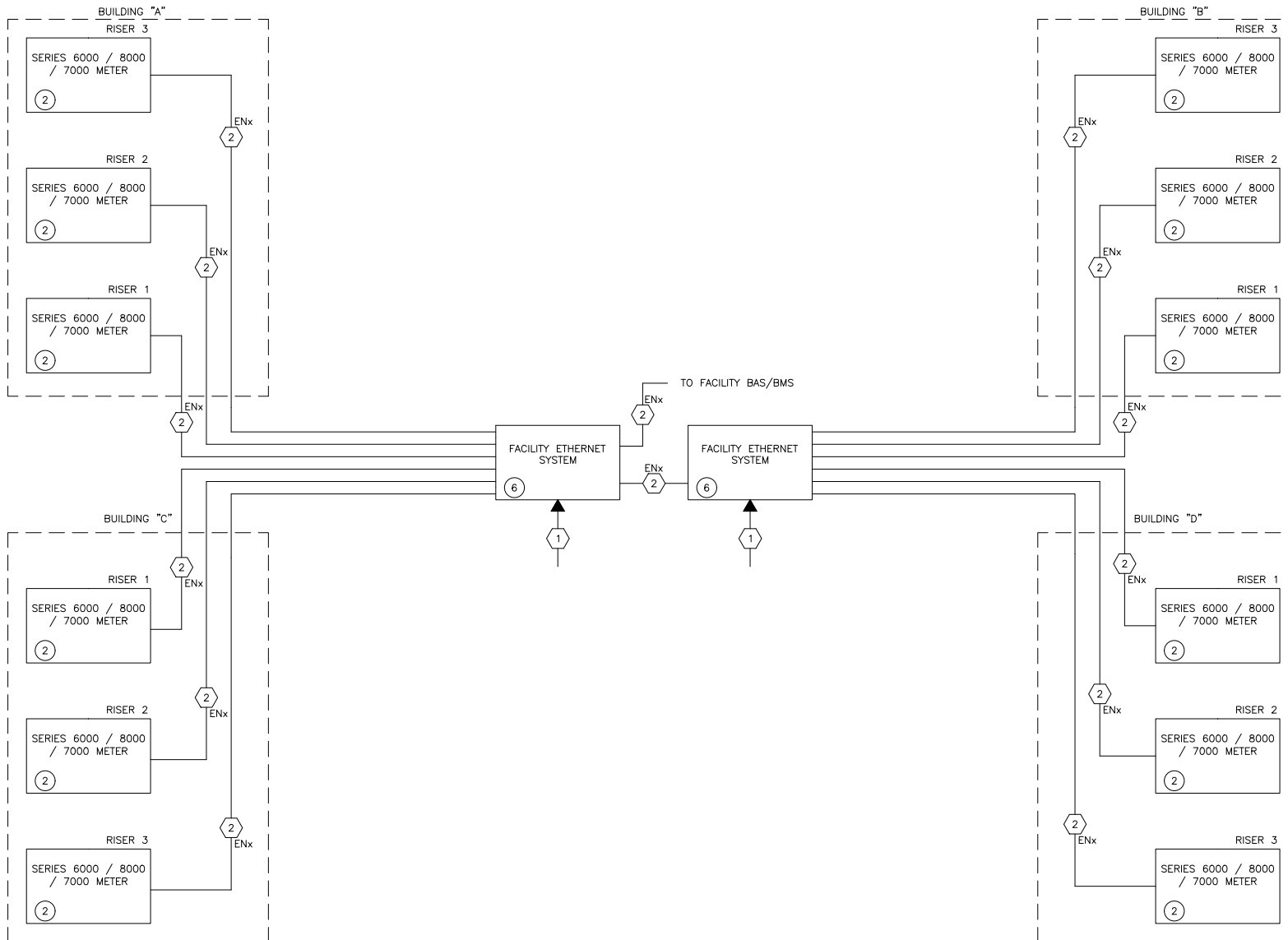




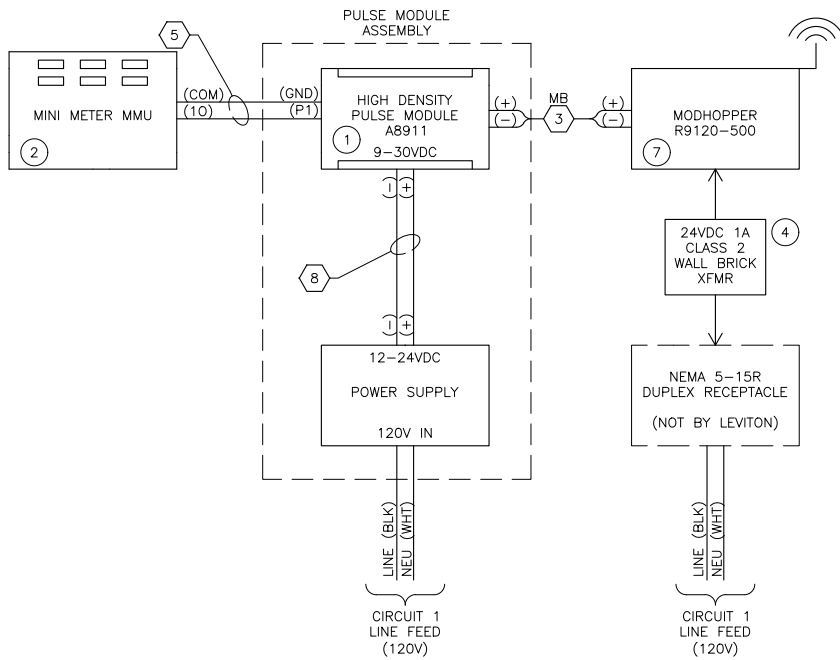
# METERS - SYSTEM BACKBONE - SERIES 7000 METER/SERIES 8000 METER TO BACNET IP



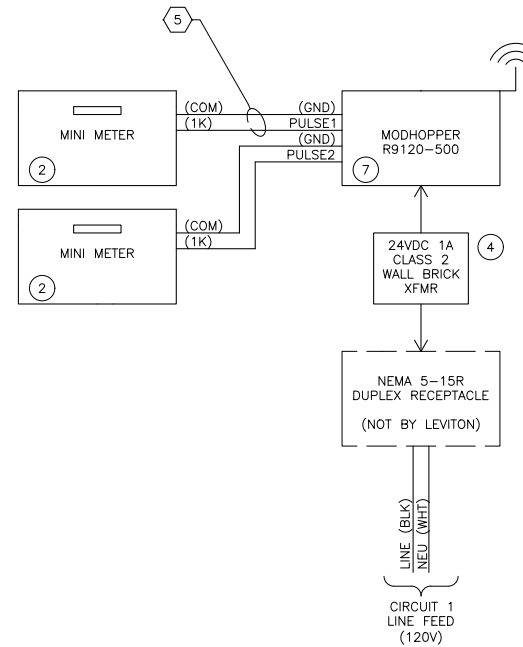
# METERS - SYSTEM BACKBONE - SERIES 6000 METER/SERIES 7000 METER/SERIES 8000 METER TO MODBUS TCP/IP



