



## **H1 interface developers manual**

©2013-2020, Husdata.se, Arandis AB

Norra Pitholmsvägen 14, 941 46 Piteå, SWEDEN

[support@husdata.se](mailto:support@husdata.se)

---

## Overview of solution

The H1 interface bridges the often complex communication methods with heat pump controllers and provides access through a simple standard interface over RS-232.

The interfacing on the computer side is the same even if 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, Bosch, NIBE, Thermia heat pumps and their different models.

The interface has hardware and software support for different connectivity with heat pumps.

When interfaces are manufactured, the interfacing circuit for the relevant heat pump is implemented and the specific firmware is loaded into the controller.

The H1 gateway technology is today integrated in to various solutions from Husdata and other suppliers. Example is the Raspberry pi interface and the H60 Wifi heat pump gateway.

### Features summary

- Available with USB (standard), RS-232 interface.
- Available in Standard cable connected model, or Raspberry PI PCB formats to fit directly on GPIO connector.
- Interface 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, supporting the majority of all popular heat pump models.
- Features galvanic insulation (RS-232 version), electrically separating the heat pump from the connected equipment.
- Firmware upgradable via the serial interface and Windows based upgrade program.
- A LED indicator shows status and enables for troubleshooting.
- Has support for Dallas 1-wire sensors. Up to 16 can be connected. (not supported)
- Has support for Electrical meter S0 or Led-eye connection. Up to 2 electrical meters can be connected.
- Easy clear text based protocol in clear text manageable directly from serial terminal

---

## H1-Protocol interface type (standard)

### Serial interface specifications

Interface: RS-232 or USB(serial)  
Baud rate: 19200  
Bits: 8  
Stop bits: 1  
Flow control none  
Protocol: H1-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 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)2013-2020 Arandis AB, Pitea Sweden.  
http://www.husdata.se  
XV401028
```

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 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 need 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
A	Pulses	As is (For S0 El-meter pulse counter)

---

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

### Example of data output from the interface with clear text output turned on (XP)

