Please read the entire operational manual before installing and programming the LogicPLUS-S Controller.

**NOTICE:** Before installation, receivers must all be programmed. See pages 27 & 28 for receiver programming instructions.

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<td>Yes</td>
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**Enclosure:**
Box - Stainless steel, locking, wall or pedestal mount.
Pedestal – Stainless steel

*See diagram page 45* for box and pedestal dimensions.

**Input Power:**
110VAC, 240VAC 50/60Hz
Solar 12V DC

**Grounding:**
Enclosure grounded to utility ground. SPD/Output board grounds with 8 foot ground rod.

*See diagram page 35, 36*

**Surge/Lightning Protection:**
Controller Surge Protection is provided by an assembly mounted below the controller panel. This board and its components are like a sophisticated fuse. It will blow in an attempt to save the main circuit board from destruction by line surges mainly created by lightning. It is connected to the main board with a simple cable for easy removal for testing and replacement if necessary.

*See diagram page 34*

**Field Surge Protection** is provided by the use of LP-SPD-F devices. Designed to be installed in valve boxes every 200-300 feet and attached to a ground rod. Rod is customer supplied.

*See diagram page 43*
<table>
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<tr>
<th>Wire type:</th>
<th>Single strand direct burial, Jacketed two conductor, or Stranded. No “Special” wire required.</th>
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<tr>
<td>Wire Size:</td>
<td>Minimum 14 gauge.</td>
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<tr>
<td>Wire Runs:</td>
<td>Maximum 12,000 feet for each two wire path (4 available).</td>
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<td>Branching &amp; Teeing:</td>
<td>Allowed but should be well planned and minimized.</td>
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<td>Wire Color:</td>
<td>Use of different colored wires is recommended for ease of wire run identification. Use different colors for each run and every tee or branch.</td>
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<tr>
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<td>Each individual output, including branches or tees, should be kept separate from the wiring of other outputs.</td>
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**Maximum Valve Operation:**
A maximum of 8 valves, anywhere on the system, may operate simultaneously, of either the same number or combinations of different numbers. The 8 valve maximum plus 3 master valves (A, B, C) plus 1 fertigation valve.

**Wire Connectors:**
One of the most critical installation requirements of a LogicPLUS-S two wire system is the quality of your wire connections. If you follow these directions you will have a reliable, dependable control system for many years. It is suggested to soldier all receiver (red wire) connections to your main two-wire run. Next install the soldered two-wire connection in a waterproof underground connector housing. When soldering is impractical, a waterproof “dry-type” Hit Products DBC-BR wire connector is required. The above mentioned product will provide an uncontaminated, dry connection. A pair of DBC-BR connectors are included with every LP-RP Receivers for the connection of each Receiver to the two wire path.

**See diagram page 40**

**Do not use pre-filled wire nut connectors as they will impede the transfer of the signal through the wire splice.**
Pump Start Relay/Fertigation Relay  
When using a pump start relay, the relay shall be a 24 VAC coil with a maximum inrush of .35 amps and holding .25 amps. The relay will act as a slave to the magnetic relay to control the pump motor. You can use up to a 5hp Hit Products pump start relay attached directly to the relay terminal.  
See diagram on page 44

Rain Sensor  
The Rain Sensor terminal is located on the bottom right of the Controller board labeled “RAIN OFF.” See Position 11 of the Programming Section of this Manual to Activate this feature.  
Note: Use only Rain Switches with “Dry Contacts” (No Power) connect the “Normally Closed” contacts. See diagram page 37

Multiple Controller Installation  
Install a separate ground rod for each controller. Do not connect the field wires of one controller with those of another. Use slave or isolation relays if activating a common master valve.  
See diagram page 39

Current Monitoring Feature  
This Feature can be accessed in three dial positions: “Run,” “Semi/Manual/Program Clear” and Test. The displayed number is in milliamps. This is useful when troubleshooting “Short Line,” “Valve Short” or controller operation.  
Note: When accessed in the “Test” position a reduced power level is sent to the field, which will result in a lower “Current Monitoring Number.”

Boost  
This Feature increases power sent to the field over the Two Wire path and is to be used when operating Multiple Valves at extended distance.

Accessory:  
Hand held programmer. For Programming Receivers away from the controller  
See diagram page 41

Trouble Shooting unit (TSU) for Trouble Shooting both Controller and Receiver/ Wiring issues.

Warranty: Any Receiver returned for warranty must have the DBC-BR connection attached. If the DBC-BR is unattached, warranty is void.
LogicPLUS-S Installation “Do’s & Don’ts”

For Warranty To Be Valid, Installation Must Comply To All Instructions Below

1. Use only LP-RP Receivers (Gray Molded Box) with the LogicPLUS-S Controllers (LP-42, LP-128 and Uni-2 Plus). **DO NOT use the L-RP (Black Molded Box) Receivers** with the LogicPLUS-S Controllers. **DO NOT use the LP-RP (Gray Box) Receiver with the Logic 1, Logic 2, Logic 3 or Uni-2 Controller.**

2. Branching and Teeing of two wire path is permitted with LogicPLUS-S, but should be well planned and minimized with care given using only waterproof DBC-BR splice kits. All wire connection/splices are to be made in a valve box. **DO NOT “Direct” bury connection/splices.**

3. LogicPLUS-S receivers must be directly attached to the 2 wire path; red wires to field wires, black wires to solenoid (See #4).

