


Installation of the Wiring Harness

(for MRX-12 through MRX-48)

1. Verify that the host system wiring is in good condition and that there are no shorted solenoids, relays, or field wiring circuits.
2. Connect a P-30 wiring harness(es) (pigtail) to the device to be controlled following the instructions included with the wiring harness(es) (see **Stations chart** below). The P-30 wiring harness is considered the same as a universal wiring harness.

 When connecting more than one wiring harness, there is no need to connect the tan, pink, or red with the yellow stripe wires (from ports 13-24, 25-36, or 37-48). (See **Illustration 1**.)



Any unused wires should be insulated to prevent shorting. Use small wire nuts or a good quality electrical tape even if the wires are cut off.

WIRE	STATIONS			
	1-12	13-24	25-36	37-48
Black	1	13	25	37
Brown	2	14	26	38
Red	3	15	27	39
Orange	4	16	28	40
Yellow	5	17	29	41
Green	6	18	30	42
Blue	7	19	31	43
Violet	8	20	32	44
Gray	9	21	33	45
White	10	22	34	46
Red/Black	11	23	35	47
Red/Green	12	24	36	48

3. Verify that there are no connections made to any circuit that uses any voltage other than 24VAC. Pump starters sometimes use 115VAC and even 230VAC, which would cause serious non-warranty damage to the remote controller.
4. If the remote controller is used with more than open host controller at the same time, there must be a system common wire connected to all controllers. If there is more than one transformer used in these systems, verify that all the transformers are in phase with each other before connecting the remote controller. If there is an out of phase transformer, there will be transformer damage, controller damage, a blown fuse, a tripped circuit breaker, or all of the above.

