



**NC** Electric  
Cooperatives

Your Touchstone Energy® Cooperatives 

# QF Metering and Telemetry Requirements

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## Disclaimer

The requirements set out in this standard are revised from time to time to reflect changes in technology, regulation, and business practices. As such, the requirements for a Developer's particular project will be memorialized in one of the following two ways:

(1) Where the requirements for a Developer's particular project have been identified and agreed to prior to execution of the Developer's Power Purchase Agreement (PPA), the requirements for the particular project will be incorporated into the PPA, via an exhibit to the PPA.

(2) Where the requirements for a Developer's particular project cannot be identified prior to execution of the Developer's PPA, this standard, including this disclaimer, will be attached as a placeholder exhibit to the PPA; NCEMC and Developer shall thereafter work in good faith to execute a letter agreement – in the form set out in Attachment 5 to this standard – that sets out the requirements for the particular project.

## Purpose

This document provides North Carolina Electric Membership Corporation (NCEMC)'s requirements for metering and real-time telemetry data from a Qualifying Facility (QF) greater than 500kW interconnected to the system of a NCEMC Participating Member. These requirements are in place to ensure the receipt of accurate and timely data for accounting and billing of resources under an executed PPA with NCEMC and QF data integration into the NCEMC Energy Management System (EMS) for daily system operations, load modeling, and forecasting.

## Definitions

Interconnection Agreement - The agreement that identifies the conditions under which the Developer's generation system and equipment, will interconnect with, and operate in parallel with the NCEMC Participating Member's electric power system.

Meter – Revenue quality metering equipment that is installed and tested in accordance with applicable American National Standards Institute (ANSI) standards and all applicable regulatory requirements.

Point of Delivery - Point(s) on the Transmission Provider's System where capacity and energy transmitted by the Transmission Provider is delivered to the NCEMC Participating Member.

Point of Interconnection – The point where the Developer's interconnection facilities connect with the NCEMC Participating Member's electric power system as outlined in the applicable Interconnection Agreement.

Power Purchase Agreement – The agreement that identifies the conditions under which the Developer will sell the output of the generation system to NCEMC.

Qualifying Facility – A generator or generation system that meets the requirements of the Public Utility Regulatory Policies Act (PURPA) for certification as a QF.

## General Requirements

- A Meter shall be installed at the Point of Interconnection as shown in the Figures below.
- NCEMC's purchase of energy under the PPA and the NCEMC Participating Member's retail sales of energy to the QF may be metered separately.
- Locations with multiple generators operate under separate PPAs at a single Point of Interconnection will require separate metering for each PPA.

### Method 1

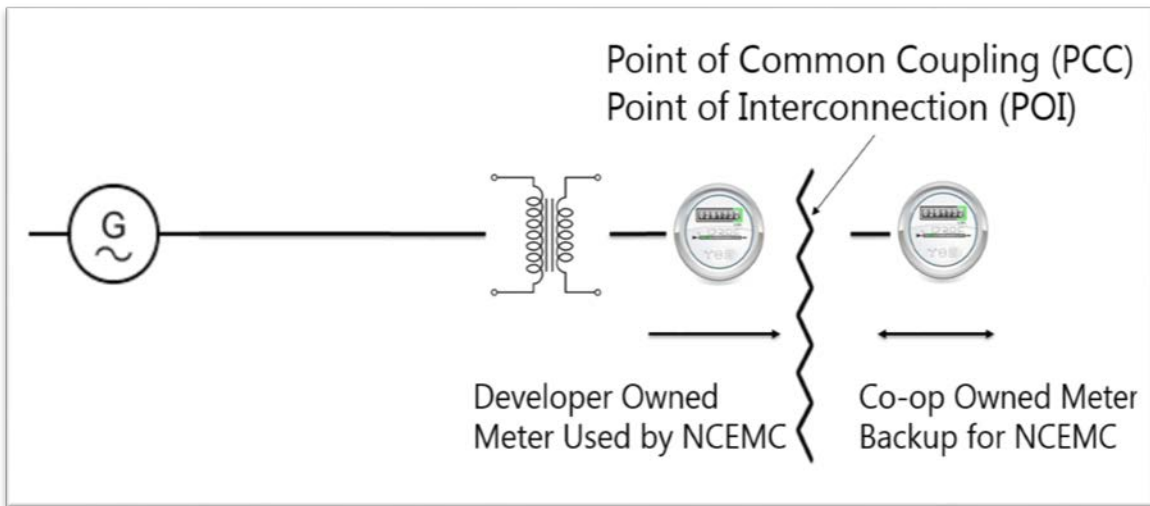


Figure 1 – Developer Owned Meter

### Method 2

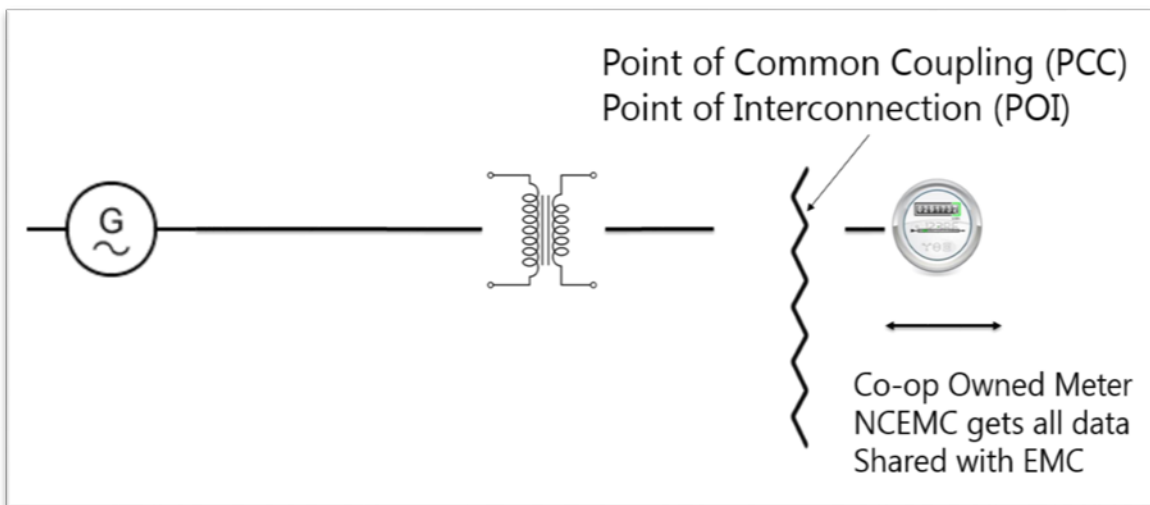


Figure 2 – Co-op Owned Single Meter Configuration

## Method 3

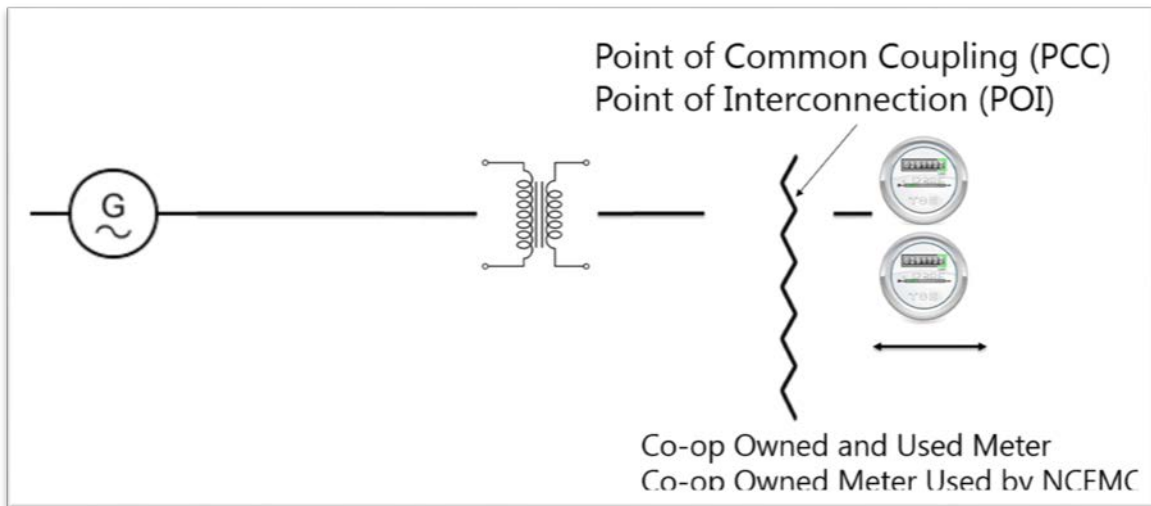


Figure 3 – Co-op Owned Dual Meter Configuration

## Project Specific Requirements

The following requirements assume the Developer will own, install, and maintain the Meter. The Developer may prefer that NCEMC's Participating Member instead own, install and maintain the Meter, but in such circumstances, these requirements remain applicable.

