Schneider Electric

Modbus Registers Map-Conext CL

Three Phase PV Inverter 20/25kVA
(Applicable to Both NA and IEC Model)

TITLE: Modbus Registers Map-Conext CL Three Phase PV Inverter 20/25kVA		DOC NO. 503-0243-01-01	REV. 1.5
PREPARED BY: Umesha M	DATE: 2016-Mar-15	**Schneider Electric**	SHEET: Page 1 of 23

Revision Approvals

Rev	Date	Approvals					
		Author	TC	Product Mgr	Program Mgr	Compliance Eng	Customer (if required)
1.3	2015-Jun-30	Umesha M	Prasad Rao	Catherine Chen	Swami Nathan	Ajith Kumar	

Revision History

Rev	Date	Description Of Change	Author
0.1	2012-Jun-04	- Copied all the registers from Conext TL product. - Added new registers from Global modbus maps specific to Conext CL product.	Firmware Team
0.2	2012-Jul-18	- Updated with more description for each registers after receiving the team inputs - Added additional baud rates19200 and 115200 which are supported by Conext CL inverter - Added additional function codes 06(write single register) - Added exception codes 03h(illegal address) and 04h(illegal data value) - Deleted the modbus registers 0xE0E0 and E0E1 which are not required for Conext CL - Updated the product serial number as per global modbus map(06 refers Conext CL)	Firmware Team
0.3	2012-Jul-31	- Updated port settings to accommodate other baud rates 38400, 57600 in order to support COMbox requirements. - Updated port settings to accommodate even and odd parity - Updated port settings to accommodate 1 and 2 stop bits - Corrected the address location for registers "C_Sunspec_DID and C_Sunspec_Length	Firmware Team
0.4	2013-Feb-27	- Updated the active power reference in terms of % age limit, updated all the LVRT registers, updated reactive power over voltage mode selection registers, - Removed the event log registers which are no more supporting on conext CL.	Umesha M
0.5	2013-Nov-20	- Renamed the document as Conext CL-NA and updated model configurations(20/25KVA) - Deleted the PV3 and PV4 related registers - Deleted the register 0xEFFF, 0xF002, 0xFA4A, - Added the multi function Relay registers - Grouped the power control registers (active power, LVRT and reactive power) - Removed the Reference document "Alarm Codes Map-Conext CL Three Phase Inverter" - Updated the Alarm code table with the latest. - Added provision to indicate the registers address in decimal	Umesha M
0.6	2013-Dec-02	- Renamed the title of the document and included both IEC and NA related registers in the common document. - Updated the values and ranges and limits of active, reactive power and LVRT related registers. - Updated the inverter module section (3.1) and updated the "inverter modules" column as per that - Added the new registers requirement (Time Delay, Lock in power) in method 2 of reactive power control)	Umesha M

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0.7	2014-Mar-17	• Deleted the few of the registers which are no more supported. • Added the new registers " inverter model" and "BOS model designation" and assigned the new address. • Updated the SunSpec registers values • Updated the modbus baud rate (0x8010) register to include enum values. • Removed the Conext TL inverter module number(07).	Umesha M
0.8	2014-Sep-14	• Added SunSpec Multiple MPPT inverter model registers • Updated the Alarm code values • Added new registers for AC, DC and Comm Internal faults. • Removed the modbus broadcast support • Corrected the modbus baud rate enum values. • Updated the multifunction relay parameters values and ranges	Umesha M
0.9	2014-Sep-19	• Added the 10 new Event register with Time stamps • Updated the SunSpec MPPT event codes. • Updated the Unused registers values in SunSpec • Updated the Address after adding the Pad register.	Umesha M
1.0	2014-Sep-25	• Added the Sunspec End block • Modified the register 0x1920 as Read/Write • Corrected spellings	Umesha M
1.1	2015-Jan-22	• Removed the support of function code 08(diagnostic code) • Added the example values for some of the registers • Deleted the register 0xFB00 • Updated the Inverter model lists available on Conext CL Family • Changed the address for few Susnpec registers from 0x9CBC to 0x9CC3 • Reactive power control and LVRT registers are made not available. • Updated the note on using the Broadcast method. • Added the Service code details (bit mapped) on registers 0x9CB2-0x9CB5	Umesha M
1.2	2015-June-24	• Updated the Reactive power control support, methods and registers • Added new register (0xFA73) • Added one more HSM State(17h-Derate status)in inverter operating states • Changed the default baud rate to 9600 instead of 19200 • Updated the descriptions of registers 0x9CD5 and 0x9CE9 • Added new Warning code details(4700)	Umesha M
1.3	2015-30-June	• Updated the range values for the register 0xFA69 • Updated the register 0x8010 to correct the default baud rate • Added description for the register 0xEFFE	Umesha M
1.4	2015-Nov-06	• Updated the reactive power method-3 Registers • Corrected the scale factor for the register0xFA61 • ==Register address 0xFA73 has been changed to 0xFA80== • ==Register address 0xFA6F has been changed to 0xFA81== • ==Register address 0xFA70 has been changed to 0xFA82== • ==Register address 0xFA71 has been changed to 0xFA83== • ==Register address 0xFA72 has been changed to 0xFA84== • ==Added new warning code to indicate the invalid date settings done by the user (4680)==	Umesha M
1.5	2016-Mar-15	• Added new register inverter operating mode (0xFA90) for the PV Hybrid control	Umesha