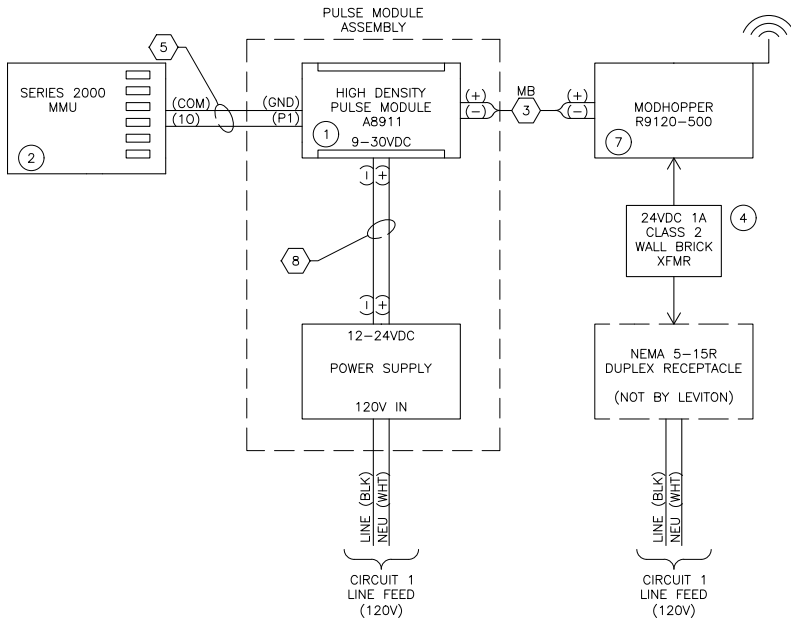
# MINI METER PULSE OUTPUT TO HIGH DENSITY PULSE MODULE, MODBUS TO MODHOPPER



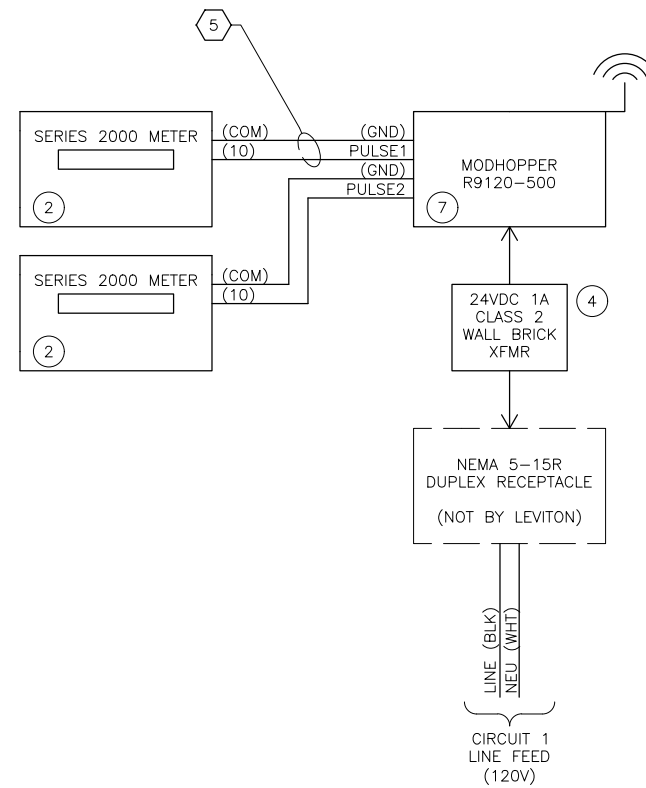
# MINI METER TO MODHOPPER ONBOARD PULSE INPUT TERMINALS



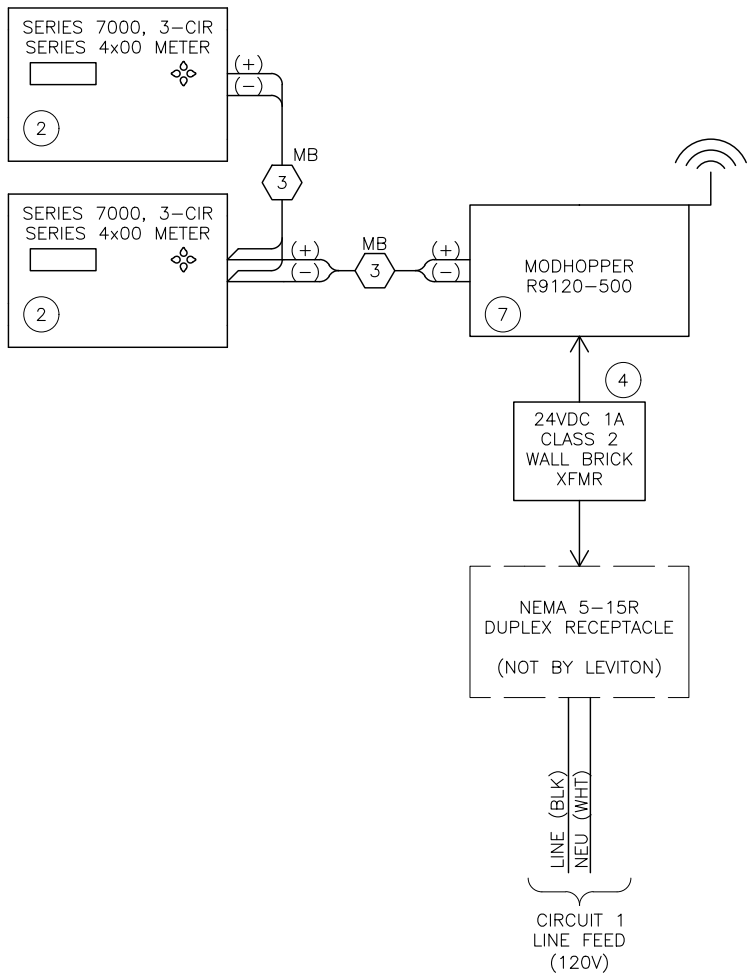
# SERIES 2000 METER MMU PULSE OUTPUT TO HIGH DENSITY PULSE MODULE, MODBUS TO MODHOPPER



