

# Developer Notes

## INSTEON Thermostat

Version 017  
Sept. 27, 2012

### Revision History

Rev	Date	Comments
001	10/28/11	Initial Release
002	11/4/11	Updated formatting in some sections for easier reading
003	11/4/11	Fixed examples and editing
004	12/13/11	Added commands
005	1/24/12	Added commands
006	2/1/12	Added yellow filter updates
007	2/2/12	Updated command list
008	4/19/12	Changed status report group flag to check EF group
009	4/20/12	Added example for adding a device to the status reporting group
010	5/8/12	...
011	5/8/12	Added 2 byte CRC calculations
012	6/19/12	Updated product name
013	7/20/12	Updated command list
014	7/27/12	Updated command list
015	9/4/12	Added new commands
016	9/14/12	Added new commands
017	9/27/12	Added new commands

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# 1 Firmware Description

## 1.1 INSTEON Commands Supported

### 1.1.1 Standard length common INSTEON commands:

All direct commands will be ignored if the sender's ID is not in the I2CS device's database with the exceptions below. The Thermostat will reply with a NAK and 0xFF in cmd2 to indicate that the ID is not in the database.

#### Assign to ALL-Link Group Command

Description: Sent when holding down the SET Button for 3 seconds on the device. Blinks the LED green for 4 minutes or until linked to another device.

Example (Hex): AA BB CC 05 0A 99 CF 01 01 (where AA.BB.CC is the Thermostat's ID)

SD Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Notes
<b>Assign to ALL-Link Group</b>	From Device	Device's ID	0x05, 0x0A, 0xXX (firmware revision)	Broadcast	0x01	0x00	Sent when holding down SET Button for 3 seconds. Group number for Thermostat is 0x01

```
11/14/2012 15:23:23.562 [RX] - 02 50 1F 0E 3C 05 0A A7 8B 01 00 INSTEON STD RX
ID Request Response
```

#### Delete from ALL-Link Group Command

Description: Blinks the LED red for 4 minutes or until unlinked from another device.

Example (Hex): AA BB CC 05 0B 99 CF 02 01 (where AA.BB.CC is the Thermostat's ID)

<b>Delete from ALL-Link Group</b>	From Device	Device's ID	0x05, 0x0B, 0xXX (firmware revision)	Broadcast	0x02	0x00	Group number for Thermostat is 0x01
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#### INSTEON Engine Version Command

Description: Returns the INSTEON Engine version in the acknowledgement.

<b>INSTEON Engine Version</b>	To device	Sender's ID	Device's ID	Direct	0x0D	0x00	
	Response	Device's ID	Sender's ID	Ack	0x0D	0x02	Indicate i2CS engine version

```
11/14/2012 15:18:43.045 [TX] - 02 62 1F 0E 3C 0F 0D 00
11/14/2012 15:18:43.066 [RX] - 02 62 1F 0E 3C 0F 0D 00 06 INSTEON STD TX
02 50 1F 0E 3C 18 D3 21 2B 0D 02 INSTEON STD RX
i2CS Engine Version
```

#### Ping Command

Description: Returns the exact same message with an acknowledgement.

<b>Ping</b>	To device	Sender's ID	Device's ID	Direct	0x0F	0x00 -> 0xFF (Don't Care Value)	
	Response	Device's ID	Sender's ID	Ack	0x0F	Same as sent	

```
11/14/2012 15:22:17.428 [TX] - 02 62 1F 0E 3C 0F 0F 00
11/14/2012 15:22:17.448 [RX] - 02 62 1F 0E 3C 0F 0F 00 06 INSTEON STD TX
02 50 1F 0E 3C 18 D3 21 2B 0F 00 INSTEON STD RX
Ping Response
```

#### ID Request Command

Description: Same as holding down the SET Button for 3 seconds on the device, but without going into linking mode

Example (Hex): AA BB CC DD EE FF 0F 0A 01 (where DD.EE.FF is the Sender's ID, AA.BB.CC is the Device's ID)

<b>ID Request</b>	To device	Sender's ID	Device's ID	Direct	0x10	0x00 -> 0xFF (Don't Care Value)	
	Response	Device's ID	Sender's ID	Ack	0x10	Same as sent	
	Sent from Device	Device's ID	0x05 0x0A 0xZZ (firmware revision)	Broadcast	0x01	0x00	Same as holding down SET Button for 3 seconds, but device not in linking mode

```

11/14/2012 15:24:27.706 [TX] - 02 62 1F 0E 3C 0F 10 00
11/14/2012 15:24:27.737 [RX] - 02 62 1F 0E 3C 0F 10 00 06 INSTEON STD TX
02 50 1F 0E 3C 18 D3 21 2B 10 00 INSTEON STD RX
ID Request
02 50 1F 0E 3C 05 0A A7 8B 01 00 INSTEON STD RX
ID Request Response
02 50 1F 0E 3C 05 0A A7 8B 01 00 INSTEON STD RX
ID Request Response
    
```

**Success Report Broadcast**

Description: Sent at the end of a group broadcast

Example (Hex): AA BB CC 11 03 01 CF 06 01 (where AA.BB.CC is the Device's ID, cleanup of cmd1 = 0x11, group = 0x01, 1 out of 3 devices failed to cleanup correctly)

SD Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Notes
<b>Broadcast cleanup</b>	To device	Sender's ID	Hi byte = cmd1 being Cleaned up  Med byte = Number of devices to be cleaned up  Lo byte = Group Number	Group Broadcast	0x06	0x00 -> 0xFF  (Number of Failed Cleanups)	

```

02 50 1F 0E 3C 11 02 01 CB 06 00  INSTEON STD RX
Broadcast Cleanup
Broadcast Cleanup of Cmd1=0x11, 2 Devices, Group 1, Zero Errors
02 50 1F 0E 3C 11 02 01 CB 06 00  INSTEON STD RX
Broadcast Cleanup
Broadcast Cleanup of Cmd1=0x11, 2 Devices, Group 1, Zero Errors

02 50 1F 0E 3C 13 02 01 CB 06 01  INSTEON STD RX
Broadcast Cleanup
Broadcast Cleanup of Cmd1=0x13, 2 Devices, Group 1, One Error
02 50 1F 0E 3C 13 02 01 CB 06 01  INSTEON STD RX
Broadcast Cleanup
Broadcast Cleanup of Cmd1=0x13, 2 Devices, Group 1, One Error
    
```