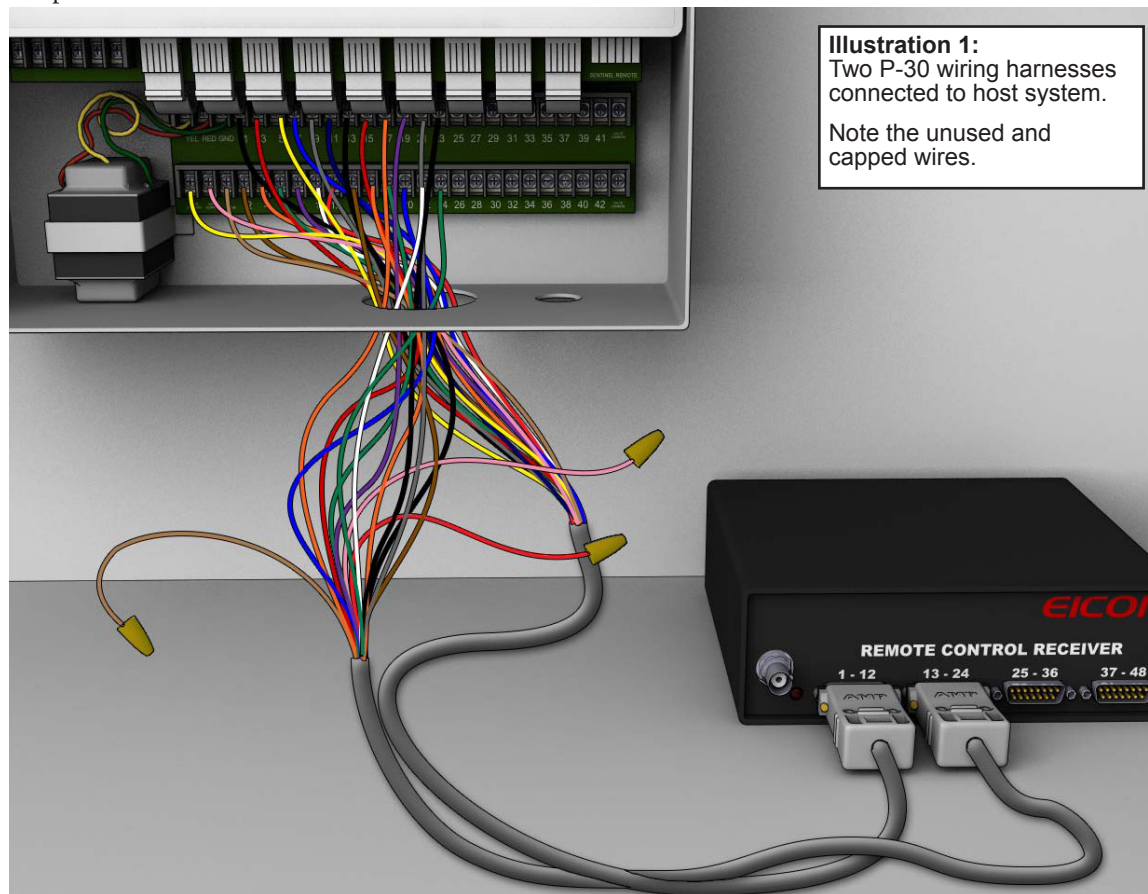


Illustration 1:
Two P-30 wiring harnesses
connected to host system.

Note the unused and
capped wires.

Expansion Port Cable Connection

(ADAPT-1 and ADAPT-2 cables sold separately.)

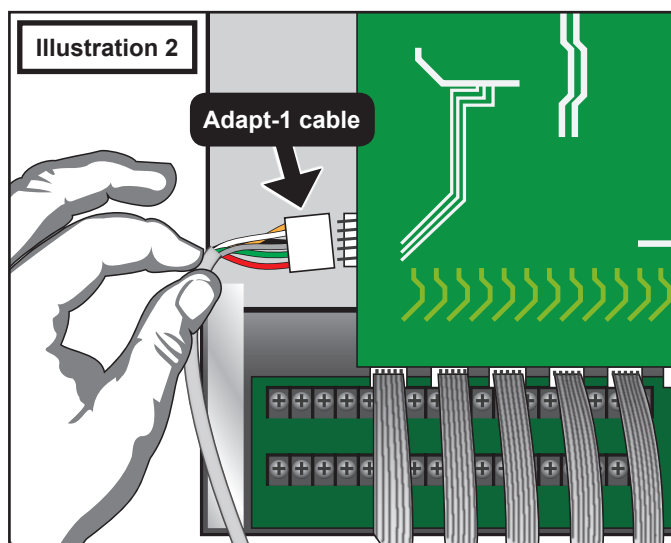


Do not use a universal wiring harness when using this expansion port. Power is supplied through this port when it is used--no other connections are required. Port compatible controllers include Irritrol, Superior Sterling, and others. Contact EICON for other compatible controllers.




Before connecting to or disconnecting cables from the expansion port, verify that the CONNECT-DISCONNECT switch is in the DISCONNECT position.

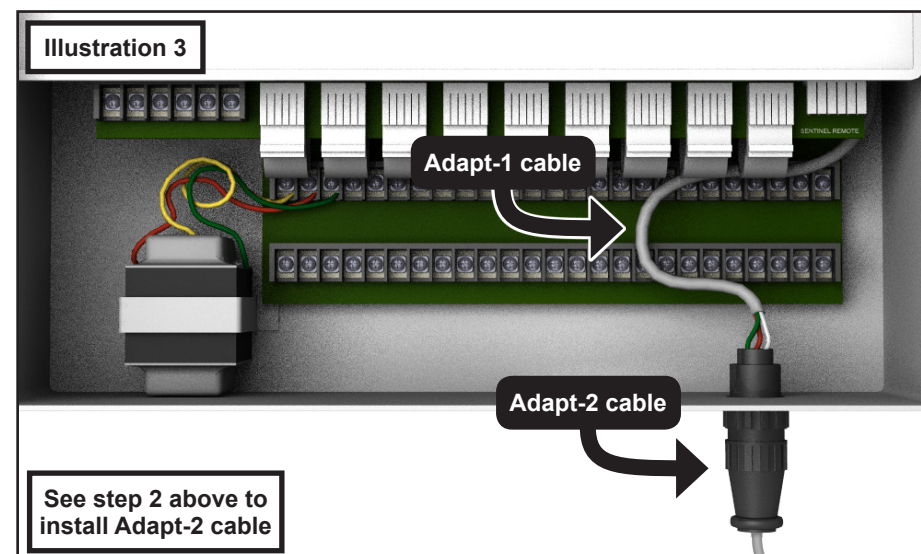
1. If using the universal version of the remote controller, connect an extension cable (Part No. ADAPT-2) to the 9-pin D-Shaped connector on the rear of the remote controller.



