GEN3 EPC Modbus Communication Protocol

Regal Beloit EPC

REVISION SHEET

Rev 0.1	Gazala	12-Apr-17	Generated from LV board PRD rev F, Gen3 UI PRD rev C and EPC combined document with reference to ECM Gen 2.0 Modbus Specifications
Rev 0.2	Gazala	16-May-17	Added Auxiliary relay status byte at location 0x06 of configuration page 1 after removing it from configuration page 9, address 0x00
Rev 0.3	Gazala	17-May-17	Eliminated Software over voltage fault count which was Duplicated. Instead, added Software over current fault Count. Also added Coherence/Stall fault in the status byte of Read Sensor.
Rev 4.0	Gazala	20-May-17	Moved the status of Auxiliary relay to configuration page 1. Also modified the format of each of the sensor, ID & configuration pages as per the feedback received from RBC on 25-May-17
Rev 4.1	Gazala	04-Jun-17	Modified all the configuration pages, ID page 0 & all the Sensor pages as per the feedback received from RBC on 25-May-17
Rev 4.2	Gazala	23-Jun-17	Added the new fault counters to sensor page 2 ie Coherence & UL fault. Also added their fault codes to table 2. Also Added AC input voltage & status of both the Aux relays in Sensor page 1
Rev 4.3	Gazala	03-Jul-17	Modified the "length" field of the queries of "Configuration R Ead/Write" & "Read Identification" to support single & multi Byte read/write of parameters to reduce the boot up time of UI
Rev 4.4	Gazala	14-Jul-17	Added keypad status & protocol selected in configuration Page 10. Modified the address of Auxiliary relay status at Sensor page 1
Rev 4.5	Anurag	13-Dec-17	Updated the memory map as per Flash UI and added following parameters: Sensor Page 0 – Address 014, 0x15 Sensor Page 1 – Address 0x1F, 0x20, 0x21 Configuration Page 10 – Address 0x62

Rev 4.6	Anurag	19-Dec-17	Added configuration page 3 Added parameters in Sensor Page 3 – address 0x0F, 0x10 , 0x11, 0x12
Rev 4.7	Anurag	20-Dec-17	Changed the values of status for address 0x20 and 0x21 In sensor PAGE 1, 0 for OFF and 1 for ON
Rev 4.8	Ajinkya J	22-Jun-18	Added Table 8 in Appendix B – Identification Page 0 Address 0x04
Rev 4.9	Ajinkya J	24-Jun-18	Updated the description in configuration page 10.
Rev 4.10	Anurag	31st-Jul-18	Updated the default values in configuration page 10.
Rev 4.11	Ajinkya J	1st-Aug-18	Updated the step size values in configuration page 10.
Rev 4.12	Ajinkya J	8th-Aug-18	Added HUA parameter in configuration page 10. Removed Torque from PWM mode in configuration page 10. Updated the step size values in configuration page 10.
Rev 4.13	Ajinkya J	24th-Aug-18	Changes done in configuration page 10. 1. Added Freeze Protection hrs duration 2. Added Step Size for Timer mode Step1,2 and 3 3. Updated Reserved values and HUA default values 4. Added disabled value for Start and Stop time of Step1,2 and 3. Changes done in configuration page 1. 1. Updated Serial timeout values
Rev 4.14	Ajinkya J	3rd-Sept-18	Changes done in configuration page 10. 1. Added Freeze Protection hrs duration default value 2. Added Step Size override high/low duration 3. Updated LV priming duration value. 4. Changed Default value to clock.
Rev 4.15	Ajinkya J	24th-Sept-18	Fault Code modification in section 5.7.5, Table 2 Updated Sensor Page 1 and 2. In Config Page10 - Changed PWM default value to OFF.
Rev 4.16	Ajinkya J	24th-Oct-18	Digital Input 1,2,3,4 Status Changed to OFF and ON.

Rev 4.17   Manjunath 30th-Oct-18   Configuration 1, Page 3,
                                                Tittles corrected from 0x5B to 0x68 as
                                                per Yilcan suggested
                                                Description updated to configure Motor serial number
                                                (corrected from 0x82 to 0x90)
                                         In Config Page10 –
                                                Changed Priming duration default value to
                                                OFF and its value
                                                Removed "Disable" & Changed PWM
                                                default value to OFF.
                                                PWM Min & Max Values ranges changed.
                                         In Appendix A, Page 4
                                                Data Flash low & high byte information added.
                                         In Appendix A, Page 0
                                                Prime Status is updated with its Status

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Tables

1 Scope

This document describes the hardware layer and the EPC communication protocol. This document is a complete specification for the communication with the EPC Gen3 LV board . The EPC protocol utilizes many of the communications features from the public MODBUS over serial line specification. EPC serial is not intended to be 100% Modbus compatible.

2 Hardware Layer (RS-485)

Communication takes place over a differential, bi-directional serial bus conforming to RS-485 standards (EIA/TIA-485-A). In this configuration only two wires forming a differential pair are used, no common ground connection is required (over long runs a common ground may improve bus performance and noise immunity). The EPC ECM motor may supply up to 250mA of current at approximately 10 volts dc to a connected device. The implementation is intended for a multi-drop application where one master and up to 16 slaves share a common bus. The EPC ECM participates as a slave on the bus.

As defined in specification 'EIA/TIA-485-A' logic state 1 (on) is signaled when (voltage A > voltage B). Digital logic 0 (OFF) is signaled with (voltage A < voltage B). The line idle state is (voltage A > voltage B).
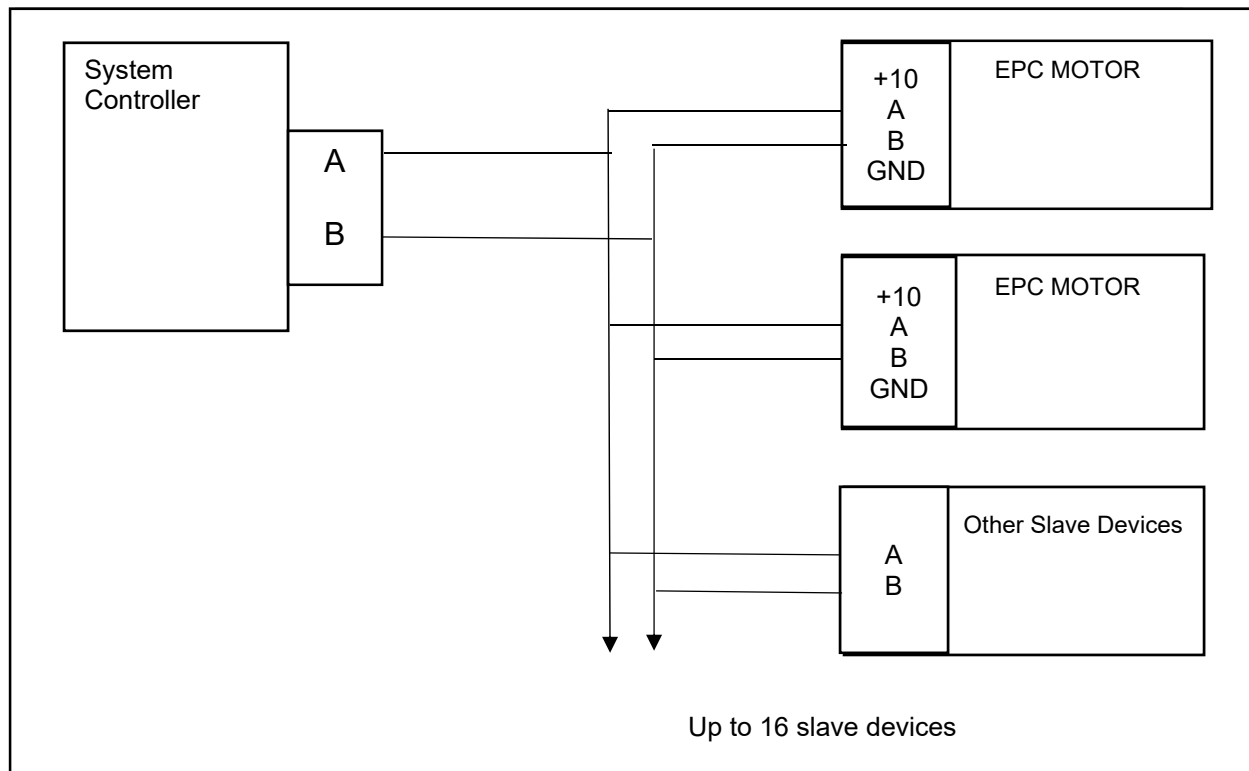

Figure 1: Communication wiring

3   Isolation

Isolation requirements must be determined for each system implementation. However, in many cases an internal isolation provided by the EPC ECM is sufficient and eliminates the need for controller side isolation. LV board contains two microcontrollers, one dedicated to motor control and another responsible for user interaction through the RS485 port or the provided digital inputs. The two controllers are digitally isolated and this eliminates need for controller side isolation.

4   Byte Format

The standard data rate is 9600 BAUD. The transmission is always in the format of 8 data bits, no parity and one stop bit. Stop bit is the line idle state. The least significant bit is transmitted first. A single byte transmission time is 1146us at 9600 BAUD.

The start bit is defined as logic 0 and the bus idle being logic state 1. Figure 2 shows the voltage waveform for transmission of 0x59. This is the waveform you would see with a scope connected in

Figure 1 with scope negative on "B" and scope positive on "A".
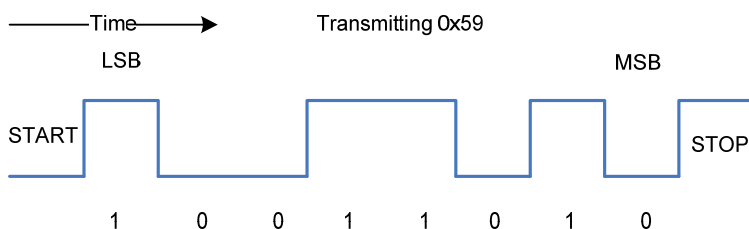
Figure 2: Transmission Example

5   EPC Gen3 ECM Modbus Communication Protocol

5.1   Communication Packet

Message packet content:

Start	Address	Function	ACK	Data	CRC	End
3.5+ bytes idle time	1 byte	1 byte	1 byte	0 to 11 bytes	2 bytes	3.5+ bytes idle time

Start: Minimum of 3.5 bytes times bus idle.
Address: One byte address of the slave unit.
Address 0 is reserved for broadcast messages.
Addresses 0xF8 through 0xFF are reserved for compatibility with MODBUS.

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Only odd addresses from 0x15 through 0x0F7 (and 0 for broadcast) are valid for this protocol
The remaining even addresses are reserved for alternate protocols
Address 0x15 is the default address for the EPC ECM

Function/Command: One byte function code 0-0x7F. The Most Significant bit is set in an error reply.

ACK: Filled with value 0x20 in command from bus master, ACK (0x10) or NACK error code (see 5.7.8) in reply

Data: Zero up to 11 bytes of data depending on the function

CRC: 2 byte CRC-16 as described in "MODBUS over Serial Line, V1.0, Modbus.org" or see **Error! Reference source not found.**

End: Minimum of 3.5 byte times bus idle. In theory, end and start idle times can overlap leaving just one idle time between message packets. In practice, a message sent to the EPC ECM is followed by a minimum of 4ms idle time (for 9600 baud rate) before the response is sent.

