USER GUIDE

AquaCiat CALEO Heat-Pump Modbus Communication

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REVISION HISTORY

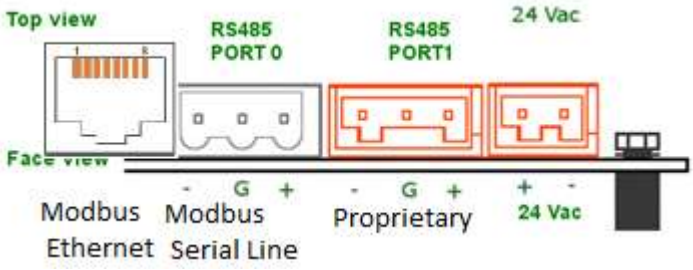
Revision	Date	Description of Change
Original	13/06/2016	Initial
Rev A	07/09/2016	Added SH and SUCT_T in mapping (SR1.4 and above)

ACRONYMS

DI	Discrete Input
EXV	Expansion Valve
FC	Free Cooling
HR	Holding Register
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
IR	Input Register
Net	Network
OAT	Outside Air Temperature
RTU	Remote Terminal United Technologies Corporation
SCT	Saturated Condensing Temperature
SST	Saturated Suction Temperature
TCP	Transmission Control Protocol
xxLS	..Low Speed
xxHS	..High Speed

1. Connection channels

Here below sockets available for communication purposes with external devices.



sockets identification available for communication

1.1. RS485 socket details

Bus “port0” is intended to Modbus serial line with RS485 (i.e. no control flow)

Transmission mode:

Used for Local area network communication type by external devices.

- With twisted shielded pair
- distance up to 1000m without amplifier
- Normally configurable at 9600, 19200 or 38400 baud in half duplex.
- Parity bit may be active or deactivated. If parity is disabled, additional stop bits are automatically set for frame timing considerations. Otherwise, parity may be odd or even according to the settings chosen.

  Exclusively RTU mode operates with configurable combination (No ASCII mode permission)
  1 start, 8 data, even parity, 1 stop bit
  1 start, 8 data, odd parity, 1 stop bit
  1 start, 8 data, even parity forced, 1 stop bit
  1 start, 8 data, odd parity forced, 1 stop bit
  1 start, 8 data, 2 stop bit
  ~~1 start, 8 data, no parity , 1 stop bit~~ (EXCLUDED)

- RTU protocol is compatible with both Little/ Big Endian for data field (i.e. either most significant byte is sent first or Least significant byte is sent first)

- Unit identifier must be declared from 1 to 247 as slave product number setup (i.e. station number)

- Cyclic Redundancy Check is made by the RTU protocol layer as defined in Appendix A of “Modbus over serial line” specification available at modbus.org

- Due to floating no native floating point representation for the Modbus communication protocol, IEEE754 representation has been integrated. As the opposite, float handled as integer is also available (i.e. float X 10) depending on setup.

Bus “port1” is proprietary and therefore reserved for internal purpose.

1.2. RJ45 socket details

Modbus Ethernet is intended to Modbus IP.

Used for wide area network communication type by external devices (building management system tool or maintenance tool and so on…)

- Cross pair wired cable shall be used for nominal configuration.
- distance up to 100m without amplifier
- Speed communication at 10 Mega baud not configurable
- IPv4 address configurable for class address with DHCP NOT active for

  Class A (0.xxx.xxx.xxx to 127.xxx.xxx.xxx)

  Class B (128.0.xxx.xxx to 191. 255.xxx.xxx)

  Class C (192.0.0.xxx to 223.255.255.xxx)

  (IP address declared on the control unit needed to set up connection with external device)
- All requests are sent via Transfer Control Protocol on registered port 502 by default but other port number may be set as calibrate value.
- TCP/IP Modbus protocol is compatible with both Little/ Big Endian for data field (i.e. either most significant byte is sent first or Least significant byte is sent first)
- Unit identifier must be declared from 1 to 247 as slave product number setup (i.e. station number)

2. Modbus Functions

- The following standard function are supported

Code	*Modbus function*	*Address register range*	*Application*
01 with quantity 1	READ COIL STATUS	0 to 9999 (decimal)	None
01 with quantity N	READ MULTIPLE COIL STATUS (from 1 to 2000max. contiguous)		None
15 with quantity 1	WRITE COIL		None
15 with quantity N	WRITE MULTIPLE COILS (from 1 to 2000max. contiguous)		None
02 with quantity 1	READ DISCRETE INPUT	0 to 9999 (decimal)	Alarms
02 with quantity N	READ MULTIPLE DISCRETE INPUTS (from 1 to 2000max. contiguous)		
04 with quantity 2	READ INPUT REGISTER	0 to 9999 (decimal)	Useful user parameters
04 with quantity NX2	READ MULTIPLE INPUT REGISTERS (from 1 to 123 max. contiguous)		Useful user parameters
03 with quantity 2	READ HOLDING REGISTER	0 to 9999 (decimal)	Configuration or service dataset
03 with quantity NX2	READ MULTIPLE HOLDING REGISTERS (from 1 to 123 max. contiguous)		Configuration or service dataset
16 with quantity 2	WRITE HOLDING REGISTER		Configuration or service dataset
16 with quantity NX2	WRITE MULTIPLE HOLDING REGISTERS (from 1 to 123 max. contiguous)		Configuration or service dataset

