H1 interface developers manual

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Firmware version 10.18

The H1 interface bridges the often complex communication methods with a heat pump controller and provides access through a simple standard interface over RS-232. The interfacing for the developer will be exact the same despite using it connected to different heat pump models. For example, reading the radiator return temperature or setting the room temp will use the same method on IVT, NIBE, Thermia heat pumps. The interface has hardware and software support for a number of protocols. When interfaces are manufactured, the interfacing chip for the relevant heat pump is mounted and the specific firmware is loaded into the controller. So there are different HW/SW configurations to fit different heat pumps.

Features
- Provides a generic platform to communicate with different heat pumps using the same standard protocol and parameters.
- Provides a secure and convenient way to read and write information to and from heat pump controllers.
- Interface is provided in different hardware configuration, support many popular heat pump models.
- Features galvanic insulation, electrically separating the heat pump from the connected equipment.
- Firmware is upgradable via the serial interface.
- A LED indicator shows status and makes troubleshooting easy.
- Has hw support for Dallas 1-wire sensors. Up to 16 can be connected. (not finished)
- Has hw support for Electrical meter S0 or Led-eye connection. Up to 2 meters can be metered. (not finished)

Serial interface specification
Interface: RS-232
Baud rate: 19200
Bits: 8
Stop bits: 1
Flow control: none
Protocol: Proprietary as described in this manual.

Communication structure
All communication is made in plain text and all numbers are in hexadecimal format. Tests of communications can be managed from a standard terminal software, such as Putty.

Data received from the interface has a two letter command structure + data and always end with chr 13 + chr 10 (Carriage Return + New Line, \r\n).
The command sent to the interface is always two capital letters followed by optional data and an ending (cr).

When powering up the interface (getting power from the heat pump) it first displays copyright information like below, followed by version information. This information is also shown at reset. You can manually reset the interface by sending the letter "!".

```
(C)2013-2014 Arandis AB, Pitea Sweden.
http://www.husdata.se
XV401012
```

The version information start with XV followed by three hexadecimal bytes.
1. Firmware/Interface variant for different heat pump types.
   Rego600, Rego400, Rego80, Rego1000, NIBE EB100, NIBE Styr2002, Thermia Diplomat, Thermia Villa.
2. Version
3. Revision

After the this message is displayed, the communication with the heat pump will initialize. It can take up to 30 seconds depending on heat pump model.
The registers on the heat pump is then automatically acquired by the interface and will be output continuously via the serial interface. After all registers are read once, the interface will only output data if something changes. For example if a temperature is changed on a sensor, it will output the new value.
If all values needs to be refreshed the Re-sync command can be called by the command XR.

Registers
The interface firmware has a common set of pre-programmed heat pump registers to be read and written to. These registers are listed at the end of this document.

The register data format is a 2 byte number, ex 0101. The leftmost number (4 bits) representing the data type and the rest is the actual index number. For example on 0001, the left 0 indicating that this is a temperature. 001 indicating the Radiator return sensor index number. And likewise 1A01, 1 is indicating that this is a bool on/off device. and A01 indicating index for the Compressor.

No	Unit / Data type	Additional info
0	Degrees	Divide by 10
1	On/off bool	0 or 1
2	Number	Divide by 10
3	Percent	Divide by 10
4	Ampere	Divide by 10
5	kWh	Divide by 10
6	Hours	As is
7	Minutes	As is
8	Degree minutes	As is
9	kw	As is

There are two types of registers. The "Common" and the "HP-Specfic" registers.

The interface is continuously syncing with the Common registers and will output any change. A Common register consists of sensor information, status of devices (compressor, pumps, valves), a few standard settings and a some other controller parameter such as Degree minutes. The Common registers has a common structure and id's for all heat pump models.

With the "XL" command will get a list of all available registers for to connected heatpump and with the "XP" command you have the option to turn on clear text register names and values shown in decimal. This feature is convenient for test and debug.

The HP-Specific registers will only be read and output if the "XS" command is sent. These registers are unique for every heat pump model. You can set/write to some of the HP-Specific registers using the "XW" command. Please see tables in the end of this document for details.