5.2   Special Addresses

Un-configured slaves (motors) will respond at the default address 0x15. They may be reprogrammed for any valid address through the set of extended commands. Address zero is used to broadcast messages which are received, processed, and responded by all slaves on the bus regardless of their programmed address. In the response, the actual address is sent in the address field.

5.3   Communication Flow

All communication is initiated by the bus master. The bus master sends commands to slave devices requesting action and/or a reply. A slave device must never drive the bus unless the master sends a command to that device requesting a reply. The bus is multi-drop. Therefore, all commands will be received by all slaves. Slaves must decode all commands only processing those with the slave's specific address.

5.4   Slave Addressing / Message Validation

Each slave monitors the bus watching for any commands that match its address. If a command is received with an address match, it is validated before processing. The following items are required for the slave to process an incoming command:

1. The address byte must match the slaves address
2. The length of the message must match the function type.
3. The CRC-16 bytes must be correct.

If any one of the requirements above is not satisfied the command is ignored and no reply is generated. If all requirements are satisfied, the command is processed by the slave. The device will respond with its assigned device code regardless of the code set by the bus master. A valid message may be

received with a command and data block that cannot be processed for some reason (data outside of limits etc.). In this case the slave will respond with an appropriate error message.

5.5 Command / Reply Timing

3.5 character idle periods are required before beginning the message and after ending the message. Once a message is received by the EPC ECM, a response packet is initiated, if required, between 4ms (for 9600 baud rate) and **10ms (Except STORE command)**. The ECM allows the bus to be idle for minimum of 4ms (for 9600 baud rate) before initiating its reply.   A packet is considered initiated when the first start bit is sent.

5.6 Incomplete Commands

Any incomplete command may be flushed from the buffer once the bus is idle for 3.5 character times.

5.7 Functions

5.7.1 Go

Receive 5 bytes:

Address	Function	ACK	CRC Lo	CRC Hi
0x15-0xF7	0x41	0x20	-	-

Response 5 bytes:

Address	Function	ACK	CRC Lo	CRC Hi
0x15-0xF7	0x41	0x10	-	-

Go command starts the motor spinning. The Set Demand command must be sent first. If the motor is already running, the Go command is ignored. If the motor is in the fault mode, NACK response with the "General Failure" NACK code is replied back.

5.7.2 Stop

Receive 5 bytes:

Address	Function	ACK	CRC Lo	CRC Hi
0x15-0xF7	0x42	0x20	-	-

Response 5 bytes:

Address	Function	ACK	CRC Lo	CRC Hi
0x15-0xF7	0x42	0x10	-	-

Motor immediately stops if in run mode upon receiving this command. Stop command can be sent to ECM and it is acknowledged in any operating status.

5.7.3 Status

Receive 5 bytes:

Address	Function	ACK	CRC Lo	CRC Hi
0x15-0xF7	0x43	0x20	-	-

Response 6 bytes:

Address	Function	ACK	Status	CRC Lo	CRC Hi
0x15-0xF7	0x43	0x10	0-0xFF	-	-

Status Byte	Definition
0x00	stop mode – motor stopped
0x09	run mode – boot (motor is getting ready to spin)
0x0B	run mode – vector
0x20	fault mode – motor stopped

Table 1: Status byte definition

If there is a fault, the control will go into fault mode and there will be a fault or faults associated with the fault mode, which can be read from fault code locations.

5.7.4 Set Demand

Receive 8 bytes:

Address	Function	ACK	Mode	Demand Lo	Demand Hi	CRC Lo	CRC Hi
0x15-0xF7	0x44	0x20	0,1,3	0-0xFF	0-0xFF	-	-

Response 8 bytes:

Address	Function	ACK	Mode	Demand Lo	Demand Hi	CRC Lo	CRC Hi
0x15-0xF7	0x44	0x10	0,1,3	0x-0xFF	0-0xFF	-	-

Mode:
0 = Speed control, Demand = RPM * 4
1 = Torque control, Demand = lb-ft * 1200
2 = Reserved (used to be flow)
3 = Reserved

If the motor is already spinning a new mode and/or demand set by this command will take effect immediately. Demand can be set in any mode (operating status).

5.7.5 Read Sensor

Receive 7 bytes:

Address	Function	ACK	Page	Address	CRC Lo	CRC Hi
0x15-0xF7	0x45	0x20	0 - 4	0-0xFF	-	-

Response 9 bytes:

Address	Function	ACK	Page	Address	Value Lo	Value Hi	CRC Lo	CRC Hi
0x15-0xF7	0x45	0x10	0 - 4	0x-0xFF	0-0xFF	0-0xFF	-	-

See Error! Reference source not found. for a list of sensors and their addresses. All sensor data is reported in 16 bit (2 byte) values with scaling for certain numbers. If the number is signed, it is returned in 2's complement format. Since the fault code is 1 byte, the high byte of the data is returned zero when reading fault code.

Faults	Fault Code
Software Overcurrent	0x21
DC overvoltage	0x22
DC under voltage	0x23
Hardware overcurrent	0x26
Startup Failure	0x2A
Processor – Fatal	0x2D
IGBT over temperature	0x2E
Loss of phase	0x2F
Low Power	0x30
Processor - Registers	0x31
Processor - Program counter	0x32
Processor - Interrupt/Execution	0x33
Processor - Clock	0x34
Processor - Flash memory	0x35
Ras Fault	0x36
Processor - ADC	0x37
Keypad Fault	0x3C
LVB Data Flash Fault	0x3D

Comm Loss Fault- LVB & Drive	0x3E
Generic Fault	0x3F; any other code not listed
Coherence Fault	0x40
UL Fault	0x41
SVRS Fault Type 1	0x42
SVRS Fault Type 2	0x43
SVRS Fault Type 13	0x44

Table 2: Fault codes

5.7.6 Read Identification

Receive 8 bytes:

Address	Function	ACK	Page	Address	Length	CRC Lo	CRC Hi
0x15-0xF7	0x46	0x20	0	0-0xFF	Total parameters - 1	-	-

Response 9+Length bytes:

Address	Function	ACK	Page	Address	Length	Data	CRC Lo	CRC Hi
0x15-0xF7	0x46	0x10	0	0-0xFF	Total parameters	1 byte	-	-

Response length is variable depending on the length of data that is requested. Length value of 0 is for 1 byte. See Appendix B for the list of identification bytes and addresses.

5.7.7 Configuration Read/Write

READ, Receive 8 bytes:

Address	Function	ACK	Page	Address	Length	CRC Lo	CRC Hi
0x15-0xF7	0x64	0x20	0x00,0x01,0x08,0x09,0x0A	0-0xFF	Total no of parameters -1	-	-

WRITE, Receive 9+Length bytes:

Address	Function	ACK	Page	Address	Length	Data Field	CRC Lo	CRC Hi
0x15-0xF7	0x64	0x20	0x80,0x81,0x88,0x89,0x8A	0-0xFF	Total no of parameters -1	Length+1 bytes	-	-

Response 9+Length bytes:

Address	Function	ACK	Page	Address	Length	Data	CRC Lo	CRC Hi
0x15-0xF7	0x64	0x10	0x00,0x01,0x08,0x09, 0x0A, 0x80,0x81,0x88,0x89, 0x8A	0-0xFF	Total no of parameters	Length+1 bytes	-	-

It writes/reads to/from RAM location. Page number holds read/write bit in MSBit. (Read=0, write=1) Valid length is 0 corresponding to 1 byte of data. See Appendix C for a list of configuration addresses and data.
Write operation will be complete after store command i.e. Data will be stored in Data Flash after store command.

5.7.8 Error Reply

Response 5 bytes:

Address	Function		ACK	CRC Lo	CRC Hi
0x15-0xF7	Echo of command	0x80	NACK	-	-

No reply is sent to messages with incorrect CRC-16 bytes and wrong frame size.

To designate an exception response, the MSBit of the function byte is set. NACK error code identifies the type of error.

NACK Error Codes:

0x01   Command not recognized / illegal
0x02   Operand out of allowed range
0x03   Data out of range
0x04   General failure: fault mode
0x05   Incorrect command length
0x06   Command cannot be executed now
0x09   Buffer error (not used)
0x0A   Running parameters incomplete (not used)

5.7.9   Store Configuration

Receive 5 bytes:

Address	Function	ACK	CRC Lo	CRC Hi
0x15-0xF7	0x65	0x20	-	-

Response 5 bytes:

Address	Function	ACK	CRC Lo	CRC Hi
0x15-0xF7	0x65	0x10	-	-

Store Configuration command stores everything written with the Configuration Write command to DataFlash. In other words, it stores Configuration Pages. Write command that is sent during the execution of the Store Configuration command will receive the WAIT error code until the write to the DataFlash is complete. Data writing can take up to 1 second

6 Appendix A

"Not applicable for LVB/Gen3UI" indicates that the sensor location implemented in ECM Gen 2.0 is not applicable to Gen3UI

Sensor Mapping: Page 0								
Read Access: Always Enabled								
All these parameters are from RAM of LV board								
Page	Byte address	Title	Description	Variable name	Size of variable (bytes)	Type of variable	Range of parameter	Scaling factor
0	0x00	Motor Speed	Motor speed in rpm	Speed	2	Union	2400 to 13,800	4
0	0x01	Motor Current	Peak current in Amp	Current	2	Union	Need information	1000
0	0x02	Operating Mode	0 = Speed control 1 = Torque control	ubOperatingMode	1	Unsigned byte	0 to 1	NA
0	0x03	Demand	Demand sent to motor	uwDemand	2	Unsigned integer	600 to 3450	For speed mode control, commanded RPM * 4; for torque mode control, commanded torque lb-ft * 1200
0	0x04	Torque	Motor torque	Torque	2	Union	Need information	1200 lb-ft
0	0x05	Inverter Input Power	Input power	InputPower	2	Union	Need information	NA
0	0x06	DC Bus Voltage	Bus voltage	DCBusVoltage	2	Union	0 to 230V	64

0	0x07	Ambient Temperature	Estimated outside of enclosure	AmbientTemperature	2	Union	Need information	128
0	0x08	Status	Same as Status Command	ubTempBuffer[2]	1	Unsigned byte		NA
0	0x09	Previous Fault	Last fault code since power up, 0x00 is no fault	ubTempBuffer[2]	1	Unsigned byte		NA
0	0x0A	Output Power	Shaft power in Watts	OutputPower	2	Union	0 to 230	1
0	0x0B	SVRS Bypass Status	NA	NA	NA	NA	NA	NA
0	0x0C	Number of Current Faults	Total of current faults	ubNumberOfCurrentFault	1	Unsigned byte		NA
0	0x0D	Motor line Voltage	NA	NA	NA	NA	NA	NA
0	0x0E	Ramp Status	Motor status byte	ubTempBuffer[2]	1	Unsigned byte		NA
0	0x0F	No of total fault	NA	NA	NA	NA	NA	NA
0	0x10	Prime Status	0 = Priming Stopped 1 = Priming Running 2 = Priming Over	ubTempBuffer[2]	1	Unsigned byte	0 to 2	NA
0	0x11	Motor input power	NA	NA	NA	NA	NA	NA
0	0x12	IGBT Temperature	Temperature inside IGBT Module	ModuleTemperature	2	Union		128
0	0x13	PCB temperature	NA	NA	NA	NA	NA	NA

0	0x14	Status of External input	0- No external input 3- PWM 4- DI_1 present 5- DI_2 present 6- DI_3 present 7- DI_4 present 8- Serial input	ubTempBuffer[2]	1	Unsigned byte		NA
0	0x15	Reference Speed	Reference speed in RPM	Speed	2	Union	2400 to 13,800	4