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1. Introduction

1.1 Scope

This document defines the modbus registers maps required for Conext CL-NA and Conext CL-E Three-Phase PV Inverters 18/20/25kVA.

This document is derived from Conext TL modbus specification document (503-0200-01-01) and added several registers to fulfill the configuration and monitoring over modbus requirements.

Note: Most of the registers defined in this document are common with Conext TL product except for few new additions.

1.2 Related Documents

Document Reference	Document Title	Document Number	Version
1.	Modbus Read Device Identification extension (FC 43/14)	RFC TR_026	0.8
2.	Modbus Application Protocol Specification	From www.modbus.org	1.1b
3.	Modbus Registers Required from Conext TL Three-Phase Inverters	503-0200-01-01	1.8
4.	Modbus register map new 3phase inverters XC100/XC250/XC500/XC630 and RCU-based products	503-0158-01-01	A.81
5.	Conext TL Three Phase inverter Alarm code	503-0199-01-01	1.1B
6.	SunSpec Alliance Interoperability Specification Common Models	NA	1.5
7.	SunSpec Alliance Interoperability Specification Inverter Models	NA	1.1
8.	SunSpec-Alliance-M-MPPT-Specification-T-1	NA	TEST1

2. MODBUS IMPLEMENTATION

2.1 Port Settings

Baud Rate	9600(default), 19200, 38400, 57600,115200,
Data bits	8
Parity	Even, Odd, None(default)
Stop bits	1(default), 2

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2.2 Modes

2.2.1 RTU Mode

The Conext CL-NA inverter supports RTU mode of modbus communication.

2.2.2 Modbus/TCP-IP

The Conext CL-NA inverter supports Modbus/TCP-IP mode. The Modbus/TCP-IP does not require any baud rate settings as well other parameters similar to RTU mode. However this requires parameters like IP address, Modbus Port number and Modbus Slave address in order to communicate with other external Tools/software.

Parameter	Values
Port number	502
Slave address	10 (default)

2.3 Supported Modbus Functions

- Function 3 (03h): Read Holding Registers.
- Function 6 (06h): Write single Register
- Function 16 (10h): Preset Multiple Registers
- Function 43 (2Bh): Read Device Identification.

<u>Note:</u> Addresses are 0 based ("on the wire" addressing) and not 1 based ("traditional" addressing).

2.4 Exception Responses

The following exceptions are supported:

Code	Name	Meaning
01	Illegal Function	An illegal function code is contained in the function field of the request packet. Only functions 3, 8 and 16 are supported.
02	Illegal Address	The address referenced in the data field of the request packet is invalid for the specified function. Note: All unused address contains a value 0xFF and no exception occurs in Conext CL.
03	Illegal Data	A value contained in the query data field is not an Allowable value for slave.
04	Slave device failure	An unrecoverable error occurred while the slave was attempting to perform the requested action

2.5 Broadcasts

Broadcast request packets from the master are supported. Broadcasts are only valid with Function 16(10h) and Function 06 (06h) and are triggered by setting the

slave address to zero (0). All slaves will receive and execute the request, but will not respond.

