User Guide

Modbus protocol for Atlas, Calibra, Calibra Eco, Calibra Cool and Diplomat Inverter

Genesis platform: Version 16.00

The English language is used for the original instructions.
Other languages are a translation of the original instructions.
(Directive 2006/42/EC)

Table of Contents

1 Connecting Modbus

1.1 Connecting Modbus

The heat pump supports two Modbus protocols:

- Modbus RTU (connect to the BM-card (Port: MBe) located in the electrical cabinet)
- Modbus TCP/IP (connect to the RJ45 connection located on the display unit)

The settings for Modbus parameters can be found under Settings / BMS in the display.
For Modbus TCP/IP, if you have secondary units, you will need a network switch or router since the primary/secondary interface uses the same RJ45 connector for its communication. Make sure that you are not using the same port as the Primary uses to communicate to its secondaries.

2   Scale, function, negative numbers & MSB/LSB

2.1   Scale, function, negative numbers & MSB/LSB

Scale	
1	No conversion factor
10	Conversion factor 10, i.e. the transmitted value is a tenfold larger
100	Conversion factor 100, i.e. the transmitted value is a tenfold larger

Function	Function	Description
1	Read Coil Status	Read one or more consecutive boolean registers
2	Read Input Status	Read one or more consecutive boolean registers
3	Read Holding Registers	Read one or more consecutive analog registers
4	Read Input Registers	Read one or more consecutive analog registers
5	Force Single Coil	Write to one boolean register
6	Preset Single Holding Register	Write to one analog register
15	Force Multiple Coils	Write one or more consecutive boolean registers
16	Preset Multiple Holding Registers	Write one or more consecutive analog registers

Negative numbers

Negative numbers are represented by the upper half of each 16 bit register.

100 = 100
...
2 = 2
1 = 1
0 = 0
-1 = 65535
-2 = 65534
-3 = 65533
...
-100 = 65436
etc.

Example: if "Brine out low alarm limit" register is set to -5 °C then, since the register has a scale of 100, the value read on Modbus should be 65036, representing -500.

Observe that not all variables are signed, i.e. "Compressor operating hours (LSB)" is a strict positive number between 0 to 65535.

MSB/LSB

Some variables has potential to surpass their maximum value, for instance the variable "Compressor operating hours" can become larger than 65535.
For these specific variables, that might be affected by this, there are two registers, MSB (Most Significant Bit) and LSB (Least Significant Bit) that can be combined in order to get a 32 bit number representation of the value.
I.e. "Compressor operating hours" is separated in to "Compressor operating hours (MSB)" and "Compressor operating hours (LSB)". The LSB register is counting up by 1 for each hour that the compressor has been running and when it reaches 65535 then it will add 1 to the MSB register and reset the LSB register.
In order to obtain the total Compressor operating hours then the two registers are combined into a 32 bit register where the MSB address represents the upper 16 bits and LSB represents the lower 16 bits.

Example:

Compressor operating hours (MSB) = 2
Compressor operating hours (LSB) = 2345
Total Compressor operating hours = 2 × 65536 (MSB) + 2345 (LSB) = 133417 hours

2.2 Addressing

A ''De Facto-standard'' have come to be with the purpose of simpler integration. Addressing is done as follows:

First variable of	Is addressed	Typical function(s)
COIL STATUS	00001	1, 5 (5=write)
INPUT STATUS	10001	2
HOLDING REGISTERS	40001	3, 6 (6=write)
INPUT REGISTERS	30001	4

Observe that some systems cannot handle aforementioned addressing system. Commonly a combination of function and absolute reference to 0 is used. The address table shows both alternatives.

2.3 Factory default

Parameter	Factory	Range
Speed	19200 bps	19200 (2400,4800,9600, 14400, 19200, 28800, 38400, 57600, 115200)
Parity	Even	Even, none, odd
Address	1	1-247, not implemented on Modbus TCP/IP, the heat pump will respond to each address on its specific IP-address using the designated modbus port
Start bit	1	1
Stop bit	1	1 stop bit when Even or Odd Parity and optional when Parity None is chosen
Data bit	8	Data bits can only be 8 bits
Port	502	1-65535
Modbus mode	RTU	RTU, TCP/IP

2.4 Table key

Reference to	
1	Heating system
2	Hot water
3	TWC*
4	WCS *
5	Cooling
6	Pool
7	Distribution circuit
8	Buffer tank
9	Electric meter
10	Internal heat pump

* The reference number, does not apply to every heat pump model.

3 Address list

3.1 Read/Write Digital Registers

COILS - Function codes: 1=read coils, 5=write single coil, 15=write multiple coils						
Position number	Units	Reference to	Address	De Facto Address	Scale	Description
	active/inactive		3	4	1	Reset all alarms
117	on/off	1	5	6	1	Enable external additional heater
71	on/off		7	8	1	Enable flow switch/pressure switch
	on/off	2	8	9	1	Enable tap water
	on/off	1	9	10	1	Enable heat
	on/off	5	10	11	1	Enable active cooling
107	on/off	7	11	12	1	Enable mix valve 1
	on/off		20	21	1	Enable brine out monitoring
	on/off		21	22	1	Enable brine pump continuous operation
36	on/off	1	22	23	1	Enable system circulation pump
117	on/off	1	25	26	1	Enable additional heater only (No compressor). Requires Operation mode: Standby
	on/off		26	27	1	Enable current limitation
	on/off	6	28	29	1	Enable pool (EM)
	on/off	6	31	32	1	Enable external additional heater for pool (EM)
	on/off	5	33	34	1	Enable passive cooling (EM)
	on/off	10	34	35	1	Enable variable speed mode for condenser pump
	on/off	10	35	36	1	Enable variable speed mode for brine pump
207	on/off		37	38	1	Enable outdoor temp dependent for cooling with mixing valve 1
	on/off		38	39	1	Enable internal brine pump to start when cooling is active for mixing valve 1
	on/off	1	39	40	1	Enable outdoor temp dependent for external heater
	on/off		40	41	1	Enable brine in monitoring
	on/off		41	42	1	Enable fixed system supply set point, allows defacto address 40117
	on/off		42	43	1	Enable evaporator freeze protection
	on/off		59	60	1	Enable continuous operation mode for condenser pump.
	on/off		60	61	1	Allow current limiter to restrict external additional heater
	on/off		61	62	1	Allow current limiter to restrict secondary heat pump units

