

ENERGY TECHNOLOGY GROUP, INC.

"Transforming Utility Data Collection"

Installation Guide

RCU-41

Installation Guide – RCU-41

This installation guide furnishes an overview of the RCU-41 and its wiring architecture, and outlines the procedures for successful installation of the RCU-41 products. The RCU-41 is a monitoring, processing and communications device capable of collecting multiple inputs from a variety of sources. Proper installation is required for the WebNet Architecture to properly function. Deviation from this guide may cause communication errors, faulty data readings and/or intermittent data.

Questions regarding the installation process should be referred to ETG Installation Support.

Note:

- **This device requires professional installation.**
- **Any changes or modifications not expressly approved by ETG would void authority to operate this device.**
- **Tested to comply with FCC Standards. The EUT has been evaluated and found compliant with the requirements as set forth in CFR 47 sections 15. 203, 15.205, 15.207, 15.209 and 15.247.**

Information to the User:

Class B Digital Device

A digital device that is marketed for use in a residential environment notwithstanding use in commercial, business and industrial environments. Examples of such devices include, but are not limited to, personal computers, calculators, and similar electronic devices that are marketed for use by the general public. Note: The responsible party may also qualify a device intended to be marketed in a commercial, business or industrial environment as a Class B device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B digital device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a device as a Class B digital device, regardless of its intended use.

This equipment complies with the FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and the user and must not be co-located or operated with any other antenna or transmitter.

Energy Technology Group, Inc.
5601 Bridge Street • Suite 400
Fort Worth, Texas 76112
Phone 817.496.5350 • Fax 817.496.5357

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IMPORTANT NOTES!

Installation

The Energy Technology Group RCU-41 Remote Communications Unit must be installed using recommended materials and methods as presented in this installation manual. Failure to follow these instructions and installation procedures can result in faulty operation of the equipment and failure of the RCU-41 Remote Communications Unit. Failure to follow these instructions and installation procedures can result in the voiding of the manufacturer's warranty on the RCU-41 Remote Communications Unit.

- **This device requires professional installation.**
- **Any changes or modifications not expressly approved by ETG would void authority to operate this device.**
- **Tested to comply with FCC Standards. The EUT has been evaluated and found compliant with the requirements as set forth in CFR 47 sections 15. 203, 15.205, 15.207, 15.209 and 15.247.**

It is important that the installer be completely familiar with the Drilling Safety and Mounting Hardware information found in the Appendices of this manual.

Various Types of Utility Meters

The information about, and graphic representations of, utility meters included in this document are generic in nature and are not intended to represent any specific manufacturer's metering device. It is not possible to provide specifications and information for every meter currently found in the marketplace. While Energy Technology Group will provide any help possible with the information available to them at the time, users of the RCU-41 Remote Communications Unit have the sole responsibility for acquisition and application of the specifications and information needed to insure proper operation of the RCU-41 Remote Communications Unit with their particular metering devices.

Retrofit of Non-Reporting Meters

Utility meter pulse initiators needed to retrofit non-reporting meters can be purchased from:

RIOTronics
6841 South Yosemite, Unit 3C
Englewood, CO 80112
Attn: Andy Brock
Phone: 303-773-2600
FAX: 303-773-1148
email: info@riotronics.com
www.riotronics.com

RIOTronics offers the portion of the device installation on customer supplied indexes for a very nominal fee. This includes pre-testing of their pulse unit after being affixed to your index. Contact RIOTronics for details.

Installation guides for their pulse initiators are supplied with each order.

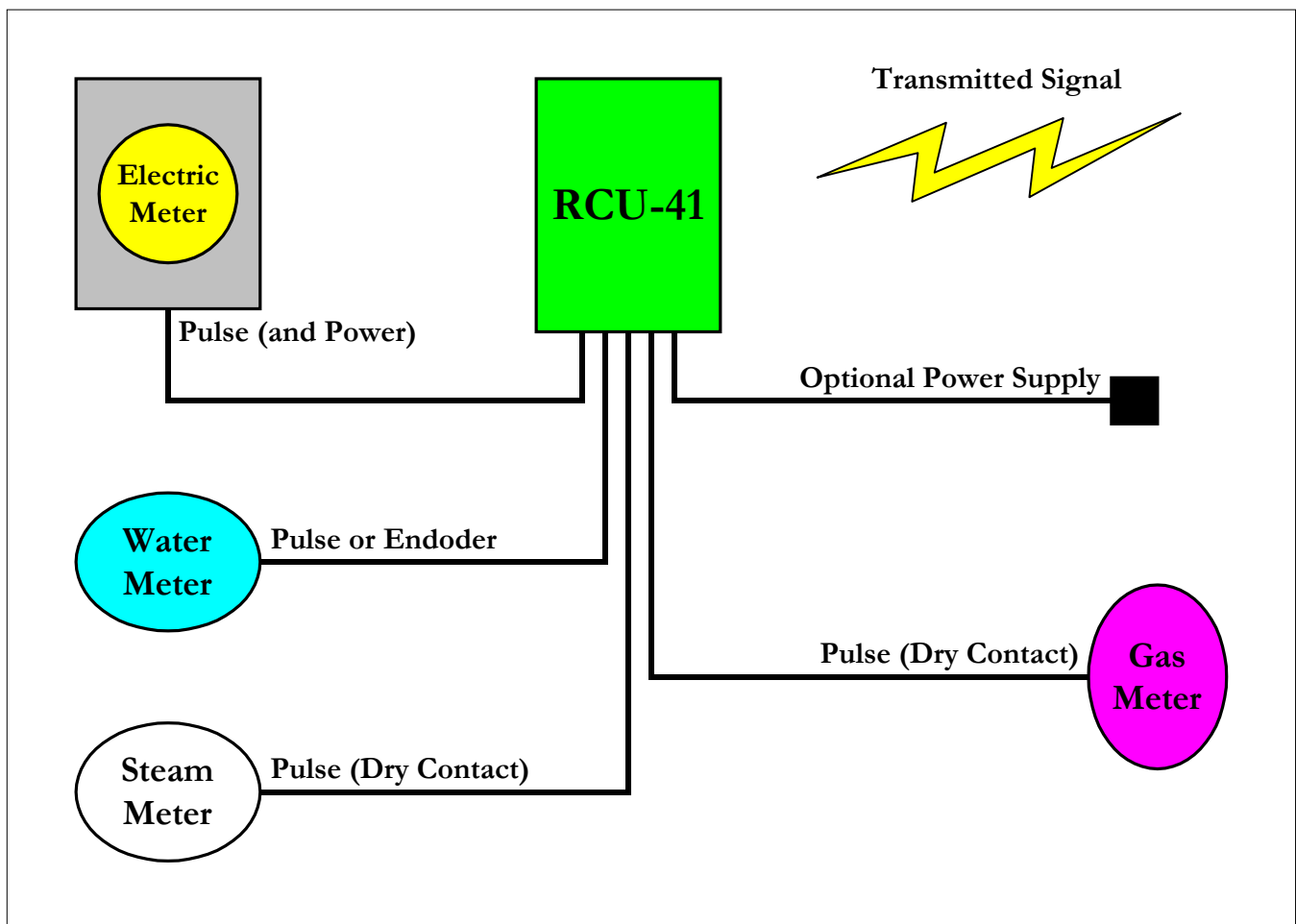
Overview

The Energy Technologies Group RCU-41 Remote Communications Unit provides for the remote and continuous monitoring of a customer's energy and water usage by a centrally located facility, eliminating the need for monthly and quarterly reading of utility meters at the customer location.

An RCU-41 Remote Communications Unit collects signals from each of the utility metering devices via dedicated wired links. These RCU-41 Remote Communications Unit are located at each customer premises. The collected information is then transmitted to the utility, in most cases, via a wireless link.

The RCU-41 can also accept other inputs from a variety of sources by using optional input modules. It can also provide control outputs to a variety of devices using optional output modules.

Installations can include different combinations of utility metering devices, including electric, water, gas, steam, etc. Each has its own unique method of communicating with the RCU-41 and, therefore, unique wiring requirements.



Installation and cabling of the RCU-41 Remote Communications Unit is simple and straightforward. Utility meters for electricity, water, gas, etc. are each connected directly to the RCU-41 using dedicated cables (see Figure xx).

