The Robur T10 DDC Modbus Interface, f/w 4.015

Abstract

This document provides information specific to Robur DDC Modbus interface, related to DDC firmware release 4.015.
DDC f/w 4.015 Modbus interface is backward compatible with previous DDC firmware supporting Modbus protocol.
The DDC supports two Modbus registers mappings, named v1.0 and v2.0. This document refers to the v2.0 mapping. The v1.0 mapping is intended only for backward compatibility (DDC f/w 2.005) and it's use is deprecated.

DDC Modbus Communication

The Robur DDC implements the Modbus RTU communication standard, as a Modbus slave agent. It can be accessed through a standard RS232 port or as an alternative a RS-485 port, which can be configured to work according to one of the following settings:

- 19.200 8N1 (default)
- 19.200 8E1
- 19.200 8N2 (only for RS-232)
- 9.600 8N1
- 9.600 8E1
- 9.600 8N2 (only for RS-232)

If the DDC is set for RS-232 Modbus communication, the Modbus master device must be connected on the RS-232 port on the front panel (DB9) or alternatively on the back with the RJ-45 connector.
Please use a serial null modem cable to connect to DDC with DB9. Refer to Robur S.p.A. for cabling using RJ-45.
If the DDC is set for RS-485 Modbus communication, the Modbus master device must be connected to the RS-485 connector on the back. Refer to DDC manual for details.
Using the DDC user interface it's possible to set the Modbus slave address. Default is 1.

DDC Modbus Map

The Robur DDC Modbus map uses all the four areas described in the standard:

- Coils (R/W bit oriented I/O, address range 0xxxx)
- Discrete Input (R/O bit oriented Input, address range 1xxxx)
- Input Registers (R/O Word oriented Input, address range 3xxxx)
- Holding Registers (R/W Word oriented I/O, address range 4xxxx)

The following Modbus function codes are supported:
- (01) Read Coil Status
- (02) Read Discrete Input
- (03) Read Holding Register
- (04) Read Input Register
- (05) Write Single Coil
- (06) Write Single Register

- (15) Write Multiple Coil
- (16) Write Multiple Register
- (23) Read/Write Multiple Register

The DDC supports Modbus broadcast messages.

Several fields are mapped to both a R/O and a R/W area.
The following part describes the DDC Modbus map and provides information about using the functions provided by the DDC through the Modbus Interface.

Modbus addresses are listed using two different notations: the first column shows addresses using the “Type Prefix” Modbus notation, while the second column shows addresses using the “Real” Modbus address notation.
In the “Type Prefix” Modbus address notation:
- the first digit is a type prefix, so it's not actually part of the address;
- the addresses themselves start from 1;

e.g. the first holding register address will be shown as "40001", with "4" being the prefix for ‘holding register type’, while the first input register address will be “30001”, with “3” being the prefix for ‘input register type’.
In the “Real” Modbus address notation, the address shown is exactly the same being sent in the actual Modbus communication, so:
- there's no prefix;
- the addresses start from 0;

Please note that “Real” Modbus addresses are given in hexadecimal form; e.g. both the first holding register address and the first input register address will be shown as “0x0000”.
The Modbus function code will specify the register type.

COIL (Read/Write, unless otherwise noted)

Note that Command Coils refers to Services rather than Plants.
Main services are: Cooling, Heating, Base domestic hot water and Separable domestic hot water.

"Type prefix" address (dec)	"Real" address (hex)	Type	Category	Description
00001	0x0000	Bit	**Remote Assistance Command**	Remote Start/Stop Cooling Service or 2 pipes Cool/Heat Service START (1) / STOP (0) *-not mapped if DDC is not master or cooling service not configured.* *-readonly if R.A. control not enabled or monitor mode enabled.*
00002	0x0001	Bit		Remote Start/Stop Heating Service START (1) / STOP (0) *-not mapped for 2 pipes cool/heat plant* *-not mapped if DDC is not master or heating service not configured.* *-readonly if R.A. control not enabled or monitor mode enabled.*
00003	0x0002	Bit		Remote CoolHeatMode HEAT (1) / COOL (0) *-not mapped if DDC is not master or not 2 pipes* *-readonly if R.A. control not enabled or "Plant Enable setup" enables "aRYW"*
00004	0x0003	Bit	**Generic command**	GAHP-W priority button HEAT (1) / COOL (0) *-not mapped if 2 pipes cool/heat plant or if no GAHP-W in plant* *-readonly if no control enabled (no RA nor BMS)*
00005	0x0004	Bit	**Building Management System Command**	BMS Start/Stop Cooling Service or 2 pipes Cool/Heat Service START (1) / STOP (0) *-not mapped if DDC is not master or cooling service not configured.* *-readonly if BMS control not enabled*
00006	0x0005	Bit		BMS Start/Stop Heating Service START (1) / STOP (0) *-not mapped for 2 pipes cool/heat plant* *-not mapped if DDC is not master or heating service not configured.* *-readonly if BMS control not enabled.*
00007	0x0006	Bit		BMS CoolHeatMode HEAT (1) / COOL (0) *-not mapped if DDC is not master or not 2 pipes* *-readonly if R.A. control not enabled or "Plant Enable setup" enables "aRYW"*
00008	0x0007	Bit	**Reserved**	FREE (Not mapped)
00009	0x0008	Bit		FREE (Not mapped)
00010	0x0009	Bit		FREE (Not mapped)
00011	0x000A	Bit		FREE (Not mapped)
00012	0x000B	Bit		FREE (Not mapped)
00013	0x000C	Bit		FREE (Not mapped)
00014	0x000D	Bit	**Building Management System Command**	BMS Start/Stop Base Domestic Hot Water Service START (1) / STOP (0) *-not mapped if DDC is not master or base DHW service not configured.* *-readonly if BMS control not enabled*
00015	0x000E	Bit		BMS Start/Stop Separable Domestic Hot Water Service START (1) / STOP (0) *-not mapped if DDC is not master or separable DHW service not configured.* *-readonly if BMS control not enabled*
00016	0x000F	Bit	**External digital request (RB100 like)**	External digital request Cooling service or 2 pipes cool/heat service operating in cooling mode *-not mapped if DDC is not master or cooling service not configured.* *-readonly if neither R.A. control nor BMS control are enabled* *-readonly if external request is not enabled.*
00017	0x0010	Bit		External digital request Heating service or 2 pipes cool/heat service operating in heating mode *-not mapped if DDC is not master or heating service not configured.* *-readonly if neither R.A. control nor BMS control are enabled* *-readonly if external request is not enabled.*

00018	0x0011	Bit		External digital request Base domestic hot water service *-not mapped if DDC is not master or base DHW service not configured.* *-readonly if neither R.A. control nor BMS control are enabled* *-readonly if external request is not enabled*
00019	0x0012	Bit		External digital request Separable domestic hot water service *-not mapped if DDC is not master or separable DHW service not configured.* *-readonly if neither R.A. control nor BMS control are enabled* *-readonly if external request is not enabled*
00020	0x0013	Bit	**External analog request (need setpoint register setting) (RB100 like)**	External analog request Cooling service or 2 pipes cool/heat service operating in cooling mode *-not mapped if DDC is not master or cooling service not configured.* *-readonly if neither R.A. control nor BMS control are enabled* *-readonly if external request is not enabled*
00021	0x0014	Bit		External analog request Heating service or 2 pipes cool/heat service operating in heating mode *-not mapped if DDC is not master or heating service not configured.* *-readonly if neither R.A. control nor BMS control are enabled* *-readonly if external request is not enabled*
00022	0x0015	Bit		External analog request Base domestic hot water service *-not mapped if DDC is not master or base DHW service not configured.* *-readonly if neither R.A. control nor BMS control are enabled* *-readonly if external request is not enabled*
00023	0x0016	Bit		External analog request Separable domestic hot water service *-not mapped if DDC is not master or separable DHW service not configured.* *-readonly if neither R.A. control nor BMS control are enabled* *-readonly if external request is not enabled*
00024 – 10000	0x0017 – 0x270F			FREE for additional categories (Not mapped)

External requests (RB100 like) notes

- RB100 like external requests act in parallel with actual RB100 requests;
- An analog request overrides matching digital request;
- After 5 minutes without Modbus communication, all these coils reset to zero.

DISCRETE INPUTS AREA (Read Only)

"Type prefix" address (dec)	"Real" address (hex)	Type	Category	Description
10001	0x0000	Bit	**Command access type (Remote assistance)**	IsWritable Remote Start/Stop Cooling Service or 2 pipes Cool/Heat Service TRUE (1) / FALSE (0)
10002	0x0001	Bit		IsWritable Remote Start/Stop Heating Service TRUE (1) / FALSE (0)
10003	0x0002	Bit		IsWritable Remote CoolHeatMode TRUE (1) / FALSE (0)
10004	0x0003	Bit		IsMapped Remote Start/Stop Cooling Service or 2 pipes Cool/Heat Service TRUE (1) / FALSE (0)
10005	0x0004	Bit		IsMapped Remote Start/Stop Heating Service TRUE (1) / FALSE (0)
10006	0x0005	Bit		IsMapped Remote CoolHeatMode TRUE (1) / FALSE (0)
10007	0x0006	Bit	**Command access type (generic)**	IsWritable GAHP-W priority TRUE (1) / FALSE (0)
10008	0x0007	Bit		IsMapped GAHP-W priority TRUE (1) / FALSE (0)
10009	0x0008	Bit	**Command access type (BMS)**	IsWritable BMS Start/Stop Cooling Service or 2 pipes Cool/Heat Service TRUE (1) / FALSE (0)
10010	0x0009	Bit		IsWritable BMS Start/Stop Heating Service TRUE (1) / FALSE (0)
10011	0x000A	Bit		IsWritable BMS CoolHeatMode TRUE (1) / FALSE (0)
10012	0x000B	Bit		IsMapped BMS Start/Stop Cooling Service or 2 pipes Cool/Heat Service TRUE (1) / FALSE (0)
10013	0x000C	Bit		IsMapped BMS Start/Stop Heating Service TRUE (1) / FALSE (0)
10014	0x000D	Bit		IsMapped BMS CoolHeatMode TRUE (1) / FALSE (0)
10015 - 10026	0x000E-0x0019			FREE (Not mapped)
10027	0x001A	Bit	**Command access type (BMS)**	IsWritable BMS Start/Stop Base Domestic Hot Water Service
10028	0x001B	Bit		IsMapped BMS Start/Stop Base Domestic Hot Water Service
10029	0x001C	Bit		IsWritable BMS Start/Stop Separable Domestic Hot Water Service
10030	0x001D	Bit		IsMapped BMS Start/Stop Separable Domestic Hot Water Service
10031	0x001E	Bit	**External digital request access type**	IsWritable External digital request Cooling service or 2 pipes cool/heat service in cooling mode
10032	0x001F	Bit		IsWritable External digital request Heating service or 2 pipes cool/heat service in heating mode
10033	0x0020	Bit		IsWritable External digital request Base domestic hot water service
10034	0x0021	Bit		IsWritable External digital request Separable domestic hot water service
10035	0x0022	Bit		IsMapped External digital request Cooling service or 2 pipes cool/heat service in cooling mode
10036	0x0023	Bit		IsMapped External digital request Heating service or 2 pipes cool/heat service in heating mode
10037	0x0024	Bit		IsMapped External digital request Base domestic hot water service
10038	0x0025	Bit		IsMapped External digital request Separable domestic hot water service
10039	0x0026	Bit	**External analog request access type**	IsWritable External analog request Cooling service or 2 pipes cool/heat service in cooling mode
10040	0x0027	Bit		IsWritable External analog request Heating service or 2 pipes cool/heat service in heating mode

10041	0x0028	Bit		IsWritable External analog request Base domestic hot water service
10042	0x0029	Bit		IsWritable External analog request Separable domestic hot water service
10043	0x002A	Bit		IsMapped External analog request Cooling service or 2 pipes cool/heat service in cooling mode
10044	0x002B	Bit		IsMapped External analog request Heating service or 2 pipes cool/heat service in heating mode
10045	0x002C	Bit		IsMapped External analog request Base domestic hot water service
10046	0x002D	Bit		IsMapped External analog request Separable domestic hot water service
10047 - 10500	0x002E-0x01F3			FREE (Not mapped)
10501	0x01F4	Bit	**DDC Service Status**	On/Off Cooling Service or 2 Pipes Cool/Heat Service ON (1) / OFF (0) *-Not mapped if cooling service not configured*
10502	0x01F5	Bit		On/Off Heating Service ON (1) / OFF (0) *-Not mapped for 2 pipes cool/heat plant* *-Not mapped if heating service not configured*
10503	0x01F6	Bit		CoolHeatMode HEAT (1) / COOL (0) *-Mapped only for 2 pipes Cool/Heat Plant* *-Not mapped for DDC MONitor working mode*
10504	0x01F7	Bit		On/Off Base Domestic Hot Water Service ON (1) / OFF (0) *-not mapped if DHW service (base part) not configured.*
10505	0x01F8	Bit		On/Off Separable Domestic Hot Water Service ON (1) / OFF (0) *-not mapped if DHW service (saparable part) not configured.*
10506 - 11000	0x01F9-0x03E7			FREE (Not mapped)
11001	0x03E8	Bit	**Cooling Module 00 Status**	Not Configured (Module 00) TRUE (1) / FALSE (0)
11002	0x03E9	Bit		User Excluded (Module 00) TRUE (1) / FALSE (0)
11003	0x03EA	Bit		Offline (Module 00) TRUE (1) / FALSE (0)
11004	0x03EB	Bit		ON/OFF (Module 00) ON (1) / OFF (0)
11005	0x03EC	Bit		Performing Defrosting (Module 00) TRUE (1) / FALSE (0)
11006	0x03ED	Bit		Off Due to Limit Temperature (Module 00) TRUE (1) / FALSE (0)
11007	0x03EE	Bit		Water FlowSwitch (Module 00) FLOW (1) / NO FLOW (0)
11008	0x03EF	Bit		Alarm (W/E) (Module 00) TRUE (1) / FALSE (0)
11009	0x03F0	Bit		Warning Alarm (Module 00) TRUE (1) / FALSE (0)
11010	0x03F1	Bit		Error Alarm (Module 00) TRUE (1) / FALSE (0)
11011	0x03F2	Bit		DHW request (Module 00) ON (1) / OFF (0) Only for S61 f/w 3.016 and later. Previous set to 0.
11012	0x03F3	Bit		Flame status (Module 00) ON (1) / OFF (0) Only for S61 f/w 3.016 and later. Previous set to 0.
11013 - 11064	0x03F4 - 0x0427			FREE (Not mapped)
11065 - 11128	0x0428 - 0x0467		**Cooling Module 01 Status**	*As above*
11129 - 11192	0x0468 - 0x04A7		**Cooling Module 02 Status**	*As above*

