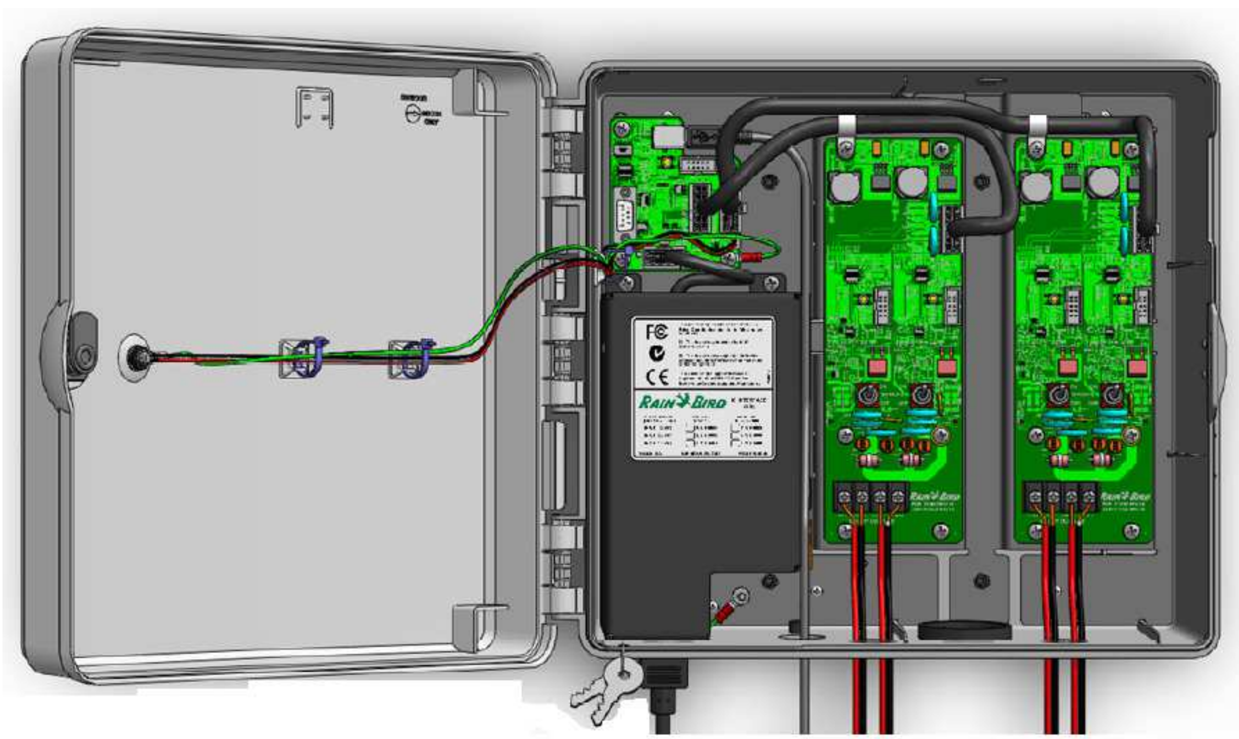
IC System™
Design Guide v 2.3



Updated August 2016

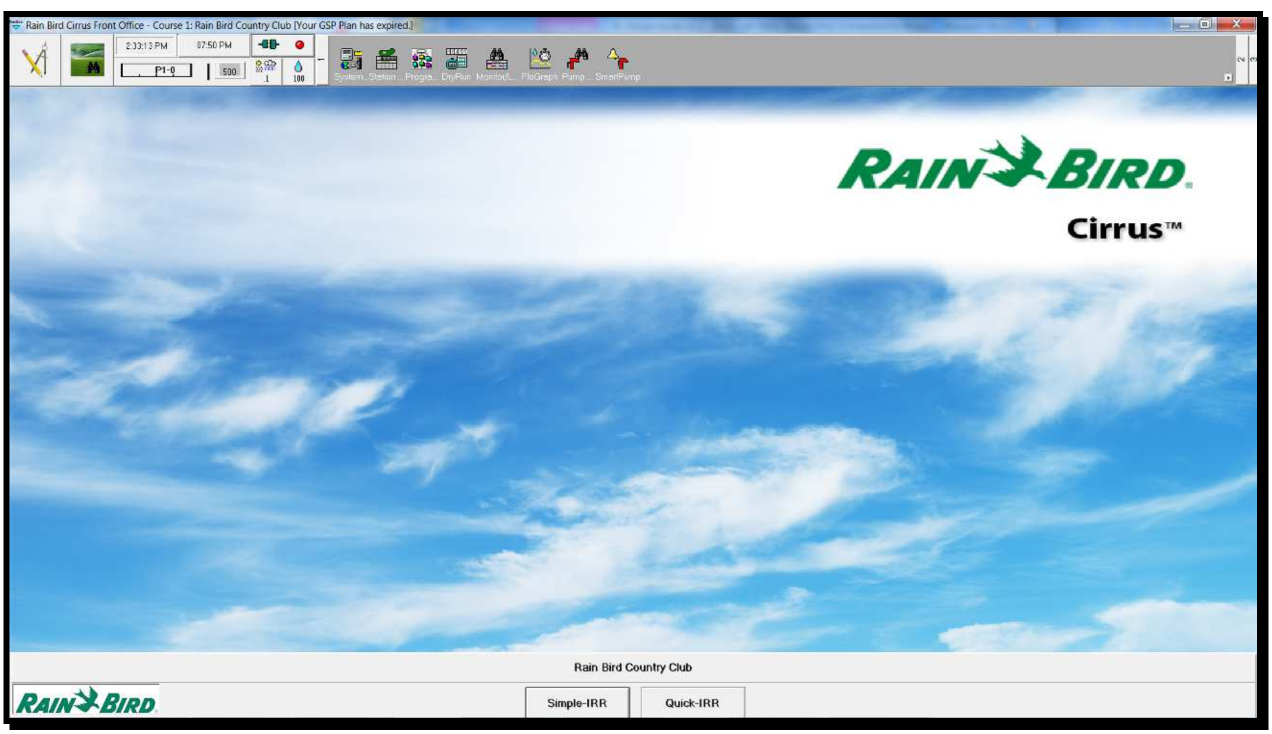
Introduction

This Design Guide is presented to help clarify standard design questions for the IC System™. If there are any questions or specific examples that may not be adequately addressed within this guide, please contact your Rain Bird sales or service manager for additional clarification to aid in the proper design for the specific application.

IC System– Product Definitions

Central Control Software

Cirrus™, Nimbus II™, Stratus II™ and Stratus LT™ are the Central Control applications that are available to operate with the IC System. The software is used to establish the irrigation system parameters, operate the system and perform troubleshooting tasks. There are many troubleshooting diagnostic features within the software that enable the user to quickly diagnose and identify the location of field related issues on the course.