2. Connect the other end of the extension cable (the end with the circular connector) to a controller equipped with an adaptor cable (Part No. ADAPT-1). If power is applied to the host controller, the PWR indicator on the front of the receiver should begin blinking. Place the CONNECT-DISCONNECT switch in the CONNECT position. The remote controller should be operational at this time.
3. Proceed with step 5 under **Remote Controller Operating Instructions**.
Contact selling distributor or EICON for assistance if needed.

Installation of Adapt 1 Cable


1. Install the Adapt-1 cable as indicated in **Illustration 2**.
2. Verify that the locking barbs on the white female connector of the Adapt-1 cable engage the locking tab of the remote ready connector.
 Do not install this connector backwards or with pins offset.
3. Knock out the plug in the bottom of the controller cabinet and install the black circular connector using the screws included with the Adapt-1 cable assembly.
4. Use one of the screws to retain the cap strap.
5. Always replace the cap when this connector is not in use.

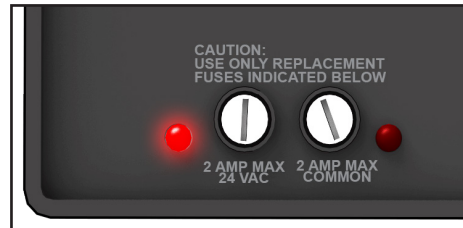


Fuse Selection

Do not vary fuse 1 (F1) from its value of 2 AMP. Fuse 2 (F2) is factory set at 2 AMP. The F2 fuse protects the host transformer that provides 24 VAC power.

If a fuse other than what the factory provides is required, install a fuse in the F2 fuse holder that will protect the host 24VAC transformer. For example, if the host system has a transformer that is only capable of activating 3 outputs at the same time, use fuses that will open when more than 3 outputs are activated. If there is a 1.5 amp fuse in the host controller, use a 1.5 amp or smaller rated fuse, etc.

 If a fuse opens or “blows” because of excessive current demands or shorting, a red indicator next to the defective fuse will illuminate. Repair the cause of the problem and replace the defective fuse with a fuse that has a rating no greater than recommended above. Damage caused by improper selection of fuses will void the warranty.






Handheld Transceiver Instructions

EICON reserves the right to change specifications on any product without notice. The model and brand name of equipment supplied by EICON may change.

1. Verify that the battery and the antenna are installed. Verify that the battery is charged. Spare batteries and chargers are available.
2. Select channel 1 with the channel selector located on top of the transceiver (**Illustration 4**). (Channel selection may vary with special frequency orders.)
3. Turn the volume control knob (**Illustration 4**) to the right to turn the transceiver on.
4. Two-way voice communication and the remote operation of selected outputs are now possible. Squelch adjustments may be necessary.

Remote Controller Operating Instructions

-  If an EICON remote controller does not have the timing options, any outputs activated will remain on until they are turned off using the handheld transceiver or until power is removed.
-  A variety of features and options are available. One feature that is often overlooked is the “lock” feature (refer to step 8 below). This feature prevents interference from other identical remote controller operators that happen to be in close proximity. Optional PL (private line) is available for both the receiver and the handheld which eliminates interference without the need for additional key entries.

1. Connect the wiring harness for the first 12 outputs to the 1-12 extension. Do not make repeated or jerky insertions.
 Only the 1-12 connector should have the Tan (24VAC) and Pink (COMMON) wires connected to the host system. Do not connect the Tan or Pink wires to anything on the 13-24, 25-36, or 37-48 connectors if so equipped. The pink wire in the 1-12 connector should always be connected to the valve common terminal or wire. The tan wire in the 1-12 connector should always be connected to the 24VAC source (the leg of the 24VAC transformer that is not connected to the valve common and gives an AC voltage reading of 24VAC in relation to the valve common).
2. Install the supplied antenna or an appropriate antenna according to the antenna manufacturer's instructions. Be sure that there is not an electrical connection between the cabinet and any metal antenna parts (including connectors). Verify that there is not a connection by using an OHM meter.
3. If used, connect the 13-24 extension to the 13-24 harness, the 25-36 extension to the 25-36 harness, and the 37-48 extension to the 37-48 harness.
4. Check to see if the PWR light is blinking. If it is blinking, the remote controller should be operational.



5. When a handheld transceiver is used, an address code is needed to gain access to the controller. If the address code has not been changed, there is a three-digit code located on the rear of the remote controller.


To gain access to a remote controller, press the * (star) key 2 times followed by the three digits of the code, then the # key. (Use only gentle fingertip pressure on the keyboard as any physical damage to the keyboard voids the keyboard warranty.)