11193 - 11256	0x04A8-0x04E7		**Cooling Module 03 Status**	*As above*
11257 - 11320	0x04E8-0x0527		**Cooling Module 04 Status**	*As above*
11321 - 11384	0x0528 - 0x0567		**Cooling Module 05 Status**	*As above*
11385 - 11448	0x0568 - 0x05A7		**Cooling Module 06 Status**	*As above*
11449 - 11512	0x05A8-0x05E7		**Cooling Module 07 Status**	*As above*
11513 - 11576	0x05E8-0x0627		**Cooling Module 08 Status**	*As above*
11577 - 11640	0x0628 - 0x0667		**Cooling Module 09 Status**	*As above*
11641 - 11704	0x0668 - 0x06A7		**Cooling Module 10 Status**	*As above*
11705 - 11768	0x06A8-0x06E7		**Cooling Module 11 Status**	*As above*
11769 - 11832	0x06E8-0x0727		**Cooling Module 12 Status**	*As above*
11833 - 11896	0x0728 - 0x0767		**Cooling Module 13 Status**	*As above*
11897 - 11960	0x0768 - 0x07A7		**Cooling Module 14 Status**	*As above*
11961 - 12024	0x07A8-0x07E7		**Cooling Module 15 Status**	*As above*
12025	0x07E8	Bit	**Heating Module 00 Status**	Not Configured (Module 00) TRUE (1) / FALSE (0)
12026	0x07E9	Bit		User Excluded (Module 00) TRUE (1) / FALSE (0)
12027	0x07EA	Bit		Offline (Module 00) TRUE (1) / FALSE (0)
12028	0x07EB	Bit		ON/OFF (Module 00) ON (1) / OFF (0)
12029	0x07EC	Bit		Performing Defrosting (Module 00) TRUE (1) / FALSE (0)
12030	0x07ED	Bit		Off Due to Limit Temperature (Module 00) TRUE (1) / FALSE (0)
12031	0x07EE	Bit		Water FlowSwitch (Module 00) FLOW (1) / NO FLOW (0)
12032	0x07EF	Bit		Alarm (W/E) (Module 00) TRUE (1) / FALSE (0)
12033	0x07F0	Bit		Warning Alarm (Module 00) TRUE (1) / FALSE (0)
12034	0x07F1	Bit		Error Alarm (Module 00) TRUE (1) / FALSE (0)
12035	0x07F2	Bit		DHW request (Module 00) ON (1) / OFF (0) Only for S61 f/w 3.016 and later. Previous set to 0.
12036	0x07F3	Bit		Flame status (Module 00) ON (1) / OFF (0) Only for S61 f/w 3.016 and later. Previous set to 0.
12037 - 12088	0x07F4 - 0x0827			FREE (Not mapped)
12089 - 12152	0x0828 - 0x0867		**Heating Module 01 Status**	*As above*
12153 - 12216	0x0868 - 0x08A7		**Heating Module 02 Status**	*As above*
12217 - 12280	0x08A8-0x08E7		**Heating Module 03 Status**	*As above*
12281 - 12344	0x08E8-0x0927		**Heating Module 04 Status**	*As above*
12345 - 12408	0x0928 - 0x0967		**Heating Module 05 Status**	*As above*
12409 - 12472	0x0968 - 0x09A7		**Heating Module 06 Status**	*As above*

12473 - 12536	0x09A8-0x09E7		**Heating Module 07 Status**	*As above*
12537 - 12600	0x09E8-0x0A27		**Heating Module 08 Status**	*As above*
12601 - 12664	0x0A28-0x0A67		**Heating Module 09 Status**	*As above*
12665 - 12728	0x0A68-0x0AA7		**Heating Module 10 Status**	*As above*
12729 - 12792	0x0AA8-0x0AE7		**Heating Module 11 Status**	*As above*
12793 - 12856	0x0AE8-0x0B27		**Heating Module 12 Status**	*As above*
12857 - 12920	0x0B28-0x0B67		**Heating Module 13 Status**	*As above*
12921 - 12984	0x0B68-0x0BA7		**Heating Module 14 Status**	*As above*
12985 - 13048	0x0BA8-0x0BE7		**Heating Module 15 Status**	*As above*
13049 - 20000	0x0BE8-0x0270F			FREE (Not mapped)

Module Status Flags notes

- ON/OFF discrete input tells whether the module is working or stopped.
  It's equal to the DDC On/Off request, except for Defrosting and Offlimit. In this cases On/Off status is off (0).
  Note that when W12 or W29 are active, On/Off status is on (1).
- Defrosting flag only applies to GAHP-A and GAHP-AR unit types modules; always set to FALSE for other unit types modules.
- At most one of ON/OFF, Defrosting and Offlimit flags is set to TRUE at a given time.
- If Offline flag is TRUE (Unit has no electrical supply or is not communicating with the DDC), then ON/OFF, Defrosting, OffLimit and Flowswitch flags are set to FALSE, although their actual status is "unknown"; Alarm flag is set to TRUE, since Offline status is an alarm condition itself.
- The Alarm flag set means unit has at least one (W)arning or (E)rror alarm condition.
- The Warning alarm flag set means unit has at least one Warning alarm condition.
- The Error alarm flag set means unit has at least one Error alarm condition.
- DHW request status means that the module operates for Domestic Hot Water production.
- Flame status = 1 if flame is on.

INPUT REGISTERS (Read Only)

Note that Alarms and Working data registers refers to Machine Groups (plants) rather than Services.
Main groups are: Base Cooling Plant, Base Heating Plant, Separable Heating Plant.
Water timer refers to Services.

"Type prefix" address (dec)	"Real" address (hex)	Type	category	Description
30001	0x0000	Bit-map	**DDC configuration**	DDC ID See "DDC ID notes"
30002	0x0001	Unsigned Word		DDC Serial Number (Most Significant Word)
30003	0x0002	Unsigned Word		DDC Serial Number (Least Significant Word)
30004	0x0003	Unsigned Word		DDC Firmware Release Major i.e. digits on the left of dot
30005	0x0004	Unsigned Word		DDC Firmware Release Minor i.e. digits on the right of dot
30006	0x0005	Unsigned Word		DDC Is Cooling Plant or 2 Pipes C/H Plant Master DDC TRUE(1) / FALSE(0) / NO_VALUE (0xFFFF) if NO_VALUE means Cooling Plant or 2 Pipes C/H Plant is not configured
30007	0x0006	Unsigned Word		DDC Is Heating Plant or 2 Pipes C/H Plant Master DDC TRUE(1) / FALSE(0) / NO_VALUE (0xFFFF) if NO_VALUE means Heating Plant or 2 Pipes C/H Plant is not configured
30008	0x0007	Unsigned Word		Number of registers of the "Module Working Data" category (not including timestamps, working time, ignition number) (constant value) Useful to read out all module working data, regardless of DDC f/w version.
30009	0x0008	Unsigned Word		Number of cooling modules configured on this DDC [1..16] / NO_VALUE (0xFFFF) if j then module slots 0..(j - 1) will contain data if NO_VALUE means no cooling modules are configured
30010	0x0009	Unsigned Word		Number of heating modules configured on this DDC [1..16] / NO_VALUE (0xFFFF) if j then module slots 0..(j - 1) will contain data if NO_VALUE means no heating modules are configured
30011	0x000A	Unsigned Word		Cooling Plant or 2 Pipes C/H Plant ID [0..15] / NO_VALUE (0xFFFF) if NO_VALUE means Cooling Plant or 2 Pipes C/H Plant is not configured
30012	0x000B	Unsigned Word		Heating Plant or 2 Pipes C/H Plant ID [0..15] / NO_VALUE (0xFFFF) if NO_VALUE means Heating Plant or 2 Pipes C/H Plant is not configured
30013	0x000C	boolean		2 Pipes Cooling/Heating Plant configured on this DDC TRUE (1) / FALSE (0)
30014	0x000D	boolean		GAHP-W units configured on this DDC TRUE (1) / FALSE (0)
30015	0x000E	Unsigned Word		Number of registers of the "Module Working Data Part 2" category. Useful to read out all module working data, regardless of DDC f/w version.
30016 - 30100	0x000F - 0x0063			FREE (Not mapped)

30101	0x0064	Bit-map	**DDC working data: Base cooling plant**	Timestamp 1 – See “Time stamps Notes”
30102	0x0065	Bit-map		Timestamp 2 – See “Time stamps Notes”
30103	0x0066	Signed Word		Outlet Water Temperature (Base Cooling Plant) *(=ABSENT_ANALOG if base cooling plant not configured or DDC is not master)*
30104	0x0067	Signed Word		Inlet Water Temperature (Base Cooling Plant) *(=ABSENT_ANALOG if base cooling plant not configured or DDC is not master)*
30105	0x0068	Signed Word		External Ambient Temperature (Mean of all unit’s external temperature probes or DDC external probe temperature [if installed]) *(=ABSENT_ANALOG if base cooling plant not configured or DDC is not master)*
30106	0x0069	Signed Word		Internal Ambient Temperature (DDC Probe) *(=ABSENT_ANALOG if base cooling plant not configured or Chrono not configured)*
30107	0x006A	Enum		Cool/Heat transient mode *(0 = all functional; 1 = modules are being turned off; 2 = modules are being cool/heat-switched; ABSENT_ANALOG if not 2 pipes or DDC is not master or DDC in monitor mode)*
30108 - 30250	0x006B - 0x00F9			FREE (Not mapped)
30251	0x00FA	Bit-map	**DDC working data: Base heating plant**	Timestamp 1
30252	0x00FB	Bit-map		Timestamp 2
30253	0x00FC	Signed Word		Outlet Water Temperature (Base Heating Plant) *(=ABSENT_ANALOG if base heating plant not configured or DDC is not master) (equal to base cooling plant in 2 pipes cool/heat plant)*
30254	0x00FD	Signed Word		Inlet Water Temperature (Base Heating Plant) *(=ABSENT_ANALOG if base heating plant not configured or DDC is not master) (equal to base cooling plant in 2 pipes cool/heat plant)*
30255	0x00FE	Signed Word		External Ambient Temperature (Mean of all unit’s external temperature probes or DDC external probe temperature [if installed]) Same value as Register 30105
30256	0x00FF	Signed Word		Internal Ambient Temperature (DDC Probe, same value as Register 30106)
30257	0x0100	Enum		Cool/Heat transient mode (same as base cooling plant)
30258	0x0101	Enum		Separable Heating Plant Inclusion state *(0 = is Undefined; 1= is Included; 2 = is Separate; 3 = is being Included; 4 = is being Separated) (=ABSENT_ANALOG if heating plant not configured or DDC is not master or DDC in monitor mode)*
30259 - 30400	0x0102 - 0x018F			FREE (Not mapped)
30401	0x0190	Signed Word	**DDC Settings: Water regulation Base cooling plant (or 2 pipes base Cool/heat plant in cooling mode)**	Default Water Setpoint Temperature [°C/10] *(=ABSENT_ANALOG if cooling plant not configured)*
30402	0x0191	Unsigned Word		*(=0) (=ABSENT_ANALOG if cooling plant not configured)*
30403	0x0192	Signed Word		Water Differential Temperature [°C/10] *(=ABSENT_ANALOG if cooling plant not configured)*
30404	0x0193	Signed Word		Currently Active Water Setpoint Temp. [°C/10] *(=ABSENT_ANALOG if cooling plant not configured)*

30405	0x0194	Signed Word	**DDC Settings: General Water Timer Cooling Service**	MON - Time Period 1 Setpoint Temperature [℃/10]
30406	0x0195	Unsigned Word		MON - Time Period 1 ON Time [h * 60 + m]
30407	0x0196	Unsigned Word		MON - Time Period 1 OFF Time [h * 60 + m]
30408	0x0197	boolean		MON - Time Period 1 Enabled TRUE (1) / FALSE (0)
30409 - 30412	0x0198 - 0x019B			MON - Time Period 2 *As above*
30413 - 30416	0x019C- 0x019F			MON - Time Period 3 *As above*
30417 - 30420	0x01A0- 0x01A3			MON - Time Period 4 *As above*
30421	0x01A4	Signed Word		TUE - Time Period 1 Setpoint Temperature [℃/10]
30422	0x01A5	Unsigned Word		TUE - Time Period 1 ON Time [h * 60 + m]
30423	0x01A6	Unsigned Word		TUE - Time Period 1 OFF Time [h * 60 + m]
30424	0x01A7	boolean		TUE - Time Period 1 Enabled TRUE (1) / FALSE (0)
30425 - 30428	0x01A8 - 0x01AB			TUE - Time Period 2 *As above*
30429 - 30432	0x01AC- 0x01AF			TUE - Time Period 3 *As above*
30433 - 30436	0x01B0- 0x01B3			TUE - Time Period 4 *As above*
30437	0x01B4	Signed Word		WED - Time Period 1 Setpoint Temperature [℃/10]
30438	0x01B5	Unsigned Word		WED - Time Period 1 ON Time [h * 60 + m]
30439	0x01B6	Unsigned Word		WED - Time Period 1 OFF Time [h * 60 + m]
30440	0x01B7	boolean		WED - Time Period 1 Enabled TRUE (1) / FALSE (0)
30441 - 30444	0x01B8 - 0x01BB			WED - Time Period 2 *As above*
30445 - 30448	0x01BC- 0x01BF			WED - Time Period 3 *As above*
30449 - 30452	0x01C0- 0x01C3			WED - Time Period 4 *As above*
30453	0x01C4	Signed Word		THU - Time Period 1 Setpoint Temperature [℃/10]
30454	0x01C5	Unsigned Word		THU - Time Period 1 ON Time [h * 60 + m]
30455	0x01C6	Unsigned Word		THU - Time Period 1 OFF Time [h * 60 + m]
30456	0x01C7	boolean		THU - Time Period 1 Enabled TRUE (1) / FALSE (0)
30457 - 30460	0x01C8- 0x01CB			THU - Time Period 2 *As above*
30461 - 30464	0x01CC- 0x01CF			THU - Time Period 3 *As above*
30465 - 30468	0x01D0- 0x01D3			THU - Time Period 4 *As above*
30469	0x01D4	Signed Word		FRI - Time Period 1 Setpoint Temperature [℃/10]
30470	0x01D5	Unsigned Word		FRI - Time Period 1 ON Time [h * 60 + m]
30471	0x01D6	Unsigned Word		FRI - Time Period 1 OFF Time [h * 60 + m]
30472	0x01D7	boolean		FRI - Time Period 1 Enabled TRUE (1) / FALSE (0)
30473 - 30476	0x01D8- 0x01DB			FRI - Time Period 2 *As above*
30477 - 30480	0x01DC- 0x01DF			FRI - Time Period 3 *As above*
30481- 30484	0x01E0- 0x01E3			FRI - Time Period 4 *As above*