*5) Should always be set to 1 i auto mode

3.2 Read Digital Registers

DISCRETE INPUTS - Function codes: 2=read discrete inputs						
Position number	Units	Reference to	Address	De Facto Address	Scale	Description
	active/inactive		0	10001	1	Alarm active, Class: A
	active/inactive		1	10002	1	Alarm active, Class: B

DISCRETE INPUTS - Function codes: 2=read discrete inputs						
Position number	Units	Reference to	Address	De Facto Address	Scale	Description
	active/ inactive		2	10003	1	Alarm active, Class: C
	active/ inactive		3	10004	1	Alarm active, Class: D - Genesis secondary
	active/ inactive	10	9	10010	1	High pressure switch alarm
	active/ inactive	10	10	10011	1	Low pressure level alarm
	active/ inactive	10	11	10012	1	High discharge pipe temperature alarm
	On/Off	10	12	10013	1	Operating pressure limit indication
	active/ inactive	10	13	10014	1	Discharge pipe sensor alarm
	active/ inactive	10	14	10015	1	Liquid line sensor alarm
	active/ inactive	10	15	10016	1	Suction gas sensor alarm
71	active/ inactive		16	10017	1	Flow/pressure switch alarm
	active/ inactive		22	10023	1	Power input phase detection alarm
	active/ inactive	10	23	10024	1	Inverter unit alarm
51	active/ inactive	1	24	10025	1	System supply low temperature alarm
	active/ inactive	10	25	10026	1	Compressor low speed alarm
	active/ inactive	10	26	10027	1	Low super heat alarm
	active/ inactive	10	27	10028	1	Pressure ratio out of range alarm
	active/ inactive	10	28	10029	1	Compressor pressure outside envelope alarm
	active/ inactive		29	10030	1	Brine temperature out of range alarm
	active/ inactive	10	30	10031	1	Brine in sensor alarm
	active/ inactive	10	31	10032	1	Brine out sensor alarm
	active/ inactive	10	32	10033	1	Condenser in sensor alarm
	active/ inactive	10	33	10034	1	Condenser out sensor alarm
50	active/ inactive		34	10035	1	Outdoor sensor alarm
51	active/ inactive	1	35	10036	1	System supply line sensor alarm
108	active/ inactive	7	36	10037	1	Mix valve 1 supply line sensor alarm
58	active/ inactive	5	47	10048	1	Cooling supply line sensor alarm (EM)
	active/ inactive		49	10050	1	Brine delta out of range alarm

DISCRETE INPUTS - Function codes: 2=read discrete inputs						
Position number	Units	Reference to	Address	De Facto Address	Scale	Description
53	active/ inactive	2	50	10051	1	Tap water mid sensor alarm
	active/ inactive		55	10056	1	Brine in high temperature alarm
	active/ inactive		56	10057	1	Brine in low temperature alarm
	active/ inactive		57	10058	1	Brine out low temperature alarm
108	active/ inactive	7	60	10061	1	Mix valve 1 supply temperature deviation alarm
	active/ inactive		66	10067	1	Sum alarm
58	active/ inactive	5	67	10068	1	Cooling circuit supply line temperature deviation alarm (EM)
62	active/ inactive		74	10075	1	Temperature room sensor alarm
	active/ inactive	10	75	10076	1	Inverter unit communication alarm
60	active/ inactive	6	76	10077	1	Pool return line sensor alarm
	on/off	6	77	10078	1	External stop for pool, read only
	on/off		78	10079	1	External start brine pump, read only
	on/off		79	10080	1	External relay for brine/ground water pump.
	active/ inactive		83	10084	1	Genesis secondary unit alarm - this specific secondary unit can't communicate with its primary unit
	active/ inactive		84	10085	1	Primary unit alarm - the primary has detected other primary units on the same network with a network mask that is allowing conflict. Change network settings in order to avoid problem. For instance change port number on the primary and its secondary unit.
	active/ inactive		85	10086	1	Primary unit alarm - the primary has not detected all secondary units. Make sure that the primary/secondary settings are correct and the network mask and port and number of Genesis secondaries settings are correct.
	on/off	10	86	10087	1	Oil boost in progress
	active/ inactive		87	10088	1	Tap water top sensor alarm.
	on/off	10	199	10200	1	Compressor control signal
	on/off		201	10202	1	Smart Grid 1, EVU input
	active/ inactive		202	10203	1	External alarm input
	on/off		204	10205	1	Smart Grid 2
117	on/off	1	206	10207	1	External additional heater control signal
109	on/off	7	209	10210	1	Mix valve 1 circulation pump control signal
	on/off	10	210	10211	1	Condenser pump On/off control
36	on/off	1	211	10212	1	System circulation pump control signal
	on/off	10	218	10219	1	Brine pump On/off control
176	on/off	1	219	10220	1	External heater circulation pump control signal
	on/off	1	220	10221	1	Heating season (winter) active
117	on/off	1	221	10222	1	External additional heater active
	on/off	10	224	10225	1	Heat pump stopping
	on/off	10	225	10226	1	Heat pump OK to start