3. Mapping interface

Table	Item	Description	Media Type	Address (hex)	Format
ALM	EXCH_FREEZE_F	Water Exchanger Freeze Protection	DI	1 (0001)h	1 bit (Boolean)
ALM	LOW_SUCTION_A_F	Circuit A Low Saturated Suction Temperature	DI	5 (0005)h	1 bit (Boolean)
ALM	HIGH_SH_A_F	Circuit A High Superheat	DI	8 (0008)h	1 bit (Boolean)
ALM	LOW_SH_A_F	Circuit A Low Superheat	DI	11 (000B)h	1 bit (Boolean)
ALM	CPA1_REVERSE_ROT_F	Compressor A1 Not Started Or Pressure Increase not Established	DI	16 (0010)h	1 bit (Boolean)
ALM	CPA2_REVERSE_ROT_F	Compressor A2 Not Started Or Pressure Increase not Established	DI	17 (0011)h	1 bit (Boolean)
ALM	LOSS_COM_MS_F	Master/Slave communication Failure	DI	30 (001E)h	1 bit (Boolean)
ALM	CCN_EMSTOP_F	Unit is in Network emergency stop	DI	31 (001F)h	1 bit (Boolean)
ALM	PUMP1_F	Water Pump #1 Fault	DI	32 (0020)h	1 bit (Boolean)
ALM	REPEATED_HI_DGT_A_F	Circuit A Repeated High Discharge Gas Overrides	DI	37 (0025)h	1 bit (Boolean)
ALM	REPEATED_LO_SST_A_F	Circuit A Repeated Low Suction Temp Overrides	DI	40 (0028)h	1 bit (Boolean)
ALM	HEAT_LOW_EWT_F	Low Entering Water Temperature In Heating	DI	43 (002B)h	1 bit (Boolean)
ALM	COOLER_FLOW_F	Cooler Interlock Failure	DI	51 (0033)h	1 bit (Boolean)
ALM	HP_SWITCH_A_F	Circuit A High pressure switch Failure	DI	63 (003F)h	1 bit (Boolean)
ALM	SENSORS_SWAP_F	Water Exchanger Temperature Sensors Swapped	DI	97 (0061)h	1 bit (Boolean)
ALM	DHW_ANTILEG_F	DHW Antilegionella Setpoint Not Achieved	DI	215 (00D7)h	1 bit (Boolean)
ALM	CPA1_FBK_KRIWAN_F	Comp. A1 failed: Motor protection Kriwan Safety Opened	DI	1119 (045F)h	1 bit (Boolean)
ALM	CPA2_FBK_KRIWAN_F	Comp. A2 failed: Motor protection Kriwan Safety Opened	DI	1129 (0469)h	1 bit (Boolean)
ALM	DP_A_F	Circuit A Discharge Pressure Transducer Failure	DI	2001 (07D1)h	1 bit (Boolean)
ALM	SP_A_F	Circuit A Suction Pressure Transducer Failure	DI	2004 (07D4)h	1 bit (Boolean)
ALM	WP_IN_F	Water Exchanger Entering Fluid Transducer Failure	DI	2024 (07E8)h	1 bit (Boolean)
ALM	ECO_SP_A_F	Circuit A Economizer Pressure Transducer	DI	2013 (07DD)h	1 bit (Boolean)
ALM	SERVICE_MAINT_ALERT	Service Maintenance Alert	DI	3000 (0BB8)h	1 bit (Boolean)
ALM	FGAS_NEEDED	Fgas check needed, call your maintenance company	DI	3005 (0BBD)h	1 bit (Boolean)
ALM	SIOB_A_LOW_VOLT_F	Circuit A SIOB Low Voltage Failure	DI	4001 (0FA1)h	1 bit (Boolean)

ALM	SIOB_CIR_A_COM_F	Loss of communication with SIOB Board Number A	DI	4901 (1325)h	1 bit (Boolean)
ALM	LOSS_COMM_AUX1_N1_F	Loss of communication with AUX1 Board	DI	4602 (11FA)h	1 bit (Boolean)
ALM	EWT_F	Water Exchanger Entering Fluid Thermistor Failure	DI	5001 (1389)h	1 bit (Boolean)
ALM	LWT_F	Water Exchanger Leaving Fluid Thermistor Failure	DI	5002 (138A)h	1 bit (Boolean)
ALM	DEFROST_T_A_F	Circuit A Defrost Thermistor Failure	DI	5003 (138B)h	1 bit (Boolean)
ALM	OAT_F	OAT Thermistor Failure	DI	5010 (1392)h	1 bit (Boolean)
ALM	CHWSTEMP_F	MASTER/Slave Common Fluid Thermistor Failure	DI	5011 (1393)h	1 bit (Boolean)
ALM	SUCTION_T_A_F	Circuit A Suction Gas Thermistor Failure	DI	5012 (1394)h	1 bit (Boolean)
ALM	ECO_T_A_F	Circuit A Economizer Gas Thermistor Failure	DI	5024 (13A0)h	1 bit (Boolean)
ALM	DEFROST_T_2_F	2d Coil Defrost Thermistor Failure	DI	5004 (138C)h	1 bit (Boolean)
ALM	DHW_F	Domestic Hot Water Tank Thermistor Failure	DI	5025 (13A1)h	1 bit (Boolean)
ALM	DRV_WTR_PUMP_F	Variable Speed Water Pump Failure	DI	7003 (1B5B)h	1 bit (Boolean)
ALM	ILL_FACT_CONF_F	Illegal Configuration	DI	8001 (1F41)h	1 bit (Boolean)
ALM	INI_FACT_CONF_F	Initial Factory Configuration Required	DI	8000 (1F40)h	1 bit (Boolean)
ALM	M_S_CONFIG_F	Master Chiller Configuration Error	DI	8101 (1FA5)h	1 bit (Boolean)
PROTOCOL	SP_OCC	Setpoint Occupied?	HR	0 (0000)h	Signed Integer (32-bit)
PROTOCOL	CHIL_S_S	Net.: Cmd Start/Stop	HR	2 (0002)h	Signed Integer (32-bit)
PROTOCOL	CHIL_OCC	Chiller occupied?	HR	4 (0004)h	Signed Integer (32-bit)
PROTOCOL	EMSTOP	Emergency Stop	HR	6 (0006)h	Signed Integer (32-bit)
PROTOCOL	HC_SEL	Heatcool Select	HR	8 (0008)h	Signed Integer (32-bit)
PROTOCOL	SP_SEL	Setpoint Select	HR	10 (000A)h	Signed Integer (32-bit)
PROTOCOL	DEM_LIM	Demand Limit	HR	12 (000C)h	Signed Integer (32-bit)
PROTOCOL	CTRL_PNT	Control Point	HR	14 (000E)h	IEEE Float (32-bit)
PROTOC	LAG_LIM	Slave demand limit	HR	16	Signed