Electrical power (6 Volts AC) for the RCU-41 is usually obtained from the electrical meter enclosure and no other power supply or electrical connection is required. Electrical power for the RCU-41 may be obtained from an optional plug-in power supply that is installed inside the building and cabled to the RCU-41. This powering method is required when electrical metering is not one of the monitored services.

Before Beginning

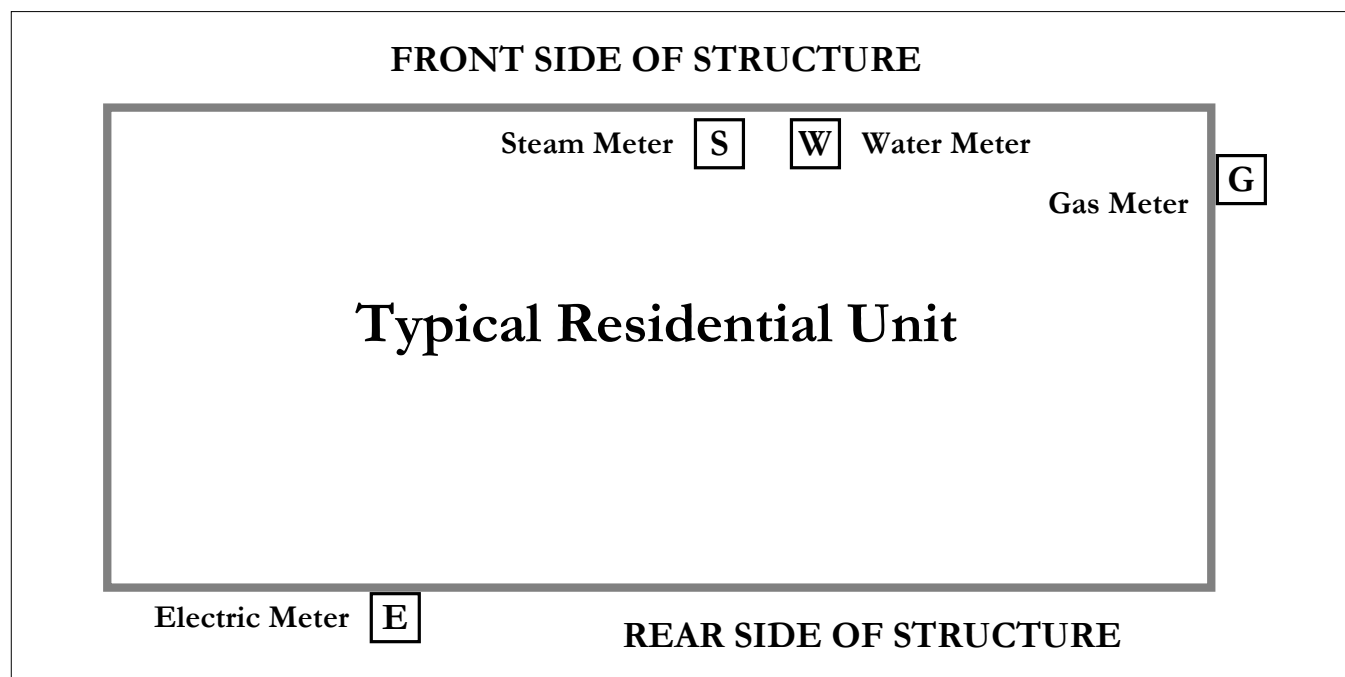
Before beginning the installation, check the furnished materials against the packing list. If any parts are missing contact the ETG Installation Center or the distributor. The following items should be included:

- ◆ 1 each RCU-41 Enclosure
- ◆ 1 each RCU-41 Main Board
- ◆ 1 each RCU-41 RF Module
- ◆ 1 each RCU-41 Antenna
- ◆ 2 each Rubber Grommet
- ◆ 1 each Installation Manual

Surveying the Site

The installer should make a complete survey of the site before beginning work. A 'walk-around' site survey should include at least all of the following:

- ◆ Determine the type of building construction
- ◆ Pay particular attention to the exterior finish (siding) of the structure (siding material may be wood, Masonite, asbestos shakes, aluminum, vinyl or steel siding, brick, stucco, etc.).
- ◆ Observe the location of each utility meter to be connected to the RCU-41. Utility meters are found at a variety of different locations in a typical residential unit.
- ◆ Note in particular the location of the electrical meter and any meters that are located outside, such as electric and gas meters. Look for the best locations for cable entry into the structure.
- ◆ Identify the location of an inside electrical power outlet (120 Volts AC) if the optional power supply (transformer) is required. The optional power supply will be necessary when electrical metering is not included as part of the service.
- ◆ Make a note of any potential problems or challenges that could prevent proper installation.



Electrical meters are most often located on the rear of side of a residential structure but , in some cases, may be located on the side of the structure or even inside.

Check to see if the remote indicating meter has been installed. This is usually indicated by the presence of one or two wire pigtails, several feet in length, extending from the electrical meter socket enclosure.

When the remote indicating electrical meter has been installed, there will be 6 Volts AC present on two of the conductors. This voltage does not represent a hazard to life or property, however caution is still advised.

Warning! Exercise extreme caution when working around electrical lines and equipment. They should always be presumed to be a potential shock hazard. Do not attempt any work on electrical lines or equipment. A qualified and licensed electrician must perform all such work.

Note: Other utilities, such as the telephone company and the cable television company, may have lines and equipment located in the area adjacent to the electrical meter. Exercise caution so as not to disturb telephone or cable television lines or equipment. Also note that these lines can, like power lines, be a potential shock hazard.

Water meters are almost always located inside the structure, and are usually found in the basement or lower level. Check at the front of the structure first because the municipal water supply almost always enters the front of the structure.

Check to see if the remote indicating meter head has been installed. Screw terminals that are located on the top or side of the indicator usually evidence this. In some cases a remote indicating meter head will already be connected to an outside display unit. Check to see if a cable is already connecting the meter head to an outside display unit.

If two screw terminals are present check to see if one of them has a plus (+) indication. If three screw terminals are present check for wire color indications (i.e. red, black and green).

Gas meters are usually located outside the structure but not near the electrical service entrance. Often the best and most convenient cable route to the gas meter is through the inside of the structure and not along the outside of the structure (see Figure xx).

Check to see if the remote indicating meter has been installed. A wire pigtail extending from the gas meter housing usually evidences this.

Warning! Exercise extreme caution when working around gas lines and equipment. They should always be presumed to be a potential explosion hazard. Do not attempt any work on gas lines or equipment. A qualified individual must perform all such work.



Planning the Installation

The installer should plan the installation before beginning work, which should include at least all of the following:

- ◆ Identify the location for the RCU-41 Remote Communications Unit (usually next to the outdoor electrical meter).

The RCU-41 should be located on the outside wall of the structure, as high as practical and as close as practical to the electric utility meter.