**1.1.2 Standard length Thermostat INSTEON commands:  
To set a device to get status reporting add a controller of device link with group 0xEF and set 0x2E to 0x08.**

Example: (Thermostat INSTEON ID: 0x01 78 5A; PLM INSTEON ID: 0x14 82 86

```

11/14/2012 15:38:05.229 [TX] - 02 62 1F 0E 3C 1F 2F 00 01 02 0F FF 08 E2 EF 18 D3 21
00 00 00 DB
11/14/2012 15:38:05.253 [RX] - 02 62 1F 0E 3C 1F 2F 00 01 02 0F FF 08 E2 EF 18 D3 21
00 00 00 DB 06 INSTEON EXT TX
Write Group EF to Thermostat First Record
02 50 1F 0E 3C 18 D3 21 2B 2F 00 INSTEON STD RX

11/14/2012 15:38:08.764 [TX] - 02 62 1F 0E 3C 1F 2E 00 00 08 00 00 00 00 00 00 00
00 00 00 CA
11/14/2012 15:38:08.788 [RX] - 02 62 1F 0E 3C 1F 2E 00 00 08 00 00 00 00 00 00 00
00 00 00 CA 06 INSTEON EXT TX
Check EF Group and Set EF Group Flag
02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

02 50 1F 0E 3C 18 D3 21 01 72 3C INSTEON STD RX
Status Reporting Heat Set Point

```

SD Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Notes
Status Reporting Temperature	From device	Device's ID		Direct	0x6E	0x00 -> 0xFF (Temperature x 0.5)	

```

11/14/2012 16:09:03.665 [RX] - 02 50 1F 0E 3C 18 D3 21 01 6E B5 INSTEON STD RX
Status Report Temperature

```

Status Reporting Humidity	From device	Device's ID		Direct	0x6F	0x00 -> 0xFF (Humidity)	
---------------------------	-------------	-------------	--	--------	------	-------------------------	--

```

11/14/2012 16:18:37.835 [RX] - 02 50 1F 0E 3C 18 D3 21 01 6F 20 INSTEON STD RX
Status Reporting Humidity

```

Status Reporting Mode/Fan Status	From device	Device's ID		Direct	0x70	0x00 - Off Mode 0x01 - Heat Mode 0x02 - Cool Mode 0x03 - Auto Mode 0x04 - Program Mode 0x10 - Off Mode with Fan On 0x11 - Heat Mode with Fan On 0x12 - Cool Mode with Fan On 0x13 - Auto Mode with Fan On 0x14 - Program Mode with Fan On	
----------------------------------	-------------	-------------	--	--------	------	--	--

```

02 50 1F 0E 3C 18 D3 21 01 70 00 INSTEON STD RX
Status Reporting Mode Status (Off Mode)

```

```

02 50 1F 0E 3C 18 D3 21 01 70 01 INSTEON STD RX
Status Reporting Mode Status (Heat Mode)

```

02 50 1F 0E 3C 18 D3 21 01 70 02 INSTEON STD RX  
 Status Reporting Mode Status (Cool Mode)

02 50 1F 0E 3C 18 D3 21 01 70 03 INSTEON STD RX  
 Status Reporting Mode Status (Auto Mode)

02 50 1F 0E 3C 18 D3 21 01 70 04 INSTEON STD RX  
 Status Reporting Mode Status (Program Mode)

02 50 1F 0E 3C 18 D3 21 01 70 10 INSTEON STD RX  
 Status Reporting Mode Status (Off Mode - Fan On)

02 50 1F 0E 3C 18 D3 21 01 70 11 INSTEON STD RX  
 Status Reporting Mode Status (Heat Mode - Fan On)

02 50 1F 0E 3C 18 D3 21 01 70 12 INSTEON STD RX  
 Status Reporting Mode Status (Cool Mode - Fan On)

02 50 1F 0E 3C 18 D3 21 01 70 13 INSTEON STD RX  
 Status Reporting Mode Status (Auto Mode - Fan On)

02 50 1F 0E 3C 18 D3 21 01 70 14 INSTEON STD RX  
 Status Reporting Mode Status (Program Mode - Fan On)

<b>Status Reporting Cool set point</b>	From device	Device's ID		Direct	0x71	0x00 -> 0xFF (Cool set point)	
--	-------------	-------------	--	--------	------	-------------------------------	--

02 50 1F 0E 3C 18 D3 21 01 71 4F INSTEON STD RX  
 Status Reporting Cool Set Point

<b>Status Reporting Heat set point</b>	From device	Device's ID		Direct	0x72	0x00 -> 0xFF (Heat set)	
--	-------------	-------------	--	--------	------	-------------------------	--

02 50 1F 0E 3C 18 D3 21 01 72 3B INSTEON STD RX  
 Status Reporting Heat Set Point

<b>Status Reporting for External Temperature (Wireless only)</b>	From device	Device's ID		Direct	0x73	0x00 -> 0xFF (External Temperature: -40 to +125)	
--	-------------	-------------	--	--------	------	--	--

02 50 1F 0E 3C 18 D3 21 01 73 50 INSTEON STD RX  
 Status Reporting External Temperature

Extended length Thermostat INSTEON commands:

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Notes
<b>Thermostat Set Cool set point</b>	To device	Sender's ID	Device's ID	Extended Direct	0x6C	0x00 -> 0xFF (Temperature x 2)	change current temperature cool set point to Temperature x 0.5
	Response	Device's ID	Sender's ID	Ack	0x6C	Same as sent	

```

11/16/2012 08:20:35.504 [TX] - 02 62 1F 0E 3C 1F 6C 90 00 00 00 00 00 00 00 00 00 00 00 00 04
11/16/2012 08:20:35.521 [RX] - 02 62 1F 0E 3C 1F 6C 90 00 00 00 00 00 00 00 00 00 00 00 00 04 06 INSTEON EXT TX
02 50 1F 0E 3C 18 D3 21 2B 6C 90 INSTEON STD RX
Set Cool Set Point (72 Degrees)
    
```

<b>Thermostat set heat set point</b>	To device	Sender's ID	Device's ID	Extended Direct	0x6D	0x00 -> 0xFF (Temperature x 2)	change current temperature heat set point to Temperature x 0.5
	Response	Device's ID	Sender's ID	Ack	0x6D	Same as sent	

```

11/16/2012 08:20:43.359 [TX] - 02 62 1F 0E 3C 1F 6D 82 00 00 00 00 00 00 00 00 00 00 00 00 11
11/16/2012 08:20:43.381 [RX] - 02 62 1F 0E 3C 1F 6D 82 00 00 00 00 00 00 00 00 00 00 00 00 11 06 INSTEON EXT TX
02 50 1F 0E 3C 18 D3 21 2B 6D 82 INSTEON STD RX
Set Heat Set Point (65 Degrees)
    
```

Set Cool/Heat Set Point Info									
Data 1 (1 byte)	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7	Data 8	Data 13	Data 14
Byte 1 of Data	Byte 2 of Data	Byte 3 of Data	Byte 4 of data	Byte 5 of data	Byte 6 of data	Byte 7 of data	Byte 8 of data	Byte13 of data	Checksum

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Notes
<b>Thermostat Control</b>	To device	Sender's ID	Device's ID	Direct	0x6B	See Thermostat Control Info	
	Response	Device's ID	Sender's ID	Ack	0x6B	Same as sent	

**Thermostat Control Info**

Cmd2	Description	Thermostat Support	Comments
0x04	set mode to heat and returns 04 in ACK	yes	On Heat
0x05	set mode to cool and returns 05 in ACK	yes	On Cool
0x06	set mode to auto and returns 06 in ACK	yes	Auto
...	Turn fan on and returns 07 in ACK	yes	
0x09	Turn all off and returns 09 in ACK	yes	Off All
0x0A	set mode to Program and returns 0A in ACK	yes	Program

Note: Fan Control is not supported in Wireless Thermostat because there is no Fan Group and the Fan is not physically connected to the Wireless Thermostat.

Thermostat Control Info									
Data 1 (1 byte)	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7	Data 8	Data 13	Data 14
Byte 1 of Data	Byte 2 of Data	Byte 3 of Data	Byte 4 of data	Byte 5 of data	Byte 6 of data	Byte 7 of data	Byte 8 of data	Byte13 of data	Checksum

```

11/16/2012 08:23:20.469 [TX] - 02 62 1F 0E 3C 1F 6B 04 00 00 00 00 00 00 00 00 00 00 00 00 00 91
11/16/2012 08:23:20.498 [RX] - 02 62 1F 0E 3C 1F 6B 04 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 91 06 INSTEON EXT TX
02 50 1F 0E 3C 18 D3 21 2B 6B 04 INSTEON STD RX
Set to Heat Mode

11/16/2012 08:23:26.709 [TX] - 02 62 1F 0E 3C 1F 6B 05 00 00 00 00 00 00 00 00 00 00 00 00 00 90
11/16/2012 08:23:26.735 [RX] - 02 62 1F 0E 3C 1F 6B 05 00 00 00 00 00 00 00 00 00 00 00 00 00 90
00 00 00 90 06 INSTEON EXT TX
02 50 1F 0E 3C 18 D3 21 2B 6B 05 INSTEON STD RX
Set to Cool Mode

11/16/2012 08:21:55.649 [TX] - 02 62 1F 0E 3C 1F 6B 06 00 00 00 00 00 00 00 00 00 00 00 00 00 8F
11/16/2012 08:21:55.668 [RX] - 02 62 1F 0E 3C 1F 6B 06 00 00 00 00 00 00 00 00 00 00 00 00 00 8F
00 00 00 8F 06 INSTEON EXT TX
02 50 1F 0E 3C 18 D3 21 2B 6B 06 INSTEON STD RX
Set to Auto Mode

11/16/2012 08:22:04.113 [TX] - 02 62 1F 0E 3C 1F 6B 09 00 00 00 00 00 00 00 00 00 00 00 00 00 8C
11/16/2012 08:22:04.130 [RX] - 02 62 1F 0E 3C 1F 6B 09 00 00 00 00 00 00 00 00 00 00 00 00 00 8C
00 00 00 8C 06 INSTEON EXT TX
02 50 1F 0E 3C 18 D3 21 2B 6B 09 INSTEON STD RX
Set Mode to Off

11/16/2012 08:22:12.768 [TX] - 02 62 1F 0E 3C 1F 6B 0A 00 00 00 00 00 00 00 00 00 00 00 00 00 8B
11/16/2012 08:22:12.785 [RX] - 02 62 1F 0E 3C 1F 6B 0A 00 00 00 00 00 00 00 00 00 00 00 00 00 8B
00 00 00 8B 06 INSTEON EXT TX
02 50 1F 0E 3C 18 D3 21 2B 6B 0A INSTEON STD RX
Set to Program Mode

```

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Notes
<b>Stay awake for 4 minutes</b>	From device	Device's ID		Extended Direct	0x20	0x06	Thermostat stay awake for 4 minutes
	Response	Device's ID	Sender's ID	Ack	0x20	0x06	See Stay Awake/Sleep Info

<b>Sleep in 3 seconds</b>	From device	Device's ID		Extended Direct	0x20	0x07	Thermostat go to sleep in 3
---------------------------	-------------	-------------	--	-----------------	------	------	-----------------------------

							seconds
	Response	Device's ID	Sender's ID	Ack	0x20	0x07	See Stay Awake/Sleep Info