ICI

The Integrated Control Interface (ICI) is the electronic hardware and firmware that accepts commands from the Central Control Software and directs them to the field. The ICI also communicates intelligently with the field in order to update the status back to the Central Control Software.

ICM

The Integrated Control Module (ICM) is mounted on Rain Bird manufactured valve-in-head golf rotors or electric in-line valves. The ICM communicates directly to the Rain Bird central control software via Rain Bird MAXI™ cable two-wire path and the ICI interface. The central control software automatically operates the rotors and valves throughout the golf course by activating each individual ICM as needed.

If the ICM is installed on Rain Bird electric in-line valves, an ICM valve adapter (ICMA) is required.

ICSD

The Integrated Control Surge Device (ICSD) provides surge protection for the system in case of lightning strikes.

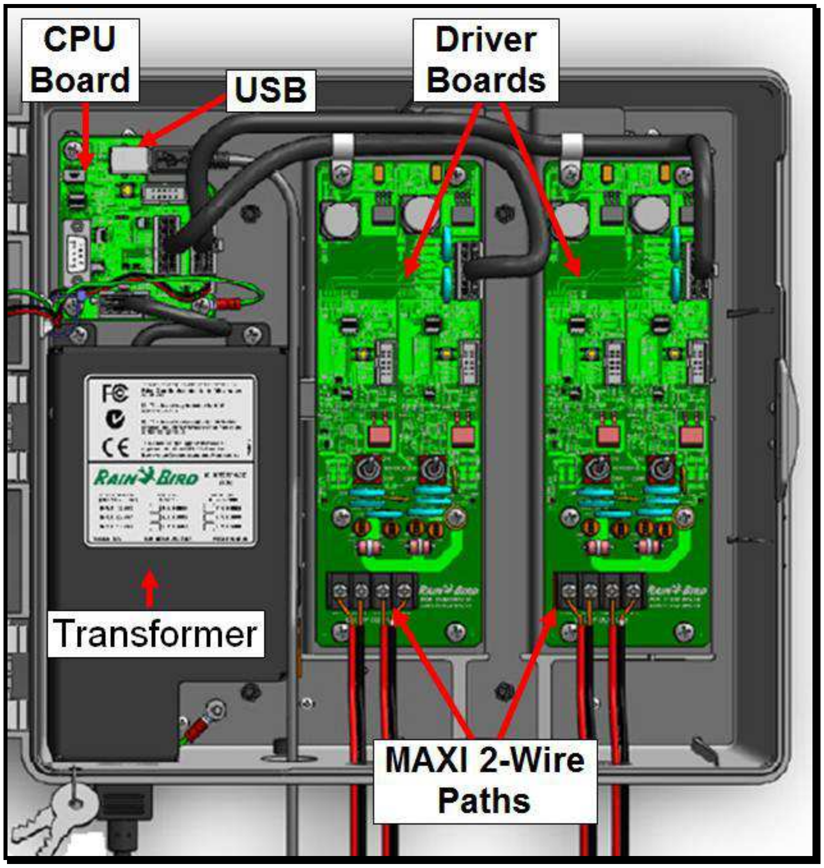
Components of the Integrated Control Interface (ICI)

CPU Board

The CPU Board provides communication between the Central Control Computer and each of the wire paths.

Driver Board

The Driver Board provides communication between the CPU board and the ICMs in the field. Depending upon the model, there may be one or two Driver Boards in the ICI.



Uninterruptable Power Supply (UPS)

Rain Bird recommends the use of a UPS to provide battery backup in cases of fluctuating or loss of power to the Integrated Control Interface (ICI). When operated by battery the IC System™ requires a "pure sine wave" signal and not a modified, square or PWM wave.

The computer running the Central Control software and ICI should be powered through a UPS. Rain Bird has verified **APC model Smart-UPS 1500** for the IC System. Different countries may have differing requirements and APC typically makes a Smart-UPS for each country according to the needs of that country. If sourcing a Smart-UPS for a different country, please source the UPS in the country in which the system will be operated. For example, do not purchase a Smart-UPS in the United States and ship it to Asia. The local Rain Bird distributor can source the appropriate UPS in-country.

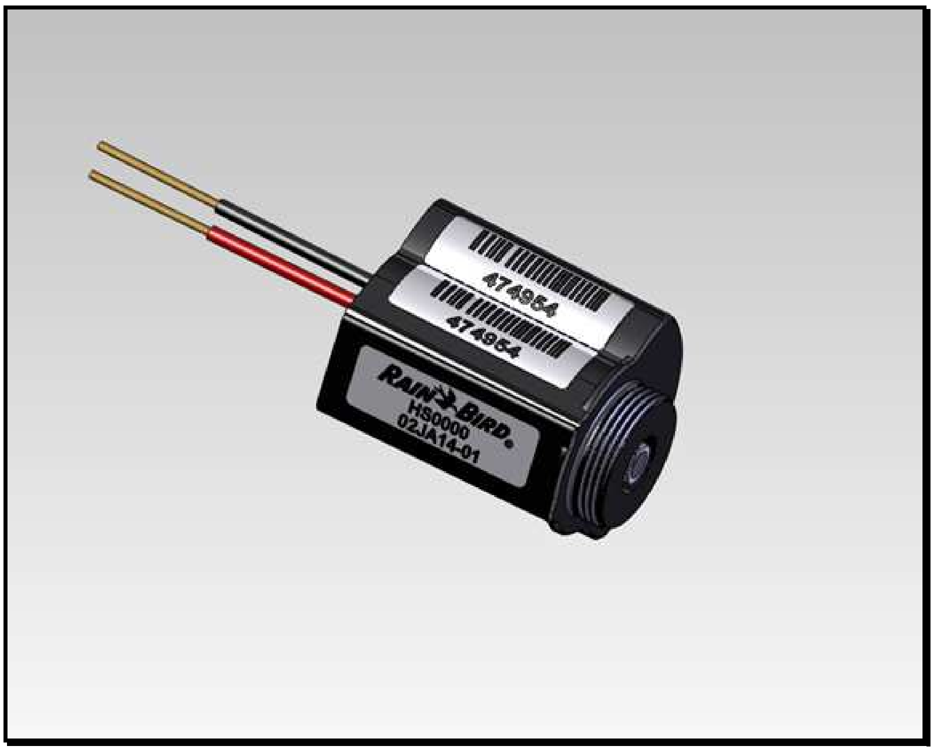
Less expensive UPS models are available in a variety of stores but it has been proven that these do not produce the "pure sine wave" signal required by the IC System. Please purchase the APC Smart-UPS 1500 model for an IC System.

