

RFN-420cL Radio Frequency Node

Technical Support: 1-800-815-2258

Instructional Leaflet

This instructional leaflet contains general installation information for the RFN-420cL Radio Frequency Node. No special test equipment or programming is required to install the RFN-420cL in the field. Once powered up, the RFN-420cL automatically connects to the Eaton's Cooper Power Systems™ RF mesh network.

The RFN-420cL is based on Itron's CENTRON II® C2SX meter and it uses two-way Radio Frequency (RF) mesh communications to provide low cost remote meter reading and advanced data collection.

This advanced function meter offers time-of-use (TOU) rates, load profile data, and the optional service disconnect capability.

The RFN-420cL is also available with or without ZigBee® capability. ZigBee allows the RFN-420cL to be integrated with a Home Area Network (HAN) and communicate with other ZigBee devices.

Make sure the RFN being installed matches the service type, current class, and capacity required. If the RFN is installed outdoors, the socket must be weatherproof.



WARNING Dangerous voltages are present. Equipment damage, personal injury, and death can result if safety precautions are not followed. Use authorized utility procedures to install, test, and service the RFN-420cL.

Cooper Power Systems
by **E.T.N**



SAFETY FOR LIFE



Eaton’s Cooper Power Systems™ products meet or exceed all applicable industry standards relating to product safety. We actively promote safe practices in the use and maintenance of our products through our service literature, instructional training programs, and the continuous efforts of all Eaton’s Cooper Power Systems employees involved in product design, manufacture, marketing, and service.

We strongly urge that you always follow all locally approved safety procedures and safety instructions when working around high voltage lines and equipment and support our “Safety For Life” mission.

SAFETY INFORMATION

The instructions in this manual are not intended as a substitute for proper training or adequate experience in the safe operation of the equipment described. Only competent technicians who are familiar with this equipment should install, operate, and service it.

A competent technician has these qualifications:

- *Is thoroughly familiar with these instructions.*
- *Is trained in industry-accepted high- and low-voltage safe operating practices and procedures.*
- *Is trained and authorized to energize, de-energize, clear, and ground power distribution equipment.*
- *Is trained in the care and use of protective equipment such as flash clothing, safety glasses, face shield, hard hat, rubber gloves, hotstick, etc.*

Following is important safety information. For safe installation and operation of this equipment, be sure to read and understand all cautions and warnings.

Safety Instructions

Following are general caution and warning statements that apply to this equipment. Additional statements, related to specific tasks and procedures, are located throughout the manual.



DANGER: Hazardous voltage. Contact with hazardous voltage will cause death or severe personal injury. Follow all locally approved safety procedures when working around high and low-voltage lines and equipment. G103.3



DANGER: Before installing, operating, maintaining, or testing this equipment, carefully read and understand the contents of this document. Improper operation, handling, or maintenance can result in death, severe personal injury, and equipment damage. G101.0



DANGER: This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply may result in death, severe personal injury, and equipment damage. G102.1



DANGER: Power distribution and transmission equipment must be properly selected for the intended application. It must be installed and serviced by competent personnel who have been trained and understand proper safety procedures. These instructions are written for such personnel and are not a substitute for adequate training and experience in safety procedures. Failure to properly select, install, or maintain power distribution and transmission equipment can result in death, severe personal injury, and equipment damage. G102.1

Hazard Statement Definitions

This document may contain four types of hazard statements:



DANGER: Indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING: Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION: Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury or equipment damage.

CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in equipment damage only.



RFN-420cL Regulatory Notices

WARNING The Original Equipment Manufacturer (OEM) must ensure that FCC Labeling requirements are met. This includes a clearly visible label on the outside of the OEM enclosure specifying the Cooper Power Systems FCC identifier (FCC ID: P9X-RFN420CL) and IC Number (IC: 6766A-RFN420CL) as well as the FCC Notice below.