### Metering and Real-Time Telemetry Data Requirements

1. Developer will install an MV-90 compatible Meter. Attachment 4 contains a list of acceptable meters that is not all inclusive<sup>1</sup>.
2. Developer will make the following data available through Ethernet connection:
  - a. MV-90 protocol to be utilized by NCEMC for billing purposes (kWh). The Meter will be programmed for Eastern Standard Time.
  - b. DNP 3.0 protocol to be utilized by NCEMC for real-time data transmittal (kW & kVAR).
3. Developer will procure a Hoffman A30H2412GQRLP fiberglass cabinet ("NCEMC Communication Cabinet") and A30P24 subpanel. The Developer may propose an alternative box to NCEMC for consideration; this box shall be similar in size, construction, material, include a subpanel, and offer ability to be secured with a padlock.
4. Developer will install the NCEMC Communication Cabinet, including a 2' x 2' ground pad in front of the Cabinet connected to earth ground, either directly to a Developer owned pole located outside of the solar fence or mounted flush outside the fence around the project site in accordance with Attachment 2. Developer shall provide NCEMC unrestricted access to the NCEMC Communication Cabinet to monitor, maintain, and replace equipment in the NCEMC Communication Cabinet as necessary. Developer shall

<sup>1</sup> NCEMC recommends an SEL-735 meter to allow delivery of billing and real-time data from a single meter. This may help minimize the cost to the Developer, who may otherwise need to install an RTAC or RTU for real-time data transmittal.

coordinate with NCEMC for final location of the NCEMC Communication Cabinet prior to installation.

5. Developer will install conduits to the NCEMC Communication Cabinet as outlined in Attachment 1:
  - a. One 1-1/2" conduit from the location of Developer's station service to the NCEMC Communication Cabinet.
  - b. One 2" conduit from the Meter to the NCEMC Communication.
  - c. Where necessary, Developer will install one 2" conduit from the RTU (if the Meter is not capable of sending real-time data) to the NCEMC Communication Cabinet.
6. Developer will provide NCEMC with a 120V power circuit via the 1-1/2" conduit, terminating at a junction box with two outlet GFCI receptacles inside the NCEMC Communication Cabinet.
7. Developer will install a fiber optic cable with a minimum of six strands inside the 2" conduit. Developer will install ST connectors at both ends of the fiber optic cable. NCEMC typically uses a 62.5 multimode fiber with ST connects.
8. Developer will procure two B&B fiber converters in accordance with Attachment 3. Upon mutual agreement, NCEMC may be able to purchase the B&B fiber converters and furnish to the Developer for installation. Developer will reimburse NCEMC for the purchase of the B&B fiber converters.
9. Developer will install one B&B fiber converter inside the NCEMC Communication Cabinet and one B&B fiber converter at the location where billing and real-time data is transmitted.
10. NCEMC will procure and install communications equipment necessary to transmit and receive billing and real-time data from the site to NCEMC's office as outlined in Attachment 1.
11. Developer will complete the Metering and Real-Time Data Specification form in Attachment 6 and send it to NCEMC upon installation and programming of the Meter and real-time data equipment.
12. Developer will send NCEMC the certified third-party Meter calibration test report upon commissioning.
13. Upon commissioning, ownership and maintenance of the NCEMC Communication Cabinet and B&B fiber converters inside the NCEMC Communication Cabinet will be transferred to NCEMC. All other equipment, cabling, and wiring necessary to fulfill the above requirements will be maintained in good working order and repaired or replaced as necessary by the Developer.

### Transmission Provider Requirements

NCEMC's Transmission Provider may have additional requirements including but not limited to coordination of protective relay equipment, installation of a Transmission Provider owned meter or relaying components, or reprogramming the Point of Delivery meter to register reverse power flow.

NCEMC may be required to enter into agreements with Duke Energy Carolinas, Duke Energy Progress, or Dominion/PJM for the purposes of installing and maintaining metering, relay

protection, and other requirements to meet their Facility Interconnection Requirement (FIR) or Open Access Transmission Tariff (OATT).

### Project Costs

The Developer will be responsible for any costs associated with the above requirements. NCEMC's monthly administrative charge from the PPA is used to cover its ongoing costs, including maintenance of the NCEMC Communication Cabinet and communications circuit.

Upon completion of the communications installation, NCEMC will bill the Developer for the actual cost of the labor and materials necessary to fulfill these requirements. The Developer shall reimburse NCEMC by remitting payment of the invoice in accordance to the terms outlined on the invoice.

Should NCEMC incur any costs, either as a one-time or recurring charge from its Transmission Provider as a result of its requirements, NCEMC and/or its Participating Member will pass these charges along to the Developer.

### Information Timeline

#### Interconnection Agreement Execution

Upon execution of the Interconnection Agreement with the NCEMC Participating Member, the Developer will furnish the following information to NCEMC:

1. Preliminary Meter information from Attachment 6 (make and model of Meter).
2. Site drawings showing location of NCEMC Communication Cabinet and Meter.
3. Name and contact information (address, email, phone, and fax) of a person in charge who will be NCEMC's point of contact to establish site visit or communications regarding the project.
4. Name and contact information (address, email, phone, and fax) of the person who will be responsible for processing NCEMC's invoice for the reimbursement of the costs (materials and labor) to fulfill the metering and real-time telemetry requirements.
5. Name and contact information (address, email, phone, and fax) of a primary and back-up person who will be responsible for resolving operational issues with equipment and wiring during the term of the PPA.

Upon reviewing the initial information a site visit may be required to discuss the details of the project. This site visit may be held concurrently with the pre-construction meeting held with the NCEMC Participating Member.

Once NCEMC has sufficient information to determine how the metering and real-time telemetry data will be transmitted from the QF to NCEMC, NCEMC will present the Developer's person in charge with a Metering and Telemetry Requirements letter for review and execution. A draft Metering and Telemetry Requirements letter is provided in Attachment 5.

### Project Construction

Developer will keep NCEMC staff informed of the project progress and coordinate with NCEMC personnel during the installation of the Meter and real-time data equipment to ensure the timely installation of the communication equipment.

Developer will provide NCEMC with a copy of the certified third-party Meter calibration test report.

### Project Commissioning

NCEMC and Developer will verify that all of the requirements of the letter have been met and that NCEMC is able to receive billing and real-time data from the Developer's Meter 5 business days prior to the commercial operation date.