Note: Broadcast is only valid for Modbus RTU mode.

Note: Broadcast is used only by Schneider Electric Monitoring Devices and not recommended for other Users.

3.   Registers

All registers shall be read/write accessible at all access levels.

3.1 Inverter Models supported

Modbus registers defined in this table are common among Conext CL and Conext CL-NA products except few registers which are highlighted and mentioned.

Supported Inverter Model lists:

Inverter Model	Inverter Model
Conext CL European(E)	Conext CL-NA North America(NA)
PVSCL20E100	PVSCL18NA100
PVSCL20E200	PVSCL18NA200
PVSCL20E201	PVSCL18NA201
PVSCL20E300	PVSCL18NA300
PVSCL20E301	PVSCL18NA301
PVSCL25E100	PVSCL25NA100
PVSCL25E200	PVSCL25NA200
PVSCL25E201	PVSCL25NA201
PVSCL25E300	PVSCL25NA300
PVSCL25E301	PVSCL25NA301

Modbus Registers (Hex)	Inverter Models	Short Description	Access Type	Units	Size
Product Related Information					
0x0001 – 0x0009	NA,E	Product Model Designation (Inverter+BOS)	Read	"C" style null terminated ASCII string (Ex: PVSCL25E301E)	Uint8 x 18max (Unused location will contain 0xFF).
0x0014 – 0x001D	NA,E	Product Serial Number	Read	"C" style null terminated ASCII string (Ex:ZX1419018749)	Uint8 x20max (unused location will contain 0xFF)
0x0028 – 0x0031	NA,E	Inverter model designation	Read	"C" style null terminated ASCII string (Ex: PVSCL25E)	Uint8 x 20max (unused location will contain 0xFF)

0x0032 - 0x003B	NA,E	BOS model designation	Read	"C" style null terminated ASCII string (Ex: PVSCL2025E301)	Uint8 x 20max (unused location will contain 0xFF)
0x0082 – 0x008B	NA,E	Software Part Number (Processor A)	Read	"C" style null terminated ASCII string (ex: 986-2188)	Uint8 x20max (unused location will contain 0xFF)
0x0096 – 0x009F	NA,E	Software Part Number (Processor B)	Read	"C" style null terminated ASCII string (ex: 986-2185)	Uint8 x20max (unused location will contain 0xFF)
0x00AA– 0x00B3	NA,E	Software Part Number (Processor C)	Read	"C" style null terminated ASCII string (ex: 986-2186)	Uint8 x20max (unused location will contain 0xFF)
0x0160 - 0x0169	NA, E	Name of the Software for Processor A	Read	"C" style null terminated ASCII string (Ex: COMM)	Uint8 x20max (unused location will contain 0xFF)
0x016A – 0x0173	NA,E	Name of the Software for Processor B	Read	"C" style null terminated ASCII string (Ex: DC-DC)	Uint8 x20max (unused location will contain 0xFF)
0x0174 – 0x017D	NA,E	Name of the Software for Processor C	Read	"C" style null terminated ASCII string (Ex: DC-AC)	Uint8 x20max (unused location will contain 0xFF)
0x0200 - 0x0206	NA,E	Build Number of the software for Processor A	Read	"C" style null terminated ASCII string (Ex: BN03)	Uint8 x14max (unused location will contain 0xFF)
0x0207 – 0x020D	NA,E	Build Number of the software for Processor B	Read	"C" style null terminated ASCII string (Ex: BN03)	Uint8 x14max (unused location will contain 0xFF)
0x020E – 0x0214	NA,E	Build Number of the software for Processor C	Read	"C" style null terminated ASCII string (Ex: BN03)	Uint8 x14 (unused location will contain 0xFF)
0x02A0 - 0x02A1	NA,E	Checksum of the Software for Processor A	Read	"C" style null terminated ASCII string (Ex: ADAF)	Uint32
0x02A2 – 0x02A3	NA,E	Checksum of the Software for Processor B	Read	"C" style null terminated ASCII string (Ex: FDDF)	Uint32
0x02A4 – 0x02A5	NA,E	Checksum of the Software for Processor C	Read	"C" style null terminated ASCII string (Ex: CDAD)	Uint32
0x0340 - 0x0344	NA,E	Version of the Software for Processor A	Read	"C" style null terminated ASCII string (Ex: 02.02)	Uint8 x10max (unused location will contain 0xFF)
0x0345 – 0x0349	NA,E	Version of the Software for Processor B	Read	"C" style null terminated ASCII string (Ex: 02.02)	Uint8 x10max (unused location will contain 0xFF)
0x034A – 0x034E	NA,E	Version of the Software for Processor C	Read	"C" style null terminated ASCII string (Ex: 02.02)	Uint8 x10max (unused location will contain 0xFF)
Inverter Energy Information					
	NA,E	kWh Energy Produced	Read	kWHr/x10	Uint32

