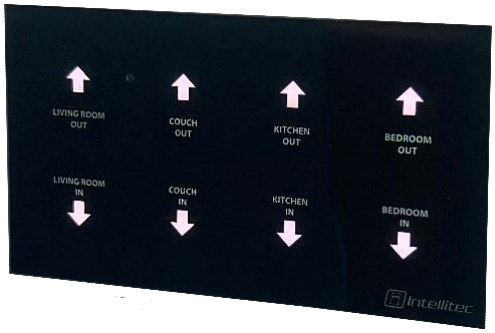
Intellitec
Intelligent Use of Technology

Capacitive Touch Keypads (RV-C)

Part number: 00-01183-000
00-01184-000
00-01185-000
00-01186-000



Description:

This document is a guide for system integrators that provides the necessary information for communicating and interfacing with the Capacitive Touch Keypads RV-C. This document includes a description of the devices functionality and full list of supported DGN's regarding the communication and configuration of the Capacitive Touch Keypads.

The Capacitive Touch Keypads communicate via CANbus utilitizing the RV-C protocol. 4-pin Minifit connectors are used as the main connector. It is used for communicating on the RV-C network and providing power and ground to the device. The Minifit pin definitions are listed below:

Pin	Description
1	CAN H
2	CAN L
3	GND
4	PWR

The RV-C protocol defines the data rate for all transmitters at 250 kbits/s, with a sample point rate being between the range of 85% to 90%. For more information on the physical layer of an RV-C network please refer to the RV-C specification provided on the RV-C website.

RV-C Product Specifications

The Capacitive Touch Keypads support dynamic source addressing. As defined in the RV-C specification, the preferred dynamic address ranged is 0x90-0x9F.

Manufacturer Code:	0x69
Default Source Address:	0x84
Product Definition	DC Input, Keypad

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Supported RV-C DGN's

DGN	1FFB8h
Name	DGN_DIGITAL_INPUT_STATUS
Description	Defines the state of each input button on keypad.

Byte	Bit	Name	Data Type	Value Description
0	-	Instance	Uint8	0 – Invalid 1-250 - valid
1	-	Position	Uint8	0 – Off 1 – On
2	0 to 1	Configuration	Uint2	Always 1 - Momentary
3	-	Number of Positions	Uint8	Always 2 – On/Off
4	0 to 3	Bank Select	Uint4	0xF
5 to 7	Reserved	Reserved	Uint24	Reserved

DGN	17F00h
Name	General Reset
Description	General reset allows the user to perform a software reset.

Byte	Bit	Name	Data Type	Value Description
0	0 to 1	Reboot	Bit	00b - No action 01b - Reboot
	2 to 3	Clear Faults	Bit	Not Supported
	4 to 5	Reset Default	Bit	Not Supported
	6 to 7	Reset Stats	bit	Not Supported
1	0 to 1	Test Mode	bit	Not Supported
	2 to 3	Restore OEM Settings	bit	Not Supported
	4 to 5	Reboot/Enter Bootloader Mode	bit	Not Supported

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DGN	1EF00h (Lower two bytes of DGN are destination address)
Name	Proprietary Message
Description	The proprietary messages used by the keypad allows read and write commands for controlling the keypads backlights. Note: More on proprietary messaging described in the Proprietary Messaging section of this document.

Byte	Bit	Name	Data Type	Value Description
0	-	MFG Code	Uint8	0x69 – Intellitec Manufacturer Code
1	-	Function	Uint8	0x00 – Read Request 0x01 – Write Request
2	-	Parameter	Uint8	Button Position
3	-	Parameter Value	Uint8	0x00 – Back Light off 0x01 – Back Light On
4	-	Parameter Value	Uint8	1-10 – Valid values (Value in 10% increments) 0xFF – Use Ambient Light Sensor
5	-	Instance	Uint8	Instance of button
6	-	Reserved	Uint8	reserved
7	-	MFG Code	Uint8	0x69 Manufacturer Code