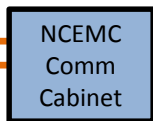
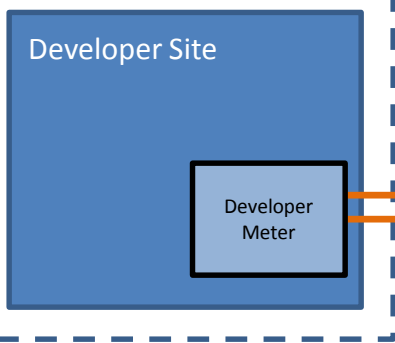
## Revision History

Approval Date	Rev. No.	Description of Change and/or Reason
3/20/15	0	Initial document
7/13/15	1	Add Attachment 3, Telecommunication cabinet typical cost to clarify the costs of the telecommunication cabinet and associated equipment and Attachment 4, Telemetry Diagrams for typical hourly metering and real-time telemetry communication circuit requirements
4/18/16	2	Revise language based on lessons learned, requirement of real-time data, and re-ordered attachment numbers. Addition of pole mounted cabinet to Attachment 2, new Attachment 3 B&B Fiber Converters, Attachment 5 Draft Requirements, and Attachment 6 Meter and Data Specifications. Removed specific telemetry costs Attachment.
1/12/17	2	Eratta change to remove extra meter from Figure 2
7/3/17	3	Added Disclaimer Section

## Attachment 1 – Communications Diagram

# Data and Electrical Diagram

## Meter Sends Real-Time and Billing Data



One, two inch conduits to be installed by the Developer between the Developer Meter and the NCEMC Communications Cabinet to be used as follows:

- 1) 6 strand fiber:
  - RX/TX Meter Register
  - RX/TX Meter Real-Time
  - RX/TX Spare
  
- 2) One, 1-1/2" conduit to be installed by the Developer between the Developer power source and the NCEMC Communication Cabinet to be terminated with 120 Volt source with 2 outlet GFCI receptacle.
  
- 3) One, two inch conduit to be installed by the Developer from equipment providing real-time data (if not supplied by the meter)

Ownership, set-up, maintenance and monitoring of the data path and associated equipment in the NCEMC Communication Cabinet at the site will be the responsibility of NCEMC. All material and labor costs will be billed to the Developer.

### Metering Requirements

- 1) MV-90 protocol through Ethernet port for billing/register (kWh)
- 2) DNP 3.0 protocol through Ethernet port for Real-Time data interrogation (kW and kVAR)
- 3) SEL 735 metering relay preferred
- 4) Metering will reflect power flow at the point of interconnection as specified in the Interconnection Agreement.

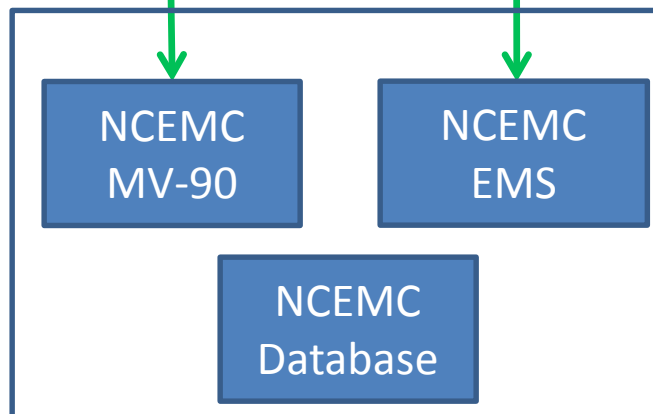
Fiber Data Path

NCEMC Data Path

\* NCEMC Communications Cabinet will be located outside of the Solar site fence at an agreed upon location between the meter and the road access point.

\*\* The Developer is responsible for installing all necessary conduit, fiber optic cable, fiber converters, and 120 volt power to the NCEMC Communications Cabinet

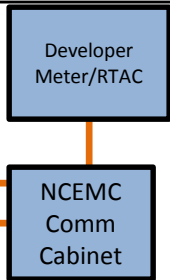
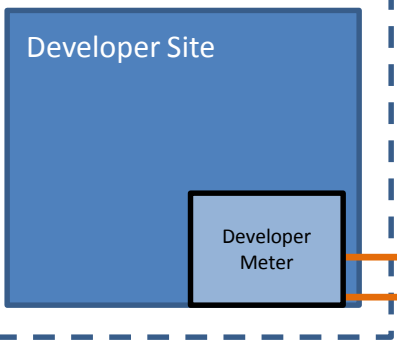
\*\*\* Maintenance and repair of the meter, conduits, fiber optic cables, and any necessary equipment within the solar site fence for purposes of data communications to NCEMC are the responsibility of the Developer.



Optional Web Services connection for Developer

# Data and Electrical Diagram

## Real-Time and Billing Data Sent From Multiple Devices



One, two inch conduits to be installed by the Developer between the Developer Meter and the NCEMC Communications Cabinet to be used as follows:

1) 6 strand fiber:

- RX/TX Meter Register
- RX/TX Meter Real-Time
- RX/TX Spare

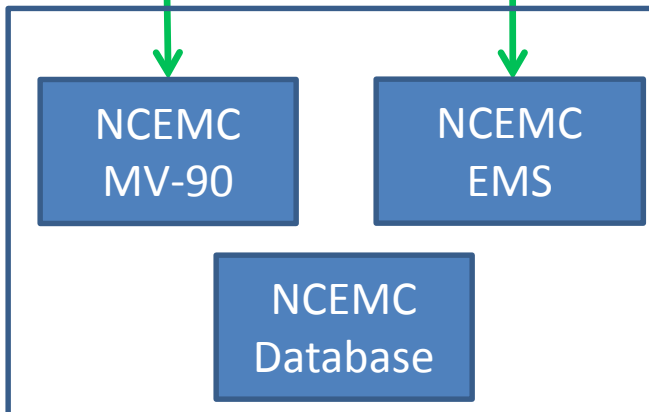
2) One, 1-1/2" conduit to be installed by the Developer between the Developer power source and the NCEMC Communication Cabinet to be terminated with 120 Volt source with 2 outlet GFCI receptacle.

3) One, two inch conduit to be installed by the Developer from equipment providing real-time data (if not supplied by the meter)

Ownership, set-up, maintenance and monitoring of the data path and associated equipment in the NCEMC Communication Cabinet at the site will be the responsibility of NCEMC. All material and labor costs will be billed to the Developer.

Fiber Data Path

NCEMC Data Path



Optional Web Services connection for Developer

### Metering Requirements

- 1) MV-90 protocol through Ethernet port for billing/register (kWh)
- 2) DNP 3.0 protocol through Ethernet port for Real-Time data interrogation (kW and kVAR)
- 3) SEL 735 metering relay preferred
- 4) Metering will reflect power flow at the point of interconnection as specified in the Interconnection Agreement.