DISCRETE INPUTS - Function codes: 2=read discrete inputs						
Position number	Units	Reference to	Address	De Facto Address	Scale	Description
101	on/off	6	235	10236	1	Pool directional valve position (EM)
38	on/off	5	236	10237	1	Cooling circuit circulation pump control signal (EM)
76	on/off	5	238	10239	1	Surplus heat directional valve position (EM)
	on/off	5	240	10241	1	Cooling circuit regulation control signal (EM)
79	on/off	5	242	10243	1	Active cooling directional valve position (Borehole disconnected) (EM)
	on/off		245	10246	1	Indication when mixing valve 1 is producing passive cooling
	on/off	10	246	10247	1	Compressor is unable to speed up

3.3 Read Analog Registers

INPUT REGISTERS - Function codes: 4=read input registers						
Position number	Units	Reference to	Address	De Facto Address	Scale	Description
	enum		1	30002	1	Currently running: First prioritised demand *1
	bitfield		2	30003	1	Currently running: Bit registers that shows the all the current running demands according to *6
		10	4	30005	100	Compressor available gears *3
	rpm	10	5	30006	1	Compressor speed
117	%	1	6	30007	100	External additional heater: Current demand (%)
	°C	10	7	30008	100	Discharge pipe temperature
	°C	10	8	30009	100	Condenser in temperature
	°C	10	9	30010	100	Condenser out temperature
	°C	10	10	30011	100	Brine in temperature
	°C	10	11	30012	100	Brine out temperature
51	°C	1	12	30013	100	System supply line temperature
50	°C		13	30014	100	Outdoor temperature
55	°C	2	15	30016	100	Tap water top temperature
53	°C	2	16	30017	100	Tap water lower temperature
53/55	°C	2	17	30018	100	Tap water weighted temperature
51	°C	1	18	30019	100	System supply line calculated set point
51	°C	1	19	30020	100	Selected heat curve, (system) supply line
51	°C	1	20	30021	100	Heat curve, X-coordinate 1 (highest outdoor temperature)
51	°C	1	21	30022	100	Heat curve, X-coordinate 2
51	°C	1	22	30023	100	Heat curve, X-coordinate 3
51	°C	1	23	30024	100	Heat curve, X-coordinate 4
51	°C	1	24	30025	100	Heat curve, X-coordinate 5
51	°C	1	25	30026	100	Heat curve, X-coordinate 6
51	°C	1	26	30027	100	Heat curve, X-coordinate 7 (lowest outdoor temperature)
	°C		27	30028	100	System return line temperature.
		10	30	30031	100	Calculated demand (heat)
		5	36	30037	1	Cooling season integral value
	%	10	39	30040	100	Condenser circulation pump speed (%)
108	°C	7	40	30041	100	Mix valve 1 supply line temperature
136	°C	8	41	30042	100	Buffer tank temperature
107	%	7	43	30044	100	Mix valve 1 position

INPUT REGISTERS - Function codes: 4=read input registers						
Position number	Units	Reference to	Address	De Facto Address	Scale	Description
	%	10	44	30045	100	Brine circulation pump speed (%)
77	%	2	47	30048	1	Tap water valve position (%)
	h	10	48	30049	1	Compressor operating hours (MSB)
	h	10	49	30050	1	Compressor operating hours (LSB)
	h	2	50	30051	1	Tap water operating hours (MSB)
	h	2	51	30052	1	Tap water operating hours (LSB)
117	h	1	52	30053	1	External additional heater operating hours (MSB)
117	h	1	53	30054	1	External additional heater operating hours (LSB)
	%	10	54	30055	100	Compressor speed percent
	enum		55	30056	1	Currently running: Second prioritised demand *1
	enum		56	30057	1	Currently running: Third prioritised demand *1
		10	60	30061	1	Compressor temporarily blocked, (start restriction timer)
		10	61	30062	100	Compressor current gear
	enum		62	30063	1	Queued demand, first priority *1
	enum		63	30064	1	Queued demand, second priority *1
	enum		64	30065	1	Queued demand, third priority *1
	enum		65	30066	1	Queued demand, fourth priority *1
	enum		66	30067	1	Queued demand, fifth priority *1
317	step		67	30068	1	Active step internal immersion heater
51/136	°C	8	68	30069	100	Buffer tank charge set point
	A	9	69	30070	100	Electric meter L1 current (A)
	A	9	70	30071	100	Electric meter L2 current (A)
	A	9	71	30072	100	Electric meter L3 current (A)
	V	9	72	30073	100	Electric meter L1-0 voltage (V)
	V	9	73	30074	100	Electric meter L2-0 voltage (V)
	V	9	74	30075	100	Electric meter L3-0 voltage (V)
	V	9	75	30076	10	Electric meter L1-L2 voltage (V)
	V	9	76	30077	10	Electric meter L2-L3 voltage (V)
	V	9	77	30078	10	Electric meter L3-L1 voltage (V)
	W	9	78	30079	1	Electric meter L1 power (W)
	W	9	79	30080	1	Electric meter L2 power (W)
	W	9	80	30081	1	Electric meter L3 power (W)
	kWh	9	81	30082	1	Electric meter - meter value (kWh)
	enum		82	30083	1	Current Smart Grid mode *4
		9	83	30084	10	Electric meter kWh total (LSB)
		9	84	30085	10	Electric meter kWh total (MSB)
58	°C	5	106	30107	100	Cooling circuit supply line temperature (EM)
62	°C		121	30122	10	Room temperature sensor
	°C	10	122	30123	100	Bubble point, high pressure temperature
	°C	10	123	30124	100	Dew point, high pressure temperature
	°C	10	124	30125	100	Dew point, low pressure temperature
	K	10	125	30126	100	Superheat temperature
	K	10	126	30127	100	Sub cooling temperature
	bar(g)	10	127	30128	100	Low pressure side, pressure (bar(g))
	bar(g)	10	128	30129	100	High pressure side, pressure (bar(g))
	°C	10	129	30130	100	Liquid line temperature
	°C	10	130	30131	100	Suction gas temperature