4. **Wire Connections**
   A. **All field wiring Connections** of LogicPLUS-S Receiver Red Wires (1 each to each of field wires) to field wires must use the enclosed DBC-BR splice kits. See instructions on back. **DO NOT USE PRE-FILLED GEL TYPE WIRE NUTS.**

   B. All receiver to Valve Solenoid Connections must be waterproof, using “dry type” wire connectors (Hit Products DBC series or 3M™ DBY/DBR series™) and/or soldered and then installed in waterproof housings. **DO NOT USE PRE-FILLED GEL TYPE WIRE NUTS.**

5. **DO NOT install the LogicPLUS-S** Controller, its Receivers or any LogicPLUS-S Field Wire within 15 feet of any high voltage current that may cause electrical interference such as; electrical panels, meters, pumps, equipment or controls.

6. Use with standard 24 VAC solenoids only. **DO NOT use any with low power/diode bridge type solenoids.**

7. Use different colored field wires for each wire in each two-wire path.

8. LogicPLUS-S provides 4 separate field outputs. **Line 1, Line 2, Line 3 and Line 4. DO NOT mix the wiring.**
INSTALLING THE LogicPLUS-S

Mounting the controller............When selecting the controller installation location, make sure controller and all related wiring is a minimum of 15 feet from any high voltage control boxes, pumps or any high voltage equipment. This irrigation controller is a computer and should be installed accordingly. When mounting the LogicPLUS-S indoors, notice the “keyhole” shaped mounting slot as well as 2 mounting holes on the back of the controller. Use the template provided to locate mounting screw locations. Remove the four face plate screws and two lower panel screws to access enclosure mounting screws. To attach to wall studs, use a #10 screw, leaving 1/4” of the shank exposed to slip into the “keyhole” slot. To additionally secure the controller, drive additional screws through the bottom mounting holes into the stud or cross bracing.

When mounting the LogicPLUS-S outdoors, use the same procedure as above. When attaching the controller to hollow walls, masonry, or cinder blocks, use appropriate toggle bolts, masonry shields or compression drive bolts. For additional weatherproofing, run a silicon bead around the case between the controller and the wall. It is also recommended to fill mounting holes with silicon as well, to prevent water or insects from entering the controller.

The LogicPLUS-S should be hard wired to power supply the by a qualified electrical technician. Use an approved Gfi device and utilize proper grounding techniques using the green wire from controller transformer. This will help assure safety as well as performance and reliability of the LogicPLUS-S controller. The manufacturer’s warranty becomes invalid without proper grounding as per local code. See enclosed “Installation Diagram for Primary Wiring.” Warning! When connecting the field receivers, make sure there is no power to the printed circuit board, controller and/or the receivers; this will prevent the shorting of receivers and controller.

Unscrew the LogicPLUS-S bottom terminal plate and route the field wires (one to four sets) through the hole at the bottom of the controller. Secure each 2-wire run under the appropriate terminal on the terminal strip labeled “Line 1,” “Line 2,” “Line 3,” “Line 4.” If using multiple outputs, keep each 2 wire set independent. Do not mix output “Line 1” with output “Line 2,” “Line 3” with “Line 4” or any other combination. It is strongly suggested to use different colored wires for each wire used.

See diagram page 34

TEST BEFORE BACK-FILLING TRENCH

To easily test for communication and wire integrity, connect each receiver to the field wiring at each planned location. It is not necessary for receiver to be attached to solenoid/valve for test, but O.K. if already connected. Do not allow black receiver wires to touch each other (short or ground) when testing. Manually sequence controller through each station number for minimum of 30 seconds, checking each activated receiver in the field for a continuously activated bright LED light on each receiver. A continuously activated bright LED light on receiver during station activation confirms satisfactory communication.

Please read the entire operational manual before installing and programming the LogicPLUS-S Controller.
PROGRAMMING THE LogicPLUS-S 42 and LogicPLUS-S 128 CONTROLLERS

The LogicPLUS-S Controllers are so easy to program because the four sets of black up/down arrow buttons correspond to whatever is directly above them in the display. You can toggle between ON and OFF, set hours, minutes, and seconds, or even select program numbers, valve numbers, and start times simply by using these up/down buttons located directly under their functions. The square Function button located to the right of the arrow buttons will access the functions listed when the dial is turned to the numbered position stated by each function.

The controller programming consists of 8 buttons to control the display, a twelve position rotary switch and a special function key for more special options. The 8 buttons that control the display are located directly below the portion of the display they control. Each set (two buttons) of buttons operates the display up or down for ease of getting to the function, number, valve or time desired. For ease of explanation, the following terminology will be used throughout these instructions. The set of buttons to the far left will be button **set 1**, directly right of these will be **set 2**, directly right of **set 2** will be **set 3** and the last set or far right set will be **set 4**, the special Function button in the upper right of the control panel, will be referred to as **set 5**.