Table 3: Sensor Page 0 Addressing Map

Note: The signed numbers are in 2's complement

Sensor Mapping: Page 1								
Read Access: Always Enabled								
All these parameters are from RAM of LV board								
Page	Address	Title	Description	Variable name	Size of variable (bytes)	Type of variable	Range of parameter	Scaling factor
1	0x00	Modulation Index	NA	NA	NA	NA	NA	NA
1	0x01	EPC Secure Access	16-bit unsigned; 0=OFF, 1=ON	ubEPCSourceAccess	1	Unsigned byte	0 to 1	NA
1	0x02	Prime detection timer	Prime detection timer	sensor.ubPrimeDetectionTimer	1	Unsigned byte	NA	NA
1	0x03	Prime verify timer	Prime verify timer	sensor.ubPrimeVerifyTimer	1	Unsigned byte	NA	NA
1	0x04	SVRS functionality	NA	NA	NA	NA	NA	NA
1	0x05	Entrapment detection	NA	NA	NA	NA	NA	NA

1	0x06	SVRS Bypass Timer	NA	NA	NA	NA	NA	NA
1	0x07	Serial Timeout Counter	16-bit unsigned	uwSerialTimeoutCounter	2	Unsigned integer	0 to 65535	NA
1	0x08	Total Run time low	Value is incremented on hourly basis	sensor.TotalRunTimer.ubByte[0] & sensor.TotalRunTimer.ubByte[1]	2	Union	0 to 2147483647	NA
1	0x09	Total Run time high	Value is incremented on hourly basis	sensor.TotalRunTimer.ubByte[2] & sensor.TotalRunTimer.ubByte[3]	2	Union	2147483647 to 4294967297	NA
1	0x0A	Total life time low	Value is received from drive	sensor.TotalLifeTimer.ubByte[0] & sensor.TotalLifeTimer.ubByte[1]	2	Union	0 to 2147483647	NA
1	0x0B	Total life time High	Value is received from drive	sensor.TotalLifeTimer.ubByte[2] & sensor.TotalLifeTimer.ubByte[3]	2	Union	2147483647 to 4294967297	NA
1	0x0C	Total session timer low	Incremented on secondly basis	sensor.udSessionTimerCounter	4	Unsigned long	0 to 2147483647	NA
1	0x0D	Total session timer high	Incremented on secondly basis	sensor.udSessionTimerCounter	4	Unsigned long	2147483647 to 4294967297	NA
1	0x0E	Fault Timer Low	NA	NA	NA	NA	NA	NA
1	0x0F	Fault Timer High	NA	NA	NA	NA	NA	NA

1	0x10	Reset counter	Received from drive	sensor.ubReset Counter	1	Unsigned byte	NA	NA
1	0x11	Watchdog timer counter	Received from drive	sensor.ubWatch dogTimerCount er	1	Unsigned byte	NA	NA
1	0x12	Low voltage counter	NA	NA	NA	NA	NA	NA
1	0x13	Serial CRC ERR Counter Low	Received from drive	sensor.SerialCR CErrorCounter[0] & sensor.SerialCR CErrorCounter[1]	2	Unsigned byte	0 to 0xFFFF FFFF	NA
1	0x14	Serial CRC ERR Counter High	Received from drive	sensor.SerialCR CErrorCounter[2] & sensor.SerialCR CErrorCounter[3]	2	Unsigned byte		NA
1	0x15	1st Fault	16-bit unsigned; 1st present fault	ubFault[0]	1	Unsigned byte	0x00 to 0xFF	NA
1	0x16	2nd Fault	16-bit unsigned; 2nd present fault	ubFault[1]	1	Unsigned byte	0x00 to 0xFF	NA
1	0x17	3rd Fault	16-bit unsigned; 3rd present fault	ubFault[2]	1	Unsigned byte	0x00 to 0xFF	NA
1	0x18	4th Fault	16-bit unsigned; 4th present fault	ubFault[3]	1	Unsigned byte	0x00 to 0xFF	NA
1	0x19	PFC Status	Received from drive	sensor.ubPFCSt atus	1	Unsigned byte	0x00 – 0x01	NA
1	0x1A	EEPROM CRC fault	NA	NA	NA	NA	NA	NA
1	0x1B	EEPROM Timeout register	NA	NA	NA	NA	NA	NA
1	0x1C	Customer Serial CRC Error	NA	NA	NA	NA	NA	NA

		Counter Low						
1	0x1D	Customer Serial CRC Error Counter High	NA	NA	NA	NA	NA	NA
1	0x1E	Prime Loss Timer	Received from drive	sensor.ubNumberOfPrimeFailureFaults	1	Unsigned byte	NA	NA
1	0x1F	AC input voltage	Source voltage on which system is operating	sensor.ubACInputVoltage	1	Unsigned byte	230 and 115	NA
1	0x20	Auxiliary-1 relay status	0 – OFF 1 - ON	sensor.ubDriveAuxRelay1Status	1	Unsigned byte	0 and 1	NA
1	0x21	Auxiliary-2 relay status	0 – OFF 1 - ON	sensor.ubDriveAuxRelay2Status	1	Unsigned byte	0 and 1	NA

Table 4: Sensor Page 1 Addressing Map

Sensor Mapping: Page 2								
Read Access: Always Enabled								
All these parameters are from RAM of LV board								
Page	Address	Title	Description	Variable name	Size of variable (bytes)	Type of variable	Range of parameter	Scaling factor
2	0x00	Number of Software Over current		uwSoftwareOverCurrentFaultCount	2	Unsigned integer	0 to 65535	NA
2	0x01	Number of DC Overvoltage Fault Count		uwDCOvervoltageFaultCount	2	Unsigned integer	0 to 65535	NA
2	0x02	Number of DC undervoltage Fault Count		uwDCUndervoltageFaultCount	2	Unsigned integer	0 to 65535	NA

2	0x03	Number of Hardware Overcurrent Fault Count		uwHardwareOvercurrentFaultCount	2	Unsigned integer	0 to 65535	NA
2	0x04	Number of Over Temperature Fault Count		uwOverTemperatureFaultCount	2	Unsigned integer	0 to 65535	NA
2	0x05	Number of Loss Of Phase Fault Count		uwLossOfPhaseFaultCount	2	Unsigned integer	0 to 65535	NA
2	0x06	Number of Low Power Fault Count		uwLowPowerFaultCount	2	Unsigned integer	0 to 65535	NA
2	0x07	Number of Data Flash Fault Count		uwDataFlashFaultCount	2	Unsigned integer	0 to 65535	NA
2	0x08	Number of Motor CommLoss Fault Count		uwMotorCommLossFaultCount	2	Unsigned integer	0 to 65535	NA
2	0x09	Number of Keypad Faults		uwGen3UIKeypadFaultCount	2	Unsigned integer	0 to 65535	NA
2	0x0A	Number of IGBT Temperature Faults	This parameter is supposed to be IGBT over temperature	uwIGBTOverTemperatureFaultCount	2	Unsigned integer	0 to 65535	NA
2	0x0B	Number of coherence fault		uwCoherenceFaultCount	2	Unsigned integer	0 to 65535	NA
2	0x0C	Number of UL fault		uwULFaultCount	2	Unsigned integer	0 to 65535	NA

2	0x0D	Number of SVRS1 fault		uwSVRSFaultType1Count	2	Unsigned integer	0 to 65535	NA
2	0X0E	Number of SVRS2 fault		uwSVRSFaultType2Count	2	Unsigned integer	0 to 65535	NA
2	0X0F	Number of SVRS3 fault		uwSVRSFaultType3Count	2	Unsigned integer	0 to 65535	NA
2	0x10	Number of MotorStall fault		uwStallFaultCount	2	Unsigned integer	0 to 65535	NA

Table 5: Sensor Page 2 Addressing Map

Sensor Mapping: Page 3								
Read Access: Always Enabled								
All these parameters are from RAM of LV board								
Page	Address	Title	Description	Variable name	Size of variable (bytes)	Type of variable	Range of parameter	Scaling factor
3	0x00	q-axis Current Reference	NA	NA	NA	NA	NA	NA
3	0x01	q-axis Current	NA	NA	NA	NA	NA	NA
3	0x02	Mains Voltage RMS	NA	NA	NA	NA	NA	NA
3	0x03	Commanded Speed	NA	NA	NA	NA	NA	NA
3	0x04	Reference Speed	NA	NA	NA	NA	NA	NA
3	0x05	q-axis Current Command	NA	NA	NA	NA	NA	NA
3	0x06	DIP switch positions	Bit 0 - Dip Switch 2 Bit 1 - Dip Switch 3	ubDIPSwitchPosition	1	Unsigned byte	0 to 3	NA

			Bit 2 - Dip Switch 4 Bit 3 - Dip Switch 5						
3	0x07	q-axis voltage limit	NA	NA	NA	NA	NA	NA	NA
3	0x08	Prime Detection Current	NA	NA	NA	NA	NA	NA	NA
3	0x09	Digital Input Detection	16-bit, bit 0: i/p 1 detected, Bit 1:i/p 2 detected ,Bit 2 : i/p 3 detected, Bit 3: i/p 3 detected	ubDigitalInputDetection	1	Unsigned Byte	0x00 to 0x0E	NA
3	0x0A	System Clock hours	Increments on hourly basis	sensor.ubSystemClockHours	1	Unsigned Byte	0 to 23	NA
3	0x0B	System Clock minutes	Increments on minutes basis	sensor.ubSystemClockMinutes	1	Unsigned Byte	0 to 59	NA
3	0x0C	System Clock seconds	Increments on seconds basis	sensor.ubSystemClockSeconds	1	Unsigned Byte	0 to 59	NA
3	0x0D	Stop Command Source		sensor.ubSTOPCommandInitiatingState & sensor.ubSTOPCommandPreviousInitiatedState	1	Unsigned byte	0 to 13	NA
3	0x0E	Last Key Pressed	NA	NA	NA	NA	NA	NA
3	0x0F	Humidity Value	Humidity sensor value	sensor.uwRelativeHumidityValue.ubByt	2	Unsigned integer	0 to 65535	NA

				e[0] & sensor.uwRelativeHumidityValue.ubByte[1]				
3	0x10	Acceleration in X-dir		sensor.uwAccelerationXData.ubByte[0] & sensor.uwAccelerationXData.ubByte[1]	2	Unsigned integer	0 to 65535	NA
3	0x11	Acceleration in Y-dir		sensor.uwAccelerationYData.ubByte[0] & sensor.uwAccelerationYData.ubByte[1]	2	Unsigned integer	0 to 65535	NA
3	0x12	Acceleration in Z-dir		sensor.uwAccelerationZData.ubByte[0] & sensor.uwAccelerationZData.ubByte[1]	2	Unsigned integer	0 to 65535	NA

Table 6: Sensor Page 3 Addressing Map

Sensor Mapping: Page 4								
Read Access: Always Enabled								
All these parameters are from DataFlash to know the count								
Page	Address	Title	Description	Variable name	Size of variable (bytes)	Type of variable	Range of parameter	Scaling factor
4	0x00	illigal instructions	Number of illigal instructions	ubTrapResetCount	1	Unsigned long int	0-255	NA