OL				(0010)h	Integer (32-bit)
HCCONFIG	hr_sel	Heating Reset Select	HR	20 (0014)h	Signed Integer (32-bit)
RESETCFG	oathr_no	OAT No Reset Value	HR	32 (0020)h	IEEE Float (32-bit)
RESETCFG	oathr_fu	OAT Full Reset Value	HR	34 (0022)h	IEEE Float (32-bit)
RESETCFG	dt_hr_no	Delta T No Reset Value	HR	36 (0024)h	IEEE Float (32-bit)
RESETCFG	dt_hr_fu	Delta T Full Reset Value	HR	38 (0026)h	IEEE Float (32-bit)
RESETCFG	hr_deg	Heating Reset Deg. Value	HR	40 (0028)h	IEEE Float (32-bit)
RESETCFG	I_hr_no	Current No Reset Value	HR	42 (002A)h	IEEE Float (32-bit)
RESETCFG	I_hr_fu	Current Full Reset Value	HR	44 (002C)h	IEEE Float (32-bit)
CP_UNABL	un_cp_a1	Compressor A1 Disable	HR	60 (003C)h	Signed Integer (32-bit)
CP_UNABL	un_cp_a2	Compressor A2 Disable	HR	62 (003E)h	Signed Integer (32-bit)
SETPOINT	hsp1	Heating Setpoint 1	HR	80 (0050)h	IEEE Float (32-bit)
SETPOINT	hsp2	Heating Setpoint 2	HR	82 (0052)h	IEEE Float (32-bit)
SETPOINT	hramp_sp	Heating Ramp Loading	HR	84 (0054)h	IEEE Float (32-bit)
SETPOINT	lim_sp1	Switch Limit Setpoint	HR	90 (005A)h	Signed Integer (32-bit)
MODBUSRS	metric	Metric Unit	HR	106 (006A)h	Signed Integer (32-bit)
MODBUSRS	swap_b	Swap Bytes	HR	108 (006C)h	Signed Integer (32-bit)
MODBUSRS	real_typ	Real type management	HR	110 (006E)h	Signed Integer (32-bit)
MODBUSIP	metric	Metric Unit	HR	112 (0070)h	Signed Integer (32-bit)
MODBUSIP	swap_b	Swap Bytes	HR	114 (0072)h	Signed Integer (32-bit)
MODBUSIP	real_typ	Real type management	HR	116 (0074)h	Signed Integer (32-bit)
GENUNIT	SP_OCC	Setpoint Occupied?	IR	0 (0000)h	Signed Integer

					(32-bit)
GENUNIT	CHIL_S_S	Net.: Cmd Start/Stop	IR	2 (0002)h	Signed Integer (32-bit)
GENUNIT	CHIL_OCC	Net.: Cmd Occupied	IR	4 (0004)h	Signed Integer (32-bit)
GENUNIT	EMSTOP	Emergency Stop	IR	6 (0006)h	Signed Integer (32-bit)
GENUNIT	CTRL_TYP	Local=0 Net.=1 Remote=2	IR	8 (0008)h	Signed Integer (32-bit)
GENUNIT	STATUS	Running Status	IR	10 (000A)h	Signed Integer (32-bit)
GENUNIT	min_left	Minutes Left for Start	IR	12 (000C)h	IEEE Float (32-bit)
GENUNIT	SP_SEL	Setpoint Select	IR	16 (0010)h	Signed Integer (32-bit)
GENUNIT	CAP_T	Percent Total Capacity	IR	18 (0012)h	Signed Integer (32-bit)
GENUNIT	CAPA_T	Circuit A Total Capacity	IR	20 (0014)h	Signed Integer (32-bit)
GENUNIT	CAPB_T	Circuit B Total Capacity	IR	22 (0016)h	Signed Integer (32-bit)
GENUNIT	DEM_LIM	Active Demand Limit Val	IR	24 (0018)h	Signed Integer (32-bit)
GENUNIT	SP	Current Setpoint	IR	26 (001A)h	IEEE Float (32-bit)
GENUNIT	CTRL_PNT	Control Point	IR	28 (001C)h	IEEE Float (32-bit)
GENUNIT	ALM	Alarm	IR	30 (001E)h	Signed Integer (32-bit)
MODBUSRS	modrt_en	RTU Server Enable	IR	32 (0020)h	Signed Integer (32-bit)
MODBUSRS	ser_UID	Server UID	IR	34 (0022)h	Signed Integer (32-bit)
MODBUSRS	baudrate	Baudrate	IR	40 (0028)h	Signed Integer (32-bit)
MODBUSRS	parity	Parity	IR	42 (002A)h	Signed Integer (32-bit)
MODBUSRS	stop_bit	Stop bit	IR	44 (002C)h	Signed Integer

					(32-bit)
GENUNIT	CTRL_WT	Control Water Temp	IR	46 (002E)h	IEEE Float (32-bit)
TEMP	EWT	Entering Water Temp.	IR	48 (0030)h	IEEE Float (32-bit)
TEMP	LWT	Leaving Water Temp.	IR	50 (0032)h	IEEE Float (32-bit)
TEMP	OAT	Outside Air Temperature	IR	52 (0034)h	IEEE Float (32-bit)
TEMP	CHWSTEMP	Master/Slave Temperature	IR	54 (0036)h	IEEE Float (32-bit)
TEMP	SCT_A	Saturated Condensing Tp	IR	56 (0038)h	IEEE Float (32-bit)
TEMP	SST_A	Saturated Suction Temp	IR	58 (003A)h	IEEE Float (32-bit)
TEMP	DEFRT_A	Defrost Temperature A	IR	64 (0040)h	IEEE Float (32-bit)
TEMP	DEFRT_2	Defrost Temp Second Coil	IR	66 (0042)h	IEEE Float (32-bit)
TEMP	SUCT_A	Suction Gas Temperature	IR	68 (0044)h	IEEE Float (32-bit)
LOADFACT	SH_A	Main Superheat	IR	72 (0048)h	IEEE Float (32-bit)
PRESSURE	DP_A	Discharge Pressure	IR	94 (005E)h	IEEE Float (32-bit)
PRESSURE	SP_A	Main Suction Pressure	IR	96 (0060)h	IEEE Float (32-bit)
PRESSURE	W_P_IN	Inlet Water Pressure	IR	102 (0066)h	IEEE Float (32-bit)
INPUTS	ONOFF_SW	Remote On/Off Switch	IR	106 (006A)h	Signed Integer (32-bit)
INPUTS	SETP_SW	Remote Setpoint Switch	IR	112 (0070)h	Signed Integer (32-bit)
INPUTS	LIM_SW1	Limit Switch	IR	114 (0072)h	Signed Integer (32-bit)
INPUTS	FLOW_SW	Flow Switch	IR	118 (0076)h	Signed Integer (32-bit)
INPUTS	HP_SW_A	HP Switch Circuit A	IR	128 (0080)h	Signed Integer (32-bit)
INPUTS	bacdongl	BACnet Dongle	IR	132 (0084)h	Signed Integer (32-bit)
INPUTS	FDBK_A1	CPA1 Safety FeedBack	IR	140 (008C)h	Signed Integer (32-bit)
INPUTS	FDBK_A2	CPA2 Safety FeedBack	IR	142 (008E)h	Signed Integer (32-bit)
OUTPUT	EXV_A	Main EXV Position	IR	160	IEEE Float

S				(00A0)h	(32-bit)
OUTPUTS	RV_A	4-Way Refrigerant Valve	IR	168 (00A8)h	Signed Integer (32-bit)
OUTPUTS	EXCH_HTR	Exchangers Heaters	IR	174 (00AE)h	Signed Integer (32-bit)
OUTPUTS	BOILER	Boiler Command	IR	176 (00B0)h	Signed Integer (32-bit)
OUTPUTS	EHS_STEP	Electrical Heat Stage	IR	178 (00B2)h	Signed Integer (32-bit)
OUTPUTS	CP_A1	Compressor 1 Output	IR	182 (00B6)h	Signed Integer (32-bit)
OUTPUTS	CP_A2	Compressor 2 Output	IR	184 (00B8)h	Signed Integer (32-bit)
OUTPUTS	FAN_A1LS	Fan A1LS Output	IR	198 (00C6)h	Signed Integer (32-bit)
OUTPUTS	FAN_A1HS	Fan A1HS Output	IR	200 (00C8)h	Signed Integer (32-bit)
OUTPUTS	FAN_A2LS	Fan A2LS Output	IR	202 (00CA)h	Signed Integer (32-bit)
OUTPUTS	FAN_A2HS	Fan A2HS Output	IR	204 (00CC)h	Signed Integer (32-bit)
OUTPUTS	ALARM	Alarm Relay Status	IR	222 (00DE)h	Signed Integer (32-bit)
OUTPUTS	RUNNING	Running Relay Status	IR	224 (00E0)h	Signed Integer (32-bit)
OUTPUTS	PUMP_1	Pump 1 Output	IR	240 (00F0)h	Signed Integer (32-bit)
LOADFACT	wp_in	Corrected Water Pressure	IR	250 (00FA)h	IEEE Float (32-bit)
PUMPSTAT	drvp_pct	Pump Drive Percent	IR	280 (0118)h	IEEE Float (32-bit)
RUNTIME	hr_mach	Machine Operating Hours	IR	294 (0126)h	IEEE Float (32-bit)
RUNTIME	st_mach	Machine Starts Number	IR	296 (0128)h	IEEE Float (32-bit)
RUNTIME	hr_cp_a1	Compressor A1 Hours	IR	298 (012A)h	IEEE Float (32-bit)
RUNTIME	hr_cp_a2	Compressor A2 Hours	IR	300 (012C)h	IEEE Float (32-bit)
RUNTIME	st_cp_a1	Compressor A1 Starts	IR	314 (013A)h	IEEE Float (32-bit)

RUNTIME	st_cp_a2	Compressor A2 Starts	IR	316 (013C)h	IEEE Float (32-bit)
RUNTIME	hr_pump1	Water Pump Hours	IR	330 (014A)h	IEEE Float (32-bit)
RUNTIME	hr_fana1	Circuit A Fan #1 Hours	IR	338 (0152)h	IEEE Float (32-bit)
RUNTIME	hr_fana2	Circuit A Fan #2 Hours	IR	340 (0154)h	IEEE Float (32-bit)
MODES	m_limit	Demand Limit Active	IR	370 (0172)h	Signed Integer (32-bit)
MODES	m_ramp	Ramp Loading Active	IR	372 (0174)h	Signed Integer (32-bit)
MODES	m_cooler	Cooler Heater Active	IR	374 (0176)h	Signed Integer (32-bit)
MODES	m_leadla	Master Slave Active	IR	384 (0180)h	Signed Integer (32-bit)
MODES	m_heater	Electric Heat Active	IR	388 (0184)h	Signed Integer (32-bit)
MODES	m_boiler	Boiler Active	IR	392 (0188)h	Signed Integer (32-bit)
MODES	m_defr_a	Defrost Active	IR	396 (018C)h	Signed Integer (32-bit)
MODES	m_sst_a	Low Suction	IR	400 (0190)h	Signed Integer (32-bit)
MODES	m_dgt_a	Compressor Envelope	IR	404 (0194)h	Signed Integer (32-bit)
MODES	m_hp_a	High Pressure Override	IR	408 (0198)h	Signed Integer (32-bit)
MODES	m_sh_a	Low SuperHeat	IR	412 (019C)h	Signed Integer (32-bit)
GENCONF	ramp_sel	Ramp Loading Select	IR	432 (01B0)h	Signed Integer (32-bit)
GENCONF	off_on_d	Unit Off to On Delay	IR	434 (01B2)h	Signed Integer (32-bit)
HCCONFIG	max_th	Max Heating OAT Threshld	IR	454 (01C6)h	IEEE Float (32-bit)
PUMPCONF	pump_seq	Exchanger Pump Enable	IR	456 (01C8)h	Signed Integer (32-bit)
PUMPCONF	pump_per	Pump Sticking Protection	IR	462 (01CE)h	Signed Integer

					(32-bit)
PUMPCONF	pump_loc	Flow Checked if Pump Off	IR	468 (01D4)h	Signed Integer (32-bit)
HCCONFIG	boil_th	Boiler OAT Threshold	IR	472 (01D8)h	IEEE Float (32-bit)
HCCONFIG	ehs_th	Elec Stage OAT Threshold	IR	474 (01DA)h	IEEE Float (32-bit)
HCCONFIG	ehs_back	1 Elec Stage For Backup	IR	476 (01DC)h	Signed Integer (32-bit)
HCCONFIG	ehs_pull	Electrical Pulldown Time	IR	478 (01DE)h	Signed Integer (32-bit)
HCCONFIG	ehs_defr	Quick EHS For Defrost	IR	480 (01E0)h	Signed Integer (32-bit)
USERCONF	use_pass	User Password	IR	482 (01E2)h	Signed Integer (32-bit)
FACTORY	unitsize	Unit Capacity	IR	486 (01E6)h	Signed Integer (32-bit)
FACTORY	fac_pass	Factory Password	IR	490 (01EA)h	Signed Integer (32-bit)
FACTORY	ehs_sel	Electrical Heat Stages	IR	492 (01EC)h	Signed Integer (32-bit)
FACTORY	boil_sel	Boiler Command Select	IR	494 (01EE)h	Signed Integer (32-bit)
FACTORY	wp_sel	Water Pump ?	IR	500 (01F4)h	Signed Integer (32-bit)
FACTORY	vsd_pump	Variable Speed Pump	IR	510 (01FE)h	Signed Integer (32-bit)
FACTORY	duct_opt	Ducted Option	IR	518 (0206)h	Signed Integer (32-bit)
MAINTCFG	s_alert	Servicing Alert	IR	540 (021C)h	Signed Integer (32-bit)
MAINTCFG	charge_c	Refrigerant Charge Ctrl	IR	542 (021E)h	Signed Integer (32-bit)
MAINTCFG	wloop_c	Water Loop Control	IR	544 (0220)h	Signed Integer (32-bit)
MAINTCFG	pump1_c	CPump Ctl Delay (days)	IR	546 (0222)h	Signed Integer (32-bit)
MAINTC	wfilte_c	Water Filter Ctrl (days)	IR	552	Signed

FG				(0228)h	Integer (32-bit)
MST_SLV	ms_sel	Master/Slave Select:	IR	554 (022A)h	Signed Integer (32-bit)
MST_SLV	ms_ctrl	Master Control Type:	IR	556 (022C)h	Signed Integer (32-bit)
MST_SLV	slv_addr	Slave Address	IR	558 (022E)h	Signed Integer (32-bit)
MST_SLV	start_dt	Start If Error Higher	IR	560 (0230)h	IEEE Float (32-bit)
MST_SLV	lag_mini	Lag Minimum Running Time	IR	562 (0232)h	Signed Integer (32-bit)
MST_SLV	lstr_tim	Lag Start Timer	IR	564 (0234)h	Signed Integer (32-bit)
MST_SLV	ll_bal	Lead/Lag Balance	IR	566 (0236)h	Signed Integer (32-bit)
MST_SLV	ll_bal_d	Lead/Lag Balance Delta	IR	568 (0238)h	Signed Integer (32-bit)
MST_SLV	lag_pump	Lag Unit Pump Control	IR	570 (023A)h	Signed Integer (32-bit)
MST_SLV	lead_pul	Lead Pulldown Time	IR	572 (023C)h	Signed Integer (32-bit)
MST_SLV	ll_serie	Chiller In Series	IR	574 (023E)h	Signed Integer (32-bit)
M_MSTSLV	ms_activ	Master/Slave Ctrl Active	IR	578 (0242)h	Signed Integer (32-bit)
M_MSTSLV	lead_sel	Lead Unit is the:	IR	580 (0244)h	Signed Integer (32-bit)
M_MSTSLV	slv_stat	Slave Chiller State	IR	582 (0246)h	Signed Integer (32-bit)
M_MSTSLV	slv_capt	Slave Chiller Total Cap	IR	584 (0248)h	Signed Integer (32-bit)
M_MSTSLV	l_strt_d	Lag Start Delay	IR	586 (024A)h	Signed Integer (32-bit)
M_MSTSLV	ll_hr_d	Lead/lag Hours Delta	IR	588 (024C)h	Signed Integer (32-bit)
M_MSTSLV	ll_chang	Lead/lag Changeover?	IR	590 (024E)h	Signed Integer

					(32-bit)
M_MST SLV	ll_pull	Lead Pulldown ?	IR	592 (0250)h	Signed Integer (32-bit)
M_MST SLV	ms_error	Master/Slave Error	IR	594 (0252)h	Signed Integer (32-bit)
M_MST SLV	cap_max	Max Available Capacity ?	IR	596 (0254)h	Signed Integer (32-bit)
M_MST SLV	lagstat	Slave lagstat	IR	598 (0256)h	IEEE Float (32-bit)
M_MST SLV	slav_hr	Slave Operating Hours	IR	600 (0258)h	IEEE Float (32-bit)
M_MST SLV	slav_ewt	Slave Cooler Ent. Fluid	IR	602 (025A)h	IEEE Float (32-bit)
M_MST SLV	slav_lwt	Slave Cooler Leav. Fluid	IR	604 (025C)h	IEEE Float (32-bit)
SERVICE 1	ewt_opt	Entering Fluid Control	IR	608 (0260)h	Signed Integer (32-bit)
SERVICE 1	sh_sp_a	Main EXV Superheat Setp	IR	616 (0268)h	IEEE Float (32-bit)
SERVICE 1	mop_sp	EXV MOP Setpoint	IR	620 (026C)h	IEEE Float (32-bit)
SERVICE 1	hp_th	High Pressure Threshold	IR	622 (026E)h	IEEE Float (32-bit)
SERVICE 1	heatersp	Cooler Heater Delta Spt	IR	624 (0270)h	IEEE Float (32-bit)
SERVICE 1	zm_spt	Auto Z Multiplier Setpt	IR	634 (027A)h	Signed Integer (32-bit)
SERVICE 1	hc_zm	Maximum Z Multiplier	IR	636 (027C)h	IEEE Float (32-bit)
SERVICE 1	flow_ctl	Flow Control Method	IR	640 (0280)h	Signed Integer (32-bit)
SERVICE 1	dt_stp	Flow Delta T Setpoint	IR	644 (0284)h	IEEE Float (32-bit)
SERVICE 1	pump_min	Pump Minimum Speed	IR	652 (028C)h	Signed Integer (32-bit)
SERVICE 1	b_metric	Blackbox In Metric ?	IR	670 (029E)h	Signed Integer (32-bit)
SERVICE 1	pump_max	Pump Maximum Speed	IR	672 (02A0)h	Signed Integer (32-bit)
SERVICE 1	pump_sav	Pump Min Speed Cap=0%	IR	676 (02A4)h	Signed Integer (32-bit)
LOADFACT	ctrl_avg	Average Ctrl Water Temp	IR	720 (02D0)h	IEEE Float (32-bit)
LOADFA	diff_wt	Differential Water Temp	IR	722	IEEE Float