**NOTE:**  See diagram page 9-26

The main rotary dial has 12 positions just like the numbered hour positions on a clock 1-12. The rotary switch consists of the following positions and functions:

**NOTE:**

When you first install your LogicPLUS-S 42 or LogicPLUS-S 128 controller, use the Master Clear feature to clear all possible information stored in the unit. Put dial in position 10, press top right Up/Down key set 4 under “CLR” OFF. Display will change, then press top right Up/Down key set 4 under “Master Yes” again. Controller will automatically clear ALL programmable data except current date and time.
PROGRAMMING CONTROLLER

DATE
TIME 00:00

SET 1  SET 2  SET 3  SET 4

FUNCTION BUTTON

SET 5
**Position 1**

Current Time: Set time of day, use set 1 to change display from time to date, use set 2 to set hour (this will set A.M. or P.M.), use set 3 to set minutes, use set 4 to “Zero out” seconds.

Current Date: Set today’s Date, use set 2 to set month, use set 3 to set day of month, use set 4 to set year, i.e.: 6/25/12
Set Valve Run Times:
Use set 1 to choose the program, use set 2 to choose the valve number, use set 3 to set hours, use set 4 to set minutes. Input the total irrigation run time desired for each valve, including pre wet and fertigation time.

Pre Wet and Fertigation option:
Press Function Button, the display will now be the same, except with the following changes, a “P” will show in front of Hours. Use set 3 or 4 to set amount of hours and minutes for the pre-wet time. Press Function Button, again the display will stay the same except for a “F” that will show in front of hours, use sets 3 or 4 to set the amount of hours and minutes for fertigation.

Definitions:
Pre-Wet will run concurrently at the start of the valve run time.
Fertigation will start at the conclusion of the programmed Pre-wet cycle and will automatically activate the fertigation receiver. If only fertigation time is programmed and no pre-wet time is programmed, fertigation will start at the commencement of the valve run time programmed. This receiver will remain activated for as long as the fertigation is programmed. If the total valve run time is 15 minutes, pre-wet for 3 minutes and fertigation for 5 minutes, then there will be 7 minutes remaining of valve run time after the fertigation cycle ends.

**NOTE:** At no time will the controller permit the total time of pre-wet and fertigation to exceed the total run time programmed. No pre-wet run times need to be programmed in order to run the fertigation mode.

**NOTE:** Program 6 can only be set in minutes and seconds, as all other programs can be set in hours and minutes. The maximum run times can be set from 1 minute to 10 hours and 59 minutes on all programs except 6, which can be set for a minimum of 10 seconds to a maximum of 59 minutes and 59 seconds. With the water budget feature (position 8) these run times can be increased or decreased from 0% to 250% in 5% increments.

**NOTE:** A maximum of any 8 receivers/valves (any combination) may be operated simultaneously.
**Pause**: Use set 1 to choose the program, use set 2 or 3 to set desired pause time, use set 4 to turn master valve or pump start function ON or OFF during pause function.

**Definitions**:

**Pause**: Amount of time delay between sequential valve openings in a program.

**Master**: Master ON will keep the master valve or pump relay ON during pause.

**Master OFF**: Will turn master valve or pump relay OFF during pause.

**Note**: In order for the master valve to function, the master valve must be activated (See position 8 page 21) for that specific program.
To set start times, use set 1 to choose the desired program, use set 2 to choose the start number, always use start 1 for the first start time after midnight and so on through start 8 (LogicPLUS-S 42) start 16 (LogicPLUS-S 128) use set 3 to set the hour of the start time, use set 4 to set the minutes of the start time.

**Note:** The start time is part of the first leg of a pre-programmed function called “Diamond Settings” Refer to Diamond settings at the end of this programming guide for full details.
To review the total run time in a specific program, use set 1 to choose the program number. The total run time of that specific program is shown in the lower right hand position of the display. You can review the water budget setting along with the total run time in this position. If the water budget is changed from the default 100% the total run times will change in this position, but in position 2, the valve run times will stay inputted. The actual running valve is determined by the input in position 2 multiplied by the water budget setting in position 8.

Note: On a 7 day calendar the actual day will be displayed.

Note: By adjusting the budget up or down (0% to 250%) it will change the total run time. See position 8 for further discussion. The budget is the second leg of the Diamond Setting.
The calendar is the third leg of the **Diamond Setting**. After programming the run times and the start times, the calendar will automatically establish the minimum calendar period. You can manually change the calendar to any desired period, longer than the minimum “Auto-calendar” period, but not shorter. By pressing set 1 to select the program, press set 2 to change the number of days desired in the calendar, (if the total run time exceeds one day, the calendar can not be set backwards.) Press set 3 to review the days of the calendar. By pressing set 3 repetitively, the display above set 4 will show one of the following events: STRT (start), RUN or OFF for each day of the calendar.