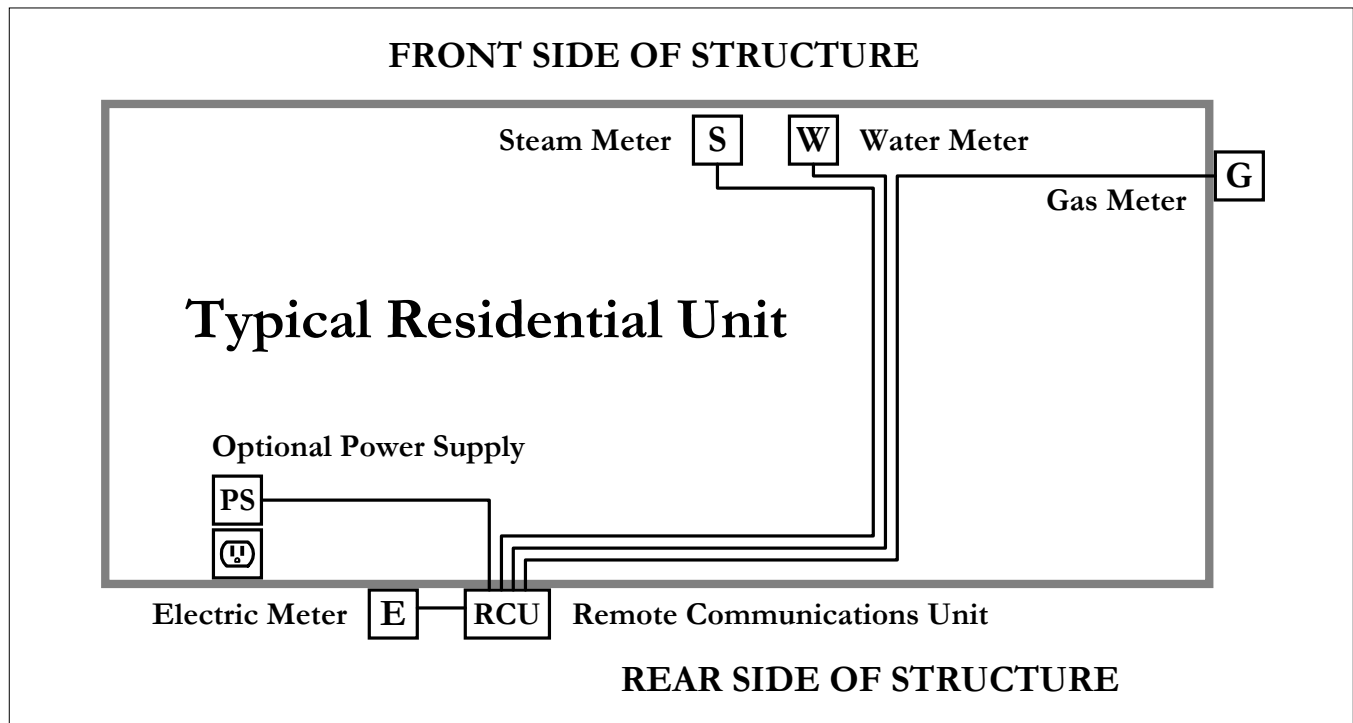
Identify an outdoor mounting location for the RCU-41 that is as close as practical to the electrical meter if the electrical meter is located inside the structure.

Note: The RCU-41 must be located on the outside of the structure.

Note any special mounting requirements for the RCU-41.

- ◆ Verify that a cable can be run from the RCU-41 to each utility meter using the installation procedures described in this manual.
- ◆ Determine the actual cable route from the RCU-41 to each utility meter including entrance holes and interior holes that will have to be drilled.
Cable routes should be selected that permit a continuous wire run from the RCU-41 to each meter. Splices in cable runs should be avoided.
- ◆ Locate an inside electrical power outlet (acceptable to the customer) and determine the cable route from the RCU-41 to the power outlet if the optional power supply is required.

Warning! Do not use an exterior outlet for the optional power supply and do not use an extension cord to connect the optional power supply to a wall outlet.



Discuss the plan with the customer before mounting equipment or drilling holes. The customer may be able to identify the location of meters, pipes, electric wires, gas lines, etc. Obtaining the customer's approval can eliminate customer complaints after the installation has been completed.

Performing the Installation

Positioning and Mounting the RCU-41 Remote Communications Unit

Determine the exact mounting location for the RCU-41 (see the figure to the right). It should be placed on the outside of the structure, as high as possible, and near (but not against) the electrical meter enclosure. The RCU-41 may be placed on either the left or right side of the meter enclosure, depending on existing conditions.

It is recommended that the RCU be at mounted least five (5) feet above ground level. Maintain a minimum of 8 inches of working clearance between the meter enclosure and RCU-41 when installing the RCU-41 adjacent to the electrical meter enclosure. If the electrical meter is located inside the structure then mount the RCU-41 outside as close as practicable to the electrical meter.

A mounting template with integrated level is provided with the installation tool kit. Position the template against the structure wall making sure that it is level. Check the location of the mounting holes to be sure that they will not be in a place where drilling or attachment will be difficult or unattractive. Using a pencil, mark the location of the top and bottom mounting holes.

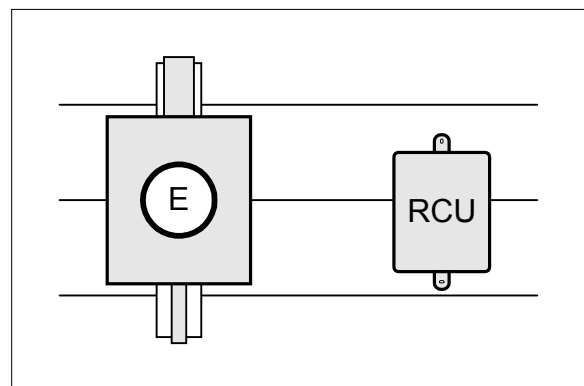
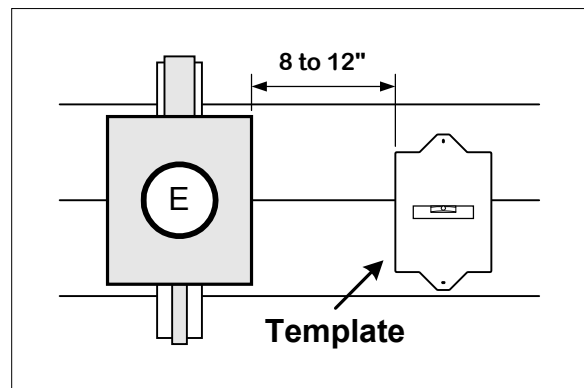
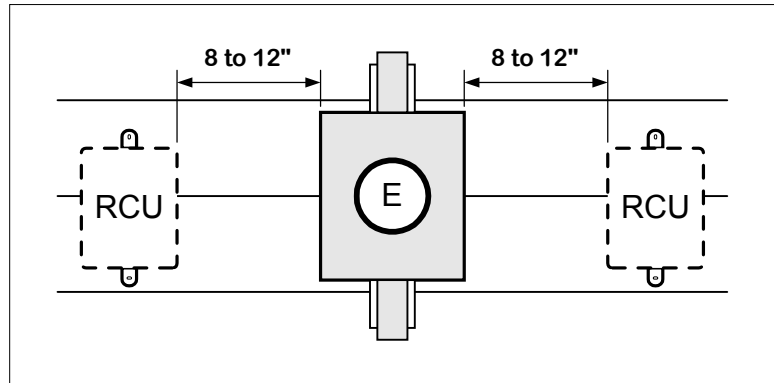
Mounting surfaces will vary with the structure and could be wood, asbestos, metal or vinyl siding, stucco or brick. Each type of siding will require its own unique mounting hardware and methods. It is extremely important that the installer be completely familiar with the Drilling Safety and Mounting Hardware information found in the Appendices of this manual.

Carefully drill the two mounting holes using the correct bit. Exercise care when drilling holes so as not to cause damage to, or disfiguration of, the structure's siding material. Install appropriate anchors where they are required (brick, stucco, etc.).

Secure both the top and the bottom of the RCU-41 to the structure with the appropriate screws.

Do not use temporary or incomplete mounting methods.

DO NOT attach the RCU-41 to any electrical conduit or mast, or to the electrical meter enclosure. To do so is a violation of the National Electrical Code. See NEC 300.11 (B).



Locating and Drilling the Entry Hole

After mounting the RCU-41 on the structure, determine the exact location for the cable entry hole. This entry hole should be as close as possible to the RCU-41 and must provide access to the lower level or basement area of the structure. The recommended location for this entry hole is in the immediate area of the main electrical service entrance (where the electrical service conduit enters the structure).

The entry hole should be 3/8 inch in diameter and must be large enough for all of the cables required to connect to the remaining utility meters (water, gas, etc.). A 3/8-inch hole will permit up to five cables to enter the structure using the recommended cable (see Figure xx).

Always drill a new hole for the metering cable entrance. Do not use existing electrical, telephone line or cable television cable entrance holes. Do not drill holes through window or doorframes. Do not run cables through windows, doors, or vents.

Drilling will put permanent holes in a customer's home. Use caution when drilling the cable entrance hole to avoid unnecessary damage to the structure and siding material.

Drilling Through Exterior Walls

Investigate both the inside and outside areas of the structure before drilling through the exterior wall.

Exterior walls may contain elements of other systems and installers must be aware of these before drilling. These elements can include insulation, electrical wiring, plumbing facilities, telephone cabling, cable television cabling, alarm and security wiring, ductwork for heating or cooling, etc. It is important to identify possible routing of all these items before drilling.