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0x0802 (H word) – 0x0803 (L word)		(Accumulated energy produced since commissioning)		(Ex: 0000DFb5)hex (Ex: 4910.9KW)dec	
0x0804, 0x0805	NA,E	Energy Today (Accumulated energy produced Today)	Read	kWHr/x10	Uint32
0x0806, 0x0807	NA,E	Energy Today -1 (Accumulated energy produced Yesterday)	Read	kWHr/x10	Uint32
0x0808, 0x0809	NA,E	Energy Today -2 (Accumulated energy produced Today-2)	Read	kWHr/x10	Uint32
0x080A, 0x080B	NA,E	Energy Today -3 (Accumulated energy produced Today-3)	Read	kWHr/x10	Uint32
0x080C, 0x080D	NA,E	Energy Today -4 (Accumulated energy produced Today-4)	Read	kWHr/x10	Uint32
0x080E, 0x080F	NA,E	Energy Today -5 (Accumulated energy produced Today-5)	Read	kWHr/x10	Uint32
0x0810, 0x0811	NA,E	Energy Today -NA,E (Accumulated energy produced Today-NA,E)	Read	kWHr/x10	Uint32
0x081E – 0x081F	NA,E	Unit operation Hours (life time) (Cumulative)	Read	Hr/x1 (Ex: 00000139)hex (ex: 313Hours) dec	Uint32
Inverter Operational State Register					
0x1700	NA,E	Operational Mode State 2→Reconnecting to grid 3→Online and power production 15h→No PV 16h→ Offline due to services/errors 17h→Power Derate	Read	16 bit unsigned integer Note: Values displayed are in Hex format	Uint16
Inverter Temperature registers					
0x1701	NA,E	Temperature control Board (Ambient)	Read	C/X10	Sint16
0x1702	NA,E	Temperature of DC Module12	Read	C/X10	Sint16
0x1703	NA,E	Temperature of DC Module34	Read	C/X10	Sint16
0x1705	NA,E	Grid Current (sum of all the phases)	Read	A/X10	Uint16
0x1706	NA,E	Temperature of Inverter Module A	Read	C/X10	Sint16
0x1707	NA,E	Temperature of Inverter Module B	Read	C/X10	Sint16
0x1708	NA,E	Temperature of Inverter Module C	Read	C/X10	Sint16
Inverter Energy Information Registers					
0x1709	NA,E	Phase A to Neutral Voltage	Read	Vrms/X10	Sint16
0x170A	NA,E	Phase B to Neutral Voltage	Read	Vrms/X10	Sint16