Stay Awake/ Sleep Info									
Data 1 (1 byte)	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7	Data 8	Data 13	Data 14
0x00	0x00	0x00	0x00	0x00	0x00	0x00	0x00	0x00	Checksum

```

11/16/2012 08:25:55.122 [TX] - 02 62 1F 0E 3C 1F 20 06 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 DA
11/16/2012 08:25:55.146 [RX] - 02 62 1F 0E 3C 1F 20 06 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 DA 06 INSTEON EXT TX
02 50 1F 0E 3C 18 D3 21 2B 20 06 INSTEON STD RX
Stay Awake for 4 Minutes

11/16/2012 08:26:00.916 [TX] - 02 62 1F 0E 3C 1F 20 07 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 D9
11/16/2012 08:26:00.940 [RX] - 02 62 1F 0E 3C 1F 20 07 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 D9 06 INSTEON EXT TX
02 50 1F 0E 3C 18 D3 21 2B 20 07 INSTEON STD RX
Sleep in 3 seconds

```

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Get Database	To device	Sender's ID	Device's ID	Extended Direct	0x2F	0x00	0x00 -> 0xFF (Don't Care Value)	See Get Database Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2F	0x00	N/A	N/A
	From device	Device's ID	Sender's ID	Extended Direct	0x2F	0x00	Same as sent	See Returned Extended Get Database Info

Get Database Info									
Data 2 (1 byte)	Data 3	Data 4	Data 5	Data 6	Data 7	Data 8	Data 9	Data 10	Data 11
0x00	0x00 -> 0xFF (Hi Byte Address)	0x00 -> 0xFF (Lo Byte Address)	0x00 -> 0xFF (# of Records, 0x00 dumps all records)	N/A	N/A	N/A	N/A	N/A	N/A

Returned Extended Get Database Info (will continue to be sent until # of records is sent or until the first never been used record is sent)									
Data 2 (1 byte)	Data 3	Data 4 (1 byte)	Data 5	Data 6	Data 7	Data 8	Data 9	...	Data 13





SD Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Notes
<b>On Status</b>	From device	Device's ID		Direct	0x11	0x00 -> 0xFF (Don't Care Value)	

```
02 50 1F 0E 3C 00 00 01 CB 11 00 INSTEON STD RX
On Status
02 50 1F 0E 3C 00 00 01 CB 11 00 INSTEON STD RX
On Status
```

<b>Off Status</b>	From device	Device's ID		Direct	0x13	0x00 -> 0xFF (Don't Care Value)	
-------------------	-------------	-------------	--	--------	------	------------------------------------	--

```
02 50 1F 0E 3C 00 00 01 CB 13 00 INSTEON STD RX
Off Status
02 50 1F 0E 3C 00 00 01 CB 13 00 INSTEON STD RX
Off Status
```

SD Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Notes
<b>Beep</b>	From device	Device's ID		Direct	0x30	0x00 -> 0xFF (Don't Care Value)	Beep once, same as the press button beep sound
	Response	Device's ID	Sender's ID	Ack	0x30	Same as sent	

```
11/19/2012 13:39:41.184 [TX] - 02 62 1F 0E 3C 0F 30 00
11/19/2012 13:39:41.208 [RX] - 02 62 1F 0E 3C 0F 30 00 06 INSTEON STD TX
02 50 1F 0E 3C 18 D3 21 2B 30 00 INSTEON STD RX
Thermostat Beep
```

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Read and Set Data	To device	Sender's ID	Device's ID	Extended Direct	0x2E	0x00	0x00 -> 0xFF (Group/Button)	See Read and Set Data Info and Read and Set Data Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2E	0x00	Same as sent	N/A

### Read and Set Data Info

Data 2	Description
0x00	Data 2: 0 is for Read Data (Responder unit will send back a Data 2: 1 below) Data3: 0 is for Read Data Set 1
0x01	Data2: 1 return of data Data3: 0 for Return of Data Set 1 Data4: LocalTempLowByte Data5: Humidity Data6: TempOffset Data7: HumiOffset Data8: System Mode 0 = Off 1 = Auto 2 = Heat 3 = Cool 4 = Program Data9: Fan Mode Data10: Backlight Seconds (If Battery Level is Full) - <5: always off - >60: always on - Others(5-60): in seconds  (If Battery Level is not Full) - >5: set to 5 seconds <5: in seconds Data11: Set the on/off min change time in minutes Data12: N/A Data13: Flags Byte - Bit0: linking lock - Bit1: button beep enable - Bit2: button lock - Bit3: temperature format: 1=C; 0=F - Bit4: time format: 1: 24 hour; 0 12 hours Data14: LocalTempHighByte

```

11/19/2012 13:43:57.381 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00
11/19/2012 13:43:57.401 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 06 INSTEON EXT TX
02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX
02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 00 2C 2D 32 0F 01 00 05 05 04 00 01 INSTEON
EXT RX
Read Data 1 Response

```

0x02	Data 2: 2 Set Temperature Offset Data3: Temperature Offset (From -50 to +50 in 0.1C degree unit)
------	---

```

11/19/2012 16:57:39.533 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00
11/19/2012 16:57:39.560 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 06 INSTEON EXT TX

```

02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX  
02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 00 2E 2A 32 0F 00 00 05 05 04 00 01 INSTEON  
EXT RX

Read Data 1 Response

11/19/2012 16:57:46.173 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 02 19 00 00 00 00 00 00 00  
00 00 00 B6

11/19/2012 16:57:46.200 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 02 19 00 00 00 00 00 00 00  
00 00 00 B6 06 INSTEON EXT TX

Set Temperature Offset to 25

02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

11/19/2012 16:57:49.742 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00  
00 00 00 00

11/19/2012 16:57:49.767 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00  
00 00 00 00 06 INSTEON EXT TX

02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 00 12 2A 19 0F 00 00 05 05 04 00 01 INSTEON  
EXT RX

Read Data 1 Response

0x03	Data 2: 3 Set Humidity Offset Data3: Humidity Offset (From -100 to +100 in 0.1% unit)
------	--