30485	0x01E4	Signed Word		SAT - Time Period 1 Setpoint Temperature [℃/10]
30486	0x01E5	Unsigned Word		SAT - Time Period 1 ON Time [h * 60 + m]
30487	0x01E6	Unsigned Word		SAT - Time Period 1 OFF Time [h * 60 + m]
30488	0x01E7	boolean		SAT - Time Period 1 Enabled TRUE (1) / FALSE (0)
30489 - 30492	0x01E8-0x01EB			SAT - Time Period 2 *As above*
30493 - 30496	0x01EC-0x01EF			SAT - Time Period 3 *As above*
30497 - 30500	0x01F0-0x01F3			SAT - Time Period 4 *As above*
30501	0x01F4	Signed Word		SUN - Time Period 1 Setpoint Temperature [℃/10]
30502	0x01F5	Unsigned Word		SUN - Time Period 1 ON Time [h * 60 + m]
30503	0x01F6	Unsigned Word		SUN - Time Period 1 OFF Time [h * 60 + m]
30504	0x01F7	boolean		SUN - Time Period 1 Enabled TRUE (1) / FALSE (0)
30505 - 30508	0x01F8-0x01FB			SUN - Time Period 2 *As above*
30509 - 30512	0x01FC-0x01FF			SUN - Time Period 3 *As above*
30513 - 30516	0x0200-0x0203			SUN - Time Period 4 *As above*
30517 - 30676	0x0204-0x02A3			FREE (Not mapped)
30677	0x02A4	Signed Word	**DDC Settings:** **Water regulation** **Base heating plant** **(or 2 pipes base Cool/heat plant in heating mode)**	Default Water Setpoint Temperature [℃/10] *(=ABSENT_ANALOG if heating plant not configured)*
30678	0x02A5	Unsigned Word		*(=0)* *(=ABSENT_ANALOG if heating plant not configured)*
30679	0x02A6	Signed Word		Water Differential Temperature [℃/10] *(=ABSENT_ANALOG if heating plant not configured)*
30680	0x02A7	Signed Word		Currently Active Water Setpoint Temp. [℃/10] *(=ABSENT_ANALOG if heating plant not configured)*
30681	0x02A8	Signed Word	**DDC Settings:** **General Water Timer Heating Service**	MON - Time Period 1 Setpoint Temperature [℃/10]
30682	0x02A9	Unsigned Word		MON - Time Period 1 ON Time [h * 60 + m]
30683	0x02AA	Unsigned Word		MON - Time Period 1 OFF Time [h * 60 + m]
30684	0x02AB	boolean		MON - Time Period 1 Enabled TRUE (1) / FALSE (0)
30685 - 30688	0x02AC-0x02AF			MON - Time Period 2 *As above*
30689 - 30692	0x02B0-0x02B3			MON - Time Period 3 *As above*
30693 - 30696	0x02B4-0x02B7			MON - Time Period 4 *As above*

30697	0x02B8	Signed Word		TUE - Time Period 1 Setpoint Temperature [°C/10]
30698	0x02B9	Unsigned Word		TUE - Time Period 1 ON Time [h * 60 + m]
30699	0x02BA	Unsigned Word		TUE - Time Period 1 OFF Time [h * 60 + m]
30700	0x02BB	boolean		TUE - Time Period 1 Enabled TRUE (1) / FALSE (0)
30701 - 30704	0x02BC-0x02BF			TUE - Time Period 2 *As above*
30705 - 30708	0x02C0-0x02C3			TUE - Time Period 3 *As above*
30709 - 30712	0x02C4-0x02C7			TUE - Time Period 4 *As above*
30713	0x02C8	Signed Word		WED - Time Period 1 Setpoint Temperature [°C/10]
30714	0x02C9	Unsigned Word		WED - Time Period 1 ON Time [h * 60 + m]
30715	0x02CA	Unsigned Word		WED - Time Period 1 OFF Time [h * 60 + m]
30716	0x02CB	boolean		WED - Time Period 1 Enabled TRUE (1) / FALSE (0)
30717 - 30720	0x02CC-0x02CF	Signed Word		WED - Time Period 2 *As above*
30721 - 30724	0x02D0-0x02D3	Unsigned Word		WED - Time Period 3 *As above*
30725 - 30728	0x02D4-0x02D7	Unsigned Word		WED - Time Period 4 *As above*
30729	0x02D8	Signed Word		THU - Time Period 1 Setpoint Temperature [°C/10]
30730	0x02D9	Unsigned Word		THU - Time Period 1 ON Time [h * 60 + m]
30731	0x02DA	Unsigned Word		THU - Time Period 1 OFF Time [h * 60 + m]
30732	0x02DB	boolean		THU - Time Period 1 Enabled TRUE (1) / FALSE (0)
30733 - 30736	0x02DC-0x02DF			THU - Time Period 2 *As above*
30737 - 30740	0x02E0-0x02E3			THU - Time Period 3 *As above*
30741 - 30744	0x02E4-0x02E7			THU - Time Period 4 *As above*
30745	0x02E8	Signed Word		FRI - Time Period 1 Setpoint Temperature [°C/10]
30746	0x02E9	Unsigned Word		FRI - Time Period 1 ON Time [h * 60 + m]
30747	0x02EA	Unsigned Word		FRI - Time Period 1 OFF Time [h * 60 + m]
30748	0x02EB	boolean		FRI - Time Period 1 Enabled TRUE (1) / FALSE (0)
30749 - 30752	0x02EC-0x02EF			FRI - Time Period 2 *As above*
30753 - 30756	0x02F0-0x02F3			FRI - Time Period 3 *As above*
30757 - 30760	0x02F4-0x02F7			FRI - Time Period 4 *As above*
30761	0x02F8	Signed Word		SAT - Time Period 1 Setpoint Temperature [°C/10]
30762	0x02F9	Unsigned Word		SAT - Time Period 1 ON Time [h * 60 + m]
30763	0x02FA	Unsigned Word		SAT - Time Period 1 OFF Time [h * 60 + m]
30764	0x02FB	boolean		SAT - Time Period 1 Enabled TRUE (1) / FALSE (0)
30765 - 30768	0x02FC-0x02FF			SAT - Time Period 2 *As above*
30769 - 30772	0x0300-0x0303			SAT - Time Period 3 *As above*
30773 - 30776	0x0304-0x0307			SAT - Time Period 4 *As above*

30777	0x0308	Signed Word		SUN - Time Period 1 Setpoint Temperature [°C/10]
30778	0x0309	Unsigned Word		SUN - Time Period 1 ON Time [h * 60 + m]
30779	0x030A	Unsigned Word		SUN - Time Period 1 OFF Time [h * 60 + m]
30780	0x030B	boolean		SUN - Time Period 1 Enabled TRUE (1) / FALSE (0)
30781 - 30784	0x030C-0x030F			SUN - Time Period 2 *As above*
30785 - 30788	0x0310-0x0313			SUN - Time Period 3 *As above*
30789 - 30792	0x0314-0x0317			SUN - Time Period 4 *As above*
30793	0x0318	Signed Word	**DDC Settings:** **General Water Timer** **Base domestic hot water** **Service**	MON - Time Period 1 Setpoint Temperature [°C/10]
30794	0x0319	Unsigned Word		MON - Time Period 1 ON Time [h * 60 + m]
30795	0x031A	Unsigned Word		MON - Time Period 1 OFF Time [h * 60 + m]
30796	0x031B	boolean		MON - Time Period 1 Enabled TRUE (1) / FALSE (0)
30797 - 30800	0x031C-0x031F			MON - Time Period 2 *As above*
30801 - 30804	0x0320-0x0323			MON - Time Period 3 *As above*
30805 - 30808	0x0324-0x0327			MON - Time Period 4 *As above*
30809	0x0328	Signed Word		TUE - Time Period 1 Setpoint Temperature [°C/10]
30810	0x0329	Unsigned Word		TUE - Time Period 1 ON Time [h * 60 + m]
30811	0x032A	Unsigned Word		TUE - Time Period 1 OFF Time [h * 60 + m]
30812	0x032B	boolean		TUE - Time Period 1 Enabled TRUE (1) / FALSE (0)
30813 - 30816	0x032C-0x032F			TUE - Time Period 2 *As above*
30817 - 30820	0x0330-0x0333			TUE - Time Period 3 *As above*
30821 - 30824	0x0334-0x0337			TUE - Time Period 4 *As above*
30825	0x0338	Signed Word		WED - Time Period 1 Setpoint Temperature [°C/10]
30826	0x0339	Unsigned Word		WED - Time Period 1 ON Time [h * 60 + m]
30827	0x033A	Unsigned Word		WED - Time Period 1 OFF Time [h * 60 + m]
30828	0x033B	boolean		WED - Time Period 1 Enabled TRUE (1) / FALSE (0)
30829 - 30832	0x033C-0x033F			WED - Time Period 2 *As above*
30833 - 30836	0x0340-0x0343			WED - Time Period 3 *As above*
30837 - 30840	0x0344-0x0347			WED - Time Period 4 *As above*

30841	0x0348	Signed Word		THU - Time Period 1 Setpoint Temperature [°C/10]
30842	0x0349	Unsigned Word		THU - Time Period 1 ON Time [h * 60 + m]
30843	0x034A	Unsigned Word		THU - Time Period 1 OFF Time [h * 60 + m]
30844	0x034B	boolean		THU - Time Period 1 Enabled TRUE (1) / FALSE (0)
30845 - 30848	0x034C-0x034F			THU - Time Period 2 *As above*
30849 - 30852	0x0350-0x0353			THU - Time Period 3 *As above*
30853 - 30856	0x0354-0x0357			THU - Time Period 4 *As above*
30857	0x0358	Signed Word		FRI - Time Period 1 Setpoint Temperature [°C/10]
30858	0x0359	Unsigned Word		FRI - Time Period 1 ON Time [h * 60 + m]
30859	0x035A	Unsigned Word		FRI - Time Period 1 OFF Time [h * 60 + m]
30860	0x035B	boolean		FRI - Time Period 1 Enabled TRUE (1) / FALSE (0)
30861 - 30864	0x035C-0x035F			FRI - Time Period 2 *As above*
30865 - 30868	0x0360-0x0363			FRI - Time Period 3 *As above*
30869 - 30872	0x0364-0x0367			FRI - Time Period 4 *As above*
30873	0x0368	Signed Word		SAT - Time Period 1 Setpoint Temperature [°C/10]
30874	0x0369	Unsigned Word		SAT - Time Period 1 ON Time [h * 60 + m]
30875	0x036A	Unsigned Word		SAT - Time Period 1 OFF Time [h * 60 + m]
30876	0x036B	boolean		SAT - Time Period 1 Enabled TRUE (1) / FALSE (0)
30877 - 30880	0x036C-0x036F			SAT - Time Period 2 *As above*
30881 - 30884	0x0370-0x0373			SAT - Time Period 3 *As above*
30885 - 30888	0x0374-0x0377			SAT - Time Period 4 *As above*
30889	0x0378	Signed Word		SUN - Time Period 1 Setpoint Temperature [°C/10]
30890	0x0379	Unsigned Word		SUN - Time Period 1 ON Time [h * 60 + m]
30891	0x037A	Unsigned Word		SUN - Time Period 1 OFF Time [h * 60 + m]
30892	0x037B	boolean		SUN - Time Period 1 Enabled TRUE (1) / FALSE (0)
30893 - 30896	0x037C-0x037F			SUN - Time Period 2 *As above*
30897 - 30900	0x0380 - 0x0383			SUN - Time Period 3 *As above*
30901 - 30904	0x0384 - 0x0387			SUN - Time Period 4 *As above*
30905 - 30952	0x0388 - 0x03B7			FREE (Not mapped)

			DDC Alarms: **Cooling Plant or 2 Pipes Cool/Heat Plant Cooling Side** **Single Client Area**	
30953	0x03B8	unsigned Word		General Alarm No Alarm (0) / Info (1) / Warning (2) / Error (3)
30954	0x03B9	unsigned Word		DDC Network ID
30955	0x03BA	unsigned Word		Alarm 1 String Code
30956	0x03BB	Bitmap		Alarm 1 Error Code
30957	0x03BC	unsigned Word		Alarm 2 String Code
30958	0x03BD	Bitmap		Alarm 2 Error Code
30959	0x03BE	unsigned Word		Alarm 3 String Code
30960	0x03BF	Bitmap		Alarm 3 Error Code
30961	0x03C0	unsigned Word		Alarm 4 String Code
30962	0x03C1	Bitmap		Alarm 4 Error Code
30963	0x03C2	unsigned Word		Alarm 5 String Code
30964	0x03C3	Bitmap		Alarm 5 Error Code
			DDC Alarms: **Heating Plant or 2 Pipes Cool/Heat Plant Heating Side** **Single Client Area**	
30965	0x03C4	unsigned Word		General Alarm No Alarm (0) / Info (1) / Warning (2) / Error (3)
30966	0x03C5	unsigned Word		DDC Network ID
30967	0x03C6	unsigned Word		Alarm 1 String Code
30968	0x03C7	bitmap		Alarm 1 Error Code
30969	0x03C8	unsigned Word		Alarm 2 String Code
30970	0x03C9	bitmap		Alarm 2 Error Code
30971	0x03CA	unsigned Word		Alarm 3 String Code
30972	0x03CB	bitmap		Alarm 3 Error Code
30973	0x03CC	unsigned Word		Alarm 4 String Code
30974	0x03CD	bitmap		Alarm 4 Error Code
30975	0x03CE	unsigned Word		Alarm 5 String Code
30976	0x03CF	bitmap		Alarm 5 Error Code