Once addressed, any output can be activated by entering the number of the output desired followed by the # key. (What is meant by “output” in this sentence?) (Is there a list of numbers for the various outputs?)

If the receiver is within visual range, the PWR indicator will increase its blink rate indicating that the receiver has been addressed. The blink rate will continue flashing at the faster rate until the receiver has been locked. See No. 8 below. (Timing option equipped remote controllers will turn off all outputs and lock themselves after 30 minutes of being addressed.)


- Additional outputs can be activated by entering the number of the desired output followed again by the # key. (Be aware that numerous outputs can be activated and keep in mind the limits of the host system.) The master output is activated any time one or more outputs have been activated.

-  Pressing keys ‘19###*##’ will turn output No. 19 on and off using the # key as the “ON” switch and the * key as the “OFF” switch. Notice that no number keys were pressed after the initial output (19) keys.

The master output can be activated by itself by entering the # key only. If an output has been previously activated, that output is remembered and will come on when the # key is entered.

All outputs can be turned off at the same time by pressing the * key twice.

8. The standard locking code is 96* if no special timing codes are desired. (The locking code in earlier controllers is 46*). Locking prevents accidental tampering. Re-entry is required to make any changes to the status of the remote controller once an exit (locking) code has been entered.

-  Enter and send the key sequence ****123##*5#96***. This turned off output number 4 from the above example using the ****** keys and then turned on output number 5. It then locks the remote controller from further instructions all in one transmission and will leave selected valve(s) running for up to 30 minutes.

Simultaneous and sequential time-out of activated outputs is possible using one of the Syringe Timing Exit Codes listed below.

Once the syringe timing exit code is entered, the remote controller is locked from all further instructions. This prevents accidental tampering. Re-entry is necessary to make any changes to the status of the remote controller at this point.



Send the key sequence ****123#**5#75***. In this example, remote controller number 123 was addressed again, the ****** turned off output number 4 from the previous example, output number 5 was turned on and then the remote controller was locked again using the 75* (5 minute) exit code. Output number 5 will remain on for 5 minutes or until changes are made.



Send the key sequence ****123#**6#7#23#75***. In this example, remote controller 123 was address again, the ****** turned off output number 5 from the previous example, outputs 6, 7, and 23 were turned on and, since the 75* exit code was used, will remain on together for 5 minutes.

Syringe Timing Exit Codes (handheld operation)

71* = 1 minute	81* = 11 minutes
72* = 2 minutes	82* = 12 minutes
73* = 3 minutes	83* = 13 minutes
74* = 4 minutes	84* = 14 minutes
75* = 5 minutes	85* = 15 minutes
76* = 6 minutes	86* = 16 minutes
77* = 7 minutes	87* = 17 minutes
78* = 8 minutes	88* = 18 minutes
79* = 9 minutes	89* = 19 minutes
80* = 10 minutes	90* = 20 minutes
46* = 30 minutes in older controllers	
96* = 30 minutes	




After using any exit code above, access can be regained to this or other remote controllers by repeating step 5 above.



The status of the outputs will not be changed (before the syringe time expires) when the controller is locked or re-addressed unless outputs are purposely turned on or off while the remote controller is addressed.

- Move several feet away from the controller before attempting to use the handheld radio. CAUTION: Some electronic controllers are very sensitive to nearby radio transmissions.

Timed Sequential Syringe Mode

- The sequential syringe mode is activated/de-activated by selecting output No. 95.
- Turn on output No. 95 by sending the key sequence 95#. At this point any outputs that were on will be turned off.
- Enter any outputs to be included in the automatic timed sequence.
-  The lowest numbered output will be activated as it is entered and any previously entered high output will be turned off. The high numbered output is still remembered as part of the automatic timed sequence.
- To begin the timing process, exit or lock the remote controller using the desired syringe timing exit code from the list above.

All entered outputs will run, one after the other, in ascending order, for the amount of time specified by the syringe timing exit code. Timed sequential mode may be ended by either allowing the sequence to time out or by sending ****** with the handheld transceiver while the remote controller is addressed.