11/19/2012 16:57:49.742 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00  
00 00 00 00

11/19/2012 16:57:49.767 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00  
00 00 00 00 06 INSTEON EXT TX

02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 00 12 2A 19 0F 00 00 05 05 04 00 01 INSTEON  
EXT RX

Read Data 1 Response

11/19/2012 16:58:30.747 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 03 0A 00 00 00 00 00 00 00  
00 00 00 C4

11/19/2012 16:58:30.765 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 03 0A 00 00 00 00 00 00 00  
00 00 00 C4 06 INSTEON EXT TX

Set Humidity Offset to 10

02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

11/19/2012 16:58:34.394 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00  
00 00 00 00

11/19/2012 16:58:34.412 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00  
00 00 00 00 06 INSTEON EXT TX

02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 00 12 29 19 0A 00 00 05 05 04 00 01 INSTEON  
EXT RX

Read Data 1 Response

0x04	Data 2: 4 Set flags: Data 4: Flag bytes - Bit0: linking lock - Bit1: button beep enable - Bit2: button lock - Bit3: temperature format:1=C; 0=F - Bit4: time format: 1: 24 hour; 0 12 hours
------	---





```
11/20/2012 11:18:55.054 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00
11/20/2012 11:18:55.076 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 06 INSTEON EXT TX
02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX
02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 00 1C 27 19 0A 00 00 05 05 03 00 01 INSTEON
EXT RX
Read Data 1 Response
```

**Temperature Format:**

```
11/20/2012 11:18:55.054 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00
11/20/2012 11:18:55.076 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 06 INSTEON EXT TX
02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX
02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 00 1C 27 19 0A 00 00 05 05 03 00 01 INSTEON
EXT RX
Read Data 1 Response
```

```
11/20/2012 11:19:45.351 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 04 00 08 00 00 00 00 00 00 00 00
00 00 00 C5
11/20/2012 11:19:45.379 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 04 00 08 00 00 00 00 00 00 00 00
00 00 00 C5 06 INSTEON EXT TX
Temperature Format in Celsius
02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX
```

```
11/20/2012 11:19:49.415 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00
11/20/2012 11:19:49.426 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 06 INSTEON EXT TX
02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX
02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 00 1C 27 19 0A 00 00 05 05 03 08 01 INSTEON
EXT RX
Read Data 1 Response
```

```
11/20/2012 11:19:54.662 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 04 00 00 00 00 00 00 00 00 00 00
00 00 00 CD
11/20/2012 11:19:54.689 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 04 00 00 00 00 00 00 00 00 00 00
00 00 00 CD 06 INSTEON EXT TX
Set Flags (Linking Lock Off, Button Beep Disable, Button Lock Off, Temperature
Format Fahrenheit, Time Format 12 Hours)
02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX
```

```
11/20/2012 11:19:58.070 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00
11/20/2012 11:19:58.095 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 06 INSTEON EXT TX
02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX
02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 00 1C 27 19 0A 00 00 05 05 03 00 01 INSTEON
EXT RX
Read Data 1 Response
```

**Time Format:**

```
11/20/2012 11:19:58.070 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00
11/20/2012 11:19:58.095 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 06 INSTEON EXT TX
02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX
```

```

02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 00 1C 27 19 0A 00 00 05 05 03 00 01  INSTEON
EXT RX
  Read Data 1 Response

11/20/2012 11:42:52.485 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 04 00 10 00 00 00 00 00 00
00 00 00 BD
11/20/2012 11:42:52.503 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 04 00 10 00 00 00 00 00 00
00 00 00 BD 06  INSTEON EXT TX
  Time Format in 24 Hours
02 50 1F 0E 3C 18 D3 21 2B 2E 00  INSTEON STD RX

11/20/2012 11:43:01.653 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00
00 00 00 00
11/20/2012 11:43:01.675 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00
00 00 00 00 06  INSTEON EXT TX
02 50 1F 0E 3C 18 D3 21 2B 2E 00  INSTEON STD RX
02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 00 17 28 19 0A 00 00 05 05 03 10 01  INSTEON
EXT RX
  Read Data 1 Response

11/20/2012 11:43:06.260 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 04 00 00 00 00 00 00 00 00
00 00 00 CD
11/20/2012 11:43:06.284 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 04 00 00 00 00 00 00 00 00
00 00 00 CD 06  INSTEON EXT TX
  Set Flags (Linking Lock Off, Button Beep Disable, Button Lock Off, Temperature
Format Fahrenheit, Time Format 12 Hours)
02 50 1F 0E 3C 18 D3 21 2B 2E 00  INSTEON STD RX

11/20/2012 11:43:09.780 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00
00 00 00 00
11/20/2012 11:43:09.800 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00
00 00 00 00 06  INSTEON EXT TX
02 50 1F 0E 3C 18 D3 21 2B 2E 00  INSTEON STD RX
02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 00 17 28 19 0A 00 00 05 05 03 00 01  INSTEON
EXT RX
  Read Data 1 Response

11/20/2012 13:53:37.924 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00
00 00 00 00
11/20/2012 13:53:37.938 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00
00 00 00 00 06  INSTEON EXT TX
02 50 1F 0E 3C 18 D3 21 2B 2E 00  INSTEON STD RX
02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 00 26 29 19 0A 00 00 05 05 03 00 01  INSTEON
EXT RX
  Read Data 1 Response

11/20/2012 13:56:44.989 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 05 00 00 00 00 00 00 00 00
00 00 00 CC
11/20/2012 13:56:45.002 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 05 00 00 00 00 00 00 00 00
00 00 00 CC 06  INSTEON EXT TX

```

0x05	Data 2: 5 set the backlight seconds: (If Battery Level is Full) - <5: always off - >60: always on - Others(5-60): in seconds  (If Battery Level is not Full) - >5: set to 5 seconds - <5: in seconds
------	--



Set On/Off Minimum Change Time to 2 Minutes  
02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