INPUT REGISTERS - Function codes: 4=read input registers						
Position number	Units	Reference to	Address	De Facto Address	Scale	Description
		1	131	30132	1	Heating season integral value
74	%	5	137	30138	1	Mix valve cooling opening degree (EM2/3)
		2	139	30140	1	Desired gear for tap water
		1	140	30141	1	Desired gear for heating
		5	141	30142	1	Desired gear for cooling
		6	142	30143	1	Desired gear for pool
			143	30144	1	Number of available secondaries Genesis
			145	30146	1	Total distributed gears to all units
			146	30147	1	Maximum gear out of all the currently requested gears
108	°C	7	147	30148	100	Desired temperature distribution circuit Mix valve 1
	active/ inactive		160	30161	1	Primary unit alarm - the combined output of all Class D alarms. This signal is a bit field, one bit for each secondary heat pump unit.
	active/ inactive		161	30162	1	Primary unit alarm - the primary unit has lost communication with one or more Genesis secondaries. This signal is a bit field, one bit for each heat pump.
	active/ inactive		162	30163	1	Primary unit alarm - Class A alarm detected on the Genesis secondary heat pump unit. This signal is a bit field, one bit for each secondary heat pump unit.
	active/ inactive		163	30164	1	Primary unit alarm - Class B alarm detected on the Genesis secondary heat pump unit. This signal is a bit field, one bit for each secondary heat pump unit.
			311	30312	1	Control software version: Major
			312	30313	1	Control software version: Minor
			313	30314	1	Control software version: Micro
	%		315	30316	100	Expansion valve opening degree
	°C		319	30320	1	Inverter temperature

3.4 Read/Write Analog Registers

HOLDING REGISTERS - Function codes: 3=read holding registers, 6=write single register, 16=write multiple registers						
Position number	Units	Reference to	Address	De Facto Address	Scale	Description
	enum		0	40001	1	Operational mode *2
51	°C	1	3	40004	100	Max limitation, set point curve radiator
51	°C	1	4	40005	100	Min limitation, set point curve radiator
	°C		5	40006	100	Comfort wheel setting
51	°C	1	6	40007	100	Set point heat curve, Y-coordinate 1 (highest outdoor temperature)
51	°C	1	7	40008	100	Set point heat curve, Y-coordinate 2
51	°C	1	8	40009	100	Set point heat curve, Y-coordinate 3
51	°C	1	9	40010	100	Set point heat curve, Y-coordinate 4
51	°C	1	10	40011	100	Set point heat curve, Y-coordinate 5
51	°C	1	11	40012	100	Set point heat curve, Y-coordinate 6
51	°C	1	12	40013	100	Set point heat curve, Y-coordinate 7 (lowest outdoor temperature)
50	°C	1	16	40017	100	Heating season stop temperature
53/55	°C	2	22	40023	100	Start temperature tap water (only valid when tap water mode is Normal)

HOLDING REGISTERS - Function codes: 3=read holding registers, 6=write single register, 16=write multiple registers						
Position number	Units	Refer-ence to	Address	De Facto Ad-dress	Scale	Description
53/55	°C	2	23	40024	100	Stop temperature tap water (only valid when tap water mode is Normal)
		1	26	40027	1	Minimum allowed gear in heating *3
		1	27	40028	1	Maximum allowed gear in heating *3
		2	28	40029	1	Maximum allowed gear in tap water *3 (only valid when tap water mode is Normal)
		2	29	40030	1	Minimum allowed gear in tap water *3 (only valid when tap water mode is Normal)
74	%	5	30	40031	100	Cooling mix valve set point (EM)
74	%	5	49	40050	100	Cooling supply line mix valve: Lowest allowed opening degree (EM)
74	%	5	50	40051	100	Cooling supply line mix valve: Highest allowed opening de-gree (EM)
183	%	6	58	40059	100	Pool charge set point (EM)
	min	1	61	40062	1	Gear shift delay heating
	min	6	62	40063	1	Gear shift delay pool
	min	5	63	40064	1	Gear shift delay cooling
	°C	10	67	40068	100	Brine in high alarm limit
	°C	10	68	40069	100	Brine in low alarm limit
	°C	10	69	40070	100	Brine out low alarm limit
	K		70	40071	100	Brine max delta limit
117		1	75	40076	1	External additional heater start (PID sum)
	%	10	76	40077	100	Condenser pump lowest allowed speed (%)
	%	10	77	40078	100	Brine pump lowest allowed speed (%)
117		1	78	40079	100	External additional heater stop (PID sum)
	%	10	79	40080	100	Condenser pump highest allowed speed (%)
	%	10	80	40081	100	Brine pump highest allowed speed (%)
	%	10	81	40082	100	Condenser pump standby speed (%)
	%	10	82	40083	100	Brine pump standby speed (%)
		6	85	40086	1	Minimum allowed gear in pool *3
		6	86	40087	1	Maximum allowed gear in pool *3
		5	87	40088	1	Minimum allowed gear in cooling *3
		5	88	40089	1	Maximum allowed gear in cooling *3
	°C	5	105	40106	100	Start temp for cooling (EM)
	°C	5	106	40107	100	Stop temp for cooling (EM)
108	°C	7	107	40108	100	Min limitation Set point curve radiator Mix valve 1
108	°C	7	108	40109	100	Max limitation Set point curve radiator Mix valve 1
108	°C	7	109	40110	100	Set point curve, Y-coordinate 1 Mix valve 1 (highest outdoor temperature)
108	°C	7	110	40111	100	Set point curve, Y-coordinate 2 Mix valve 1
108	°C	7	111	40112	100	Set point curve, Y-coordinate 3 Mix valve 1
108	°C	7	112	40113	100	Set point curve, Y-coordinate 4 Mix valve 1
108	°C	7	113	40114	100	Set point curve, Y-coordinate 5 Mix valve 1
108	°C	7	114	40115	100	Set point curve, Y-coordinate 6 Mix valve 1
108	°C	7	115	40116	100	Set point curve, Y-coordinate 7 Mix valve 1 (lowest outdoor temperature)
51	°C		116	40117	100	Fixed system supply set point, requires defacto address 42 to be enabled