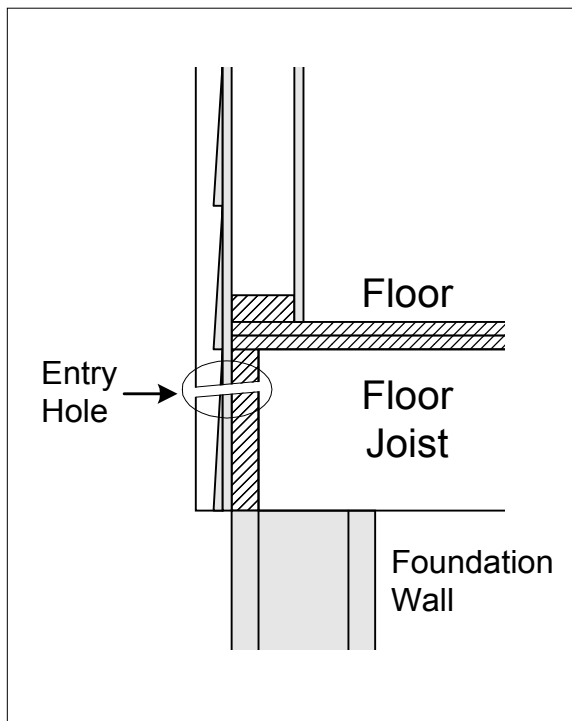
If you need to measure, make sure the measurements you take are accurate and made from a good reference point. (For example, the inside corner of a window or door). Make sure there is enough clearance in all directions to allow for slight measurement errors. Always try to drill a hole in an inconspicuous place. Avoid drilling through foundation walls as this could cause damage that is not easily repaired.

Always drill the hole at an upward angle (from outside to inside). The exterior opening should always be lower than the interior opening. The angle should be about 15 degrees. This will help to prevent water from following the cables into the house.

Use the correct bit for the siding on the home (wood bit through wood siding, masonry bit through mortar, concrete block, etc.). Remember that a drill bit always makes a larger hole and often breaks out or splinters material when exiting the hole. Using a sharp bit and light pressure can lessen this effect.

Drill from outside to inside. Drill through the softer mortar between bricks or concrete blocks. Move the bit around between the walls to feel for wires, pipes, etc. Clean out the entry hole completely.

Ask the customer to keep children and pets away from the area where you are drilling. Use a shop towel, newspaper or other material to catch the debris that falls when drilling holes.



Pulling Cables into the Structure

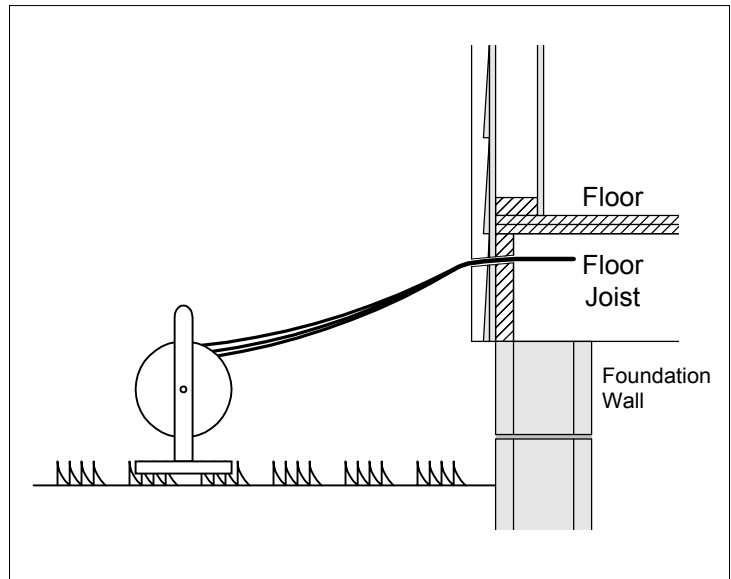
Cables to interior utility meters will be required for a great majority of the installations.

One four-conductor, 22-gauge cable is required for each utility meter that is to be connected to the RCU-41.

One two-conductor, 18 gauge cable is required if the optional power supply is required.

Set up cable reels outside of the structure directly in front of the entry hole. There should be a separate reel for each cable run required.

If the electrical meter is located inside the structure then the pigtail cables from the electrical meter will have to be pulled from the inside to the outside of the structure. It would be best to pull these cables to the outside of the structure before pulling the remaining cables to the inside of the structure.



Mark the ends of all cables with a Sharpie permanent marker pen using designations as follows.

E — Electric W — Water G — Gas S — Steam P — Power Supply

If there are multiple meters for the same type of utility (i.e. multiple water meters) then mark the cables letter designator and a number starting with the number one (1). The same would apply for multiple meters for other utilities.

W1 — Water Meter No. 1 W2 — Water Meter No. 2

Be sure to mark the reels to match the marking on the ends of the cables. Make sure that all cable and reel markings are legible.

Tape the cable ends together with electrical tape and push the bundle into the entry hole. Insert a sufficient amount of cable so as to make it easy to locate the cable bundle on the inside of the structure.

If there is difficulty pushing the bundle through the entry hole then attach the cable ends to the Labor Saving Devices GOROD Wire Pusher (in the installation tool kit) and push the cable bundle through the entry hole.

After locating the cable bundle inside the structure, pull enough wire into the structure to reach the respective utility meters (as determined during the planning process).

After making absolutely certain there is enough cable to easily reach the utility meters, pull enough cable from the reels to reach the RCU-14. Mark the outside ends according to the reel marking using the Sharpie marker pen and cut the cable free of the reels. The free ends can now be routed to the RCU-41.

Caution: Leaving a little extra cable is far better than cutting the cable a little too short.

Exterior Cable Routing and Securing Methods

When installations include connection to an exterior electrical meter, the electric utility meter will be cabled directly to the RCU-41 and will not require interior wiring.

There should be two cables extending from the electrical meter housing. One will be the electrical meter signal cable (four 22 gauge conductors) and the other will be the RCU power cable (two 18 gauge conductors).

Note: The power cable carries the 6 Volts AC that provides electrical power to the RCU-41. This cable will be live and should be handled with care.

The pigtail cables should be routed directly to the RCU-41 (see Figure xx) and connected to the correct terminals. Cables between the RCU-41 and the electrical metering device should be securely attached to the building structure using suitable clips or other appropriate attachment hardware (see caution note).

Caution: Do not draw cables too tight between enclosures. Maintain a minimum bending radius of 1/2 inch for all cables. Do not let cables hang from the enclosures. Do not use staples to fasten cables to aluminum, vinyl or asbestos siding material. Drill pilot holes in siding material before installing screws.

Cables to the remaining utility meters (and to the optional power supply when required) will enter the structure.

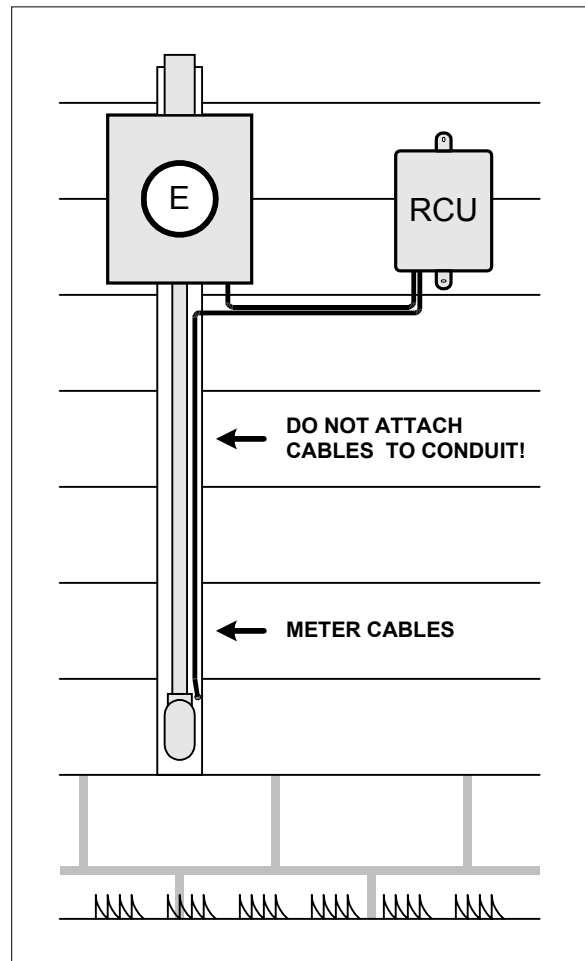
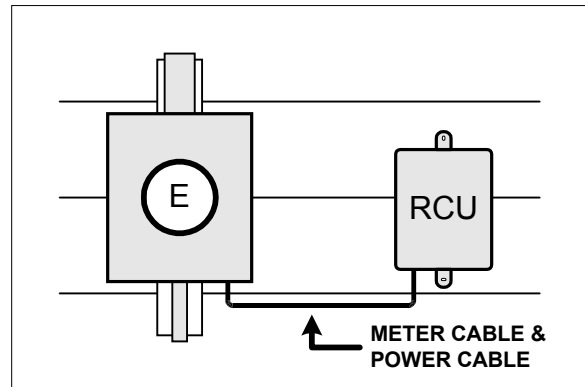
All exterior cabling between the RCU-41 and the entrance hole should be securely attached to the building structure using suitable clips or other appropriate attachment hardware (see caution note above).