11/20/2012 13:58:39.338 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00 00 00  
00 00 00 00

11/20/2012 13:58:39.378 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 00 00 00 00 00 00 00 00 00 00  
00 00 00 00 06 INSTEON EXT TX

02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 00 26 2A 19 0A 00 00 0A 02 04 00 01 INSTEON  
EXT RX

Read Data 1 Response

0x07	Data 2: 7 set the energy saving mode set back degree
------	--

11/20/2012 13:59:45.009 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00 00 00  
00 00 00 00

11/20/2012 13:59:45.028 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00 00 00  
00 00 00 00 06 INSTEON EXT TX

02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 01 5A 1E A7 51 3D 01 04 32 00 01 01 INSTEON  
EXT RX

Read Data 2 Response

11/20/2012 14:00:12.279 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 07 05 00 00 00 00 00 00 00 00 00  
00 00 00 C5

11/20/2012 14:00:12.302 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 07 05 00 00 00 00 00 00 00 00 00  
00 00 00 C5 06 INSTEON EXT TX

Set Energy Saving Mode Set Back Degrees to 5 Degrees

02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

11/20/2012 14:00:15.975 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00 00 00  
00 00 00 00

11/20/2012 14:00:15.997 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00 00 00  
00 00 00 00 06 INSTEON EXT TX

02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 01 5A 1E A7 51 3D 01 05 32 00 01 01 INSTEON  
EXT RX

Read Data 2 Response

0x08	Data 2: 8 To check EF group and set the EF group flag in firmware
------	---

11/20/2012 14:01:02.212 [TX] - 02 62 1F 0E 3C 1F 2E 00 00 08 00 00 00 00 00 00 00 00 00 00  
00 00 00 CA

11/20/2012 14:01:02.228 [RX] - 02 62 1F 0E 3C 1F 2E 00 00 08 00 00 00 00 00 00 00 00 00 00  
00 00 00 CA 06 INSTEON EXT TX

Check EF Group and Set EF Group Flag

02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

0x0B	Data 2: B set the humidity high point
------	---------------------------------------

11/20/2012 14:01:43.572 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00 00 00  
00 00 00 00

11/20/2012 14:01:43.596 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00 00 00  
00 00 00 00 06 INSTEON EXT TX

02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 01 5A 1E A7 51 3D 01 05 32 00 01 01 INSTEON  
EXT RX  
Read Data 2 Response

11/20/2012 14:01:50.589 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 0B 63 00 00 00 00 00 00 00  
00 00 00 63  
11/20/2012 14:01:50.601 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 0B 63 00 00 00 00 00 00 00  
00 00 00 63 06 INSTEON EXT TX  
Set Humidity High Point to 99  
02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

11/20/2012 14:01:55.301 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00  
00 00 00 00  
11/20/2012 14:01:55.320 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00  
00 00 00 00 06 INSTEON EXT TX  
02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX  
02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 01 63 1E A7 51 3D 01 05 32 00 01 01 INSTEON  
EXT RX  
Read Data 2 Response

0x0C	Data 2: C set the humidity low point
------	--------------------------------------

11/20/2012 14:01:55.301 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00  
00 00 00 00  
11/20/2012 14:01:55.320 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00  
00 00 00 00 06 INSTEON EXT TX  
02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX  
02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 01 63 1E A7 51 3D 01 05 32 00 01 01 INSTEON  
EXT RX  
Read Data 2 Response

11/20/2012 14:02:21.550 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 0C 01 00 00 00 00 00 00 00  
00 00 00 C4  
11/20/2012 14:02:21.571 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 0C 01 00 00 00 00 00 00 00  
00 00 00 C4 06 INSTEON EXT TX  
Set Humidity Low Point to 1  
02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

11/20/2012 14:02:25.202 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00  
00 00 00 00  
11/20/2012 14:02:25.218 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00  
00 00 00 00 06 INSTEON EXT TX  
02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX  
02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 01 63 01 A7 51 3D 01 05 32 00 01 01 INSTEON  
EXT RX  
Read Data 2 Response

0x0D	Data 2: D set the external temperature offset
------	---

11/20/2012 14:04:21.135 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00  
00 00 00 00  
11/20/2012 14:04:21.146 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00  
00 00 00 00 06 INSTEON EXT TX  
02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX  
02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 01 63 01 A7 51 3D 01 05 32 00 01 01 INSTEON  
EXT RX

Read Data 2 Response

11/20/2012 14:04:50.717 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 0D 64 00 00 00 00 00 00 00  
00 00 00 60

11/20/2012 14:04:50.740 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 0D 64 00 00 00 00 00 00 00  
00 00 00 60 06 INSTEON EXT TX

Set External TempOffset to 100

02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

11/20/2012 14:04:55.630 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00  
00 00 00 00

11/20/2012 14:04:55.651 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00  
00 00 00 00 06 INSTEON EXT TX

02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 01 63 01 A7 51 3D 01 05 64 00 01 01 INSTEON  
EXT RX

Read Data 2 Response

0x0E	Data2: E set temperature option: 1=Internal; 2=External
------	---

11/20/2012 14:06:16.411 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00  
00 00 00 00

11/20/2012 14:06:16.433 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00  
00 00 00 00 06 INSTEON EXT TX

02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 01 63 01 A7 51 3D 01 05 32 00 01 01 INSTEON  
EXT RX

Read Data 2 Response

11/20/2012 14:06:23.643 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 0E 02 00 00 00 00 00 00 00  
00 00 00 C1

11/20/2012 14:06:23.664 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 0E 02 00 00 00 00 00 00 00  
00 00 00 C1 06 INSTEON EXT TX

Set Temperature Option (External)

02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

11/20/2012 14:06:29.163 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00  
00 00 00 00

11/20/2012 14:06:29.185 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00  
00 00 00 00 06 INSTEON EXT TX

02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 01 63 01 A7 51 3D 01 05 32 00 01 02 INSTEON  
EXT RX

