



RV

INSTALLATION & OPERATIONS MANUAL

110V DIRECT RESPONSE

AUTO-RETRACT SYSTEM

Installation & Operations Manual

The unique and innovative 110V electronic control system provides Carefree's *Direct Response* system with interior pushbutton controls for standard extend/retract functions. At the master control panel the auto-retract system can be engaged to automatically retract the awning in windy conditions. Sensitivity can be set to respond to a variety of wind speed conditions.

TABLE OF CONTENTS

Installation	3
Sensor Installation	3
Mounting the Sensor w/ Bracket	4
Mounting the Sensor w/o Bracket.....	5
Switch Installation	5
Control Box Installation.....	6
Ignition Lockout Sensor Installation (Optional)	6
Installing the Remote Receiver.....	6
Programming the Remote Receiver	7
Operational Notes:	7
Wiring Diagram –Direct Response System	8
Testing the System.....	9
Operation	10
The Auto-Retract System	11
Using the Remote Control	11
Limited Warranty	12

SAFETY INFORMATION

WARNING

A WARNING INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH , IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY AND/OR MAJOR PROPERTY DAMAGE.

CAUTION

A CAUTION INDICATES A POTENTIALLY HAZARDOUS SITUATION THAT MAY CAUSE MINOR TO MODERATE PERSONAL INJURY AND/OR PROPERTY DAMAGE. IT MAY ALSO BE USED TO ALERT AGAINST UNSAFE PRACTICES.

NOTE: A note indicates further information about a product, part, or step.

Tip: A tip provides helpful suggestions.

COMPONENT CHECKLIST

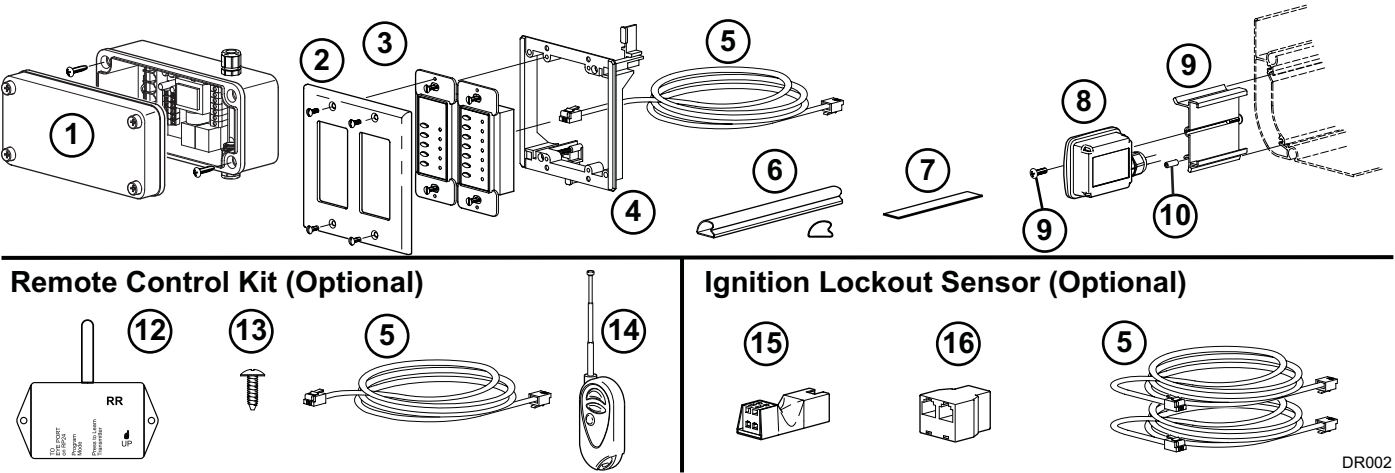


Figure 1. Component Checklist.

☒	ITEM	DESCRIPTION	QTY	NOTE
☐	1	Control Box	1	
☐	2	Switch Plate	1	1
☐	3	Switch Assy	1	1
☐	4	Switch Mount Box	1	
☐	5	Cable	60"	NOTE 4
☐	6	Wire Channel	6'	2
☐	7	Double Sided Tape	4"	10
☐	8	Sensor Assy, Motion (includes 25' of cable)	1	
☐	9	Bracket, Vertical Sensor Mount	1	2
☐	10	Screw, Phillips Head	#10 x 3/4	2
☐	11	Roll Pin	1/8 x 9/16	1
☐	12	RF Receiver, 133 MHz	1	3
☐	13	Screw, Phillips Truss Head	#6 x 1/2	2
☐	14	Remote Control Key FOB	1	3
☐	15	Sensor, Ignition Lockout	1	3
☐	16	Splitter	1	3
NOTES:				
1. Mounting screws are included with switches and switch plate.				
2. Sensor Bracket is used for Mirage Applications Only.				
3. Remotes and Ignition Lockout Sensor are optional and must be ordered separately.				
4. Item 5 (Cable - 60") quantities required: 1 for switch (item 3), 1 for remote receiver (item 12); 2 for ignition lockout sensor (item 15).				

INSTALLATION

WARNING

ALWAYS DISCONNECT THE VEHICLE BATTERY AND ELECTRICAL SOURCES BEFORE WORKING WITH ELECTRICAL WIRING AND COMPONENTS.