HOLDING REGISTERS - Function codes: 3=read holding registers, 6=write single register, 16=write multiple registers						
Position number	Units	Reference to	Address	De Facto Address	Scale	Description
	enum		117	40118	1	Outdoor temperature source, is an enumeration where 0 = designated PT1000 sensor located on BM-card. 1 = BMS register 40119 (De Facto). When the source is BMS the outdoor temperature alarm is automatically removed when the sensor data is valid. If no valid sensor data is present the heat pump will use its designated PT1000 sensor and if that sensor is missing the heat pump will use 0 degrees C as a fallback value.
	°C		118	40119	100	Outdoor temperature sensor, this register will be the source of the outdoor temperature given that BMS-address 40118 is set to 1. The valid range of the temperature is between -50 to 200 degrees C. If this register is not updated with a new temperature within 12 hours or the value is outside the valid range, the fallback logic will be triggered stated in description of BMS register 40118. This signal is automatically filtered in the heat pump.
	A		119	40120	1	Maximum phase current
	A		120	40121	1	Compressor current hysteresis
	enum		124	40125	1	Desired Power Consumption Control, control mode. Controlled by BMS, may be overridden by the Digital input for Smart grid. In SG-Ready mode 0=Normal, 1=Load-Up, 2=EVU, 3=Boost. When in PL/LU mode 0=Normal, 1=Power Limit(defacto address 40126), 2=Load-Up, 3=Power Limit(defacto address 40126)
	kW		125	40126	10	Input power limit during Power Limitation (defacto 40125), NOTE: If the power limitation is set too low, the compressor will be unable to run.
108	enum		298	40299	1	Selected mode for mixing valve 1, 0:Heat, 1:Cool, 2:Auto
	°C	6	299	40300	10	Set point return temp from pool to heat exchanger (EM)
	K	6	300	40301	10	Set point pool hysteresis (EM)
108	°C	5	302	40303	100	Set point for supply line temp passive cooling with mixing valve 1
	°C	5	303	40304	100	Set point minimum outdoor temp when cooling is permitted
	°C	1	304	40305	100	External heater outdoor temp limit
317	enum		321	40322	1	Enabled immersion heater *7

4   Heat pump unit

4.1   Heat pump unit

Position number	Units	Reference to	Address	De Facto Address	Scale	Description
	on/off		3	4	1	Reset all alarms
117	on/off	1	5	6	1	Enable external additional heater
71	on/off		7	8	1	Enable flow switch/pressure switch
	on/off	2	8	9	1	Enable tap water
	on/off	1	9	10	1	Enable heat
	on/off	10	20	21	1	Enable brine out monitoring
	on/off	10	21	22	1	Enable brine pump continuous operation
36	on/off	1	22	23	1	Enable system circulation pump
117	on/off	1	25	26	100	Enable additional heater only (No compressor). Requires Operation mode: Standby
	on/off	10	34	35	1	Enable variable speed mode for condenser pump
117	on/off	10	35	36	1	Enable variable speed mode for brine pump
	on/off		39	40	1	Enable outdoor temp dependent for external heater
	on/off	10	42	43	1	Enable evaporator freeze protection
	on/off		59	60	1	Enable continuous operation mode for condenser pump.
	on/off		60	61	1	Allow current limiter to restrict external additional heater
	on/off		61	62	1	Allow current limiter to restrict secondary heat pump units
	active/ inactive		0	10001	1	Alarm active, Class: A
	active/ inactive		1	10002	1	Alarm active, Class: B
	active/ inactive		2	10003	1	Alarm active, Class: C
	active/ inactive		3	10004	1	Alarm active, Class: D - Genesis secondary
	active/ inactive	10	9	10010	1	High pressure switch alarm
	active/ inactive	10	10	10011	1	Low pressure level alarm
	active/ inactive	10	11	10012	1	High discharge pipe temperature alarm
	on/off	10	12	10013	1	Operating pressure limit indication
	active/ inactive	10	13	10014	1	Discharge pipe sensor alarm
	active/ inactive	10	14	10015	1	Liquid line sensor alarm
	active/ inactive	10	15	10016	1	Suction gas sensor alarm
71	active/ inactive		16	10017	1	Flow/pressure switch alarm
	active/ inactive		22	10023	1	Power input phase detection alarm
	active/ inactive	10	23	10024	1	Inverter unit alarm