Read Data 2 Response

11/20/2012 14:06:34.458 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 0E 01 00 00 00 00 00 00 00  
00 00 00 C2

11/20/2012 14:06:34.477 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 0E 01 00 00 00 00 00 00 00  
00 00 00 C2 06 INSTEON EXT TX

Set Temperature Option (Internal)

02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

11/20/2012 14:06:38.091 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00  
00 00 00 00

11/20/2012 14:06:38.108 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00  
00 00 00 00 06 INSTEON EXT TX

02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX

02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 01 63 01 A7 51 3D 01 05 32 00 01 01 INSTEON  
EXT RX

Read Data 2 Response

0x00	Data 2: 0 is for Read Data (Responder unit will send back a Data 2: 1 below) Data3: 1 is for Read Data Set 2
0x01	Data 2: 1 is for return of data Data3: 1 for Return of Data Set 2 Data4: humidity low Data5: humidity high Data6: Firmware version Data7: Cool set point Data8: Heat Set point Data9: RF offset Data10: Energy Saving Setback Point Data11: External TempOffset Data12: 1 is Status Report Enabled, 0 is Status Report Disabled Data13: External Power On: 0=Off; 1=On Data14: External Temperature Option: 1=Internal; 2=External

```

11/20/2012 14:08:38.551 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00
00 00 00 00
11/20/2012 14:08:38.579 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 01 00 00 00 00 00 00 00
00 00 00 00 06 INSTEON EXT TX
02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX
02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 01 63 01 A7 51 3D 01 05 32 00 01 01 INSTEON
EXT RX
  
```

Read Data 2 Response

0x00	Data 2: 0 is for Read Data (Responder unit will send back a Data 2: 1 below) Data3: 9 is for Read Data Set 2
0x01	Data 2: 1 is for return of data Data3: 9 for Return of Data Set 2 Data4: temp low Data5: temp high Data6: humidity Data7: System Mode 0 = Off 1 = Auto 2 = Heat 3 = Cool 4 = Program Data8: fan mode: 0 = Auto; 1 = On Data9: heat set point Data10: cool set point Data11: External Temperature High Data12: External Temperature Low Data13: Battery Level: 4 = Full -> 1 = nearly discharged Data14: Status Byte: Bit0=External Temperature, Bit1=External Power, Bit2-7=No Use

```

11/20/2012 14:08:34.281 [TX] - 02 62 1F 0E 3C 1F 2E 00 01 00 09 00 00 00 00 00 00 00
00 00 00 C8
11/20/2012 14:08:34.292 [RX] - 02 62 1F 0E 3C 1F 2E 00 01 00 09 00 00 00 00 00 00 00
00 00 00 C8 06 INSTEON EXT TX
02 50 1F 0E 3C 18 D3 21 2B 2E 00 INSTEON STD RX
02 51 1F 0E 3C 18 D3 21 11 2E 00 01 01 09 21 01 2A 00 00 3D 51 D4 FF 04 02 INSTEON
EXT RX
  
```

Read Data 3 Response

Read and Set Data Info								
Data 3	Data 4 (1 byte)	Data 5	Data 6	Data 7	Data 8	Data 9	...	Data 14

0x00	0x00	0x00	0x00	0x00	0x00	0x00		Checksum
------	------	------	------	------	------	------	--	----------

The Read and Set Data 2 command and Set Time and Schedule command both require a two byte CRC which differs from the one byte CRC in other extended commands. This CRC calculation is the same CRC that the iMeter INSTEON device uses.

### Read and Set Data 2 CRC Calculation

16 bit CRC calculation of payload for checking data involves data bytes from command 1 to data 12 byte

#### Calculation

Sample Source Code:

```

unsigned int MyFrame::crc16(unsigned char *msgbuf,int count)
{
    int loop,bit;
    unsigned int fb;
    unsigned char byte;
    unsigned int crc;

    crc = 0;

    for(loop = 0;loop < count;loop++)
    {
        byte = msgbuf[loop];
        for(bit = 0;bit < 8;bit++)
        {
            fb = byte & 1;
            fb = (crc & 0x8000) ? fb ^ 1 : fb;
            fb = (crc & 0x4000) ? fb ^ 1 : fb;
            fb = (crc & 0x1000) ? fb ^ 1 : fb;
            fb = (crc & 0x0008) ? fb ^ 1 : fb;
            crc = (crc << 1) | fb ;
            byte = byte >> 1;
        }
    }
    return crc;
}

```

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)
Read and Set Data 2	To device	Sender's ID	Device's ID	Extended Direct	0x2E	0x02	See Read and Set Data 2 Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2E	0x02	Same as sent

#### Read and Set Data 2 Info

Data 1	Description
0x00	Data 2: 0 is for Read Data (Responder unit will send back a Data 2: 1 below) Data 13: CRCHigh Data 14: CRCLow
0x01	Data1: 1, Return Data Data2: status flag Data3: hour Data4: minute Data5: second Data6: SysMode ... Data13: CRCHigh Data14: CRCLow

0x02	Data1: 2, SysMode changed Data2: status flag Data3: hour Data4: minute Data5: second Data6: SysMode ... Data13: CRCHigh Data14: CRCLow
0x03	Data1: 3, Set point changed Data2: status flag Data3: hour Data4: minute Data5: second Data6: SysMode ... Data13: CRCHigh Data14: CRCLow Offset
0x04	Data1: 4, Energy pressed Data2: status flag Data3: hour Data4: minute Data5: second Data6: SysMode ... Data13: CRCHigh Data14: CRCLow
0x05	Data1: 5, Master hold 3 Seconds Data2: status flag Data3: hour Data4: minute Data5: second Data6: SysMode ... Data13: CRCHigh Data14: CRCLow
0x06	Data1: 6, Temperature changed Data2: status flag Data3: hour Data4: minute Data5: second Data6: SysMode ... Data13: CRCHigh Data14: CRCLow
0x07	Data1: 7, Hold pressed Data2: status flag Data3: hour Data4: minute Data5: second Data6: SysMode ... Data13: CRCHigh Data14: CRCLow