To review the numbered day of the calendar the controller is currently on, use set 1 to choose the program desired. The day of the calendar will be displayed directly right of the word “DAY” in the upper display. You can change the day of the calendar by using set 3 buttons. This will or can bring all days of all programs to the same day for calendar purposes.
Note: The calendar automatically resets all programs to Day 1, today, when “Master Clear” is activated. The calendar automatically resets to today, Day 1, when any value in “Calendar” is changed. The calendar can be manually changed to any day including today in Position 5, “Total Run Time.” Day value has to be equal to or less than “calendar” number of days. Except when using a Seven day Calendar, Display will show day of the week.

(Example) SUN., MON., WED., and so on.

1. **Odd / Even**: May be accessed by pressing Function Key Set 5.

2. **Use Set 1 to select program use Set 3 and 4 to ON or OFF.**

3. **Note**: To exit the Odd / Even feature both Odd and Even must be set to OFF. Press the function button to exit.

4. **Note**: Runtimes must not go beyond 11:59 pm.

**Definitions:**

**Start**: This is the day of the calendar that the program will start. This will be automatically set upon initial programming or set by the user. This is day 1 of the calendar, the day you set up the calendar or programmed the program or let the auto-calendar set up the calendar.

**Run**: The total run time of the program has carried over into the second or more days and the program will be running these days to complete.

**Off**: The user has programmed in additional days that the program will not be active.

**Note**: The number of days that the calendar automatically sets up is determined as follows:
The number of hours from 12:00 midnight to the first start time plus the total run time, divided by 24 hours will equal the number of calendar days.

For calculating the calendar for “Run” Times over 24 hours. This example is for 56 hours Run Time per Program.

**Example**: If a start time is 8:00 am, then the first calculation would be 8 hours plus a total run time of 56 hours for a grand total of 64 hours, divided by 24 hours would equal a 2.67 day calendar, the display would show a 3 day calendar, as follows, day 1 STRT, day 2 RUN and day 3 RUN. If you wanted to irrigate every 4th day, use set 2 to expand the calendar from 3 days to 4 days, day 4 would show OFF.

**Note**: In cases not using a 7 day calendar and the information in the calendar is changed, the “Day” in the “Total Run Time” position will reset to “Day”.

**Note**: To further understand the Diamond setting for calendar, read the Diamond setting on page 29.
Any valve run times and start times set in program 6 can be looped if desired. There must be individual run times for each desired valve and ONE start time in program 6 for looping to be activated. Use set 3 and set 4 to establish the total amount of loop time desired. Use set 2 to turn looping feature ON or OFF.

**Hints for using Looping:** Looping will run a program continuously for the amount of time set in position 7 looping. For example: If looping is set for 6 hours and the start time is 8:00 am, program 6 will start at 8:00 am and run for 6 hours. A new lawn can be irrigated for 5 minutes every hour by doing the following. Valves 1, 2 and 3 operate the new lawn, set run times for 5 minutes each on valves 1, 2 and 3, then go to a valve that is not being used and set run time for 45 minutes. You want to irrigate from 10 am until 5 pm. Set start time for program 6 at 10:00 am and go to position 7, set loop for 7 hours and turn looping ON. The program will start at 10 am and run valve 1 for 5 minutes, then valve 2 for 5 minutes and then valve 3 for 5 minutes and then the valve that is not being used for 45 minutes and then back to valve 1 and so on until 7 hours runs out, which will be 5:00 pm.

**Caution!** If operating with a pump, the 45 minutes will cause “Dead Heading” on the pump and may damage the pump or pipelines.
Note: Program 6 can be sensor activated, such as a temperature sensor. The terminals for remote operation are located on the terminal board and marked pr6trg (program 6 trigger). Program the amount of run times per valve in program 6, do not put in a start time, make sure the program is ON in position 8 and whether or not the master should run with program 6.

Program the amount of loop time in position 7. When the remote sensor activates and closes the contacts for more than 30 seconds, program 6 will operate for the looping time programmed.

If for any reason the remote sensor contact opens during the looping cycle, the looping cycle will continue until the programmed time is completed. The sensor must open and close the contacts to operate the looping cycle a second time. If, for any reason, the contacts open and close during the pre-programmed length of looping, the looping program will reset at that time and start over again.
Position 8

Use set 1 to choose the program desired, use set 2 to turn a program ON or OFF (a fully programmed program can be disabled by this function) use set 3 to turn Master Valve A, B or C ON or OFF, use set 4 to increase or decrease the budget feature of the program 0%-250%. The amount of time in position 2 will not change in the display but the actual time will be increased or decreased by the amount of budget %. The new “water budgeted” run times can be viewed in position 5. Use Set 5 (Function Button) to boost power on Master or individual Valves. To be used in long run, multiple valve operation.

Note: Master Valves, pump start and Fertigation relays now Run OFF the same two wire path as the valves using a properly programmed LP-RP Receiver.
Use set 1 to set run times in minutes, use set 2 to set run time of seconds for test cycle, set 3 has no response, and use set 4 to select valve range to test, display will change, use set 1 or set 2 to select valve range start and end, use set 3 to select Master A, B or C if required, use set 4 to start test cycle, press set 4 again to stop test cycle.

The controller will immediately run each valve in sequence for valve range and predetermined run time for visual review of the system operation.