How the system works

The IC System™ uses a data transfer method that sends packets of information across a two-wire path. Each ICM has a unique address that allows the central control software to communicate with each ICM individually.

The ICM has a unique "Long Address" pre-assigned from the factory that identifies it in the central control software. The Long Address is like having a phone number for each ICM. Each ICM has a label on the outside of the housing with a barcode and the printed Long Address. The user must enter the Long Address into the central control software at initial start-up.

The central control software communicates with the ICMs in the field through a high-speed method of communication that requires that each ICM is assigned a Fast Connect Address. The Fast Connect Address is assigned automatically by the central control software based on its location in the Central Control Database.



The Fast Connect Address is a method by which the Central Control Software can quickly communicate with more than one ICM at a time. This is like having a speed dial for a phone number. The Central Control Software can manage up to 750 ICMs on a single wire path by utilizing this communication scheme.

Basic Design Data

1. The IC System™ can operate up to 750 individually controlled ICMs per wire path.

2. The central control software communicates via the Integrated Control Interface (ICI) to the ICMs on the course. The ICI is mounted indoors and located near the central control computer. It is possible to remotely locate an ICI by radio, cellular or Ethernet communication. See page 18 for additional details. System capacity is determined by the level of central control software as well **as the hardware within the ICI.**

3. Each ICI contains a maximum of two (2) Driver Boards. Each Driver Board has a maximum capacity of two (2) wire path inputs.

4. A single Driver Board has a maximum capacity of 1,500 stations when both wire paths are used.

5. The ICI has a maximum capacity of 3,000 stations when all four (4) wire paths are used on the two (2) Driver Boards.

6. The IC System can be expanded above 3,000 stations with the optional hybrid capability of the central control software. Using the optional hybrid feature, multiple ICIs can be integrated into the system, each with a capacity of 3,000 stations. Consult the Rain Bird central control brochure for additional information regarding the optional hybrid feature.

7. An ICI-1500 has the capacity of 1,500 stations using two (2) wire path outputs on a single driver board.

8. An ICI-3000 has the capacity of 3,000 stations using four (4) wire path outputs on two (2) driver boards.

System Capacity

The System Capacities are as follows:

Wire Path	Maximum of 750 ICMs per wire path		
Driver Board	Two (2) separate wire paths. Maximum 1,500 ICMs per driver board		
ICI	Two (2) driver boards. Maximum 3,000 ICMs per interface		
Central Control Software	Software	Standard Configuration*	Maximum Number of Stations**
	Stratus LT	1 ICI and 1 wire path (750 ICMs)	750 ICMs
	Stratus II	1 ICI and 1 wire path (750 ICMs)	6,000 ICMs (with Wire Path Keycode and 2 ICIs)
	Nimbus II	1 ICI and 4 wire paths (3,000 ICMs)	24,000 ICMs (with 8 ICIs)
	Cirrus	12 ICIs and 48 wire paths (36,000 ICMs)	36,000 ICMs (with 12 ICIs)

* Standard configuration is number of stations and ICIs available in the software without purchasing a Hybrid Software Module. ICIs are purchased separately as needed and are not included with the central control software.

** Maximum stations available for each level of software when additional ICIs and Hybrid Software Module are purchased.

Flexible Design

The IC System™ was designed to be as flexible as possible to accommodate the future needs of the golf course.

While each wire path can accommodate 750 ICMs, if the wire path is expected to be at maximum capacity, installing an additional wire path will create extra capacity for future expansion. When designing with multiple wire paths, try to balance the load between the wire paths in order to ensure there is room for future expansion on the wire path.

Example – Total golf course need is 1,100 ICMs. We would suggest you plan on implementing two primary wire paths with approximately 550 on each path. The purpose for this is to leave room for expansion in the future.

Wire Path

The IC System™ has been designed to provide great flexibility on each wire path. The low power requirements of each ICM ensure that it is easy to design wire paths. There are three considerations when sizing the wire path for an IC System.

- Number of ICMs on the wire path.
- Total length of wire path from the interface to the farthest ICM.
- The initial length of wire path between the ICI and the first ICM on the wire path.

Take the time to carefully plan out the wire path and utilize the following documentation to aide in planning. A properly designed and installed wire path will help to eliminate unnecessary problems after installation.

Wire Sizing Charts

The following wire sizing charts provide the proper guidelines for wire sizing on the wire path. The most important calculation is that of the primary **Trunk wire length** on each wire path. The Trunk wire length is considered to be the "longest single run of wire" that will be needed for accommodating the design quantity of ICMs on the wire path. The Trunk wire length does not consider any branches from the main wire run in the calculation of wire length. Branches are wire runs that branch out from the Trunk wire in the field, and they should be sized accordingly.

If an individual branch wire is less than 25% of the entire Trunk wire length, it can be one size smaller than the gauge of the Trunk wire. A minimum of 14 AWG (2.5 mm^2) wire size is required.

When the following chart indicates that the Trunk wire length requires 14 AWG (2.5 mm^2) wire, the branches can still utilize 14 AWG (2.5 mm^2) wire minimum.

When the following chart indicates that the Trunk wire length requires 12 AWG (4 mm^2) wire, the branches can still utilize 14 AWG (2.5 mm^2) wire.

When the following chart indicates that the Trunk wire length requires 10 AWG (6 mm^2) wire, the branches can still utilize 12 AWG (4 mm^2) wire.

If an individual branch exceeds 25% of the total Trunk wire length, that branch shall be designed with the same gauge wire as the Trunk wire. Other branches less than 25% can be designed with a wire size no more than 1 size smaller than the Trunk wire size.