			DDC Alarms: **Cooling Plant or 2 Pipes Cool/Heat Plant Cooling Side** **Multi Client Area**	
30977	0x03D0	unsigned Word		General Alarm No Alarm (0) / Info (1) / Warning (2) / Error (3)
30978	0x03D1	unsigned Word		DDC Network ID
30979	0x03D2	unsigned Word		Alarm 1 String Code
30980	0x03D3	Bitmap		Alarm 1 Error Code
30981	0x03D4	unsigned Word		Alarm 2 String Code
30982	0x03D5	Bitmap		Alarm 2 Error Code
30983	0x03D6	unsigned Word		Alarm 3 String Code
30984	0x03D7	Bitmap		Alarm 3 Error Code
30985	0x03D8	unsigned Word		Alarm 4 String Code
30986	0x03D9	Bitmap		Alarm 4 Error Code
30987	0x03DA	unsigned Word		Alarm 5 String Code
30988	0x03DB	Bitmap		Alarm 5 Error Code
			DDC Alarms: **Heating Plant or 2 Pipes Cool/Heat Plant Heating Side** **Multi Client Area**	
30989	0x03DC	unsigned Word		General Alarm No Alarm (0) / Info (1) / Warning (2) / Error (3)
30990	0x03DD	unsigned Word		DDC Network ID
30991	0x03DE	unsigned Word		Alarm 1 String Code
30992	0x03DF	bitmap		Alarm 1 Error Code
30993	0x03E0	unsigned Word		Alarm 2 String Code
30994	0x03E1	bitmap		Alarm 2 Error Code
30995	0x03E2	unsigned Word		Alarm 3 String Code
30996	0x03E3	bitmap		Alarm 3 Error Code
30997	0x03E4	unsigned Word		Alarm 4 String Code
30998	0x03E5	bitmap		Alarm 4 Error Code
30999	0x03E6	unsigned Word		Alarm 5 String Code
31000	0x03E7	bitmap		Alarm 5 Error Code
31001	0x03E8	unsigned word	**Cooling Module 00 Configuration**	Unit Network ID
31002	0x03E9	unsigned word		Module Type Major
31003	0x03EA	unsigned word		Module Type Minor
31004	0x03EB	unsigned word		Unit Type (see “Configuration data notes”)
31005	0x03EC	unsigned word		Firmware Release Major
31006	0x03ED	unsigned word		Firmware Release Minor
31007	0x03EE	unsigned word		Module Serial Number (Most Significant Word)
31008	0x03EF	unsigned word		Module Serial Number (Least Significant Word)
31009	0x03F0	unsigned word		Electronics Serial Number (Most Significant Word)
31010	0x03F1	unsigned word		Electronics Serial Number (Least Significant Word)
31011	0x03F2	boolean		*meaningless (= 0)*
31012 - 31020	0x03F3 - 0x03FB			FREE (Not mapped)

31021	0x03FC	Bitmap	**Cooling Module 00 Working Data**	Timestamp 1
31022	0x03FD	Bitmap		Timestamp 2
31023	0x03FE	signed word		Outlet Temperature
31024	0x03FF	signed word		Inlet Temperature
31025	0x0400	signed word		External Ambient Temperature
31026	0x0401	signed word		Generator/Rectifier Temperature
31027	0x0402	signed word		Condenser Temperature
31028	0x0403	signed word		Aux 1 Temperature
31029	0x0404	signed word		Aux 2 Temperature
31030	0x0405	signed word		Electronics Supply Voltage
31031	0x0406	signed word		Solution Pump RPM
31032	0x0407	signed word		Brushless Fan Drive Voltage
31033	0x0408	signed word		Absorber Temperature
31034	0x0409	signed word		Evaporator Temperature
31035	0x040A	unsigned word		WorkingTime (Most Significant Word) DEPRECATED – refer to 'working data part 2'
31036	0x040B	unsigned word		WorkingTime (Least Significant Word) DEPRECATED – refer to 'working data part 2'
31037	0x040C	unsigned word		Ignitions Number (Most Significant Word) DEPRECATED – refer to 'working data part 2'
31038	0x040D	unsigned word		Ignitions Number (Least Significant Word) DEPRECATED – refer to 'working data part 2'
31039	0x040E	signed word		*meaningless (= ABSENT_ANALOG)*
31040	0x040F	signed word	(modulating units only)	Blower speed RPM
31041	0x0410	signed word	(modulating units only)	Water flow rate [l/h]
31042	0x0411	signed word	(modulating units only)	Modulating circulator voltage
31043	0x0412	signed word	(modulating units only)	Analog input voltage
31044	0x0413	signed word	(modulating units only)	Power feedback percentage
31045	0x0414	signed word	(modulating units only)	Air-Gas Mix Temperature
31046	0x0415	signed word		*meaningless (= ABSENT_ANALOG)*
31047	0x0416	signed word		RESERVED
31048	0x0417	signed word	(modulating units only)	Fins Generator Temperature
31049	0x0418	signed word		RESERVED
31050	0x0419	signed word		RESERVED
31051	0x041A	signed word		RESERVED
31052	0x041B	signed word		RESERVED
31053	0x041C	signed word		RESERVED

31054	0x041D	signed word		RESERVED
31055	0x041E	signed word		*meaningless (= ABSENT_ANALOG)*
31056	0x041F	signed word		*meaningless (= ABSENT_ANALOG)*
31057 - 31060	0x0420 - 0x0423			FREE (not mapped)
31061	0x0424	unsigned word	**Cooling Module 00 Alarms (Single Client area)**	General Alarm Bits 1..0: No Alarm(00) / Info(01) / Warning(10) / Error(11) Bit 2: Included(0) / User Excluded(1)
31062	0x0425	unsigned word		Unit Network ID
31063	0x0426	unsigned word		Alarm 1 String Code
31064	0x0427	bitmap		Alarm 1 Error Code
31065	0x0428	unsigned word		Alarm 2 String Code
31066	0x0429	bitmap		Alarm 2 Error Code
31067	0x042A	unsigned word		Alarm 3 String Code
31068	0x042B	bitmap		Alarm 3 Error Code
31069	0x042C	unsigned word		Alarm 4 String Code
31070	0x042D	bitmap		Alarm 4 Error Code
31071	0x042E	unsigned word		Alarm 5 String Code
31072	0x042F	bitmap		Alarm 5 Error Code
31073	0x0430	unsigned word	**Cooling Module 00 Alarms (Multi Client area)**	General Alarm Bits 1..0: No Alarm(00) / Info(01) / Warning(10) / Error(11) Bit 2: Included(0) / User Excluded(1)
31074	0x0431	unsigned word		Unit Network ID
31075	0x0432	unsigned word		Alarm 1 String Code
31076	0x0433	bitmap		Alarm 1 Error Code
31077	0x0434	unsigned word		Alarm 2 String Code
31078	0x0435	bitmap		Alarm 2 Error Code
31079	0x0436	unsigned word		Alarm 3 String Code
31080	0x0437	bitmap		Alarm 3 Error Code
31081	0x0438	unsigned word		Alarm 4 String Code
31082	0x0439	bitmap		Alarm 4 Error Code
31083	0x043A	unsigned word		Alarm 5 String Code
31084	0x043B	bitmap		Alarm 5 Error Code
31085	0x043C	bitmap	**Cooling Module 00 Working Data Part 2**	WorkingTime (Most Significant Word)
31086	0x043D	bitmap		WorkingTime (Least Significant Word)
31087	0x043E	signed word		Ignitions Number (Most Significant Word)
31088	0x043F	signed word		Ignitions Number (Least Significant Word)
31089	0x0440	signed word		Defrosting Number (Most Significant Word) (only for GAHP-AR)
31090	0x0441	signed word		Defrosting Number (Least Significant Word) (only for GAHP-AR)
31091	0x0442	signed word		Cool/Heat Switching Number (Most Significant Word) (only for GAHP-AR)
31092	0x0443	signed word		Cool/Heat Switching Number (Least Significant Word) (only for GAHP-AR)
31093 - 31250	0x0444- 0x04E1		**Cooling Module 00 Settings (Empty)**	FREE (Not mapped)

31251 – 31500	0x04E2 - 0x05DB		**Cooling Module 01 Configuration, Working Data, Alarms, Settings**	*As above*
31501 - 31750	0x05DC- 0x06D5		**Cooling Module 02 Configuration, Working Data, Alarms, Settings**	*As above*
31751 - 32000	0x06D6- 0x07CF		**Cooling Module 03 Configuration, Working Data, Alarms, Settings**	*As above*
32001 - 32250	0x07D0- 0x08C9		**Cooling Module 04 Configuration, Working Data, Alarms, Settings**	*As above*
32251 - 32500	0x08CA- 0x09C3		**Cooling Module 05 Configuration, Working Data, Alarms, Settings**	*As above*
32501 - 32750	0x09C4- 0x0ABD		**Cooling Module 06 Configuration, Working Data, Alarms, Settings**	*As above*
32751 - 33000	0x0ABE- 0x0BB7		**Cooling Module 07 Configuration, Working Data, Alarms, Settings**	*As above*
33001 - 33250	0x0BB8- 0x0CB1		**Cooling Module 08 Configuration, Working Data, Alarms, Settings**	*As above*
33251 - 33500	0x0CB2- 0x0DAB		**Cooling Module 09 Configuration, Working Data, Alarms, Settings**	*As above*
33501 - 33750	0x0DAC -0x0EA5		**Cooling Module 10 Configuration, Working Data, Alarms, Settings**	*As above*
33751 – 34000	0x0EA6- 0x0F9F		**Cooling Module 11 Configuration, Working Data, Alarms, Settings**	*As above*
34001 - 34250	0x0FA0- 0x1099		**Cooling Module 12 Configuration, Working Data, Alarms, Settings**	*As above*
34251 - 34500	0x109A - 0x1193		**Cooling Module 13 Configuration, Working Data, Alarms, Settings**	*As above*
34501 - 34750	0x1194 - 0x128D		**Cooling Module 14 Configuration, Working Data, Alarms, Settings**	*As above*
34751 - 35000	0x128E- 0x1387		**Cooling Module 15 Configuration, Working Data, Alarms, Settings**	*As above*

35001	0x1388	unsigned word	**Heating Module 00 Configuration**	Unit Network ID
35002	0x1389	unsigned word		Module Type Major
35003	0x138A	unsigned word		Module Type Minor
35004	0x138B	Enum		Unit Type (see “Configuration data notes”)
35005	0x138C	unsigned word		Firmware Release Major
35006	0x138D	unsigned word		Firmware Release Minor
35007	0x138E	unsigned word		Module Serial Number (Most Significant Word)
35008	0x138F	unsigned word		Module Serial Number (Least Significant Word)
35009	0x1390	unsigned word		Electronics Serial Number (Most Significant Word)
35010	0x1391	unsigned word		Electronics Serial Number (Least Significant Word)
35011	0x1392	boolean		Module belongs to separable heating plant (if = 1)
35012 - 35020	0x1393 - 0x139B			FREE (Not mapped)

35021	0x139C	bitmap	**Heating Module 00 Working Data**	Timestamp 1
35022	0x139D	bitmap		Timestamp 2
35023	0x139E	signed word		Outlet Temperature
35024	0x139F	signed word		Inlet Temperature
35025	0x13A0	signed word		External Ambient Temperature
35026	0x13A1	signed word		Generator/Rectifier Temperature
35027	0x13A2	signed word		Condenser Temperature
35028	0x13A3	signed word		Aux 1 Temperature
35029	0x13A4	signed word		Aux 2 Temperature
35030	0x13A5	signed word		Electronics Supply Voltage
35031	0x13A6	signed word		Solution Pump RPM
35032	0x13A7	signed word		Brushless Fan Drive Voltage
35033	0x13A8	signed word		Absorber Temperature
35034	0x13A9	signed word		Evaporator Temperature
35035	0x13AA	unsigned word		WorkingTime (Most Significant Word) DEPRECATED – refer to 'working data part 2'
35036	0x13AB	unsigned word		WorkingTime (Least Significant Word) DEPRECATED – refer to 'working data part 2'
35037	0x13AC	unsigned word		Ignitions Number (Most Significant Word) DEPRECATED – refer to 'working data part 2'
35038	0x13AD	unsigned word		Ignitions Number (Least Significant Word) DEPRECATED – refer to 'working data part 2'
35039	0x13AE	signed word	(AY-C units only)	Primary OutTemp (only for AY-Condensing)
35040	0x13AF	signed word	(modulating units only)	Blower speed RPM
35041	0x13B0	signed word	(modulating units only)	Water flow rate [l/h]
35042	0x13B1	signed word	(modulating units only)	Modulating circulator voltage
35043	0x13B2	signed word	(modulating units only)	Analog input voltage
35044	0x13B3	signed word	(modulating units only)	Power feedback percentage
35045	0x13B4	signed word	(modulating units only)	Air-Gas Mix Temperature
35046	0x13B5	signed word	(modulating units only)	Flue Temperature
35047	0x13B6	signed word		RESERVED
35048	0x13B7	signed word	(modulating units only)	Fins Generator Temperature
35049	0x13B8	signed word		RESERVED
35050	0x13B9	signed word		RESERVED
35051	0x13BA	signed word		RESERVED
35052	0x13BB	signed word		RESERVED
35053	0x13BC	signed word		RESERVED