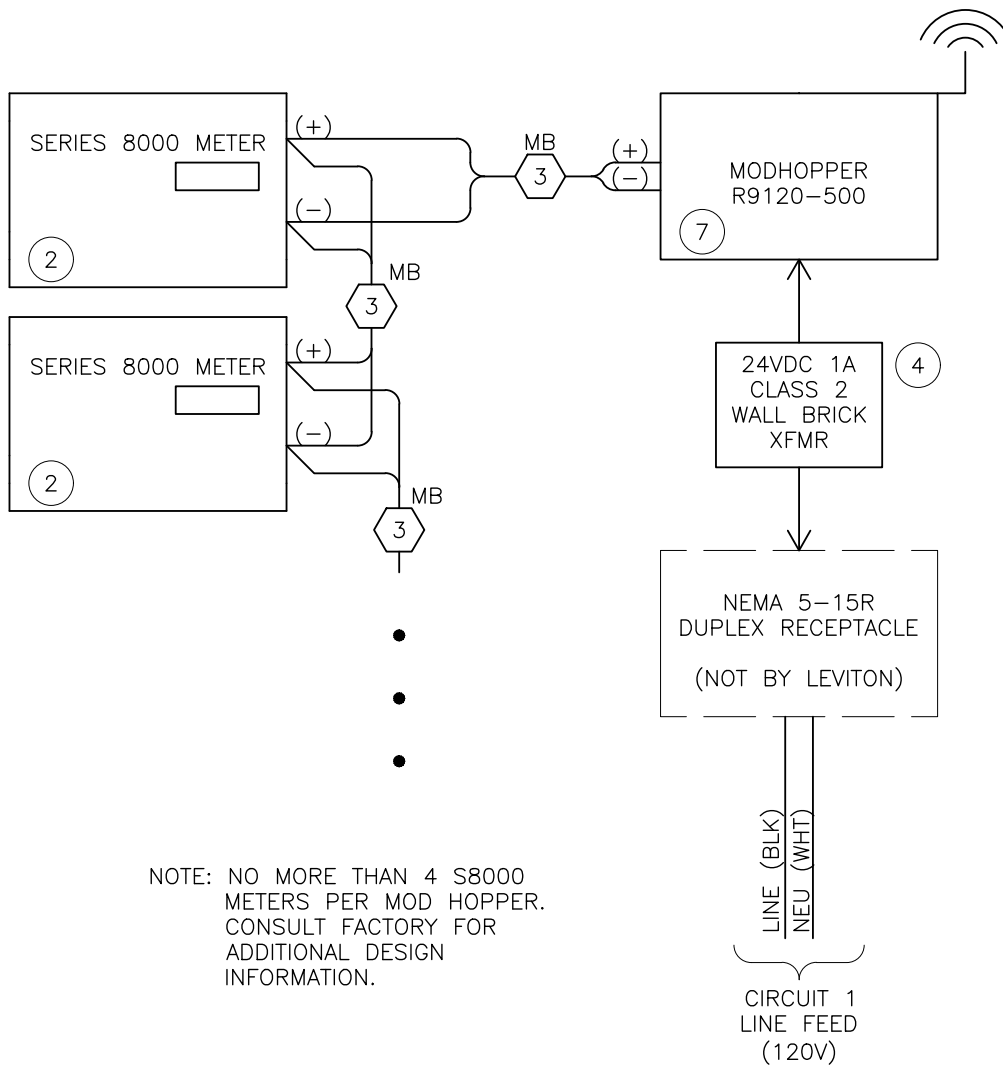
# SERIES 2000 METER TO MODSHOPPER ONBOARD PULSE INPUT TERMINALS



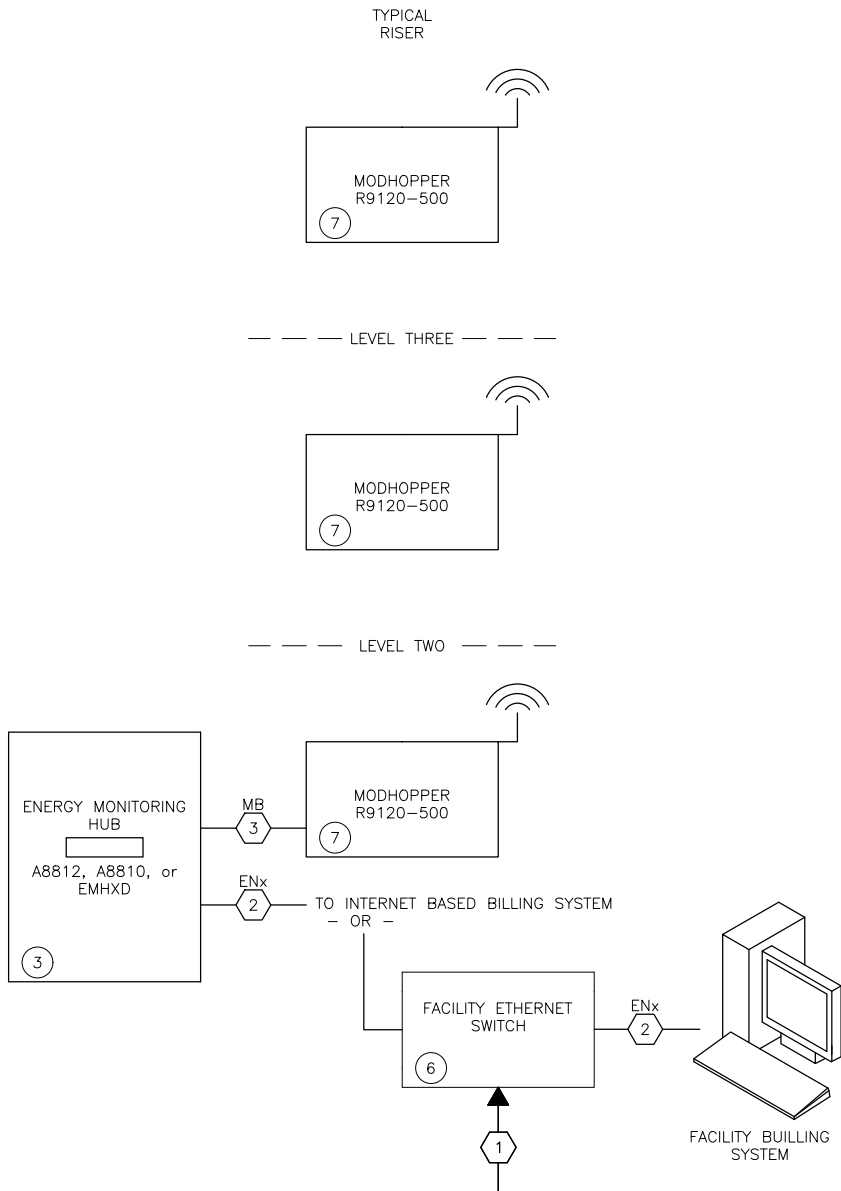