Wire Sizing Charts – (last updated April 2013)

	Wire distance in feet														
Number of Units	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000	13000	14000	15000
50	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG
100	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG
150	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG
200	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG
250	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG
300	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG
350	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG
400	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG
450	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG
500	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	10 AWG
550	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	10 AWG	10 AWG	10 AWG
600	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	10 AWG	10 AWG	10 AWG	10 AWG
650	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	10 AWG	10 AWG	10 AWG	-	-
700	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	10 AWG	10 AWG	10 AWG	-	-	-
750	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	10 AWG	10 AWG	10 AWG	10 AWG	-	-	-

April 2013

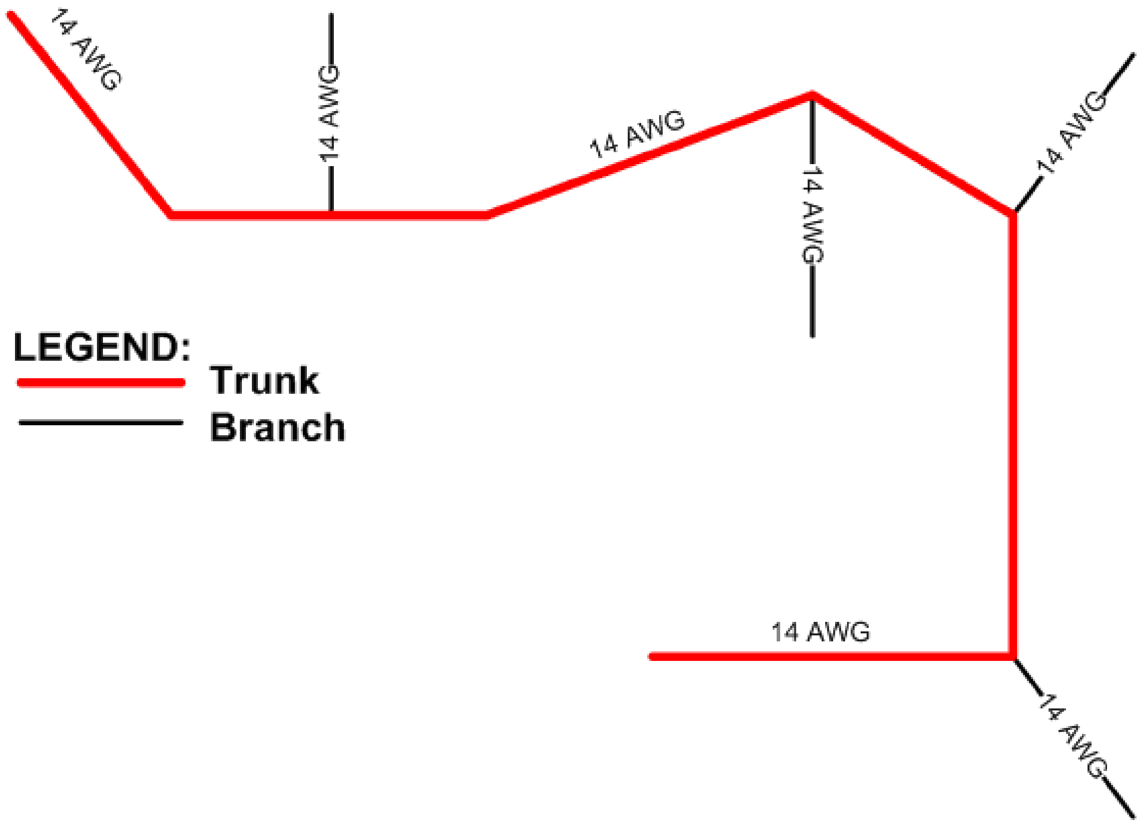
	Wire distance in meters														
Number of Units	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000	4250	4500
50	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2
100	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2
150	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2
200	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2
250	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2
300	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	4.0mm^2	4.0mm^2
350	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2
400	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2
450	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2
500	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2
550	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	6.0mm^2
600	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	6.0mm^2	6.0mm^2
650	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	6.0mm^2	6.0mm^2	6.0mm^2	6.0mm^2
700	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	6.0mm^2	6.0mm^2	6.0mm^2	6.0mm^2	-
750	2.5mm^2	2.5mm^2	2.5mm^2	2.5mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	4.0mm^2	6.0mm^2	6.0mm^2	6.0mm^2	6.0mm^2	-	-

April 2013

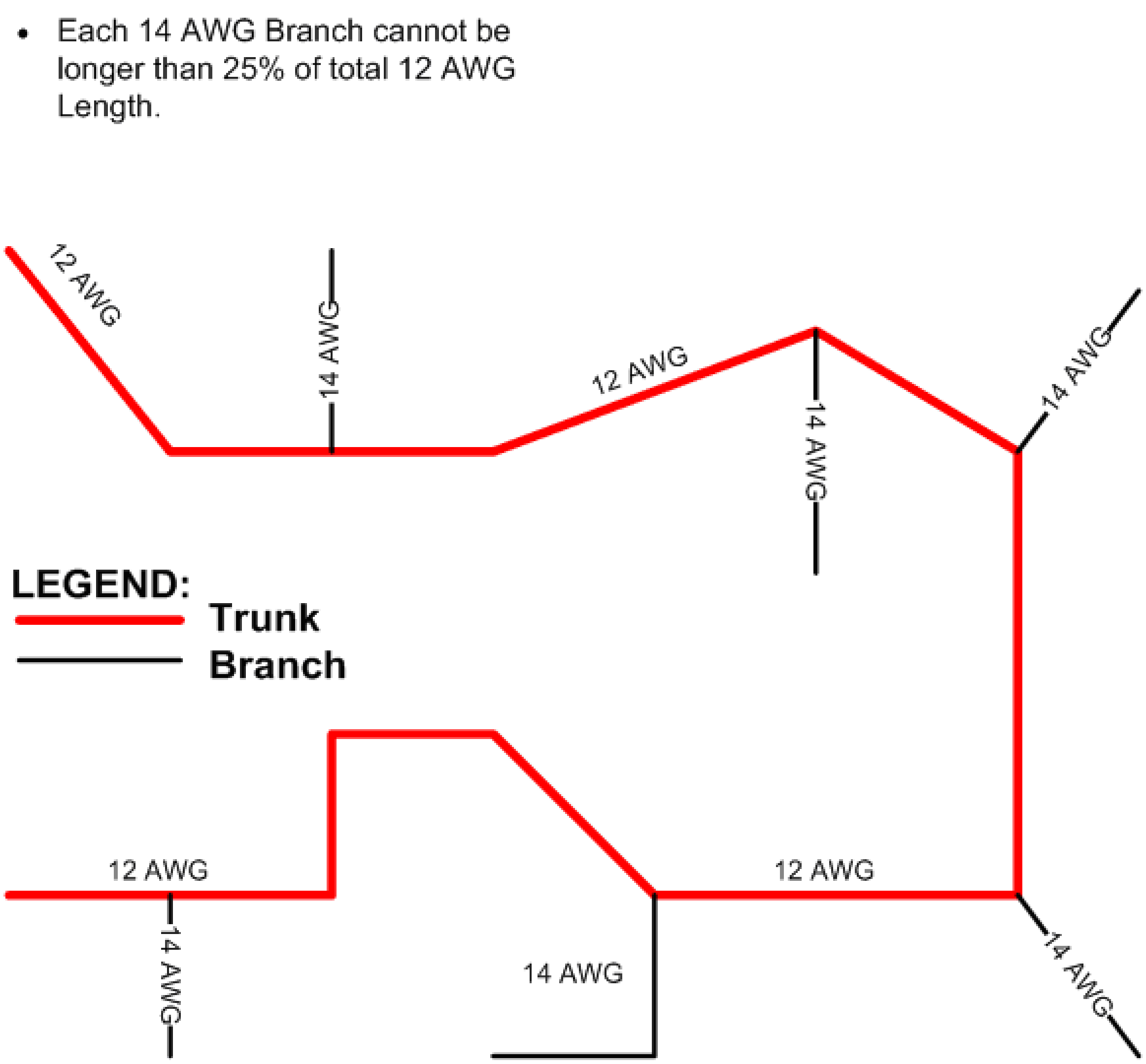
Initial Length of Run from Interface to First ICM