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0x170B	NA,E	Phase C to Neutral Voltage	Read	Vrms/X10	Sint16
0x17F1	NA,E	Grid VA (Apparent Power)	Read	KVA/X10	Uint16
0x17F4	NA,E	Grid Kvar (Reactive Power)	Read	KVAr/X10	Sint16
0x17F8	NA,E	Grid Voltage V12 (Inverter AC Voltage between Line 1 to Line 2 voltage)	Read	Vrms/X10	Sint16
0x17F9	NA,E	Grid Voltage V23 (Inverter AC Voltage between Line 2 to Line 3 voltage)	Read	Vrms/X10	Sint16
0x17FA	NA,E	Grid Voltage V31 (Inverter AC Voltage between Line 3 to Line 1 voltage)	Read	Vrms/X10	Sint16
0x17FB	NA,E	Grid Current Line 1 (Inverter Phase A current)	Read	Arms/X10	Sint16
0x17FC	NA,E	Grid Current Line 2 (Inverter Phase B current)	Read	Arms/X10	Sint16
0x17FD	NA,E	Grid Current Line 3 (Inverter Phase C current)	Read	Arms/X10	Sint16
0x17FE	NA,E	Active Power (Inverter real Power)	Read	KW/X10	Sint16
0x17FF	NA,E	PV1 Voltage	Read	V/X10	Sint16
0x1800	NA,E	PV1 Current	Read	A/X10	Sint16
0x1801	NA,E	PV1 Power	Read	KW/X10	Sint16
0x1802	NA,E	Grid Frequency	Read	Hz/X10	Uint16
0x1818	NA,E	Phase A Frequency	Read	Hz/X10	Uint16
0x1819	NA,E	Phase B Frequency	Read	Hz/X10	Uint16
0x181A	NA,E	Phase C Frequency	Read	Hz/x10	Uint16
0x181B	NA,E	Phase A Real Power	Read	KW/X10	Sint16
0x181C	NA,E	Phase B Real Power	Read	KW/X10	Sint16
0x181D	NA,E	Phase C Real Power	Read	KW/X10	Sint16
0x1828	NA,E	Inverter Alarm code	Read	Refer the Conext CL-NA Alarm codes(section 4)	Uint16
0x1829	NA,E	PV2 Voltage	Read	V/X10	Sint16
0x182A	NA,E	PV2 Current	Read	A/X10	Sint16
0x182F	NA,E	PV2 Power	Read	KW/X10	Sint16
Inverter Service, Error and Warning Logs					
0x1900-0x1901	NA, E	DC-AC MCU Event Code1	Read	Bit Mapped events Contact Schneider Electric for details	Uint32

0x1902-0x1903	NA, E	DC-AC MCU Event Code2	Read	Bit Mapped events Contact Schneider Electric for details	Uint32
0x1904-0x1905	NA,E	DC-DC MCU Event Code1	Read	Bit Mapped events Contact Schneider Electric for details	Uint32
0x1906-0x1907	NA, E	DC-DC MCU Event Code2	Read	Bit Mapped events Contact Schneider Electric for details	Uint32
0x1908-0x1909	NA,E	Comm MCU Event Code1	Read	Bit Mapped events Contact Schneider Electric for details	Uint32
0x190A-0x190B	NA,E	Comm MCU Event Code2	Read	Bit Mapped events Contact Schneider Electric for details	Uint32
0x1920-0x1921	NA,E	Global Inverter time (UTC timestamp)	R/W	Time in Seconds (Ex:0x54C09286)hex (Ex:1421906566) dec Time as per UTC **GMT**: Thu, 22 Jan 2015 06:02:46 GMT	Uint32
0x1922	NA, E	Service1	Read	Refer the Alarm codes section	Unit16
0x1923-0x1924	NA, E	Time stamp	Read	Time in Seconds	Uint32
0x1925	NA, E	Service2	Read	Refer the Alarm codes section	Unit16
0x1926-0x1927	NA, E	Time stamp	Read	Time in Seconds	Uint32
0x1928	NA, E	Service3	Read	Refer the Alarm codes section	Unit16
0x1929-0x192A	NA, E	Time stamp	Read	Time in Seconds	Uint32
0x192B	NA, E	Service4	Read	Refer the Alarm codes section	Unit16
0x192C-0x192D	NA, E	Time stamp	Read	Time in Seconds	Uint32
0x192E	NA, E	Service5	Read	Refer the Alarm codes section	Unit16
0x192F-0x1930	NA, E	Time stamp	Read	Time in Seconds	Uint32
0x1931	NA, E	Service6	Read	Refer the Alarm codes section	Unit16
0x1932-0x1933	NA, E	Time stamp	Read	Time in Seconds	Uint32
0x1934	NA, E	Service7	Read	Refer the Alarm codes section	Unit16
0x1935-0x1936	NA, E	Time stamp	Read	Time in Seconds	Uint32
0x1937	NA, E	Service8	Read	Refer the Alarm codes section	Unit16
0x1938-0x1939	NA, E	Time stamp	Read	Time in Seconds	Uint32
0x193A	NA, E	Service9	Read	Refer the Alarm codes section	Unit16
0x193B-0x193C	NA, E	Time stamp	Read	Time in Seconds	Uint32
0x193D	NA, E	Service10	Read	Refer the Alarm codes section	Unit16
0x193E-0x193F	NA, E	Time stamp	Read	Time in Seconds	Uint32