DGN	EA00h (Lower two bytes of DGN are destination address 0xFF for global)
Name	Request for DGN
Description	Request for a DGN allows the user to instantly obtain the status messages of the keypad. Instead of waiting for the standard message timing, immediate information may be obtained. Supported Request includes: PRODUCT_IDENTIFICATION

Byte	Bit	Name	Data Type	Value Description
0 to 2	-	Desired DGN	Uint17	LSB in Byte 0
3	-	Instance	Uint8	0 - 253 - Instance desired, if multi-instanced. 0xFFh if not multi-instanced, or reports from all instances is desired.
4	-	Instance Bank or Secondary Instance	Uint8	Not supported
5 to 7	-	Reserved	Uint8	

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DGN	1FECAh
Name	Diagnostic Message
Description	All devices compliant to this communication profile shall support the "DM_RV" message. This message allows the communication of diagnostic information and general operating status. If there are no active faults, data bytes 2 to 5 shall be set to FFh. The DM_RV is still broadcast, allowing other nodes to see its operating status.

Byte	Bit	Name	Data Type	Value Description
0	0 to 1	Operating Status	Uint2	0x00 – Disabled / Not operating
	2 to 3	Operating Status	Uint2	0x05 – Normal / On condition
	4 to 5	Yellow Lamp Status	Uint2	Indicates minor fault
	6 to 7	Red Lamp Status	Uint2	Indicates critical fault
1	-	DSA	Uint8	8Bh – default source address
2	-	SPN-MSB	Uint8	Refer to SPN section of document
3	-	SPN-ISB	Uint8	Refer to SPN section of document
4	5 to 7	SPN-LSB	Uint3	Refer to SPN section of document
	0 to 4	FMI	Uint5	Refer to SPN section of document
5	0 to 6	Occurrence Count	Uint7	0 – 126 counts
	7	Reserved	Bit1	Always 1
6	-	DSA Extension	Uint8	0xFF
7	0 to 3	Bank Select	Uint4	0xF

DGNs Related to Input Buttons:

DGN Name	DGN	Byte	Bit	Value Name	Value Description
DC_LOAD_STATUS	1FFBDh	0	-	Instance	0 – Invalid 1 to 250 – Valid
		2	-	Operating Status(level)	0 – 200 (each brightness level represents a 0.5% increment) If not dimmable, report 100%
DC_LOAD_COMMAND	1FFBCh	0	-	Instance	0 – Invalid 1 to 250 – Valid
		2	-	Operating Status(level)	0 – 200 (each brightness level represents a 0.5% increment) If not dimmable, report 100%

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DC_DISCONNECT_STATUS	1FED0h	0	-	Instance	0 – Invalid 1 – Main House Battery Disconnect 2 – Chassis Battery Disconnect 3 – House/Chassis Bridge 4 – Secondary House Battery 5 – Generator Starter Battery 6-250 – Other
		1	0-1	Circuit Status	00b – Circuit is disconnected 01b – Circuit is connected
DC_DISCONNECT_COMMAND	1FECFh	0	-	Instance	0 – Invalid 1 – Main House Battery Disconnect 2 – Chassis Battery Disconnect 3 – House/Chassis Bridge 4-250 – Other
		1	0-1	Command	00b – Disconnect Circuit 01b – Connect Circuit
SLIDE_STATUS	1FFE8h	0	-	Instance	1 – Room 1 2 – Room 2 3 – Room 3 4 – Room 4 5 – Generator
		1	-	Motion	0 – No Motion 1 – Extending 2 – Retracting
SLIDE_COMMAND	1FFE7h	0	-	Instance	1 – Room 1 2 – Room 2 3 – Room 3 4 – Room 4 5 – Generator
		2	-	Direction of Movement	0 – Stop 1 – Extend 2 – Retract
WATER_PUMP_STATUS	1FFB3h	0	0-1	Operating Status	00b – Pump disabled 01b – Pump enabled (standby or running)
WATER_PUMP_COMMAND	1FFB2h	0	0-1	Command	00b – Disable pump 01b – Enable pump (standby)
WATERHEATER_STATUS	1FFF7h	0	-	Instance	0 – all 1 to 250 – Instance number
		1	-	Operating modes	0 – off 1 – combustion 2 – electric 3 – gas/electric (both)