In addition to the above wire sizing chart, if the chart recommends 14 AWG (2.5 mm^2) wire path and the initial run of wire between the Interface and the first ICM on the wire path is greater than 2,500 feet (750m) then the initial length of wire (from interface to the first ICM) should be upsized by one additional wire size to 12 AWG (4.0mm^2). This is only necessary when 14 AWG (2.5 mm^2) is the recommended wire size. If the chart recommends 12 AWG (4.0 mm^2) based on number of units and total length of run of the wire path, then additional upsizing in a long initial run of wire is not necessary.

Example 1 – An installation requires 300 ICMs on a single wire path and the Trunk wire length will be up to 10,000 feet (3,000 meters). Utilizing the sizing chart the Trunk wire should use 14 AWG (2.5 mm^2) MAXI™ wire for the installation. Although there are multiple branches off of the main Trunk wire, these are not part of the calculation when determining the size of the Trunk wire. Each branch will also be 14 AWG (2.5 mm^2) wire.

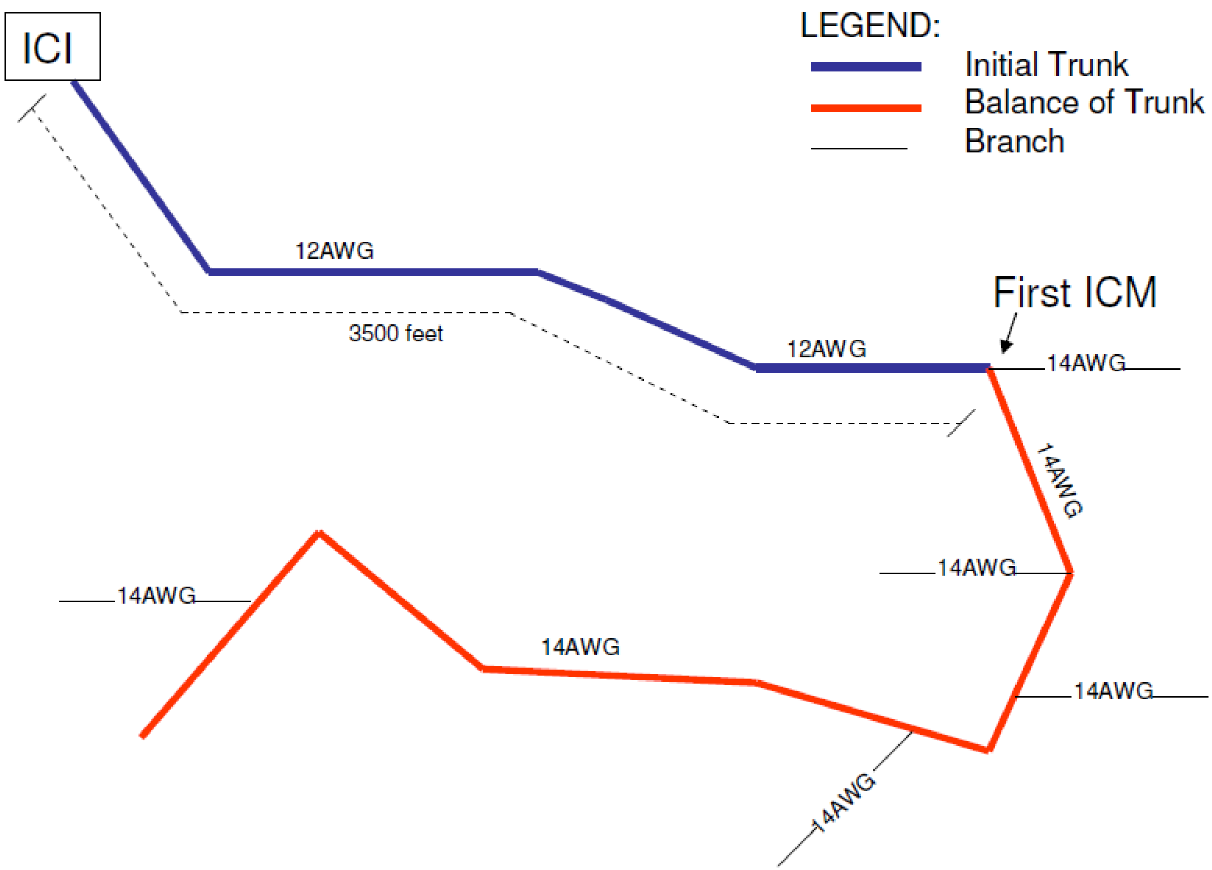


Example 2 – An installation requires 500 ICMs on a single wire path and the Trunk wire length will be up to 9,000 feet (2,700 meters). Utilizing the sizing chart the Trunk wire should be designed using 12 AWG (4.0 mm^2) wire. NOTE: 12 AWG (4.0 mm^2) wire will be used for the Trunk wire only. 14 AWG (2.5 mm^2) wire can be used for all branch lines as long as each branch does not exceed 25% of the total Trunk wire length. In this example, any branch that is less than 2250 feet (685 meters), 25% of the Trunk wire length, can be installed with 14 AWG (2.5 mm^2) wire.



Example 3 – An installation requires 400 ICMs on a wire path and the trunk wire length will be up to 8,000 feet (2,439 meters). The length of run from the ICI to the first ICM on the wire path is 3,500 feet (1,067 meters). Utilizing the sizing chart the Trunk wire should use 14 AWG (2.5 mm^2) MAXI™ wire for the installation. As the initial 3,500 feet (1,067 meters) is greater than 2,500 feet it requires an increase in wire size to 12 AWG (4.0mm^2). The initial 3,500 feet (1,067 meters) of Trunk wire should be sized at 12 AWG (4.0mm^2) from the ICI to the first ICM. After the first ICM, the Trunk wire can continue at 14 AWG (2.5mm^2).

Although there are multiple branches off of the main Trunk wire, these are not part of the calculation when determining the size of the Trunk wire. Each branch will also be 14 AWG (2.5 mm^2).