Single Stepping Mode

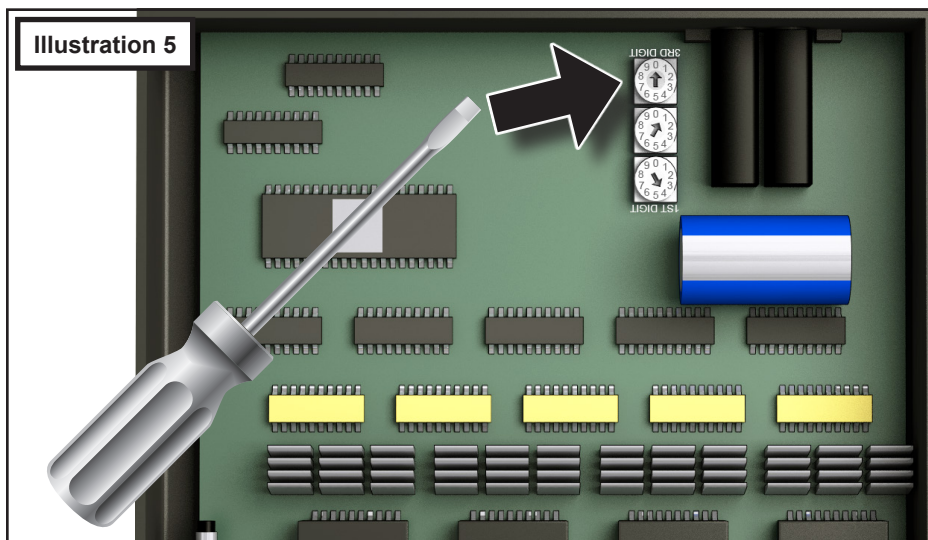
1. The single stepping or step mode is activated by selecting output No. 91.
2. Turn on output No. 91 by sending 91#. At this point the last output operated or entered in the multiple output mode will turn on if the # key is pressed. If no output was selected, output number 1 is automatically selected.
3. Send the No. 3 key to step to the next higher output.
4. Send the No. 1 key to step to the next lower output.
5. To turn off the currently selected output, send the * key.
6. Send the # key to turn the currently selected output back on.
7. The receiver can be locked by entering 96*.
8. To select the multiple output mode from the single stepping mode (and turn off single stepping), turn off output No. 91 by sending 91*.

Changing the Remote Controller Address Code

1. Remove the four enclosure screws and remove the top of the enclosure.
2. Locate three small square rotary switches labeled “1ST DIGIT” through “3RD DIGIT” (see **Illustration 5**).
3. Using a small regular screwdriver, set the switches to the code desired.



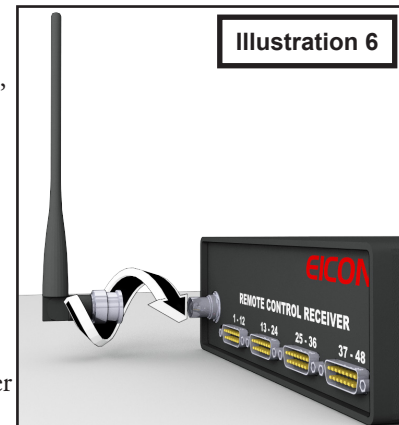
Do not have power applied when the top of the remote controller is removed. Verify that there are no antenna cables or other wires positioned where they will be damaged when replacing the top. Damage to these cables will be a non-warranty repair.



Antenna Installation

The antenna requirements of remote control systems can vary widely. Influential factors include range, terrain, atmospheric conditions, obstacles and radio traffic. Installation is accomplished by connecting the factory-supplied rubber-ducky antenna to the BNC-style connector located on the front of the remote controller (**Illustration 6**). Although not usually necessary, enhanced antennas may be required. Antennas are available through local distribution or EICON.

The antenna should be connected before power is applied to the remote controller.



DO NOT allow the exposed metal BNC connector or any metal exposed antenna parts to come into contact with the metal enclosure or any ground. If the connector is shorted to ground, a fuse will blow. Verify that the antenna is not shorted to ground or cabinets by using an OHM meter if necessary.



If the antenna is installed inside a metal enclosure, range will be impacted.

Remote Controller Testing

- When the receiver is *not* addressed, the PWR indicator blinks slowly.
- When the receiver *is* addressed, the PWR indicator blinks rapidly.

Holding the PTT key and any key on the handheld transceiver keypad (**Illustration 7**) causes the PWR indicator to stop blinking and remain illuminated.

This technique provides a method of testing all of the keypad keys as well as most of the remote controller components. (Some custom supplied and special order handheld radios will not transmit a constant tone and therefore will not allow this kind of testing.)