# SERIES 4x00/SERIES 7000, 3 CIRCUIT METER PULSE OUTPUT TO MODHOPPER



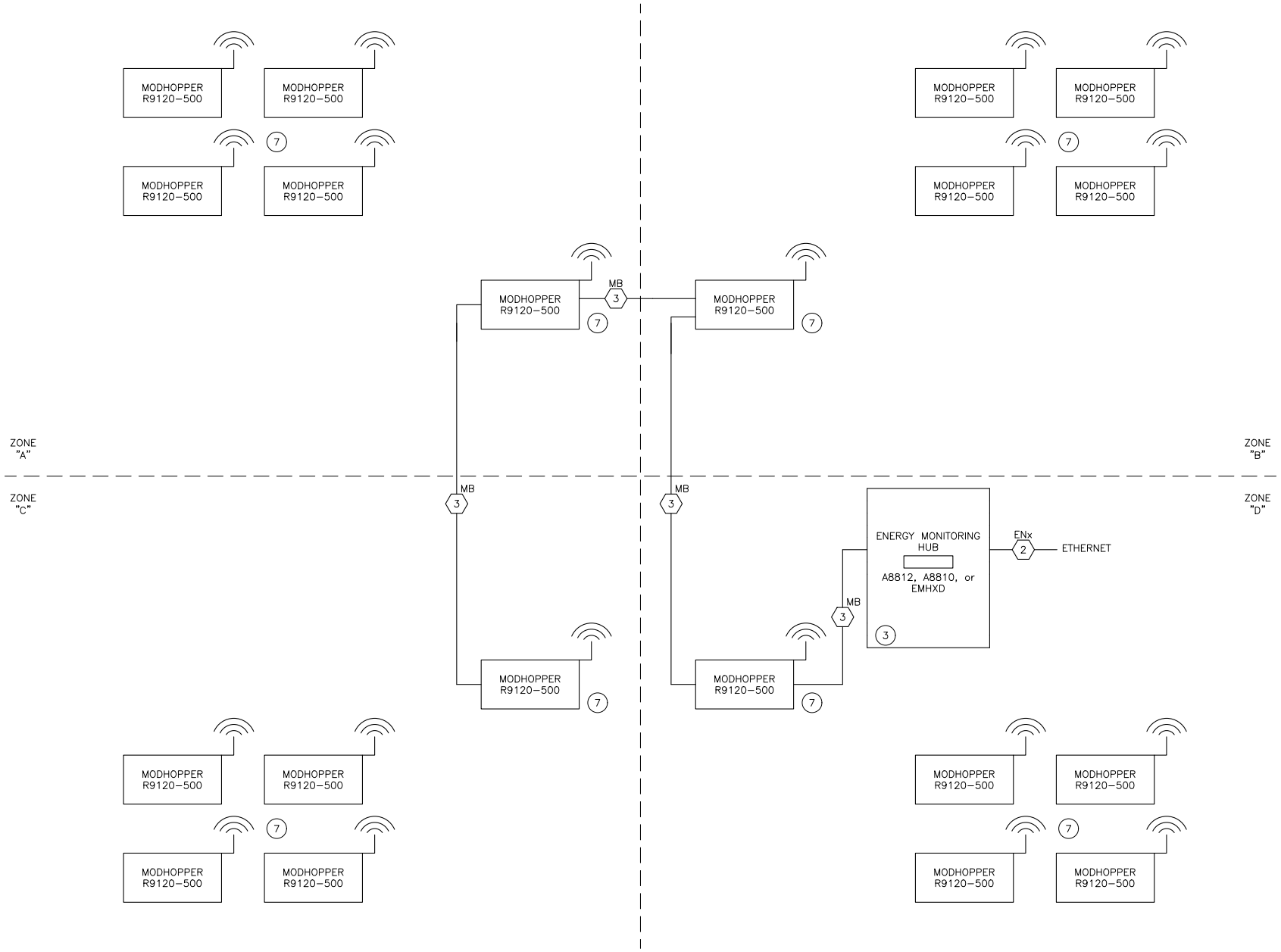
# SERIES 8000 METERS TO MODHOPPER, MONITORING SYSTEM