Example of register data output from the interface

```
XR00010106(cr)          0x0001=reg Radiator return of temp type (0)
                        0x0106=data (0x01*256)+0x06 = 262 = 26.2 deg C

XR00030198(cr)          0x0003=reg Heat carrier return of temp type (0)
                        0x0198=data (0x01*256)+0x98 = 408 = 40.8 deg C

XR0006FFE6(cr)          0x0001=reg Cold carrier out of temp type (0)
                        0xFFE6 and 0x8000 = true (left most bit set=negative)
                        0xFFE6=data ((0xFF*256)+0xE9)-65536 = -2.3 deg C

XR1A040001(cr)          0x1A04=reg Radiator return of on/off type (1)
                        0x0001=data ON
```

Commands for the H1 Interface.

Data to interface

Command	Function	Usage example
XV(cr)	Request version number	XV010304(cr)
XR(cr)	Request read and dump of Real-time registers	XR(cr)
XS(cr)	Request read and dump of heat pump specific registers	XS(cr)
XWrrrrdddd(cr)	Set a register value on HP. rrrr=register, dddd=data.	XW010600AA(cr)
XL(cr)	Request list of register names	XL(cr)
XP(cr)	Toggle clear text register names print	Warmwater (35.5c)
XM	Enable auto refresh of all registers every second minute.	
XA	Disable auto read registers and output change.	
XO	Enable auto read registers and output on change.	
XU	Enable simulator mode. Will output random data every second.	Only available on rego600 firmware.
RP1(cr)	Enable Can bus activity printout	Only rego800/1000
ZEmmhhhh(cr)	Enable S0 counter and reset. mm=Channel 1 or 2, hhhh=pulses per kWh	
WE(cr)	Scan for 1-wire temp sensors and return all ID's	
WR	Read all 1-wire temp sensors and dump result.	

Data from interface

Input	Description	Usage Example
XRrrrrdddd(cr)	Receive new data from a register. rrrr= Reg ID, dddd=data.	
XV040304	Interface version	
ZWmmhhhh(cr)	S0 Momentum load. mm=Channel 1 or 2, hhhh=Load in Watt. Updating at every change or sec.	
ZKmmhhhh(cr)	S0 Accumulated kWh. mm=Channel 1 or 2m hhhh=kWh since last reset.	
WRxxxxxxxxpptt(cr)	Return DS temp: x=8 bytes DS-ID, pp=00=+ FF=-	
XE002	Info. Rego1000 interface was moved to other Rego version, re-synchronizing.	
XE005	Can bus communication error, Check cables (Rego 800/100 only)	
XE006	Fatal error identifying Rego1000 version. Contact Husdata.se	
XE007	Unsupported Rego800 version detected, switching to	

			compatibility mode.	

Supported heat pump models

Type	SW	HW	Heat pump models	Technical
A	00	R	IVT Greenline / Optima 900	Rego 600 Serial
B	05	I	IVT 490	Rego 400 Serial
C	35	C	IVT Premiumline X, Optima/290-AW	Rego 800, Can bus
D	30	C	IVT Greenline HE/HC/HA	Rego 1000, Can bus
E	40	N	NIBE xx45	EB100, RS-485
F	50	N	NIBE Fighter series	Styr 2002, RS-485
G	60	D	Thermia Diplomat series *	901510, i2c
H	70	D	Thermia Villa series *	901353, i2c

* Not officially released yet

Common registers

ID(hex)	Temperatures	Unit	System availability
0001	Radiator Return	Degrees	ABCDEFG
0002	Radiator Forward	Degrees	B G
0003	Heat carrier Return	Degrees	ABCDE
0004	Heat carrier Forward	Degrees	ABCDEF
0005	Brine In / Evaporator	Degrees	A CDEFG
0006	Brine Out / Condenser	Degrees	A CDEFG
0007	Outdoor	Degrees	ABCDEFG
0008	Indoor	Degrees	ABCDEFG
0009	Hot water 1 / Top	Degrees	ABCDEFG
000A	Hot water 2 / Mid	Degrees	ABCDEF GT3x on A
000B	Hot gas / Compressor	Degrees	ABCDEF
000C	Suction gas	Degrees	EF
000D	Liquid flow	Degrees	EF
000E	Air intake	Degrees	A CD
000F	Exhaust air	Degrees	A C E
0010	Air outlet	Degrees	A E
0011	Pool	Degrees	EF
0012	Pressure tube	Degrees	G
ID	Other registers	Unit	System availability
4101	Load L1	Ampere	EF
4102	Load L2	Ampere	EF
4103	Load L3	Ampere	EF
x104	Add heat status	kW or %	AD-%, E-kW
2105	Degree minutes/integral	Number	EFG
0107	Heating Setpoint	Degrees	ABCDEFG
3108	Compressor speed	%	CD
3109	Circ. pump speed	%	G
3110	Brine pump speed	%	G
0111	Hot water Setpoint	Degrees	B D
ID	Settings	Unit	
2201	Operating mode 1	Number	E