35054	0x13BD	signed word		RESERVED
35055	0x13BE	signed word	(only for GAHP-W Heat-Only)	Outlet Temperature (cooling module)
35056	0x13BF	signed word	(only for GAHP-W Heat-Only)	Inlet Temperature (cooling module)
35057 - 35060	0x13C0-0x13C3			FREE (not mapped)
35061	0x13C4	unsigned word	**Heating Module 00 Alarms (Single Client area)**	General Alarm Bits 1..0: No Alarm(00) / Info(01) / Warning(10) / Error(11) Bit 2: Included(0) / User Excluded(1)
35062	0x13C5	unsigned word		Unit Network ID
35063	0x13C6	unsigned word		Alarm 1 String Code
35064	0x13C7	bitmap		Alarm 1 Error Code
35065	0x13C8	unsigned word		Alarm 2 String Code
35066	0x13C9	bitmap		Alarm 2 Error Code
35067	0x13CA	unsigned word		Alarm 3 String Code
35068	0x13CB	bitmap		Alarm 3 Error Code
35069	0x13CC	unsigned word		Alarm 4 String Code
35070	0x13CD	bitmap		Alarm 4 Error Code
35071	0x13CE	unsigned word		Alarm 5 String Code
35072	0x13CF	bitmap		Alarm 5 Error Code
35073	0x13D0	unsigned word	**Heating Module 00 Alarms (Multi Client area)**	General Alarm Bits 1..0: No Alarm(00) / Info(01) / Warning(10) / Error(11) Bit 2: Included(0) / User Excluded(1)
35074	0x13D1	unsigned word		Unit Network ID
35075	0x13D2	unsigned word		Alarm 1 String Code
35076	0x13D3	bitmap		Alarm 1 Error Code
35077	0x13D4	unsigned word		Alarm 2 String Code
35078	0x13D5	bitmap		Alarm 2 Error Code
35079	0x13D6	unsigned word		Alarm 3 String Code
35080	0x13D7	bitmap		Alarm 3 Error Code
35081	0x13D8	unsigned word		Alarm 4 String Code
35082	0x13D9	bitmap		Alarm 4 Error Code
35083	0x13DA	unsigned word		Alarm 5 String Code
35084	0x13DB	bitmap		Alarm 5 Error Code
35085	0x13DC	bitmap	**Heating Module 00 Working Data Part 2**	WorkingTime (Most Significant Word)
35086	0x13DD	bitmap		WorkingTime (Least Significant Word)
35087	0x13DE	signed word		Ignitions Number (Most Significant Word)
35088	0x13DF	signed word		Ignitions Number (Least Significant Word)
35089	0x13E0	signed word		Defrosting Number (Most Significant Word) (only for GAHP-A or GAHP-AR)
35090	0x13E1	signed word		Defrosting Number (Least Significant Word) (only for GAHP-A or GAHP-AR)
35091	0x13E2	signed word		Cool/Heat Switching Number (Most Significant Word) (only for GAHP-AR)
35092	0x13E3	signed word		Cool/Heat Switching Number (Least Significant Word) (only for GAHP-AR)
35093 - 35250	0x13E4 - 0x1481		**Heating Module 00 Settings (Empty)**	FREE (Not mapped)

35251 - 35500	0x1482 - 0x157B		**Heating Module 01 Configuration, Working Data, Alarms, Settings**	*As above*
35501 - 35750	0x157C- 0x1675		**Heating Module 02 Configuration, Working Data, Alarms, Settings**	*As above*
35751 - 36000	0x1676 - 0x176F		**Heating Module 03 Configuration, Working Data, Alarms, Settings**	*As above*
36001 - 36250	0x1770 - 0x1869		**Heating Module 04 Configuration, Working Data, Alarms, Settings**	*As above*
36251 - 36500	0x186A - 0x1963		**Heating Module 05 Configuration, Working Data, Alarms, Settings**	*As above*
36501 - 36750	0x1964 - 0x1A5D		**Heating Module 06 Configuration, Working Data, Alarms, Settings**	*As above*
36751 - 37000	0x1A5E- 0x1B57		**Heating Module 07 Configuration, Working Data, Alarms, Settings**	*As above*
37001 - 37250	0x1B58 - 0x1C51		**Heating Module 08 Configuration, Working Data, Alarms, Settings**	*As above*
37251 - 37500	0x1C52- 0x1D4B		**Heating Module 09 Configuration, Working Data, Alarms, Settings**	*As above*
37501 - 37750	0x1D4C- 0x1E45		**Heating Module 10 Configuration, Working Data, Alarms, Settings**	*As above*
37751 - 38000	0x1E46 - 0x1F3F		**Heating Module 11 Configuration, Working Data, Alarms, Settings**	*As above*
38001 - 38250	0x1F40 - 0x2039		**Heating Module 12 Configuration, Working Data, Alarms, Settings**	*As above*
38251 - 38500	0x203A - 0x2133		**Heating Module 13 Configuration, Working Data, Alarms, Settings**	*As above*
38501 - 38750	0x2134 - 0x222D		**Heating Module 14 Configuration, Working Data, Alarms, Settings**	*As above*
38751 - 39000	0x222E - 0x2327		**Heating Module 15 Configuration, Working Data, Alarms, Settings**	*As above*
39001	0x2328	Bit-map	**DDC working data: Separable heating plant**	Timestamp 1
39002	0x2329			Timestamp 2
39003	0x232A	signed word		Outlet Water Temperature (Separable Heating Plant) *(=ABSENT_ANALOG if separable heating plant not configured or DDC is not master)*
39004	0x232B	signed word		Inlet Water Temperature (Separable Heating Plant) *(=ABSENT_ANALOG if separable heating plant not configured or DDC is not master)*
39005 - 39021	0x232C- 0x233C		**FREE**	FREE (Not mapped)
39022	0x233D	Unsigned Word	**DDC Settings: Water regulation Separable heating plant**	Always read as '0'
39023	0x233E	Signed Word		Water Differential Temperature [°C/10]
39024	0x233F	Signed Word		Currently Active Water Setpoint Temp. [°C/10]

39025	0x2340	Signed Word	**DDC Settings: General Water Timer Separable domestic hot water Service**	MON - Time Period 1 Setpoint Temperature [℃/10]
39026	0x2341	Unsigned Word		MON - Time Period 1 ON Time [h * 60 + m]
39027	0x2342	Unsigned Word		MON - Time Period 1 OFF Time [h * 60 + m]
39028	0x2343	boolean		MON - Time Period 1 Enabled TRUE (1) / FALSE (0)
39029 - 39032	0x2344-0x2347			MON - Time Period 2 *As above*
39033 - 39036	0x2348-0x234B			MON - Time Period 3 *As above*
39037 - 39040	0x234C-0x234F			MON - Time Period 4 *As above*
39041	0x2350	Signed Word		TUE - Time Period 1 Setpoint Temperature [℃/10]
39042	0x2351	Unsigned Word		TUE - Time Period 1 ON Time [h * 60 + m]
39043	0x2352	Unsigned Word		TUE - Time Period 1 OFF Time [h * 60 + m]
39044	0x2353	boolean		TUE - Time Period 1 Enabled TRUE (1) / FALSE (0)
39045 - 39048	0x2354-0x2357			TUE - Time Period 2 *As above*
39049 - 39052	0x2358-0x235B			TUE - Time Period 3 *As above*
39053 - 39056	0x235C-0x235F			TUE - Time Period 4 *As above*
39057	0x2360	Signed Word		WED - Time Period 1 Setpoint Temperature [℃/10]
39058	0x2361	Unsigned Word		WED - Time Period 1 ON Time [h * 60 + m]
39059	0x2362	Unsigned Word		WED - Time Period 1 OFF Time [h * 60 + m]
39060	0x2363	boolean		WED - Time Period 1 Enabled TRUE (1) / FALSE (0)
39061 - 39064	0x2364-0x2367			WED - Time Period 2 *As above*
39065 - 39068	0x2368-0x236B			WED - Time Period 3 *As above*
39069 - 39072	0x236C-0x236F			WED - Time Period 4 *As above*
39073	0x2370	Signed Word		THU - Time Period 1 Setpoint Temperature [℃/10]
39074	0x2371	Unsigned Word		THU - Time Period 1 ON Time [h * 60 + m]
39075	0x2372	Unsigned Word		THU - Time Period 1 OFF Time [h * 60 + m]
39076	0x2373	boolean		THU - Time Period 1 Enabled TRUE (1) / FALSE (0)
39077 - 39080	0x2374-0x2377			THU - Time Period 2 *As above*
39081 - 39084	0x2378-0x237B			THU - Time Period 3 *As above*
39085 - 39088	0x237C-0x237F			THU - Time Period 4 *As above*
39089	0x2380	Signed Word		FRI - Time Period 1 Setpoint Temperature [℃/10]
39090	0x2381	Unsigned Word		FRI - Time Period 1 ON Time [h * 60 + m]
39091	0x2382	Unsigned Word		FRI - Time Period 1 OFF Time [h * 60 + m]
39092	0x2383	boolean		FRI - Time Period 1 Enabled TRUE (1) / FALSE (0)
39093 - 39096	0x2384-0x2387			FRI - Time Period 2 *As above*
39097 - 39100	0x2388-0x238B			FRI - Time Period 3 *As above*
39101 - 39104	0x238C-0x238F			FRI - Time Period 4 *As above*

39105	0x2390	Signed Word		SAT - Time Period 1 Setpoint Temperature [°C/10]
39106	0x2391	Unsigned Word		SAT - Time Period 1 ON Time [h * 60 + m]
39107	0x2392	Unsigned Word		SAT - Time Period 1 OFF Time [h * 60 + m]
39108	0x2393	boolean		SAT - Time Period 1 Enabled TRUE (1) / FALSE (0)
39109 - 39112	0x2394-0x2397			SAT - Time Period 2 *As above*
39113 - 39116	0x2398-0x239B			SAT - Time Period 3 *As above*
39117 - 39120	0x239C-0x239F			SAT - Time Period 4 *As above*
39121	0x23A0	Signed Word		SUN - Time Period 1 Setpoint Temperature [°C/10]
39122	0x23A1	Unsigned Word		SUN - Time Period 1 ON Time [h * 60 + m]
39123	0x23A2	Unsigned Word		SUN - Time Period 1 OFF Time [h * 60 + m]
39124	0x23A3	boolean		SUN - Time Period 1 Enabled TRUE (1) / FALSE (0)
39125 - 39128	0x23A4-0x23A7			SUN - Time Period 2 *As above*
39129 - 39132	0x23A8-0x23AB			SUN - Time Period 3 *As above*
39133 - 39136	0x23AC-0x23AF			SUN - Time Period 4 *As above*
39137 - 40000	0x23B0 - 0x270F		**FREE**	FREE (Not mapped)

Special register values
ABSENT_ANALOG = 32766 (signed word)
NO_VALUE = 65535 (unsigned word)

Register mapping rules
Input register that can be written in the matching Holding register area, are not mapped if related to a specific plant or service not configured on the DDC. (e.g. DDC Settings)
Input register that are read-only values, are always mapped, no matter if the related plant or service is configured or not. (e.g. DDC working data)
In the latter case, if the related plant/service is not configured, the read value is 32766 (0x7FFE) for signed registers and 65535 (0xFFFF) for unsigned registers.

Signed Word fields notes

- Signed Word fields are represented as 2's complement signed 16 bit word
- Excluded value 32766 (0x7FFE) indicates that the specific field does not exist; excluded value 32767 (0x7FFF) indicates that the specific field value is not available because of a fault condition (for example, a faulty temperatue probe).

Working data notes

- Temperature fields are expressed as Celsius Degrees Tenths. (e.g. value 10 means 1.0 °C)
- Voltage fields are expressed as Volts Tenths (e.g value 10 means 1.0 V).
- Working time fields are expressed in seconds
- Water flow rate fields are expressed in litres per hour
- Power feedback percent fields are expressed on a 0 to 10.000 scale.
- Other fields expressed as RPM or non dimensional.

Configured/Not Configured Cooling and Heating Modules notes

- Cooling and Heating Modules data register ranges in the INPUT REGISTERS Modbus map contain data (Configuration, Working Data, Alarms..) for the configured modules. Assuming *n* Cooling Modules and *m* Heating Modules are configured, then Cooling Module data ranges [0..(*n* – 1)] and Heating Module data ranges [0..(*m* – 1)] will contain data.
- Modules get assigned a data in ascending order based on their Unit Network ID.
- Empty Module data registers ranges:
    - Unsigned Word type registers will read as NO_VALUE (65535, 0xFFFF), **except otherwise mentioned**.
    - Signed Word type registers will read as ABSENT_ANALOG (32766, 0x7FFE)

Currently Active Water Setpoint Temperature notes

Unlike DDC f/w 3.000, this registers will read 0x7FFF if the related plant is OFF or in transient mode. Transient mode includes both cool/heat transient and separated/included transient.

DDC ID Notes

This register holds two information:

- The device type
- The device network ID

The following scheme describes the DDC ID register mapping:

Device type (6 bit)	Device network ID (10 bit)

Device type is an enumerative with the following meaning:
0 = Device is a DDC (Direct Digital Controller)
1 = Device is a CCI (Comfort Control Interface)

Time stamps notes

Time stamps are available at several different addresses in the INPUT REGISTERS Modbus map.
Time stamps are contiguous to Plants and Modules working data in order to simplify good correlation between the acquired working data and the acquisition time, using only one Modbus message.
Time stamps require two 16 bits words. The following scheme describes the mapping of the different time stamp fields inside the two words.

Timestamp1

Seconds (6 bit)	Minutes (6 bit)	Hours (4 msb)

Timestamp2

Hours (lsb)	Year (6 bit) (0 →2000)	Month (4 bit)	Day (5 bit)

Time uses the 24h format.

Alarms notes

- Both the DDC and the Units Cooling and Heating Modules can generate alarms.
- Alarms have three (currently two) increasing severity levels: Info (currently not used), Warning, Error.
- DDC's generated alarms are reported separately in the two plants DDC alarm data register areas, depending on which plant(s) they refer to. A few DDC alarms always apply to all configured plants.
- Up to five alarm conditions can be simultaneously reported for each Cooling and Heating Module and for the DDC.
- General alarm register is mapped as described below

not used (zero filled)	Module Excluded (1 bit)	General Rank (2 bit)

General Rank values:

- 0 : no alarm
- 1 : at least an alarm with rank = "Information" (but no "Warning" or "Error" alarms)
- 2 : at least an alarm with rank = "Warning" (but no "Error" alarms)
- 3 : at least an alarm with rank = "Error"

Module Excluded:

TRUE (1) if module is excluded.
Note that when a module is excluded, DDC will never starts it but always acquires alarm data. This value is not defined for DDC alarms and forced FALSE (0).
Use this flag if you want to avoid signalling alarms related to excluded modules, same rule used in DDC user interface.