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					4 – automatic (electric if available, otherwise combustion) 5 – test combustion (forced on) 6 – test electric (forced on)
WATERHEATER_COMMAND	1FFF6h	0	-	Instance	0 – all 1 to 250 – Instance member
		1	-	Operating modes	0 – off 1 – combustion 2 – electric 3 – gas/electric (both) 4 – automatic (electric if available, otherwise combustion) 5 – test combustion (forced on) 6 – test electric (forced on)
AWNING_STATUS	1FEF3h	0	-	Instance	1 – Awning 1 (main patio awning) 2 to 253 – Awning 2 to 253
		1	-	Motion	0 – No motion 1 – Extending 2 – Retracting
AWNING_COMMAND	1FEF2h	0	-	Instance	1 – Awning 1 (main patio awning) 2 to 253 – Awning 2 to 253
		2	-	Direction of Movement	0 – Stop 1 – Extend 2 – Retract
DC_DIMMER_STATUS_3	1FEDAh	0	-	Instance	0 – Invalid 1 to 250 – Valid
		2	-	Operating Status (Brightness)	0 – 200 (each brightness level represents a 0.5% increment)
DC_DIMMER_COMMAND_2	1FEDBh	0	-	Instance	0 – Invalid 1 to 250 – Valid
		2	-	Desired Level (Brightness)	0 – 200 (each brightness level represents a 0.5% increment)
		3	-	Command	00 – Set Level (Set output level directly to the 'desired level' 03 – OFF (Set output directly to 0%)
VEHICLE_ENVIRONMENT_STATUS	1FE87h	3	-	Ambient Light Level	0 = Dark 200 = Daylight Conditions

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Proprietary Messages

The Capacitive Touch Keypads offer parameters that are configurable via the RV-C network. This allows installers or users the ability to make changes to their module as they feel necessary. Byte 1 of the proprietary messages determine what function is being performed. 0x00 and 0x01 allow the reading and writing of these configurable parameters, respectively. The keypads can help users identify individual buttons by flashing their backlights. This feature makes the configuration of the keypad buttons easy. Byte 1 as 0x02 and 0x03 starts the identification of a button and stops the identification of a button, respectively. Byte 2 specifies which input is to be read from/written to. 0x00 represents module specific parameters and 0x01 – 0x0A specifies a particular input button. Byte 2 is also responsible for saving configuration changes. 0x0B will erase the flash and save the new configuration values that are present in the RAM. 0x0C will undo any changes made that have not been saved to flash. The tables below show how to access the parameters of the module or a specific input and a description of how the parameter functions.

Note: Any changes made to the configuration must be saved to the device using the designated proprietary message or changes will be lost upon power cycle.

Byte[2] = 0x00:

Byte[3]	Limits	Default Value	Description
0x00	250 >= Val >= 1	0x01	Module Instance is the instance of the Keypad on the RV-C network.
0x01	Val = 4, 6, 8, 10	0x0A	Number of Inputs defines how many buttons are present on the Keypad.
0x02	100 >= Val >= 10	0x64	Backlight brightness (%) during daylight conditions when button is ON
0x03	90 >= Val >= 0	0x00	Backlight brightness (%) during daylight conditions when the button is OFF
0x04	100 >= Val >= 10	0x32	Backlight brightness (%) during dark conditions when the button is ON
0x05	90 >= Val >= 0	0x0A	Backlight brightness (%) during dark conditions when the button is OFF
0x06	1 >= Val >= 0	0x01	Use Ambient Sensor – if true, the keypad will use the on-board ambient light sensor to detect daylight and dark conditions. Else the keypad will rely on other devices to report current conditions.
0x07	100 >= Val >= 10	0x32	Ambient Light Threshold is the current light conditions expressed as a percentage at which the backlight will toggle between day/night mode.