IMPORTANT NOTICES:

- Failure to follow the wiring instructions in this publication may void the motor warranty.
- All wiring must conform to NEC (National Electrical Code) and local codes.
- DO NOT wire two or more motors to one switch—No parallel wiring.
- The SO cable from the 110VAC awning motor can only pass directly through a wall, it can not be laid up in the wall and must be connected to NM wire or individual wires in conduit no more than 6 inches past the point of entry.
- The installer must provide enclosed junction boxes for all 110VAC wire splices. Boxes are required in conformance with prevailing construction codes.

The 110V electronic control system provides the user with simple pushbutton controls for the awning. The *Direct Response* electronic system is a premier auto-retract system that detects motion from adverse wind conditions and retracts the awning. Sensitivity is set by the user.

- System includes: Control box, Master control panel (w/ pushbutton awning control and wind speed sensitivity setting), motion sensor.
- The switches use a 5VDC signal to operate the control box; thus eliminating the need for a junction box for the control panel.
- An optional RF remote control is available with the *Direct Response* system.
- An optional ignition lockout is available.
- Refer to the Operation section of this manual for description of controls and settings.
- Components are connected using terminated cables. Terminated cable is 4-wire RJ11 terminated phone cord (straight, no twist). This does not include 110VAC power in or the awning motor.

NOTE: Furnished cable lengths are listed on page 12. If a connection requires a length greater than the supplied cable, the installer must provide a terminated jumper cable from the box location to the cable end.

SENSOR INSTALLATION

1. Prior to starting, determine the mounting location and method for mounting the sensor.:
 - 1.1 Open the awning slightly. On the lead rail, mark the locations of all obstructions that might interfere with the sensor when the awning is closed. This would include arm knuckles, a manual override, etc.

The mounting location must be located in an area that has no obstructions when the awning is closed.

CAUTION

THE SENSOR MUST BE MOUNTED IN A LOCATION WITH NO OBSTRUCTIONS WHEN THE AWNING IS CLOSED. THE SENSOR CAN BE DAMAGED AND THE AWNING WILL NOT CLOSE PROPERLY IF AN OBSTRUCTION IS PRESENT!

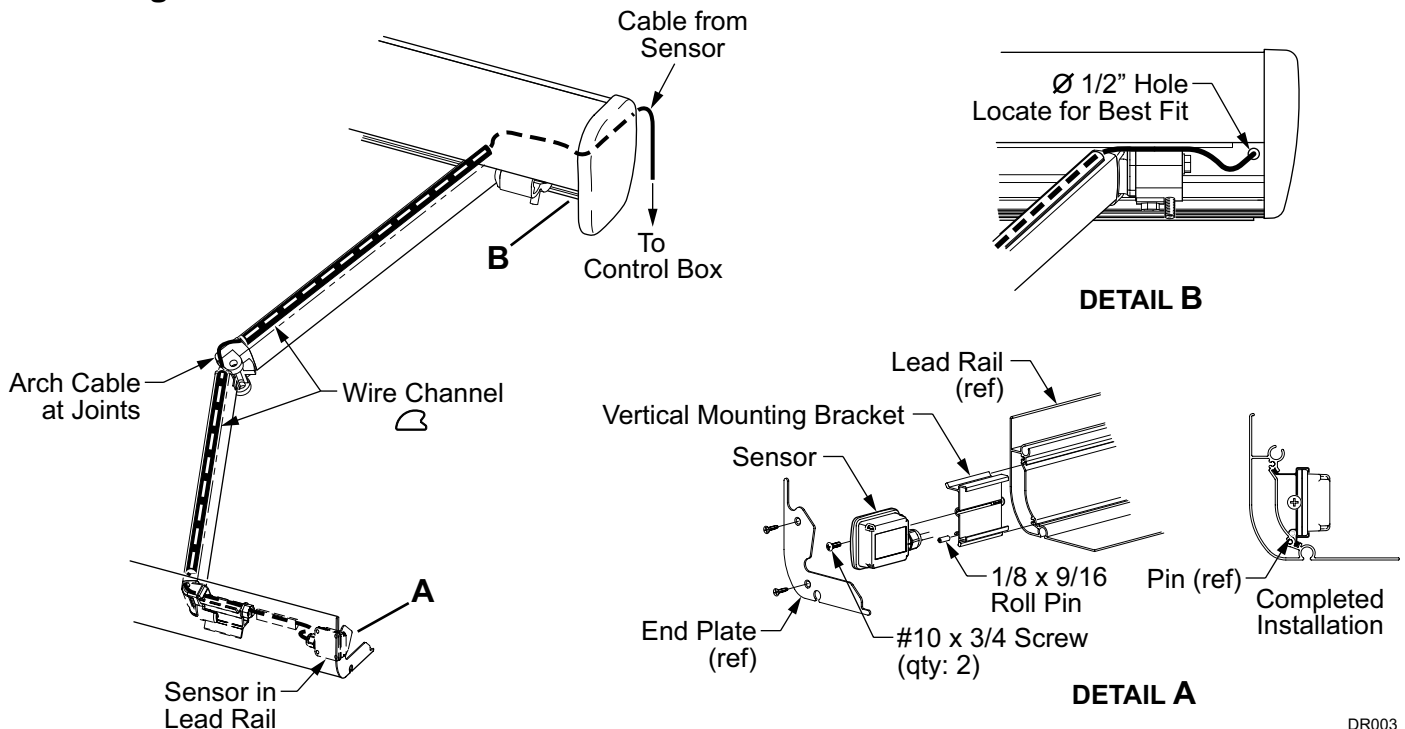
The sensor mounting area must be outside of the lateral arms.