ID		Unit	
2202	Operating mode 2	Number	
0203	Room temp target	Degrees	A CDEF
2204	Room sensor influence	Number	A CDEF
x205	Heat set 1, Curve Left	Num/Degr	A DEF
x206	Heat set 2, Curve Right	Num/Degr	D
x207	Heat set 3, Curve Parallel	Num/Degr	A E
ID	**Status**	**Unit**	**System availability**
1A01	Compressor	On/Off	ABCDEFG
1A02	Add heat step 1	On/Off	AB FG
1A03	Add heat step 2	On/Off	AB FG
1A04	Pump Cold circuit	On/Off	A CDEFG
1A05	Pump Heat circuit	On/Off	A CDEFG
1A06	Pump Radiator	On/Off	AB
1A07	Switch valve 1	On/Off	A CDEF
1A08	Switch valve 2	On/Off	
1A09	Fan	On/Off	BCD
1A0A	High Pressostat	On/Off	BCD
1A0B	Low Pressostat	On/Off	BCD
1A0C	Heating cable	On/Off	CD
1A0D	Crank shaft heater	On/Off	CD
1A0E	Shunt open	On/Off	B
1A0F	Shunt close	On/Off	B
2A20	Alarm	Number	ABCDEF

IVT Rego 1000 specific registers (not implemented yet)

ID(hex)	Settings writable	Unit	Min/Max
2F00	Program Generation	Number	
2F01	Program Version	Number	
2F02	Program Revision	Number	

Rego 800 specific registers

ID(hex)	Read only registers	Unit	Min/Max
0F50	Adj. curve at 20° out	Degrees	
0F51	Adj. curve at 15° out	Degrees	
0F52	Adj. curve at 10° out	Degrees	
0F53	Adj. curve at 5° out	Degrees	
0F54	Adj. curve at 0° out	Degrees	
0F55	Adj. curve at -5° out	Degrees	
0F56	Adj. curve at -10° out	Degrees	
0F57	Adj. curve at -15° out	Degrees	
0F58	Adj. curve at -20° out	Degrees	
0F59	Adj. curve at -25° out	Degrees	
0F5A	Adj. curve at -30° out	Degrees	
0F5B	Adj. curve at -35° out	Degrees	
0F60	Additional power	Degrees	
0F61	VV GT3 Start temp	Degrees	

ID(hex)		Unit	
0F62	VV GT9 Stopp temp	Degrees	
6F63	Runtime Comp rad	Hours	Only on some reg ver
6F64	Runtime Comp vv	Hours	Only on some reg ver
6F65	Runtime controller	Hours	Only on some reg ver
6F66	Runtime additional rad	Hours	Only on some reg ver
6F67	Runtime additional	Hours	Only on some reg ver

Rego 600 specific registers

ID(hex)	Settings writable	Unit	Min/Max
0F50	Adj. curve at 20° out	Degrees	
0F51	Adj. curve at 15° out	Degrees	
0F52	Adj. curve at 10° out	Degrees	
0F53	Adj. curve at 5° out	Degrees	
0F54	Adj. curve at 0° out	Degrees	
0F55	Adj. curve at -5° out	Degrees	
0F56	Adj. curve at -10° out	Degrees	
0F57	Adj. curve at -15° out	Degrees	
0F58	Adj. curve at -20° out	Degrees	
0F59	Adj. curve at -25° out	Degrees	
0F5a	Adj. curve at -30° out	Degrees	
0F5b	Adj. curve at -35° out	Degrees	
0F61	GT1 On value	Degrees	
0F62	GT1 On EL value	Degrees	
0F63	GT1 Off EL value	Degrees	
0F64	GT1 Off value	Degrees	
0F65	GT3 On value	Degrees	
0F66	GT3 Off value	Degrees	
0F67	GT4 Target value	Degrees	
0F68	Heat curve coupling	Degrees	

Disclaimer
The information in this document is valid for a specific interface firmware and are subject to be changed on later releases. We reserve us from incorrect information in this document.