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Byte[2] = 0x00 – 0x0A:

Byte[3]	Limits	Default Value	Description
0x00	250 >= Val >= 1	0x00	Target Instance is the instance of the device that will be controlled by the input button.
0x01	8 >= Val >= 0	0x00	Target Type is the type of device that will be controlled by the input button. *See table below*
0x02	1 >= Val >= 0	0x00	Output Dimmable – if true, the target device is a dimmable device.
0x03	1 >= Val >= 0	0x00	Slide Direction – only applicable to slideouts and awnings 0 – Extend 1 - Retract

Target Device Types:

Value	Device Type
0x00	Disabled
0x01	Digital Input
0x02	DC Load
0x03	DC Disconnect
0x04	Slideout
0x05	Water Pump
0x06	Water Heater
0x07	Awning
0x08	DC Dimmer

The keypad also offers feedback and control of the button backlights via RV-C network using proprietary messaging. This allows integrators the ability to indicate statuses to each button independently when using a passive architecture. Byte 1 of the proprietary message values of 0x00 and 0x01 allow the reading and writing of backlight statuses respectively. Byte 2 set to 0x0D represents a read/write of a passive input. Byte 3 identifies which button position to read/write to. Byte 4 represents the status of the output that the input button drives. This will update the backlight appropriately. Below are examples of proprietary requests:

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Read Module Request:

Byte[0]	Byte[1]	Byte[2]	Byte[3]	Byte[4]	Byte[5]	Byte[6]	Byte[7]
0x69	0x00	0x00	0x01	0xFF	0xFF	0xFF	0x69

Keypad Response:

Byte[0]	Byte[1]	Byte[2]	Byte[3]	Byte[4]	Byte[5]	Byte[6]	Byte[7]
0x69	0x00	0x00	0x01	Number of Inputs	0xFF	0xFF	0x69

Read Input Request:

Byte[0]	Byte[1]	Byte[2]	Byte[3]	Byte[4]	Byte[5]	Byte[6]	Byte[7]
0x69	0x00	0x02	0x01	0xFF	0xFF	0xFF	0x69

Keypad Response:

Byte[0]	Byte[1]	Byte[2]	Byte[3]	Byte[4]	Byte[5]	Byte[6]	Byte[7]
0x69	0x00	0x02	0x01	Target DGN of Input 2	0xFF	0xFF	0x69

Write Request:

Byte[0]	Byte[1]	Byte[2]	Byte[3]	Byte[4]	Byte[5]	Byte[6]	Byte[7]
0x69	0x01	0x05	0x03	0x01	0xFF	0xFF	0x69

This request is to set Input 5's slide direction to RETRACT.

Keypad Response:

Byte[0]	Byte[1]	Byte[2]	Byte[3]	Byte[4]	Byte[5]	Byte[6]	Byte[7]
0x69	0x00	0x05	0x03	0x01	0xFF	0xFF	0x69

Write Request:

Byte[0]	Byte[1]	Byte[2]	Byte[3]	Byte[4]	Byte[5]	Byte[6]	Byte[7]
0x69	0x01	0x0D	0x016	0x01	0xFF	0xFF	0x69

This request is to turn on the backlight of whichever input has a target instance of 20. *(Input must be passive)*

Keypad Response:

Byte[0]	Byte[1]	Byte[2]	Byte[3]	Byte[4]	Byte[5]	Byte[6]	Byte[7]
0x69	0x00	0x0D	0x16	0x01	0xFF	0xFF	0x69