		Modbus Settings and Configuration Registers			
0x8003	NA,E	Modbus address(slave address) (The unit needs to be power cycled for the new address to take effect)	R/W	Range: 1-247 Default: 10 Enter: 1-247	Uint16
0x8010	NA,E	Modbus Baud Rate 0: 9600 1:19200 2: 38400 3: 57600 4: 115200	R/W	Enum **Default; 9600** (The unit may needs power recycled for the new baud rate to take effect)	Uint16
		SunSpec Registers			
0x9C40	NA,E	C_SunSpec_ID	Read	SUNS	Uint32
0x9C42	NA,E	C_SunSpec_DID	Read	01	Uint16
0x9C43	NA,E	C_SunSpec_Length	Read	65	Uint16
0x9C44	NA,E	C_Manufacturer	Read	(SCHNEIDER)	String32
0x9C54	NA,E	C_Model	Read	PVSCL25NA Refer Inverter manual	String32
0x9C64	NA,E	C_Options	Read	PVSCL25NA101 Refer Inverter manual	String16
0x9C6C	NA,E	C_Version	Read	Ver2.0(example)	String16
0x9C74	NA,E	C_SerialNumber	Read	205196AA000000 Refer Inverter manual	String(32)
0x9C84	NA,E	C_DeviceAddress	Read	10 (default address)	Uint16
0x9C85	NA, E	Pad register	Read	Pad Register	Uint16
0x9C86	NA,E	C_SunSpec_DID	Read	103 (Sunspec code for 3-phase inverter model)	Uint16
0x9C87	NA,E	C_Sunspec_Length	Read	50	Uint16
0x9C88	NA,E	I_AC_Current	Read	Amps	Uint16
0x9C89	NA,E	I_AC_CurrentA	Read	Amps	Uint16
0x9C8A	NA,E	I_AC_CurrentB	Read	Amps	Uint16
0x9C8B	NA,E	I_AC_CurrentC	Read	Amps	Uint16
0x9C8C	NA,E	I_AC_Current_SF	Read	-1 (Scaling Factor equivalent to divide by ten)	Sint16
0x9C8D	NA,E	I_AC_VoltageAB	Read	Volts	Uint16
0x9C8E	NA,E	I_AC_VoltageBC	Read	Volts	Uint16
0x9C8F	NA,E	I_AC_VoltageCA	Read	Volts	Uint16
0x9C90	NA,E	I_AC_VoltageAN	Read	Volts	Uint16
0x9C91	NA,E	I_AC_VoltageBN	Read	Volts	Uint16