Position number	Units	Reference to	Address	De Facto Address	Scale	Description
	active/inactive	10	25	10026	1	Compressor low speed alarm
	active/inactive	10	26	10027	1	Low super heat alarm
	active/inactive	10	27	10028	1	Pressure ratio out of range alarm
	active/inactive		28	10029	1	Compressor pressure outside envelope alarm
	active/inactive	10	29	10030	1	Brine temperature out of range alarm
	active/inactive	10	30	10031	1	Brine in sensor alarm
	active/inactive	10	31	10032	1	Brine out sensor alarm
	active/inactive	10	32	10033	1	Condenser in sensor alarm
	active/inactive	10	33	10034	1	Condenser out sensor alarm
50	active/inactive		34	10035	1	Outdoor sensor alarm
	active/inactive		49	10050	1	Brine delta out of range alarm
	active/inactive		55	10056	1	Brine in high temperature alarm
	active/inactive		56	10057	1	Brine in low temperature alarm
	active/inactive	10	57	10058	1	Brine out low temperature alarm
	active/inactive		66	10067	1	Sum alarm
	active/inactive	10	75	10076	1	Inverter unit communication alarm
	on/off		79	10080	1	External relay for brine/ground water pump.
	active/inactive		83	10084	1	Genesis secondary unit alarm - this specific secondary unit can't communicate with its primary unit
	active/inactive		84	10085	1	Primary unit alarm - the primary has detected other primary units on the same network with a network mask that is allowing conflict. Change network settings in order to avoid problem. For instance change port number on the primary and its secondary unit.
	active/inactive		85	10086	1	Primary unit alarm - the primary has not detected all secondary units. Make sure that the primary/secondary settings are correct and the network mask and port and number of Genesis secondaries settings are correct.
	on/off	10	86	10087	1	Oil boost in progress
	active/inactive		87	10088	1	Tap water top sensor alarm.
	on/off	10	199	10200	1	Compressor control signal
	on/off		201	10202	1	Smart Grid 1, EVU input
	on/off		202	10203	1	External alarm input
	on/off		204	10205	1	Smart Grid 2
117	on/off		206	10207	1	External additional heater control signal
	on/off	10	210	10211	1	Condenser pump On/off control
	on/off	10	218	10219	1	Brine pump On/off control

Position number	Units	Reference to	Address	De Facto Address	Scale	Description
	on/off	1	219	10220	1	External heater circulation pump control signal
117	on/off	1	221	10222	1	External additional heater active
	on/off	10	224	10225	1	Heat pump stopping
	on/off	10	225	10226	1	Heat pump OK to start
	on/off	10	246	10247	1	Compressor is unable to speed up
		10	4	30005	100	Compressor available gears *3
	rpm	10	5	30006	1	Compressor speed
117	%	1	6	30007	100	External additional heater: Current demand (%)
	°C	10	7	30008	100	Discharge pipe temperature
	°C	10	8	30009	100	Condenser in temperature
	°C	10	9	30010	100	Condenser out temperature
	°C	10	10	30011	100	Brine in temperature
	°C	10	11	30012	100	Brine out temperature
50	°C		13	30014	100	Outdoor temperature
		5	36	30037	1	Cooling season integral value
	%	10	39	30040	100	Condenser circulation pump speed (%)
	%	10	44	30045	100	Brine circulation pump speed (%)
	h	10	48	30049	1	Compressor operating hours (MSB)
	h	10	49	30050	1	Compressor operating hours (LSB)
117	h	1	52	30053	1	External additional heater operating hours (MSB)
117	h	1	53	30054	1	External additional heater operating hours (LSB)
	%	10	54	30055	100	Compressor speed percent
	enum		55	30056	1	Currently running: Second prioritised demand *1
	enum		56	30057	1	Currently running: Third prioritised demand *1
		10	60	30061	1	Compressor temporarily blocked, (start restriction timer)
		10	61	30062	100	Compressor current gear
	enum		62	30063	1	Queued demand, first priority *1
	enum		63	30064	1	Queued demand, second priority *1
	enum		64	30065	1	Queued demand, third priority *1
	enum		65	30066	1	Queued demand, fourth priority *1
	enum		66	30067	1	Queued demand, fifth priority *1
317	step		67	30068	1	Active step internal immersion heater
	enum		82	30083	1	Current Smart Grid mode *4
62			121	30122	10	Room temperature sensor
	°C	10	122	30123	100	Bubble point, high pressure temperature
	°C	10	123	30124	100	Dew point, high pressure temperature
	°C	10	124	30125	100	Dew point, low pressure temperature
	K	10	125	30126	100	Superheat temperature
	K	10	126	30127	100	Sub cooling temperature
	bar(g)	10	127	30128	100	Low pressure side, pressure (bar(g))
	bar(g)	10	128	30129	100	High pressure side, pressure (bar(g))
	°C	10	129	30130	100	Liquid line temperature
	°C	10	130	30131	100	Suction gas temperature
		1	131	30132	1	Heating season integral value
			311	30312	1	Control software version: Major
			312	30313	1	Control software version: Minor
			313	30314	1	Control software version: Micro
	%		315	30316	100	Expansion valve opening degree

Position number	Units	Reference to	Address	De Facto Address	Scale	Description
	°C		319	30320	1	Inverter temperature
		1	26	40027	1	Minimum allowed gear in heating *3
		1	27	40028	1	Maximum allowed gear in heating *3
		1	61	40062	1	Gear shift delay heating
	°C	10	67	40068	100	Brine in high alarm limit
	°C	10	68	40069	100	Brine in low alarm limit
	°C	10	69	40070	100	Brine out low alarm limit
	K	10	70	40071	100	Brine max delta limit
117		1	75	40076	1	External additional heater start (PID sum)
	%	10	76	40077	100	Condenser pump lowest allowed speed (%)
	%	10	77	40078	100	Brine pump lowest allowed speed (%)
117		1	78	40079	100	External additional heater stop (PID sum)
	%	10	79	40080	100	Condenser pump highest allowed speed (%)
	%	10	80	40081	100	Brine pump highest allowed speed (%)
	%	10	81	40082	100	Condenser pump standby speed (%)
	%	10	82	40083	100	Brine pump standby speed (%)
	enum		117	40118	1	Outdoor temperature source, is an enumeration where 0 = designated PT1000 sensor located on BM-card. 1 = BMS register 40119 (De Facto). When the source is BMS the outdoor temperature alarm is automatically removed when the sensor data is valid. If no valid sensor data is present the heat pump will use its designated PT1000 sensor and if that sensor is missing the heat pump will use 0 degrees C as a fallback value.
	°C		118	40119	100	Outdoor temperature sensor, this register will be the source of the outdoor temperature given that BMS-address 40118 is set to 1. The valid range of the temperature is between -50 to 200 degrees C. If this register is not updated with a new temperature within 12 hours or the value is outside the valid range, the fallback logic will be triggered stated in description of BMS register 40118. This signal is automatically filtered in the heat pump.
	A		119	40120	1	Maximum phase current
	A		120	40121	1	Compressor current hysteresis
	°C	1	304	40305	100	External heater outdoor temp limit
317	enum		321	40322	1	Enabled immersion heater *7