Grounding

Proper grounding is very important for the IC system™. The system grounding is accomplished through the ICSD surge devices that are installed on the wire path. Rain Bird MSP surge devices are installed on each wire path prior to entering the Integrated Control Interface (ICI) at the central.

Important!

An Integrated Control Surge Device "ICSD" should be located every 15 ICMs or every 500 feet (150 meters), whichever condition is reached first. This is a guideline for design purposes and designers should try to stay as close to these guidelines as possible. However in the example of a herringbone system with 4 stations per pipe lateral, an ICSD could be installed every fourth lateral (therefore every 16th station) as a normal design practice.

The purpose of field surge devices is to offer "containment" of surge during an event so that damage caused by the event will be limited by an ICSD located on either side of the event. The key for successful containment is proper installation of ground rods or plates so that the desired Ohms resistance level is achieved.

During long runs of wire where there are no ICMs, an ICSD is <u>not</u> required every 500 feet (150 meters). For example, if there is a wire length run of 2,000 feet (609 meters) between ICMs, an ISCD should be installed immediately after the last ICM and just prior to the next ICM. ICSDs are not required at 500 foot (150 meter) intervals on the 2,000 foot (609 meter) run of wire.

At the ICI, for a long run (greater than 500 feet or 150 meters) at the beginning of the wire path, the MSP should be installed at the interface and an ICSD installed just prior to the first ICM on the wire path.

Grounding Requirements - Field

The IC System must have grounding throughout the wire path to allow any transient surges the opportunity to leave the wire path. The following requirements must be followed to properly ground the IC System:

1. Each ICSD must have an earth ground resistance of less than 50 ohms and be no more than 500 feet (150 meters) from the next ICSD.
2. Each ICSD can be located either next to a valve-in-head rotor or in-line valve. The ICSD should be accessible in case of maintenance. Either a ground rod or plate can be utilized to obtain an earth ground reading of 50 ohms or less.
3. The grounding requirement at the central control is to have less than 10 ohms of earth ground resistance. 5 ohms or less of ground resistance is preferable. The central control shall utilize

MAXI™ Surge Protectors (MSP-1) on each wire path with MAXI Ground Plates (MGP-1) as required in the system

4. Although not required, an optional shielding wire can also be utilized to improve the grounding of the system. If used, the shielding wire should be a 10 AWG (6 mm^2) bare copper wire that connects to each of the grounding rods or plates in the system. The purpose of the shielding wire is to provide shielding for the MAXI wire path by attracting surges to the shielding wire. It also can reduce the overall earth ground resistance of the system by connecting the ground rods together. Rain Bird believes the decision to use a shielding wire on a project should be based on the localized conditions at the project and is not specific to a control system type or manufacturer type. A course would have a shielding wire regardless of control system, or it does not. It should be the decision of the irrigation designer.
5. If a shielding wire is used, the ground rods or plates should be tested independently, prior to connecting the shielding wire to the rods or plates. This will ensure that the rods or plates provide a good earth ground at the ICSD. A measurement with the shield connected does not give a true reading of the individual ground location at the ICSD and will give a reading that is considerably lower than the actual grounding at that location.
6. The primary objective of grounding is to achieve the desired earth ground reading for the rods or plates regardless of which method is used. Rain Bird has had good success with ground rods when soil conditions allow them to be driven completely into the soil profile. An 8 foot (2.4 m) rod will help distribute a surge into lower layers of the soil profile, away from the soil surface and equipment.
7. ICSDs should be located at dead ends on long wire runs, approaching 500 feet (150m.) Short wire runs do not require ICSDs at the dead ends. In particular, herringbone pipe layouts do not require ICSDs at the end of each herringbone lateral.

Types of Pipe Networks

The IC System™ works equally well with "herringbone" or "sub-loop lateral" pipe network designs. Rain Bird looks to the irrigation designer to select the best pipe network layout for the irrigation system design and then apply the IC System wire path on that layout. Each type of pipe network design offers different advantages depending upon the location and size of the irrigation system. There is no preference for the IC System wire path.

Wire Path "Field Fuses" (aka "Switches")

Third-party, fused wire path "field fuse" devices are available on the market that provide the ability to isolate one leg of a wire path for troubleshooting purposes. These switch devices have proven effective on DECODER type control systems to facilitate easy troubleshooting when a wire path has gone down due to a failed decoder. However it is extremely rare for an IC System™ to experience this type of failure because the ICM is specifically designed to fail offline by itself and not bring down the wire path when damaged. For this reason, Rain Bird strongly discourages the use of third-party switches on the IC System. Third-party switches are an unnecessary, extra device on the wire path with the potential to act as an additional failure point to be investigated. Third-party switches may prevent the Rain Bird central control software system diagnostics from properly identifying a failed ICM.

Looping Communication Wire

The IC System communication wire should NOT be looped. Dead ends are highly preferred and recommended. While the system will work with looped communication wire, troubleshooting will be more difficult so looping is not recommended.

Combining Wire Paths at the Interface

While a single IC wire path can easily handle 750 ICMs when sized according to the design guide table, there are times when it may make sense to bring separate wire paths (with fewer ICMs) directly back to the interface. When combining two or more distinct wire paths into a single output terminal at the ICI, it is not necessary to calculate the total length of all of the wire paths combined when calculating Trunk wire size. Each distinct path is viewed separately as a Trunk and not a Branch. Therefore, size each of the Trunk wires paths separately, considering the number of ICMs and length of that path to calculate the wire size. NOTE: The combined number of ICMs on a single terminal output still cannot exceed 750 ICMs.

Remotely Locating Integrated Control Interfaces (ICI)

Rain Bird has had great success with remotely located interfaces for many years. Designers may wish to consider remotely locating the Integrated Control Interface (ICI) in the field to reduce long wire runs or address localized conditions. For example, the central control computer can be located at the maintenance building and the ICI can be remotely located in a pump station, clubhouse or other secure, weatherproof location that is more conveniently located to the golf course irrigation system.

Radio, cellular and Ethernet connections exist to connect the irrigation computer to a remotely located interface.

All Rain Bird interfaces, including remotely located interfaces are always online and maintain continuous real-time two-way communication between the central and each interface. The central does not download programs to remote interfaces. This ensures that all of the Rain Bird central control software advanced technologies remain active and operational with all devices attached to the control system. For example, dynamic flow management is always active on all stations regardless of whether the interface is local or remotely located. Water-saving products like RainWatch™ devices are always online and active. When activated on a central, MI Series Mobile Controller™ is online with all stations regardless of whether the interface is local or remote. There are no limitations with the remotely located interfaces compared to systems where the interface is located at the irrigation computer.