- 1.2 Thoroughly clean the inside surface of the lead rail and the top of the arms. The surfaces should be clean and free of dirt and debris.
2. Cut the wire channel slightly shorter than the arm extrusion. Cut a piece for both arm sections.
3. Attach the channel to the top of the arms using double-sided tape. Evenly distribute the short pieces of tape along the lengths of the wire channel.

Tip: For ease of installation, make sure that the split in the channel is on the same side for both channel pieces when installed.

4. Two methods of attaching the sensor to the lead rail are used. Determine the correct method for the application.
- *For Carefree Mirage and Sundial:* A vertical mounting bracket is used attach the sensor to the lead rail. (Refer to "Mounting the Sensor w/ Bracket")
 - *For other applications:* The sensor is mounted using a high bond double sided tape. (Refer to "Mounting the Sensor w/o Bracket")

Mounting the Sensor w/ Bracket



DR003

Figure 2. Mounting the Sensor w/ Bracket.

(Detail A)

1. Remove the lead rail end plate and set aside.
2. The sensor is secured to the new bracket with a #10 x 3/4 screw on each side of the bracket. Insert one (1) screw into the edge of the bracket that will be pointed to the inside of the lead rail.
3. Slide the vertical mount bracket into the grooves of the lead rail. Position in the location of the sensor.
4. Secure the bracket by pressing the 1/8 x 9/16 roll pin between the bracket and lead rail as shown.
5. Slide the new sensor into the vertical mounting bracket and secure with a #10 x 3/4 screw as shown.
6. Route the cable as shown through the wire channel. At the arm joints, arch the cable slightly to avoid binding. Do not twist the cable.
Tip: Use a small tool, such as a flat bladed screwdriver, to gently spread open the channel then insert the cable into the channel. Do this for the entire length of the channel until the cable is fully inserted.
7. At the coach wall, drill a 1/2" hole and route cable inside the coach. Ensure that the cable and hole does not interfere with the awning or with items in the coach wall.
8. Route the cable to the control box location.
9. Go to "Switch Installation" on page 5.

Mounting the Sensor w/o Bracket

This mounting method is only used on brands other than Carefree awnings.

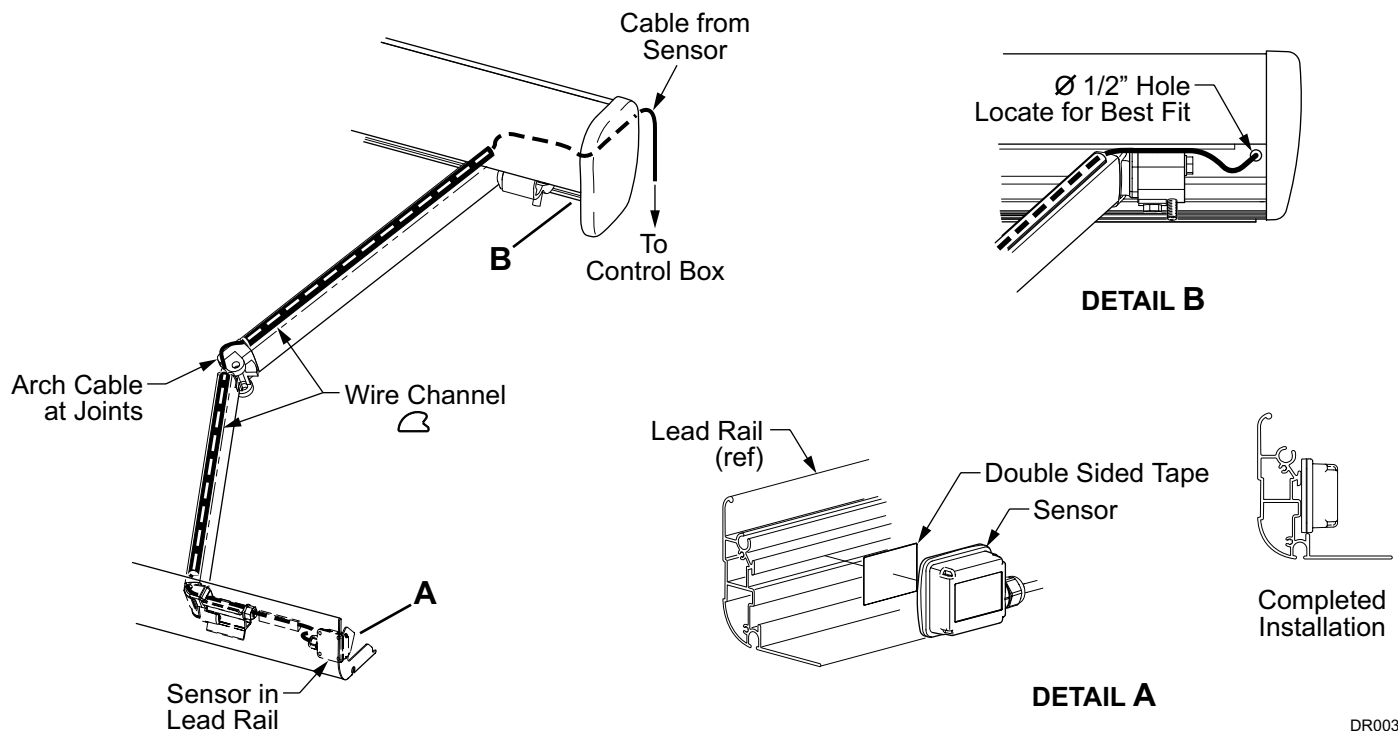


Figure 3. Mounting the Sensor w/o Bracket.