"General Alarm" register can be used when Modbus client doesn't need detailed information about alarms, but only need a single overall alarm information for each module.

- Network ID register shows the CAN ID of the module or the DDC CAN ID.
- Alarm String Code register uses the 10 LSBs of a 16 bits Word. String Code 0 (0x0000) means no Alarm, other codes uniquely identify a string associated to the specific Alarm Error Code.
  See string table below.
- Alarm Error Code register is mapped in a 16 bits Word as described below

String table:

```
01|Faulty Lockout Reset|
02|Limit Thermostat|
03|Flue Lim./Press. Sw.|
04|Antifreeze|
05|Flue Thermostat|
06|Missing Heater Board|
```

```
07|Low Air Cooling|
08|High EXT Temp.|
09|Low EXT Temp.|
10|High REC/GEN Temp.|
11|Lockout but Flame ON|
12|Low REC/GEN Temp.|
13|Cool ON, Heat W Flow|
14|Heat ON, Chil W Flow|
15|Unit ON, No Flame|
16|Low Chiller Wat Flow|
17|Solution Pump OFF|
18|Flame Lockout|
19|Chil OUT T Probe Err|
20|Chil. IN T Probe Error|
21|CND T Probe Error|
22|EXT T Probe Error|
23|REC/GEN T Probe Err.|
24|EVAP T Probe Error|
25|ABS T Probe Error|
26|Heat. IN Temp. High|
27|Heat. IN Temp. Low|
28|Heat. Differ. T High|
29|Missing Aux Board|
30|Absorb. Temp. High|
31|C Antifreez Pump ON|
32|Defrosting ON|
33|Cool ON, Heat W Flow|
34|Low Heater Wat Flow|
35|Low Heater Wat Flow|
36|Heat OUT T Probe Err|
37|Heat ON, Chil W Flow|
38|Cool ON, Heat W Flow|
39|Heat. IN T Probe Error|
40|Heat. OUT Temp. High|
41|Heat. Antifreeze ON|
42|Invalid Parameters|
43|Incompl. Params Set|
44|Invalid Page0 Params|
45|Invalid Page1 Params|
46|RY and RW Both ON|
47|24V Pwr Supply fuse|
48|Wrong Module Types|
49|Faulty Board (ROM)|
50|Faulty Board (pRAM)|
51|Faulty Board (xRAM)|
52|Faulty Board (Regs)|
53|New Unit-CCI Binding|
54|Off-line|
55|All Modules Off-Line|
56|High Cool. Wat. Temp|
57|Low Heat. Wat. Temp|
58|Both RY and RW ON|        (DDC only)
59|AMB T Probe Error|        (DDC only)
60|Unit Config Mismatch|
61|Master DDC Off-Line|      (DDC only)
62|Slave DDC Off-Line|       (DDC only)
63|Alarms Log Erased|
64|CCI Power On|
65|Alarms Log restarted|
66|> Max CCI Ign Resets|
67|C/H Vlv Opp. End Pos|
68|C/H Valve Mid Posit.|
69|2 C/H Vlv Pos Detecd|
70|Low Water Flow|
71|Faulty Board (FW)|
72|Unknown Alarm Code|
73|Sep. Modules Offline|     (DDC only)
74|C/H Valve mismatch|       (DDC only)
75|C/H Valve off-line|       (DDC only)
76|C/H Valve Timeout|        (DDC only)
77|C/H Valve Err. Pos.|      (DDC only)
78|C/H Valve Unknwn Err|     (DDC only)
79|DHW Valve mismatch|       (DDC only)
80|DHW Valve off-line|       (DDC only)
81|DHW Valve Timeout|        (DDC only)
82|DHW Valve Err. Pos.|      (DDC only)
83|Flowmeter Fault|
84|Low Primary Wat Flow|
```

```
85|Prim OUT T Probe Err|
86|Combus. Blower Fault|
87|Prim Heat OUT T High|
88|Water T. Probe Error|      (CCI only)
89|MIX T Probe Error|
90|0-10 V Input Error|        (CCI only)
91|Missing EXT T Probe|       (DDC only)
92|FLUE T Probe Error|
93|Low Internal Temp.|
94|DDC ID Conflict|           (DDC only)
95|Condens. Probe Alarm|
96|OUT T Probe Error|
97|IN T Probe Error|
98|GAHPs Water T Limit|       (Custom non standard CCI only)
99|3rd Party Unit Error|
100|OFF: Base Mfd Prb Er|
101|OFF: Sep Mfd Prb Err|
102|C(H) IN T Prbe Offln|
103|C(H) OUT T Prbe Offl|
104|Heat IN T Probe Offl|
105|Heat OUT T Prbe Offl|
106|Splt IN T Prbe Offln|
107|Splt OUT T Prbe Offl|
108|GAHP IN T Probe Offl|
109|C(H) IN T Prbe Misma|
110|C(H) OUT T Prbe Mism|
111|Heat IN T Prbe Misma|
112|Heat OUT T Prbe Mism|
113|Splt IN T Prbe Misma|
114|Splt OUT T Prbe Mism|
115|GAHP IN T Prbe Misma|
116|C(H) IN T Probe Err|
117|C(H) OUT T Probe Err|
118|Heat IN T Probe Err|
119|Heat OUT T Probe Err|
120|Splt IN T Probe Err|
121|Splt OUT T Probe Err|
122|GAHP IN T Probe Err|
123|C(H) Pri WPump Offln|
124|Heat Pri WPump Offln|
125|Splt Pri WPump Offln|
126|C(H) Pri WPump Misma|
127|Heat Pri WPump Misma|
128|Splt Pri WPump Misma|
129|Base Mfd Prb Not Cfg|
130|Splt Mfd Prb Not Cfg|
131|Base WPmp Not Config|
132|Splt WPmp Not Config|
133|C(H) Sec WPump Offln|
134|Heat Sec WPump Offln|
135|C(H) Sec WPump Misma|
136|Heat Sec WPump Misma|
137|GENF T Probe Error|
138|Wrong GENF Prb Posit|
139|Wrong Pump Sens Conn|
140|Limit Temp|
141|Sep. Limit Temp|
142|High Flue/Fins T|
143|Heat Limit Temp|
144|Chil Limit Temp|
145|Well Limit Temp|
```

Note that ‘CCI only’ string codes are not used on this device (DDC).

Alarm Error Code:

Source (2 bit)	Rank (2 bit)	Dup (1 bit)	Code (11 bit)

Source: 00 = Cooling Module
01 = Heating Module
10 = All (Both Modules)
11 = Electronics

Rank: 01 = I (Info)
10 = W (Warning)
11 = E (Error)

Dup: 0 = Alarm not duplicated on the cooling Unit's Module
1 = Alarm duplicated on the cooling Unit's Module
Some alarms are related to both Modules of a single Unit and in this case the Modbus client will read the same alarm twice. If the Modbus client want to check this condition (e.g. to avoid a double signalling), it must use the Dup flag.

Code: Actual Alarm Error Code

- All Alarm String Code and Alarm Error Code fields read as 0 (0x0000) for unconfigured Plants, Cooling and Heating Modules.
- Two similar alarm data register areas are provided for each Plant, Cooling and heating Module; first area is called "Single Client Area", second area is called "Multi Client Area". Although they provide the same information, access rules (or methods) are slightly different:
    - Rules for the Single Client Area are:
        - An alarm condition (Alarm String Code and Alarm Error Code) signaled into one of the five Alarm slots is never moved to a different slot; this avoids that a Modbus Client can think that the alarm condition terminated before it realizes that the same condition is now reported in a different slot.
        - When an alarm condition actually terminates, value 0 (0x0000, No Alarm) is written in the Alarm String Code field and the Alarm slot is locked, even if a new pending alarm condition exists and no other free Alarm slot exists. Ensuring that the Modbus Client reads value 0 also ensures that it detects the termination of the previous alarm condition. Once the Modbus Client has read the Alarm String Code field once, the Alarm Slot is unlocked and becomes available for new pending alarm conditions to be signaled.

      Although this method minimizes the Modbus Client processing (detecting the termination of an alarm condition is based on reading value 0 for the Alarm String Code), it has the disadvantage that it does not support multiple Client Entities accessing the interface.

    - Rules for the Multi Client Area are:
        - An alarm condition (Alarm String Code and Alarm Error Code) signaled into one of the five Alarm slots is never moved to a different slot; this avoids that a Modbus Client can think that the alarm condition terminated before it realizes that the same condition is now reported in a different slot; this rule is the same as the first rule of the other method.
        - When an alarm condition actually terminates, a different alarm condition can immediately replace the previous one in the same slot; this means that the Modbus Client needs to detect any Alarm String Code value or Alarm Error Code value change and react to it by:
            1. Reporting that the previous alarm condition terminated

2. Reporting the new alarm condition.

Although this method requires more processing to the Modbus Client than the previous one, it has the advantage that multiple Client Entities could access the Interface and still correctly acquire alarm data.

General Water Timer notes

General water timer input registers reads currently active settings.

Configuration data notes

"Unit type" register is an enumerative with the following meaning:

```
00 = ACF,
01 = AY,
02 = AYF2,
03 = AYF4,
04 = GAHP-W,
05 = Prontoclima-C,
06 = Prontoclima-CR,
07 = GAHP-A,
08 = GAHP-AR,
09 = ACF-HR,
10 = GAHP-W Modulating (E3 / PRO),
11 = GAHP-AR Modulating,
12 = GAHP-A Modulating (E3 / PRO),
13 = AY Condensing,
14 = Third party unit (non Robur),
15 = GAHP-W Modulating HeatOnly.
```

HOLDING REGISTERS (R/W)

"Type prefix" address (dec)	"Real" address (hex)	Type	category	Description	Read only	Write only
40001	0x0000	Unsigned Word	**Event Logger Counters**	Record Counter	R.O.	
40002	0x0001	Unsigned Word		Lost Event Counter	R.O.	
40003 - 40010	0x0002 – 0x0009			FREE (Not mapped)		
40011	0x000A	bitmap	**Event Logger Records Window**	Event Record 00 word 0	R.O.	
40012	0x000B	bitmap		Event Record 00 word 1	R.O.	
40013	0x000C	bitmap		Event Record 00 word 2	R.O.	
40014	0x000D	bitmap		Event Record 00 word 3	R.O.	
40015	0x000E	bitmap		Event Record 00 word 4	R.O.	
…	…			…		
40131	0x0082	bitmap		Event Record 24 word 0	R.O.	
40132	0x0083	bitmap		Event Record 24 word 0	R.O.	
40133	0x0084	bitmap		Event Record 24 word 1	R.O.	
40134	0x0085	bitmap		Event Record 24 word 2	R.O.	
40135	0x0086	bitmap		Event Record 24 word 3	R.O.	
40136 - 40200	0x0087 – 0x00C7			FREE (Not mapped)		
40201	0x00C8	unsigned word	**Event Logger Commands**	Record Counter Reset		L.W.O.
40202	0x00C9	unsigned word		Read Events Acknowledge		L.W.O.
40203	0x00CA	unsigned word		Lost Events Acknowledge		L.W.O.
40204 - 40220	0x00CB– 0x00DB			FREE (Not mapped)		
40221	0x00DC	Unsigned Word	**Alarm Semaphores**	Instant semaphore (Cooling Plant)	R.O.	
40222	0x00DD	Unsigned Word		Persistent semaphore (Cooling Plant)	R.O.	
40223	0x00DE	Unsigned Word		Instant semaphore (Heating Plant)	R.O.	
40224	0x00DF	Unsigned Word		Persistent semaphore (Heating Plant)	R.O.	
40225 - 40230	0x00E0– 0x00E5			FREE (Not Mapped)		
40231	0x00E6	Unsigned Word		Persistent semaphore Acknowledge (Cooling Plant)		L.W.O.
40232	0x00E7	Unsigned Word		Persistent semaphore Acknowledge (Heating Plant)		L.W.O.
40233 - 40240	0x00E8– 0x00EF			FREE (Not Mapped)		
40241	0x00F0	Unsigned Word	**Alarms Reset Commands**	Alarm Reset Unit ID (Cooling Plant)		
40242	0x00F1	Unsigned Word		Alarm Reset Request (Cooling Plant)		L.W.O.
40243	0x00F2	Unsigned Word		Alarm Reset Status (Cooling Plant)	R.O.	
40244	0x00F3	Unsigned Word		Alarm Reset Unit ID (Heating Plant)		
40245	0x00F4	Unsigned Word		Alarm Reset Request (Heating Plant)		L.W.O.
40246	0x00F5	Unsigned Word		Alarm Reset Status (Heating Plant)	R.O.	
40247 - 40290	0x00F6 – 0x0121			FREE (Not mapped)		