WARNING This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: As such, the radio component of this device is intended only for OEM integrators under the following two conditions:

1. This device may not cause harmful interference, and
2. The transmitter module may not be co-located with any other transmitter or antenna.

WARNING Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

WARNING This equipment has been tested 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 in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's Web site: www.hc-sc.gc.ca.

WARNING To comply with FCC RF exposure compliance requirements, the antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operate in conjunction with any other antenna or transmitter.

As such, the radio component of this device is intended only for OEM integrators under the following two conditions:

- The antenna must be installed such that 20 cm is maintained between the antenna and users.
- The transmitter module may not be co-located with any other transmitter or antenna.

As long as the two conditions above are met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end product for any additional compliance requirements required with this module installed (e.g., digital device emissions, PC peripheral requirements).

In the event that these conditions cannot be met (for example, co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

This transmitter module is authorized only for use in devices where the antenna may be installed such that 20 cm may be maintained between the antenna and users (for example access points, routers, wireless ASDL modems, certain laptop configurations, and similar equipment). **The final end product must be labeled in a visible area with the following: "Contains FCC ID: P9X-RFN420CL, IC: 6766A-RFN420CL" or "Contains FCC ID: P9X-RFN420CL-NZ, IC: 6766A-RFN420CLNZ".**

The radio component is an integral part of the RFN-420cL and it cannot be removed.

WARNING Transmitters with Detachable Antennas

This device has been designed to operate with the antennas listed below, and having a maximum gain of 8 dBi. Antennas not included in this list or having a gain greater than 8 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

Antennas that may be used with this product include:

- GH908U-PRO 900 MHz Omnidirectional — 8 dBi Gain
- TRA9023NP - Antenex Phantom 902 - 928 MHz — 3 dBi Gain
- 915 MHz Co-linear Antenna — 2 dBi gain

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the Equivalent Isotropically Radiated Power (EIRP) is not more than that permitted for successful communication.

RFN-420cL Installation

Complete the following steps to install an RFN-420cL:

1. Verify that the RFN being installed matches the service type, current class, and capacity required. This information can be found on the label on the front of the RFN.
For example, the RFN shown in this instructional leaflet has the following specs: FORM 2S CL200 240V 3W 60Hz TA=30 kH 7.2
2. If necessary, remove the old meter from the meter socket.
3. Line up the bottom blades of the RFN with the socket jaws of the meter socket.
4. Gently push the bottom blades of the RFN into the socket.



5. Gently rock the top blades of the RFN into place.



6. Verify that the LCD operates and that it displays the scroll sequences programmed in the meter.
The digital power indicator should move from left to right when load is applied.
7. Apply a meter seal and record the RFN serial number and other necessary information.

RFN-420cL Features and Functions

This section describes some of the features and functions of the RFN-420cL

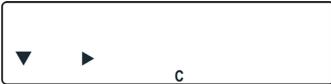


Table 1. RFN-420cL Feature Descriptions

Feature	Function
Display Indicator	One to three character values that are used to indicate the type of data being displayed. The meter scrolls through several different displays, which can include kWh usage, date, time, disconnect status, and other system information.
Disk Simulator	The disk simulator moves from left to right when usage occurs. In reverse power conditions, the disk simulator moves from right to left.
RFN Serial Number Label	Unique identification number of the Advanced Metering Infrastructure (AMI) module in the meter.
Meter Reading	The meter can be configured to display the types of data described in “Meter Readings” on page 6 .
Reconnect Power Button (Optional)	If the meter includes the service disconnect option, and it is remotely disconnected, the customer may be required to push this button to reconnect the meter.
TOU Rates	Indicates the TOU rate that is being displayed. The TOU rates are displayed in the following format: A, b, C, and d.
Metric Indicator	Type of data displayed for the current display sequence.