1. Apply double sided tape to the back face of the sensor.
2. Firmly press the sensor onto the inside vertical face of the lead rail. The sensor must be mounted on a flat and vertical surface.
3. Route the cable as shown through the wire channel. At the arm joints, arch the cable slightly to avoid binding. Do not twist the cable.
Tip: Use a small tool, such as a flat bladed screwdriver, to gently spread open the channel then insert the cable into the channel. Do this for the entire length of the channel until the cable is fully inserted.
4. At the coach wall, drill a 1/2" hole and route cable inside the coach. Ensure that the cable and hole does not interfere with the awning or with items in the coach wall.
5. Route the cable to the control box location.
6. Go to "Switch Installation" on page 5.

SWITCH INSTALLATION

1. At the switch location, cut a rectangular hole 4" x 3 3/4". The mounting box is able to clamp to thicknesses from 1/4" to 1".
2. Insert the mounting box and tighten the latch tab screws. The tabs will automatically rotate to clamp on the back side of the mounting surface. Do not overtighten the clamp screws.
3. Mount the switch assembly in the mounting box.
4. Mount the faceplate over the switches. It may be necessary to slightly loosen the switches to align the faceplate and switches.
5. Connect the switch cable to the patio switch and route to the location of the control box.

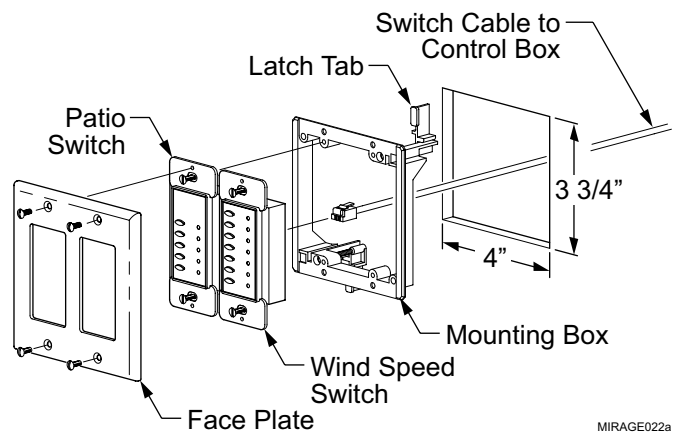


Figure 4. Switch Installation.

MIRAGE022a

CONTROL BOX INSTALLATION

1. Determine the location of the control box. Remove the lid from the control box.

NOTE: The control box is not suitable for exterior installations and must be mounted in the INTERIOR of the vehicle.

2. Attach the box using a minimum of two (2) #8 x 3/4 screws. The screws should be mounted in opposite corners.

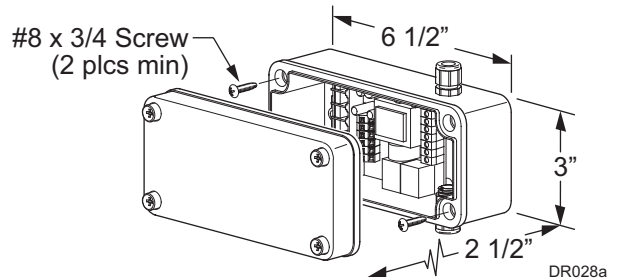


Figure 5. Control Box.

3. Route a 2-conductor 14AWG NM wire w/ ground from the AC power source to the box. It is recommended that the installer provide a dedicated AC circuit that is protected by an appropriate sized fuse/circuit breaker. Each patio awning draws a maximum of 3 amps. Connect wires to the control box as shown in the wiring diagram on page 8.
4. Splice the awning motor wires to a 3-conductor 14AWG NM wire w/ ground. Refer to the notices on page 3.
5. Route the cable wire from the motor to the control box and attach the wires to the terminals as shown.

NOTE: For RH motor:	RED WIRE goes to terminal (1);	BLACK WIRE goes to terminal (2).
For LH motor:	RED WIRE goes to terminal (2);	BLACK WIRE goes to terminal (1).

6. Connect the cable from the switch panel to "DSK" in the control box.
7. Connect the cable from the motion sensor to "AMD" in the control box.

NOTE: Use the slot cutouts in the box to route the phone cables.

IGNITION LOCKOUT SENSOR INSTALLATION (OPTIONAL)

Two optional Ignition Lockout Sensors are available with the Direct Response system. The optional EL ignition lockout will disable the extend function while the vehicle ignition key is in the ON position. The RTL ignition lockout will fully retract the awning and disable the extend function when the ignition key is turned to the ON position.

Functions will return to normal operation when the ignition key is turned OFF.