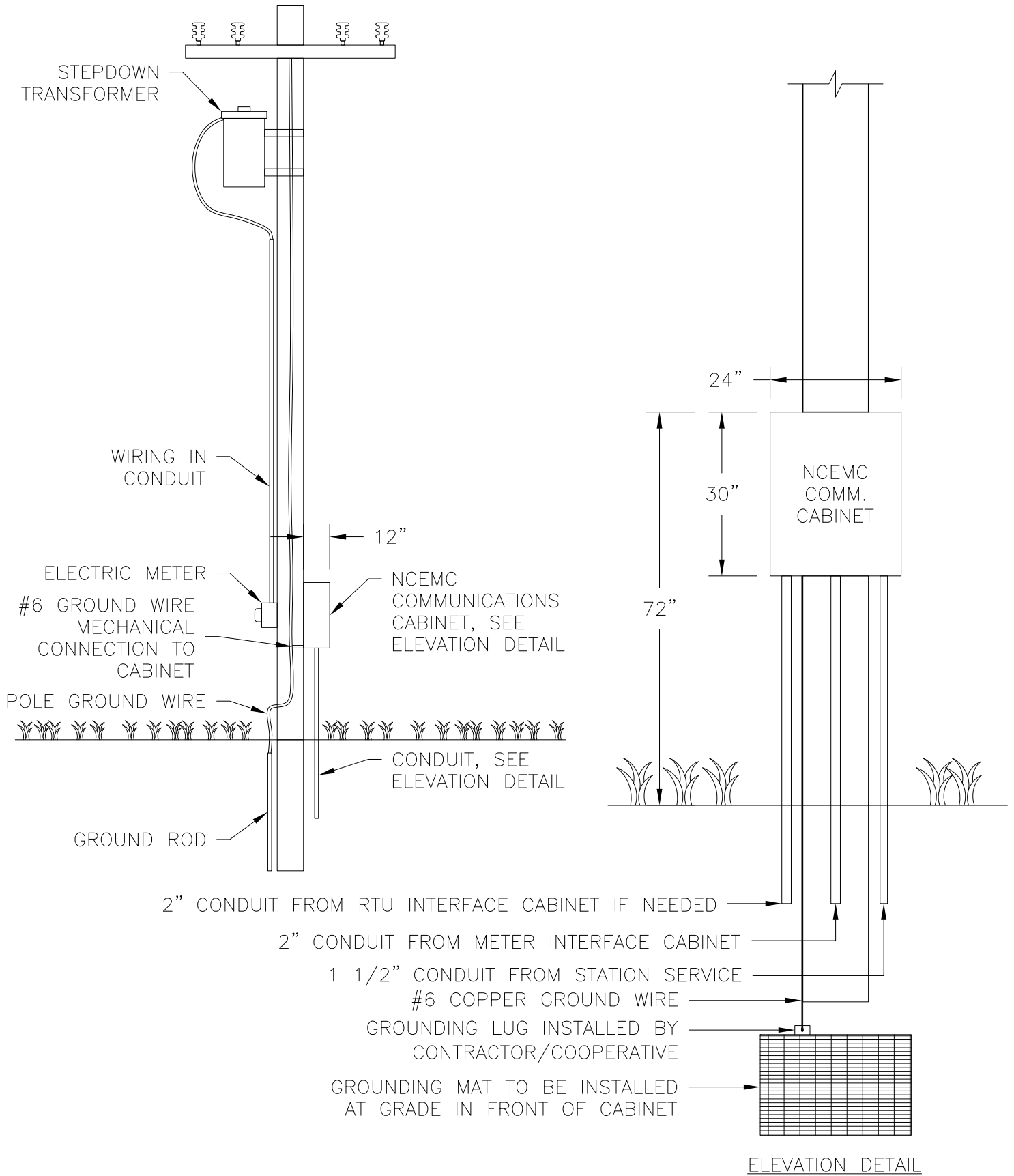
\* NCEMC Communications Cabinet will be located outside of the Solar site fence at an agreed upon location between the meter and the road access point.

\*\* The Developer is responsible for installing all necessary conduit, fiber optic cable, fiber converters, and 120 volt power to the NCEMC Communications Cabinet

\*\*\* Maintenance and repair of the meter, conduits, fiber optic cables, and any necessary equipment within the solar site fence for purposes of data communications to NCEMC are the responsibility of the Developer.

## Attachment 2 – NCEMC Communication Cabinet Specifications

X:\Power Supply Common\telemetry\NC Power Telemetry Project\Engineering\Cabinet Design CAD files\Communication Cabinet Pole Mount Installation.dwg



- 2" CONDUIT FROM RTU INTERFACE CABINET IF NEEDED
  - 2" CONDUIT FROM METER INTERFACE CABINET
  - 1 1/2" CONDUIT FROM STATION SERVICE
  - #6 COPPER GROUND WIRE
  - GROUNDING LUG INSTALLED BY CONTRACTOR/COOPERATIVE
  - GROUNDING MAT TO BE INSTALLED AT GRADE IN FRONT OF CABINET
- ELEVATION DETAIL

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MEMBERSHIP CORPORATION

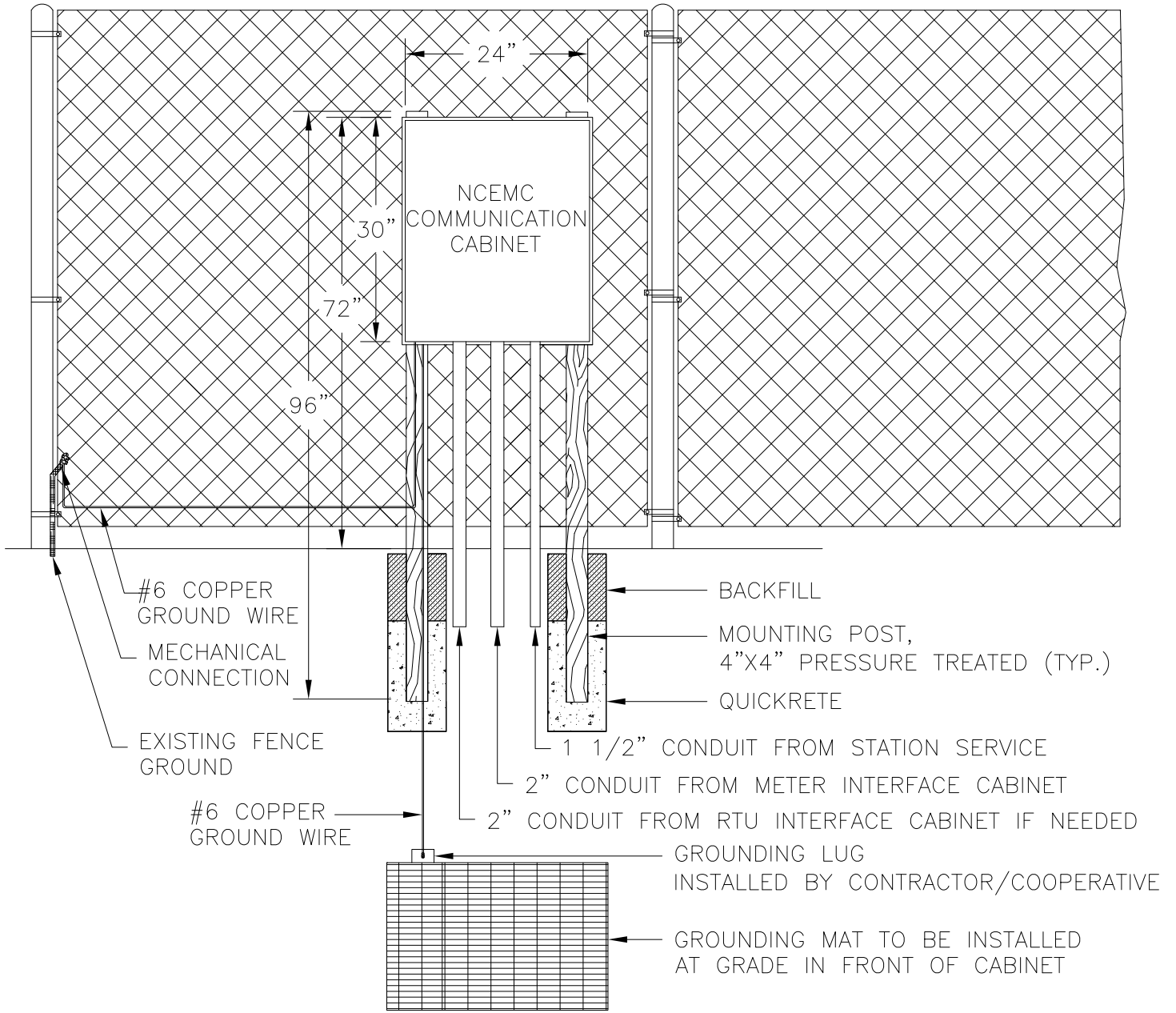
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TELEMETERING

TYPICAL NCEMC  
COMMUNICATION CABINET  
POLE MOUNT INSTALLATION



**NOTES:**

1. CABINET SPECIFICATIONS MAY CHANGE FOR NCEMC OWNED METER.
2. CABINET SHALL BE MOUNTED FLUSH OUTSIDE THE FENCE AROUND SUBSTATION/SOLAR PV SITE.