Meter Readings

The meter can be configured to display the following information:

Value	Format	Example
No Segments	No segments are displayed.	
All Segments	All segments are displayed.	
Current Local Time	Time of day in 24-hour format.	
Current Local Date	Today's date in MM.DD.YY format.	
Total kWh	Delivered kWh added to received kWh.	
Net kWh	Delivered kWh subtracted by received kWh.	
Delivered kWh	kWh delivered to the energy consumer.	
Received (Reverse) kWh	kWh received from the energy consumer.	
Last Interval kW (Demand)	kW demand over the last interval.	
Peak kW (Demand)	Highest kW demand since the last reset.	
Peak kW (Demand) Date	Date that the highest kW demand occurred.	
Peak kW (Demand) Time	Time that the highest kW demand occurred.	
Last Interval Voltage	Voltage over the last interval.	
Peak Voltage	Highest average voltage since the last reset	
Peak Voltage Date	Date that the highest average voltage occurred	
Peak Voltage Time	Time that the highest average voltage occurred	
Min Voltage	Lowest average voltage since the last reset	

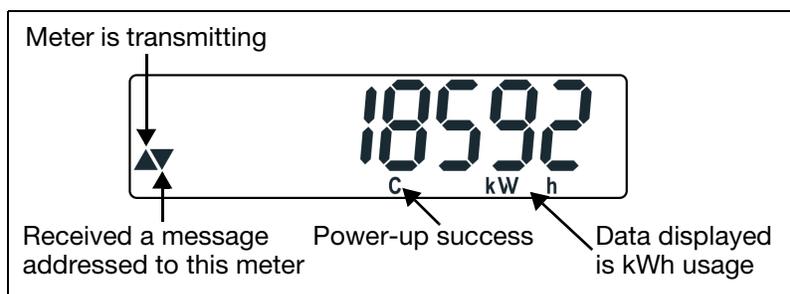


Value	Format	Example
Min Voltage Date	Date that the lowest average voltage occurred	L 10.31.10 v
Min Voltage Time	Time that the lowest average voltage occurred	L 19:40:32 v
TOU Rate x kWh	kWh accumulated for the displayed TOU rate (A, b, C, or d). Rate A is shown in this example.	583 kWh A
TOU Rate x Peak kW (Demand)	Highest kW demand reading since last reset for the displayed TOU rate (A, b, C, or d). Rate b is shown in this example.	18.590 MkW b
TOU Rate x Date of Peak kW (Demand)	Date that the highest kW demand occurred for the displayed TOU rate (A, b, C, or d). Rate b is shown in this example.	11.25.10 MkW b
TOU Rate Time of Peak kW (Demand)	Time that the highest kW demand occurred for the displayed TOU rate (A, b, C, or d). Rate b is shown in this example.	14:36:50 MkW b

Meter Communication and Power-Up Status Indicators

The segments of the RFN-420cL display, shown below, have the following meanings:

- **Up arrow** – When the meter replies to a two-way message, the Up arrow ▲ turns on for four seconds.
- **Down arrow** – When the meter receives a one-way message that is addressed to this meter, the down arrow ▼ turns on for four seconds.
- **C** – When the meter goes into calibration mode after a successful power-up, the letter C flashes at 15-second intervals for 5 minutes.
- **kWh** – The type of data that is being displayed is kWh usage.



Meter Disconnect Status

If the RFN-420cL includes the service disconnect option, the following disconnect statuses may appear when the meter is disconnected and reconnected.

Value	Format	Example
Service Disconnect Status of Off	Meter is disconnected and load side voltage is not present. ¹	
Service Disconnect Status of Load Detected	Meter is disconnected and load side voltage is present. ^a	
Service Disconnect Status of No Load Detected	Meter is connected and load side voltage is not present. ^a	
Service Disconnect Status of Ready to Connect	Meter is armed for reconnection and load side voltage is not present.	
Service Disconnect Status of Ready to Connect and Load Detected	Meter is armed for reconnection and load side voltage is present. ²	

¹ The meter will not display disconnect messages unless the Disconnect Messages are enabled.