Warning: Do not attach cables to the electrical conduit.

When all cables are installed and secured the entrance hole must be sealed completely using a suitable silicon sealant or caulking compound.

Always strive for a quality appearance. This ensures reliable operation, customer satisfaction (it's their home) and a sense of pride in one's work.

Note: Cable to exterior meters located elsewhere on the structure should be routed through the structure and not on the exterior of the structure.



Exterior Cable Routing and Securing Methods (continued)

When the electric utility meter is located inside the structure or when an electric utility meter is not part of the installation, all cables will be routed to the interior of the structure (see Figure xx and Figure xx). This will include a power cable and one cable for each utility meter.

When an electric utility meter is not part of the installation, all cables (including a power cable to the optional power supply) will be routed to the interior of the structure. This will include a power cable and one cable for each utility meter.

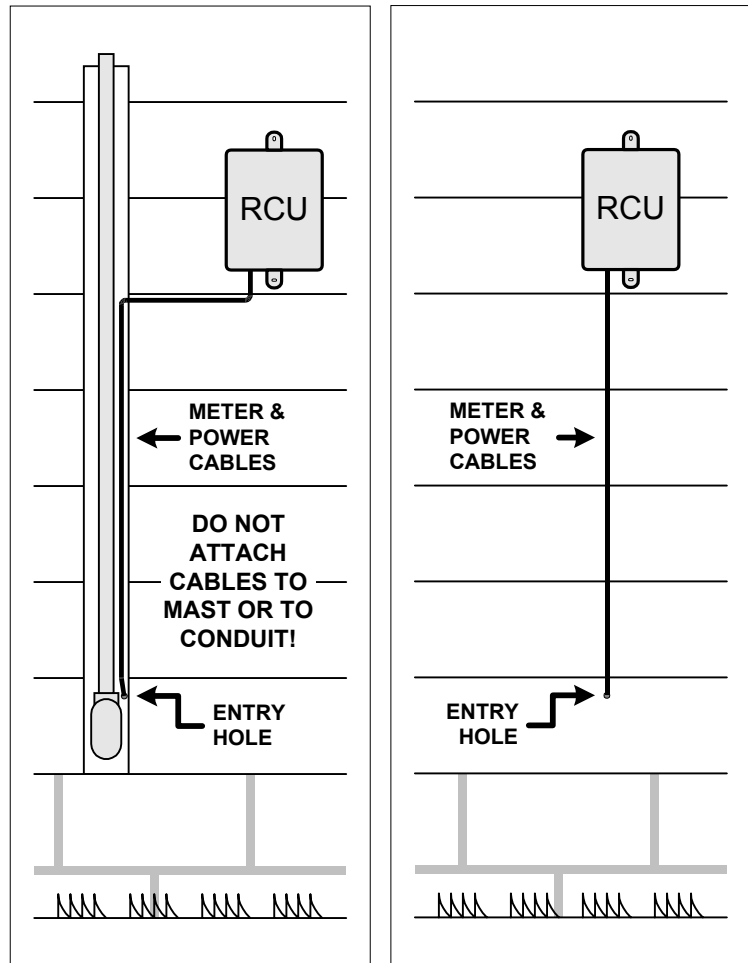
All exterior cabling between the RCU-41 and the entrance hole should be securely attached to the building structure using suitable clips or other appropriate attachment hardware (see caution note above).

Caution: Do not draw cables too tight. Maintain a minimum bending radius of 1/2 inch for all cables. Do not let cables hang from the enclosures. Do not use staples to fasten cable to aluminum, vinyl or asbestos siding material. Drill pilot holes in siding material before installing screws.

Warning: Do not attach cables to the electrical conduit.

When all cables are installed and secured the entrance hole must be sealed completely using a suitable silicon sealant or caulking compound.

Always strive for a quality appearance. This ensures reliable operation, customer satisfaction (it's their home) and a sense of pride in one's work.



Interior Cable Routing and Securing Methods

Correct installation of metering and power supply cables will help to insure that the system will function reliably for many years. Incorrect installation practices can result in system problems and possible customer dissatisfaction.

Insert the cables through the entry hole and, pulling from the inside, extent the cables to their respective meters.

After cables are in place, apply bead of silicone sealing compound around the entry hole.

All cables should be routed in straight lines to the building structure, running either in-line along the sides of joist members (in parallel with the joist) or through holes in the joist members (perpendicular to the joists) (see Figure xx). Do not route cables diagonally to the building support members.

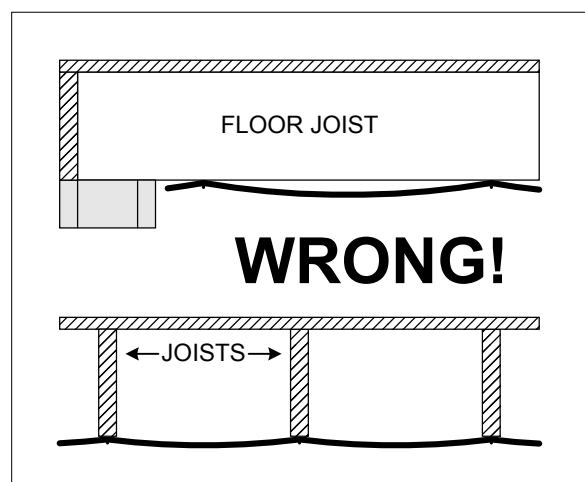
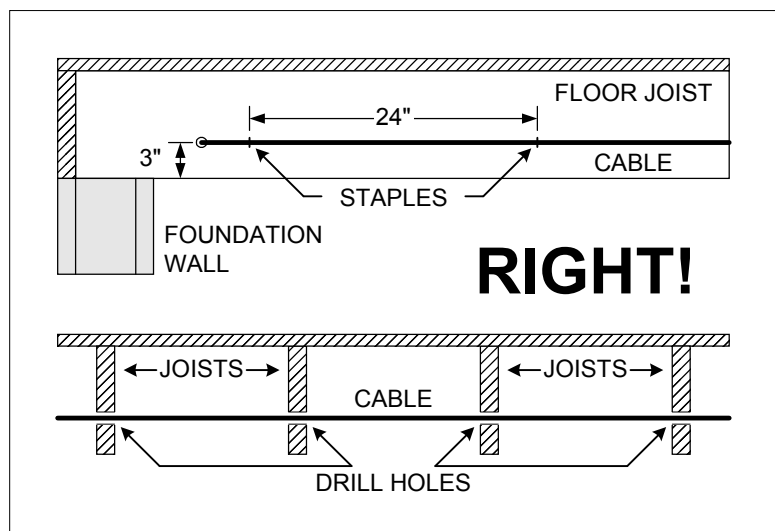
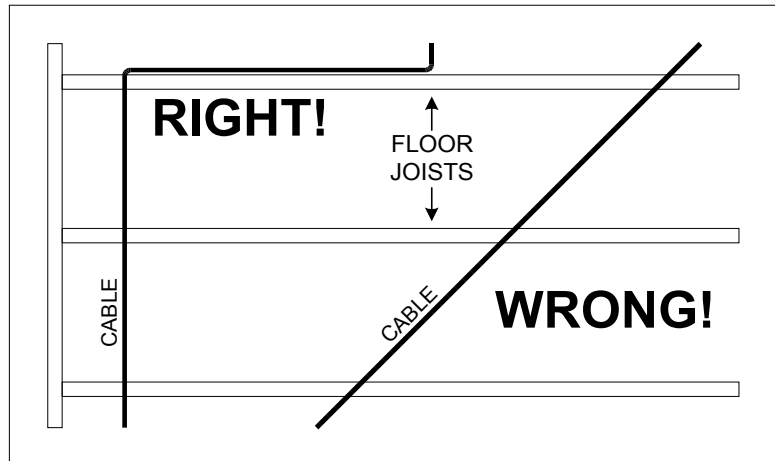
Cables run along (in parallel with) joist members should be attached with suitable staples or other attachment device. The Arrow T-18 wire staple (5/16 inch) is recommended. Cables should, where possible, be securely attached at 24 inch intervals and kept at least 3 inches above the bottom of the joist (see Figure xx).