<u>900MHz Spread Spectrum Radios:</u>

An MRLK 900 Remote Location Kit should be used to provide wireless 900MHz radio communication between the central control computer and the remotely located ICI. The MRLK900 Kit includes two radios that operate in the 902-928MHz range and automatically hop between frequencies to avoid interference.

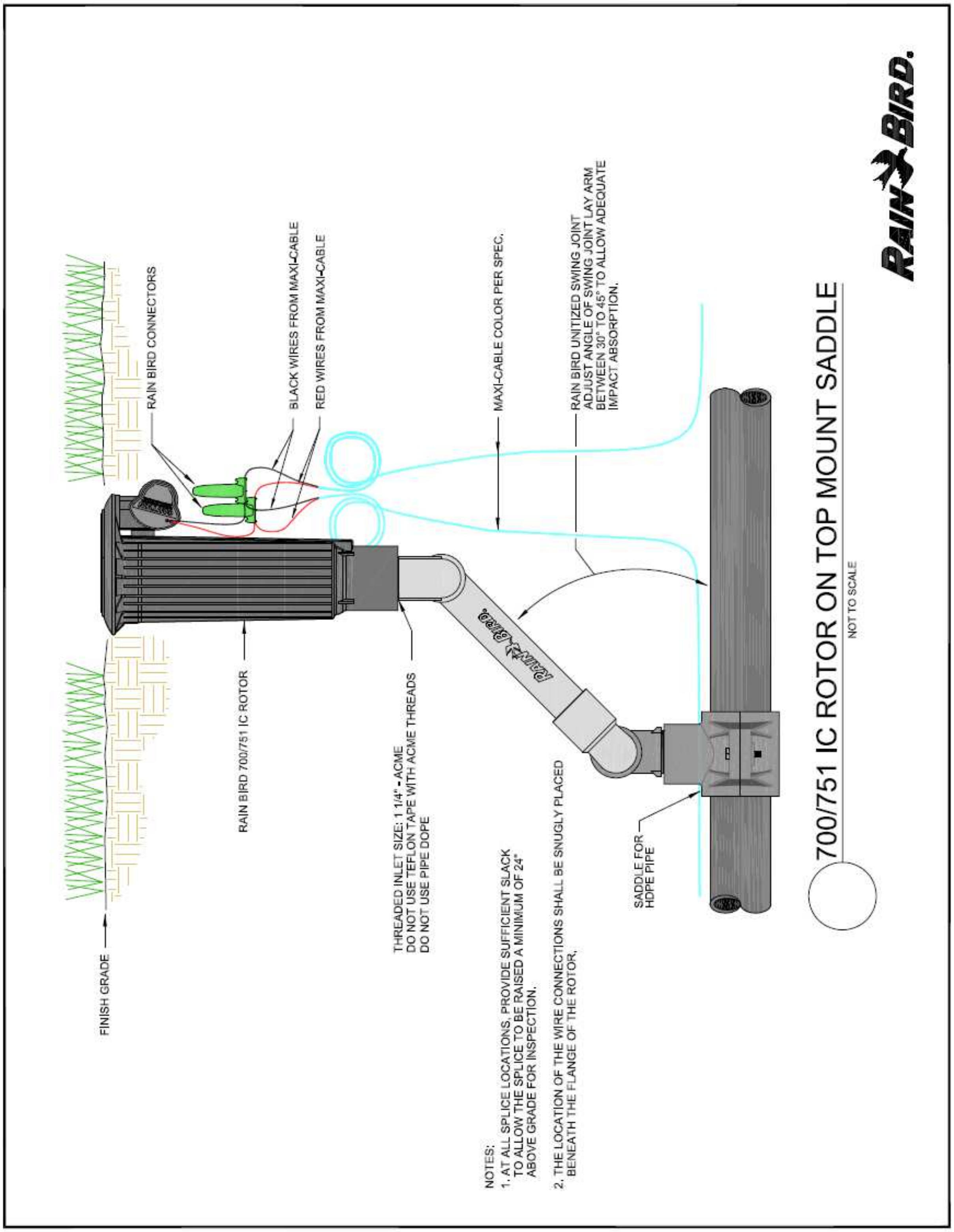
Please note the following:

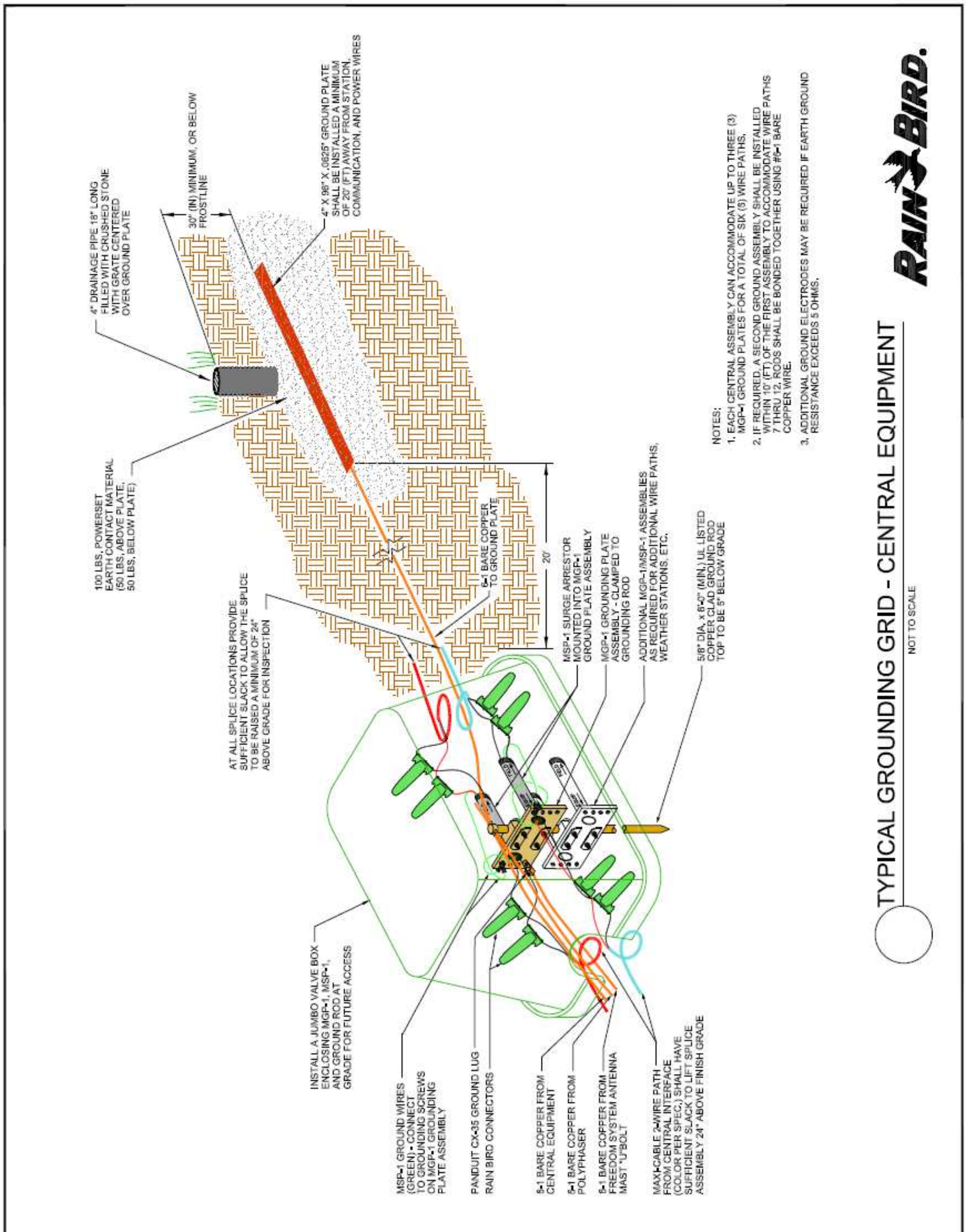
- An MRLK900 Kit is required for each remotely located ICI.
- A site survey should be completed by the authorized Rain Bird golf distributor or manufacturer to ensure that the system will communicate between the desired points. A repeater may be required to ensure good quality communication.
- 900MHz radios are NOT approved for use in some countries. This should be verified prior to completing the irrigation design.
- Remotely located interfaces require a UPS device, just as if they were located with the central control computer. The APC model Smart-UPS 1500 is the approved device.

