SP600
RV-C Keypad

Application Document

General Specifications

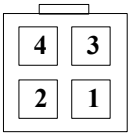
Input Voltage	8 VDC - 18 VDC
Input Amperage	100mA
Temperature Range	-40 - 185 Deg F (Industrial)
Environmental Limitations	Not sealed for exterior mounting.
Flash Memory (code space)	256k
EEPROM	2k (Build Option)
RAM	64k
External Dimensions	
Source Address	Dynamic, Initial 144-159 Initial address varies with the dipswitch setting.
Default Source Address	132 (0x84)

Connectors

Connector Types

All diagrams are “wire-side” view.

Molex 4-Pin
Receptacle - Molex 5569 Series. Part #39-30-1040
Strain Relief - 41995 Series. Part #15-04-0294
Crimp-on Connectors - 5556 Series. Part #39-00-0039



Connector Pinouts

Connector Pinouts

Main Connector *4-pin Molex*

Pin	Designation	Type	Notes
1	POWER	12V Power Input	
2	GROUND	Ground	
3	RV-C+	CAN	
4	RV-C -	CAN	

Debug Connector (Not Usually Populated) *4-pin Molex*

Pin	Designation	Type	Notes
1			
2	RS232 GND	RS-232 Common	Reserved for programming
3	RS232 TX	RS-232 Transmit	Reserved for programming
4	RS232 RX	RS-232 Receive	Reserved for programming

DGN Summary

DGN	Hex	I/O	Notes
GENERAL_RESET	0x17F40	In	Reset TM540
DM1	0xFECA	Out	Faults

DGNs Supported

General Reset
Name: GENERAL_RESET
DGN: 0x17F## (0x17F00 + source address)
Bit 1.1-1.2: Reboot unit 1 to reboot
Bit 1.5-1.6: Reset to Factory Defaults 1 to reset to defaults

Diagnostic Message
Name: DM1
DGN: 0x1FECA
Broadcast: 1 second
Bit 1.1-1.2: Product Status 0 = Off, 1 = On
Bit 1.3-1.4: Product Status 0 = Standby, 1 = Active
Bit 1.5-1.6: Yellow Lamp Status 0 = Off, 1 = On
Bit 1.7-1.8: Red Lamp Status 0 = Off, 1 = On
Byte 2: Product Identifier Always Source Address 253
Byte 3: Suspect Parameter Number (MSB) See SPN table below
Byte 4: Suspect Parameter Number (ISB)
Bits 5.1-5.5: Failure Mode Identifier (FMI)
Bits 5.6-5.8: Suspect Parameter Number (least significant bits)
Byte 6: Reserved Always 0xFF

Backlight Dimming
Name: DC_DIMMER_COMMAND_2
Byte 1 Instance Ignored
Byte 2 Group Always Group 7. e.g. 00111111b
Byte 3 Desired Level RV-C Percent.
This command sets the backlight level.

Uploading / Downloading

Keypad definitions can be uploaded and downloaded using the protocols defined in *SilverLeaf Download Protocol.sxw*. A single block of 32k is set aside for the keypad definitions. When downloading, the unit always treats the destination address as the start of this memory block. When uploading, all file blocks are directed to this memory space.

Action Programming

Each event is identified by the Set, Key, and Type.

Set is defined by the dip switch.
Key is 1..9. 1-6 = Key. 7 = Top Pair 8 = Middle Pair. 9 = Bottom Pair.
Type is QuickPress, LongPress, Press, Release, or Hold.
Note that if a key is used in a pair, the Press event can interfere with the pair.
Each event may have multiple actions.

Actions / Parameter

ID		Parameter	Description
Action Definitions			
0	Test - Set	Key Value	Sets LED test value for this key. Key Value matches definitions given in the LED Test entry below.
1	Test – Increment		Increments LED test value.
2	Dimmer Toggle	Instance	Sends DC_DIMMER_COMMAND_2 Command 0x05 - Toggle
3	Dimmer Ramp Up/Down	Instance	Sends DC_DIMMER_COMMAND_2 Command 0x15 – Ramp Up/Down
4	Dimmer Ramp Stop	Instance	Sends DC_DIMMER_COMMAND_2 Command 0x04 – Ramp Stop. This is necessary after a Dimmer Ramp Up/Down to toggle the direction of the next application.
5	Dimmer Group Toggle	Group Number	Sends DC_DIMMER_COMMAND_2 Command 0xF8 – Group Toggle
6	Dimmer Group Store	Group Number	Sends DC_DIMMER_COMMAND_2 Command 0xF6 – Group Store
7	DC Load Toggle	Instance	requires a matching LED definition
8	Water Pump Toggle		requires a matching LED definition
9	Genset Toggle		requires a matching LED definition
10	Door Lock Toggle	Group Number	Controls up to 7 locks, instances 1..7. Uses the same group bitmap as a DC DIMMER. e.g. 1111110b → Lock 1 e.g. 0111110b → Lock 1 and Lock 7
11	Backlight Control		Ramps the backlight level and sends DC_DIMMER_COMMAND_2 (Group 7) to coordinate with other keypads.
12	Keypad Lock		Locks the keypad.
13	RGB Dimmer Color Select	Instance	Sends DC_DIMMER_COMMAND_2 Command 0xE0 – Next Color
14	RGB Dimmer Group Select	Group Number	Sends DC_DIMMER_COMMAND_2 Command 0xE0 – Next Color