**Note:** The pause setting in position 3 for program 1 will determined the amount of pause between stations during the test cycle operation.

Use set 5 Function Button to perform a short test.

**Short Test**
This feature to be used for troubleshooting. See page 32.
Position 10

**Semi** - use set 1 to choose the program you want to activate for one cycle, use set 2 to activate that program ON. Leave the dial in number 10 position. **[Rotating the dial will cancel the program.]** Set 5 will activate the Current Monitoring feature.

**Note:** 30 minutes after the conclusion of the selected program the controller will automatically revert to the “RUN” condition, without putting the Dial back to “Run.”

**Manual** — Press set 3 to activate manual mode the display will change, use set 1 to choose the specific valve number to be operated manually for a predetermined time, use set 2 to set amount of hours to run, use set 3 to set amount of minutes, use set 4 to tell the controller whether or not you want the master valve A, B, C, and pump on during this manual operation. Valve will immediately be activated for that period of time. Use set 5 to activate the Current Monitoring feature. Leave the dial in number 10 position. **[Rotating the dial will cancel the program.]** At the conclusion, the controller will go back to “RUN” mode without turning the Dial back to the “RUN” position. You can activate up to 8 valves at the same time in manual mode.

**Note:** 30 minutes after the conclusion of the selected valves the controller will automatically revert to the “RUN” condition.
**Program Clear:** Turn rotary switch to position 10. Use set 4 to choose program clear, the display will change, use set 1 to choose the program that you desire to clear all the information from, use set 2 to answer yes. Set 3 can be used to exit prior to clearing program.

**Note:** By clearing the program all information for that program is deleted.

**Master Clear:** will clear all the information in the controller by way of the following: Turn rotary switch to position 10, press set 4, display will change, and then press set 4 again.

**Note:** All information data in all programs will be deleted. Only the current time and date will remain.

**Note:** Set 3 can be used to exit prior to performing a Master Clear.

**Note:** Semi/Manual mode can be operated when controller is in “OFF” mode.
Position 11

**Days of Delay:** Use Set 1 to select the number of days to delay watering (the controller will not run for the number of days set). The new day starts at midnight.

**Auto:** Use set 4 to turn ON or OFF the Automatic watering schedule. Use this setting when programming receivers or when no watering is required for extended periods of time. The Semi and Manual Functions in Dial position 10 can still be used.

**Rain:** Use 3 to change to ON when a Rain Sensor is connected OFF when no Rain Sensor is connected or to override a connected Rain Sensor.
In the “Run” position the controller will execute all that it has been instructed to do. Adding new or changing existing information can be done at anytime, even with a program running. As soon as the dial is rotated and new instructions are input, the controller will interrupt any on going activity and accept the new instructions. When the dial is returned to the “Run” position scheduled activity will resume.

Use of the Function Button while a program is running will access current monitoring. Use of the Function Button with no program running will access receiver programming.

See “LogicPLUS-S Receiver Programming Instruction.”
LogicPLUS-S Receiver Programming Instructions

When programming a receiver with a controller that is installed with the field wires connected:

1. Set the controller in the OFF position. Turn the rotary switch to position 11 (Rain Off/Auto On/Off) use the top right arrow key set 4 to turn the setting from ON to OFF. This will stop any program that is running and prevent any form starting while programming receivers.

2. Disconnect the field wires.


4. Press the “Function” key to access the “Set Decoder ID” screen.

5. Connect the 3.5mm plug wire to the 3.5mm Jack Connector on bottom of board. (Programming Port)

6. Connect each of the red wire on receiver with each of the alligator clips.

7. Be sure black receiver wires are not touching.

8. Using the arrow keys corresponding directly underneath the ID number in the display (set 3) select the desired number or MSTAR, MSTRB, MSTRC or Fert, for a Master or Fertigation receiver. The Master and Fertigation choices are found by scrolling through the station number. Use the down arrow key to quickly access the Master and Fert settings.

9. Press the arrow key corresponding to “Enter” on the display (right up set 4).

10. The LED on the receiver will flash three (3) times.

11. Remove the red leads.

12. Install “Receiver Number Identification Tag” (see below listed instructions.) If programming more receivers repeat from step 5. (see “Receiver Programming Leads” below.)

13. To end programming press “Function” key to return to “Run.” Controller will not resume “Run” automatically.

14. Re-connect field wires.

15. **Set the Controller back to ON to resume Auto Programming.** Rotate the dial to position 11. Use the top right arrow key to turn the setting from OFF to ON.
Programmable Receiver Number Identification Tags

Hit Products has developed a user friendly, flexible means to identify the number of the field programmed receivers during the receiver programming process. Inside every box of programmable receivers, you will find one set of identification tags numbered 1-128. You will use these receiver identification tags as follows:

1. Every time a receiver is programmed, find the corresponding numbered identification tag and immediately attach to receiver.

2. To attach identification tag to receiver, insert one red receiver wire into the hole (from front to back) to the left of the appropriate numbered tag as you are looking at the number. Pull red wire all the way through the hole until identification tag is approximately one inch from body of receiver. Note: This will leave the engraved number unobstructed by the wire.