4	0x01	Watchdog Resets	Number of Watchdog Resets	ubWatchTimerResetCounter	1	Unsigned Char	0-255	NA
4	0x02	RAM Parity Errors	Number of RAM Parity Errors	ubRAMParityResetCounter	1	Unsigned Char	0-255	NA
4	0x03	illigal Memory Access	Number of illigal Memory Access	ubIllegalMemoryAccessResetCounter	1	Unsigned Char	0-255	NA
4	0x04	Low Voltage Detected	Number of Reset Voltage Detected	ubLowVoltageDetectResetCounter	1	Unsigned Char	0-255	NA
4	0x05	Data Flash Write Count (Low)	Number of Total Data Flash Write Count	ubLowVoltageDetectResetCounter	2	Unsigned byte	0xFFFFFFFF	NA
4	0x06	Data Flash Write Count (High)		ubLowVoltageDetectResetCounter	2	Unsigned byte		NA

Table 7: Sensor Page 4 Addressing Map

7   Appendix B

Identification Mapping: Page 0								
Read Access: Always Enabled								
Write Access: Always Disabled								
Product Identification								
Page	Byte Address	Title	Memory Accessed/Storage	Description	Variable name	Size of variable (bytes)	Type of variable	Range of parameter
0	0x00	Drive Software Version 2	From Drive	ASCII Character	ubGen3Drive FirmwareVer sion[0]	1	Unsigned byte	NA
0	0x01	Drive Software Version 3	From Drive	ASCII Character	ubGen3Drive FirmwareVer sion[1]	1	Unsigned byte	NA
0	0x02	Drive Software Version 4	From Drive	ASCII Character	ubGen3Drive FirmwareVer sion[2]	1	Unsigned byte	NA
0	0x03	Drive Software Version 5	From Drive	MS ASCII Character	ubGen3Drive FirmwareVer sion[3]	1	Unsigned byte	NA
0	0x04	Product Identifier	From Drive	Please refer to Table 9	ubProductID	1	Unsigned byte	0x0E to 0x18
0	0x05	Reserved		8-bit; 0xFF				
0	0x06	Reserved		8-bit; 0xFF				
0	0x07	Reserved		8-bit; 0xFF				
0	0x08	Reserved		8-bit; 0xFF				
0	0x09	Reserved		8-bit; 0xFF				
0	0x0A	Reserved		8-bit; 0xFF				
0	0x0B	Customer Protocol ID	From Drive	0=No customer protocol, 1=Jandy	ubCustomerP rotocolID	1	Unsigned byte	0 to 1
0	0x0C	Horse Power	From Drive	Control plus motor power, 0x14=2.7HP	ubHorsePow er	1	Unsigned byte	
0	0x0D	Drive Manufactur er's ID	From Drive	0x0A (EPC's ID) same all the time	ubDriveMan ufactureID	1	Unsigned byte	

0	0x10	HP LSB	From Drive	HP times 100; ASCII	ubMotorHP[0]	1	Unsigned byte	
0	0x11	HP	From Drive	HP times 100 ; ASCII	ubMotorHP[1]	1	Unsigned byte	
0	0x12	HP	From Drive	HP times 100; ASCII	ubMotorHP[2]	1	Unsigned byte	
0	0x13	HP MSB	From Drive	HP times 100 ; ASCII	ubMotorHP[3]	1	Unsigned byte	
0	0x15	Software Version 1 (UL)	From Drive	ASCII character	ubGen3DriveFirmwareVersion[4]	1	Unsigned byte	
0	0x16	Software Version 2 (UL)	From Drive	LS ASCII Character	ubGen3DriveFirmwareVersion[5]	1	Unsigned byte	
0	0x17	Gen3 LVB Software Version 0	RAM of LV board	ASCII Character , MSB	ubLVBoardFirmwareVersion[0]	1	Unsigned byte	
0	0x18	Gen3 LVB Software Version 1	RAM of LV board	ASCII Character	ubLVBoardFirmwareVersion[1]	1	Unsigned byte	
0	0x19	Gen3 LVB Software Version 2	RAM of LV board	ASCII Character	ubLVBoardFirmwareVersion[2]	1	Unsigned byte	
0	0x1A	Gen3 LVB Software Version 3	RAM of LV board	ASCII Character	ubLVBoardFirmwareVersion[3]	1	Unsigned byte	

Table 8: Product Identification Addressing Map

Note: Identification page cannot be modified by user.

Motor Descriptor	Horsepower [Range]	Product Identifier
Gen 1	1.65 – 2.70 HP	0x0E
Gen 2/Non-SVRS	0.75 – 2.70HP	0x10
Gen3/SVRS	0.75 – 2.70HP	0x11
Flash/Non-SVRS	0.85 – 1.85 HP	0x17
Flash/SVRS	0.85 – 1.85 HP	0x18
Gen 3/Non-SVRS	1.50 – 2.70 HP	0x19
Gen 3/SVRS	1.50 – 2.70 HP	0x1A

Table 9: Product Identifier

Drive Software version is encoded as a string of ACSII characters with a decimal point assumed between character 2 and 1 and character 3 and 4. The example below is the software version "17.24.98".

Byte Address	Title	Example Value
0x00	Drive Software Version 2	'4'
0x01	Drive Software Version 3	'2'
0x02	Drive Software Version 4	'7'
0x03	Drive Software Version 5	'1'
0x15	Drive Software Version 1	'9'
0x16	Drive Software Version 0	'8'

Table 10 : Drive Software version example

User Interface Software version is encoded as a string of ASCII Characters with a decimal point assumed between character 2 and character 1. The example is the UI Software version of AB.CD

Byte Address	Title	Example Value
0x00	UI Software Version 0	'A'
0x01	UI Software Version 1	'B'
0x02	UI Software Version 2	'C'
0x03	UI Software Version 3	'D'

Table 11 : User Interface Software version example

8 Appendix C

Data Flash Block Number	Page Number in Particular Block	Data Flash Memory Address	Parameters	Details
0	0	0xF1000 – 0xF103F	CNFG Page8	Reserved for future use
	1	0xF1040 – 0xF107F	CNFG Page9	Reserved for future use
	2	0xF1080 – 0xF10BF	CNFG Page10	**Generic Parameters** System State, Keypad Lock/Unlock State, Priming Parameters, Freeze Parameters, Emergency STOP Duration Newly added parameters for Gen3 UI & LV board
	3	0xF10C0 – 0xF10FF	Reserved for future use	
	4	0xF1100 – 0xF113F	CNFG Page0	Customer ID and Customer Model Number Parameters
	5	0xF1140 – 0xF117F	CNFG Page1	Serial Shut Down Timeout, Communication Address Parameters
	6	0xF1180 – 0xF11BF	MOM Page	MOM all BIN Parameters
1	0	0xF1400 – 0xF17FF	CNFG Page3	Manufacturing Parameters
2	0	0xF1800 – 0XF1AFF	Checksum Page	User, Factory, Generic and Configuration Checksum Bytes
3	0	0xF1B00 – 0xF1FFF	Reserved for future use	

4	-	0XF2000 – 0XF23FF	Reserved for future use	
5	-	0XF2400- 0XF27FF	Reserved for future use	
6	-	0XF2800 – 0XF2AFF	Reserved for future use	
7	-	0XF2B00 – 0XF2FFF	Reserved for future use	

Configuration mapping: Page 0
Memory Accessed: RAM
Read Access: Always Enabled
Write Access: Always Enabled
All these parameters are stored in dataflash of LV board

Customer Configuration								
Page	Byte Addr ess	Title	Description	Data flash address	Variable name	Size of variable (bytes)	Type of variable	Range of parameter
0	0x00	Customer ID 0	ASCII Character (right most character)	0xF1100	ubCustomerID0	1	Unsigned byte	0 to 127
0	0x01	Customer ID 1		0xF1101	ubCustomerID1	1	Unsigned byte	0 to 127
0	0x02	Customer ID 2		0xF1102	ubCustomerID2	1	Unsigned byte	0 to 127
0	0x03	Customer ID 3		0xF1103	ubCustomerID3	1	Unsigned byte	0 to 127
0	0x04	Customer ID 4		0xF1104	ubCustomerID4	1	Unsigned byte	0 to 127
0	0x05	Customer ID 5	ASCII Character (left most character)	0xF1105	ubCustomerID5	1	Unsigned byte	0 to 127
0	0x06	Customer Model 0	ASCII Character (right most character)	0xF1106	ubCustomerModel0	1	Unsigned byte	0 to 127
0	0x07	Customer Model 1		0xF1107	ubCustomerModel1	1	Unsigned byte	0 to 127
0	0x08	Customer Model 2		0xF1108	ubCustomerModel2	1	Unsigned byte	0 to 127

0	0x09	Customer Model 3		0xF1109	ubCustomerModel3	1	Unsigned byte	0 to 127
0	0x0A	Customer Model 4		0xF110A	ubCustomerModel4	1	Unsigned byte	0 to 127
0	0x0B	Customer Model 5		0xF110B	ubCustomerModel5	1	Unsigned byte	0 to 127
0	0x0C	Customer Model 6		0xF110C	ubCustomerModel6	1	Unsigned byte	0 to 127
0	0x0D	Customer Model 7		0xF110D	ubCustomerModel7	1	Unsigned byte	0 to 127
0	0x0E	Customer Model 8		0xF110E	ubCustomerModel8	1	Unsigned byte	0 to 127
0	0x0F	Customer Model 9	ASCII Character (left most character)	0xF110F	ubCustomerModel9			

Table 12: Configuration Page 0 Addressing Map

Configuration mapping: Page 1								
Memory Accessed: RAM								
Read Access: Always Enabled								
Write Access: Always Enabled								
All these parameters are stored in dataflash of LV board								
Customer Configuration								
Page	Byte Add	Title	Description	Data flash address (in hex)	Variable name	Size of variable (bytes)	Type of variable	Range of parameter
1	0x00	Serial Time-out Shut Down /Digital	Serial /Digital Input time out in seconds Default 60s	0xF1140	ubSerialShutDownTimeout	1	Unsigned byte	Allowable range 0 for none

		Input Timeout						or 10-250 seconds
1	0x01	Communication Address	Communication Address (odd, 0x15-0xF7) Note: address change is immediate; the reply will include the new address (for MOD BUS only). Use store command to store it to DataFlash; 8-bit unsigned	0xF1141	ubCommunicationAddress	1	Unsigned byte	0x15-0xF7 Default: 0x15
1	0x06	External contact		0xF1146	ubExternal Contact	1	Unsigned byte	0 to 255
1	0x07	Auxiliary relay status	<table><tr><td>Value</td><td>Aux 2</td><td>Aux 1</td></tr><tr><td>0</td><td>Off</td><td>Off</td></tr><tr><td>1</td><td>X</td><td>On</td></tr><tr><td>2</td><td>X</td><td>Off</td></tr><tr><td>3</td><td>On</td><td>X</td></tr><tr><td>4</td><td>Off</td><td>X</td></tr><tr><td>5</td><td>On</td><td>On</td></tr></table>	0xF1147	ubAuxRelayControl	1	Unsigned byte	0 to 5

Table 13: Configuration Page 1 Addressing Map

Configuration mapping: Page 3
Memory Accessed: RAM
Read Access: Always Enabled
Write Access: Always Enabled
All these parameters are stored in dataflash of LV board