5   Heat

5.1   Heating system

Position number	Units	Reference to	Address	De Facto Address	Scale	Description
	on/off		41	42	1	Enable fixed system supply set point, allows defacto address 40117
51	active/inactive	1	24	10025	1	System supply low temperature alarm
51	active/inactive	1	35	10036	1	System supply line sensor alarm
62	active/inactive		74	10075	1	Temperature room sensor alarm
36	on/off	1	211	10212	1	System circulation pump control signal
		1	220	10221	1	Heating season (winter) active
51	°C	1	12	30013	100	System supply line temperature
51	°C	1	18	30019	100	System supply line calculated set point
51	°C	1	19	30020	100	Selected heat curve, (system) supply line
50	°C	1	20	30021	100	Heat curve, X-coordinate 1 (highest outdoor temperature)
50	°C	1	21	30022	100	Heat curve, X-coordinate 2
50	°C	1	22	30023	100	Heat curve, X-coordinate 3
50	°C	1	23	30024	100	Heat curve, X-coordinate 4
50	°C	1	24	30025	100	Heat curve, X-coordinate 5
50	°C	1	25	30026	100	Heat curve, X-coordinate 6
50	°C	1	26	30027	100	Heat curve, X-coordinate 7 (lowest outdoor temperature)
	°C		27	30028	100	System return line temperature.
		10	30	30031	100	Calculated demand (heat)
	°C	8	41	30042	100	Buffer tank temperature
	°C	8	68	30069	100	Buffer tank charge set point
		1	140	30141	1	Desired gear for heating
51	°C	1	3	40004	100	Max limitation, set point curve radiator
51	°C	1	4	40005	100	Min limitation, set point curve radiator
	°C	1	5	40006	100	Comfort wheel setting
51	°C	1	6	40007	100	Set point heat curve, Y-coordinate 1 (highest outdoor temperature)
51	°C	1	7	40008	100	Set point heat curve, Y-coordinate 2
51	°C	1	8	40009	100	Set point heat curve, Y-coordinate 3
51	°C	1	9	40010	100	Set point heat curve, Y-coordinate 4
51	°C	1	10	40011	100	Set point heat curve, Y-coordinate 5
51	°C	1	11	40012	100	Set point heat curve, Y-coordinate 6
51	°C	1	12	40013	100	Set point heat curve, Y-coordinate 7 (lowest outdoor temperature)
	°C	1	16	40017	100	Heating season stop temperature
51	°C		116	40117	100	Fixed system supply set point, requires defacto address 42 to be enabled

5.2 Mix valve 1

Position number	Units	Reference to	Address	De Facto Address	Scale	Description
107	on/off	7	11	12	1	Enable mix valve 1
107	on/off	5	37	38	1	Enable outdoor temp dependent for cooling with mixing valve 1
	on/off	5	38	39	1	Enable internal brine pump to start when cooling is active for mixing valve 1
108	active/inactive	7	36	10037	1	Mix valve 1 supply line sensor alarm
108	active/inactive	7	60	10061	1	Mix valve 1 supply temperature deviation alarm
109	on/off	7	209	10210	1	Mix valve 1 circulation pump control signal
107	on/off	5	245	10246	1	Indication when mixing valve 1 is producing passive cooling
108	°C	7	40	30041	100	Mix valve 1 supply line temperature
107	%	7	43	30044	100	Mix valve 1 position
108	°C	7	147	30148	100	Desired temperature distribution circuit Mix valve 1
108	°C	7	107	40108	100	Min limitation Set point curve radiator Mix valve 1
108	°C	7	108	40109	100	Max limitation Set point curve radiator Mix valve 1
108	°C	7	109	40110	100	Set point curve, Y-coordinate 1 Mix valve 1 (highest outdoor temperature)
108	°C	7	110	40111	100	Set point curve, Y-coordinate 2 Mix valve 1
108	°C	7	111	40112	100	Set point curve, Y-coordinate 3 Mix valve 1
108	°C	7	112	40113	100	Set point curve, Y-coordinate 4 Mix valve 1
108	°C	7	113	40114	100	Set point curve, Y-coordinate 5 Mix valve 1
108	°C	7	114	40115	100	Set point curve, Y-coordinate 6 Mix valve 1
108	°C	7	115	40116	100	Set point curve, Y-coordinate 7 Mix valve 1 (lowest outdoor temperature)
108	enum		298	40299	1	Selected mode for mixing valve 1, 0:Heat, 1:Cool, 2:Auto
108	°C	5	302	40303	100	Set point for supply line temp passive cooling with mixing valve 1
	°C	5	303	40304	100	Set point minimum outdoor temp when cooling is permitted

6 Tap water

6.1 Tap water

Position number	Units	Reference to	Address	De Facto Address	Scale	Description
34	on/off		14	15	1	Enable hot gas pump
53	active/inactive	2	50	10051	1	Tap water mid sensor alarm
55	°C	2	15	30016	100	Tap water top temperature
53	°C	2	16	30017	100	Tap water lower temperature
53/55	°C	2	17	30018	100	Tap water weighted temperature
77	%	2	47	30048	1	Tap water valve position (%)
	h	2	50	30051	1	Tap water operating hours (MSB)
	h	2	51	30052	1	Tap water operating hours (LSB)
		2	139	30140	1	Desired gear for tap water
53/55	°C	2	22	40023	100	Start temperature tap water (only valid when tap water mode is Normal)
53/55	°C	2	23	40024	100	Stop temperature tap water (only valid when tap water mode is Normal)
		2	28	40029	1	Maximum allowed gear in tap water *3 (only valid when tap water mode is Normal)
		2	29	40030	1	Minimum allowed gear in tap water *3 (only valid when tap water mode is Normal)