3. Insert same end of same red wire back through hole (from back of tag towards front) and continue to pull wire through until tight. The number on the tag should now be readily visible and the red wire positioned on back (blank side of tag). See above.

4. Should receiver ever be reprogrammed to a different number, make sure to replace the identification tag with the appropriately numbered identification tag. Failure to do so can create extreme confusion!
DIAMOND SETTINGS

The DS, as we call it, is an automatic calendar setting after run times and start times are entered. The DS will set the minimum days of the irrigation calendar. This is to protect against overlapping within a program. After initial programming of the LogicPLUS-S, run times and start times, the DS will not allow you to enter additional run times or increase the budget so that it will exceed the current calendar days set.

If you are unable to increase run times, check your “total run time” in position 5. If the “total run time” for that program is close to the number of current calendar days for that program you may have to increase the number of calendar days to get the controller to accept increased run times, increased water budget or adding more valves with run times to that program. The same is true of increasing the water budget; the calendar may have to be extended to accommodate the extended run times to allow the program to complete its cycle.

The DS sets the calendar automatically as follows. The start time entered is calculated as to how many hours past 12 midnight it is, for example an am start time would be 8 hours from midnight or the start of that day, then the DS looks at total run times including pause time and adds the time from midnight to the start time together. **If the total time exceeds 24 hours the calendar is set for two days**, if the total time exceeds 48 hours the calendar is set to a three-day calendar and so on. The first day will be set as a STRT day (Start) the following day will be “run” days. The day you programmed this program, automatically becomes day 1 of the calendar, for example a three-day calendar programmed on Monday would look like the following:

Day 1 STRT would be Monday  
Day 2 RUN would be Tuesday  
Day 3 RUN would be Wednesday  
Day 1 STRT would be Thursday  
Day 2 RUN would be Friday

And so on; please note that any calendar not divisible by 7 will run on different days of the week as the year progresses. If the above example were changed to a five-day calendar the days 4 and 5 would show OFF.

**Note:** It is important to remember if the total run time of a program is under 23 hours and 59 minutes; the DS automatically sets the calendar to one day. Even if the start time is set to allow the program to run past midnight into the next day. The same is true if multiple start times are used in the same program and the total runtime of the program multiplied by the number of start times is under 23 hours and 59 minutes. The DS will not allow multiple start times that total more than 23 hours and 59 minutes.
Two Wire Operation

Controller Operation
When the controller is activated by either “Auto” programming or a “Manual” Input, the power plus an encoded signal is supplied to the four field Outputs.

Receiver Operations
The Receiver operates as an electronically controlled switch. When the receiver recognizes the encoded signal that matches its programmed data, it then allows or “switches” power to the solenoid at the valve. Each receiver has a Red LED that will light when the receiver is “switched” or activated. When testing or troubleshooting, this LED is a convenient indicator of the Receiver Status. Lit condition indicates that the signal and power are present and the Power is being sent to the solenoid. An unlit condition indicates the receiver is not activated. This is an indication that the power and/or signal is not present.

Line Short/Valve Short Codes
The controller, through its current monitoring ability, can display two fault conditions: One being “Short Line” the second being “Valve Short.” These faults are triggered when current draw has exceeded a present level.

Note: No Output is sent to the field during these conditions.

If this current draw is sensed at a programs initial start a line short will be displayed.
If the current draw is sensed during a valve run time then short valve with a valve number will be displayed.

Short line will retry after 20 minutes. Turning the dial out of “Run” and back will clear the display. The controller will then try to continue any scheduled program. If the short has not been corrected the controller will go back into “Line Short”.

“Short Valve” will stay displayed during the valve run time. The controller will monitor the program status and operation will resume when the next valve is activated. If the problem has not been corrected by the time the controller is scheduled to Run again the “Short Valve” will repeat.

Note: These codes are designed to protect the controller and transformer. In extremely long wire runs the current level may not be reached to activate “Short” due to line loss.
VALVE WIRING
The field wiring from the controller to the receivers consists of either one, two, three or four, 2-wire runs, which connect, in series, to each valve location. Each 2-wire run is totally independent of the other relative to wire size requirements and the number of valves operating simultaneously. All four 2-wire runs receive and output the exact same information. The purpose of four independent 2 wire runs are for reducing the potential amount of “back tracking” when valves are located in more than one general direction from the controller. Theoretically, with the Logic controller located in the center of an irrigation project, one 2-wire run would go one direction and the second, third and fourth could go in other directions. Each 2-wire run starts at the controller and ends at the last receiver/valve for that wire run.

1) Do not loop the field wires back to the controller.
2) Do not connect field wires of one 2-wire run with those of another. Each run is independent.
3) Do not connect the field wires of one controller with those of another controller.

For the main 2-wire runs, it is very important to size the wire properly. Consideration for designing the proper wire size includes the total wire distance from controller to the farthest receiver and how many valves will be operating simultaneously. Wire size must be designed using Ohm’s law for any application.