					Manufacturer Configuration			
Pa ge	Byte Addr ess	Title	Description	Data flash address (in hex)	Variable name	Size of variable (bytes)	Type of variabl e	Range of parameter
3	0x00	First Functional Test Signature	0xA7 indicates test pass	F1400	configurationp age3.ubFirstFu nctionalTestSi gnature	1	Unsign ed byte	0 to 255
3	0x01	First Functional Test Fixture ID		F1401	configurationp age3.ubFirstFu nctionalTestFi xtureID	1	Unsign ed byte	0 to 255
3	0x02			F1402	dataflash.ubBl ankData			
3	0x03	Second functional Test Signature	0xA7 indicates test pass	F1403	configurationp age3.ubSecond FunctionalTest Signature	1	Unsign ed byte	0 to 255
3	0x04	Second functional Test Fixture ID		F1404	configurationp age3.ubSecond FunctionalTest FixtureID	1	Unsign ed byte	0 to 255
3	0x05	First Functional Test Date 4 (ASCII)	Day	F1405	configurationp age3.ubFirstFu nctionalTestDa te4	1	Unsign ed byte	0 to 255
3	0x06	First Functional Test Date 3 (ASCII))	Day	F1406	configurationp age3.ubFirstFu nctionalTestDa te3	1	Unsign ed byte	0 to 255
3	0x07	First Functional Test Date 2 (ASCII)	Day	F1407	configurationp age3.ubFirstFu nctionalTestDa te2	1	Unsign ed byte	0 to 255

3	0x08	First Functional Test Date 1 (ASCII)	Year	F1408	configurationpage3.ubFirstFunctionalTestDate1	1	Unsigned byte	0 to 255
3	0x09	First Functional Test Date 0 (ASCII)	Year	F1409	configurationpage3.ubFirstFunctionalTestDate0	1	Unsigned byte	0 to 255
3	0x0A			F140A	dataflash.ubBlankData	1	Unsigned byte	
3	0x0B	Electronics Model Number 14 (ASCII)	model	F140B	configurationpage3.ubElectronicsModelNumber14ASCII	1	Unsigned byte	0 to 255
3	0x0C	Electronics Model Number 13 (ASCII)	model	F140C	configurationpage3.ubElectronicsModelNumber13ASCII	1	Unsigned byte	0 to 255
3	0x0D	Electronics Model Number 12 (ASCII)	model	F140D	configurationpage3.ubElectronicsModelNumber12ASCII	1	Unsigned byte	0 to 255
3	0x0E	Electronics Model Number 11 (ASCII)	model	F140E	configurationpage3.ubElectronicsModelNumber11ASCII	1	Unsigned byte	0 to 255
3	0x0F	Electronics Model Number 10 (ASCII)	model	F140F	configurationpage3.ubElectronicsModelNumber10ASCII	1	Unsigned byte	0 to 255
3	0x10	Electronics Model Number 9 (ASCII)	model	F1410	configurationpage3.ubElectronicsModelNumber9ASCII	1	Unsigned byte	0 to 255
3	0x11	Electronics Model Number 8 (ASCII)	model	F1411	configurationpage3.ubElectronicsModelNumber8ASCII	1	Unsigned byte	0 to 255

3	0x12	Electronics Model Number - (ASCII)	Hyphen (0x45)	F1412	configurationpage3.ubElectronicsModelNumberOther1ASCII	1	Unsigned byte	0 to 255
3	0x13	Electronics Model Number 7 (ASCII)	HW Configuration	F1413	configurationpage3.ubElectronicsModelNumber7ASCII	1	Unsigned byte	0 to 255
3	0x14	Electronics Model Number 6 (ASCII)	HW Configuration	F1414	configurationpage3.ubElectronicsModelNumber6ASCII	1	Unsigned byte	0 to 255
3	0x15	Electronics Model Number 5 (ASCII)	HW Configuration	F1415	configurationpage3.ubElectronicsModelNumber5ASCII	1	Unsigned byte	0 to 255
3	0x16	Electronics Model Number - (ASCII)	Hyphen (0x45)	F1416	configurationpage3.ubElectronicsModelNumberOther2ASCII	1	Unsigned byte	0 to 255
3	0x17	Electronics Model Number 4 (ASCII)	SW Rev # for UL/OEM, Aftermarket	F1417	configurationpage3.ubElectronicsModelNumber4ASCII	1	Unsigned byte	0 to 255
3	0x18	Electronics Model Number 3 (ASCII)	SW Rev # for UL	F1418	configurationpage3.ubElectronicsModelNumber3ASCII	1	Unsigned byte	0 to 255
3	0x19	Electronics Model Number 2 (ASCII)	SW Rev # for UL	F1419	configurationpage3.ubElectronicsModelNumber2ASCII	1	Unsigned byte	0 to 255
3	0x1A	Electronics Model Number - (ASCII)	Hyphen (0x45)	F141A	configurationpage3.ubElectronicsModelNumberOther3ASCII	1	Unsigned byte	0 to 255

3	0x1B	Electronics Model 0Number 1 (0ASCII)	HW Rev # for UL	F141B	configurationpage3.ubElectronicsModelNumber1ASCII	1	Unsigned byte	0 to 255
3	0x1C	Electronics Model Number 0 (ASCII)	HW Rev # for UL	F141C	configurationpage3.ubElectronicsModelNumber0ASCII	1	Unsigned byte	0 to 255
3	0x1D			F141D	dataflash.ubBlankData	1	Unsigned byte	
3	0x1E	Electronics Serial Number 12 (ASCII)	Manufacturers Identifier part of SN	F141E	configurationpage3.ubElectronicsSerialNumber12ASCII	1	Unsigned byte	0 to 255
3	0x1F	Electronics Serial Number 11 (ASCII)	Manufacturers Identifier part of SN	F141F	configurationpage3.ubElectronicsSerialNumber11ASCII	1	Unsigned byte	0 to 255
3	0x20	Electronics Serial Number 10 (ASCII)	Manufacturers Identifier part of SN	F1420	configurationpage3.ubElectronicsSerialNumber10ASCII	1	Unsigned byte	0 to 255
3	0x21	Electronics Serial Number - (ASCII)	Hyphen (0x45)	F1421	configurationpage3.ubElectronicsSerialNumberASCII	1	Unsigned byte	0 to 255
3	0x22	Electronics Serial Number 9 (ASCII)	Serial number	F1422	configurationpage3.ubElectronicsSerialNumber9ASCII	1	Unsigned byte	0 to 255
3	0x23	Electronics Serial Number 8 (ASCII)	Serial number	F1423	configurationpage3.ubElectronicsSerialNumber8ASCII	1	Unsigned byte	0 to 255
3	0x24	Electronics Serial Number 7 (ASCII)	Serial number	F1424	configurationpage3.ubElectronicsSerialNumber7ASCII	1	Unsigned byte	0 to 255

3	0x25	Electronics Serial Number 6 (ASCII)	Serial number	F1425	configurationpage3.ubElectronicsSerialNumber6ASCII	1	Unsigned byte	0 to 255
3	0x26	Electronics Serial 0Number 5 (ASCII)	Serial number	F1426	configurationpage3.ubElectronicsSerialNumber5ASCII	1	Unsigned byte	0 to 255
3	0x27	Electronics Serial Number 4 (ASCII)	Serial number	F1427	configurationpage3.ubElectronicsSerialNumber4ASCII	1	Unsigned byte	0 to 255
3	0x28	Electronics Serial Number 3 (ASCII)	Serial number	F1428	configurationpage3.ubElectronicsSerialNumber3ASCII	1	Unsigned byte	0 to 255
3	0x29	Electronics Serial Number 2 (ASCII)	Serial number	F1429	configurationpage3.ubElectronicsSerialNumber2ASCII	1	Unsigned byte	0 to 255
3	0x2A	Electronics Serial Number 1 (ASCII)	Serial number	F142A	configurationpage3.ubElectronicsSerialNumber1ASCII	1	Unsigned byte	0 to 255
3	0x2B	Electronics Serial Number 0 (ASCII)	Serial number	F142B	configurationpage3.ubElectronicsSerialNumber0ASCII	1	Unsigned byte	0 to 255
3	0x2C			F142C	dataflash.ubBlankData	1	Unsigned byte	
3	0x2D	Third functional test signature	0xA7 indicates test pass	F142D	configurationpage3.ubThirdFunctionalTestSignatureAuditTester	1	Unsigned byte	0 to 255
3	0x2E	Third functional test fixture ID		F142E	configurationpage3.ubThirdFunctionalTestFixtureIDAuditTester	1	Unsigned byte	0 to 255

3	0x2F			F142F	dataflash.ubBlankData	1	Unsigned byte	
3	0x30	EOL Test Signature	0xA7 indicates test pass	F1430	configurationpage3.ubEOLTestSignature	1	Unsigned byte	0 to 255
3	0x31	EOL Test Fixture ID		F1431	configurationpage3.ubEOLTestFixtureID	1	Unsigned byte	0 to 255
3	0x32	EOL Test Date 4 (ASCII)	Day	F1432	configurationpage3.ubEOLTestDate4ASCII	1	Unsigned byte	0 to 255
3	0x33	EOL Test Date 3 (ASCII)	Day	F1433	configurationpage3.ubEOLTestDate3ASCII	1	Unsigned byte	0 to 255
3	0x34	EOL Test Date 2 (ASCII)	Day	F1434	configurationpage3.ubEOLTestDate2ASCII	1	Unsigned byte	0 to 255
3	0x35	EOL Test Date 1 (ASCII)	Year	F1435	configurationpage3.ubEOLTestDate1ASCII	1	Unsigned byte	0 to 255
3	0x36	EOL Test Date 0 (ASCII)	Year	F1436	configurationpage3.ubEOLTestDate0ASCII	1	Unsigned byte	0 to 255
3	0x37	EPC Combo Model 10 (ASCII)	model	F1437	configurationpage3.ubEPCComboModel10ASCII	1	Unsigned byte	0 to 255
3	0x38	EPC Combo Model 9 (ASCII)	model	F1438	configurationpage3.ubEPCComboModel9ASCII	1	Unsigned byte	0 to 255
3	0x39	EPC Combo Model 8 (ASCII)	model	F1439	configurationpage3.ubEPCComboModel8ASCII	1	Unsigned byte	0 to 255
3	0x3A	EPC Combo Model 7 (ASCII)	model	F143A	configurationpage3.ubEPCComboModel7ASCII	1	Unsigned byte	0 to 255

3	0x3B	EPC Combo Model 6 (ASCII)	model	F143B	configurationpage3.ubEPCComboModel6ASCII	1	Unsigned byte	0 to 255
3	0x3C	EPC Combo Model 5 (ASCII)	model	F143C	configurationpage3.ubEPCComboModel5ASCII	1	Unsigned byte	0 to 255
3	0x3D	EPC Combo Model 4 (ASCII)	model	F143D	configurationpage3.ubEPCComboModel4ASCII	1	Unsigned byte	0 to 255
3	0x3E	EPC Combo Model 3 (ASCII)	model	F143E	configurationpage3.ubEPCComboModel3ASCII	1	Unsigned byte	0 to 255
3	0x3F	EPC Combo Model 2 (ASCII)	model or space	F143F	configurationpage3.ubEPCComboModel2ASCII	1	Unsigned byte	0 to 255
3	0x40	EPC Combo Model 1 (ASCII)	model or space	F1440	configurationpage3.ubEPCComboModel1ASCII	1	Unsigned byte	0 to 255
3	0x41	EPC Combo Model 0 (ASCII)	model or space	F1441	configurationpage3.ubEPCComboModel0ASCII	1	Unsigned byte	0 to 255
3	0x42			F1442	dataflash.ubBlankData	1	Unsigned byte	
3	0x43	First Sub-functional Test Signature	0xA7 indicates test pass	F1443	configurationpage3.ubFirstSubFunctionalTestSignature	1	Unsigned byte	0 to 255
3	0x44	First Sub-functional Test Fixture ID		F1444	configurationpage3.ubFirstSubFunctionalTestFixtureID	1	Unsigned byte	0 to 255