Troubleshooting Guide

The remote controller will not operate outputs but the PWR indicator blinks.

1. Confirm that the Pink wire in the 1-12 wiring harness is connected to the COMMON terminal and the Tan wire is connected to the 24VAC source.
2. Verify receiver operation by pressing and holding a key on a working handheld transceiver and notice if the PWR indicator on the receiver stops blinking.

If the indicator does stop blinking when the key is held down, communications are good enough to attempt operations. Notice the blink rate of the PWR indicator. If it is blinking 1 time per second, the receiver has not yet been addressed. When properly addressed, the PWR indicator light will blink 2 times per second for standard remote controllers. Specially equipped remote controllers may blink up to 20 times per second when addressed.

3. Verify that the address setting is correct. Remove the top cover of the remote controller receiver and notice the setting of the address switches. When replacing the top cover, be careful not to pinch the antenna cable or the radio data module cable between the retaining screw bosses or enclosure halves. Repairs that are necessary because of damage to these cables is not a warranty item.
4. If the receiver is not addressed, press the following keys of the handheld transceiver: **nnn# where "n" is the corresponding digit of the 3 digit address code. The PWR indicator should begin blinking more rapidly.
5. If the PWR indicator blinks at the rate of 2 times per second or faster, attempt to turn on a selected output by pressing the following keys on the held held transmitter: n# where "n" is the number of the selected output. The selected output should now be on. If the output(s) operate normally, the remote controller is operational.
6. If the output does not operate normally, check the OHM reading of the selected output(s) load with a known good OHM meter and verify (in harness 1-12) that the PINK wire of the harness is connected to the COMMON wire of the system and the TAN wire is connected to a source of 24VAC.

The PWR indicator does not blink or illuminate

1. Verify with a voltmeter that there is 24 VAC between the Pink and Tan wires in the 1-12 wiring harness.
2. Check for defective, blown or open fuses in the receiver by observing the indicators next to the fuses in the rear panel. Replace fuses if necessary with the type indicated by the placard above the fuses and check for the reason for the blown fuse(s).



An antenna shield that is shorted to a cabinet, shorted solenoids or internal problems with the remote controller itself can cause blown fuses. Use only factory specified fuses to avoid non-warranty repairs.

The remote controller operates normally but reliable range is 300 yards or less and other receivers seem to have normal range.

1. Check antenna connections and proper antenna installation at the remote controller. For proper operation, antennas must be mounted outside and at least slightly above any metal obstacles and/or enclosures.
2. Large obstructions such as buildings or terrain can affect reliable range. Enhanced range capable (higher gain) antennas and cables are available for installations where reception is a problem.
3. Verify that the battery in the handheld transceiver is in good condition and fully charged. If the handheld transceiver is heavily used, replace the battery at least once a year. Never leave the handheld transceiver or battery charging for extended periods of time. 16 hours is always enough time to fully charge a battery.
4. If none of the above is the problem, return the remote controller receiver and handheld transceiver to the factory for service.

The remote controller operates normally but fuses fail when specific outputs are activated.

1. Check the resistance of the solenoids that are operated by the remote controller with an OHM meter to locate any that may be shorted. Replace or repair defective solenoids or wiring.
2. Verify that there are not an excessive number of solenoids connected to a single output on the remote controller.

When an output is activated with the handheld transceiver, it only remains activated for 30 minutes.

There is an automatic timeout in the remote controllers that provides a safety shut down of all activated outputs after 30 minutes of the last addressing of the selected remote controller. If it is desirable to have an output stay on longer than 30 minutes, addressing and exiting the remote controller without specifying any output(s) can reset the automatic timer.

The handheld transmitter seems to work but some keys are questionable.

Stand within visual range of a working remote controller. Press and hold 1 key at a time on the handheld transceiver. Observe the blinking of the PWR indicator on the front of the remote controller. If the key that is held is working properly, the PWR indicator will stop blinking in the ON state. Repeat this test for all of the keys on the handheld transceiver until all of them have been tested. If any keys fail to stop the blinking of the PWR indicator, verify that the battery is fully charged and the channel selector is properly positioned. The keypad or other portions of the handheld transceiver might be in need of repair if problems persist.

The remote controller operates the outputs connected to the first host controller, but outputs connected to other host controllers do not operate from the remote controller.