# METERS — SYSTEM BACKBONE — MODHOPPER — MONITORING SYSTEM

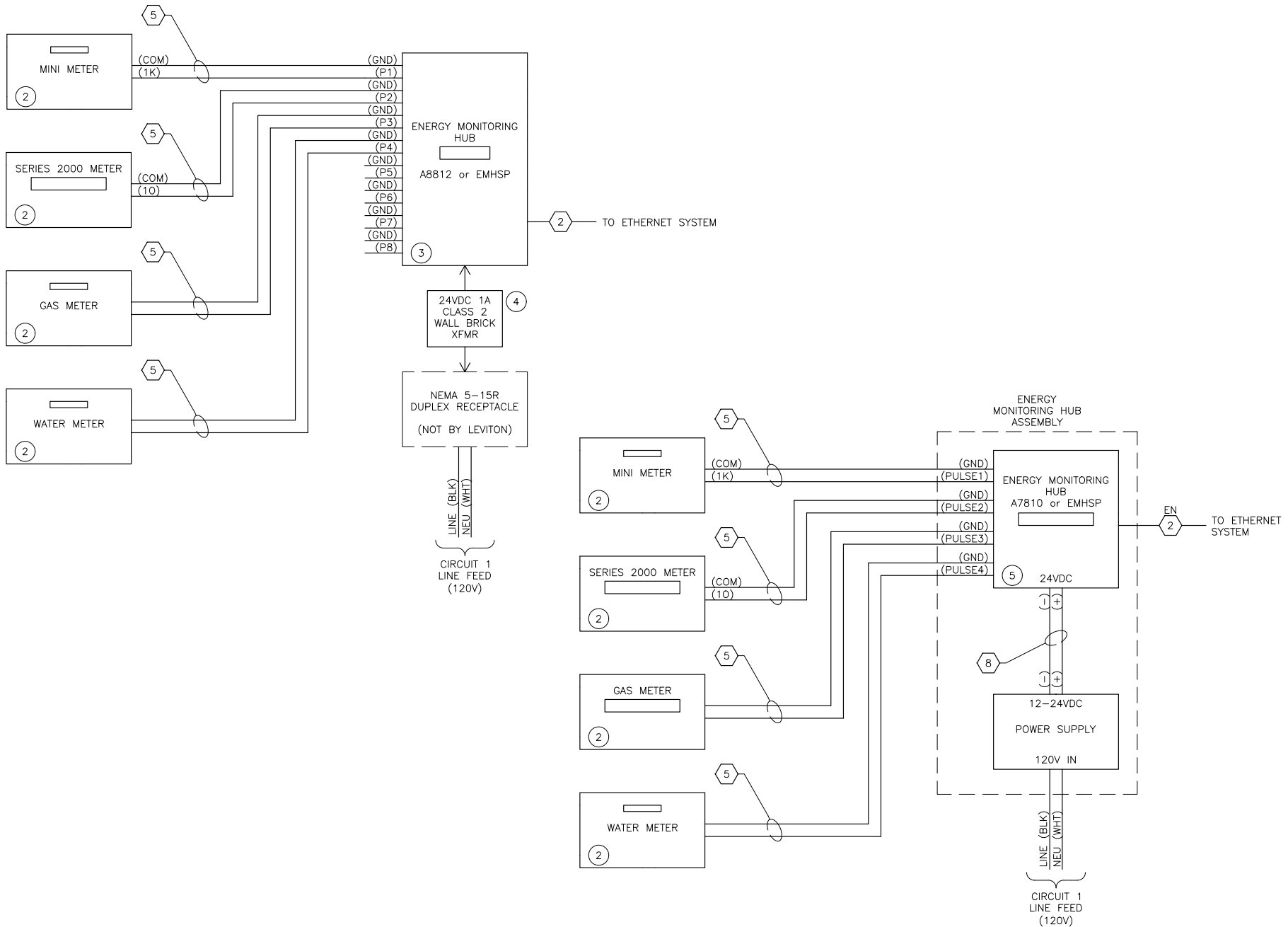


# METERS — SYSTEM BACKBONE — MODHOPPER

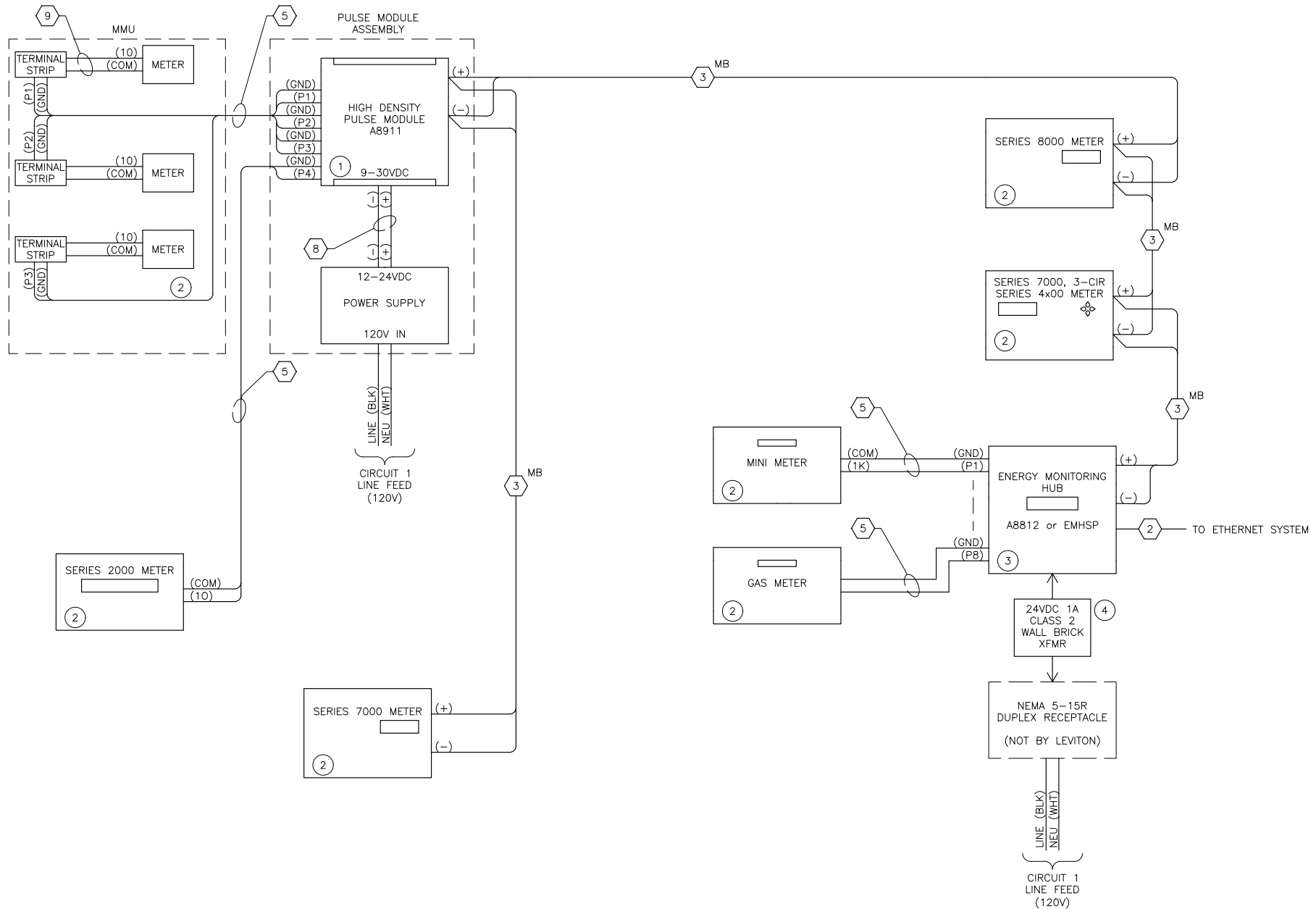