0x9C92	NA,E	I_AC_VoltageCN	Read	Volts	Uint16
0x9C93	NA,E	I_AC_Voltage_SF	Read	-1 (Scaling Factor equivalent to divide by ten)	Sint16
0x9C94	NA,E	I_AC_Power	Read	Watts	Sint16
0x9C95	NA,E	I_AC_Power_SF	Read	2 (Scaling Factor equivalent to multiply by hundred)	Sint16
0x9C96	NA,E	I_AC_Frequency	Read	Hertz	Uint16
0x9C97	NA,E	I_AC_Frequency_SF	Read	-1 (Scaling Factor equivalent to divide by ten)	Sint16
0x9C98	NA,E	I_AC_VA	Read	VA	Sint16
0x9C99	NA,E	I_AC_VA_SF	Read	2 (Scaling Factor equivalent to multiply by 100)	Sint16
0x9C9A	NA,E	I_AC_VAR	Read	VAR	Sint16
0x9C9B	NA,E	I_AC_VAR_SF	Read	2 (Scaling Factor equivalent to multiply by 100)	Sint16
0x9C9C	NA,E	I_AC_PF	Read	%	Sint16
0x9C9D	NA,E	I_AC_PF_SF	Read	-4 (Scaling Factor equivalent to divide by 10,000)	Sint16
0x9C9E-0x9C9F	NA,E	I_AC_Energy_WH	Read	Watt Hours	acc32
0x9CA0	NA,E	I_AC_Energy_WH_SF	Read	1(multiply by 1)	Uint16
0x9CA1	NA,E	I_DC_Current	Read	Amps	Uint16
0x9CA2	NA,E	I_DC_Current_SF	Read	-1 (Scaling Factor equivalent to divide by 10)	Sint16
0x9CA3	NA,E	I_DC_Voltage	Read	NA 0xFFFF	Uint16
0x9CA4	NA,E	I_DC_Voltage_SF	Read	NA 0x8000	Sint16
0x9CA5	NA,E	I_DC_Power	Read	NA 0x8000	Sint16
0x9CA6	NA,E	I_DC_Power_SF	Read	NA 0x8000	Sint16
0x9CA7	NA,E	I_Temp_Cab (ambient temperature of the inverter)	Read	C Degree Centigrade	Sint16
0x9CA8	NA,E	I_Temp_Sink	Read	NA 0x8000	Sint16
0x9CA9	NA,E	I_Temp_Trans	Read	NA 0x8000	Sint16
0x9CAA	NA,E	I_Temp_Other	Read	NA 0x8000	Sint16
0x9CAB	NA,E	I_Temp_SF	Read	-1 (Scaling Factor equivalent to divide by 10)	Sint16
0x9CAC	NA,E	I_Status	Read	Enumerated I_status_off: 1 I_status_starting:3 I_status_MPPT:4	Uint16

				I_status_throttled: 5 I_status_Fault:7	
0x9CAD	NA,E	I_Status_Vendor	Read	2h→Reconnecting 3h→Online 15h→No PV 16h→ Offline 17h→ Derate	Uint16
0x9CAE-0x9CAF	NA,E	I_Event_1	Read	NA 0XFFFFFFFF	Uint32
0x9CB0-0x9CB1	NA,E	I_Event_2	Read	NA 0XFFFFFFFF	Uint32
0x9CB2-0x9CB3	NA,E	I_Event_1_Vendor (ConextCL)	Read	Service Code1 Contact Schneider Electric for details	Uint32
0x9CB4-0x9CB5	NA,E	I_Event_2_Vendor (Conext CL)	Read	Service Code2 Contact Schneider Electric for details	Uint32
0x9CB6-0x9CB7	NA,E	I_Event_3_Vendor (ConextCL)	Read	Event Code1 Contact Schneider Electric for details	Uint32
0x9CB8-0x9CB9	NA,E	I_Event_4_Vendor (ConextCL)	Read	Event Code2 Contact Schneider Electric for details	Uint32
Sunspec MPPT Models					
0x9CBA	NA,E	C_SunSpec_DID	Read	160 (SunSpec MPPT model)	Uint16
0x9CBB	NA,E	C_SunSpec_Length	Read	Registers No of modules	Uint16
0x9CBC	NA,E	DC Input current scale factor (DCA_SF)	Read	-1 (Scaling Factor equivalent to divide by 10)	Sint16
0x9CBD	NA,E	DC Voltage scale factor (DCV_SF)	Read	-1 (Scaling Factor equivalent to divide by 10)	Sint16
0x9CBE	NA,E	DC Power scale factor (DCW_SF)	Read	0	Sint16
0x9CBF	NA,E	DC Energy Scale factor (DCWH_SF)	Read	NA 0x8000	Sint16
0x9CC0-0x9CC1	NA,E	Global DC MPPT Events (logical OR of all modules)	Read	Bit Field MPPT: 4 Throttled: 5 Fault: 7	Uint32
0x9CC2	NA,E	Numbers of modules (present and implemented(N))	Read	02 (2 MPPT Modules)	Uint16
0x9CC3	NA,E	Measurement Period (TmsPer)	Read	NA 0xFFFF	Uint16
0x9CC4	NA,E	Input ID	Read	161	Uint16
0x9CC5-0x9CCC	NA,E	ID String	Read	01(example) Free form string which describes module1 MPPT	String
0x9CCD	NA,E	DC Current	Read	Current	Uint16
0x9CCE	NA,E	DC Voltage	Read	Voltage	Uint16
0x9CCF	NA,E	DC Power	Read	Power	Int16
0x9CD0-0x9CD1	NA,E	DC Energy	Read	NA 0x00000000	Acc32
0x9CD2-0x9CD3	NA,E	Timestamp	Read	NA 0xFFFFFFFF	Uint32
0x9CD4	NA,E	Module Temperature	read	Scale factor:0	Int16