3	0x45			F1445	dataflash.ubBlankData	1	Unsigned byte	0 to 255
3	0x46	First Sub-functional Test Date 4 (ASCII)	Day	F1446	configurationpage3.ubFirstSubFunctionalTestDate4	1	Unsigned byte	0 to 255
3	0x47	First Sub-functional Test Date 3 (ASCII))	Day	F1447	configurationpage3.ubFirstSubFunctionalTestDate3	1	Unsigned byte	0 to 255
3	0x48	First Sub-functional Test Date 2 (ASCII)	Day	F1448	configurationpage3.ubFirstSubFunctionalTestDate2	1	Unsigned byte	0 to 255
3	0x49	First Sub-functional Test Date 1 (ASCII)	Year	F1449	configurationpage3.ubFirstSubFunctionalTestDate1	1	Unsigned byte	0 to 255
3	0x4A	First Sub-functional Test Date 0 (ASCII)	Year	F144A	configurationpage3.ubFirstSubFunctionalTestDate0	1	Unsigned byte	0 to 255
3	0x4B			F144B	dataflash.ubBlankData	1	Unsigned byte	
3	0x4C	Drive Serial Number 12 (ASCII)	Manufacturers Identifier part of SN	F144C	configurationpage3.ubDriveSerialNumber12ASCII	1	Unsigned byte	0 to 255
3	0x4D	Drive Serial Number 11 (ASCII)	Manufacturers Identifier part of SN	F144D	configurationpage3.ubDriveSerialNumber11ASCII	1	Unsigned byte	0 to 255
3	0x4E	Drive Serial Number 10 (ASCII)	Manufacturers Identifier part of SN	F144E	configurationpage3.ubDriveSerialNumber10ASCII	1	Unsigned byte	0 to 255
3	0x4F	Drive Serial	Hyphen (0x45)	F144F	configurationpage3.ubDriveS	1	Unsigned byte	0 to 255

		Number - (ASCII)			erialNumberASCII		
3	0x50	Drive Serial Number 9 (ASCII)	Serial number	F1450	configurationpage3.ubDriveSerialNumber9 ASCII	1	Unsigned byte	0 to 255
3	0x51	Drive Serial Number 8 (ASCII)	Serial number	F1451	configurationpage3.ubDriveSerialNumber8 ASCII	1	Unsigned byte	0 to 255
3	0x52	Drive Serial Number 7 (ASCII)	Serial number	F1452	configurationpage3.ubDriveSerialNumber7 ASCII	1	Unsigned byte	0 to 255
3	0x53	Drive Serial Number 6 (ASCII)	Serial number	F1453	configurationpage3.ubDriveSerialNumber6 ASCII	1	Unsigned byte	0 to 255
3	0x54	Drive Serial Number 5 (ASCII)	Serial number	F1454	configurationpage3.ubDriveSerialNumber5 ASCII	1	Unsigned byte	0 to 255
3	0x55	Drive Serial Number 4 (ASCII)	Serial number	F1455	configurationpage3.ubDriveSerialNumber4 ASCII	1	Unsigned byte	0 to 255
3	0x56	Drive Serial Number 3 (ASCII)	Serial number	F1456	configurationpage3.ubDriveSerialNumber3 ASCII	1	Unsigned byte	0 to 255
3	0x57	Drive Serial Number 2 (ASCII)	Serial number	F1457	configurationpage3.ubDriveSerialNumber2 ASCII	1	Unsigned byte	0 to 255
3	0x58	Drive Serial Number 1 (ASCII)	Serial number	F1458	configurationpage3.ubDriveSerialNumber1 ASCII	1	Unsigned byte	0 to 255
3	0x59	Drive Serial	Serial number	F1459	configurationpage3.ubDriveS	1	Unsigned byte	0 to 255

		Number 0 (ASCII)			erialNumber0 ASCII			
3	0x5A			F145A	dataflash.ubBlankData	1	Unsigned byte	
3	0x5B	LVB Serial Number 12 (ASCII)	Manufacturers Identifier part of SN	F145B	configurationpage3.ubPFCUISerialNumber12ASCII	1	Unsigned byte	0 to 255
3	0x5C	LVB Serial Number 11 (ASCII)	Manufacturers Identifier part of SN	F145C	configurationpage3.ubPFCUISerialNumber11ASCII	1	Unsigned byte	0 to 255
3	0x5D	LVB Serial Number 10 (ASCII)	Manufacturers Identifier part of SN	F145D	configurationpage3.ubPFCUISerialNumber10ASCII	1	Unsigned byte	0 to 255
3	0x5E	LVB Serial Number - (ASCII)	Hyphen (0x45)	F145E	configurationpage3.ubPFCUISerialNumberASCII	1	Unsigned byte	0 to 255
3	0x5F	LVB Serial Number 9 (ASCII)	Serial number	F145F	configurationpage3.ubPFCUISerialNumber9ASCII	1	Unsigned byte	0 to 255
3	0x60	LVB Serial Number 8(ASCII)	Serial number	F1460	configurationpage3.ubPFCUISerialNumber8ASCII	1	Unsigned byte	0 to 255
3	0x61	LVB Serial Number 7 (ASCII)	Serial number	F1461	configurationpage3.ubPFCUISerialNumber7ASCII	1	Unsigned byte	0 to 255
3	0x62	LVB Serial Number 6 (ASCII)	Serial number	F1462	configurationpage3.ubPFCUISerialNumber6ASCII	1	Unsigned byte	0 to 255
3	0x63	LVB Serial Number 5(ASCII)	Serial number	F1463	configurationpage3.ubPFCUISerialNumber5ASCII	1	Unsigned byte	0 to 255

3	0x64	LVB Serial Number 4 (ASCII)	Serial number	F1464	configurationpage3.ubPFCUISerialNumber4ASCII	1	Unsigned byte	0 to 255
3	0x65	LVB Serial Number 3 (ASCII)	Serial number	F1465	configurationpage3.ubPFCUISerialNumber3ASCII	1	Unsigned byte	0 to 255
3	0x66	LVB Serial Number 2 (ASCII)	Serial number	F1466	configurationpage3.ubPFCUISerialNumber2ASCII	1	Unsigned byte	0 to 255
3	0x67	LVB Serial Number 1 (ASCII)	Serial number	F1467	configurationpage3.ubPFCUISerialNumber1ASCII	1	Unsigned byte	0 to 255
3	0x68	LVB Serial Number 0 (ASCII)	Serial number	F1468	configurationpage3.ubPFCUISerialNumber0ASCII	1	Unsigned byte	0 to 255
3	0x69			F1469	dataflash.ubBlankData	1	Unsigned byte	
3	0x6A	First Functional Test Signature UI	0xA7 indicates test pass	F146A	configurationpage3.ubFirstSubFunctionalTestSignatureUI	1	Unsigned byte	0 to 255
3	0x6B	First Functional Test Fixture ID UI		F146B	configurationpage3.ubFirstSubFunctionalTestFixtureIDUI	1	Unsigned byte	0 to 255
3	0x6C			F146C	dataflash.ubBlankData	1	Unsigned byte	
3	0x6D	Second functional Test Signature (UI)	0xA7 indicates test pass	F146D	configurationpage3.ubFirstFunctionalTestSignatureUI	1	Unsigned byte	0 to 255

3	0x6E	Second functional Test Fixture ID (UI)		F146E	configurationpage3.ubFirstFunctionalTestFixtureIDUI	1	Unsigned byte	0 to 255
3	0x6F	First Functional Test Date 4 (ASCII)	Day	F146F	configurationpage3.ubFirstSubFunctionalTestDate4ASCII	1	Unsigned byte	0 to 255
3	0x70	First Functional Test Date 3 (ASCII))	Day	F1470	configurationpage3.ubFirstSubFunctionalTestDate3ASCII	1	Unsigned byte	0 to 255
3	0x71	First Functional Test Date 2 (ASCII)	Day	F1471	configurationpage3.ubFirstSubFunctionalTestDate2ASCII	1	Unsigned byte	0 to 255
3	0x72	First Functional Test Date 1 (ASCII)	Year	F1472	configurationpage3.ubFirstSubFunctionalTestDate1ASCII	1	Unsigned byte	0 to 255
3	0x73	First Functional Test Date 0 (ASCII))	Year	F1473	configurationpage3.ubFirstSubFunctionalTestDate0ASCII	1	Unsigned byte	0 to 255
3	0x74			F1474	dataflash.ubBlankData	1	Unsigned byte	
3	0x75	First UI Functional Test Date 4 (ASCII)	Day	F1475	configurationpage3.ubFirstUIFunctionalTestDate4ASCII	1	Unsigned byte	0 to 255
3	0x76	First UI Functional Test Date 3 (ASCII))	Day	F1476	configurationpage3.ubFirstUIFunctionalTestDate3ASCII	1	Unsigned byte	0 to 255
3	0x77	First UI Functional Test Date 2 (ASCII)	Day	F1477	configurationpage3.ubFirstUIFunctionalTestDate2ASCII	1	Unsigned byte	0 to 255

3	0x78	First UI Functional Test Date 1 (ASCII)	Year	F1478	configurationpage3.ubFirstUIFunctionalTestDate1ASCII	1	Unsigned byte	0 to 255
3	0x79	First UI Functional Test Date 0 (ASCII)	Year	F1479	configurationpage3.ubFirstUIFunctionalTestDate0ASCII	1	Unsigned byte	0 to 255
3	0x7A			F147A	dataflash.ubBlankData	1	Unsigned byte	
3	0x7B	Second Functional Test Date 4 (ASCII)	Day	F147B	configurationpage3.ubFirstUIFunctionalTestDate4ASCII	1	Unsigned byte	0 to 255
3	0x7C	Second Functional Test Date 3 (ASCII))	Day	F147C	configurationpage3.ubFirstUIFunctionalTestDate3ASCII	1	Unsigned byte	0 to 255
3	0x7D	Second Functional Test Date 2 (ASCII)	Day	F147D	configurationpage3.ubFirstUIFunctionalTestDate2ASCII	1	Unsigned byte	0 to 255
3	0x7E	Second Functional Test Date 1 (ASCII)	Year	F147E	configurationpage3.ubFirstUIFunctionalTestDate1ASCII	1	Unsigned byte	0 to 255
3	0x7F	Second Functional Test Date 0 (ASCII)	Year	F147F	configurationpage3.ubFirstUIFunctionalTestDate0ASCII	1	Unsigned byte	0 to 255
3	0x80	RTC Calibration Data Low Byte		F1480	configurationpage3.ubRTCCalibrationLSB	1	Unsigned byte	0 to 255
3	0x81	RTC Calibration Data High Byte		F1481	configurationpage3.ubRTCCalibrationMSB	1	Unsigned byte	0 to 255