40291	0x0122	Signed Word	**External analog request – Setpoints related to external analog coils**	External analog request setpoint Cooling service or 2 pipes cool/heat service operating in cooling mode *-not mapped if DDC is not master or cooling service not configured.* *-readonly if neither R.A. control nor BMS control are enabled* *-readonly if external request is not enabled*		
40292	0x0123	Signed Word		External analog request setpoint Heating service or 2 pipes cool/heat service in heating *-not mapped if DDC is not master or heating service not configured.* *-readonly if neither R.A. control nor BMS control are enabled* *-readonly if external request is not enabled*		
40293	0x0124	Signed Word		External analog request setpoint Base domestic hot water service *-not mapped if DDC is not master or base DHW service not configured.* *-readonly if neither R.A. control nor BMS control are enabled* *-readonly if external request is not enabled*		
40294	0x0125	Signed Word		External analog request setpoint Separable domestic hot water service *-not mapped if DDC is not master or separable DHW service not configured.* *-readonly if neither R.A. control nor BMS control are enabled* *-readonly if external request is not enabled*		
40295 - 40300	0x0126 – 0x012B			FREE (Not mapped)		
40301	0x012C	Signed Word	**DDC Settings: Water regulation Base cooling plant (or 2 pipes base Cool/heat plant in cooling mode)**	Default Water Setpoint Temperature [°C/10] *(=ABSENT_ANALOG if cooling plant not configured)*		
40302	0x012D	Unsigned Word		*(=0)* *(=ABSENT_ANALOG if cooling plant not configured)* Write value dismissed.		
40303	0x012E	Signed Word		Water Differential Temperature [°C/10] *(=ABSENT_ANALOG if cooling plant not configured)*		
40304	0x012F	Signed Word		Currently Active Water Setpoint Temp. [°C/10]	R.O.	
40305	0x0130	Signed Word	**DDC Settings: General Water Timer Cooling Service**	MON - Time Period 1 Setpoint Temperature [°C/10]		
40306	0x0131	Unsigned Word		MON - Time Period 1 ON Time [h * 60 + m]		
40307	0x0132	Unsigned Word		MON - Time Period 1 OFF Time [h * 60 + m]		
40308	0x0133	boolean		MON - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40309 - 40312	0x0134 – 0x0137			MON - Time Period 2 *As above*		
40313 - 40316	0x0138 – 0x013B			MON - Time Period 3 *As above*		
40317 - 40320	0x013C– 0x013F			MON - Time Period 4 *As above*		

40321	0x0140	Signed Word		TUE - Time Period 1 Setpoint Temperature [°C/10]		
40322	0x0141	Unsigned Word		TUE - Time Period 1 ON Time [h * 60 + m]		
40323	0x0142	Unsigned Word		TUE - Time Period 1 OFF Time [h * 60 + m]		
40324	0x0143	boolean		TUE - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40325 - 40328	0x0144 – 0x0147			TUE - Time Period 2 *As above*		
40329 - 40332	0x0148 – 0x014B			TUE - Time Period 3 *As above*		
40333 - 40336	0x014C– 0x014F			TUE - Time Period 4 *As above*		
40337	0x0150	Signed Word		WED - Time Period 1 Setpoint Temperature [°C/10]		
40338	0x0151	Unsigned Word		WED - Time Period 1 ON Time [h * 60 + m]		
40339	0x0152	Unsigned Word		WED - Time Period 1 OFF Time [h * 60 + m]		
40340	0x0153	boolean		WED - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40341 - 40344	0x0154 – 0x0157	Signed Word		WED - Time Period 2 *As above*		
40345 - 40348	0x0158 – 0x015B	Unsigned Word		WED - Time Period 3 *As above*		
40349 - 40352	0x015C– 0x015F	Unsigned Word		WED - Time Period 4 *As above*		
40353	0x0160	Signed Word		THU - Time Period 1 Setpoint Temperature [°C/10]		
40354	0x0161	Unsigned Word		THU - Time Period 1 ON Time [h * 60 + m]		
40355	0x0162	Unsigned Word		THU - Time Period 1 OFF Time [h * 60 + m]		
40356	0x0163	boolean		THU - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40357 - 40360	0x0164 – 0x0167			THU - Time Period 2 *As above*		
40361 - 40364	0x0168 – 0x016B			THU - Time Period 3 *As above*		
40365 - 40368	0x016C– 0x016F			THU - Time Period 4 *As above*		
40369	0x0170	Signed Word		FRI - Time Period 1 Setpoint Temperature [°C/10]		
40370	0x0171	Unsigned Word		FRI - Time Period 1 ON Time [h * 60 + m]		
40371	0x0172	Unsigned Word		FRI - Time Period 1 OFF Time [h * 60 + m]		
40372	0x0173	boolean		FRI - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40373 - 40376	0x0174 – 0x0177			FRI - Time Period 2 *As above*		
40377 - 40380	0x0178 – 0x017B			FRI - Time Period 3 *As above*		
40381 - 40384	0x017C– 0x017F			FRI - Time Period 4 *As above*		
40385	0x0180	Signed Word		SAT - Time Period 1 Setpoint Temperature [°C/10]		
40386	0x0181	Unsigned Word		SAT - Time Period 1 ON Time [h * 60 + m]		
40387	0x0182	Unsigned Word		SAT - Time Period 1 OFF Time [h * 60 + m]		
40388	0x0183	boolean		SAT - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40389 - 40392	0x0184 – 0x0187			SAT - Time Period 2 *As above*		
40393 - 40396	0x0188 – 0x018B			SAT - Time Period 3 *As above*		
40397 - 40400	0x018C– 0x018F			SAT - Time Period 4 *As above*		

40401	0x0190	Signed Word		SUN - Time Period 1 Setpoint Temperature [°C/10]		
40402	0x0191	Unsigned Word		SUN - Time Period 1 ON Time [h * 60 + m]		
40403	0x0192	Unsigned Word		SUN - Time Period 1 OFF Time [h * 60 + m]		
40404	0x0193	boolean		SUN - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40405 - 40408	0x0194 – 0x0197			SUN - Time Period 2 *As above*		
40409 - 40412	0x0198 – 0x019B			SUN - Time Period 3 *As above*		
40413 - 40416	0x019C– 0x019F			SUN - Time Period 4 *As above*		
40417	0x01A0	boolean	**Commands : General Water Timer Cooling Service**	General Water Timer Copy		L.W.O.
40418	0x01A1	boolean		General Water Timer Commit		L.W.O.
40419 - 40576	40419 – 40576			FREE (Not mapped)		
40577	0x0240	Signed Word	**DDC Settings: Water regulation Base heating plant (or 2 pipes base Cool/heat plant in heating mode)**	Default Water Setpoint Temperature [°C/10] *(=ABSENT_ANALOG if heating plant not configured)*		
40578	0x0241	Unsigned Word		*(=0)* *(=ABSENT_ANALOG if cooling plant not configured*) Write value dismissed.		
40579	0x0242	Signed Word		Water Differential Temperature [°C/10] *(=ABSENT_ANALOG if cooling plant not configured*)		
40580	0x0243	Signed Word		Currently Active Water Setpoint Temp. [°C/10]	R.O.	
40581	0x0244	Signed Word	**DDC Settings: General Water Timer Heating Service**	MON - Time Period 1 Setpoint Temperature [°C/10]		
40582	0x0245	Unsigned Word		MON - Time Period 1 ON Time [h * 60 + m]		
40583	0x0246	Unsigned Word		MON - Time Period 1 OFF Time [h * 60 + m]		
40584	0x0247	boolean		MON - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40585 - 40588	0x0248 – 0x024B			MON - Time Period 2 *As above*		
40589 - 40592	0x024C– 0x024F			MON - Time Period 3 *As above*		
40593 - 40596	0x0250 – 0x0253			MON - Time Period 4 *As above*		
40597	0x0254	Signed Word		TUE - Time Period 1 Setpoint Temperature [°C/10]		
40598	0x0255	Unsigned Word		TUE - Time Period 1 ON Time [h * 60 + m]		
40599	0x0256	Unsigned Word		TUE - Time Period 1 OFF Time [h * 60 + m]		
40600	0x0257	boolean		TUE - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40601 - 40604	0x0258 – 0x025B			TUE - Time Period 2 *As above*		
40605 - 40608	0x025C– 0x025F			TUE - Time Period 3 *As above*		
40609 - 40612	0x0260 – 0x0263			TUE - Time Period 4 *As above*		

40613	0x0264	Signed Word		WED - Time Period 1 Setpoint Temperature [°C/10]		
40614	0x0265	Unsigned Word		WED - Time Period 1 ON Time [h * 60 + m]		
40615	0x0266	Unsigned Word		WED - Time Period 1 OFF Time [h * 60 + m]		
40616	0x0267	boolean		WED - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40617 - 40620	0x0268 – 0x026B	Signed Word		WED - Time Period 2 *As above*		
40621 - 40624	0x026C– 0x026F	Unsigned Word		WED - Time Period 3 *As above*		
40625 - 40628	0x0270 – 0x0273	Unsigned Word		WED - Time Period 4 *As above*		
40629	0x0274	Signed Word		THU - Time Period 1 Setpoint Temperature [°C/10]		
40630	0x0275	Unsigned Word		THU - Time Period 1 ON Time [h * 60 + m]		
40631	0x0276	Unsigned Word		THU - Time Period 1 OFF Time [h * 60 + m]		
40632	0x0277	boolean		THU - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40633 - 40636	0x0278 – 0x027B			THU - Time Period 2 *As above*		
40637 - 40640	0x027C– 0x027F			THU - Time Period 3 *As above*		
40641 - 40644	0x0280 – 0x0283			THU - Time Period 4 *As above*		
40645	0x0284	Signed Word		FRI - Time Period 1 Setpoint Temperature [°C/10]		
40646	0x0285	Unsigned Word		FRI - Time Period 1 ON Time [h * 60 + m]		
40647	0x0286	Unsigned Word		FRI - Time Period 1 OFF Time [h * 60 + m]		
40648	0x0287	boolean		FRI - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40649 - 40652	0x0288 – 0x028B			FRI - Time Period 2 *As above*		
40653 - 40656	0x028C– 0x028F			FRI - Time Period 3 *As above*		
40657 - 40660	0x0290 – 0x0293			FRI - Time Period 4 *As above*		
40661	0x0294	Signed Word		SAT - Time Period 1 Setpoint Temperature [°C/10]		
40662	0x0295	Unsigned Word		SAT - Time Period 1 ON Time [h * 60 + m]		
40663	0x0296	Unsigned Word		SAT - Time Period 1 OFF Time [h * 60 + m]		
40664	0x0297	boolean		SAT - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40665 - 40668	0x0298 – 0x029B			SAT - Time Period 2 *As above*		
40669 - 40672	0x029C– 0x029F			SAT - Time Period 3 *As above*		
40673 - 40676	0x02A0 – 0x02A3			SAT - Time Period 4 *As above*		
40677	0x02A4	Signed Word		SUN - Time Period 1 Setpoint Temperature [°C/10]		
40678	0x02A5	Unsigned Word		SUN - Time Period 1 ON Time [h * 60 + m]		
40679	0x02A6	Unsigned Word		SUN - Time Period 1 OFF Time [h * 60 + m]		
40680	0x02A7	boolean		SUN - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40681 - 40684	0x02A8 – 0x02AB			SUN - Time Period 2 *As above*		
40685 - 40688	0x02AC– 0x02AF			SUN - Time Period 3 *As above*		
40689 - 40692	0x02B0 – 0x02B3			SUN - Time Period 4 *As above*		

40693	0x02B4	boolean	**Commands : General Water Timer Heating Service**	General Water Timer Copy		L.W.O.
40694	0x02B5	boolean		General Water Timer Commit		L.W.O.
40695	0x02B6	Signed Word	**DDC Settings: General Water Timer Base domestic hot water Service**	MON - Time Period 1 Setpoint Temperature [°C/10]		
40696	0x02B7	Unsigned Word		MON - Time Period 1 ON Time [h * 60 + m]		
40697	0x02B8	Unsigned Word		MON - Time Period 1 OFF Time [h * 60 + m]		
40698	0x02B9	boolean		MON - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40699 - 40702	0x02BA–0x02BD			MON - Time Period 2 *As above*		
40703 - 40706	0x02BE–0x02C1			MON - Time Period 3 *As above*		
40707 - 40710	0x02C2–0x02C5			MON - Time Period 4 *As above*		
40711	0x02C6	Signed Word		TUE - Time Period 1 Setpoint Temperature [°C/10]		
40712	0x02C7	Unsigned Word		TUE - Time Period 1 ON Time [h * 60 + m]		
40713	0x02C8	Unsigned Word		TUE - Time Period 1 OFF Time [h * 60 + m]		
40714	0x02C9	boolean		TUE - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40715 - 40718	0x02CA–0x02CD			TUE - Time Period 2 *As above*		
40719 - 40722	0x02CE–0x02D1			TUE - Time Period 3 *As above*		
40723 - 40726	0x02D2–0x02D5			TUE - Time Period 4 *As above*		
40727	0x02D6	Signed Word		WED - Time Period 1 Setpoint Temperature [°C/10]		
40728	0x02D7	Unsigned Word		WED - Time Period 1 ON Time [h * 60 + m]		
40729	0x02D8	Unsigned Word		WED - Time Period 1 OFF Time [h * 60 + m]		
40730	0x02D9	boolean		WED - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40731 - 40734	0x02DA–0x02DD	Signed Word		WED - Time Period 2 *As above*		
40735 - 40738	0x02DE–0x02E1	Unsigned Word		WED - Time Period 3 *As above*		
40739 - 40742	0x02E2–0x02E5	Unsigned Word		WED - Time Period 4 *As above*		
40743	0x02E6	Signed Word		THU - Time Period 1 Setpoint Temperature [°C/10]		
40744	0x02E7	Unsigned Word		THU - Time Period 1 ON Time [h * 60 + m]		
40745	0x02E8	Unsigned Word		THU - Time Period 1 OFF Time [h * 60 + m]		
40746	0x02E9	boolean		THU - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40747 - 40750	0x02EA–0x02ED			THU - Time Period 2 *As above*		
40751 - 40754	0x02EE–0x02F1			THU - Time Period 3 *As above*		
40755 - 40758	0x02F2–0x02F5			THU - Time Period 4 *As above*		

