

## FD-101, FD-102, FD-202, FD-401 and FD-601

A technology long-since proven on golf courses around the world, Rain Bird decoders provide best-in-class field control on centrally controlled irrigation systems. Installed underground and featuring simple, low-cost wiring, decoders are an aesthetically pleasing, full-featured, economical option for reliable in-field control.

### FEATURES AND BENEFITS

- Improve aesthetics and reduce costs with buried in-field controls.
- Easy system expansion... simply splice into the communication line and add additional decoders.
- Installation requires up to 80 percent less wire than conventional controller systems.
- Electronic components are completely encapsulated to protect against the elements.
- Simple, two-wire system can be spliced and stored during installation.
- Underground decoders reduce the chance of damage from animals or vandals.
- Pre-coded addressing eliminates confusion associated with switch-based addressing.
- With the addition of Rain Bird's Decoder Programming Unit (DPU), decoder addresses can be reassigned if necessary.

### SIMPLE, RELIABLE CONTROL

If you're looking for an alternative to a traditional in-field controller, Rain Bird decoders may be the right solution for you. These self-contained switching stations for your central control system are simple, yet very reliable. They work with your central control system just like conventional controllers but are buried underground away from the elements.

### A COST-EFFECTIVE ALTERNATIVE

A simple wiring configuration and absence of protective enclosures keeps installation and maintenance costs low. Rain Bird decoders are a "true lower than 30 volt" system that utilize a two-wire path of 14-gauge wire connecting the central control system, decoders and valves or valve-in-head sprinklers.

### SENSOR CAPABILITY

If you need information from analog, pulse or switch sensors to manage your irrigation, connect the sensor to the SD-210 sensor decoder and view the data at the central. Using Smart Sensor™, sensor data can even be used to control the irrigation.

### PROTECT AGAINST THE ELEMENTS

With all electronic components fully sealed within a water-tight enclosure and buried underground, damage from floods, frost, rodents or vandals is virtually eliminated. Rain Bird decoders are an especially good choice for flood plains.

### AN OUT-OF-SIGHT SOLUTION

Buried decoder systems leave nothing exposed to the elements. With no evidence of in-field control, this aesthetically pleasing alternative works perfectly in situations where controller enclosures are unwanted or impractical.

### EXCELLENT FOR RENOVATIONS

Thanks to advanced central control technology and simple wiring requirements, decoders are a smart choice for many golf course renovations. With Rain Bird's Cirrus™, Nimbus™ II and Stratus™ II Central Control Systems, it is now possible to use Rain Bird's hybrid feature to operate controllers, decoders and IC concurrently. This makes it easy to expand irrigation coverage using a minimal amount of wire and decoders.

### IN-FIELD CONTROL OPTIONS

The addition of decoders doesn't mean the elimination of in-field control. Decoders can be turned on and off in the field with The FREEDOM System or MI Series Mobile Controllers. The MI Series Mobile Controller allows precise control of the decoder system anywhere Internet access is available, even on a mobile phone. Another alternative is The FREEDOM System. This handheld radio remote allows you to signal changes to the central control system from anywhere on the course.

### THE RIGHT AMOUNT OF CONTROL

Select different decoders to operate one, two, four or six solenoids. Five different decoders let you choose the amount of control you need.

*\* Software required*



### ● Decoders

### HOW TO SPECIFY

FD - XXX

Model	Decoder Type
101	Single Address (1 solenoid)
102	Single Address (up to 2 solenoids)
202	Dual Address (up to 4 solenoids)
401	Four Addresses (up to 4 solenoids)
601	Six Addresses (up to 6 solenoids)

CONTROLLER POWER WIRE SIZING WORKSHEET						
	PAR+ES	PAR+ES LINK WITH RADIO	PAR+ES SAT DECODER**	PAR+ES SAT DECODER LINK WITH RADIO**	ESC-1	ESC-1 LINK WITH RADIO
Input (VAC)**	117	117	117	117	117	117
Output (VAC)	26.5	26.5	26.5	26.5	26.5	26.5
Maximum Rain Bird Solenoids at 60 Hz (50 Hz)						
Per Clock	16 (12)	16 (12)	16 (12)	16 (12)	9	9
Per Station	4	4	2	2	2	2
AMP Draw at Rest	0.15	0.17	0.235	0.250	0.18	0.20
1	0.22	0.24	0.250	0.265	0.30	0.32
2	0.30	0.32	0.258	0.273	0.42	0.44
3	0.37	0.40	0.264	0.281	0.54	0.56
4	0.45	0.47	0.272	0.289	0.66	0.68
5	0.52	0.54	0.280	0.297	0.78	0.80
6	0.60	0.62	0.288	0.305	0.90	0.92
7	0.67	0.70	0.296	0.313	1.02	1.04
8	0.75	0.77	0.304	0.321	1.14	1.16
9	0.82	0.84	0.312	0.329	—	—
10	0.90	0.92	0.320	0.337	—	—
11	0.97	0.99	0.328	0.345	—	—
12	1.05	1.07	0.336	0.353	—	—
13	1.12	1.14	0.344	0.361	—	—
14	1.20	1.22	0.352	0.369	—	—
15	1.27	1.29	0.360	0.377	—	—
16	1.35	1.37	0.368	0.385	—	—

FEATURE COMPARISON			
	PAR+ES	PAR+ES SAT DECODER	ESC-1
# Stations	16 – 72, 8	Up to 72 decoder addresses	16, 24, 40
Communication Options	Standalone, Hardwire and Radio	Standalone, Hardwire and Radio	Standalone, Hardwire and Radio
Central Control	All Rain Bird Centrals, except GO	All Rain Bird Centrals, except GO	All Rain Bird Centrals, except GO
Max Output at 60 Hz	5 Amp, 16 solenoids	5 Amp, 16 solenoids	3 Amp, 9 solenoids
# Programs	6 automatic, 2 manual	6 automatic, 2 manual	4 automatic
Program Start Times	12 per program	12 per program	8 per program
Programming Cycle	Weekday, Variable (up to 9)	Weekday, Variable (up to 9)	Even Day, Odd Day, Weekday, Variable (up to 31)
Water Adjust	0-200%, 10%	0-200%, 10%	0 - 300%, 1%
Surge Protection	Premium	Premium	Heavy-Duty
Max Station Run Times	2 Hours	2 Hours	12 Hours
Sensors	Yes	Yes	Yes
Master Valve	Yes	Yes	1 automatic and second set by station

\*Includes Master Valve.