1. Connect the first cable to "BUS" in the control box.
2. Attach the splitter to the other end of the cable.
3. Attach the Lock-Out Sensor to the end of the second cable. Route the cable as desired and connect the cable to the splitter.
4. Attach a wire to the ground terminal of the sensor and route the wire to a suitable 12VDC ground.
5. Attach a 2nd wire to the 12VDC of the sensor and route the wire to a SWITCHED 12VDC source. A switched 12VDC source is a line that is hot only when the ignition is in the on position. NOTE: Wires to the sensor are not pin specific.
6. Bundle and secure the sensor, cable and wires as required.

INSTALLING THE REMOTE RECEIVER

1. Determine the location of the optional RF receiver:
 - 1.1 Do not mount the unit near heat producing elements such as LP appliances or engine exhaust components.
 - 1.2 For best reception, do not mount the unit near or on a metal surface.
 - 1.3 Mount the unit with the antenna pointing up.
 - 1.4 The clearance dimensions for the receiver are shown in Figure 6 on page 7.
 - 1.5 The included cable is approximately 60 inches long. Mount the unit close enough to the control box so that the cord can be connected without stressing the connections.
 - 1.6 Allow adequate room below the box to access the connector jack, programming button and indicator light.

- Position the box and secure using two (2) #6 x 1/2" screws.

NOTE: If the box is mounted on a surface that is less than 1/2" thick, the screws will protrude through the opposite side of the surface.

- Connect the cable to the receiver.
- If using the Ignition Lockout Sensor, route the cable to the splitter and connect. If not using the sensor connect the cable directly to the control box

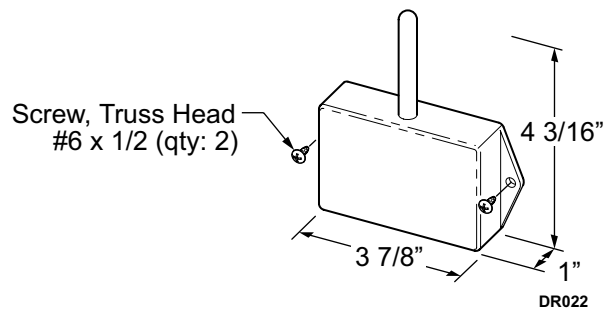


Figure 6. Mounting the RF Receiver.

PROGRAMMING THE REMOTE RECEIVER

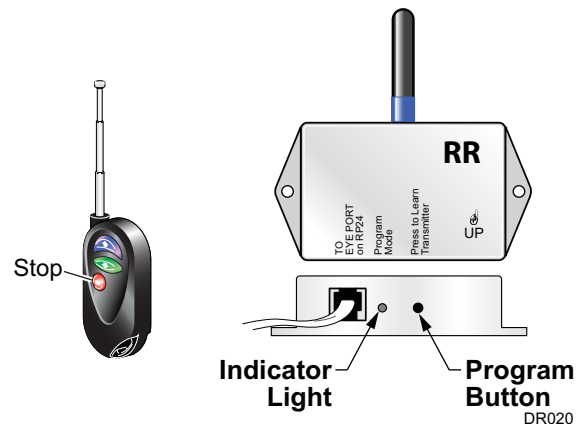
These instructions apply to the current 433 MHz configuration of the remote and receiver. For older versions (418 MHz) refer to the Mirage Service Manual available on-line @ www.carefreeofcolorado.com.

- Power to the control box must be on.
- Press and release the "Press to Learn Transmitter" button on the bottom of the receiver box. The receiver is in program mode when the red light comes on.
- Press and release the stop button on the remote. The red light will go out after the receiver learns the remote signal.

NOTE: Pressing the stop button will cause the blue up arrow button to default as the open (extend) function.

If a function button is pressed to train the receiver, it will be programmed as the open (extend) button. Example: Pressing the bottom button will program the bottom button for extend and the top button as retract.