1. Verify that there is a common wire connecting all host controllers together. If the common wire does not connect all controllers, only those valves with a common wire connected to the remote controller will operate.
2. Check to see if the same problem occurs at other host controller locations. If the remote controller operates normally at other locations, verify all wiring and voltages at the location where the problem occurs. If the problem persists, return the remote controller for repair.

Someone else is using a remote controller within reception range of my remote controller and they are operating my valves.

1. Secure mode is not being used. Use the secure mode (page X) while interference from other remote controller operators persists.
2. The remote controller has not been locked. Use any of the exit codes to lock the remote controller. See number “8” under Remote Controller Operating Instructions earlier in this manual.

Outputs that are not connected to valve circuits are giving a 24VAC reading even though they have not been turned on.

The remote controller does its output switching with an electronic device called a Triac. Triacs leak enough voltage to cause most voltmeters to indicate system voltage when there is no load on the Triac. An open valve wire will have the same effect as an output that has no wire or load. Notice that a system in good working order gives a reading of 0VAC or very near 0VAC on deactivated outputs that are connected to loads such as solenoids or relays.

Electrial and RF Specifications

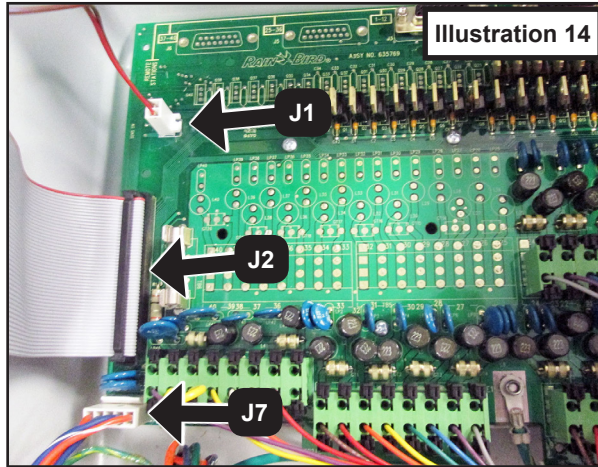
Power requirement	24VAC minimum 40VA
Output current for valves @ 24VAC each output maximum	1.5A
Radio transmitter output power (remote controller 2 way units only)	2 watts +/- 10%
Radio receiver sensitivity (handheld transceiver and remote controller)	1uV typ.
Radio Frequency	user order
Fuse requirement F1 (factory)	2 AMP AGC
Fuse requirement F2 (factory)	2 AMP AGC

Installation for the RLM-RB

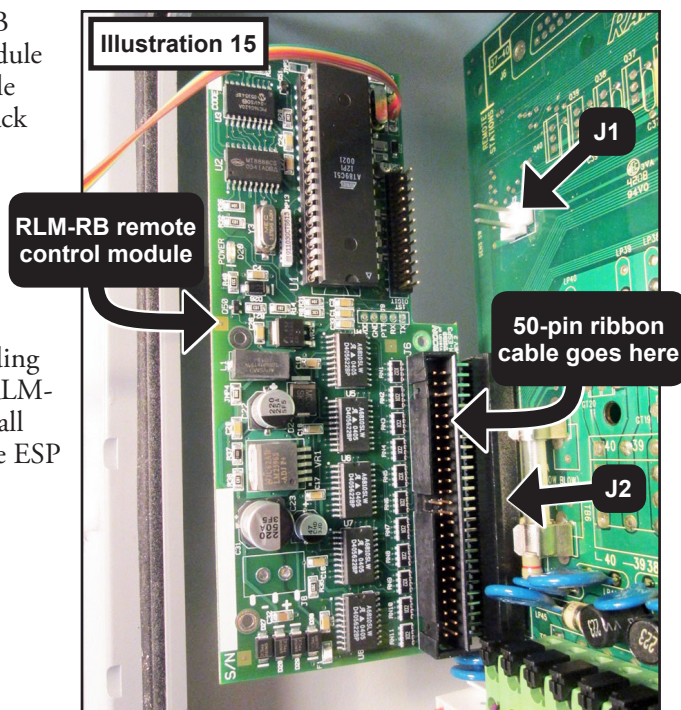
Retro-Link for Rainbird ESP Installation Instructions

The EICON RLM-RB remote control system is a compact, easy to install module that may be installed in the Rainbird ESP model controllers. Installation requires no tools and may be easily accomplished by following these simple instructions.