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MEMBERSHIP CORPORATION

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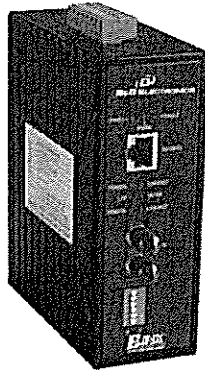
TELEMETERING

TYPICAL NCEMC  
COMMUNICATION CABINET  
SUBSTATION INSTALLATION

## Attachment 3 – B&B Fiber Converter Specifications



## Hardened Compact Media Converter

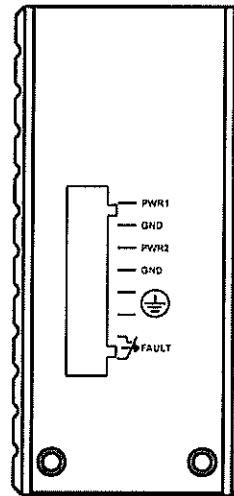


This quick installation guide describes how to install and use the hardened compact Media Converter. Capable of operating at temperature extremes of -40 to +75°C, this is the media converter of choice for harsh environments constrained by space.

### Physical Description

Terminal Block and Power Inputs

Terminal Block Assignment	
PWR1	Power input 1 (10 to 48VDC)
GND	Power Ground
PWR2	Power input 2 (10 to 48VDC)
GND	Power Ground
	Earth Ground
	1. The relay opens if PWR1 or PWR2 fails 2. The relay opens if the Port Link is Down (When the Link Down Alarm is Enabled)



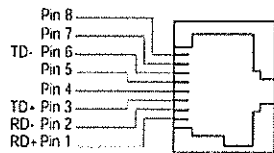
While only one power source is required to power up the media converter, two power sources offer redundancy for those mission critical applications. (PWR1 and PWR2)

The terminals labeled Fault are connected to a dry contact. The dry contact is normally closed when either power source is connected and active. When no power is applied, the dry contact is normally open.

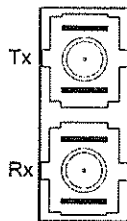
### 10/100BaseTX and 100BaseFX Connectors

10/100BaseTX Connections:

Pin	Regular Ports	Uplink Port
1	Receive Data + (input)	Transmit Data + (output)
2	Receive Data - (input)	Transmit Data - (output)
3	Transmit Data + (output)	Receive Data + (input)
4	NC	NC
5	NC	NC
6	Transmit Data - (output)	Receive Data - (input)
7	NC	NC
8	NC	NC



100BaseFX Connections:



The Tx (transmit) port of device 1 is connected to the Rx (receive) port of device 2, and the Rx (receive) port of device 1 to the Tx (transmit) port of device 2.

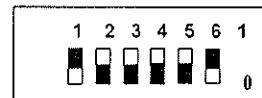
### LED's and DIP Switch

LED Status:

LEDs	State	Indication
FAULT	Steady	Power or ports function abnormally
	Off	Power and ports function normally
PWR1 PWR2	Steady	Power on (PWR stands for POWER)
	Off	Power off
10/100	Steady	100Mbps network connection
	Off	10Mbps network connection
LFP	Steady	LFPT function enabled
	Off	LFPT function disabled
LNK/ACT	Steady	Network connection established(LNK stands for LINK)
	Flashing	Transmitting or receiving data(ACT stands for ACTIVITY)
	Off	Neither a network connection established nor transmitting/receiving data
FDX/COL	Steady	Connection in full duplex mode(FDX stands for FULL-DUPLEX)
	Flashing	Collision occurred(COL stands for COLLISION)
	Off	Connection in half-duplex mode

DIP Switch Settings:

Pos.	Down(0)	Up(1)
1	Disable Link-fault-pass-through	Enable Link-fault-pass-through
2	RJ45 Auto Negotiation Enabled	RJ45 Forced Mode
3	RJ45 Forced to 100Mbps	RJ45 Forced to 10Mbps
4	RJ45 Forced to Full Duplex	RJ45 Forced to Half Duplex
5	Fiber Forced to Full Duplex	Fiber Forced to Half Duplex
6	Disable Link Down Alarm	Enable Link Down Alarm



**Link-fault-pass-through**

**Link-Fault-Pass-Through Overview**

When two Media Converters are connected via their fiber ports

**Link Fault of the FX port:**

A Link Fault condition will be sensed on the RJ45 port whenever the media converter detects a Link Fault condition on the Fiber port. (The 10/100, LNK/ACT, and FDX/COL LED's will be off.)

**Link Fault of the TX port:**

The Media Converter A: A Link Fault condition will be sensed on the FX port whenever the media converter detects a Link Fault condition on the TX port. Thus, the 100, LNK/ACT, and FDX/COL LEDs of the TX port of the Media Converter A would be off.

The Media Converter B: A Link Fault condition will be informed to the FX port of the Media Converter B. Then a Link Fault condition will be sensed on the TX port of the Media Converter B whenever the Media Converter B detects a Link Fault condition on the FX port. Thus, the 100, LNK/ACT, and FDX/COL LEDs of the Media Converter B would be off.

Link Fault of the FX Port						
		TX Port			FX Port	
LEDs	PWR	100	LNK/ACT	FDX/COL	LNK/ACT	FDX/COL
Media Converter A	ON	OFF	OFF	OFF	OFF	OFF
Media Converter B	ON	OFF	OFF	OFF	OFF	OFF

Link Fault of the TX port of the Media Converter A						
		TX Port			FX Port	
LEDs	PWR	100	LNK/ACT	FDX/COL	LNK/ACT	FDX/COL
Media Converter A	ON	OFF	OFF	OFF	ON	ON
Media Converter B	ON	OFF	OFF	OFF	OFF	OFF

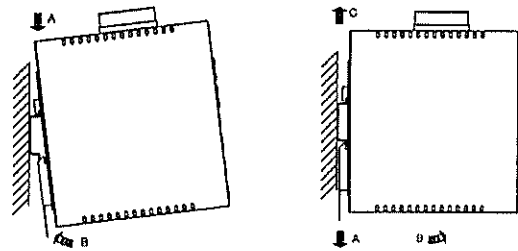
**Functional Description**

- Meets NEMA TS1/2 Environmental requirements such as temperature, shock, and vibration for traffic control equipment.
- Meets IEC61000-6-2 EMC Generic Standard Immunity for industrial environment.
- One channel media converter between 10/100BaseTx and 100BaseFx
- Support 802.3/802.3u/802.3x Auto-negotiation: 10/100Mbps, Full/half-duplex, Auto MDI/MDIX
- 100BaseFX: Multi mode SC or ST type; Single mode SC type.
- DIP switch for configuring link-fault-pass-through, fixed speed, full/half duplex and link down alarm
- Store-and-forward mechanism
- Non-blocking full wire-speed forwarding rate
- Support broadcast storm filtering
- Back-pressure & IEEE 802.x compliant flow control
- Alarms for power failure by relay output.
- Redundant 10-48 VDC terminal block power inputs.
- Supports DIN-rail mounting installation.
- Front panel LED status.
- Field Wiring Terminal: Use Copper Conductors Only, 60/75°C, 12-24 AVG torque value 7 lb-in.
- -40°C to 75°C (-40°F to 167°F) operating temperature range. Tested for functional operation @ -40°C to 85°C (-40°F to 185°F). UL1604 Industrial Control Equipment certified Maximum Surrounding Air Temperature @ 74°C (165°F).

- Supports DIN-rail or Panel Mounting installation.
- UL1604 Class I, Division 2 Classified for use in hazardous locations (Applicable to versions with Terminal Block power option).
- This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D OR non-hazardous locations only.
- WARNING – EXPLOSION HAZARD – Do not disconnect equipment unless power has been removed or the area is known to be non-hazardous.
- WARNING – EXPLOSION HAZARD – Substitution of components may impair suitability for Class I, Division 2.

**Assembly, Startup, and Dismantling**

- Assembly: Place the media converter on the DIN rail from above using the slot. Push the front of the media converter toward the mounting surface until it audibly snaps into place.
- Startup: Connect the supply voltage to start up the media converter via the terminal block.
- Dismantling: Pull out the lower edge and then remove the media switch from the DIN rail.