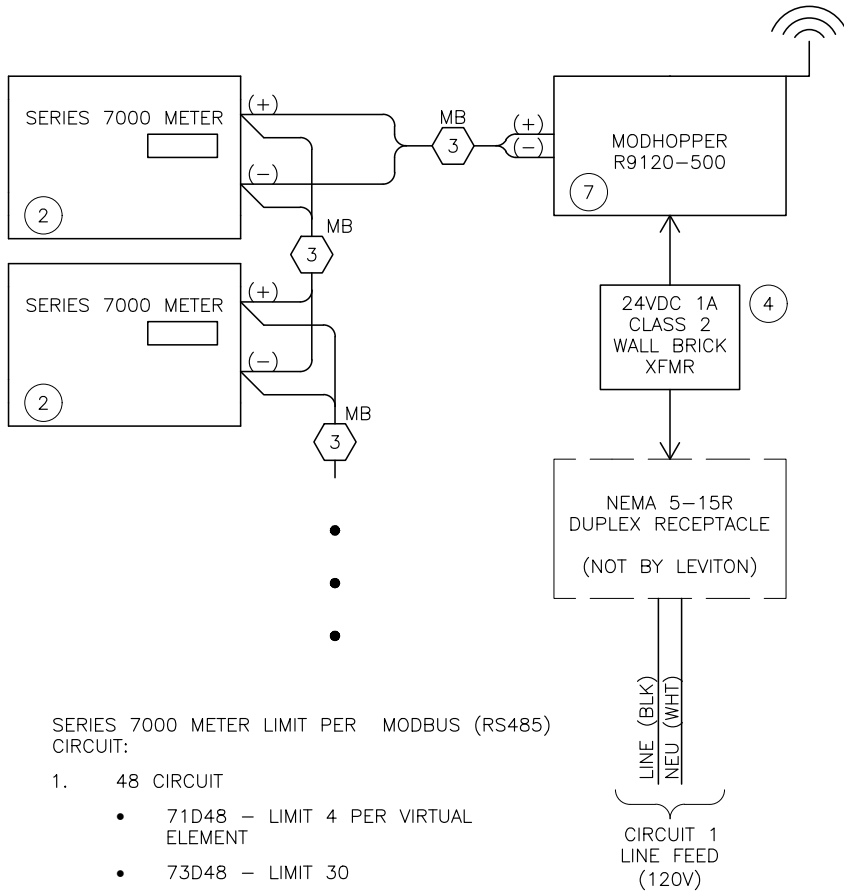
# PULSE METERS—INDIVIDUAL MINI METERS, SERIES 2000, GAS, WATER TO ENERGY MONITORING HUB



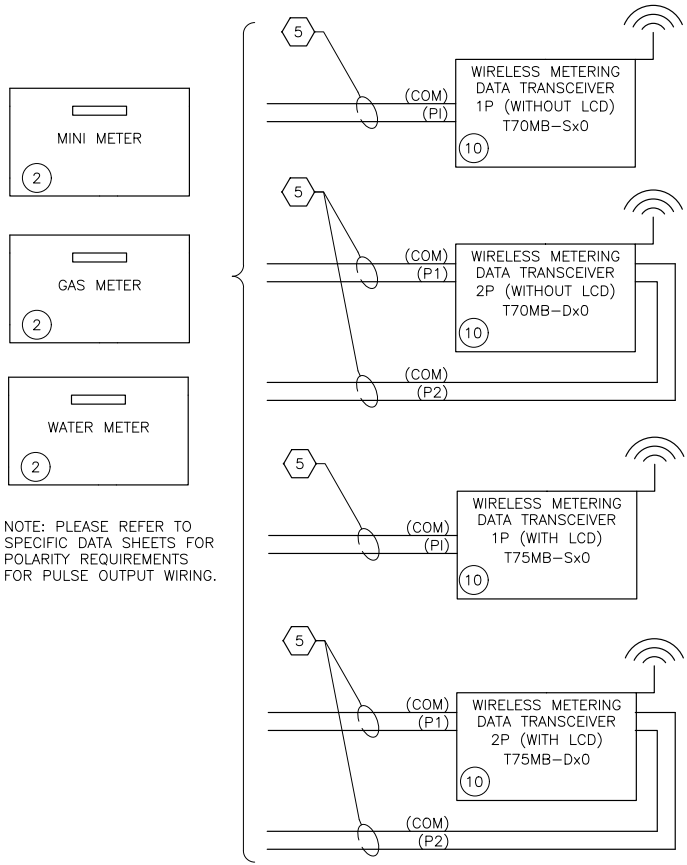
# INDIVIDUAL MINI METER, GAS, WATER, 4x00, 7000, 8000 AND SERIES 2000 WITH HIGH DENSITY PULSE MODULE TO ENERGY MONITORING HUB, MONITORING SYSTEM