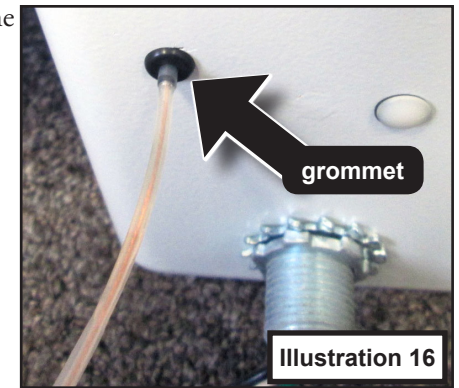
1. Open the Rainbird ESP controller exposing the back panel with wiring connections (**Illustration 14**).
2. Disconnect the J7 transformer connector.
3. Carefully disconnect the large ribbon connection (J2) and the small two wire connection (J1).



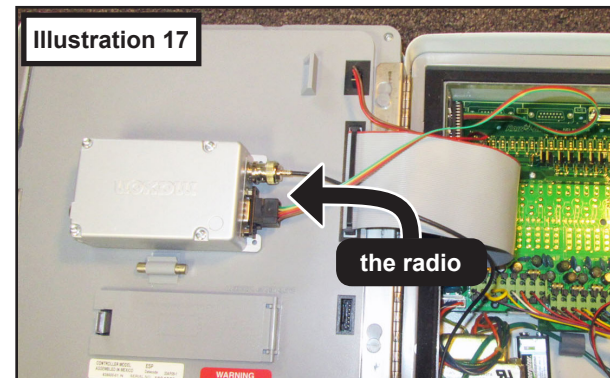
4. Install the RLM-RB remote control module into the 50-pin male connector in the back panel (J2) (**Illustration 15**).
5. Connect the 50-pin cable from the face panel of the ESP controller into the corresponding connector on the RLM-RB module. Reinstall connector J1 on the ESP controller.



6. Remove the front left screw plug in the grommet. Route the RLM-RB antenna wire through this grommet. When properly installed, 6" of the antenna should be exposed (**Illustration 16**).



7. Attach radio firmly to lid with supplied velcro tape (**Illustration 17**).



Be certain that no part of the Retro-Link or data radio comes in electrical contact with anything including the controller enclosure in order to prevent expensive non-warranty repair costs to the Retro-Link and/or the controller due to improper installation.

8. Reconnect the transformer connector J7.

At this time the red LED on the RLM-RB should begin flashing slowly. This indicates that the module is installed properly and ready for operation. If the LED is not illuminated and flashing, review the installation instructions. If any problem cannot be resolved, contact EICON.

Toro Commitment to Quality

Toro is committed to developing and producing the highest quality, best performing, most dependable products on the market. Because your satisfaction is our first priority, we have provided the Toro Helpline to assist you with any questions or problems that may arise. If for some reason you are not satisfied with your purchase or have questions, please contact us toll free at **1-877-345-8676**.

Warranty

The Toro Company and its affiliate, Toro Warranty Company, pursuant to an agreement between them, jointly warrants, to the owner, against defects in material and workmanship for a period of five years from the date of purchase. Neither The Toro Company nor Toro Warranty Company is liable for failure of products not manufactured by them, even though such products may be sold or used in conjunction with Toro products. During such warranty period, we will repair or replace, at our option, any part found to be defective. Return the defective part to the place of purchase. Our liability is limited solely to the replacement or repair of defective parts. There are no other express warranties. This warranty does not apply where equipment is used, or installation is performed, in any manner contrary to Toro's specifications and instructions, nor where equipment is altered or modified. Neither The Toro Company nor Toro Warranty Company is liable for indirect, incidental or consequential damages in connection with the use of equipment, including but not limited to: vegetation loss, the cost of substitute equipment or services required during periods of malfunction or resulting non-use, property damage or personal injury resulting from installer's negligence.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. All implied warranties, including those of merchantability and fitness for use, are limited to the duration of this express warranty. Some states do not allow limitations of how long an implied warranty lasts, so the above limitation may not apply to you. This warranty gives you specific legal rights and you may have other rights which vary from state to state.

FCC 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.

FCC Note: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

Note: 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 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.

The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How To Identify and Resolve Radio-TV Interference Problems." This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, stock # 004-000-00345-4.

This Class B digital apparatus complies with Canadian ICES-003. International: This is a CISPR 22 Class B product.



Count on it.

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