**Specifications**

Applicable Standards	IEEE 802.3 10BaseT, IEEE 802.3u 100BaseTX & 100BaseFX
Fixed Ports	(1) TX port, (1) FX port
Speed	10BaseT: 10/20Mbps for half/full-duplex 100BaseTX/FX: 100/200Mbps for half/full-duplex
Switching Method	Store-and-Forward
Forwarding rate	14,880/148,800pps for 10/100Mbps
Cable	10BaseT: 2-pair UTP/STP Cat. 3, 4, 5 up to 100m 100BaseTX: 2-pair UTP/STP Cat. 5 up to 100m 100BaseFX: MMF (50 or 62.5um), SMF (9 or 10um)
LED Indicators	Per Unit - PWR1, PWR2, FAULT, LFP Per Port - TX: LNK/ACT, FDX/COL, 100 FX: LNK/ACT, FDX/COL
Dimensions	2 x 4.3 x 5.4 in. (5 x 11 x 13.6cm)
Weight	0.6 Kg
Power	Terminal Block: 200mA @ 24VDC, 10-48VDC
Power Consumption	4.8W Max.
Operating Temperature	-40°C to 75°C. Tested for functional operation at -40°C to 85°C. UL1604 Industrial Control Equipment certified Maximum Surrounding Air Temperature @ 74°C.
Storage Temperature	-45°C to 93°C
Humidity	10 to 95%, non-condensing
Safety	Hazardous locations: Class I, Division 2 group A, B, C & D
Emissions	FCC Part 15, Class A EN61000-6-3, EN61000-6-2
<b>Standards</b>	
ESD Standard (EN61000-4-2)	
Radiated FRI Standards (EN61000-4-3)	
Burst Standards (EN61000-4-4)	
Surge Standards (EN61000-4-5)	
Induced RFI Standards (EN61000-4-6)	
Magnetic Field Standards (EN61000-4-8)	
Voltage Dips Standards (EN61000-4-11)	
Environmental Test Compliance:	
Vibration Resistance (IEC 60068-2-6 Fc)	
Shock (IEC 60068-2-27 Ea)	
Free Fall (IEC 60068-2-32 Ed)	
NEMA TS1/2 Environmental requirements for traffic control equipment	

## Attachment 4 – MV-90 Supported Meters

# MV-90 xi & MVLT xi

## Devices Supported List

14-Aug-2015



Vendor	Devices	TIM	Type	Probe Support	Decode Support
American Innovations	EMM 330	EMM	Electric		
Ametek	EXJ register w/ JEM1	EXJ	Electric	Yes	
Ametek	JEM10	JM10	Electric	Yes	
Ametek	JEM10 for Saudi Arabia	J10D	Electric		
Ametek	JEM2 with ASCII protocol	JE2A	Electric	Yes	
Ametek	JEM2 with Binary protocol	JE2B	Electric	Yes	
Ametek	JEMSTAR and Ci20 meter	JMST	Electric	Yes	Yes
Ametek	JEMStar II	JST2	Electric	Yes	
Ametek	JR1	JR1	Electric		
Ametek	JR1 w/ RTS -CTS Flow Control (NIPCO)	JR1F	Electric		
AMPY (Email Metering)	A-11L Meter	A11L	Electric	Yes	
AMPY (Email Metering)	EM3300 Meter	EM33	Electric	Yes	
AMPY (Email Metering)	Email Model A11 Meter	EA11	Electric	No	
AMPY (Email Metering)	Email P1 Meter	EMP1	Electric	Yes	
AMPY (Email Metering)	Email P1 Single Phase Meter	EMAL	Electric	No	
AMPY (Email Metering)	Q3, Q4 Meter	EMQ4	Electric	Yes	
Aptech	403 load control firmware, E-ICT WebRTU	ATC4	Electric	Yes	
Aptech	804 recorder (PSI Sentry 100 clones)	ATC1	Electric	Yes	
Aptech	804 test mode firmware	ATC3	Electric	Yes	
Aptech	804 timed relay control	ATC2	Electric	Yes	
Austin International	Sentry 200 Sentry 300 EG	PSI2	Electric		
Austin International	Vision 20 Meter	VS20	Electric	Probe Only	
Bristol Babcock	Total Flow	BBTF	Gas		
CEWE	Prometer 2243	CEWE	Electric	Yes	
CEWE	Prometer R	CPM2	Electric	Yes	Yes
Daniels	Solarflow Plus 2470, 2480	SOLF	Gas	Yes	
DataWatt	Datawatt D15	D15	Electric		
DataWatt	Datawatt D17	DWAT	Electric	Yes	
DataWatt	MidiElcor	ELCR	Gas		
Domestic Automation	LINC	LINC	Electric	Yes	
Dresser ROOTS	Micro PTZ+ Log Meter	MPTZ	Gas	No	
Dresser ROOTS	MicroCorrector	PTZ2	Gas		
Eagle Research	PAT2, PAT4, AE2000, AE5000, AE6000, XARTU, MPPlus	AE	Gas	Yes	
ED&A	HPC Datalogger	HPC	Electric	No	
EDMI	MK10 (Atlas Meter)	EDMX	Electric	Yes	
EDMI	MK2 System 2000-01xx Energy Meter and MK3 System 2000-04xx Energy Meter	EDM	Electric	Yes	
EDMI	MK6 System 2000 (Genius Energy Meter)	EDM6	Electric	Yes	
Electro Industries	Futura	EIF	Electric		
Electro Industries	Nexus 1250 and 1270 series meters	NEXS	Electric	Yes	
Electro Industries	Nexus 1252/1262, 1272, and 1500 series meters	NEX2	Electric	Yes	Yes
Electro Industries	Shark 200	SHK2	Electric	No	Yes
Elgama Elektronika Lithuania	EPQS	EG21	Electric	Yes	Yes
Elgama Elektronika Lithuania	EPQS	EG31	Electric	Yes	Yes
Elspec	Blackbox G4410, G4420 and G4430	ELG4	Electric	No	
Elster	A3 Alpha, A1800 IEC meter, A3 WIC (probe)	A3, A3P	Electric	Yes	Yes
Elster	A3 WIC -- MV-90 xi Remote only	A3IP	Electric	No	Yes
Elster	Alpha meter (A1), EMF-2460	ALPH	Electric	Yes	Yes
Elster	Alpha PowerPlus Meter (A2)	ALPP	Electric	Yes	Yes
Elster	EMF registers in 25xx & 26xx families	EMF	Electric	Yes	
Elster	IEC Alpha Meter	ALPI	Electric	Yes	
Elster	REX Universal Meter - WIC Remote Only	REXW	Electric	No	Yes
Elster Germany	A140, A120	A140	Electric	Yes	
Elster Germany	AEM500, A1350, A1500, A2500, and A(S)220	A500	Electric		Yes
Elster Germany	AS1440	AS14	Electric	No	Yes
Elster UK	Alpha Vision meter (A1700)	VISI	Electric	Yes	Yes
Elster UK	AS230	A230	Electric	Yes	Yes
Elster UK	Elster A1120 and the A1140 Meters	VI40	Electric	Yes	Yes
Elster UK	OPUS Family of Outstations	OPUS	Electric	Yes	
Elster UK	PPM Polyphase Programmable Meter	GECP	Electric		
Elster UK	PPM Polyphase Programmable Meter Issue2	GEC2	Electric		
EMH - Elektrizitätszähler GmbH & Co KG	LZQJ-XC meters dlms/ COSEM protocol	LZQ	Electric	Yes	Yes
EMH - Elektrizitätszähler GmbH & Co KG	LZQJ-XC meters VDEW w 62056-021 protocol	LZQ2	Electric	Yes	Yes