CT				(02D2)h	(32-bit)
LOADFACT	delta_t	Water Delta T	IR	724 (02D4)h	IEEE Float (32-bit)
LOADFACT	reset	Reset Amount	IR	726 (02D6)h	IEEE Float (32-bit)
LOADFACT	tp_error	Controlled Temp Error	IR	728 (02D8)h	IEEE Float (32-bit)
LOADFACT	cap_lim	Actual Capacity Limit	IR	732 (02DC)h	Signed Integer (32-bit)
LOADFACT	zm	Current Z Multiplier Val	IR	734 (02DE)h	IEEE Float (32-bit)
LOADFACT	smz	Load/Unload Factor	IR	736 (02E0)h	IEEE Float (32-bit)
LOADFACT	over_cap	Active Capacity Override	IR	740 (02E4)h	Signed Integer (32-bit)
LOADFACT	sh_sp_a	Main Superheat Setp	IR	748 (02EC)h	IEEE Float (32-bit)
LOADFACT	ov_exv_a	Main EXV Override	IR	754 (02F2)h	Signed Integer (32-bit)
LOADFACT	eh_stage	Requested Electric Stage	IR	784 (0310)h	Signed Integer (32-bit)
LOADFACT	ehspulld	Electrical Pulldown?	IR	786 (0312)h	Signed Integer (32-bit)
DRV_CTRL	SET_DRV	Attach LEN Drive	IR	834 (0342)h	Signed Integer (32-bit)
DEFROST	frost_a	Exchanger Frost Factor	IR	836 (0344)h	Signed Integer (32-bit)
DEFROST	def_se_a	Next Sequence Allowed in	IR	838 (0346)h	Signed Integer (32-bit)
DEFROST	def_ac_a	Defrost Active?	IR	840 (0348)h	Signed Integer (32-bit)
DEFROST	DEFRT_A	Defrost Temperature	IR	842 (034A)h	IEEE Float (32-bit)
DEFROST	defr_dua	Defrost Duration	IR	844 (034C)h	IEEE Float (32-bit)
DEFROST	over_d_a	Override State	IR	848 (0350)h	Signed Integer (32-bit)
DEFROST	sst_dm_a	Mean SST Calculation	IR	850 (0352)h	IEEE Float (32-bit)
DEFROST	delt_a	Delta: OAT - Mean SST	IR	852 (0354)h	IEEE Float (32-bit)
DEFROST	delt_r_a	Reference Delta	IR	854 (0356)h	IEEE Float (32-bit)
DEFROS	delt_v_a	Delta - Reference Delta	IR	856	IEEE Float

T				(0358)h	(32-bit)
DEFROST	fr_int_a	Frost Integrator Gain	IR	858 (035A)h	IEEE Float (32-bit)
DEFROST	def_f_sp	Defrost Fan Start Setpo	IR	860 (035C)h	IEEE Float (32-bit)
LAST_POR	date_on1	Power On 1 :day-mon-year	IR	892 (037C)h	IEEE Float (32-bit)
LAST_POR	time_on1	Power On 1 :hour-minute	IR	894 (037E)h	IEEE Float (32-bit)
LAST_POR	date_of1	PowerDown 1:day-mon-year	IR	896 (0380)h	IEEE Float (32-bit)
LAST_POR	time_of1	PowerDown 1:hour-minute	IR	898 (0382)h	IEEE Float (32-bit)
LAST_POR	date_on2	Power On 2 :day-mon-year	IR	900 (0384)h	IEEE Float (32-bit)
LAST_POR	time_on2	Power On 2 :hour-minute	IR	902 (0386)h	IEEE Float (32-bit)
LAST_POR	date_of2	PowerDown 2:day-mon-year	IR	904 (0388)h	IEEE Float (32-bit)
LAST_POR	time_of2	PowerDown 2:hour-minute	IR	906 (038A)h	IEEE Float (32-bit)
LAST_POR	date_on3	Power On 3 :day-mon-year	IR	908 (038C)h	IEEE Float (32-bit)
LAST_POR	time_on3	Power On 3 :hour-minute	IR	910 (038E)h	IEEE Float (32-bit)
LAST_POR	date_of3	PowerDown 3:day-mon-year	IR	912 (0390)h	IEEE Float (32-bit)
LAST_POR	time_of3	PowerDown 3:hour-minute	IR	914 (0392)h	IEEE Float (32-bit)
LAST_POR	date_on4	Power On 4 :day-mon-year	IR	916 (0394)h	IEEE Float (32-bit)
LAST_POR	time_on4	Power On 4 :hour-minute	IR	918 (0396)h	IEEE Float (32-bit)
LAST_POR	date_of4	PowerDown 4:day-mon-year	IR	920 (0398)h	IEEE Float (32-bit)
LAST_POR	time_of4	PowerDown 4:hour-minute	IR	922 (039A)h	IEEE Float (32-bit)
LAST_POR	date_on5	Power On 5 :day-mon-year	IR	924 (039C)h	IEEE Float (32-bit)
LAST_POR	time_on5	Power On 5 :hour-minute	IR	926 (039E)h	IEEE Float (32-bit)
LAST_POR	date_of5	PowerDown 5:day-mon-year	IR	928 (03A0)h	IEEE Float (32-bit)
LAST_POR	time_of5	PowerDown 5:hour-minute	IR	930 (03A2)h	IEEE Float (32-bit)
PR_LIMIT	sdt_m_a	Discharge A Temp Average	IR	932 (03A4)h	IEEE Float (32-bit)
PR_LIMIT	sdtlim_a	Discharge A Temp Limit	IR	934 (03A6)h	IEEE Float (32-bit)
PR_LIMIT	sst_m_a	Suction A Temp Average	IR	936 (03A8)h	IEEE Float (32-bit)
SERMAINT	S_RESET	Reset Maintenance Alert	IR	952 (03B8)h	Signed Integer (32-bit)