² The user will be unable to reconnect the meter until the load side voltage is removed.

Meter Errors

The RFN-420cL displays errors using the following three-digit codes:

Value	Format	Example
Error Code	A three-digit code appears in the upper left corner of the meter display if one of the following errors occur: - 100 – Meter communication issue - 101 – Address not set - 102 – Disconnect relay failure - 20x – Itron error codes	



RFN-420cL Specifications

RF Communications Specifications

Type:

RF Mesh

Operating Frequency:

902 MHz to 928 MHz License Free Band

RF Output Power:

30 dBm (1 W) Maximum

Data Rates:

38.4 kbps, 76.8 kbps and 153.6 kbps

Receiver Sensitivity:

-104 dBm (@ 1% PER, +25 °C, 38.4 kbps)

-101 dBm (@ 1% PER, +25 °C, 76.8 kbps)

-98 dBm (@ 1% PER, +25 °C, 153.6 kbps)

Mode:

Frequency Hopping Spread Spectrum (FHSS)

ZigBee Radio Specifications

ZigBee Certification:

Smart Energy Profile 1.1

Operating Frequency:

2.4 GHz ISM Band

RF Maximum Output Power:

20 dBm (0.1 W)

Data Rate:

250 kbps

Receiver Sensitivity:

-101 dBm (@ 1% PER, +25 °C)

Mode:

Direct Sequence Spread Spectrum (DSSS)

Operating Requirements

Voltage:

120 V or 240 V

Frequency:

60 Hz

Temperature:

-40 °F to +185 °F (-40 °C to +85 °C)

Humidity:

5% to 95%, non-condensing

Meter Dimensions

6.95 in. H x 6.95 in. W x 5.00 in. D

(17.65 cm H x 17.65 cm W x 12.7 cm D)

Electrostatic Discharge

15 kV through Air per ANSI C12.1 (IEC61000-4-2)

Surge Withstand Capability

Oscillatory:

6 kV @ 100 kHz waveform per

ANSI C12.1 (IEEE C62.41)

Fast Transient:

6 kV @ 1.2x50 μ s - 8x20 μ s waveform per

ANSI C12.1 (IEEE C62.41)

Meter Style Numbers

Style Number	Form	Amp	Voltage
420-ITC201SC011300	1S	200	120
420-ITC202SC021300	2S	200	240
420-ITC202SC031300	2S	320	240
420-ITC203SC041300	3S	20	120
420-ITC203SC051300	3S	20	240
420-ITC204SC061300	4S	20	240
420-ITC212SC071300	12S	200	120
420-ITC225SC081300	25S	200	120

Meter Style Numbers with ZigBee

Style Number	Form	Amp	Voltage
420-ITC201SC011400	1S	200	120
420-ITC202SC021400	2S	200	240
420-ITC202SC031400	2S	320	240
420-ITC203SC041400	3S	20	120
420-ITC203SC051400	3S	20	240
420-ITC204SC061400	4S	20	240
420-ITC212SC071400	12S	200	120
420-ITC225SC081400	25S	200	120

Meter Style Numbers with Service Disconnect

Style Number	Form	Amp	Voltage
420-ITC201SC091300	1S	200	120
420-ITC202SC101300	2S	200	240
420-ITC212SC111300	12S	200	120
420-ITC225SC131300	25S	200	120

Meter Style Numbers with ZigBee and Service Disconnect

Style Number	Form	Amp	Voltage
420-ITC201SC091400	1S	200	120
420-ITC202SC101400	2S	200	240
420-ITC212SC111400	12S	200	120
420-ITC225SC131400	25S	200	120



FCC COMPLIANCE STATEMENT

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested 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 in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

These devices operate under Part 15 of the FCC rules. Modifications to these devices not expressly authorized by Cooper Power Systems may affect your ability to legally operate these devices.

DISCLAIMER OF WARRANTIES AND LIMITATION OF LIABILITY

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