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)
<b>Set Time and Schedule</b>	To device	Sender's ID	Device's ID	Extended Direct	0x2E	See Set Time and Schedule Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2E	Same as sent

**Set Time and Schedule Info**

Cmd 2	Description
0x02	Cmd2: 2 Data 1: 0, Read data (Responder unit will send back a Data 2: 1 below) ... Data 13: CRC high Data 14: CRC low
0x02	Cmd2: 2 Data1: 1, Return data Data2: day Data3: hour Data4: minute Data5: second Data6: Sys Mode*16 + Fanmode Data7: current cool set point Data8: humidity Data9: temp High byte Data10: temp low byte Data11: status flag Data12: current heat set point Data13: CRC high Data14: CRC low
0x02	Cmd2: 2 Data1: 2, Set data command Data2: day Data3: hour Data4: minute Data5: second Data6: Sys Mode*16 + Fanmode Data7: current cool set point Data8: humidity Data9: temp High byte Data10: temp low byte Data11: status flag Data12: current heat set point Data13: CRC high Data14: CRC low
0x03	Cmd2: 3, Set Sunday schedule Data1: wake time Data2: wake cool Data3: wake heat Data4: leave time Data5: leave cool Data6: leave heat ... Data13: CRCHigh Data14: CRCLow
0x04	Cmd2: 4, Set Monday schedule: Same as Set Sunday schedule
0x05	Cmd2: 5, Set Tuesday schedule: Same as Set Sunday schedule
0x06	Cmd2: 6, Set Wednesday schedule: Same as Set Sunday schedule
0x07	Cmd2: 7, Set Thursday schedule: Same as Set Sunday schedule
0x08	Cmd2: 8, Set Friday schedule: Same as Set Sunday schedule
0x09	Cmd2: 9, Set Saturday schedule: Same as Set Sunday schedule

Cmd 2	Description
0x10	Cmd2: 10, Read Sunday schedule ... Data 13: CRC high



**Checksum Information**

Data14 will contain a 2s compliment of cmd1 through 2nd to last data record in the last data record.

Example of Checksum:

01 02 03 04 05 06 1F 2F 00 01 02 0F FF 08 E2 01 08 B6 EA 00 1B 01 11
From 01.02.03 to 04.05.06
a record at 0FFF (A valid boundary)
08 bytes a record that 04.05.06 will control
Group 1 the responder is 08.B6.EA (00 1B 01 DNC)
11 is the check sum

Int	Hex	
47	2F	
0	00	
1	01	
2	02	
15	0F	
255	FF	
8	08	
226	E2	
1	01	
8	08	
182	B6	
234	EA	
0	00	
27	1B	
1	01	
1007	3EF	Sum
	10	Compliment (Last byte)
	11	Add 1

## 1.2 Memory Map

### 1.2.1 All-Link Database (AL /L) Overview

The AL /L starts at the top of external (serial) EEPROM and grows downward. In the Thermostat, top of memory is 0x0FFF. Each AL /L Record is 8 bytes long, so the first record starts at 0x0FF8, the second record starts at 0x0FF0, and so on down to 0x0300 for a total of 416 links. In what follows, the 3-byte INSTEON Address contained in a record is called the *Device ID* or sometimes just the *ID*. The high byte (MSB) of the Device ID is *ID2*, the middle byte is *ID1*, and the low byte (LSB) is *ID0*.

### 1.2.2 Thermostat External EEPROM Structure Overview

Location		Comments
0x0FF8	0xA2 01 AA BB CC FF FE 00	All-Link Database Record
0x0FF0		
0x0FD8		
.....		
0x0300		Last Record, 416 total links allowed
0x02XX	N/A	Addressing below 0x0300 is ignored by database

### 1.2.3 AL /L Record Format

#### Thermostat AL Record Format

Database entries with Record Control Bit 6: 0 = Responder and Group 1 will control the local load.

Linear ALL-Link Database (AL /L) Record Format		
Field	Length (bytes)	Description
Record Control	1	Record Control Flag Bits: Bit 7: 1 = Record is in use, 0 = Record is available Bit 6: 1 = Controller (Master) of Device ID, 0 = Responder to (Slave of) Device ID Bit 5: Not used Bit 4: Not used Bit 3: Not used Bit 2: Not used Bit 1: 1 = Record has been used before, 0 = 'High-water Mark' Bit 0: Not used
Group	1	ALL-Link Group Number this Device ID belongs to
ID	3	Device ID (ID2, ID1, ID0 in that order)
Data 1	1	Not used
Data 2	1	Not used
Data 3	1	Not used

To add a record to an AL /L, you search for an existing record that is marked available. (Available means the same as empty, unused or deleted.) If none is available, you create a new record at the end of the AL /L.

An unused record will have bit 7 of the *Record Control* byte set to zero. The last record in an AL /L will have bit 1 of the *Record Control* byte set to zero.

#### **1.2.4 Overwriting an Empty AL /L Record**

If you found an empty record, you simply overwrite it with your new record data.

Change bit 7 of the *Record Control* byte from zero to one to show that the record is now in use.

Set bit 6 of the *Record Control* byte to one if the device containing the AL /L is an INSTEON Controller of the INSTEON Responder Device whose *ID* is in the record. If instead the device containing the AL /L is an INSTEON Responder to the INSTEON Controller Device whose *ID* is in the record, then clear bit 6 of the *Record Control* byte to zero. In other words, within an AL /L, setting bit 6 means "I'm a Controller," and clearing bit 6 means "I'm a Responder."

Put the ALL-Link Group number in the *Group* field, and put the *Device ID* in the *ID* field. Finally, set the *Data 1*, *Data 2*, and *Data 3* fields appropriately for the *Record Class* you are storing.

#### **1.2.5 Creating a New AL /L Record**

To create a new record at the end of the AL /T, find the record with bit 1 of the *Record Control* byte set to zero, indicating that it is the last record in the AL /L. Flip that bit to one.