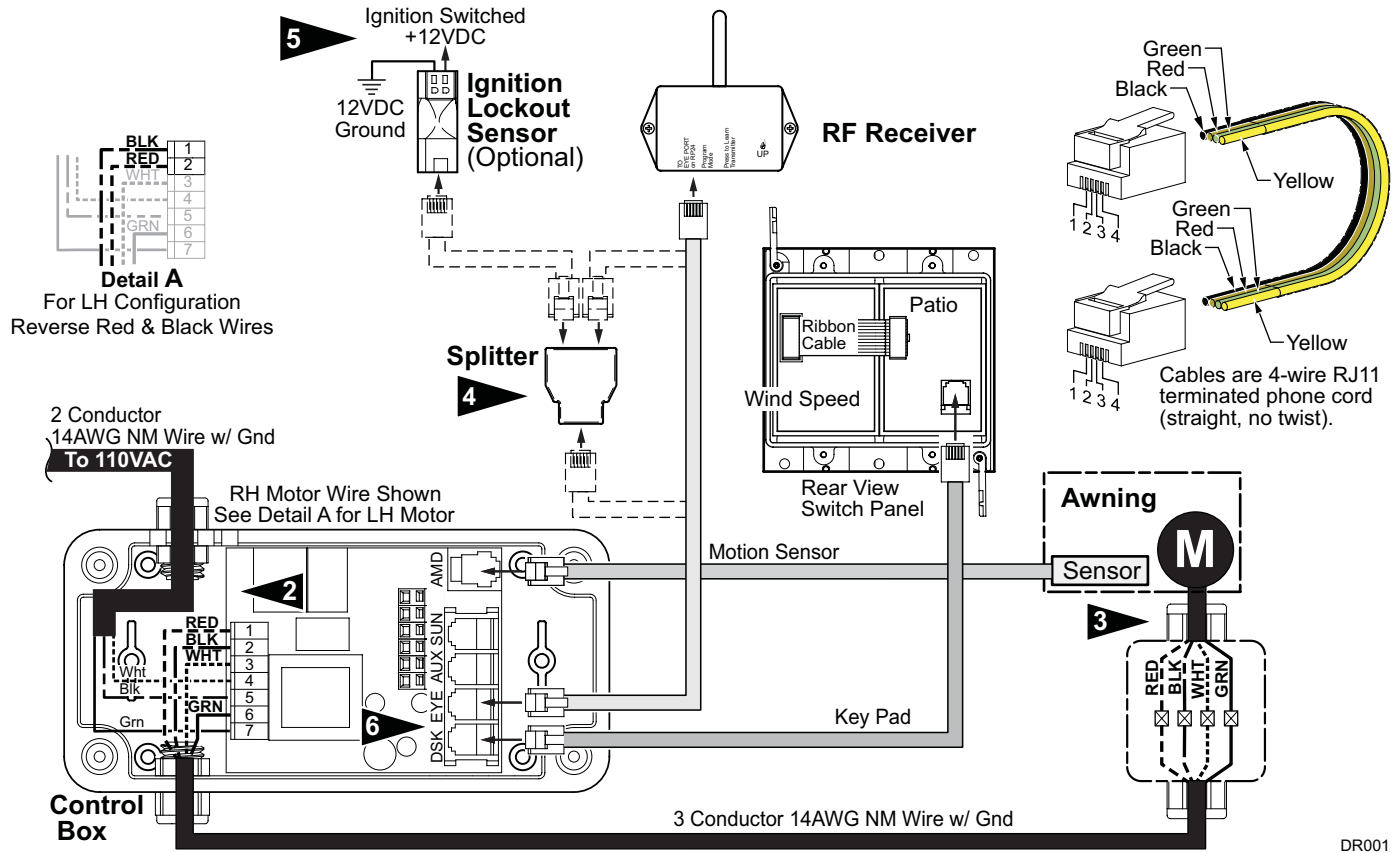
- Repeat for each additional remote.



Operational Notes:

- Transmitter and receiver operate on a frequency of 433 MHz.
- The receiver exits the program mode after ten seconds.
- If the light does not come on above, the memory is full and must be cleared. If the light still does not come on, check the continuity of the cord between the boxes and repair or replace as required. Pin 1 of the 1st connector goes to pin 1 of the 2nd connector etc.
- If the light does not go out in above, the receiver already knows the transmitter's signal or the battery in the remote needs to be replaced.
- To clear the memory: PRESS AND HOLD the transmitter learn button. While holding the button, the indicator light should be OFF for the full 5 seconds then come on.
- The system may be programmed for up to 5 remotes. Additional remotes may be ordered separately.

WIRING DIAGRAM –DIRECT RESPONSE SYSTEM



NOTES:

- 1** Wire Legend
- Red
 - Black
 - White
 - Green (Ground)
- 2** For RH Motor Configurations: Motor Red goes to Pin (1); Motor Black goes to Pin (2)
For LH Motor Configurations: Motor Red goes to Pin (2); Motor Black goes to Pin (1)
- 3** The SO cable from the 110VAC awning motor can only pass directly through a wall; it cannot be laid up in the wall and must be connected to NM wire or individual wires in conduit no more than 6" past the point of entry.
- 4** Splitter is used only when Optional Lock-Out Sensor is installed. Connect RF receiver directly to "EYE" if Lock-Out is not installed.
- 5** Wires for Ignition Lock-Out Sensor are not pin specific.
- 6** For early units: Label "DSK" was "ACC"; Label "EYE" was "BUS" label "AMD" was "SHAKE"

FROM		To (RH CONFIGURATION)		To (LH CONFIGURATION)	
Motor	Red	Control Box	1	Control Box	2
	Black		2		1
	White		3		3
	Ground		6		6
AC Power Source	White	Control Box	4	Control Box	4
	Black		5		5
	Ground		7		7
Awning Sensor	10' Cable	Control Box	"AMD"	Control Box	"AMD"
Patio Switch	60" Cable	Control Box	"DSK"	Control Box	"DSK"
Splitter	60" Cable	Control Box	"EYE"	Control Box	"EYE"
RR Receiver	60" Cable	Splitter		Splitter	
Ignition Lockout	60" Cable	Splitter		Splitter	

TESTING THE SYSTEM

When 110VAC power is removed from the system, the controller does not retain previous positioning information. When power is restored, positioning information is updated when the first function is initiated.

The function LEDs (extend, retract and stop) perform a dual function. When the button is pressed, the LED illuminates. The LED stays illuminated during the selected operation and after the awning has fully extended or retracted. This provides an indicator of the awning position. When the stop button is pressed, the LED will illuminate and stay on until a function is pressed. If on, it indicates that the awning is partially extended/retracted.

All function buttons are press ON/press OFF. The auto-functions will continue until the awning is fully extended/retracted or when the stop button is pressed.