The field wiring should consist of one to four continuous main 2 wire runs starting at the controller terminal labeled “Line 1,” “Line 2,” “Line 3,” “Line 4” and continuing to the last receiver/valve of that wire run. If using the multiple output feature, use one continuous length of wire independently for each output. Every receiver is to be connected directly anywhere on one of your main two-wire continuous runs. The last receiver installed is the end of the main two wire run. You may operate a maximum of eight of the same numbered receivers eight valves maximum of any random numbered receivers at any one time.

WIRE CONNECTIONS:
One of the most critical installation requirements of a Two Wire system is the quality of your wire connections. If you follow these directions you will have a reliable, dependable control system for many years. It is suggested to solder all receiver (red wire) connections to your main two-wire run. Next install the soldered two-wire connection in a waterproof underground connector housing. When soldering is impractical, a waterproof “dry-type” connection such as the Hit Products DBC-BR wire connector is required. The above mentioned products will provide an uncontaminated, dry connection.

See diagram page 40

Do not use pre-filled wire nut connectors as they will impede the transfer of the signal through the wire splice.
# Troubleshooting Hints for LogicPLUS-S Two-Wire Systems

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| **Display Blank.** | No Power.  
  Incorrect Programming  
  Controller is OFF  
  Program is OFF  
  No start times  
  Calendar not set correctly  
  Water budget set at zero. | 1) Check: 110v or 220v supply and corrections. Correct as needed.  
  2) Check: 12V DC at the controller board terminals. If no 12V DC possible bad power supply.  
  3) Check: the connector between the SPD board and controller. Re-seat if needed. |
| **Controller Operates in “Manual” or “Test” but not in “Auto.”** | Incorrect Programming  
  Controller is OFF  
  Program is OFF  
  No start times  
  Calendar not set correctly  
  Water budget set at zero. | Correct Programming  
  See the Programming section of this Manual. |
| **Controller Displaying “Short Line” or Turning ON/OFF and “Clicking”** | High Current Draw  
  1) More than 8 valves activating.  
  2) Short field wires.  
  3) Field wires of one controller connected to field wires of a second controller. | 1) Possible failed Receiver.  
  2) Field wires shorted.  
  3) Possible failed LP-SPD-F. |
| **No Valves Activating.** | 1) Controller not activating.  
  2) Field Wire Connection. | 1) See “Controller Operates in Manual and Test but not Auto”.  
  2) Check the “Field Out” wire connections at the Controller.  
  3) Failed Controller or SPD BO Replace Panel or SPD BO. |
| **Single Valve not Activating.** | 1) Bad wire connection.  
  2) Failed Receiver. | 1) Check Receiver Wire Connection.  
  2) See Receiver Operation. |
<p>| <strong>Multiple Valves not Activating.</strong> | 1) Field wiring or connections. | 1) Check wiring and connections between the last valve working and the first valve not working. |</p>
<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display is flashing “Rain Off”.</td>
<td>Power is being supplied to Rain Off connector.</td>
</tr>
<tr>
<td></td>
<td>Incorrect Rain Switch.</td>
</tr>
<tr>
<td>Controller displaying reads “Valve Short” with a valve number.</td>
<td>High current draw during valve run time.</td>
</tr>
<tr>
<td></td>
<td>1) Possible bad solenoid.</td>
</tr>
<tr>
<td></td>
<td>2) Shorted wires between receiver and solenoid.</td>
</tr>
<tr>
<td></td>
<td>3) Possible bad receiver.</td>
</tr>
<tr>
<td>Display frozen, does not respond to rotating valve.</td>
<td>Micro is locked.</td>
</tr>
<tr>
<td></td>
<td>1) Turn power off for a minute, then back on.</td>
</tr>
<tr>
<td></td>
<td>2) Perform a Master Clear.*</td>
</tr>
<tr>
<td></td>
<td>Note: *All Controller Information Will be lost.</td>
</tr>
<tr>
<td>Display reads ‘SPD Board Not Attached”.</td>
<td>Controller does not sense SPD board.</td>
</tr>
<tr>
<td></td>
<td>1) Interface cable not connected</td>
</tr>
<tr>
<td></td>
<td>2) Bad Connector/Cable, reset connectors</td>
</tr>
<tr>
<td>Valves Turning ON/OFF during run time.</td>
<td>Possible EMF interference</td>
</tr>
<tr>
<td></td>
<td>Check: Controller, Receivers and Field Wiring location in respect to any high voltage.</td>
</tr>
</tbody>
</table>
LogicPLUS-S Panel/SPD Board Wiring
Electrical/Ground for 110-240VAC 50/60Hz Application
Ground Wiring

**NOTE:** Use separate Ground Rod for each Controller in multiple Controller installations.

**NOTE:** SPD Ground to a Grounding Rod DO NOT CONNECT TO UTILITY GROUND.
Rain Switch Connections

After the Rain switch connections are complete turn the dial to position 11 use set 3 arrow to change the display from Rain/Off to Rain/On

**Note:** This step must be performed to acknowledge a Rain Sensor.

**Note:** Turning the display from Rain/On to Rain/Off may be used to override the Rain Sensor. See Dial Position 11 in the Programming Instructions.
WIRING INSTRUCTIONS

1. Turn off Power.
2. Remove the Logic face plate and stainless steel panel.
3. Mount the antenna bracket utilizing the holes in the Logic stainless steel cab (upper right hand side or top). See Remote Technology’s antenna mounting directions.
4. Connect antenna leads.
5. Using the double backed tape, mount the receiver card directly to the stainless steel cab. Locate properly to leave access to the address switches.
6. Connect antenna lead to ANTENNA JACK.
8. Reinstall front panel.
DBC-BR Wire Connector Installation Instruction

**WARNING!** Turn off power before installing or removing connector. All electrical work should be done according to appropriate electrical codes.