40759	0x02F6	Signed Word		FRI - Time Period 1 Setpoint Temperature [℃/10]		
40760	0x02F7	Unsigned Word		FRI - Time Period 1 ON Time [h * 60 + m]		
40761	0x02F8	Unsigned Word		FRI - Time Period 1 OFF Time [h * 60 + m]		
40762	0x02F9	boolean		FRI - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40763 - 40766	0x02FA–0x02FD			FRI - Time Period 2 *As above*		
40767 - 40770	0x02FE–0x0301			FRI - Time Period 3 *As above*		
40771 - 40774	0x0302–0x0305			FRI - Time Period 4 *As above*		
40775	0x0306	Signed Word		SAT - Time Period 1 Setpoint Temperature [℃/10]		
40776	0x0307	Unsigned Word		SAT - Time Period 1 ON Time [h * 60 + m]		
40777	0x0308	Unsigned Word		SAT - Time Period 1 OFF Time [h * 60 + m]		
40778	0x0309	boolean		SAT - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40779 - 40782	0x030A–0x030D			SAT - Time Period 2 *As above*		
40783 - 40786	0x030E–0x0311			SAT - Time Period 3 *As above*		
40787 - 40790	0x0312–0x0315			SAT - Time Period 4 *As above*		
40791	0x0316	Signed Word		SUN - Time Period 1 Setpoint Temperature [℃/10]		
40792	0x0317	Unsigned Word		SUN - Time Period 1 ON Time [h * 60 + m]		
40793	0x0318	Unsigned Word		SUN - Time Period 1 OFF Time [h * 60 + m]		
40794	0x0319	boolean		SUN - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40795 - 40798	0x031A–0x031D			SUN - Time Period 2 *As above*		
40799 - 40802	0x031E–0x0321			SUN - Time Period 3 *As above*		
40803 - 40806	0x0322–0x0325			SUN - Time Period 4 *As above*		
40807	0x0326	boolean	**Commands : General Water Timer Base domestic hot water Service**	General Water Timer Copy		L.W.O.
40808	0x0327	boolean		General Water Timer Commit		L.W.O.
40809 - 40852	0x0328–0x0353			FREE (Not mapped)		
40853	0x0354	bitmap	**WAP historical alarm**	Timestamp 1	R.O.	
40854	0x0355	bitmap		Timestamp 2	R.O.	
40855	0x0356	unsigned Word		Unit ID (479 means PDC related alarm)	R.O.	
40856	0x0357	Bitmap		Alarm code	R.O.	
40857	0x0358	Unsigned word		String code	R.O.	
40858	0x0359	Unsigned word		On/Off/Instant *(0/1/2)*	R.O.	
40859	0x035A	Unsigned word		Absolute index (1..4096) (absolute position in alarm queue)	R.O.	
40860	0x035B	Unsigned word		Alarm number (related to most recent alarm)	R.O.	
40861	0x035C	Unsigned word		Number of alarms (total number of alarms in queue)	R.O.	
40862	0x035D	unsigned word		alarm index		
40863 - 40871	0x035E–0x0366			FREE (Not mapped)		

40872	0x0367	Unsigned Word	**DDC Settings: Water regulation Separable domestic hot water Service**	Always read as '0'; write value dismissed.		
40873	0x0368	Signed Word		Water Differential Temperature [℃/10]		
40874	0x0369	Signed Word		Currently Active Water Setpoint Temp. [℃/10]	R.O.	
40875	0x036A	Signed Word	**DDC Settings: General Water Timer Separable domestic hot water Service**	MON - Time Period 1 Setpoint Temperature [℃/10]		
40876	0x036B	Unsigned Word		MON - Time Period 1 ON Time [h * 60 + m]		
40877	0x036C	Unsigned Word		MON - Time Period 1 OFF Time [h * 60 + m]		
40878	0x036D	boolean		MON - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40879 - 40882	0x036E – 0x0371			MON - Time Period 2 *As above*		
40883 - 40886	0x0372 – 0x0375			MON - Time Period 3 *As above*		
40887 - 40890	0x0376 - 0x0379			MON - Time Period 4 *As above*		
40891	0x037A	Signed Word		TUE - Time Period 1 Setpoint Temperature [℃/10]		
40892	0x037B	Unsigned Word		TUE - Time Period 1 ON Time [h * 60 + m]		
40893	0x037C	Unsigned Word		TUE - Time Period 1 OFF Time [h * 60 + m]		
40894	0x037D	boolean		TUE - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40895 - 40898	0x037E – 0x0381			TUE - Time Period 2 *As above*		
40899 - 40902	0x0382 – 0x0385			TUE - Time Period 3 *As above*		
40903 - 40906	0x0386 - 0x0389			TUE - Time Period 4 *As above*		
40907	0x038A	Signed Word		WED - Time Period 1 Setpoint Temperature [℃/10]		
40908	0x038B	Unsigned Word		WED - Time Period 1 ON Time [h * 60 + m]		
40909	0x038C	Unsigned Word		WED - Time Period 1 OFF Time [h * 60 + m]		
40910	0x038D	boolean		WED - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40911 - 40914	0x038E – 0x0391	Signed Word		WED - Time Period 2 *As above*		
40915 - 40918	0x0392 – 0x0395	Unsigned Word		WED - Time Period 3 *As above*		
40919 - 40922	0x0396 - 0x0399	Unsigned Word		WED - Time Period 4 *As above*		
40923	0x039A	Signed Word		THU - Time Period 1 Setpoint Temperature [℃/10]		
40924	0x039B	Unsigned Word		THU - Time Period 1 ON Time [h * 60 + m]		
40925	0x039C	Unsigned Word		THU - Time Period 1 OFF Time [h * 60 + m]		
40926	0x039D	boolean		THU - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40927 - 40930	0x039E – 0x03A1			THU - Time Period 2 *As above*		
40931 - 40934	0x03A2 – 0x03A5			THU - Time Period 3 *As above*		
40935 - 40938	0x03A6 - 0x03A9			THU - Time Period 4 *As above*		

40939	0x03AA	Signed Word		FRI - Time Period 1 Setpoint Temperature [℃/10]		
40940	0x03AB	Unsigned Word		FRI - Time Period 1 ON Time [h * 60 + m]		
40941	0x03AC	Unsigned Word		FRI - Time Period 1 OFF Time [h * 60 + m]		
40942	0x03AD	boolean		FRI - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40943 - 40946	0x03AE– 0x03A1			FRI - Time Period 2 *As above*		
40947 - 40950	0x03B2 – 0x03B5			FRI - Time Period 3 *As above*		
40951 - 40954	0x03B6 – 0x03B9			FRI - Time Period 4 *As above*		
40955	0x03BA	Signed Word		SAT - Time Period 1 Setpoint Temperature [℃/10]		
40956	0x03BB	Unsigned Word		SAT - Time Period 1 ON Time [h * 60 + m]		
40957	0x03BC	Unsigned Word		SAT - Time Period 1 OFF Time [h * 60 + m]		
40958	0x03BD	boolean		SAT - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40959 - 40962	0x03BE– 0x03C1			SAT - Time Period 2 *As above*		
40963 - 40966	0x03C2– 0x03C5			SAT - Time Period 3 *As above*		
40967 - 40970	0x03C6– 0x03C9			SAT - Time Period 4 *As above*		
40971	0x03CA	Signed Word		SUN - Time Period 1 Setpoint Temperature [℃/10]		
40972	0x03CB	Unsigned Word		SUN - Time Period 1 ON Time [h * 60 + m]		
40973	0x03CC	Unsigned Word		SUN - Time Period 1 OFF Time [h * 60 + m]		
40974	0x03CD	boolean		SUN - Time Period 1 Enabled TRUE(1) / FALSE(0)		
40975 - 40978	0x03CE– 0x03D1			SUN - Time Period 2 *As above*		
40979 - 40982	0x03D2– 0x03D5			SUN - Time Period 3 *As above*		
40983 - 40986	0x03D6– 0x03D9			SUN - Time Period 4 *As above*		
40987	0x03DA	boolean	**Commands : General Water Timer Separable domestic hot water Service**	General Water Timer Copy		L.W.O.
40988	0x03DB	boolean		General Water Timer Commit		L.W.O.
40989 - 50000	0x03DC - 0x270F			FREE		

Special register values
ABSENT_ANALOG = 32766

Read only and write only registers
Read only (R.O.) register return “illegal data address” in case of write request;
Write only (W.O.) registers return “illegal data address” in case of read request;
Logically write only (L.W.O.) registers return 0xFFFF in case of read request.

Events Logger notes

- The internal DDC Events (alarms) Logger, storing up to 4096 event records, can be accessed through the Modbus Interface.
- The Record Counter field contains the number of unread event records, i.e. records that have not been read through the Modbus Interface since they were generated.

- The Record Counter can be reset by writing value 1 (0x0001) to the Record Counter Reset register. If reset, the Record Counter will contain the total number of the event records currently stored in the DDC Event Logger; this is useful if the Modbus Client wants to access all the Event Logger.
- Event Records can be accessed through the Event Logger Records Window registers. Up to 25 event records a time can be read, then the actual number of records read must be acknowledged by writing such number to the Read Events Acknowledge register. Writing to such register causes the DDC to update the value in the Record Counter Register and to update the content of the Event Logger Records Window registers. Event Record are ordered based on Timestamp (Event Record 00 contains an older event than Event Record 01, and so on).
- The Lost Event Counter register contains the number of lost events, i.e. the number of events that have not been read through the Modbus Interface AND have been overwritten by newer events. The Modbus Client resets this counter by writing the same value to the Lost Events Ackowledge register.
- An Event Record occupies five 16 bits Words, formatted as in the following:

Event Record Word 0 (Timestamp1)

Seconds (6 bit)	Minutes (6 bit)	Hours (4 msb)

Event Record Word 1 (Timestamp2)

Hours (lsb)	Year (6 bit) (0 →2000)	Month (4 bit)	Day (5 bit)

Event Record Word 2

B (1 bit)	Event Code (11 bit)	W/E(1 bit)	DDC(1 bit)	Cool(1bit)	Heat(1bit)

Event Record Word 3

'0' (4 bit)	Event String Code (10 bit)	ON/OFF/INST(2 bit)

Event Record Word 4

'0' (7 bit)	Unit Network ID (9 bit)

Words 0 and 1 contain the event timestamp.

Word 2:

B: 1 → the event is related to the unit's on board electronics
0 → the event is strictly related to the cooling or/and heating module of a unit, or is generated by the DDC.

Event Code: The Alarm Code.

W/E: 1 → the event is a Warning
0 → the event is an Error

DDC: 1 → the event is generated by the DDC
0 → the event is not generated by the DDC

NOTE: DDC can generate two types of events:

- Events related to the Cooling or/and Heating modules of a specific Unit
- Events related to the Cooling or/and Heating Plant, but not to a specific Unit's modules

Cool: 1 → the event is related to the Cooling Plant (either to a specific Unit's cooling module or not)
0 → the event is not related to the Cooling Plant

Heat: 1 → the event is related to the Heating Plant (either to a specific Unit's cooling module or not)
0 → the event is not related to the Heating Plant
NOTE: at least one of Cool and Heat bits is set; both may be set.

Word 3:
Event String Code: Unique String Code associated to the specific event. Refer to alarm string code table described in INPUT REGISTER section.

ON/OFF/INSTANT (2 bits): 00 → ON (Event is Alarm occurrence)
01 → OFF (Event is Alarm termination)
10 → INSTANT (Event has no duration, e.g. "Power On" event)
11 → not used

Word 4:
Unit Network ID: Network ID → Unit whose Cooling or/and Heating Modules generated the event
Excluded value 479 (0x01DF) → the event is generated by the DDC and is not related to a specific Unit.

Alarm Semaphores notes
The Alarm Semaphores purpose is that of providing a quick Cooling/Heating Plant oriented alarm overview.
The Instant Semaphores provide the current Plant Alarm status:
Instant Semaphore: 0 → No Alarm
1 → Warning Level Alarms
2 → Error Level Alarms

The Persistent Semaphores signal whether Plant alarm conditions occurred since last time they were read and acknowledged. Coding of Persistent Semaphores values is the same as with the Instant Semaphores.

In order to acknowledge and reset the Persistent Semaphores, value 1 (0x0001) has to be written to the corresponding Persistent Semaphore Acknowledge register.

Alarms Reset Commands notes
Some types of Unit alarms can be reset (cleared) through the Modbus Interface.
In order to clear alarms:

- Poll the Alarm Reset Status register till read value is not 0 (0x0000, this value means that system is processing a pending request)
- Write the Network ID of the relevant Unit to the Alarm Reset Unit ID register.
- Write value 1 (0x0001) to the Alarm Reset Request register
- Poll the Alarm Reset Status register till read value is not 0 (0x0000); status value will be one of the following:
  1 → Request not supported (rejected)
  2 → Request executed (OK)
  3 → Request was aborted due to an internal error (request may be retried)
  4 → Request was rejected due to a previous pending request (request may be retried)

NOTE: Flame lockout cannot be cleared with this command

External analog request notes

- These registers are not mapped if related to a non configured plant or service.
- External request setpoint values defaults to NO_ANALOG (0x7FFF) (not valid data)
- External request setpoint values remain unchanged in case of Modbus heartbeat timeout.
- All setpoint register values are clipped according to limits set on the DDC.
- All setpoint values represented as 2's complement, one decimal digit fixed point

General Water Timer programming notes

The General Water Timer allows the user to program up to four (non overlapping) ON time periods per day of the week, each period having a specific water setpoint temperature. It is possible to program the General Water Timer through the Modbus Interface. Programming occurs in a DDC working buffer, which is then committed to the internal copy actually used by the DDC fo the plants operation:

- The existing General Water Timer program can optionally be read into the working buffer by writing value 1 (0x0001) to the General Water Timer Copy register
- The different fields of the GWT can be written; the Time Period Enabled field must be written after the other Time period fields. Writing the Time Period Enabled field to value 1 (0x0001) turns the Time Period ON; a sanity check of the time period fields is performed which may result in the Time Period Enabled not being set to value 1 (e.g. Time Period ON Time > Time Period OFF Time, or time period overlapped with other time periods of the same week day); also, writing fields out of range will result in saturating them to max or min value of the allowed range.
- Finally, the working buffer can be committed, by writing value 1 to the General Water Timer Commit register. When doing this, the new General Water Timer program becomes active.
- Note that General Water Timer must be enabled in the DDC panel, otherwise the Modbus settings will not be used by the system.

Holding register access policies

By selecting "Plant parameters" checkbox in the Bus Access Setup screen on the DDC, it's possible to grant/deny access (both read and write) to the following Setting registers:

- Water setpoint
- Water differential temperature
- Currently active setpoint
- General Water timer settings

The rest of the holding registers are not affected by this limitation.

Setpoint

All setpoint register values are expressed as Celsius Degrees Tenths. (e.g. value 10 means 1.0 °C).
If a setpoint register is written with an out-of-range value, it will be clipped to the closest limit.