6.2 HGW

Position number	Units	Reference to	Address	De Facto Address	Scale	Description
364	on/off		6	7	1	Enable HGW
364	active/inactive	2	52	10053	1	HGW sensor alarm
364	on/off	2	223	10224	1	HGW regulation control signal
407	°C	2	45	30046	100	HGW supply line temperature
364	%	2	47	30048	1	HGW mix valve position (%)

7   Cooling

7.1   Cooling

Position number	Units	Reference to	Address	De Facto Address	Scale	Description
	On/Off	5	10	11	1	Enable active cooling
	On/Off	5	33	34	1	Enable passive cooling (EM)
		5	63	40064	1	Gear shift delay cooling
		5	87	40088	1	Minimum allowed gear in cooling *3
		5	88	40089	1	Maximum allowed gear in cooling *3
345	On/Off	5	78	10079	1	External start brine pump, read only
		5	141	30142	1	Desired gear for cooling

7.2   Cooling circuit

Position number	Units	Reference to	Address	De Facto Address	Scale	Description
58	active/ inactive	5	67	10068	1	Cooling circuit supply line temperature deviation alarm (EM)
38	on/off	5	236	10237	1	Cooling circuit circulation pump control signal (EM)
	on/off	5	240	10241	1	Cooling circuit regulation control signal (EM)
58	°C	5	106	30107	100	Cooling circuit supply line temperature (EM)
74	on/off	5	137	30138	1	Mix valve cooling opening degree (EM2/3)
74	%	5	30	40031	100	Cooling mix valve set point (EM)
74	%	5	49	40050	100	Cooling supply line mix valve: Lowest allowed opening degree (EM)
74	%	5	50	40051	100	Cooling supply line mix valve: Highest allowed opening degree (EM)

8   Pool

8.1   Pool

Position number	Units	Reference to	Address	De Facto Address	Scale	Description
	on/off	6	28	29	1	Enable pool (EM)
	on/off	6	31	32	1	Enable external additional heater for pool (EM)
60	active/inactive	6	76	10077	1	Pool return line sensor alarm
342	on/off	6	77	10078	1	External stop for pool, read only
101	on/off	6	235	10236	1	Pool directional valve position (EM)
183	°C	6	119	30120	100	Pool supply line temperature (EM)
60	°C	6	120	30121	100	Pool return line temperature (EM)
		6	142	30143	1	Desired gear for pool
183	°C	6	58	40059	100	Pool charge set point (EM)
		6	62	40063	1	Gear shift delay pool
		6	85	40086	1	Minimum allowed gear in pool *3
		6	86	40087	1	Maximum allowed gear in pool *3
60	°C	6	299	40300	10	Set point return temp from pool to heat exchanger (EM)
60	K	6	300	40301	10	Set point pool hysteresis (EM)

9   Electric meter

9.1   Electric meter

For this function, the accessory "Current limiter" is required.

Position number	Units	Reference to	Address	De Facto Address	Scale	Description
	on/off	9	26	27	1	Enable current limitation
	A	9	69	30070	100	Electric meter L1 current (A)
	A	9	70	30071	100	Electric meter L2 current (A)
	A	9	71	30072	100	Electric meter L3 current (A)
	V	9	72	30073	100	Electric meter L1-0 voltage (V)
	V	9	73	30074	100	Electric meter L2-0 voltage (V)
	V	9	74	30075	100	Electric meter L3-0 voltage (V)
	V	9	75	30076	10	Electric meter L1-L2 voltage (V)
	V	9	76	30077	10	Electric meter L2-L3 voltage (V)
	V	9	77	30078	10	Electric meter L3-L1 voltage (V)
	W	9	78	30079	1	Electric meter L1 power (W)
	W	9	79	30080	1	Electric meter L2 power (W)
	W	9	80	30081	1	Electric meter L3 power (W)
	kWh	9	81	30082	1	Electric meter - meter value (kWh)
		9	83	30084	10	Electric meter kWh total (LSB)
		9	84	30085	10	Electric meter kWh total (MSB)

Footnotes:
*1) 1: Manual operation, 2: Defrost, 3: Hot water, 4: Heat, 5: Active Cooling, 6: Pool, 7: Anti legionella, 8: Passive Cooling 98: Standby 99: No demand 100: OFF
*2) 1: OFF, 2: Standby, 3: ON/Auto
*3) Different heat pumps have different number of available gears.
For instance: Commercial can have 10, while domestic can have 9 gears.
*4) These applies to Smart grid function. 1: EVU, 4: Normal, 5: Comfort, 6: Boost
*5) Should always be set to 1 i auto mode
*6) Bit 0: Manual operation Bit 1: Defrost, Bit 2: Hot water, Bit 3: Heat, Bit 4: Active Cooling, Bit 5: Pool, Bit 6: Anti legionella, Bit 7: Passive Cooling, Bit 8: Reserved, Bit 9: Standby, Bit 10: No demand, Bit 11: OFF

*7) 0=Disable immersion heater, 2=Internal immersion heater enabled

Thermia AB reserves the right to make changes in the software protocol availability and related documents without further notice. By controlling and/or interacting with the heat pump the user takes full responsibility for any consequences. Thermia AB will not take any liability for damages on equipment, properties or personal injuries occurring as a consequence of any attempts of remotely controlling the heat pumps or system.