# MV-90 xi & MVLT xi

## Devices Supported List

14-Aug-2015



Vendor	Devices	TIM	Type	Probe Support	Decode Support
EMON (MeterSmart)	8 channel I-MON and 3 channel PRO-MON	EMON	Electric		
Energy Intellect	Energy Intellect VM Series Meter	VM	Electric	Yes	Yes
Energy Intellect	TM, TMA	TML	Electric	Yes	
Enermet	MT30E, MT40, E700, E200 and E600	ENMT	Electric	Yes	Yes
Equimeter	EC3000 Autocorrector/NexCorr	ACOR	Gas	Yes	
Equimeter	Electrocorrector P & T	EQM	Gas	Yes	
Fisher (Emerson Process Management)	FloBoss107	F107	Gas	No	
Fisher (Emerson Process Management)	ROC 300 series, FloBoss 407 and 500 series	FROC	Gas	No	
Flonidan	UNIFLO 1200	FUNI	Gas	No	
Galvanic Applied Sciences	EVC, EPR, ER, and IDR devices	GAL	Gas	No	
GE	DR87, DR87/1, DR87/2	DR87	Electric	Yes	
GE	GE TMx and TMRx meters, L&G DCx meters (Tx8x, Tx9x)	TMR	Electric	Probe Only	Yes
GE	I210	I210	Electric	Yes	Yes
GE	kV (a.k.a. kV96) meter	KV	Electric	Yes	Yes
GE	kV2, kV2c, kV2c+, kV2ce, kV2cs, SM300	KV2	Electric	Yes	Yes
GE	Phase 3 (KRC-901, KTC-901, KM-901), EV and ES Meter	PH3	Electric	Yes	Yes
Instromet	999 and 555 Corrector	I999	Gas		
Intellimeter	Meter Data Collection System Webservice	MDCS	Electric	No	
Iskraemeco	MT372/MT375	M372	Electric	Yes	
Iskraemeco	MT420/ME420	M420	Electric	Yes	
Iskraemeco	MT85x	M851	Electric	Yes	
Iskraemeco	MT880 & MT38x	MT88	Electric	Yes	Yes
Iskraemeco	POREG2	ISK2	Electric	Yes	
Iskraemeco	POREG4	ISK4	Electric	Yes	
Itron	200 Series (MT200 & MTR200) and Centron	M200	Electric	Yes	
Itron	CENTRON II	CEN2	Electric	Yes	Yes
Itron	CENTRON Image	CENT	Electric	Yes	Yes
Itron	Datastar Recorder, L&G DG100's	SANG	Electric	Yes	
Itron	EM211 Meter	EM21	Electric	Probe Only	Yes
Itron	Fulcrum	FULC	Electric	Yes	Yes
Itron	Indigo+ International	INDI	Electric	Yes	
Itron	Indigo+ Meter	INDP	Electric	Yes	
Itron	OpenWay CENTRON Cellular Meter -- MV-90 xi remote only	CENI	Electric	No	Yes
Itron	OpenWay CENTRON, CENTRON Bridge, CENTRON II Cellular (probe)	OWC	Electric	Probe Only	Yes
Itron	PXA-5 /R	PXAR	Electric	Yes	
Itron	Q1000	Q1K	Electric	Yes	Yes
Itron	Quantum	QNTM	Electric	Yes	
Itron	Quantum w/ QDIF Board	QDIF	Electric	Yes	
Itron	Sentinel	STLP	Electric	Yes	Yes
Itron	SEVC-D	SEVC	Gas	Yes	
Itron	SL7000, ACE6000, ACE7000 & ACE8000	SL7K	Electric	Yes	Yes
Itron	Spectra A12E recorder	SPEC	Electric	Yes	
Itron	SQ400	SQ4	Electric	Yes	
Itron	TIM Itron/Actaris CORUS gas volume converter (MID)	CORS	Gas	Yes	Yes
Itron	Vectron	VTRN	Electric	Yes	Yes
Kamstrup	UNIGAS and UNILOG devices	KUNI	Gas	No	
Kenda	Medo Outstation device	MED	Electric		
Kenda	Meteor Outstation device	MTR	Electric		
Landis+Gyr	Clone of PSI Sentry 100	LNG1	Electric	Yes	
Landis+Gyr	Clone of PSI Sentry 100 with timed relay	LNG2	Electric	Yes	
Landis+Gyr	CTR101 & 102 registers	CTR	Electric		
Landis+Gyr	DXR	DXR	Electric	Yes	Yes
Landis+Gyr	E650 S4X	S4X	Electric	Probe Only	Yes
Landis+Gyr	EM5400 meter	EM54	Electric	Yes	Yes
Landis+Gyr	Focus AX and RX ANSI meter	FOCS	Electric	Yes	Yes
Landis+Gyr	RXR S3, AXR & RXR S4, ZMC, SSM-4, Altimus	RXR	Electric	Yes	Yes
Landis+Gyr	S4E ANSI Meter	S4E	Electric	Yes	Yes
Landis+Gyr	Sentry 100	PSI1	Electric	Yes	
Landis+Gyr	Sentry 100 w/ load control firmware	PSI4	Electric	Yes	
Landis+Gyr	Sentry 200	PSI2	Electric	Yes	
Landis+Gyr	Sentry 200 w/ test mode firmware	PSI3	Electric	Yes	

# MV-90 xi & MVLT xi

## Devices Supported List

14-Aug-2015



Vendor	Devices	TIM	Type	Probe Support	Decode Support
Landis+Gyr	Sentry 200/EXP & QUAD4 & alpha cust id	EXPA	Electric		
Landis+Gyr	Sentry 200/EXP recorder, Quad 4+, MAXsys 2410, 2510, and Elite	EXP	Electric	Yes	
Landis+Gyr	U1200, S1200	LGUA	Electric	Probe Only	
Landis+Gyr Zug	7ED62	7E62	Electric		
Landis+Gyr Zug	EMT - 21xx & FCM3	FCM	Electric	Yes	
Landis+Gyr Zug	FAF -11/12/21.2/22	FAF	Electric	Yes	
Landis+Gyr Zug	FAG Meter	FAG	Electric	Yes	
Landis+Gyr Zug	FBC meter	FBC	Electric	Yes	
Landis+Gyr Zug	FCL /1	FCL	Electric	Yes	
Landis+Gyr Zug	FCR meter	FCR	Electric	Yes	
Landis+Gyr Zug	METCOM3 Modem	MET3	Electric		
Landis+Gyr Zug	ZMB/EKM through L&G METCOM2 Modem	MET2	Electric		
Landis+Gyr Zug	ZxD, ZxQ, ZxG Meters DLMS/ COSEM device	ZMD	Electric	Yes	Yes
LG Industrial Systems	LGRW34 Meter	LGIS, LGS2	Electric	Yes	
Mercury	EC-AT, MINI-AT, MINI-MAX, MINI-MAX-AT, MPA and ER	MERB	Gas	Yes	
Metretek	Commercial Pulse Accumulator	CPA	Gas		
Metretek	SIP, IMU, and IMU2	SIP	Gas		
Metretek	SMOD (for SMOD versions before '93)	MTEK	Gas	Yes	
Metscan/Itron	CID 30	MCID	Gas		
Metscan/Itron	CMD2000	MCMD	Gas		
Metscan/Itron	RMD 4.0LP	MRMD	Gas		
MiM (Malaysian Intelligence Meters)	Smart Anti Tamper meter	MIM	Electric	Yes	Yes
Misa	Miestro-3 (dlms)	MIE3	Electric	Yes	Yes
Misa	Miestro-CT	MIES	Electric	Yes	Yes
Mitsubishi	MX2	MX2	Electric	Yes	Yes
Nilsen	EMS2600e, 26FRC	NL26	Electric	Yes	
PRI	CALMU3 LINK	LINK	Electric	Yes	
PRI	CALMU3, CALMU3+, Sprint, and Premier meters	CMU3	Electric	Yes	
PRI	Premier meters supporting PACT, PAKNET, LBP, and PACT+	CMUX	Electric	Yes	
Quadlogic	Quadlogic Series 5 Transmitters, MiniClosets and Transponders	QLS5	Electric		
Reynolds	323 LVC, XVC Volume Corrector	RLVC	Gas		
Reynolds	In-line 841, 881r	INLI	Gas	Yes	
Reynolds	Recor 843 using Meter number for ID	RECM	Gas	Yes	
Reynolds	Recor 843 using serial number for ID	RECR	Gas	Yes	
Reynolds	Reynolds RVC /HVC Series Volume Correctors	RRVC	Gas	No	
Robinton/ Aptech	LPR	LPR	Electric	Yes	
SATEC	EM920	EM92	Electric	Yes	Yes
SATEC	PM172E	SATC	Electric	No	
SATEC	PM174, PM175, PM180	P174	Electric	No	Yes
Schneider Electric (Power Measurements/Square-D)	ION 7300, 7330, 7350, 7500, 7550, 7600, 7650, 7700, 8300, 8400, 8500, 8600, 8650, 8800	ION	Electric	Yes	Yes
Schweitzer Engineering Labs (SEL)	SEL-734 meter using the Modbus protocol	S734	Electric	Yes	
Schweitzer Engineering Labs (SEL)	SEL-734 meter using the SEL ASCII protocol	734A	Electric		
Schweitzer Engineering Labs (SEL)	SEL-735 meter using the SEL ASCII protocol	735A	Electric		
Scientific Columbus	Scientific Columbus JEM-II (ASCII protocol)	JE2W	Electric	No	
Sensus	Sensus iCON APEX	IAPX	Electric	Yes	Yes
Siemens UK	CM32 Outstation	CM32	Electric	No	
Siemens UK	S4S register	S4S	Electric	Yes	
Siemens/Dietrich	MBUS	MBUS	Electric		
Siris	50G Gas Recorder	S50G	Gas	No	
SmartNet	Mk2 PIM and PIM3	SNMT	Electric	Yes	Yes
Square D (Schneider Electric)	CM2350 Circuit Monitor	SQD	Electric		
Strike Technologies	ENERMAX meter	EMX	Electric		
Strike Technologies	ENERMAX+	EMXP	Electric	Yes	Yes
Teldata/ First Point	AC4, DC4, TDS-4M, TDS-2	TLDT	Gas		
Telecontrols	Optimodem	OPM	Electric		
Transdata	EMS-99, EMS-96 and MARK V, SSR6000 Recorder	EMS	Electric	Yes	Yes
Trilliant Networks/ Nertec Design	TL402 Telereader	TL4	Gas	No	
Westinghouse	EWR with Bubble Memory	EWR1	Electric		
Westinghouse	SPRITE recorder	SPRI	Electric	Yes	
Zaptronix	Model ZAP03BE	IMS	Electric		
ZIV	SCT series	SCTX	Electric	Yes	Yes