Cables run across (perpendicular to) joist members should be routed through new holes drilled in the joist members (see Figure xx). These new holes should be located at least 3 inches above the bottom of the joist.

Metering cables may be routed through holes occupied by telephone cables, cable television coaxial cables, thermostat wiring, or doorbell wiring, etc when space permits. Do not force cables into tight spaces or do anything that might damage existing wiring. Do not attach the metering cables to any of these other cables. Do not route metering cables through existing holes in joist members that are already occupied by electrical conduit or electrical power and light cables.

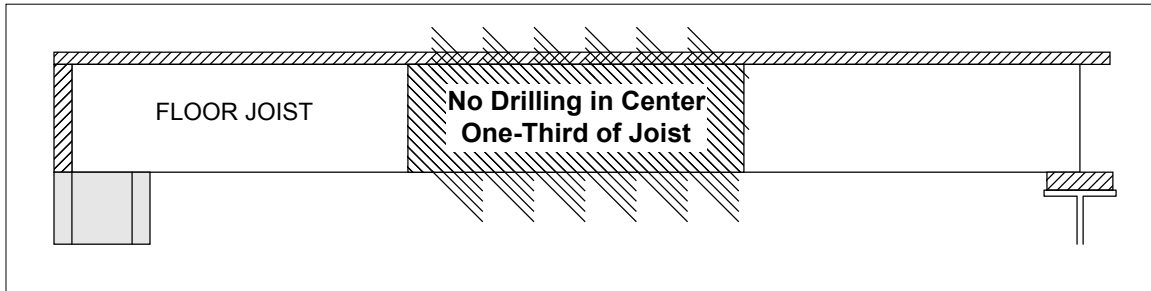
Cables must not be routed along, or attach to, the bottom of joist members where they might be subject to damage (see Figure xx).

Warning! The National Electrical Code requires that holes bored through wood members be at least 1¼ inches above the bottom of the joist member.



Interior Cable Routing and Securing Methods (continued)

Holes should not be drilled in the center one-third of joist members (see Figure xx).



Do not attach metering cables to conduits, water pipes, gas pipes or other cables.

Do not allow metering cables to come in contact with lighting fixtures, furnace flue pipes, hot water heater flue pipes, dryer vent ductwork, hot water pipes, steam pipes, etc.

After all holes have been drilled it is time to run the cable.

Remember these points to ensure a quality installation:

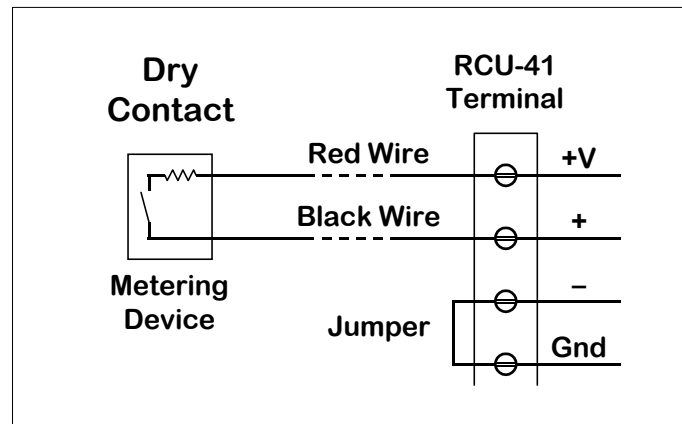
- ◆ It is usually best to set the cable reels or boxes outside the structure and close to the entry hole. This will allow the cable runs to be pulled together.
- ◆ Remember that straight lines look more professional than diagonal lines.
- ◆ Avoid placing any exterior wiring on the front or street side of the house.
- ◆ When using wire ties (tie-wraps), not over tighten them as this could pinch and damage the cable, causing problems in the future.

[Additional information to be added here for running cables down walls to meters.]

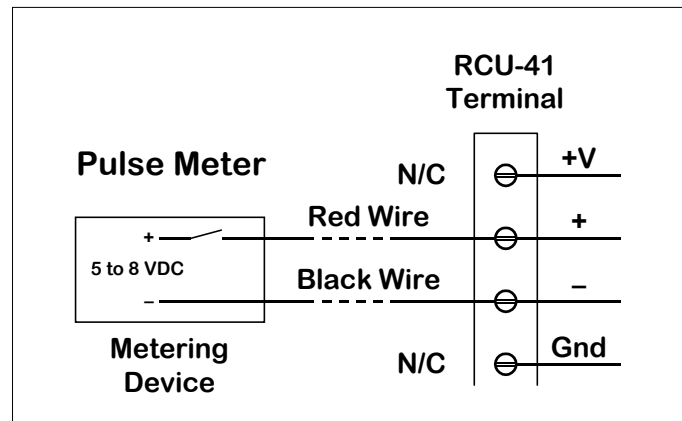
How Utility Meters "Talk" to the RCU-41

A brief explanation of how utility meters communicate with the RCU-41 is included here. They do so in a variety of ways and the more common of these are explained here.

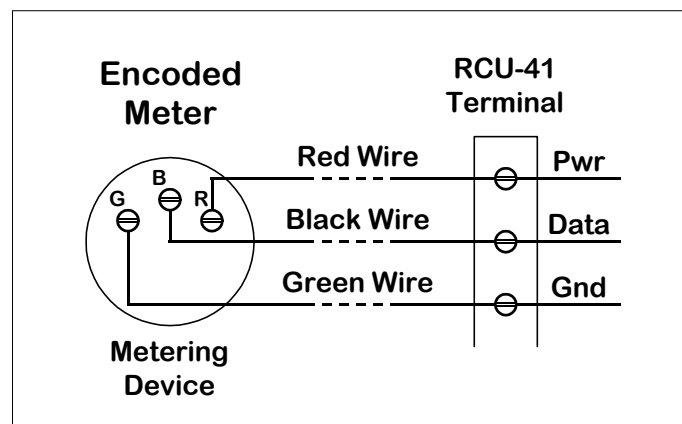
The simplest method is known as a dry contact closure that is most often found on gas meters and steam meters. They could also be found on some electrical meters and water meters. The meter has an electrical contact (or switch) that activates (or 'closes') at intervals that accurately communicate the energy or water usage to the RCU-41 (see Figure xx). It is referred to as "dry" contact because the meter does not produce any voltage. The voltage for this signaling method originates at the RCU-41. This method of signaling requires two wires between the meter and the RCU-41. The polarity of the connection (which wire is connected to which terminal) is not critical.



The second method is known as the pulse type meter and is most often found on electrical meters and some water meters. The pulse meter generates a voltage pulse at intervals that accurately communicate the energy or water usage to the RCU-41 (see Figure xx). The voltage for this signaling method originates at the metering device and not at the RCU-41. This method requires two wires between the meter and the RCU-41. The polarity of the connection is critical. If not wired correctly, the meter cannot communicate with the RCU-41. Electrical terminals on pulse type metering devices should provide an indication as to which is the positive (+) terminal.