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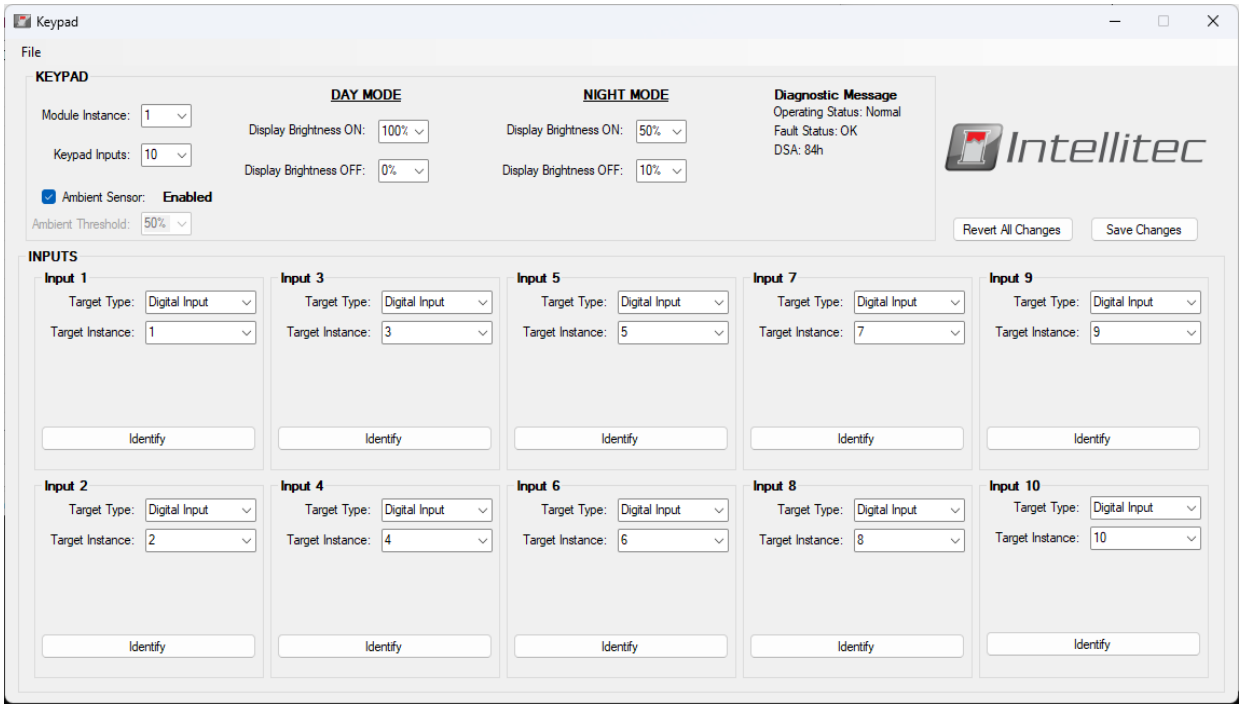
Save Request:

Byte[0]	Byte[1]	Byte[2]	Byte[3]	Byte[4]	Byte[5]	Byte[6]	Byte[7]
0x69	0x01	0x0B	0xFF	0xFF	0xFF	0xFF	0x69

Windows Graphical User Interface (GUI)



The RV-C Keypad GUI is a Windows-based tool that allows integrators to configure devices to their exact needs. This tool can configure all the parameters that are mentioned in the table above. Please note:

- When the ambient sensor on the RV-C keypad is disabled, the device will need to retrieve ambient light information from the VEHICLE_ENVIRONMENT_STATUS DGN to adjust the device's brightness levels.
- When identifying an input button, all other button LEDs are disabled, and the selected button will flash in a 1Hz pattern.
- The "Save Changes" button must be clicked to push all changes made in the GUI over to the keypad device.

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Available Product Literature and Guides:

Brochure:	53-01183-000
Product Specification:	53-01183-001
User's Guide:	53-01183-100
Integrator Guide:	53-01183-300

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