## Attachment 5 – Draft Metering and Telemetry Requirements Letter

[Developer Person In Charge Last Name]

1

[Date]

[Date]

[Developer Person In Charge Name]

[Developer Person in Charge Title]

[Developer]

[Developer Person In Charge Mailing Address]

**RE: North Carolina Electric Membership Corporation (NCEMC) Metering and Telemetry Requirements for [REDACTED] Project**

Dear [Person In Charge Name]:

This letter is intended to supplement the [REDACTED] Power Purchase Agreement (PPA) executed between NCEMC and [Developer Holding Company] to outline NCEMC's requirements to meet Section [REDACTED]. References below to the Developer refer either to [Developer] or [Developer Holding Company] or both, depending upon how [Developer] and [Developer Holding Company] have allocated responsibilities.

**Material Installation for Metering and Real-time Data**

[Restatement of requirements and any special project requirements]

**Billing**

NCEMC estimates the cost for materials and labor related to fulfill its requirements above will be \$\_,000. NCEMC will bill the Developer for the actual cost of the labor and materials necessary to fulfill the above requirements by sending the final bill:

[Developer Billing Contact]

[Developer]

[Developer Billing Contact Address]

[Developer Billing Contact E-mail Address]

[Developer Billing Contact Phone Number(s)]

Developer agrees to reimburse NCEMC by remitting payment of the invoice in accordance to the terms outlined on the invoice.



[Developer Person In Charge Last Name]

2

[Date]

### **Installation**

NCEMC's contact for the installation of the communications equipment:

[NCEMC Installer]

North Carolina Electric Membership Corporation  
3400 Sumner Boulevard  
Raleigh, NC 27616

[NCEMC Installer E-mail Address]

[NCEMC Installer Phone Number(s)]

To ensure accurate configuration of the meter and real-time data into our SCADA the Developer will need to provide NCEMC with the information in the Metering and Real-Time Data Specifications document.

### **Operational Issues**

Upon commissioning of the project during the PPA term, should NCEMC need to contact the Developer regarding but not limited to operational issues with equipment and wiring used to communicate to the Meter, the following is the Developer's contact:

[Developer Operational Contact]

[Developer]

[Developer Operational Contact Address]

[Developer Operational Contact E-mail Address]

[Developer Operational Contact Phone Number(s)]

[Developer Operational Backup Contact]

[Developer]

[Developer Operational Backup Contact Address]

[Developer Operational Backup Contact E-mail Address]

[Developer Operational Backup Contact Phone Number(s)]

Developer agrees to make a good faith effort to resolve operational issues within three (3) business days. Should the Developer determine that additional time is needed, Developer shall contact NCEMC's billing department contact below to describe the nature of the problem and provide an estimate of when the issue will be resolved:

[NCEMC Billing Analyst]

North Carolina Electric Membership Corporation  
3400 Sumner Boulevard  
Raleigh, NC 27616

[NCEMC Billing Analyst E-mail Address]

[NCEMC Billing Analyst Phone Number(s)]

[Developer Person In Charge Last Name]

[Date]

If you have any questions, please feel free to contact me at (919) 875-3124. If these requirements are acceptable please acknowledge by signing and returning a copy of this letter to my attention.

Sincerely,

[NCEMC Staff]  
[NCEMC Staff Title]

- Attachments:  
Communications Diagram.pdf  
Communications Cabinet.pdf  
B&B Fiber Converter Specifications.pdf  
Metering and Real-Time Data Specifications.pdf

cc:

Agreed to by:

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_

Company: \_\_\_\_\_

Date: \_\_\_\_\_

Project: \_\_\_\_\_ Project

## Attachment 6 – Metering and Real-Time Data Specifications

# Project

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## Metering and Real-Time Data Specifications

NCEMC uses a master DNP address of 1 which cannot be changed. To ensure accurate configuration of the meter and real-time data into our SCADA the following information in Sections 1-3 are needed from the Developer.

### Section 1

<b>Billing</b>									
Meter Manufacturer and Model									
Meter Serial Number									
Meter Wiring Method (Form 5,9 or 36)									
CT Ratio									
PT Ratio									
Is CT and PT Ratio set in the Meter	Yes <input type="checkbox"/> No <input type="checkbox"/>								
Full Scale Value	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Watt</th> <th style="padding: 5px;">Volt</th> <th style="padding: 5px;">Amp</th> </tr> </thead> <tbody> <tr> <td style="height: 20px;"></td> <td style="height: 20px;"></td> <td style="height: 20px;"></td> </tr> </tbody> </table>			Watt	Volt	Amp			
Watt	Volt	Amp							
Meter Multiplier									
Pulse Multiplier									
Meter Constant									
Meter Password (read only)									
Intervals Per Hour									
Verify that Meter does not follow DST and set to Eastern Standard Time	Yes <input type="checkbox"/> No <input type="checkbox"/>								
Meter Channel for kW delivered to NCEMC (to be furnished by NCEMC)	Channel 1								
Meter Channel for kVAR delivered to NCEMC (to be furnished by NCEMC)	Channel 3								
Meter Channel for kW received to Project (to be furnished by NCEMC)	Channel 2								
Meter Channel for kVAR received to Project (to be furnished by NCEMC)	Channel 4								

## Section 2

Real-Time Data	
Communication Manufacturer and Model	
Real-time Port Number (default 20000)	
DNP Address (to be furnished by NCEMC)	
DNP Map	

## Section 3

Name and contact information for NCEMC staff to contact while configuring the meter in the billing system:

Name and contact information for NCEMC staff to contact while configuring the meter in the SCADA system:

## Section 4

NCEMC Staff member notes relevant to this project: