

IS2007, ECL120 and ECL220 Modbus Specification, rev 023

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1 Information

1.1 Purpose

This document describes the Modbus interface for the ECL120 and ECL220 family of controllers.

1.2 Intentions of the ECL Modbus Interface

The Modbus interface is generally used when connecting the ECL controller to a local Building Management Systems (BMS) or SCADA systems.

1.3 State of this document

The document is work in progress – the information is subject to change!

1.4 FW Version

This document revision 18 supports the FW version 01.07.xx (2024 Summer Release)

2 General

2.1 Modbus Address Overview

Table 2 shows how register addresses in Modbus data model are organized in the ECL. SYSTEM addresses are used for information related to the controller hardware and APPLICATION addresses are used for information related to the application running on the ECL.

	Start Address	End Address	Type
SYSTEM	1	1999	System Info
	2000	3999	System Settings
	4000	5999	Inputs
	6000	7999	Outputs
	8000	9999	System Alarms/Events
	10000	11999	System Schedules
	20000	20999	Generic Application Info
APPLICATION	21000	21999	Circuit 1
	22000	22999	Circuit 2
	2X000	2X999	Circuit X
	29000	29999	Circuit 9
	2X000	2X099	<i>Circuit X - Status</i>
	2X100	2X199	<i>Circuit X – Sensor</i>
	2X200	2X299	<i>Circuit X – References</i>
	2X300	2X399	<i>Circuit X – Alarms</i>
	2X400	2X499	<i>Circuit X – Settings</i>
	2X700	2X799	<i>Circuit X - Outputs</i>
	2X800	2X999	<i>Circuit X – Schedule</i>
	30000	30999	Generic Application Info – Extended
	31000	31999	Circuit 1 – Extended
	32000	32999	Circuit 2 – Extended
	3X000	3X999	Circuit X – Extended
M-bus	39000	39999	Circuit 9 – Extended
	49950	50000	M-bus configuration See IS2009, M-bus via Modbus
	50001	50500	M-bus meter configuration & data See IS2009, M-bus via Modbus
Reserved	60000	62000	Reserved

Table 1: Modbus Address Map in Modbus data model

The Modbus addresses are according to the Modbus data model and are offset by 1 in relation to the Modbus PDU addresses. Address: 1 => PDU address: 0.

2.2 Modbus supported function codes

Following function codes is fully supported:

- 0x03 Read input register
- 0x04 Read holding register
- 0x06 Write single holding register
- 0x10 Write multiple holding registers
- 0x15 Write file record (used for FW update)

2.3 Modbus Types and Formats

The ECL Modbus interfaces use the Big-Endian format.

Example:

12345 in Decimal would become 0x3039 in Hex and 0x30 would be transmitted as the first byte and 0x39 as the second byte. We show this in the following table as AB.

Each Modbus address will hold 2 bytes so some types will take up several addresses in the Modbus address space. For floating point, we support [IEEE 754](#).

Table 2 Shows the different Data Types used on the ECL Modbus.

Type	Size	Modbus Format	Modbus Space
Int16	2 bytes	AB	1
UInt16	2 bytes	AB	1
Int32	4 bytes	ABCD	2
UInt32	4 Bytes	ABCD	2
Int64	8 Bytes	ABCDEFGH	4
UInt64	8 Bytes	ABCDEFGH	4
Float	4 bytes	ABCD	2
String8	8 bytes	ABCDEFGH	4
String16	16 bytes	ABCDEFGH+.....	8
String32	32 bytes	ABCDEFGH+.....	16
String64	64 bytes	ABCDEFGH+.....	32

Table 2: Modbus Data Types

2.3.1 Special considerations for Strings

strings will be terminated/filled with newlines unless the string has the same length as the string type.

Example:

String = "ECL120" stored into a String8 type will look like this "ECL120\n\n"

String = "FIRMWARE" stored into a String8 type will be unchanged and stored as "FIRMWARE"

Exhibit the same behavior when storing strings and fill unused portions of the string with newline characters (0x00 or \n).



3 Modbus Address Specification

3.1 System Address (Min / Max / Default)

3.1.1 System Info (1 -> 1999)

Addr	RW	Name	Type	Unit	Default	Min	Max	Description
1	R	Product Serial Number	String16	-	-	-	-	Product Serial Number
11	R	Product Model Name	String16	-	"NA"	-	-	Product Model Name
21	R	Firmware Version	String16	-	-	-		Firmware Version format = xx.yy.zz xx = Major Version yy = Minor Version zz = Patch number
30	R	Software Version	String16		"00.00.00"			Software Version format = x.y.z x = Major Version y = Minor Version z = Patch number
40	R	Software Application Name	String16	-	"ECL120"	-	-	Software Application Name
50	R	Firmware Code Number	String16	-	"100C4xxx"	-	-	Firmware Code Number
60	R	Software Code Number	String16	-	"100C4xxx"	-	-	Software Code Number
70	R	Hardware Code Number	String16	-	"100U2201"	-	-	Hardware Code Number
78	R	Hardware Version	UInt16	-	0	-	-	Hardware Version format = xxyy (hex) xx = Major Version (upper byte) yy = Minor Version (lower byte) e.g. 1281 => 5.1
80	R	Product Code Number	String16	-	"100B1xxx"	-	-	Product Code Number
90	R	Manufacturer Name	String16	-	"Danfoss A/S"	-	-	Manufacturer Name
140	R	Station Manufacturer Name	String64	-	"Danfoss A/S"	-	-	Station Manufacturer Name
180	R	Station Description	String64	-	"NA"	-	-	Station Description
220	R	Station Serial Number	String16	-	"NA"	-	-	Station Serial Number
230	R	Station Product Code Number	String16	-	"NA"	-	-	Station Product Code Number



Addr	RW	Name	Type	Unit	Default	Min	Max	Description
500	R	Modbus Messages OK Count	UInt32	-	0	0	2 ³²	Modbus Messages OK Count
502	R	Modbus Messages NOK Count	UInt32		0	0	2 ³²	Modbus Messages NOK Count

510	R	Total Runtime	UInt32	Seconds	0	0	2 ³²	Total Runtime (Seconds)
512	R	Application Runtime	UInt32	Seconds	0	0	2 ³²	Application Runtime (Seconds)

550	R	Emergency Mode Status	UInt16	-	0	0	1	Emergency Mode Status 0 = Not Active 1 = Active
551	R	Emergency Mode Running Time	UInt32	Seconds	0	0	2 ³²	Emergency Mode Running Time

600	R	Current Local Time	String16	-	"T[hh]:[mm]:[ss]"	-	-	Current Local Time Format: "Thh:mm:ss" according to ISO 8601
610	R	Current Local Date	String16	-	"YYYY-MM-DD"	-	-	Current Local Date Format: "YYYY-MM-DD"
620	R	Time Valid	UInt16	-	0	0	1	Time Valid 0 = No 1 = Yes
622	RW	Time UTC Value	UInt32	Epoch	1262304000	0	2 ³²	Time UTC Value
624	R	Time Local Time (Epoch)	UInt32	Epoch	1262304000	0	2 ³²	Time Local Time (Epoch)

3.1.2 System Settings (2000 -> 3999)

Addr	RW	Name	Type	Unit	Default	Min	Max	Description
2000	RW	RS485 Baud rate	UInt32	-	38400	19200	115200	RS485 Baud rate
2002	RW	RS485 Bias Value	UInt16	-	0	0	1	RS485 Bias Value
2003	RW	Modbus Slave Address	UInt16	-	5	1	247	Modbus Slave Address

2050	RW	Time Daylight Saving Active	UInt16	-	0	0	1	Time Daylight Saving Active
2051	RW	Time TimeZone Offset	Int32		0	0	65535	Time TimeZone Offset

2100	R	Ethernet IP Address	String16	-	"0.0.0.0"			Ethernet IP Address
2110	R	Ethernet MAC Address	String32	-	"XX:XX:XX:XX:XX:XX"			Ethernet MAC Address

2200	RW	Triac Override Mode TR1	UInt16	-	0	0	1	Triac Override Mode TR1
2201	RW	Triac Override Mode TR2	UInt16	-	0	0	1	Triac Override Mode TR2

2210	RW	Relay Override Mode R1	UInt16	-	0	0	1	Relay Override Mode R1
2211	RW	Relay Override Mode R2	UInt16	-	0	0	1	Relay Override Mode R2

2220	RW	Pump Pwm Override Mode Dutycycle P1	UInt16	-	0	0	1	Pump Pwm Override Mode Dutycycle P1
2221	RW	Pump Pwm Override Mode Frequency P1	UInt16	-	0	0	1	Pump Pwm Override Mode Frequency P1

2230	RW	Stepper Override Mode Position Stepper 1	UInt16	-	0	0	1	Stepper Override Mode Position Stepper 1
2231	RW	Stepper Override Mode Position Stepper 2	UInt16	-	0	0	1	Stepper Override Mode Position Stepper 2

3.1.3 Inputs (4000 -> 5999)

Addr	RW	Name	Type	Unit	Default	Min	Max	Description
4000	R	Value of Temperature Sensor S1	Float	°C	0	-64	192	Current value of temperature sensor S1

4009	R	Status of Temperature Sensor S1	UInt16		1	0	3	0: OK 1: Invalid 2: Open circuit 3: Short circuit
4010	R	Value of Temperature Sensor S2	Float	°C	0	-64	192	Current value of temperature sensor S2

4019	R	Status of Temperature Sensor S2	UInt16		1	0	3	0: OK 1: Invalid 2: Open circuit 3: Short circuit
4020	R	Value of Temperature Sensor S3	Float	°C	0	-64	192	Current value of temperature sensor S3

4029	R	Status of Temperature Sensor S3	UInt16		1	0	3	0: OK 1: Invalid 2: Open circuit 3: Short circuit
4030	R	Value of Temperature Sensor S4	Float	°C	0	-64	192	Current value of temperature sensor S4

4039	R	Status of Temperature Sensor S4	UInt16		1	0	3	0: OK 1: Invalid 2: Open circuit 3: Short circuit
4040	R	Value of Temperature Sensor S5	Float	°C	0	-64	192	Current value of temperature sensor S5



Addr	RW	Name	Type	Unit	Default	Min	Max	Description
4049	R	Status of Temperature Sensor S5	UInt16		1	0	3	0: OK 1: Invalid 2: Open circuit 3: Short circuit
4050	R	Value of Temperature Sensor S6	Float	°C	0	-64	192	Current value of temperature sensor S6

4059	R	Status of Temperature Sensor S6	UInt16		1	0	3	0: OK 1: Invalid 2: Open circuit 3: Short circuit
4060	R	Value of Flow Sensor 1	Float	Hz	0	0	300	Current value of flow sensor 1

4398	RW	Outdoor temperature source	UInt16		0	0	2	<i>From version 01.08.00</i> 0: Physical sensor (depend on App --/S1/S2) 1: Modbus ¹ 2: Reserved
4399	RW	Outdoor temperature share config	UInt16		0	0	2	0: Sharing off 1: Share on Modbus 2: Receive on Modbus <i>From 01.07.03</i>
4400	RW	Measurement Source Modbus	Int16	°C	0	-6400	19200	Temperature value received on Modbus – scaled 100 times.
4401	RW	Modbus Temperature Sensor Status	UInt16		1	0	1	0: OK 1: NOK

3.1.4 Outputs (6000 -> 7999)

Addr	RW	Name	Type	Unit	Default	Min	Max	Description
6200	RW	Triac Override Value TR1	Int16		0	-1500	1500	

¹ Note that both 4398=1 & 4399=2 needs to be configured for SCADA Outdoor Temperature write



Addr	RW	Name	Type	Unit	Default	Min	Max	Description
6201	RW	Triac Override Value TR2	Int16		0	-1500	1500	

6210	RW	Relay Override Value R1	Int16		0	0	32767	
6211	RW	Relay Override Value R2	Int16		0	0	32767	

6220	RW	Pump Pwm Override Value Dutycycle P1	Float	%	0	0	100	
6222	RW	Pump Pwm Override Value Frequency P1	Float	Hz	100	0	4000	

6230	RW	Stepper Override Position Value Stepper 1	Float	%	0	0	100	
6232	RW	Stepper Override Position Value Stepper 2	Float	%	0	0	100	

3.1.5 (Only ECL 220) M-bus & meters (49950 -> 50500)

Supported from firmware 01.06.xx

Addr	RW	Name	Type	Unit	Default	Min	Max	Description
40998	R	M-bus status	UInt16		0	0	3	0=INIT, IDLE, SEARCHING, OVERCURRENT PROTECTION
40999	RW	M-bus Command	UInt16		0	0	4	0=NONE, INIT, UPDATE VALUES, SEARCH PRIMARY, SEARCH SECONDARY
50000	RW	M-bus baud	UInt16		2400	300	9600	300, 600, 1200, 2400, 4800, 9600

ECL 220 support up to 5 meters:

Meter no	Addr start
Meter 1	50001



Meter no	Addr start
Meter 2	50101
Meter 3	50201
Meter 4	50301
Meter 5	50401

Addr	RW	Name	Type	Unit	Default	Min	Max	Description
50x01	RW	Use Secondary Address	UInt16		0	0	1	0: Use primary addressing 1: Use secondary addressing
50x02	RW	Primary Address	UInt16		255	0	255	255: Not configured
50x03	RW	Secondary Address	UInt32		0	0	99999999	0: Not configured
50x05	RW	Scan time	UInt16	S	60	1	3600	Scan/Poll time in seconds (best effort service)
50x06	R	Reserved	UInt16		0			Furture expansion, will return 0
50x07	R	Reserved	UInt16		0			Furture expansion, will return 0
50x08	R	Reserved	UInt16		0			Furture expansion, will return 0
50x09	R	ID	UInt32		0	0	99999999	Up to 8 digits
50x11	R	Device Type (previously called medium)	UInt16		0	0	255	"Raw value from meter, as defined in standard EN 13757-7:2018 (Table 13) E.g. 0x04 => Thermal energy meter - Heat (outlet)"
50x12	R	MAN	UInt16		0			"Raw value from meter as defined in standard, EN 60870 / EN 62056-21:2002 ID number 0x10D3 => ""DFS"" => Danfoss A/S"
50x13	R	Last sample utc	UInt32	Epoch	0	0	2 ³²	Sample ECL UTC time
50x15	R	Status byte (M-bus telegram)	UInt16		0	0	255	Raw value from meter telegram, as define in EN 13757-7:2018 (Table 14)
50x16	R	Reserved	UInt16		0			Furture expansion, will return 0
50x17	R	Flow temperature	Float	deg. C	0			
50x19	R	Return temperature	Float	deg. C	0			
50x21	R	Flow rate	Float	L/h	0			
50x23	R	Power	Float	W	0			



Addr	RW	Name	Type	Unit	Default	Min	Max	Description
50x25	R	Volume	Int64	L	0		2 ⁶³	
50x29	R	Energy	Int64	Wh	0		2 ⁶³	
50x33	R	Tariff1 Acc. Energy	Int64	Wh	0		2 ⁶³	
50x37	R	Tariff2 Acc. Energy	Int64	Wh	0		2 ⁶³	
50x41	R	Up time	UInt32	Hours	0	0	2 ³²	On time' or 'Operating time' (first found in telegram)
50x43	R	Current time [m-bus defined structure]	UInt32		0	0		Data type F, Compound CP32, Data and Time
50x45	R	MAX Flow	Float	L/h	0			MAX value
50x47	R	MAX Power	Float	W	0			MAX value
50x49	R	MAX Flow temperature	Float	deg. C	0			MAX value
50x51	R	MAX Return temperature	Float	deg. C	0			MAX value

If the meter values do not explicitly indicates it, values are Sub unit = 0, Storage number = 0 and no tariff.

3.2 Application Address Space (20000 -> 39999)

APPLICATION	Start Address	End Address	Type
	20000	20999	Generic Application Info
	21000	21999	Circuit 1
	22000	22999	Circuit 2
	2X000	2X999	Circuit X
	29000	29999	Circuit 9
	2X000	2X099	Circuit X - Status
	2X100	2X199	Circuit X - Sensor
	2X200	2X299	Circuit X - References
	2X300	2X399	Circuit X - Alarms
	2X400	2X499	Circuit X - Settings
	2X700	2X799	Circuit X - Outputs
	2X800	2X999	Circuit X - Schedule
	30000	30999	Generic Application Info - Extended
	31000	31999	Circuit 1 - Extended
	32000	32999	Circuit 2 - Extended
	3X000	3X999	Circuit X - Extended
	39000	39999	Circuit 9 - Extended

3.2.1 Application Info (20000 -> 20799)

The Application Info address space will contain information that is relevant to all circuits in the Application.

Addr	RW	Name	Type	Unit	Description
--					

3.2.2 Application Circuits Overview (21000 -> 39999)

X is circuit number 1 -> 9.

3.2.2.1 Information (2X000 -> 2X099)

Overall mode and status of the circuit X.

Addr	RW	Name	Type	Unit	Description
2X000	RW	Operation Mode	UInt16	-	
2X001	R	Operation Status	UInt16	-	
2X002	R	Heat Demand Status	UInt16	-	
2X003	RW	Boost Active	UInt16	-	0 – Not active 1 – Active
2X004	R	Boost Remaining Time	Float	-	
2X006	R	Circulation Status	UInt16	-	
2X007	R	Bypass Status	UInt16	-	

3.2.2.2 Sensors (2X100 -> 2X199)

Sensor or measurements values in circuit X.

Addr	RW	Name	Type	Unit	Description
2X100	R	Flow Temperature	Float	C	
2X102	R	Outside Temperature	Float	C	
2X104	R	Return Temperature	Float	C	
2X106	R	Room Temperature	Float	C	
2X108	R	Supply Temperature	Float	C	
2X110	R	DHW Temperature	Float	C	
2X112	R	DHW Flow Rate	Float	m3/s	

3.2.2.3 References (2X200 -> 2X299)

All controller references or setpoints in circuit X. Note that some are calculated by controller and therefore read only.

Addr	RW	Name	Type	Unit	Description
2X200	R	Flow Temperature Reference	Float	C	
2X202	RW	Flow Temperature Minimum Reference	Float	C	
2X204	RW	Flow Temperature Maximum Reference	Float	C	
2X206	R	Weather Compensated Out Reference	Float	C	
2X208	RW	Summer Cut Out Temperature Reference	Float	C	
2X210	RW	Return Temperature Reference	Float	C	
2X212	RW	Room Comfort Relative Reference	Float	C	
2X214	RW	Room Saving Relative Reference	Float	C	
2X216	RW	Room Comfort Reference	Float	C	
2X218	RW	Room Saving Reference	Float	C	
2X220	RW	Frost Protection Flow Reference	Float	C	
2X222	RW	DHW Temperature Reference	Float	C	
2X224	RW	DHW Scolding Temperature Reference	Float	C	
2X226	RW	Bypass Temperature Reference	Float	C	
2X228	RW	Compensator 1 Reference	Float	C	
2X230	RW	Compensator 2 Reference	Float	C	
2X232	RW	Weather Curve Y0	Float	C	Weather Curve
2X234	RW	Weather Curve Y1	Float	C	Weather Curve
2X236	RW	Weather Curve Y2	Float	C	Weather Curve
2X238	RW	Weather Curve Y3	Float	C	Weather Curve
2X240	RW	Weather Curve Y4	Float	C	Weather Curve
2X242	RW	Weather Curve Y5	Float	C	Weather Curve
2X244	RW	Constant Base Reference	Float	C	Base reference for Room and Fixed control principle
2X246	RW	Constant Base Slope	Float	-	Slope used in Room and Fixed control principle
2X248	RW	Supply Offset Reference	Float	K	Offset used in supply control principle
2X250	RW	Pump Heat Temp	Float	C	Minimum required heat flow reference for heating pump to be turned on
2X252	RW	Frost Protection Outside Temp Reference	Float	C	If outside temperature is below this limit, heating pump is forced on
2X254	RW	Operation Reference Principle Comfort	Float	C	Comfort reference when using Operation Reference as base (cooling)

Addr	RW	Name	Type	Unit	Description
2X256	RW	Operation Reference Principle Saving	Float	C	Saving reference when using Operation Reference as base (cooling)

3.2.2.4 Alarm (2X300 -> 2X399)

Alarm status in circuit X.

Addr	RW	Name	Type	Unit	Description
2X300	R	Flow Sensor Missing Alarm	UInt16	-	
2X301	R	Flow Temperature Not Reached Alarm	UInt16	-	

3.2.2.5 Settings (2x400 -> 2X499)

Supported settings for the controller in circuit X.

Addr	RW	Name	Type	Unit	Description
2X400	RW	Pump After Run Time	UInt32	s	
2X402	RW	Return Limiter Min Influence	Float	-	
2X404	RW	Return Limiter Max Influence	Float	-	
2X406	RW	Return Limiter Adaption Time	Float	s	
2X408	RW	Room Limiter Min Influence	Float	-	
2X410	RW	Room Limiter Max Influence	Float	-	
2X412	RW	Room Limiter Adaption Time	Float	s	
2X414	RW	Compensator 1 Limiter Min Influence	Float	-	
2X416	RW	Compensator 1 Limiter Max Influence	Float	-	
2X418	RW	Compensator 2 Limiter Min Influence	Float	-	
2X420	RW	Compensator 2 Limiter Max Influence	Float	-	
2X422	RW	DHW Circulation On time	UInt32	s	
2X424	RW	DHW Circulation Off time	UInt32	s	
2X426	RW	Pump Exercise Time On	UInt32	s	
2X428	RW	Pump Exercise Idle Time	UInt32	s	
2X430	RW	Pump Exercise Trigger Time	UInt32	s	
2X432	RW	Valve Exercise Opening	Float	%	
2X434	RW	Valve Exercise Open Time	UInt32	s	
2X436	RW	Valve Exercise Close Time	UInt32	s	
2X438	RW	Boost Period	UInt32	s	
2x440	RW	Boost Added Temperature	Float	K	
2X442	RW	Reference Ramp Period	UInt32	s	Duration of the ramping of reference when used
2X444	RW	Auto Reduced Saving Temperature Limit	Float	C	Limit for when auto reduction of saving is maxed out
2X446	RW	Heating PID Xp Low	UInt16	-	PID Xp when temperature is below reference
2X447	RW	Heating PID Xp High	UInt16	-	PID Xp when temperature is above reference
2X448	RW	Heating PID Tn	UInt16	s	Adaption time for PID
2X449	RW	Heating Motor Speed*	UInt16	s/mm	
2X450	RW	Heating Motor Spindle	Float	m	
2x452	RW	Bypass Mode	UInt16	-	0 – Cold Hex 1 – Semi hot Hex
2x453	RW	Bypass Control	UInt16	-	0 – Minimum Temperature 1 – Time to reach reference
2X454	RW	Compensator 1 Adaption Time	UInt16	s	
2X455	RW	Compensator 2 Adaption Time	UInt16	s	

Addr	RW	Name	Type	Unit	Description
2X456	RW	Slope of the Weather Compensation curve	Float	-	Weather Compensation Slope Parameter that its initial value is set at reset based on curve
2x458	RW	Heat Flow PID Deadband	Float	K	Sets the +/- deadband/neutral zone for the heat flow PID

*must be scaled in Frodo with 1e3

3.2.2.6 Enable (2X600 -> 2X699)

Addr	RW	Name	Type	Unit	Description
2X600	RW	Room Limiter Enable	UInt16	-	0 – Disabled 1 – Enabled
2X601	RW	Return Limiter Enable	UInt16	-	0 – Disabled 1 – Enabled
2X602	RW	Total Stop Enable	UInt16	-	0 – Disabled 1 – Enabled
2X603	RW	Summer Cut Out Enable	UInt16	-	0 – Disabled 1 – Enabled
2X604	RW	Reference Ramp Enable	UInt16	-	0 – Disabled 1 – Enabled
2X605	RW	Auto Reduced Saving Enable	UInt16	-	0 – Disabled 1 – Enabled
2X606	RW	Frost Protection Enable	UInt16	-	0 – Disabled 1 – Enabled
2X607	RW	Towel Dryer Enable	UInt16	-	0 – Disabled 1 – Enabled
2X608	RW	Pump Exercise Enable	UInt16	-	0 – Disabled 1 – Enabled
2X609	RW	Valve Exercise Enable	UInt16	-	0 – Disabled 1 – Enabled
2X610	RW	External Override Enable	UInt16	-	0 – Off 1 – Saving when open 2 – Comfort when open 3 – Comfort when closed/shorted 4 – Saving when closed/shorted
2X611	RW	DHW Circulation Enable	UInt16	-	0 – Disabled 1 – Enabled
2X612	RW	Bypass Enable	UInt16	-	0 – Disabled 1 – Enabled
2X613	RW	Compensator 1 Enable	UInt16	-	0 – Disabled 1 – Enabled
2X614	RW	Compensator 2 Enable	UInt16	-	0 – Disabled 1 – Enabled

3.2.2.7 Outputs (2X700 -> 2X799)

Supported outputs from the controller in circuit X.

Addr	RW	Name	Type	Unit	Description
2X700	R	Valve Position	Float	%	
2X702	R	Pump State	UInt16	-	
2X703	R	TWA State	UInt16		



3.2.2.8 Week Schedule (YX800 -> YX999)

First scheduler (Y=2) in circuit in X has address range 2X800->2X999. A second scheduler (Y=3) will then have address range 3X800->3X999, utilizing the circuit extended range.

Addr	RW	Name	Type	Unit	Default	Min	Max	Description
YX800		DHW Circulation Schedule Day1						Address range: YX 800 – YX 810 See YXYX0 for more details. YX = 80, XY = 81
YX820		DHW Circulation Schedule Day2						Address range: YX 820 – YX 830 See YXYX0 for more details. YX = 82, XY = 83
YX840		DHW Circulation Schedule Day3						Address range: YX 840 – YX 850 See YXYX0 for more details. YX = 84, XY = 85
YX860		DHW Circulation Schedule Day4						Address range: YX 860 – YX 870 See YXYX0 for more details. YX = 86, XY = 87
YX880		DHW Circulation Schedule Day5						Address range: YX 880 – YX 890 See YXYX0 for more details. YX = 88, XY = 89
YX900		DHW Circulation Schedule Day6						Address range: YX 900 – YX 910 See YXYX0 for more details. YX = 90, XY = 91
YX920		DHW Circulation Schedule Day7						Address range: YX 920 – YX 930 See YXYX0 for more details. YX = 92, XY = 93
YXYX0	RW	Circulation Schedule DayX Period1 Start	UInt32	s	86400	0	86400	Refer specific week day above for YX/XY value Time Period in seconds: 0 = 00:00, 86400 = 23:59
YXYX2	RW	Circulation Schedule DayX Period1 Stop	UInt32	s	86400	0	86400	See YXYX0
YXYX4	RW	Circulation Schedule DayX Period2 Start	UInt32	s	86400	0	86400	See YXYX0
YXYX6	RW	Circulation Schedule DayX Period2 Stop	UInt32	s	86400	0	86400	See YXYX0
YXYX8	RW	Circulation Schedule DayX Period3 Start	UInt32	s	86400	0	86400	See YXYX0
YXXY0	RW	Circulation Schedule DayX Period3 Stop	UInt32	s	86400	0	86400	See YXYX0





3.3 App 3 – P266 / ECL220

Codes for App version 1.0.3 and later.

Circuit 1 is DHW controller with stepper-controlled valve, bypass and circulation support.

Circuit 2 is Heating controller with stepper-controlled valve.

3.3.1 Circuit 1 - DHW Status (21000 -> 21099)

Addr	RW	Name	Type	Unit	Min	Max	Description
21006	R	DHW Circulation Active	UInt16	-	0	1	Current status of Circulation
21007	R	DHW Bypass Active	UInt16	-	0	1	Current status of Bypass

3.3.2 Circuit 1 - DHW Sensors (21100 -> 21199)

Addr	RW	Name	Type	Unit	Min	Max	Description
21108	R	Supply Temperature	Float	C	-150	150	Measured Supply Temperature
21110	R	DHW Temperature	Float	C	-150	150	Measured DHW Temperature
21112	R	DHW Flow Rate	Float	m3/s	0	1	Measured DHW Flow Rate

3.3.3 Circuit 1 - DHW References (21200 -> 21299)

Addr	RW	Name	Type	Unit	Min	Max	Description
21222	RW	DHW Temperature Reference	Float	C	5	150	Reference for DHW Temperature
21224	RW	DHW Scolding Temperature Reference	Float	C	0	75	Maximum allowed DHW Temperature before scolding protection kicks in
21226	RW	Bypass Temperature Reference	Float	C	5	150	Reference for supply temperature in bypass

3.3.4 Circuit 1 - DHW Alarms (21300 -> 21399)

Addr	RW	Name	Type	Unit	Min	Max	Description
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3.3.5 Circuit 1 - DHW Settings (21400 -> 21499)

Addr	RW	Name	Type	Unit	Min	Max	Description
21422	RW	DHW Circulation On Time	UInt32	sec	0	9000	On time for circulation pump when active
21424	RW	DHW Circulation Off Time	UInt32	sec	0	27000	Off time for circulation pump when active
21452	RW	Bypass Mode	UInt16	-	0	1	0 – Cold Hex 1 – Semi hot Hex

3.3.6 Circuit 1 - DHW Enable (21600 -> 21699)

Addr	RW	Name	Type	Unit	Min	Max	Description
21611	RW	DHW Circulation Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
21612	RW	Bypass Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled

3.3.7 Circuit 1 - DHW Outputs (21700 -> 21799)

Addr	RW	Name	Type	Unit	Min	Max	Description
21700	R	DHW Valve Position	Float	%	0	1	Scale 100
21702	R	DHW Circulation Pump State	UInt16	-	0	1	Current state of Pump Relay for Circulation
21703	R	Bypass TWA State	UInt16	-	0	1	Current state of TWA for Bypass

3.3.8 Circuit 1 - DHW Circulation Week Schedule (21800 -> 21999)

Addr	RW	Name	Type	Unit	Default	Min	Max	Description
21800		DHW Circulation Schedule Day1						Address range: 21800 – 21810 See 21XX0 for more details. XX = 80, XY = 81
21820		DHW Circulation Schedule Day2						Address range: 21820 – 21830 See 21XX0 for more details. XX = 82, XY = 83
21840		DHW Circulation Schedule Day3						Address range: 21840 – 21850 See 21XX0 for more details. XX = 84, XY = 85
21860		DHW Circulation Schedule Day4						Address range: 21860 – 21870 See 21XX0 for more details. XX = 86, XY = 87
21880		DHW Circulation Schedule Day5						Address range: 21880 – 21890 See 21XX0 for more details. XX = 88, XY = 89
21900		DHW Circulation Schedule Day6						Address range: 21900 – 21910 See 21XX0 for more details. XX = 90, XY = 91
21920		DHW Circulation Schedule Day7						Address range: 21920 – 21930 See 21XX0 for more details. XX = 92, XY = 93
21XX0	RW	Circulation Schedule DayX Period1 Start	UInt32	s	86400	0	86400	Refer specific week day above for XX/XY value Time Period in seconds: 0 = 00:00, 86400 = 23:59
21XX2	RW	Circulation Schedule DayX Period1 Stop	UInt32	s	86400	0	86400	See 21XX0
21XX4	RW	Circulation Schedule DayX Period2 Start	UInt32	s	86400	0	86400	See 21XX0
21XX6	RW	Circulation Schedule DayX Period2 Stop	UInt32	s	86400	0	86400	See 21XX0
21XX8	RW	Circulation Schedule DayX Period3 Start	UInt32	s	86400	0	86400	See 21XX0
21XY0	RW	Circulation Schedule DayX Period3 Stop	UInt32	s	86400	0	86400	See 21XX0

3.3.9 Circuit 2 - Heat Status (22000 -> 22099)

Addr	RW	Name	Type	Unit	Min	Max	Description
22000	RW	Operation Mode	UInt16	-	0	10	Current operation mode: 0 = Automatic 1 = Comfort 2 = Saving 3 = Frost protection
22001	R	Operation Status	UInt16	-	0	10	Current operation status: 0 = Comfort 1 = Saving 2 = Frost Protection
22002	R	Heat Demand Status	UInt16	-	0	1	Status of external override
22003	RW	Boost Active	UInt16	-	0	10	0 – Not active 1 – Active
22004	R	Boost Remaining Time	Float	s	0	99999	Remaining time of boost

3.3.10 Circuit 2 - Heat Sensors (22100 -> 22199)

Addr	RW	Name	Type	Unit	Min	Max	Description
22100	R	Heat Flow Temperature	Float	C	-150	150	Current Heat Flow Temperature
22102	R	Outside Temperature	Float	C	-150	150	Current Outside Temperature
22104	R	Return Temperature	Float	C	-150	150	Current Return Temperature
22106	R	Room Temperature	Float	C	-150	150	Current Room Temperature
22108	R	Supply Temperature	Float	C	-150	150	Current Supply Temperature

3.3.11 Circuit 2 - Heat References (22200 -> 22299)

Addr	RW	Name	Type	Unit	Min	Max	Description
22200	R	Heat Flow Temperature Reference	Float	C	0	150	Calculated heat flow reference
22202	RW	Heat Flow Temperature Minimum Reference	Float	C	5	150	Minimum allowed value for the calculated heat flow reference
22204	RW	Heat Flow Temperature Maximum Reference	Float	C	5	150	Maximum allowed value for the calculated heat flow reference
22206	R	Heat Weather Compensated Reference	Float	C	-150	150	Calculated value from the weather compensator
22208	RW	Heat Summer Cut Out Temperature Reference	Float	C	0	50	Reference for outdoor temperature for when heating will be turned off
22210	RW	Heat Return Temperature Reference	Float	C	5	150	Reference for Return Limiter
22212	RW	Heat Room Comfort Relative Reference	Float	C	0.5	5	Relative Comfort Reference for Room Limiter
22214	RW	Heat Room Saving Relative Reference	Float	C	0.5	5	Relative Saving Reference for Room Limiter
22216	RW	Heat Room Comfort Reference	Float	C	5	40	Comfort Reference for Room Limiter
22218	RW	Heat Room Saving Reference	Float	C	5	40	Saving Reference for Room Limiter
22220	RW	Frost Protection Heat Flow Reference	Float	C	5	40	Reference for Heat Flow Temperature when in Frost Protection
22232	RW	Weather Curve Y0	Float	C	5	250	Weather Curve
22234	RW	Weather Curve Y1	Float	C	5	250	Weather Curve
22236	RW	Weather Curve Y2	Float	C	5	250	Weather Curve
22238	RW	Weather Curve Y3	Float	C	5	250	Weather Curve
22240	RW	Weather Curve Y4	Float	C	5	250	Weather Curve
22242	RW	Weather Curve Y5	Float	C	5	250	Weather Curve
22244	RW	Constant Base Reference	Float	C	-200	200	Base reference for Room and Fixed control principle
22246	RW	Constant Base Slope	Float	-	0	5	Slope used in Room and Fixed control principle
22248	RW	Supply Offset Reference	Float	K	-45	0	Offset used in supply control principle



Addr	RW	Name	Type	Unit	Min	Max	Description
22250	RW	Pump Heat Temp	Float	C	5	40	Minimum required heat flow reference for heating pump to be turned on
22252	RW	Frost Protection Outside Temp Reference	Float	C	-10	20	If outside temperature is below this limit, heating pump is forced on

3.3.12 Circuit 2 - Heat Alarms (22300 -> 22399)

Addr	RW	Name	Type	Unit	Min	Max	Description
22300	R	Heat Alarm Sensor Missing	UInt16		1		Alarm for missing heat flow sensor
22301	R	Heat Alarm Reference Not Reached	UInt16		0	1	Alarm for reference not reached

3.3.13 Circuit 2 - Heat Settings (22400 -> 22499)

Addr	RW	Name	Type	Unit	Min	Max	Description
22400	RW	Heat Pump After Run Time	UInt32	sec	0	18000	After Run for Heating Pump Relay
22402	RW	Return Limiter Min Influence	Float	-	0	10	Return Limiter Min Influence
22404	RW	Return Limiter Max Influence	Float	-	-10	0	Return Limiter Max Influence
22406	RW	Return Limiter Adaption Time	Float	-	0	50	Return Limiter Adaption Time
22408	RW	Room Limiter Min Influence	Float	-	0	10	Room Limiter Min Influence
22410	RW	Room Limiter Max Influence	Float	-	-10	0	Room Limiter Max Influence
22412	RW	Room Limiter Adaption Time	Float	-	0	50	Room Limiter Adaption Time
22426	RW	Heat Pump Exercise Time On	UInt32	s	0	18000	Heat Pump Exercise Time On
22428	RW	Heat Pump Exercise Idle Time	UInt32	s	0	864000	3 Days of idle then activate trigger time from next day

Addr	RW	Name	Type	Unit	Min	Max	Description
22430	RW	Heat Pump Exercise Trigger Time	UInt32	s	0	864000	Exercise at 12:00
22432	RW	Heat Valve Exercise Opening	Float	%	0	1	Scale 100
22434	RW	Heat Valve Exercise Open Time	UInt32	s	0	86400	Time the valve stays open
22436	RW	Heat Valve Exercise Close Time	UInt32	s	0	864000	Time the valve stays close, before eventual pump exercise starts
22438	RW	Boost Period	UInt32	s	0	86400	
22440	RW	Boost Added Temperature	Float	K	0	25	
22442	RW	Reference Ramp Period	UInt32	s	0	5940	Duration of the ramping of reference when used
22444	RW	Auto Reduced Saving Temperature Limit	Float	C			Limit for when auto reduction of saving is maxed out
22446	RW	PID Xp Low	UInt16	-			PID Xp when temperature is below reference
22447	RW	PID Xp High	UInt16	-			PID Xp when temperature is above reference
22448	RW	PID Tn	UInt16	s			Adaption time for PID
22456	RW	Slope of the Weather Compensation curve	Float	-	0	4	Weather Compensation Slope Parameter that its initial value is set at reset based on curve
22458	RW	Heat flow PID Deadband	Float	K	0	10	Sets the +/- deadband/neutral zone for the heat flow PID

3.3.14 Circuit 2 - Heat Enable (22600 -> 22699)

Addr	RW	Name	Type	Unit	Min	Max	Description
22600	RW	Room Limiter Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
22601	RW	Return Limiter Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
22602	RW	Total Stop Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
22603	RW	Summer Cut Out Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
22604	RW	Reference Ramp Enable	UInt16	-	0	1	0 – Disabled

Addr	RW	Name	Type	Unit	Min	Max	Description
							1 – Enabled
22605	RW	Auto Reduced Saving Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
22606	RW	Frost Protection Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
22607	RW	Towel Dryer Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
22608	RW	Pump Exercise Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
22609	RW	Valve Exercise Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
22610	RW	External Override Enable	UInt16	-	0	1	0 – Off 1 – Saving when open 2 – Comfort when open 3 – Comfort when closed/shorted 4 – Saving when closed/shorted

3.3.15 Circuit 2 - Heat Outputs (22700 -> 22799)

Addr	RW	Name	Type	Unit	Min	Max	Description
22700	R	Heat Valve Position	Float	%	0	1	Scale 100
22702	R	Heat Pump State	UInt16	-	0	1	Current state of heating pump relay
22703	R	Heat TWA State	UInt16	-	0	1	Current state of heating TWA output



Circuit 2 – Heating Week Schedule (22800 -> 22999)

Addr	RW	Name	Type	Unit	Default	Min	Max	Description
22800		Weekly Schedule Day1						Address range: 22800 – 22810 See 22XX0 for more details. XX = 80, XY = 81
22820		Weekly Schedule Day2						Address range: 22820 – 22830 See 22XX0 for more details. XX = 82, XY = 83
22840		Weekly Schedule Day3						Address range: 22840 – 22850 See 22XX0 for more details. XX = 84, XY = 85
22860		Weekly Schedule Day4						Address range: 22860 – 22870 See 22XX0 for more details. XX = 86, XY = 87
22880		Weekly Schedule Day5						Address range: 22880 – 22890 See 22XX0 for more details. XX = 88, XY = 89
22900		Weekly Schedule Day6						Address range: 22900 – 22910 See 22XX0 for more details. XX = 90, XY = 91
22920		Weekly Schedule Day7						Address range: 22920 – 22930 See 22XX0 for more details. XX = 92, XY = 93
22XX0	RW	Weekly Schedule DayX Period1 Start	UInt32	s	86400	0	86400	Refer specific week day above for XX/XY value Time Period in seconds: 0 = 00:00, 86400 = 23:59
22XX2	RW	Weekly Schedule DayX Period1 Stop	UInt32	s	86400	0	86400	See 22XX0
22XX4	RW	Weekly Schedule DayX Period2 Start	UInt32	s	86400	0	86400	See 22XX0
22XX6	RW	Weekly Schedule DayX Period2 Stop	UInt32	s	86400	0	86400	See 22XX0
22XX8	RW	Weekly Schedule DayX Period3 Start	UInt32	s	86400	0	86400	See 22XX0
22XY0	RW	Weekly Schedule DayX Period3 Stop	UInt32	s	86400	0	86400	See 22XX0



3.3.16 Circuit 2 – Towel Dryer Week Schedule (32800 -> 32999)

Addr	RW	Name	Type	Unit	Default	Min	Max	Description
32800		Weekly Schedule Day1						Address range: 32800 – 32810 See 32XX0 for more details. XX = 80, XY = 81
32820		Weekly Schedule Day2						Address range: 32820 – 32830 See 32XX0 for more details. XX = 82, XY = 83
32840		Weekly Schedule Day3						Address range: 32840 – 32850 See 32XX0 for more details. XX = 84, XY = 85
32860		Weekly Schedule Day4						Address range: 32860 – 32870 See 32XX0 for more details. XX = 86, XY = 87
32880		Weekly Schedule Day5						Address range: 32880 – 32890 See 32XX0 for more details. XX = 88, XY = 89
32900		Weekly Schedule Day6						Address range: 32900 – 32910 See 32XX0 for more details. XX = 90, XY = 91
32920		Weekly Schedule Day7						Address range: 32920 – 32930 See 32XX0 for more details. XX = 92, XY = 93
32XX0	RW	Weekly Schedule DayX Period1 Start	UInt32	s	86400	0	86400	Refer specific week day above for XX/XY value Time Period in seconds: 0 = 00:00, 86400 = 23:59
32XX2	RW	Weekly Schedule DayX Period1 Stop	UInt32	s	86400	0	86400	See 32XX0
32XX4	RW	Weekly Schedule DayX Period2 Start	UInt32	s	86400	0	86400	See 32XX0
32XX6	RW	Weekly Schedule DayX Period2 Stop	UInt32	s	86400	0	86400	See 32XX0
32XX8	RW	Weekly Schedule DayX Period3 Start	UInt32	s	86400	0	86400	See 32XX0
32XY0	RW	Weekly Schedule DayX Period3 Stop	UInt32	s	86400	0	86400	See 32XX0



3.4 App 4 A130 / ECL120

Codes for App version 1.2.2 and later.

Circuit 1 is Heating controller with motor-controlled valve.

Has 2 schedulers one for heating and one for bypass.

3.4.1 Circuit 1 - Heat Status (21000 -> 21099)

Addr	RW	Name	Type	Unit	Min	Max	Description
21000	RW	Operation Mode	UInt16	-	0	10	Current operation mode: 0 = Automatic 1 = Comfort 2 = Saving 3 = Frost protection
21001	R	Operation Status	UInt16	-	0	10	Current operation status: 0 = Comfort 1 = Saving 2 = Frost Protection
21002	R	Heat Demand Status	UInt16	-	0	1	Status of external override
21003	RW	Boost Active	UInt16	-	0	10	0 – Not active 1 – Active
21004	R	Boost Remaining Time	Float	s	0	99999	Remaining time of boost
21007	R	DHW Bypass Active	UInt16	-	0	1	Current status of Bypass

3.4.2 Circuit 1 - Heat Sensors (21100 -> 21199)

Addr	RW	Name	Type	Unit	Min	Max	Description
21100	R	Heat Flow Temperature	Float	C	-150	150	Current Heat Flow Temperature
21102	R	Outside Temperature	Float	C	-150	150	Current Outside Temperature
21104	R	Return Temperature	Float	C	-150	150	Current Return Temperature
21106	R	Room Temperature	Float	C	-150	150	Current Room Temperature
21108	R	Supply Temperature	Float	C	-150	150	Current Supply Temperature
21110	R	DHW Temperature	Float	C	-150	150	Current DHW Temperature



3.4.3 Circuit 1 - Heat References (21200 -> 21299)

Addr	RW	Name	Type	Unit	Min	Max	Description
21200	R	Heat Flow Temperature Reference	Float	C	0	150	Calculated heat flow reference
21202	RW	Heat Flow Temperature Minimum Reference	Float	C	5	150	Minimum allowed value for the calculated heat flow reference
21204	RW	Heat Flow Temperature Maximum Reference	Float	C	5	150	Maximum allowed value for the calculated heat flow reference
21206	R	Heat Weather Compensated Reference	Float	C	-150	150	Calculated value from the weather compensator
21208	RW	Heat Summer Cut Out Temperature Reference	Float	C	0	50	Reference for outdoor temperature for when heating will be turned off
21210	RW	Heat Return Temperature Reference	Float	C	5	150	Reference for Return Limiter
21212	RW	Heat Room Comfort Relative Reference	Float	C	0.5	5	Relative Comfort Reference for Room Limiter
21214	RW	Heat Room Saving Relative Reference	Float	C	0.5	5	Relative Saving Reference for Room Limiter
21216	RW	Heat Room Comfort Reference	Float	C	5	40	Comfort Reference for Room Limiter
21218	RW	Heat Room Saving Reference	Float	C	5	40	Saving Reference for Room Limiter
21220	RW	Frost Protection Heat Flow Reference	Float	C	5	40	Reference for Heat Flow Temperature when in Frost Protection
21226	RW	Bypass Temperature Reference	Float	C	5	150	Reference for supply temperature in bypass
21232	RW	Weather Curve Y0	Float	C	5	250	Weather Curve
21234	RW	Weather Curve Y1	Float	C	5	250	Weather Curve
21236	RW	Weather Curve Y2	Float	C	5	250	Weather Curve
21238	RW	Weather Curve Y3	Float	C	5	250	Weather Curve
21240	RW	Weather Curve Y4	Float	C	5	250	Weather Curve
21242	RW	Weather Curve Y5	Float	C	5	250	Weather Curve
21244	RW	Constant Base Reference	Float	C	-200	200	Base reference for Room and Fixed control principle
21246	RW	Constant Base Slope	Float	-	0	5	Slope used in Room and Fixed control principle



Addr	RW	Name	Type	Unit	Min	Max	Description
21248	RW	Supply Offset Reference	Float	K	-45	0	Offset used in supply control principle
21250	RW	Pump Heat Temp	Float	C	5	40	Minimum required heat flow reference for heating pump to be turned on
21252	RW	Frost Protection Outside Temp Reference	Float	C	-10	20	If outside temperature is below this limit, heating pump is forced on

3.4.4 Circuit 1 - Heat Alarms (21300 -> 21399)

Addr	RW	Name	Type	Unit	Min	Max	Description
21300	R	Heat Alarm Sensor Missing	UInt16		0	1	Alarm for missing heat flow sensor
21301	R	Heat Alarm Reference Not Reached	UInt16		0	1	Alarm for reference not reached

3.4.5 Circuit 1 - Heat Settings (21400 -> 21499)

Addr	RW	Name	Type	Unit	Min	Max	Description
21400	RW	Heat Pump After Run Time	UInt32	sec	0	18000	After Run for Heating Pump Relay
21402	RW	Return Limiter Min Influence	Float	-	0	10	Return Limiter Min Influence
21404	RW	Return Limiter Max Influence	Float	-	-10	0	Return Limiter Max Influence
21406	RW	Return Limiter Adaption Time	Float	-	0	50	Return Limiter Adaption Time
21408	RW	Room Limiter Min Influence	Float	-	0	10	Room Limiter Min Influence
21410	RW	Room Limiter Max Influence	Float	-	-10	0	Room Limiter Max Influence
21412	RW	Room Limiter Adaption Time	Float	-	0	50	Room Limiter Adaption Time
21426	RW	Heat Pump Exercise Time On	UInt32	s	0	18000	Heat Pump Exercise Time On



Addr	RW	Name	Type	Unit	Min	Max	Description
21428	RW	Heat Pump Exercise Idle Time	UInt32	s	0	864000	3 Days of idle then activate trigger time from next day
21430	RW	Heat Pump Exercise Trigger Time	UInt32	s	0	864000	Exercise at 12:00
21432	RW	Heat Valve Exercise Opening	Float	%	0	1	Scale 100
21434	RW	Heat Valve Exercise Open Time	UInt32	s	0	86400	Time the valve stays open
21436	RW	Heat Valve Exercise Close Time	UInt32	s	0	864000	Time the valve stays close, before eventual pump exercise starts
21438	RW	Boost Period	UInt32	s	0	86400	
21440	RW	Boost Added Temperature	Float	K	0	25	
21442	RW	Reference Ramp Period	UInt32	s	0	5940	Duration of the ramping of reference when used
21444	RW	Auto Reduced Saving Temperature Limit	Float	C			Limit for when auto reduction of saving is maxed out
21446	RW	PID Xp Low	UInt16	-			PID Xp when temperature is below reference
21447	RW	PID Xp High	UInt16	-			PID Xp when temperature is above reference
21448	RW	PID Tn	UInt16	s			Adaption time for PID
21449	RW	Motor Speed	UInt16	s/mm	0	65535	Speed of motor
21450	RW	Valve Spindle	Float	m	0	0.05	Valve spindle length
21456	RW	Slope of the Weather Compensation curve	Float	-	0	4	Weather Compensation Slope Parameter that its initial value is set at reset based on curve
21458	RW	Heat flow PID Deadband	Float	K	0	10	Sets the +/- deadband/neutral zone for the heat flow PID

3.4.6 Circuit 1 - Heat Enable (21600 -> 21699)

Addr	RW	Name	Type	Unit	Min	Max	Description
21600	RW	Room Limiter Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
21601	RW	Return Limiter Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
21602	RW	Total Stop Enable	UInt16	-	0	1	0 – Disabled

Addr	RW	Name	Type	Unit	Min	Max	Description
							1 – Enabled
21603	RW	Summer Cut Out Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
21604	RW	Reference Ramp Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
21605	RW	Auto Reduced Saving Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
21606	RW	Frost Protection Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
21608	RW	Pump Exercise Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
21609	RW	Valve Exercise Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
21610	RW	External Override Enable	UInt16	-	0	1	0 – Off 1 – Saving when open 2 – Comfort when open 3 – Comfort when closed/shorted 4 – Saving when closed/shorted
21612	RW	Bypass Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled

3.4.7 Circuit 1 - Heat Outputs (21700 -> 21799)

Addr	RW	Name	Type	Unit	Min	Max	Description
21700	R	Heat Valve Position	Float	%	0	1	Scale 100 – Estimated position of motor
21702	R	Heat Pump State	UInt16	-	0	1	Current state of Heating pump relay

3.4.8 Circuit 1 – Heating Week Schedule (21800 -> 21999)

Addr	RW	Name	Type	Unit	Default	Min	Max	Description
21800		Weekly Schedule Day1						Address range: 21800 – 21810 See 21XX0 for more details. XX = 80, XY = 81
21820		Weekly Schedule Day2						Address range: 21820 – 21830 See 21XX0 for more details. XX = 82, XY = 83
21840		Weekly Schedule Day3						Address range: 21840 – 21850 See 21XX0 for more details. XX = 84, XY = 85
21860		Weekly Schedule Day4						Address range: 21860 – 21870 See 21XX0 for more details. XX = 86, XY = 87
21880		Weekly Schedule Day5						Address range: 21880 – 21890 See 21XX0 for more details. XX = 88, XY = 89
21900		Weekly Schedule Day6						Address range: 21900 – 21910 See 21XX0 for more details. XX = 90, XY = 91
21920		Weekly Schedule Day7						Address range: 21920 – 21930 See 21XX0 for more details. XX = 92, XY = 93
21XX0	RW	Weekly Schedule DayX Period1 Start	UInt32	s	86400	0	86400	Refer specific week day above for XX/XY value Time Period in seconds: 0 = 00:00, 86400 = 23:59
21XX2	RW	Weekly Schedule DayX Period1 Stop	UInt32	s	86400	0	86400	See 21XX0
21XX4	RW	Weekly Schedule DayX Period2 Start	UInt32	s	86400	0	86400	See 21XX0
21XX6	RW	Weekly Schedule DayX Period2 Stop	UInt32	s	86400	0	86400	See 21XX0
21XX8	RW	Weekly Schedule DayX Period3 Start	UInt32	s	86400	0	86400	See 21XX0
21XY0	RW	Weekly Schedule DayX Period3 Stop	UInt32	s	86400	0	86400	See 21XX0

3.4.9 Circuit 1 – Bypass Week Schedule (31800 -> 31999)

Addr	RW	Name	Type	Unit	Default	Min	Max	Description
31800		Weekly Schedule Day1						Address range: 31800 – 31810 See 31XX0 for more details. XX = 80, XY = 81
31820		Weekly Schedule Day2						Address range: 31820 – 31830 See 31XX0 for more details. XX = 82, XY = 83
31840		Weekly Schedule Day3						Address range: 31840 – 31850 See 31XX0 for more details. XX = 84, XY = 85
31860		Weekly Schedule Day4						Address range: 31860 – 31870 See 31XX0 for more details. XX = 86, XY = 87
31880		Weekly Schedule Day5						Address range: 31880 – 31890 See 31XX0 for more details. XX = 88, XY = 89
31900		Weekly Schedule Day6						Address range: 31900 – 31910 See 31XX0 for more details. XX = 90, XY = 91
31920		Weekly Schedule Day7						Address range: 31920 – 31930 See 31XX0 for more details. XX = 92, XY = 93
31XX0	RW	Weekly Schedule DayX Period1 Start	UInt32	s	86400	0	86400	Refer specific week day above for XX/XY value Time Period in seconds: 0 = 00:00, 86400 = 23:59
31XX2	RW	Weekly Schedule DayX Period1 Stop	UInt32	s	86400	0	86400	See 31XX0
31XX4	RW	Weekly Schedule DayX Period2 Start	UInt32	s	86400	0	86400	See 31XX0
31XX6	RW	Weekly Schedule DayX Period2 Stop	UInt32	s	86400	0	86400	See 31XX0
31XX8	RW	Weekly Schedule DayX Period3 Start	UInt32	s	86400	0	86400	See 31XX0
31XY0	RW	Weekly Schedule DayX Period3 Stop	UInt32	s	86400	0	86400	See 31XX0



3.5 App 5 A131/ECL120

Codes for App version 1.0.2 and later.

Circuit 1 is Cooling controller with motor-controlled valve.

3.5.1 Circuit 1 - Cooling Status (21000 -> 21099)

Addr	RW	Name	Type	Unit	Min	Max	Description
21000	RW	Operation Mode	UInt16	-	0	10	Current operation mode: 0 = Automatic 1 = Comfort 2 = Saving 3 = Frost protection
21001	R	Operation Status	UInt16	-	0	10	Current operation status: 0 = Comfort 1 = Saving 2 = Frost Protection
21002	R	Cooling Demand Status	UInt16	-	0	1	Status of external override
21003	RW	Boost Active	UInt16	-	0	10	0 – Not active 1 – Active

3.5.2 Circuit 1 - Cooling Sensors (21100 -> 21199)

Addr	RW	Name	Type	Unit	Min	Max	Description
21100	R	Heat Flow Temperature	Float	C	-150	150	Current Heat Flow Temperature
21102	R	Outside Temperature	Float	C	-150	150	Current Outside Temperature
21104	R	Return Temperature	Float	C	-150	150	Current Return Temperature
21106	R	Room Temperature	Float	C	-150	150	Current Room Temperature

3.5.3 Circuit 1 - Cooling References (21200 -> 21299)

Addr	RW	Name	Type	Unit	Min	Max	Description
21200	R	Cooling Flow Temperature Reference	Float	C	0	150	Calculated cooling flow reference
21202	RW	Cooling Flow Temperature Minimum Reference	Float	C	5	150	Minimum allowed value for the calculated cooling flow reference
21204	RW	Cooling Flow Temperature Maximum Reference	Float	C	5	150	Maximum allowed value for the calculated cooling flow reference
21210	RW	Cooling Return Temperature Reference	Float	C	5	150	Reference for Return Limiter
21212	RW	Cooling Room Comfort Relative Reference	Float	C	0.5	5	Relative Comfort Reference for Room Limiter
21214	RW	Cooling Room Saving Relative Reference	Float	C	0.5	5	Relative Saving Reference for Room Limiter
21216	RW	Cooling Room Comfort Reference	Float	C	5	40	Comfort Reference for Room Limiter
21218	RW	Cooling Room Saving Reference	Float	C	5	40	Saving Reference for Room Limiter
21220	RW	Standby Flow Reference	Float	C	5	40	Standby Reference for Cooling Flow Temperature
21228	RW	Compensator 1 Reference	Float	C	0	80	Reference for Compensator 1
21230	RW	Compensator 2 Reference	Float	C	0	80	Reference for Compensator 2

3.5.4 Circuit 1 - Cooling Alarms (21300 -> 21399)

Addr	RW	Name	Type	Unit	Min	Max	Description
21300	R	Cooling Alarm Sensor Missing	UInt16		0	1	Alarm for missing Cooling flow sensor

3.5.5 Circuit 1 - Cooling Settings (21400 -> 21499)

Addr	RW	Name	Type	Unit	Min	Max	Description
21402	RW	Return Limiter Min Influence	Float	-	0	10	Return Limiter Min Influence
21404	RW	Return Limiter Max Influence	Float	-	-10	0	Return Limiter Max Influence
21406	RW	Return Limiter Adaption Time	Float	-	0	50	Return Limiter Adaption Time
21408	RW	Room Limiter Min Influence	Float	-	0	10	Room Limiter Min Influence
21410	RW	Room Limiter Max Influence	Float	-	-10	0	Room Limiter Max Influence
21412	RW	Room Limiter Adaption Time	Float	-	0	50	Room Limiter Adaption Time
21414	RW	Compensator 1 Min Influence	Float	-	0	10	Compensator 1 Min Influence
21416	RW	Compensator 1 Max Influence	Float	-	-10	0	Compensator 1 Max Influence
21418	RW	Compensator 2 Min Influence	Float	-	0	10	Compensator 2 Min Influence
21420	RW	Compensator 2 Max Influence	Float	-	-10	0	Compensator 2 Max Influence
21426	RW	Cooling Pump Exercise Time On	UInt32	s	0	18000	Cooling Pump Exercise Time On
21428	RW	Cooling Pump Exercise Idle Time	UInt32	s	0	864000	3 Days of idle then activate trigger time from next day
21430	RW	Cooling Pump Exercise Trigger Time	UInt32	s	0	864000	Exercise at 12:00
21432	RW	Cooling Valve Exercise Opening	Float	%	0	1	Scale 100
21434	RW	Cooling Valve Exercise Open Time	UInt32	s	0	86400	Time the valve stays open
21436	RW	Cooling Valve Exercise Close Time	UInt32	s	0	864000	Time the valve stays close, before eventual pump exercise starts
21438	RW	Boost Period	UInt32	s	0	86400	

Addr	RW	Name	Type	Unit	Min	Max	Description
21440	RW	Boost Added Temperature	Float	K	0	25	
21446	RW	PID Xp Low	UInt16	-			PID Xp when temperature is below reference
21447	RW	PID Xp High	UInt16	-			PID Xp when temperature is above reference
21448	RW	PID Tn	UInt16	s			Adaption time for PID
21449	RW	Motor Speed	UInt16	s/mm	0	65535	Speed of motor
21450	RW	Valve Spindle	Float	m	0	0.05	Valve spindle length
21458	RW	Cooling flow PID Deadband	Float	K	0	10	Sets the +/- deadband/neutral zone for the cooling flow PID

3.5.6 Circuit 1 - Cooling Enable (21600 -> 21699)

Addr	RW	Name	Type	Unit	Min	Max	Description
21600	RW	Room Limiter Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
21601	RW	Return Limiter Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
21602	RW	Total Stop Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
21608	RW	Pump Exercise Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
21609	RW	Valve Exercise Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
21610	RW	External Override Enable	UInt16	-	0	1	0 – Off 1 – Saving when open 2 – Comfort when open 3 – Comfort when closed/shorted 4 – Saving when closed/shorted
21613	RW	Compensator 1 Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
21614	RW	Compensator 2 Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled



3.5.7 Circuit 1 – Cooling Outputs (21700 -> 21799)

Addr	RW	Name	Type	Unit	Min	Max	Description
21700	R	Cooling Valve Position	Float	%	0	1	Scale 100 – Estimated position of motor
21702	R	Cooling Pump State	UInt16	-	0	1	



3.5.8 Circuit 1 – Cooling Week Schedule (21800 -> 21999)

Addr	RW	Name	Type	Unit	Default	Min	Max	Description
21800		Weekly Schedule Day1						Address range: 21800 – 21810 See 21XX0 for more details. XX = 80, XY = 81
21820		Weekly Schedule Day2						Address range: 21820 – 21830 See 21XX0 for more details. XX = 82, XY = 83
21840		Weekly Schedule Day3						Address range: 21840 – 21850 See 21XX0 for more details. XX = 84, XY = 85
21860		Weekly Schedule Day4						Address range: 21860 – 21870 See 21XX0 for more details. XX = 86, XY = 87
21880		Weekly Schedule Day5						Address range: 21880 – 21890 See 21XX0 for more details. XX = 88, XY = 89
21900		Weekly Schedule Day6						Address range: 21900 – 21910 See 21XX0 for more details. XX = 90, XY = 91
21920		Weekly Schedule Day7						Address range: 21920 – 21930 See 21XX0 for more details. XX = 92, XY = 93
21XX0	RW	Weekly Schedule DayX Period1 Start	UInt32	s	86400	0	86400	Refer specific week day above for XX/XY value Time Period in seconds: 0 = 00:00, 86400 = 23:59
21XX2	RW	Weekly Schedule DayX Period1 Stop	UInt32	s	86400	0	86400	See 21XX0
21XX4	RW	Weekly Schedule DayX Period2 Start	UInt32	s	86400	0	86400	See 21XX0
21XX6	RW	Weekly Schedule DayX Period2 Stop	UInt32	s	86400	0	86400	See 21XX0
21XX8	RW	Weekly Schedule DayX Period3 Start	UInt32	s	86400	0	86400	See 21XX0
21XY0	RW	Weekly Schedule DayX Period3 Stop	UInt32	s	86400	0	86400	See 21XX0



3.6 App 6 – P116 / ECL220

Circuit 1 is DHW controller with stepper-controlled valve, bypass and circulation support.

3.6.1 Circuit 1 - DHW Status (21000 -> 21099)

Addr	RW	Name	Type	Unit	Min	Max	Description
21006	R	DHW Circulation Active	UInt16	-	0	1	Current status of Circulation
21007	R	DHW Bypass Active	UInt16	-	0	1	Current status of Bypass

3.6.2 Circuit 1 - DHW Sensors (21100 -> 21199)

Addr	RW	Name	Type	Unit	Min	Max	Description
21108	R	Supply Temperature	Float	C	-150	150	Measured Supply Temperature
21110	R	DHW Temperature	Float	C	-150	150	Measured DHW Temperature
21112	R	DHW Flow Rate	Float	m3/s	0	1	Measured DHW Flow Rate

3.6.3 Circuit 1 - DHW References (21200 -> 21299)

Addr	RW	Name	Type	Unit	Min	Max	Description
21222	RW	DHW Temperature Reference	Float	C	5	150	Reference for DHW Temperature
21224	RW	DHW Scolding Temperature Reference	Float	C	0	75	Maximum allowed DHW Temperature before scolding protection kicks in
21226	RW	Bypass Temperature Reference	Float	C	5	150	Reference for supply temperature in bypass

3.6.4 Circuit 1 - DHW Alarms (21300 -> 21399)

Addr	RW	Name	Type	Unit	Min	Max	Description
--							



3.6.5 Circuit 1 - DHW Settings (21400 -> 21499)

Addr	RW	Name	Type	Unit	Min	Max	Description
21422	RW	DHW Circulation On Time	UInt32	sec	0	9000	On time for circulation pump when active
21424	RW	DHW Circulation Off Time	UInt32	sec	0	27000	Off time for circulation pump when active
21452	RW	Bypass Mode	UInt16	-	0	1	0 – Cold Hex 1 – Semi hot Hex

3.6.6 Circuit 1 - DHW Enable (21600 -> 21699)

Addr	RW	Name	Type	Unit	Min	Max	Description
21611	RW	DHW Circulation Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled
21612	RW	Bypass Enable	UInt16	-	0	1	0 – Disabled 1 – Enabled

3.6.7 Circuit 1 - DHW Outputs (21700 -> 21799)

Addr	RW	Name	Type	Unit	Min	Max	Description
21700	R	DHW Valve Position	Float	%	0	1	Scale 100
21702	R	DHW Circulation Pump State	UInt16	-	0	1	Current state of Pump Relay for Circulation
21703	R	Bypass TWA State	UInt16	-	0	1	Current state of TWA for Bypass