SERMAINT	charge_m	1 - Refrigerant Charge	IR	954 (03BA)h	Signed Integer (32-bit)
SERMAINT	wloop_m	2 - Water Loop Size	IR	956 (03BC)h	Signed Integer (32-bit)
SERMAINT	s_date1	Date numeric	IR	958 (03BE)h	IEEE Float (32-bit)
SERMAINT	s_hour1	Hour mntn numeric	IR	960 (03C0)h	Signed Integer (32-bit)
SERMAINT	s_days1	Days running numeric	IR	962 (03C2)h	Signed Integer (32-bit)
SERMAINT	f_date1	Fgas Date numeric	IR	964 (03C4)h	IEEE Float (32-bit)
ALARMRST	RST_ALM	Alarm Reset	IR	966 (03C6)h	Signed Integer (32-bit)
ALARMRST	alarm_1c	Current Alarm 1	IR	968 (03C8)h	Signed Integer (32-bit)
ALARMRST	alarm_2c	Current Alarm 2	IR	970 (03CA)h	Signed Integer (32-bit)
ALARMRST	alarm_3c	Current Alarm 3	IR	972 (03CC)h	Signed Integer (32-bit)
ALARMRST	alarm_4c	Current Alarm 4	IR	974 (03CE)h	Signed Integer (32-bit)
ALARMRST	alarm_5c	Current Alarm 5	IR	976 (03D0)h	Signed Integer (32-bit)
INPUTS	LIM_ANAL	Limit Analog Input	IR	1000 (03E8)h	IEEE Float (32-bit)
MODBUSIP	modip_en	TCP/IP Server Enable	IR	1032 (0408)h	Signed Integer (32-bit)
MODBUSIP	ser_UID	Server UID	IR	1034 (040A)h	Signed Integer (32-bit)
MODBUSIP	port_nbr	Port Number	IR	1036 (040C)h	Signed Integer (32-bit)
FLOWCONF	deadband	Deadband (for Step ctrl)	IR	1542 (0606)h	IEEE Float (32-bit)
FLOWCONF	dt_kd	PID Control Deriv. Gain	IR	1544 (0608)h	IEEE Float (32-bit)
FLOWCONF	dt_ki	PID Control Integ. Gain	IR	1546 (060A)h	IEEE Float (32-bit)
FLOWCONF	dt_kp	PID Control Prop. Gain	IR	1548 (060C)h	IEEE Float (32-bit)
FLOWC	dt_stp	Water Delta T Setpoint	IR	1550	IEEE Float

ONF				(060E)h	(32-bit)
FLOWCONF	logictyp	Logic: 0=No,1=STEP,2=PID	IR	1552 (0610)h	Signed Integer (32-bit)
FLOWCONF	maxspeed	Maximum Pump Speed	IR	1554 (0612)h	Signed Integer (32-bit)
FLOWCONF	minspeed	Minimum Pump Speed	IR	1556 (0614)h	Signed Integer (32-bit)
FLOWCONF	step	Pump Speed Step	IR	1558 (0616)h	Signed Integer (32-bit)
FLOWCONF	timer	Reschedule Timer	IR	1560 (0618)h	Signed Integer (32-bit)
HCCONFIG	min_th	Min Heating OAT Threshld	IR	1562 (061A)h	IEEE Float (32-bit)
INPUTS	DHW_REQ	DHW Tank Request	IR	1564 (061C)h	Signed Integer (32-bit)
LOADFACT	ECO_SH	Economizer Superheat	IR	1566 (061E)h	IEEE Float (32-bit)
LOADFACT	ecosh_sp	Economizer SH Setpoint	IR	1568 (0620)h	IEEE Float (32-bit)
LOADFACT	exv_v_a	Main EXV Movement	IR	1570 (0622)h	IEEE Float (32-bit)
LOADFACT	mov_eco	Economizer EXV Movement	IR	1572 (0624)h	IEEE Float (32-bit)
LOADFACT	over_eco	Economizer EXV Override	IR	1574 (0626)h	Signed Integer (32-bit)
MODES	m_dhw	DHW Active	IR	1576 (0628)h	Signed Integer (32-bit)
MODES	m_spedfr	Special Defrost Active	IR	1578 (062A)h	Signed Integer (32-bit)
MODES	m_summer	Summer Active	IR	1580 (062C)h	Signed Integer (32-bit)
OUTPUTS	DHW_3WV	Domestic Hot Water Valve	IR	1582 (062E)h	Signed Integer (32-bit)
OUTPUTS	EV_VALV1	ECO/CPA1 Isolation Valve	IR	1584 (0630)h	Signed Integer (32-bit)
OUTPUTS	EV_VALV2	ECO/CPA2 Isolation Valve	IR	1586 (0632)h	Signed Integer (32-bit)
OUTPUTS	EXV_ECO	Economizer EXV Position	IR	1588 (0634)h	IEEE Float (32-bit)
OUTPUTS	PUMP_EXT	External Pump Output	IR	1590 (0636)h	IEEE Float (32-bit)

PRESSURE	ECO_SP_A	Eco. Suction Pressure	IR	1592 (0638)h	IEEE Float (32-bit)
PUMPSTAT	PUMP_EXT	External Pump Output	IR	1594 (063A)h	Signed Integer (32-bit)
SERMAINT	pump1_m	3 - Pump (days)	IR	1596 (063C)h	Signed Integer (32-bit)
SERMAINT	wfilte_m	4 - Water Filter (days)	IR	1598 (063E)h	Signed Integer (32-bit)
SERVICE1	eco_shsp	Economizer Superheat Sp	IR	1600 (0640)h	IEEE Float (32-bit)
SERVICE1	sstthoff	SST offset Fan Speed	IR	1602 (0642)h	IEEE Float (32-bit)
TEMP	DHW_TT	DHW Tank Temperature	IR	1604 (0644)h	IEEE Float (32-bit)
TEMP	ECO_SST	Eco. Saturated Suction T	IR	1606 (0646)h	IEEE Float (32-bit)
TEMP	ECO_SUCT	Economizer Suction Gas T	IR	1608 (0648)h	IEEE Float (32-bit)