3	0x82	Hayward Ecostar Pump Family	Reserved	F1482	configurationpage3.ubPumpFamily	1	Unsigned byte	0 to 255
3	0x83	Hayward Ecostar HP Rating	Used for Motor Serial Number 12	F1483	configurationpage3.ubHPRating	1	Unsigned byte	0 to 255
3	0x84	Hayward Ecostar Type of Use	Used for Motor Serial Number 11	F1484	configurationpage3.ubTypeOfUse	1	Unsigned byte	0 to 255
3	0x85	Hayward Ecostar Type of Control	Used for Motor Serial Number 10	F1485	configurationpage3.ubTypeOfControl	1	Unsigned byte	0 to 255
3	0x86	Hayward Ecostar Supply Type	Used for Motor Serial Number 9	F1486	configurationpage3.ubSupplyType	1	Unsigned byte	0 to 255
3	0x87	Hayward Ecostar Features (Higher Byte)	Used for Motor Serial Number 8	F1487	configurationpage3.Features.ubByte[1]	1	Unsigned byte	0 to 255
3	0x88	Hayward Ecostar Features (Lower Byte)	Used for Motor Serial Number 7	F1488	configurationpage3.Features.ubByte[0]	1	Unsigned byte	0 to 255
3	0x89	Hayward Ecostar Max DC Bus (Higher Byte)	Used for Motor Serial Number 6	F1489	configurationpage3.MaxDCBus.ubByte[1]	1	Unsigned byte	0 to 255
3	0x8A	Hayward Ecostar Max DC Bus (Lower Byte)	Used for Motor Serial Number 5	F148A	configurationpage3.MaxDCBus.ubByte[0]	1	Unsigned byte	0 to 255

3	0x8B	Hayward Ecostar Max Amp (Higher Byte)	Used for Motor Serial Number 4	F148B	configurationpage3.MaxAmp.ubByte[1]	1	Unsigned byte	0 to 255
3	0x8C	Hayward Ecostar Max Amp (Lower Byte)	Used for Motor Serial Number 3	F148C	configurationpage3.MaxAmp.ubByte[0]	1	Unsigned byte	0 to 255
3	0x8D	Hayward Ecostar Max Power (Higher Byte)	Used for Motor Serial Number 2	F148D	configurationpage3.MaxPower.ubByte[1]	1	Unsigned byte	0 to 255
3	0x8E	Hayward Ecostar Max Amp (Lower Byte)	Used for Motor Serial Number 1	F148E	configurationpage3.MaxPower.ubByte[0]	1	Unsigned byte	0 to 255
3	0x8F	Hayward Ecostar Max Temperature	Used for Motor Serial Number 0	F148F	configurationpage3.ubMaxTemperature	1	Unsigned byte	0 to 255
3	0x90	Hayward Ecostar Future use	Reserved	F1490	configurationpage3.ubFutureUse	1	Unsigned byte	0 to 255

Table 14 Configuration Page 3 Addressing Map

Note :

Address 0x82 through 0x90 were not found used, to address the Motor Serial number configuration & to avoid correction in the current structure the same addresses are used to configure Motor Serial number. Approved DOU is attached for the kind reference.

P rwru#Vhuld#
Qxpehu#Dgglwlrq1m

Configuration mapping: Page 9

Read Access: Always Enabled

Write Access: Always Enabled

All these parameters are stored in dataflash of LV board

				Control Configuration				
Page	Byte Add	Title	Description	Data flash address	Variable name	Size of variable (bytes)	Type of variable	Range of parameter
9	0x00	Gen3 Priming State	0- Gen3 is priming not 1- Gen 3 priming	0xF1040	isUIPriming	1	Unsigned byte	0 to 1

Table 15 Configuration Page 9 Address

Configuration mapping: Page 10

Read Access: Always Enabled

Write Access: Always Enabled

All these parameters are stored in dataflash of LV board

				Control Configuration				
Page	Byte Add	Title	Description	Data flash address	Variable name	Size of variable (bytes)	Type of variable	Range of parameter
10	0x00	System State	1 =Start , 0 = Stop;Default = Stop	0xF1080	ubState	1	Unsigned byte	0 to 1 Default: 0
10	0x01	Keypad status	Lock/unlock state of keypad	0xF1081	ubLockUnlockState	1	Unsigned byte	0 to 3; 0- Unlocked 1- Locked 2- Unlocked & Stuck 3-Locked & Stuck Default: 0

10	0x02	Priming Duration (LVB)		0xF1082	ubPrimingDuration	1	Unsigned byte	Duration: 0,3 to 15 minutes, default – OFF
10	0x03	Priming Speed (LVB) (LSB)		0xF1083	uwPrimingSpeed.ubByte[0]	1	Unsigned byte	Range= 1500 to max operating speed
10	0x04	Priming Speed(LVB) (MSB)		0xF1084	uwPrimingSpeed.ubByte[1]	1	Unsigned byte	Default = 2600 RPM Step Size:25
10	0x05	Protocol selected		0xF1081	ubCustomerProtocolID	1	Unsigned byte	0 to 4 0 = Default 1 = Jandy 2 = Pentair 3 = Prologic/Omnilogic 4 = All in One Default value = 0
10	0x06	Freeze Protection Enable/ Disable	0 = Disable 1 = ON 2 = OFF	0xF1086	ubEnableDisableState	1	Unsigned byte	0 to 2; Default = ON
10	0x07	Freeze Protection Turn ON Temperature		0xF1087	ubTurnONTemperature	1	Unsigned byte	Valid range = 32° to 72°F Default: 39 Step Size: 1
10	0x08	Freeze Protection Duration		0xF1088	ubDuration	1	Unsigned byte	Default = 2 Hours; Valid Range = 1 – 8 Hrs. Step Size: 1

10	0x09	Freeze Protection Speed (LSB)	Freeze Protection Speed = MSB * 256+ LSB;	0xF1089	uwSpeed.ubByte[0]	1	Unsigned byte	Default = 2600RPM Valid Range = 600 to 3450RPM
10	0x0A	Freeze Protection Speed (MSB)		0xF108A	uwSpeed.ubByte[1]	1	Unsigned byte	Step Size:25
10	0x0B	Temporary STOP Duration		0xF108B	ubTemporarySTOPDuration	1	Unsigned byte	Default = 4 minutes Range: 0x01 to 0xFF Step Size: 1
10	0x0C	PWM Mode (Digital Input 1) Enable/ Disable	0 = Disable 1 = ON 2 = OFF	0xF108C	ubEnableDisableState	1	Unsigned byte	0 to 2; Default: OFF
10	0x0D	PWM Demand Mode	0 = Speed	0xF108D	ubDemandMode	1	Unsigned byte	Default Value = 0
10	0x0E	PWM Mode Min Setting (Low Byte)		0xF108E	uwMinSetting.ubByte[0]	1	Unsigned byte	Min-Max range Valid Range = 600 to 3250 rpm
10	0x0F	PWM Mode Min Setting (High Byte)		0xF108F	uwMinSetting.ubByte[1]	1	Unsigned byte	Default: 600 Step Size:25
10	0x10	PWM Mode Max Setting (Low Byte)		0xF1090	uwMaxSetting.ubByte[0]	1	Unsigned byte	Min-Max range Valid Range = 800 to 3450 rpm

10	0x11	PWM Mode Max Setting (High Byte)		0xF1091	uwMax Setting. ubByte[1]	1	Unsigned byte	Default: 3450 Step Size:25
10	0x12	HUA (1st byte) MSB		0xF1092	ubHUA Address [0]	1	Unsigned byte	Value = 0x10 by Default 0x10 represent Variable Speed. Pump
10	0x13	HUA (2nd byte)	Hayward Unique Address	0xF1093	ubHUA Address [1]	1	Unsigned byte	Range = 0x00 to 0xFF Default:0x00
10	0x14	HUA (3rd byte)		0xF1094	ubHUA Address [2]	1	Unsigned byte	Range = 0x00 to 0xFF Default:0x00
10	0x15	HUA (4th byte)		0xF1095	ubHUA Address [3]	1	Unsigned byte	Range = 0x00 to 0xFF Default:0x00
10	0x16	HUA (5th byte) LSB		0xF1096	ubHUA Address [4]	1	Unsigned byte	Range = 0x00 to 0xFF Default:0x00

10	0X17	TurnOff Timeout	LCD related parameters	0xF1097	ubLcdTurnOFF Timeout	1	Unsigned byte	1 to 5 mins Default: 2 Step size: 1
10	0x18	Brightness		0xF1098	ubBrightness	1	Unsigned byte	0 to 100 % Default: 100 Step Size:10
10	0x19	Aux 1 Relay Speed(LSB)	Speed of Aux 1 relay	0xF1099	uwAux1Relay SpeedThreshold.ubByte[0]	1	Unsigned byte	600 to 3450 rpm Default: 2800 Step size: 25
10	0x1A	Aux 1 Relay Speed (MSB)		0xF109A	uwAux1Relay SpeedThreshold.ubByte[1]	1	Unsigned byte	
10	0x1B	Aux 1 Relay Duration (LSB)	Duration of Aux 1 relay In Minutes	0xF109B	uwAux1Relay DurationLimit.ubByte[0]	1	Unsigned byte	0 to 1440 minutes Default: 0 Step Size: 15
10	0x1C	Aux 1 Relay Duration (MSB)		0xF109C	uwAux1Relay DurationLimit.ubByte[1]	1	Unsigned byte	
10	0x1D	Aux 2 Relay Speed(LSB)	Speed of Aux 2 relay	0xF109D	uwAux2Relay SpeedThreshold.ubByte[0]	1	Unsigned byte	600 to 3450 rpm Default: 2800 Step Size: 25
10	0x1E	Aux 2 Relay Speed (MSB)		0xF109E	uwAux2Relay SpeedThreshold.ubByte[1]	1	Unsigned byte	
10	0x1F	Aux 2 Relay Duration (LSB)	Duration of Aux 2 relay in Minutes	0xF109F	uwAux2Relay DurationLimit.ubByte[0]	1	Unsigned byte	0 to 1440 minutes Default: 0 Step Size: 15
10	0x20	Aux 2 Relay Duration(MSB)		0xF10A0	uwAux2Relay DurationLimit.ubByte[1]	1	Unsigned byte	

10	0x21	Aux relay Status Clock Schedule	Status of both the Aux relays in case of clock schedule	0xF10 A1	ubAuxRelaySc hedule	1	Unsi gned byte	bit 0 & 1 represen t the staus of Aux 1 & 2 respectiv ely of Step 1 bit 2 & 3 represen t the staus of Aux 1 & 2 respectiv ely of Step 2 bit 4 & 5 represent the staus of Aux 1 & 2 respectively of Step 3 Default: 0
10	0x22	Schedule Setup Type	Clock/Timer 0-Clock 1- Timer	0xF10 A2	ubScheduleTy pe	1	Unsi gned byte	0 to 1 Default: CLOCK
10	0x23	Priming Duration (Gen3UI)	2 = OFF 3 -15 minutes	0xF10 A3	ubGen3UIPrim ingDuration	1	Unsi gned byte	2, 3 to 15 minutes Default: OFF StepSize:1