Please contact your distributor or Rain Bird representative to verify the above information and obtain more details regarding the use of MRLK900 kits to remotely locate an ICI on your project.

<u>Ethernet or Cellular Connection:</u>

It is possible to remotely configure an IC interface to communicate via Ethernet or cellular with the irrigation central. This has been done successfully on Rain Bird control systems in a number of locations. Please contact your Rain Bird Golf Distributor or Rain Bird sales manager for additional information.


700/751 IC ROTOR ON TOP MOUNT SADDLE
NOT TO SCALE
FINISH GRADE
RAIN BIRD CONNECTORS
BLACK WIRES FROM MAXI-CABLE
RED WIRES FROM MAXI-CABLE
MAXI-CABLE COLOR PER SPEC.
RAIN BIRD UNITIZED SWING JOINT
ADJUST ANGLE OF SWING JOINT LAY ARM
BETWEEN 30° TO 45° TO ALLOW ADEQUATE
IMPACT ABSORPTION.
RAIN BIRD 700/751 IC ROTOR
THREADED INLET SIZE: 1 1/4" - ACME
DO NOT USE TEFLON TAPE WITH ACME THREADS
DO NOT USE PIPE DOPE
SADDLE FOR
HDPE PIPE
NOTES:
1. AT ALL SPLICE LOCATIONS, PROVIDE SUFFICIENT SLACK
TO ALLOW THE SPLICE TO BE RAISED A MINIMUM OF 24"
ABOVE GRADE FOR INSPECTION.
2. THE LOCATION OF THE WIRE CONNECTIONS SHALL BE SNUGLY PLACED
BENEATH THE FLANGE OF THE ROTOR.


100 LBS, POWERSET EARTH CONTACT MATERIAL (50 LBS, ABOVE PLATE, 50 LBS, BELOW PLATE)
4" DRAINAGE PIPE 18" LONG FILLED WITH CRUSHED STONE WITH GRATE CENTERED OVER GROUND PLATE
30" (IN) MINIMUM, OR BELOW FROSTLINE
AT ALL SPLICE LOCATIONS PROVIDE SUFFICIENT SLACK TO ALLOW THE SPLICE TO BE RAISED A MINIMUM OF 24" ABOVE GRADE FOR INSPECTION
4" X 96" X .0625" GROUND PLATE SHALL BE INSTALLED A MINIMUM OF 20' (FT) AWAY FROM STATION, COMMUNICATION, AND POWER WIRES
INSTALL A JUMBO VALVE BOX ENCLOSING MGP-1, MSP-1, AND GROUND ROD AT GRADE FOR FUTURE ACCESS
MSP-1 GROUND WIRES (GREEN) - CONNECT TO GROUNDING SCREWS ON MGP-1 GROUNDING PLATE ASSEMBLY
PANDUIT CX-35 GROUND LUG
RAIN BIRD CONNECTORS
6-1 BARE COPPER TO GROUND PLATE
20'
6-1 BARE COPPER FROM CENTRAL EQUIPMENT
6-1 BARE COPPER FROM POLYPHASER
6-1 BARE COPPER FROM FREEDOM SYSTEM ANTENNA MAST "U"BOLT
MAXI-CABLE 2-WIRE PATH FROM CENTRAL INTERFACE (COLOR PER SPEC.) SHALL HAVE SUFFICIENT SLACK TO LIFT SPLICE ASSEMBLY 24" ABOVE FINISH GRADE
MSP-1 SURGE ARRESTOR MOUNTED INTO MGP-1 GROUND PLATE ASSEMBLY
MGP-1 GROUNDING PLATE ASSEMBLY - CLAMPED TO GROUNDING ROD
ADDITIONAL MGP-1/MSP-1 ASSEMBLIES AS REQUIRED FOR ADDITIONAL WIRE PATHS, WEATHER STATIONS, ETC.
5/8" DIA. x 8'-0" (MIN.) UL LISTED COPPER CLAD GROUND ROD TOP TO BE 5" BELOW GRADE
NOTES:
1. EACH CENTRAL ASSEMBLY CAN ACCOMMODATE UP TO THREE (3) MGP-1 GROUND PLATES FOR A TOTAL OF SIX (6) WIRE PATHS.
2. IF REQUIRED, A SECOND GROUND ASSEMBLY SHALL BE INSTALLED WITHIN 10' (FT) OF THE FIRST ASSEMBLY TO ACCOMMODATE WIRE PATHS 7 THRU 12. RODS SHALL BE BONDED TOGETHER USING #6-1 BARE COPPER WIRE.
3. ADDITIONAL GROUND ELECTRODES MAY BE REQUIRED IF EARTH GROUND RESISTANCE EXCEEDS 5 OHMS.
TYPICAL GROUNDING GRID - CENTRAL EQUIPMENT
NOT TO SCALE