```
XR000200ED  002 Radiator Forward (23.7c)
XR0003018A  003 Heat carrier Return (39.4c)
XR000400E9  004 Heat carrier Forwrđ (23.3c)
XR00050075  005 Brine in/Evaporator (11.7c)
XR00060057  006 Brine out/Condenser (8.7c)
XR0007FF6A  007 Outdoor (-15.0c)
XR0008DEAD  008 Indoor (-853.1c)
XR000901D3  009 Hot water 1 / Top (46.7c)
XR000B024A  00B Hot gas / Compr. (58.6c)
XR000E0000  00E Air intake (0.0c)
XR002000D9  020 Radiator Forward 2 (21.7c)
XR00210000  021 Indoor 2 (0.0c)
XR1A010001  A01 Compressor (1.0 )
XR1A040001  A04 Pump Cold circuit (1.0 )
XR1A050001  A05 Pump Heat circuit (1.0 )
XR1A060001  A06 Pump Radiator (1.0 )
XR1A070000  A07 Switch valve 1 (0.0 )
XR1A090000  A09 Fan (0.0 )
XR1A0A0001  A0A High Pressostat (1.0 )
XR1A0B0001  A0B Low Pressostat (1.0 )
XR1A0C0000  A0C Heating cable (0.0 )
XR1A0D0000  A0D Crank case heater (0.0 )
XR1A200000  A20 Alarm (0.0 )
```

## Commands for the H1 Interface.

### Data to interface

Command	Function	Example / Returns
!	Reset	! (cr)
XV	Request version number	XV010304 (cr)
XR	Request re-read and dump of Real-time registers	XR (cr)
XS	Request read and dump of heat pump specific registers	XS (cr)
XWrrrrrrdddd	Set a register value on HP. rrrr=register, dddd=data.	XW010600AA (cr) XW01 (ok)
XL	Request list of register names	XL (cr)
XP	Toggle clear text register names print out	XP (cr) Warmwater (35.2c)
XM	Enable auto refresh of all registers every second minute. default=off	
XA	Disable register monitoring and update at change. Default=enabled.	
XO	Enable register monitoring and update at change. Default=enabled.	
XU	Enable simulator mode. Will output random data every second.	Only available on rego600 firmware.
XH	Enable Rego 2-3000 statistical registers	
RP1, RP0	Enable/disable Can bus activity printout	Only rego800/1000
SA	Toggle OFF/ON to printout collected pulses every 10 sec. Default=on	
SP	Print out collected pulses and reset counter.	
SS	Set S0 port 1 to Input port instead to detect an on/off state.	
WE	Scan for 1-wire temp sensors and return all ID's	
WR	Read all 1-wire temp sensors and dump result.	
XBxx	Read alarm logs XB=Last log, XB05 = 5 last logs, etc. Max 20. Support only for Rego 600 and Rego2000.	XB010E0B1B0D3130 Or XB1540 (R2000) See below for desc.
XF	List Max/Min values for settable registers	
XE	Enable terminal ECHO	

Data format from interface

Input	Description	Usage Example
XRrrrrrdddd(cr)	Receive new data from a register. rrrr= Reg ID, dddd=data.	
XV040304	Interface version	
WRxxxxxxxxpqtt(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 800/1000 only)	
XE006	Fatal error identifying Rego1000 version. Contact Husdata.se	
XE007	Unsupported Rego800 version detected, switching to compatibility mode.	
XI024	NIBE EB100 detected comm alarm, will be reset in 10 minutes	
XI025	NIBE EB100 alarm has been reset	
XB010E0B1B0D3130	XB 01 0E0B1B 0D3130 01 = Alarm Code Next part is date YYMMDD Last part is Time HHMMSS Rego 600 only	For Rego 600 Only
XB1540 XB1541 XB1542	XB 1540 1540 = alarmcode 1540h= 5440 HP Alarm Command XB always answers with 3 rows of alarmcodes. 0000= no alarm.	For Rego 2000 Only

## General information

### Supported heat pump models

ID	Type	Heat pump models	Technical
A	00	IVT Greenline / Optima 900	Rego 600 Serial
B	05	IVT 490	Rego 400 Serial
C	35	IVT Premiumline X, Optima/290-AW	Rego 800, Can bus
D	30	IVT Greenline HE/HC/HA+Prem HQ/EQ	Rego 1000, Can bus
E	40	NIBE xx45	EB100, RS-485
F	50	NIBE Fighter series	Styr 2002, RS-485
G	60	Thermia Diplomat series	901510, i2c
I	10	IVT AirX, Geo series, Vent202, etc	Rego 2000, 3000 EMS
H	62	Thermia Inverter M (not avail yet)	Genesis Modbus

### Common registers, Monitored.

H1-ID (hex)	Temperatures	Unit	System availability
0001	Radiator Return	Degrees	ABCDEFGF
0002	Radiator Forward	Degrees	B G I
0003	Heat carrier Return	Degrees	ABCDE I
0004	Heat carrier Forward	Degrees	ABCDEF I
0005	Brine In / Evaporator	Degrees	A CDEFG I
0006	Brine Out / Condenser	Degrees	A CDEFG I
0007	Outdoor	Degrees	ABCDEFGF I
0008	Indoor	Degrees	ABCDEFGF I
0009	Hot water 1 / Top	Degrees	ABCDEFGF I
000A	Hot water 2 / Mid	Degrees	ABCDEF I GT3x on A
000B	Hot gas / Compressor	Degrees	ABCDEF I
000C	Suction gas	Degrees	EF I
000D	Liquid flow	Degrees	EF
000E	Air intake	Degrees	A CD I
000F	Exhaust air	Degrees	A C EF
0010	Air outlet	Degrees	A EF
0011	Pool	Degrees	C EF
0012	Pressure tube	Degrees	G
0020	HC2: Radiator Forward	Degrees	D
0021	HC2: Indoor	Degrees	D
0022	HC2: Radiator Return	Degrees	D
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 %	A CD-%, E-kW I-%
2105	Degree minutes/integral	Number	EFG
0107	Heating Setpoint	Degrees	ABCDEFGF
x108	Compressor speed	%	CD-% I=kW
3109	Circ. pump speed	%	G I
3110	Brine pump speed	%	G I
0111	Hot water Setpoint	Degrees	B D G
0208	Hot water Stoptemp	Degrees	FG





## IVT Rego 1000 specific registers

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

## IVT Rego 800 specific registers

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

## IVT 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	

### IVT Rego600 Alarm codes

Alarm no	Description
0	No Alarm
1	Sensor radiator return (GT1)
2	Outdoor sensor (GT2)
3	Sensor hot water (GT3)
4	Mixing valve sensor (GT4)
5	Room sensor (GT5)
6	Sensor compressor (GT6)
7	Sensor heat tran fluid out (GT8)
8	Sensor heat tran fluid in (GT9)
9	Sensor cold tran fluid in (GT10)
10	Sensor cold tran fluid in (GT11)
11	Compresor circuit switch
12	Electrical cassette
13	HTF C=pump switch (MB2)
14	Low pressure switch (LP)
15	High pressure switch (HP)
16	High return HP (GT9)
17	HTF out max (GT8)
18	HTF in under limit (GT10)
19	HTF out under limit (GT11)
20	Compressor superhear (GT6)
21	3-phase incorrect order
22	Power failure
23	Heat carrier delta high

### IVT / Bosch Rego 2000 / 300 statistical registers, activate polling with XH

ID(hex)	Settings writable	Unit	Min/Max
6C50	Total op. time	Sec	
5C51	Supplied energy totat	kWh	
5C52	Supplied energy hotwater	kWh	
5C53	Supplied energy heating	kWh	
5C54	Aux consumption tot	kWh	
5C55	Aux consumption hot water	kWh	
5C56	Aux consumption heating	kWh	
5C57	Compressor consumption total	kWh	
5C58	Compressor consumption heater	kWh	
5C59	Compressor consumption hot water	kWh	



