

CoolPlug PRM



CoolPlug Universal Interface Adapter for HVAC Systems

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1 Document Revision History

- 0.3 - Added Operation status register
- 0.2 - Added Modbus Slave Address topic
- 0.1 - Initial



2 Modbus Interface

CoolPlug is fully compliant with following Modbus specifications:

- [MODBUS over Serial Line Specification and Implementation Guide V1.02](#)
- [MODBUS application protocol specification V1.1b](#)

CoolPlug supports Modbus RTU Transmission Mode. The default frame format for CoolPlug is:

```

Baud Rate  9600
Start Bits  1
Data Bits   8
Parity      No
Stop Bits   1

```

CoolPlug physical connection to Modbus is Two-Wire EIA/TIA-485 standard interface via 485-A and 485-B terminals, recommended by Modbus specification. On such 2W-bus, at any time only one driver has the right for transmitting thus a Modbus communication is always initiated by the master. CoolPlug will never transmit without receiving a request from Modbus master.

A number of CoolPlug devices can be connected to single 2W-bus. Each CoolPlug in this case must have unique Modbus slave address.

Supported Modbus Functions

Function Code	Function Description
03 (0x03)	Read Holding Registers
06 (0x06)	Write Single Register
16 (0x10)	Write Multiple registers
43 14 (0x2B 0x0E)	Read Device Information

2.1 Modbus Slave Address

In a standard Modbus network, there is one Master and up to 247 Slaves, each with a unique Slave Address from 1 to 247. CoolPlug Modbus Slave Address can be queried with `line` command or changed with `line myid` command. In the example below the new Slave Address will become 0x51 (81 decimal) after power reset:

```

>line myid L2 51
OK, Boot Required!

```

Alternatively Modbus Slave Address can be queried and changed via Modbus interface by accessing Holding Register 0x24 (36 decimal). After writing a new value into Holding Register 0x24, CoolPlug has to be restarted. It can be done by writing 2 into Holding Register 0x02 (See [Modbus Register Map](#) for details).

The default (factory set) Modbus Slave Address for CoolPlug devices is calculated from it's Serial Number (SN) according to the below procedure. All calculations are in hexadecimal format.

SN 283B96D0XXXX

□

Slave Address = (03D0XXXX mod F7) + 1



2.2 Modbus Register Map

Holding Register Address*		Description	Read Write	Required**		Notes
Hex	Dec			Version	Type	
CoolPlug Internals						
0002	2	Reset	w			1 - Enter Boot Mode 2 - Reset CoolPlug CoolPlug does not respond to the write request into this register.
Configuration and Status						
001E	30	Virtual Auto Mode Changeover Threshold Tch. See Virtual Auto Mode	r/w	0.1.3		^o Celsius (x10) rounded to 0.5°C, 0-Disabled
001F	31	Use Virtual Auto Mode as Auto Mode	r/w	0.1.3		0/1 - Disable/Enable
0020	32	HVAC Type index	r			Internal use
0021	33	Firmware Version	r			Major * 100 + Minor* 10 + SubMinor
0022	34	Serial Number low word	r			
0023	35	Serial Number high word	r			
0024	36	Modbus Slave Address	w			Effective only after reset
0025	37	Master/Slave on HVAC line if another RC is connected	r/w	0.0.4		0 - Slave 1 - Master 2 - Auto
0026	38	Indoor Centralized Address	r			
Line/Indoor Status						
0060	96	Line state (bit fields)	r			bit0: 0 - not connected to indoor, 1 - connected to indoor bit1: - Reserved bit2: 0 - no failure, 1 - indoor reports failure bit3: 0 - normal operation, 1 - device in boot mode bit4: 0 - line configured, 1 - line not configured bits5..15: - Reserved
0061	97	Compact indoor status	r			bit0: 0 - on/off bits: 1-5 - mode see mode encoding bits 6-9: - fan speed see fan speed encoding bits 10-12: - louver see louver position encoding bit13: - filter sign bit14: - therm on
0062	98	Set temperature	r/w			^o Celsius (x10)
0063	99	Ambient temperature	r			^o Celsius (x10)
0064	100	HVAC Failure code	r			0 - OK, else - HVAC failure code
0065	101	Own ambient (feed) temperature	r/w			^o Celsius (x10)
Line/Indoor Status (alternative)						
0090	144	Line state (bit fields)	r			Same as 0x0060
0091	145	On/Off	r/w			0 - Off, other - On



Holding Register Address*		Description	Read Write	Required**		Notes
Hex	Dec			Version	Type	
0092	146	Mode	r/w			see mode encoding
0093	147	Fan speed	r/w			see fan speed encoding
0094	148	Swing	r/w			see louver position encoding
0095	149	Filter sign	r/w			0 - no filter sign 1 - filter cleaning required
0096	150	Set temperature	r/w			°Celsius (x10)
0097	151	Ambient temperature	r			°Celsius (x10)
0098	152	HVAC Failure code	r			0 - OK, else - failure code
0099	153	Own ambient (feed) temperature	r/w			°Celsius (x10)
009A	154	Operation status	r	0.1.0	DK	0 - No demand 1 - Heating 2 - Cooling

* On the Modbus wire register addresses start from 0 and their values on wire are less by 1 then specified in table.

** If nothing specified, register is supported in any version and/or type. N.A. means future option

Mode Encoding

Cool	0
Heat	1
Auto	2
Dry	3
HAux	4
Fan	5

Fan Speed Encoding

Low	0
Medium	1
High	2
Auto	3
Top	4
Very Low	5

Louver (swing) position Encoding

Vertical	0
30°	1
45°	2
60°	3
Horizontal	4
Auto	5
Off	6
No	7



3 Virtual Auto Mode

Virtual Auto Mode (VAUT) feature is an emulation of the native HVAC auto mode by CoolPlug software.

VAUT changeover temperature T_{ch} defines a threshold between heating and cooling modes according to below rules:

- In cooling mode: if Set Temperature - Room Temperature $> T_{ch}$ pass to heating mode.
- In heating mode: if Room Temperature - Set Temperature $> T_{ch}$ pass to cooling mode.

To configure VAUT changeover temperature - T_{ch} , it's value must be provided in °C with optional 0.5°C precision.

```
>line vault L1 2  
OK
```

```
>line vault L1 3.5  
OK
```

To disable VAUT feature set $T_{ch} = 0$

```
>line vault L1 0  
OK
```

VAUT mode can be used to substitute **auto** mode command and status.

Toggle AUTO as VAUT flag

```
>line flags L1 ^ v08000000  
OK
```