1. Insert Brass Connector with Screw showing in the opening in Handle. Insert all Wires into Brass Connector.

2. Use Screwdriver to tighten Screw very firmly on Wires while holding splice in Handle. Pull Wires to check for integrity of connection. Repeat process if any loose Wires.

3. Remove Wires and Brass Connector from Handle.

4. Insert Wires to bottom of Tube.

5. Bend Wires to fit under Cap and securely snap Cap to fully closed position.

**IMPORTANT NOTICE:** Before utilizing the product, the user should determine the suitability of the product for its intended use. Hit Products Corp. expressly disclaims the implied warranties and conditions of merchantability and fitness for a particular purpose. In no case shall Hit Products Corp. be liable under any legal theory, including but not limited to contact or strict liability, for any direct, indirect, special, incidental or consequential damages resulting from product use.

Manufactured by Hit Products Corp., Lindsay, Ca, USA  
www.hitproductscorp.com
LOGIC HAND HELD RECEIVER PROGRAMMER
PROGRAMMING INSTRUCTIONS

WARNING: WHEN PROGRAMMING A RECEIVER AT THE VALVE BOX BE SURE TO DISCONNECT BOTH RED RECEIVER WIRES FROM THE FIELD WIRING AND ONE BLACK RECEIVER WIRE GOING TO THE SOLENOID

1. To turn on the Programmer press the ON/ENTER button (after 20-30 seconds of no activity the programmer will turn off). The display will read:

2. Clip the 2 red leads of the Programmer to the 2 red leads of the Decoder/Receiver to be programmed. Be sure the black leads of the Receiver/Decoder are not touching.

3. To Program a Logic Receiver:
   a. To Program a Decoder/Receiver press the top button. The display will read:

4. This unit will display "LOW BATTERY":
   To replace the battery, remove the six (6) screws from the back cover. Replace the 9V battery and replace the back cover and screws. Be sure to place red wires properly.

5. To Test a Logic Receiver
   a. To Test a Decoder/Receiver ID, press the middle button. The display will read:

   b. Use the top 2 buttons to scroll up or down to the required number.
   c. Press Enter.
   d. The LED in the Receiver/Decoder will flash 3 times.
   e. The receiver is now programmed.

   LP-HHRP

   LP-HHRP
LogicPLUS Valve Wiring

Typical Connection Points

Typical Connection Point with Surge Protection Devices

Last Valve on Wire Run

Field Wires end at the last Valve. Do NOT loop back to Controller.
LP-SPD-F Wiring
Field Surge Protection Device

Install Every 200-300 ft. along the 2 wire path

To field wires
Connection

To a Ground Rod
(Customer Supplied)

Ground Rod

7/8” Wide

1.50”

2.50”

To Next Valve

Red

Red

Black

Black

Green

Receiver

LP-SPD-F

Customer Supplied

1.50”

7/8” Wide

1.50”

2.50”
LogicPLUS-S Master Valve/Pump Start/Fertigation Relay Wiring
Pedestal/Box Mounting Instructions/Dimensions

INSTRUCTIONS:
1. MOUNT PEDESTAL BASE USING THREE MOUNTING HOLES.

2. REMOVE THE REAR PANEL FROM PEDESTAL IF NECESSARY TO INSTALL WIRING 3/4 INCH KNOCKOUTS ARE AVAILABLE ON BOTH SIDES.

3. BACK OUT TWO TOP SCREW AND REMOVE REMAINING FOUR SCREWS FROM TOP OF PEDESTAL.

4. MOUNT STAINLESS STEEL BOX TO PEDESTAL.
   A) REMOVE CONTROLLER FACE PLATE AND STAINLESS STEEL PANEL FROM STAINLESS STEEL BOX.
   B) MOUNT BOX TO PEDESTAL UTILIZING THE TWO MOUNTING HOLES (KEYHOLES).

5. REPLACE THE FOUR SCREWS REMOVED IN STEP 3 AND TIGHTEN ALL 6 SCREWS.

6. BRING THE WIRING THROUGH THE BACK OF THE BOX AND SECURE.

7. MAKE WIRING CONNECTIONS TO CONTROLLER (SEE LOGIC WIRING INSTRUCTIONS) AND REPLACE CONTROLLER PANEL INTO STAINLESS STEEL BOX AND REPLACE THE STAINLESS STEEL PLATE.

8. REPLACED PEDESTAL REAR PANEL IF NEEDED.

NOTE: KEEP FIELD WIRES SEPARATED FROM AC POWER WIRES INSIDE PEDESTAL.