\*\*Considering 72 decoders installed.

NOTE: Total AMP DRAW in chart is based on 117 VAC input. For 220/240 VAC input controllers, use 50% of amp draw shown in chart.

### MAXIMUM CRITICAL PATH LENGTHS FOR TWO-WIRE PATHS

Nominal Wire Size	Ohms/1000' Ohms/Km	MAXIMUM LENGTH FOR CRITICAL PATH			
		LOOP		STAR	
		Km	Miles	Km	Miles
2.5 mm <sup>2</sup>	15.00 Ohms/Km	12.0	7.5	3.0	1.8
14 AWG	2.58 Ohms/1000'	15.2	9.6	3.8	2.4
12 AWG	1.62 Ohms/1000'	24.4	15.2	6.1	3.8
10 AWG	1.02 Ohms/1000'	39.2	24.4	9.8	6.1

### CHARACTERISTIC TABLE FOR VARIOUS DECODER MODELS

DECODER MODEL	NUMBER OF ADDRESSES PER DECODER	MAXIMUM NUMBER OF SOLENOIDS PER ADDRESS	MAXIMUM ADDRESSES OPERATING AT ONCE	CURRENT DRAW (mA AT REST PER DECODER)
FD-101	1	1	1	0.5 mA
FD-102	1	2	1	0.5 mA
FD-202	2	2	2	1.0 mA
FD-401 <sup>1</sup>	4	1	4	1.0 mA
FD-601	6	1	4	1.0 mA

### DESIGN CRITERIA FOR DECODER SYSTEMS

CONDITION	CIRRUS	NIMBUS II	STRATUS II	STRATUSLT
Maximum resistance in critical path	33 Ohms	33 Ohms	33 Ohms	33 Ohms
Maximum number of addresses per wire path <sup>2</sup>	250	250	250	200
Maximum number of addresses per LDI	500	500	500	300
Maximum number of addresses per SDI	200	200	200	200
Maximum number of active solenoids per wire path	20	20	20	15
Recommended Interface unit	LDI	LDI	LDI	SDI
Maximum number of active solenoids per recommended interface <sup>3</sup>	40	40	40	15
Active solenoid current draw (mA)				
Golf (green coil)	20 mA	20 mA	20 mA	20 mA
"B" (white wires)	25 mA	25 mA	25 mA	25 mA
"DV" (black wires)	15 mA	15 mA	15 mA	15 mA
Hybrid system max number of interfaces per system (LDI, SDI)	12	3	2	1

<sup>1</sup>Has LSP-1 surge protection built-in.

<sup>2</sup>A wire path is the leg coming off the LDI, SDI or LTB.

<sup>3</sup>The number of decoders on a large system with long wire runs may reduce the number of active decoders that you will be able to operate at one time before the interface maximum current draw is exceeded and the interface shuts down (disconnects from the field wiring).

<sup>4</sup>Although the LDI can handle a maximum of 500 decoder addresses total. With any number over 380, the number of active decoders you will be able to operate simultaneously may be reduced.

<sup>5</sup>Although the LDI and SDI can supply 1,000 mA and 500 mA respectively, allow 50 mA of safety factor (design 950 mA with a LDI and 450 mA with a SDI)

### BASIC DATA FOR DECODER SYSTEM DESIGN

THE BASIC DATA FOR A DECODER SYSTEM IS AS FOLLOWS:

500 maximum <sup>4</sup>	Decoder addresses per LDI interface unit
200 maximum	Decoder addresses per SDI interface unit
40 maximum	Active solenoids per LDI (with 20 mA current draw each)
15 maximum	Active solenoids per SDI (with 20 mA current draw each)
20 maximum	Active solenoids per two-wire path on LDI (with 20 mA current draw each)
15 maximum	Active solenoids per two-wire path on SDI (with 20 mA draw current each)
9 Volts	Maximum allowable voltage drop per two-wire path
15 mA (total) <sup>5</sup>	For LDI or SDI Lights
0.5 mA each	For each inactive FD-101 or FD-102 decoder
1.0 mA each	For each inactive FD-401, FD-202 or FD-601 decoder
15 mA each	For each active DV solenoid coil with black wires
20 mA each	For each active Golf (green) solenoid coil
25 mA each	For each active B solenoid coil with white wires
LSP-1 Installation	No more than 8 decoders between two LSP-1 surge arrestors or no more than 500 ft, whichever is less. LSP-1 ground grid resistance of 50 Ohms or less is recommended.

### MAXIMUM WIRE LENGTHS FOR SECONDARY PATH WIRE RUNS

Wire Size	SECONDARY WIRE RUN LENGTHS	
	Meters	Feet
1.5 mm <sup>2</sup>	100	328
2.0 mm <sup>2</sup>	133	436
2.5 mm <sup>2</sup>	166	545
16.0 AWG	88	289
14.0 AWG	139	456
12.0 AWG	220	720