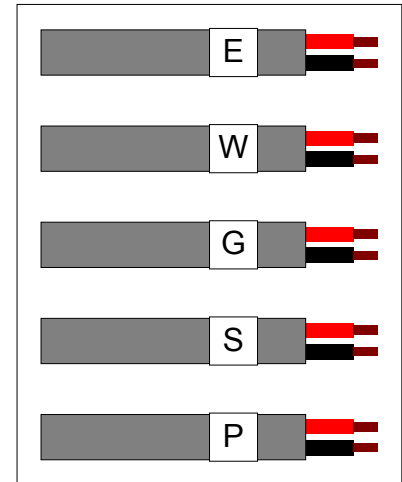
The third method is known as the encoded type meter and is found on some water meters. The encoded water meter converts the energy or water usage information to a data stream (much like a computer) that is then transmitted to the RCU-41 (see Figure xx). The voltage for this signaling method originates at the RCU-41. This method requires three wires between the meter and the RCU-41. The connection wiring is critical. If not wired correctly, the meter will not communicate with the RCU-41. Electrical terminals on encoder type metering devices should provide an indication as to which are the positive, data and ground terminals.



Cable Identification

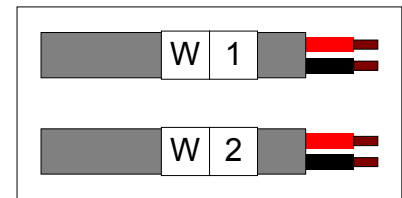
Cables connecting each utility meter to the RCU-41 must be clearly identified at the RCU-41 and at the utility meter to facilitate both the initial installation process and subsequent maintenance. A standardized letter-based labeling code is recommended as shown below.

E	Electric Meter
W	Water Meter
G	Gas Meter
S	Steam Meter
P	Power Supply



Cables connecting multiple water meters to the RCU-41 shall be labeled with the correct letter designator and a number starting with the number one (1). The same would apply for multiple meters for other utilities.

W1	Water Meter No. 1
W2	Water Meter No. 2



Wire marker tape labels manufactured by 3M are recommended for tagging cables.

E	3M Part Number SDR-E
W	3M Part Number SDR-W
G	3M Part Number SDR-G
S	3M Part Number SDR-S
P	3M Part Number SDR-P
1	3M Part Number SDR-1
2	3M Part Number SDR-2

A 3M-marker tape dispenser, part number STD is recommended to organize and manage the wire markers.

Reminder: Mark all cables at both ends, RCU-41 and utility meter, with correct label.

Cable Preparation and Color Coding

All metering system signal wiring is to be accomplished with four-conductor, separately insulated, 22 gauge, solid copper conductors contained in a single outer jacket. This cable must be UL listed for use in dwellings and ultraviolet resistant for outside use. The individual wire insulation colors must be red, black, green and yellow.

A uniform color coding arrangement is used when making connections to facilitate both the initial installation process and subsequent maintenance. This color coding should be followed without exception.

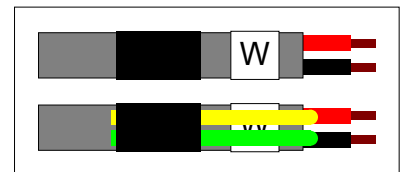
Cables connecting each utility meter to the RCU-41 must be carefully prepared for attachment to meters and to the RCU-41 terminals.

Exercise care when removing the outer jacket of the cable. Do not nick or otherwise damage the insulation of the individual conductors. Do not expose more conductor than necessary to make neat and reliable connections to the RCU-41 and to the metering devices.

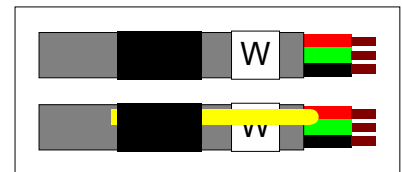
Exercise similar care when removing insulation from individual conductors. Do not nick or otherwise damage the copper conductors. Do not remove more insulation than necessary to make neat and reliable connections.

As stated previously, cabling requirements will vary depending on the method used by the metering device to communicate with the RCU-41.

Use the red and black wires for cables connecting each dry contact and pulse type utility meter to the RCU-41. The yellow and green wires are to be folded back onto the cable jacket and held in place with vinyl electrical tape or a cable tie.



Use the red, green and black wires for cables connecting each encoded type utility meter to the RCU-41. The yellow wire is to be folded back onto the cable jacket and held in place with vinyl electrical tape or a cable tie.



Cables connecting the 6 Volts AC power from the electrical utility meter (or the optional power supply) to the RCU-41 should use the red and black wire (figure not yet available).

Making Connections at the Meter

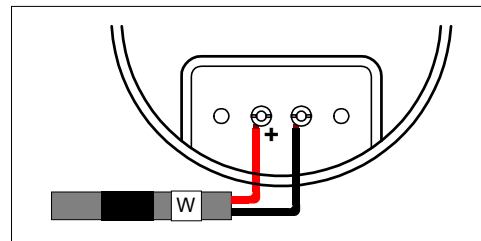
All connections to utility metering devices should be made as described below.

Electrical Meters

Connections to electrical meters are made using the pre-installed pigtail cable. This cable should contain four (4) individual wires. The Red and Black wires are the pulser output and are to be connected to the RCU-41 electrical metering input. The Green and Yellow wires are the 6 Volt AC power supply and are to be connected to the RCU-41 power input. (See **"Making Connections at the RCU-41"**)

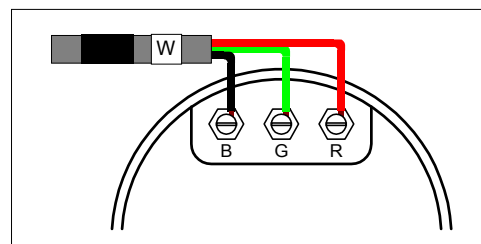
Water Meters

Connections from pulse-type utility meters to the RCU-41 are made using two wires (the red and black wires). Polarity is important for this meter connection. The plus (+) terminal on the meter must be connected to the plus (+) terminal at the RCU-41. Use the red wire for this connection. The remaining terminal on the meter is connected to the minus (–) terminal at the RCU-41. Use the black wire for this connection.



It may be necessary to splice into existing remote meter reader circuit wires to make the water meter connection. This can be accomplished by cutting the existing wiring at the appropriate location (either at the water meter or at the remote indicator) and splicing in the cable that will connect to the RCU-41 water meter input. It is extremely important to ensure that the circuit polarity is correct or the RCU-41 will not respond to the meter's pulses. Use 3M Scotchlok UR2 connectors to make the splice and an approved tool for compressing the connectors. (See **"Making Connections with 3M's UR2 and UY2 Connectors"**)

Connections from encoder-type utility meters to the RCU-41 are made using three wires (the red, green and black wires). Correct color coding is important for this meter connection. Connections to encoding utility meters should be made using the red, green and black. Connect each wire to the meter head being careful to observe the color code.

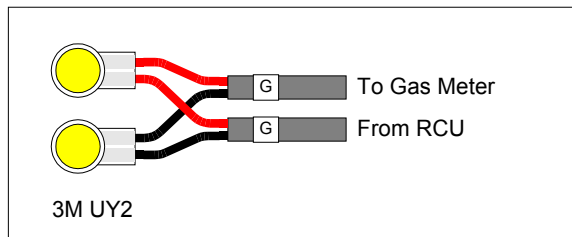


Gas Meters

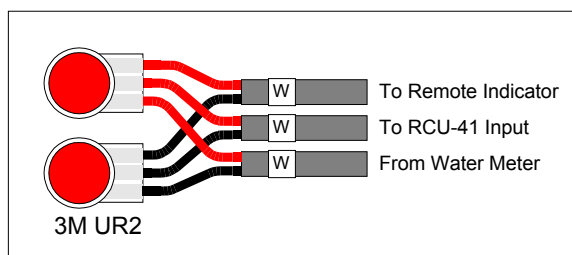
Connections to gas meters shall be made using the pre-installed pigtail cable. This cable should contain between two (2) and four (4) individual wires. The Red and Black wires are the dry contact pulse output and are to be connected to the RCU-41 gas metering input as shown in **"Making Connections at the RCU-41."**

Making Connections with 3M Scotchlok UR2 and UY2 Connectors

It may occasionally be necessary to splice wires. This can be accomplished by trimming the wiring at the appropriate location and splicing them with 3M UY2 connectors. It is extremely important to ensure that the circuit polarity is correct or the RCU-41 will not respond to the meter's pulses.