10	0x24	Priming Speed (Gen3UI) (LSB)	Priming Speed through Gen3UI	0xF10 A4	uwGen3UIPri mingSpeed.ub Byte[0]	1	Unsi gned byte	1500 to Max operating speed
10	0x25	Priming Speed (Gen3UI) (MSB)		0xF10 A5	uwGen3UIPri mingSpeed.ub Byte[1]	1	Unsi gned byte	Default: 2600 Step Size: 25
10	0x26 – 0x2D	Reserved (Value to be set as 0)						
10	0x2E	Digital 1 Status	ON/OFF Digital input 1	0xF10 AE	ubDigital1Stat us	1	Unsi gned byte	1- ON 2- OFF Default: ON
10	0x2F	Digital 1 Speed(LSB)	Speed for Digital 1	0xF10 AF	uwDigital1Spe ed.ubByte[0]	1	Unsi gned byte	600 to Max operating speed
10	0x30	Digital 1 Speed(MSB)		0xF10 B0	uwDigital1Spe ed.ubByte[1]	1	Unsi gned byte	Default: 600 Step Size:25
10	0x31	Digital 2 Status	ON/OFF Digital input 2	0xF10 B1	ubDigital2Stat us	1	Unsi gned byte	1- ON 2- OFF Default: ON
10	0x32	Digital 2 Speed(LSB)	Speed for Digital 2	0xF10 B2	uwDigital2Spe ed.ubByte[0]	1	Unsi gned byte	600 to Max operating speed
10	0x33	Digital 2 Speed(MSB)		0xF10 B3	uwDigital2Spe ed.ubByte[1]	1	Unsi gned byte	Default: 1200 Step Size:25
10	0x34	Digital 3 Status	ON/OFF Digital input 3	0xF10 B4	ubDigital3Stat us	1	Unsi gned byte	1- ON 2- OFF Default: ON
10	0x35	Digital 3 Speed(LSB)	Speed for Digital 3	0xF10 B4	uwDigital3Spe ed.ubByte[0]	1	Unsi gned byte	600 to Max operating speed
10	0x36	Digital 3 Speed(MSB)		0xF10 B5	uwDigital3Spe ed.ubByte[1]	1	Unsi gned byte	Default: 2400 Step Size:25

10	0x37	Digital 4 Status	ON/OFF Digital input 4	0xF10 B6	ubDigital4Status	1	Unsigned byte	1- ON 2- OFF Default: ON
10	0x38	Digital 4 Speed(LSB)	Speed for Digital 4	0xF10 B7	uwDigital4Speed.ubByte[0]	1	Unsigned byte	600 to Max operating speed
10	0x39	Digital 4 Speed(MSB)		0xF10 B8	uwDigital4Speed.ubByte[1]	1	Unsigned byte	Default: 3000 Step Size:25
10	0x3A	Step 1 Timer Mode Hrs		0xF10 B9	ubSTEP1TimerModeDurationHours	1	Unsigned byte	0 to 24 Default: 4 Step Size:1
10	0x3B	Step 1 Timer Mode Mins		0xF10 BA	ubSTEP1TimerModeDurationMinutes	1	Unsigned byte	0 to 45 Duration: 0 Step Size: 15
10	0x3C	Step 1 Timer Mode RPM (LSB)		0xF10 BB	uwSTEP1TimerModeSpeed.ubByte[0]	1	Unsigned byte	600 to Max operating speed
10	0x3D	Step 1 Timer RPM (MSB)		0xF10 BC	uwSTEP1TimerModeSpeed.ubByte[1]	1	Unsigned byte	Default: 3100 Step Size: 25
10	0x3E	Step 1 Clock Mode Start Time Hrs		0xF10 BD	ubSTEP1ClockModeStartTimeHours	1	Unsigned byte	0 to 23, 25 Default: 8 Step Size:1 25: Disabled
10	0x3F	Step 1 Clock Mode Start Time Mins		0xF10 BE	ubSTEP1ClockModeStartTimeMinutes	1	Unsigned byte	0 to 45 Default: 0 Step Size:15
10	0x40	Step 1 Clock Mode Stop Time Hrs		0xF10 BF	ubSTEP1ClockModeStopTimeHours	1	Unsigned byte	0 to 23,25 Default: 11 Step Size:1 25: Disabled
10	0x41	Step 1 Clock Mode Stop Time Mins		0XF1 0C0	ubSTEP1ClockModeStopTimeMinutes	1	Unsigned byte	0 to 45 Default: 0 Step Size: 15

10	0x42	Step 1 Clock Mode RPM (LSB)		0XF1 0C1	uwStep1Clock ModeSpeed.u bByte[0]	1	Unsi gned byte	600 to Max operating speed
10	0x43	Step 1 Clock Mode RPM (MSB)		0XF1 0C2	uwStep1Clock ModeSpeed.u bByte[1]	1	Unsi gned byte	Default: 3450 Step Size: 25
10	0x44	Step 2 Timer Mode Hrs		0XF1 0C3	ubSTEP2Time rModeDuration Hours	1	Unsi gned byte	0 to 24 Default: 4 Step Size:1
10	0x45	Step 2 Timer Mode Mins		0XF1 0C4	ubSTEP2Time rModeDuration Minutes	1	Unsi gned byte	0 to 45 Default: 0 Step Size: 15
10	0x46	Step 2 Timer Mode RPM (LSB)		0XF1 0C5	uwSTEP2Time rModeSpeed.u bByte[0]	1	Unsi gned byte	600 to Max operating speed
10	0x47	Step 2 Timer RPM (MSB)		0XF1 0C6	uwSTEP2Time rModeSpeed.u bByte[1]	1	Unsi gned byte	Default: 2600 Step Size: 25
10	0x48	Step 2 Clock Mode Start Time Hrs		0XF1 0C7	ubSTEP2Cloc kModeStartTi meHours	1	Unsi gned byte	0 to 23,25 Default: 11 Step Size:1 25: Disabled
10	0x49	Step 2 Clock Mode Start Time Mins		0XF1 0C8	ubSTEP2Cloc kModeStartTi meMinutes	1	Unsi gned byte	0 to 45 Default: 0 Step Size: 15
10	0x4A	Step 2 Clock Mode Stop Time Hrs		0XF1 0C9	ubSTEP2Cloc kModeStopTim eHours	1	Unsi gned byte	0 to 23 Default: 13 Step Size:1 25: Disabled
10	0x4B	Step 2 Clock Mode Stop Time Mins		0XF1 0CA	ubSTEP2Cloc kModeStopTim eMinutes	1	Unsi gned byte	0 to 45 Default: 0 Step Size: 15

10	0x4C	Step 2 Clock Mode RPM (LSB)		0XF1 0CB	uwStep2Clock ModeSpeed.u bByte[0]	1	Unsi gned byte	600 to Max operating speed
10	0x4D	Step 2 Clock Mode RPM (MSB)		0XF1 0CC	uwStep2Clock ModeSpeed.u bByte[1]	1	Unsi gned byte	Default: 2600 Step Size: 25
10	0x4E	Step 3 Timer Mode Hrs		0XF1 0CD	ubSTEP3Time rModeDuration Hours	1	Unsi gned byte	0 to 24 Default: 8 Step Size:1
10	0x4F	Step 3 Timer Mode Mins		0XF1 0CE	ubSTEP3Time rModeDuration Minutes	1	Unsi gned byte	0 to 45 Duration: 0 Step Size: 15
10	0x50	Step 3 Timer Mode RPM (LSB)		0XF1 0CF	uwSTEP3Time rModeSpeed.u bByte[0]	1	Unsi gned byte	600 to Max operating speed
10	0x51	Step 3 Timer RPM (MSB)		0XF1 0D0	uwSTEP3Time rModeSpeed.u bByte[1]	1	Unsi gned byte	Default: 1600 Step Size: 25
10	0x52	Step 3 Clock Mode Start Time Hrs		0XF1 0D1	ubSTEP3Cloc kModeStartTi meHours	1	Unsi gned byte	0 to 23,25 Default: 13 Step Size:1 25: Disabled
10	0x53	Step 3 Clock Mode Start Time Mins		0XF1 0D2	ubSTEP3Cloc kModeStartTi meMinutes	1	Unsi gned byte	0 to 45 Default: 0 Step Size: 15
10	0x54	Step 3 Clock Mode Stop Time Hrs		0XF1 0D3	ubSTEP3Cloc kModeStopTim eHours	1	Unsi gned byte	0 to 23,25 Default: 21 Step Size:1 25: Disabled
10	0x55	Step 3 Clock Mode Stop Time Mins		0XF1 0D4	ubSTEP3Cloc kModeStopTim eMinutes	1	Unsi gned byte	0 to 45 Default: 0 Step Size: 15

10	0x56	Step 3 Clock Mode RPM (LSB)		0XF10D5	uwStep3Clock ModeSpeed.u bByte[0]	1	Unsigned byte	600 to Max operating speed
10	0x57	Step 3 Clock Mode RPM (MSB)		0XF10D6	uwStep3Clock ModeSpeed.u bByte[1]	1	Unsigned byte	Default: 1725 Step Size: 25
10	0x58	Override High Timer Mode Hrs	Minimum Value is 0:30 HRS	0XF10D7	ubOverrideHig hHours	1	Unsigned byte	0 to 24 Default: 2 Step Size:1
10	0x59	Override High Timer Mode Mins		0XF10D8	ubOverrideHig hMinutes	1	Unsigned byte	0 to 45 Default: 0 Step Size:15
10	0x5A	Override High Timer Mode RPM (LSB)		0XF10D9	uwOverrideHig hSpeed.ubByt e[0]	1	Unsigned byte	600 to Max operating speed
10	0X5B	Override High Timer RPM (MSB)		0XF10DA	uwOverrideHig hSpeed.ubByt e[1]	1	Unsigned byte	Default: 3450 Step Size: 25
10	0X5C	Override Low Timer Mode Hrs	Minimum Value is 0:30 HRS	0XF10DB	ubOverrideLo wHours	1	Unsigned byte	0 to 24 Default: 2 Step Size:1
10	0X5D	Override Low Timer Mode Mins		0XF10DC	ubOverrideLo wMinutes	1	Unsigned byte	0 to 45 Default: 0 Step Size:15
10	0X5E	Override Low Timer Mode RPM (LSB)		0XF10DD	uwOverrideLo wSpeed.ubByt e[0]	1	Unsigned byte	600 to Max operating speed
10	0X5F	Override Low Timer RPM (MSB)		0XF10DE	uwOverrideLo wSpeed.ubByt e[1]	1	Unsigned byte	Default: 1725 Step Size: 25
10	0x60	Max operating speed(LSB)	This value will be used as the upper limit for	0XF10DF	uwMaxOperati ngSpeed.ubBy te[0]	1	Unsigned byte	

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10	0x61	Max operating speed(MSB)	speed configurations in Digital input, etc. This is a factory configurable parameter	0XF10E0	uwMaxOperatingSpeed.ubByte[1]	1	Unsigned byte	600 to 3450 Default: 3450 Step Size: 25
10	0x62	Board Type	Selects the board type 1: DISTRIBUTION 2: ZODIAC	0XF10E1	ubBoardType	1	Unsigned byte	1 and 2 Default: DISTRIBUTION
10	0x63	Product ID	25 = NON SVRS 26 = SVRS	0XF10E2	ubProductID	1	Unsigned byte	Default: NON SVRS

Table 16 Configuration Page 10 Addressing

9 Appendix D

Definitions in Code:

word: signed 16-bit number
uword: unsigned 16-bit number
ubyte: unsigned 8-bit number

CRC-16 Checksum Code for EPC MODBUS:

```
// Command is the beginning of RX buffer pointer, buffer length is "Len-1"
// Len is RX buffer index plus one
word CRC16(ubyte *Command, word Len)
{
   word x,b;
   uword sum;

   sum=0xFFFF;

       for (x=0; x<Len; x++)
       { //cycle through bytes
              sum^=(*(Command+x));
              for (b=0; b<8; b++)
              {
                     if (sum&0x0001)
                     {
                        sum=sum>>1;
                        sum^=0xA001;
                     }
                     else
                     {
                        sum=sum>>1;
                     }
              }
       }

       return sum;
}
```