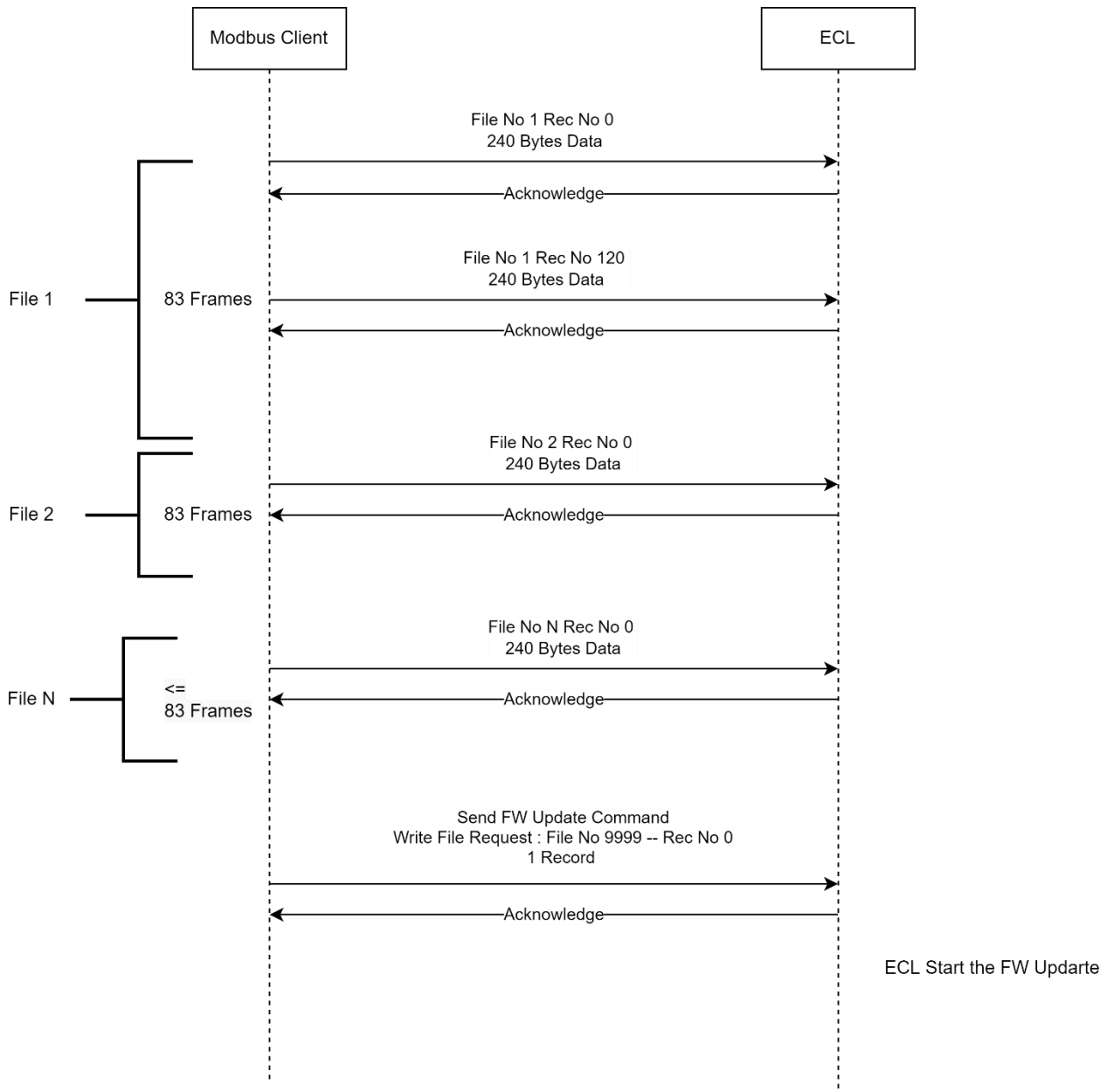
3.6.8 Circuit 1 - DHW Circulation Week Schedule (21800 -> 21999)

Addr	RW	Name	Type	Unit	Default	Min	Max	Description
21800		DHW Circulation Schedule Day1						Address range: 21800 – 21810 See 21XX0 for more details. XX = 80, XY = 81
21820		DHW Circulation Schedule Day2						Address range: 21820 – 21830 See 21XX0 for more details. XX = 82, XY = 83
21840		DHW Circulation Schedule Day3						Address range: 21840 – 21850 See 21XX0 for more details. XX = 84, XY = 85
21860		DHW Circulation Schedule Day4						Address range: 21860 – 21870 See 21XX0 for more details. XX = 86, XY = 87
21880		DHW Circulation Schedule Day5						Address range: 21880 – 21890 See 21XX0 for more details. XX = 88, XY = 89
21900		DHW Circulation Schedule Day6						Address range: 21900 – 21910 See 21XX0 for more details. XX = 90, XY = 91
21920		DHW Circulation Schedule Day7						Address range: 21920 – 21930 See 21XX0 for more details. XX = 92, XY = 93
21XX0	RW	Circulation Schedule DayX Period1 Start	UInt32	s	86400	0	86400	Refer specific week day above for XX/XY value Time Period in seconds: 0 = 00:00, 86400 = 23:59
21XX2	RW	Circulation Schedule DayX Period1 Stop	UInt32	s	86400	0	86400	See 21XX0
21XX4	RW	Circulation Schedule DayX Period2 Start	UInt32	s	86400	0	86400	See 21XX0
21XX6	RW	Circulation Schedule DayX Period2 Stop	UInt32	s	86400	0	86400	See 21XX0
21XX8	RW	Circulation Schedule DayX Period3 Start	UInt32	s	86400	0	86400	See 21XX0
21XY0	RW	Circulation Schedule DayX Period3 Stop	UInt32	s	86400	0	86400	See 21XX0

4 FW Update via Modbus

ECL Full FW can be updated via standard Modbus File transfer function code, the following sequence diagram shows the procedure flow that needs to be taken in order to do FW Update. The entire FW Update can be divided into two parts:

1. Transferring the image



2. Start FW Update CMD

4.1 Transferring Image:

Transferring image is possible through Standard Write File Record (Function Code 0x14). here are the following requirements that the modbus client needs to follow, in order to transfer an Image to ECL using Standard Write File Record.

1. The very First Frame should have File No 1 and Record No 0
2. Each frame should contain fixed no of 120 records/ 240 bytes of data (except the very last frame which is the remainder or what is basically left)
3. It is very important that your frame, file no and record no follow the right sequence otherwise you get an modbus exception response, the following table is an illustration of the right sequence.

	File No	Rec No (starting Rec)	Record Length
Frame 1	1	0	120
Frame 2	1	120	120
Frame 3	1	240	120
.....	1	...	120
Frame 83	1	9840	120
Frame 1	2	0	120
Frame 2	2	120	120
Frame 3	2	240	120
.....	2	...	120
Frame 83	2	9840	120
Frame 1	n	0	120
Frame 2	n	120	120
Frame 3	n	240	120
.....	n	...	120
Frame X	n	A	B

So, depending on the size of the file the image can be split into n files, since 120 records (240 Bytes) is sent on each frame, it means each file contains 9960 Bytes x 2 = 19920 Bytes. For example, if an image is 90 Kbytes, it would take 5 files to transfer the image

- $90000/19920 = 4,5$

Each File takes 83 Frames to be transferred to ECL, apart from the last file than can take X ($1 \leq x \leq 83$) number of frames, where the last frame has Record Length B ($1 \leq B \leq 120$)

4. if exception is returned from ECL that is because sequence described in point 3 has not been completed or writing flash has gone wrong (very unlikely), please retry after 30 seconds.
5. Timeout is 30 seconds meaning ECL does not accept any time between frames to be more than 30 seconds, if it does not see a frame while transfer of image is in process it simply times out and abort the transfer process and you need to start over.

4.2 First File Record Frame

Here is how the very first Write File Record frame (excluding the data field) should look like:

	Slave Address	Function Code	Req Data Length	Reference Type	File No		Record No		Record Length	
Hex	0x05	0x15	0xF7	0x06	0x00	0x01	0x00	0x00	0x00	0x78
Dec	5	21	247	6	1		0		120	

Second Frame

	Slave Address	Function Code	Req Data Length	Reference Type	File No		Record No		Record Length	
Hex	0x05	0x15	0xF7	0x06	0x00	0x01	0x00	0x78	0x00	0x78
Dec	5	21	247	6	1		120		120	

Third Frame

	Slave Address	Function Code	Req Data Length	Reference Type	File No		Record No		Record Length	
Hex	0x05	0x15	0xF7	0x06	0x00	0x01	0x00	0xF0	0x00	0x78
Dec	5	21	247	6	1		240		120	

Fourth Frame

	Slave Address	Function Code	Req Data Length	Reference Type	File No		Record No		Record Length	
Hex	0x05	0x15	0xF7	0x06	0x00	0x01	0x01	0x68	0x00	0x78
Dec	5	21	247	6	1		360		120	

4.3 Start FW Update CMD

After Image transferred is completed the modbus client needs to send the command to start the FW update.

There are two commands:

1. Start Full FW Update
2. Abort Full FW Update

Start Full Fw Update Frame (excluding CRC)

	Slave Address	Function Code	Req Data Length	Refe Type	File No		Record No		Record Length		Rec val	
Hex	0x05	0x15	0x09	0x06	0x27	0x0F	0x00	0x00	0x00	0x01	0x00	0x01
Dec	5	21	9	6	1		0		1		1	

Abort Full FW Update (excluding CRC)

	Slave Address	Function Code	Req Data Length	Refe Type	File No		Record No		Record Length		Rec val	
Hex	0x05	0x15	0x09	0x06	0x27	0x0F	0x00	0x00	0x00	0x01	0x00	0x00
Dec	5	21	9	6	1		0		1		0	

5 Appendix

5.1 Reserved Address Space

Addr	Type	Available	Parameter Name	Storage Type
60000	UInt32	120,220	TestRamUInt32	Ram
60002	Int32	120,220	TestRamInt32	Ram
60004	UInt16	120,220	TestRamUInt16	Ram
60005	Int16	120,220	TestRamInt16	Ram
60006	UInt16	120,220	TestRamUInt16	Ram
60007	Int16	120,220	TestRamInt8	Ram
60008	Float	120,220	TestRamFloat	Ram
60010	String16	120,220	TestRamString	Ram
60018	UInt32	120,220	TestStaticUInt32	Static
60020	Int32	120,220	TestStaticInt32	Static
60022	UInt16	120,220	TestStaticUInt16	Static
60023	Int16	120,220	TestStaticInt16	Static
60024	UInt16	120,220	TestStaticUInt16	Static
60025	Int16	120,220	TestStaticInt8	Static
60026	Float	120,220	TestStaticFloat	Static
60028	String16	120,220	TestStaticString	Static
60036	UInt32	120,220	TestOneTimeUInt32	Onetime
60038	UInt32	120,220	TestQvalueUInt32	Q-value
60040	UInt32	120,220	TestDynamicUInt32	Dynamic
60042	UInt64	120,220	TestRamUInt64	Ram
60046	Int64	120,220	TestRamInt64	Ram
60050	UInt64	120,220	Test StaticUInt64	Static
60054	Int64	120,220	Test StaticInt64	Static