1. While observing the control panel, have a second person initiate 110VAC power to the coach and awning system. The following should occur:
 - 1.1 The Auto-Retract and Wind Speed LEDs should illuminate briefly then extinguish.
 - 1.2 The Power ON/OFF and function/position LEDs will briefly illuminate.
 - 1.3 The system then goes to the default settings: The POWER "ON", AUTO-RETRACT "ON" and MEDIUM Wind Speed LED will be on.

NOTE: The function/position LEDs (extend, stop and retract) will not be illuminated. During power up the controller does not retain position information. The controller is updated with the first function used.

2. Press the POWER "OFF". ALL LEDs should be extinguished. The POWER ON/OFF button disables all functions including Auto-Retract and the optional RF remote. It does not disconnect the 110VAC power.
3. Press the POWER "ON". Press the EXTEND button, the LED should illuminate while the awning extends and stay on after the awning auto-stops. Observe the awning, it should fully extend. The system performs an auto-tension action when the awning is fully extended. The awning rolls in reverse to tension the fabric. The auto-tension feature works only with the extend function when the awning is fully extended or the stop button is pushed while extending.
4. After the awning is fully extended, press the RETRACT button, the EXTEND LED should extinguish and the Retract LED should illuminate while the awning is retracting. Press the STOP button.
5. When the STOP button is pressed, the awning will stop, the RETRACT LED should extinguish and the STOP LED should illuminate.
6. Press the RETRACT button, allow the awning to retract fully, the Retract LED will illuminate and stay lit.
7. Press the AUTO-RETRACT OFF. The AUTO-RETRACT and WIND SPEED LEDs should go out.
8. Press the AUTO-RETRACT ON. Press each Wind Speed button and confirm that the corresponding LEDs illuminate.
9. Test the Auto-Retract function:
 - 9.1 Fully extend the awning.
 - 9.2 With the AUTO-RETRACT ON, set the WIND SPEED to the lowest setting.
 - 9.3 Create a firm but gentle rocking motion with the leading edge of the awning. The awning should retract after 2-3 seconds of the motion.
10. *If the optional Ignition Sensor is installed:*
 - 10.1 Partially retract the awning.
 - 10.2 Turn the ignition key ON.
 - 10.3 Press the EXTEND button. The LED should flash for 2 seconds then shut off and the previous function LED will come back on.

OPERATION

The *Direct Response* system provides the user with a wide range of awning controls with simple pushbutton operation. The standard operation is straight-forward with the buttons clearly labeled. Each is described below. These buttons operate the same with or without the auto-retract system turned on.

Power ON/OFFPress ON, Press OFF. The power switch must be on before any awning functions can be used. When the power is ON, the LED will illuminate.

⚠ CAUTION

EXCEPT WHEN THE AUTO-RETRACT SYSTEM IS ACTIVE, IT IS STRONGLY RECOMMENDED THAT THE POWER SWITCH BE SET TO OFF WHENEVER THE AWNING IS NOT BEING OPERATED AND DURING TRANSPORT. THIS ACTS AS A SAFETY TO PREVENT THE AWNING FROM BEING ACCIDENTLY OPENED UNEXPECTEDLY.

Extend.....Press and release. The awning will extend out to the full extension and stop automatically. When the button is pushed, the LED will illuminate and stay on until another function is activated.

NOTE: If the optional ignition lockout is installed, the system will disable the extend function while the vehicle ignition key is in the ON position. Pressing the extend button will cause the extend LED to flash for 2 seconds then shut off then the previous LED will come back on.

During normal operation, the awning will extend out completely then roll back slightly to provide tension to the fabric.

Stop.....Press and release. During extend and retract functions, the operator may stop the awning by pressing this button. When the button is pushed, the LED will illuminate and stay on until another function is activated.

Retract.....Press and release. The awning will retract and stop automatically when the awning is fully retracted. When the button is pushed, the LED will illuminate and stay on until another function is activated.

All function buttons are press ON - press OFF. The auto-functions continue until the awning is fully extended/retracted or when the stop button is pressed. It is not necessary to hold the function button while the function is active.

The function LEDs (extend, retract and stop) perform a dual function. When the button is pressed, the LED illuminates. The LED stays illuminated during the selected operation and after the awning has fully extended or retracted. This provides an indicator of the awning position. When the stop button is pressed, the LED will illuminate and stay on until a function is pressed. If on, it indicates that the awning is partially extended/retracted.

NOTE: When 110VAC power is removed from the system, the controller does not retain previous positioning information. When power is restored, positioning information is updated when the first function is initiated.

⚠ CAUTION

AT STARTUP (110VAC APPLIED) DO NOT PRESS THE RETRACT BUTTON TO UPDATE THE POSITIONING INFORMATION. THIS CAN CAUSE THE MOTOR TO RUN IN AN OVER CURRENT MODE. IF THIS OCCURS, THE MOTOR'S THERMAL PROTECTION DEVICE MAY SHUT OFF THE MOTOR AND THE OPERATOR MUST WAIT APPROXIMATELY 15 MINUTES, FOR THE MOTOR TO COOL OFF, BEFORE OPERATING THE AWNING. TO PROPERLY SET THE POSITIONING, PUSH THE EXTEND BUTTON, ALLOW TO RUN FOR 1 SECOND THEN PRESS THE STOP OR RETRACT BUTTON.