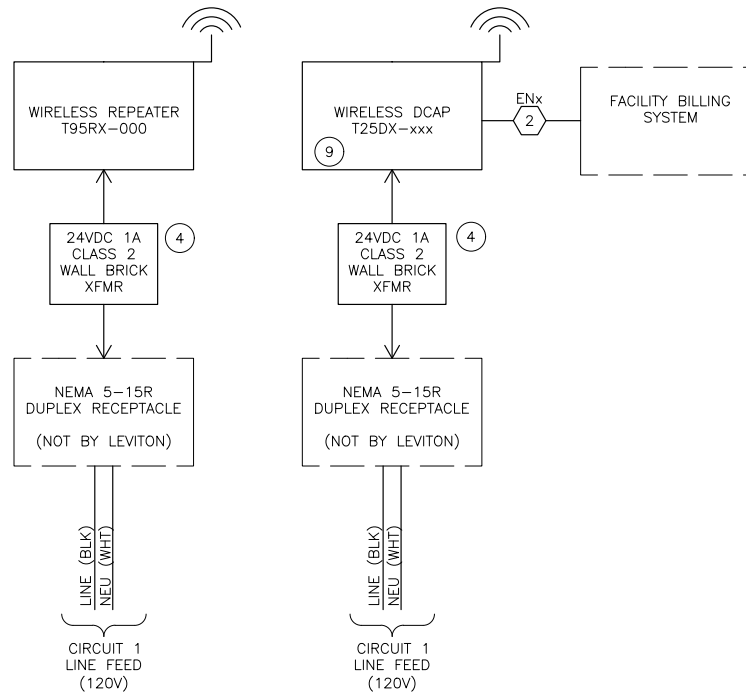
# SERIES 7000 METERS TO MODHOPPER, MONITORING SYSTEM



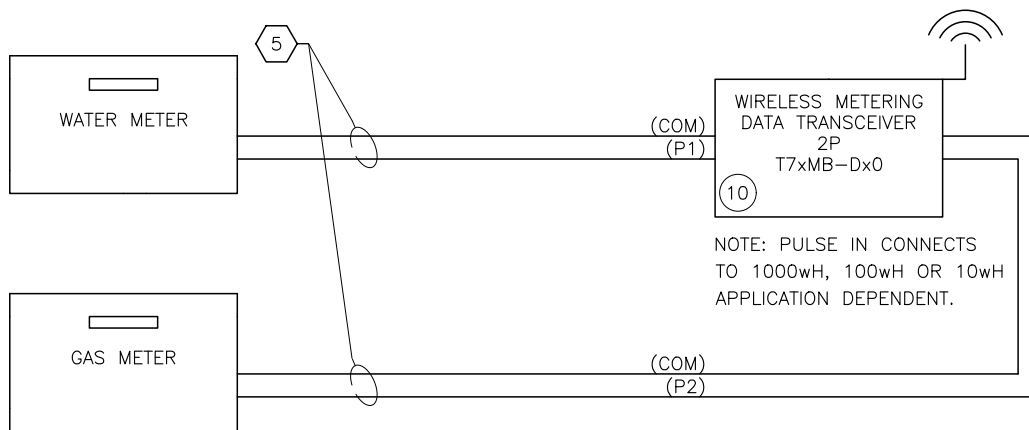
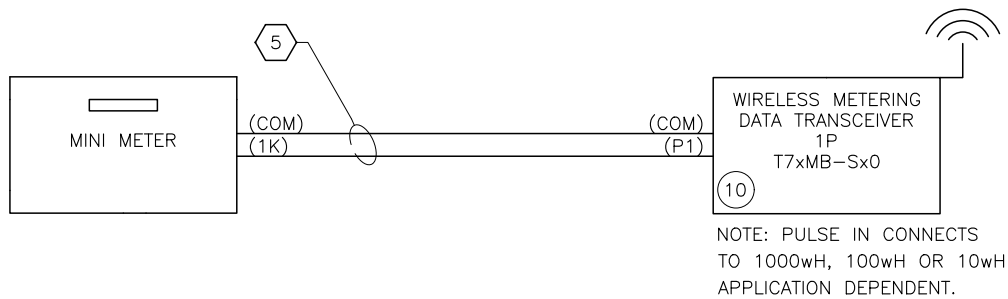
# WIRELESS METERING DATA TRANSCEVERS, DCAP, AND REPEATER



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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