15	Breaker Reset	Instance	Sends DC_DISCONNECT_COMMAND.
16	Rozie Enable/Disable		Sends PROP_TELEMATICS_CONFIG to TM555.
LED Definitions			
128	Test	Initial Value	Per test value for this key. Range 0-15. 0 = All Off. 1 = Blue, 2 = White, 4 = Red, 7 = All, 8 - Flashing.
129	Dimmer Status	Instance	Off = Blue, On = White, Fault = Red
130	DC Load Status	Instance	Off = Blue, On = White, Fault = Red
131	Water Pump Status		Off = Blue, On = White, Fault = Red
132	Genset Status		Off = Blue, On = White, Fault = Red, Cranking, Preheat = Blinking White/Blue
133	Door Lock Status	Instance	Unlocked = White, Locked = Blue
134	Breaker Status	Instance	Ok = Blue, Tripped = Blinking Red
135	Rozie Status		Enabled = Blue, Disabled = White, Red = TM555 Not Responding

Each instruction is compiled to a 16-byte structure

Byte1	Prefix	Always 0. Used by flash routines.
Byte 2	Set	0-255
Byte 3	Key	1-9.
Byte 4	Event	0 = Quick Press 1 = Long Press 2 = Initial Press 3 = Hold 4 = Release 5 = LED
Byte 5	Action ID	See Chart
Byte 6	Action Parameter	Per Type. Usually Instance
Byte 7-16	Reserved	

Instructions do not have to be kept in order.

By default, the KDF Editor will define for Set 255 a keypad test. Each key will have the following definitions: (Initial Press / Test-Set / 0) (Hold / Test Increment) (Release / Test-Set 15) and (LED / Test / 7).

Unconfigured Behavior

If no KDF file has been downloaded to the unit, then each key press or hold will cycle the corresponding LEDs. The unit will power on with all LEDs blue.

If a KDF file is loaded but no definitions match the current dipswitch settings, the unit will behave similarly, except the LEDs will flash.

Stuck Key

A stuck key is indicated by a flashing red LED.

Typical Applications

Dimmer Switch

Quick Press	Dimmer Toggle
Hold	Dimmer Ramp Up/Down
Long Press	Dimmer Ramp Stop
LED	Dimmer Status

Multiple circuits can be controlled by a single button. Simply repeat the instructions for each circuits. Due to timing constraints, no more than about four circuits should be controlled by one button.

Dimmer Group

Quick Press	Dimmer Group Toggle
Long Press	Dimmer Group Store
LED	Dimmer Status (choose one circuit from group.)

Multiple groups can be handled in a single message.

Toggled Devices (e.g. DC Load, Water Pump, Genset)

Initial Press	Toggle
LED	Status

Locks

Initial Press	Door Lock Toggle
LED	Door Lock Status (for lowest instance in the group)

For example, to group locks 2..5, implement Door Lock Toggle with Group 225 (0xE1, 11100001b) and implement Door Lock Status with Instance 2.

Backlight Control

The backlight is controlled by the DC_DIMMER_COMMAND_2 DGN, applied to Group 7. The backlight level is not reported.

DC Dimmer Command 2

Name:	DC_DIMMER_COMMAND_2	
DGN:	0x1FEDB	
Byte 1	Instance	Ignored.
Byte 2	Group	Must be 00xxxxxxb (Group 7).
Byte 3	Desired Level	RV-C Percent.

DM-RV

All DM-RV's are sent with DSA of 132. Diagnostic events include:

SPN	*FMI*	*Description*	*Lamp*
1-KEY-0	7	Stuck Key	Yellow Lamp
3	12	Corrupt KDF File	Red Lamp
3	13	No KDF File	Red Lamp

If the keypad LEDs are flashing, then a KDF file is loaded but none of the actions defined match the dipswitch setting.