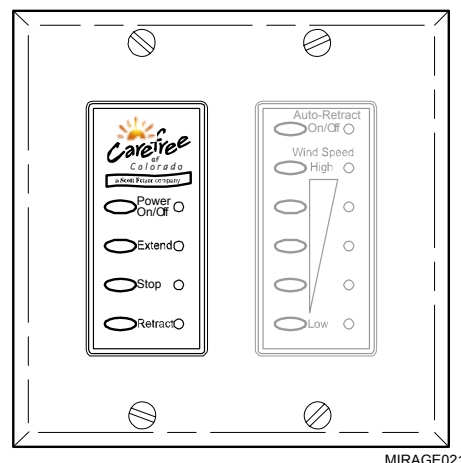


Figure 7. Direct Response Pushbutton Controls.

THE AUTO-RETRACT SYSTEM

The *Direct Response* system detects awning motion caused by windy conditions. The user is able to set the sensitivity and may have to experiment to find the best setting for the user's preferences.

The system operates by gauging the motion of the awning's leading edge. When persistent motion exceeds the factory preset threshold value for 2 seconds or longer, the system will automatically retract the awning. The pushbutton controls allow the user to choose between 5 factory preset sensitivity values (threshold values).

Gust detection is incorporated into the software. When the motion value is suddenly and sharply increased above a safe maximum value, then the 2 second persistence measure is overridden and the awning closes immediately.

To operate the auto-retract system: Turn the power ON; turn the Auto-Retract ON; set the sensitivity to the desired level.

NOTE: If the Auto-Retract LEDs flash when pressed on, this indicates that the motion sensor has been disengaged or otherwise disabled. Contact a Carefree service center for service.

⚠ CAUTION

THE CAREFREE DIRECT RESPONSE SYSTEM IS A PREMIERE ELECTRONIC AUTO-RETRACT SYSTEM THAT PROVIDES PROTECTION AGAINST ADVERSE ELEMENTS; BUT NO AUTO-RETRACT SYSTEM IS A GUARANTEE AGAINST SEVERE OR DESTRUCTIVE WEATHER; THE EFFECTS OF WIND AND RAIN ON AN AWNING ARE UNPREDICTABLE AND MAY CAUSE SEVERE DAMAGE TO THE AWNING AND/OR VEHICLE. IF WIND OR EXTENDED PERIODS OF RAIN ARE EXPECTED, RETRACT THE AWNING.

USING THE REMOTE CONTROL

A remote control is provided with the *Direct Response* system. In simple terms, the remote is a wireless key pad that functions in the same manner that the stationary control panel. The remote provides the advantage of allowing you to operate the awning from any convenient location.

The remote has a maximum operating range of 50 feet. Actual distance may vary depending on the specific installation and location of the receiver in the vehicle.

Remotes transmit on a frequency of 433MHz.

To use: turn system power ON at the control panel.

NOTE: Power ON/OFF and the Auto-Retract system can only be operated at the control panel.

Extend Press and release. The awning will extend out to the full extension and stop automatically.

Retract Press and release. The awning will retract and stop automatically when the awning is fully retracted.

Stop Press and release. During extend and retract functions, the awning may be stopped by pressing this button.

KEY FOB BATTERY

The 433 MHz remote uses a battery (Radio Shack p/n 23-279 or equivalent) that should provide a long period of service. To access: Remove the small screw from the back of the case and carefully snap off the back. Lift the old battery out and insert the new battery.

Batteries are available through local battery outlets.

Battery life is dependent on frequency of use, environmental conditions and condition of remote.

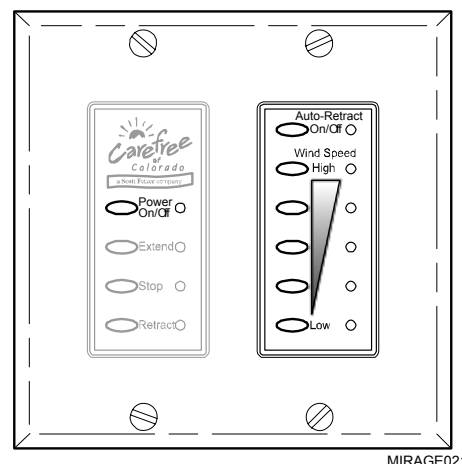


Figure 8. Auto-Retract Controls.



LIMITED WARRANTY

Carefree of Colorado (hereafter referred to as Carefree) warrants to the FIRST retail Purchaser that the 110V Direct Response System is free of defects in material and workmanship for one (1) year from original date of purchase.

This warranty does not apply to damages that are the result of improper installation, misuse or neglect. In addition, wear and fading from normal use is excluded from this coverage.

WARRANTY CLAIM PROCEDURE

1. Retain a copy of the original purchase receipt.
2. If the product is found defective within the warranty period, return the product along with the original purchase receipt to your qualified Carefree dealer.
3. All returns are for product replacement only. No returns for cash or credit are accepted.
4. Carefree does not cover any costs associated with delivery or return of the product.



This manual is provided courtesy of **RV Tech Cheat Sheet**



Professional resources for the whole RV industry — free.

We put manuals, wiring diagrams and hard-won tech knowledge in every technician's hands, so repairs get done right the first time, techs work faster, and RV owners everywhere get better service.



rvtechcheatsheet.com/manuals

Find thousands more RV manuals, wiring diagrams and parts lists

RV techs: share fixes, ask questions and learn from each other.

Join our free Facebook group →



Follow proper safety practices. If in doubt, consult a professional RV technician.