It may be necessary to splice into existing remote meter reader circuit wires to complete the water meter connection. This can be accomplished by cutting the existing wiring at the appropriate location (either at the water meter or at the remote indicator) and splicing in the cable that will connect to the RCU-41 water meter input. It is extremely important to ensure that the circuit polarity is correct or the RCU-41 will not respond to the meter's pulses.



Use 3M Scotchlok UR2 and UY2 connectors to make splices and an approved tool for compressing the splicers.

The 3M Scotchlok UR2 Connector (red cap) has three ports and accepts any two or three solid copper conductor combinations of 19-26 AWG with a maximum insulation outside diameter of 0.082 inches. The wires joined can be of different wire gauges. The UR2 is filled with a sealant to provide moisture resistance.

The 3M Scotchlok UY2 Connector (yellow cap) has two ports and accepts any two solid copper conductor combinations of 19-26 AWG with a maximum insulation outside diameter of 0.082 inches. The wires joined can be of different wire gauges. The UY2 is filled with a sealant to provide moisture resistance.

Use caution to make sure the conductor is pushed completely into connector before crimping. Insulation need not be removed from the wire.



The correct compression tool (AEI Part No. 12543) is required for compressing UR2 and UY2 connectors. Do not use other types of pliers to compress these connectors.



Making Connections at the RCU-41

Connections at the RCU-41 are simple and straightforward. They must, however, be made correctly, otherwise the RCU may function erratically, and possibly not at all. The factory standard configuration provides for six metering devices and is shown below.

Inputs 1 through 4 are identical and may be configured for either dry contact metering devices or pulse type metering devices. Care must be exercised to insure that connections are made correctly for the type of meter connected.

Inputs 5 and 6 are identical (to each other) and are used exclusively for encoded metering devices. Once again, care must be exercised to insure that connections are made correctly.

One can see from the terminal layout the various options for metering device connections (see Figure xx).

Inputs 1 and 2 are configured for dry contact metering devices. There are four connection points for each metering device and all are used. Note that a jumper is required between minus (–) and ground (GND) for this input configuration to function. While wire polarity is not important, it is wise to maintain uniform wiring throughout the installation process.

Inputs 3 and 4 are shown configured for pulse metering devices. Note that the jumper is not required for this input to function. Wire polarity is critically important. The voltage supply (+V) and ground (GND) terminals are not used for this configuration.

Inputs 5 and 6 are configured for encoded metering devices. Wire connections between the metering device and the RCU-41 must be correctly made. Use extra care must be exercised when wiring encoded meters.

The bottom two terminals are the power input connection to the RCU-41, which requires 6 Volts AC. This power is normally derived from the pulser board in the electrical meter, but may be obtained from a separate power supply when necessary.

1	Steam	+V	⊖	Red Wire from Meter	
		+	⊖	Black Wire from Meter	
		–	⊖	Jumper	
		GND	⊖		
2	Gas	+V	⊖	Red Wire from Meter	
		+	⊖	Black Wire from Meter	
		–	⊖	Jumper	
		GND	⊖		
3	Electric	+V	⊖	N/C	
		+	⊖	Red Wire from Meter	
		–	⊖	Black Wire from Meter	
		GND	⊖	N/C	
4	Pulse Water	+V	⊖	N/C	
		+	⊖	+ Terminal on Meter	
		–	⊖	– Terminal on Meter	
		GND	⊖	N/C	
5	Encoded Water	PWR	⊖	Red Wire from Meter	
		DATA	⊖	Black Wire from Meter	
		GND	⊖	Green Wire from Meter	
6	Encoded Water	PWR	⊖	Red Wire from Meter	
		DATA	⊖	Black Wire from Meter	
		GND	⊖	Green Wire from Meter	
			⊖	Yellow Wire from Electrical Meter	
			⊖	Green Wire from Electrical Meter	
	Power				

Appendix A — Drilling Safety

Job safety is paramount. Be consistent in following safety procedures.

- ◆ Check for items that may fall off the wall before drilling through walls.
- ◆ Wear eye protection when drilling holes.
- ◆ Use a battery powered drill or a double-insulated electric drill.
- ◆ Never modify the AC cord by cutting the polarized prong, removing the grounding prong or splicing in additional wire.
- ◆ Never use a cord or extension cord that has been repaired with electrical tape.
- ◆ Use extra caution when using an electric powered drill in wet or damp locations.
- ◆ Use sharp drill bits. Use light pressure and let the drill do the work. Do not push too hard.
- ◆ Use a hammer drill when drilling through brick or cement.
- ◆ After drilling, be careful not to lay the drill bit against anything that could burn or melt. The tip of the drill bit can be extremely hot after use.

Appendix B — Mounting Hardware

Wood Siding

When fastening to wooden structures, use either nail or screw-type fasteners.

The most common fastener is a plastic clip with a nail. These are often referred to as "Roka" clips, even though this type of clip is made by several manufacturers. "Roka" is the brand name for just one manufacturer. When hammering this clip in, be careful not to hit the cable with the hammer as you could damage the cable.

Another type of clip is made out of plastic or metal. It has a U or C-shaped clip. These types of clips are available with either nails or screws to attach to the building.

[Arrow T-18 Staple Gun]

Asbestos Shingles

Although many homes have asbestos shingles, other types of materials are also in use. Research the building codes and practices for homes in your area to determine if asbestos siding is common.

There has been much concern over asbestos as a potential cancer-causing agent. This problem exists primarily when drilling in asbestos shingles, but the risk of airborne particles exists whenever you are working with it. Consult your safety coordinator for assistance in determining how to work safely with or around this type of material.

Use extreme caution when attaching any material to shingles, such as cedar siding, slate or asbestos, because they are fragile. Screws or nails placed too close to the edges may result in damage to the shingle. Many of these types of shingles are no longer manufactured, making it extremely difficult to repair any damage. Drilling a small pilot hole will reduce the chance of damage to this type of siding, but try to avoid drilling if at all possible. Look for another cable route. Consider a crawl space or unfinished basement, if possible.

If you have no other option than attaching to shingles, follow these guidelines:

Only use the joints between the shingles to place nail clips or drive rings.

Clips attached with anchors and screws produce a more secure attachment than those with nails do. Remember to take extra care and drill with an extra-light touch. This will help you avoid breakage. Be sure your drill bit is sharp.

The only support underneath a shingle is along the nail seams where the top and bottom of the shingles overlap. When using nail clips on a horizontal run, keep the cable directly under a row of shingles. The shadow created by the overlapping shingles will help hide the cable.

Do not over tighten the attachment screws, as this could chip or break the shingle.

Aluminum Siding

Aluminum siding attachments are made with vertical or horizontal siding clips. These clips are designed to attach cable onto the aluminum siding without making any holes. Use them as follows:

Note that clips have a slot into which you place the cable.

Attach the clip to the siding by wedging the top tapered edge into a Joint where the siding is connected or overlapped.

Follow normal guidelines for spacing the clips horizontally and vertically.

Never hammer, screw or staple into aluminum siding.

Vinyl Siding

Vinyl siding is difficult to work with because, like aluminum, you should not make holes in it. Vinyl is fragile and may crack if pressure is applied to a hollow area. Older vinyl can become brittle, especially in cold temperatures. Use these guidelines when attaching to vinyl siding:

Place vertical clips 24 inches to 36 inches apart into the joints between separate pieces of the siding.

With the customer's permission, the cable can be installed down the corner molding of vinyl siding. It must be attached at the top and bottom using a secure attachment. Gently pull the edge of the corner piece up, just enough to slide the cable under and behind it.

Stucco

When attaching to stucco finished buildings, do the following:

Drill and insert metal or plastic dips with screws and anchors when attaching to stucco.

If you need to use a nail clip or drive ring, drill a pilot hole before hammering it into the stucco.

Brick

The most common fasteners used on brick buildings are clips with anchors and screws. These come in a variety of sizes. Concrete and cinder block installations can be handled in a manner similar to brick. To install this type of attachment:

Drill a hole into the mortar joint. Do not drill directly into the brick, as you could chip or break it.

Insert a plastic anchor into the hole.

Insert the screw fastener with the C or U-clip surrounding the coaxial cable.

When installing onto cinder block, it is possible to drill and attach fasteners directly to the block rather than the mortar Joint, but avoid drilling near the edge of the block. Chipping and breakage may occur.