0x9CD5	NA,E	MPPT Operating State	Read	I_status_off: 1 I_status_starting:3 I_status_MPPT:4 I_status_throttled: 5 I_status_Fault:7	Uint16
0x9CD6- 0x9CD7	NA,E	DC MPPT Events	Read	NA 0xFFFFFFFF	Uint32
0x9CD8	NA,E	Input ID	Read	162	Uint16
0x9CD9- 0x9CE0	NA,E	ID String	Read	02(example) Free form string which describes module2 MPPT	String
0x9CE1	NA,E	DC Current	Read	Current	Uint16
0x9CE2	NA,E	DC Voltage	Read	Voltage	Uint16
0x9CE3	NA,E	DC Power	Read	Power	Int16
0x9CE4- 0x9CE5	NA,E	DC Energy	Read	NA 0x00000000	Acc32
0x9CE6- 0x9CE7	NA,E	Timestamp	Read	NA 0xFFFFFFFF	Uint32
0x9CE8	NA,E	Module Temperature	read	Scale factor:0	Int16
0x9CE9	NA,E	MPPT Operating State	Read	I_status_off: 1 I_status_starting:3 I_status_MPPT:4 I_status_throttled: 5 I_status_Fault:7	Uint16
0X9CEA- 0X9CEB	NA,E	DC MPPT Events	Read	NA 0xFFFFFFFF	Uint32
0X9CEC	NA,E	C_SunSpec_DID	Read	0xFFFF (End of Device specific Models)	Uint16
0X9CED	NA,E	C_SunSpec_Length	Read	0	Uint16
Remote operation					
0xEFFE	NA,E	Remote Disable/Enable (remote shutdown, remote inverter enable)	R/W	0: Normal Operation 1: **6B42** (reset inverter) Note: No response from inverter is expected. 2: **6B43** (Inverter Offline) Note: Default value is 0000 after inverter is rebooted) 3:**6B44** (Inverter Online)	Uint16
0xF807	Not available	Rated Apparent Power (Rated Output Apparent Power (S_{out_rated}). "Rated Apparent Power" limits the max value of "User Apparent Power Limit".	R/W	Not available	Not available
0xF80C	Not available	Rated Reactive Power (Maximum Reactive Power. Value of " Rated Reactive Power " limits the max	R/W	Not available	Not available

		value of " User Reactive Power Reference ")			
0xF9F9	Not available	Max LVRT Duration (Maximum duration for LVRT Event	R/W	Not available	Not available
0xF9FB	Not available	User Phase Angle Ref Phase Angle for Var Command (positive for capacitive reactive power, negative for inductive reactive power)	R/W	Not available	Not available
		User Active Power Management Registers			
0xFA19	NA,E	User Active Power Limit (User Active Power Limit in terms of Actual Value)	R/W	Unit: kW /x10 Increment = 0.1 kW Range: 0 - 25kW Enter: 0 to 250 Default: Value depending on inverter power rating. Refer the inverter manual or Inverter model list	Uint16
0xFAF1	NA, E	User Active Power Management Percentage	R/W	Increment = 1% Default : 100% Range : 0 to 100% Enter : 0-100	Uint16
0xFA1A	Not available	Active Anti-Islanding Function (Sets whether or not the inverter is performing "active anti- islanding" detection)	R/W	Not available	Not available
0xFA1B	Not available	User Reactive Power Reference (User Reactive Power Reference (Q_{out_ref}) (PV). Max "User Reactive Power Reference" is limited by the value of " Rated Reactive Power ". (positive for capacitive reactive power, negative for inductive reactive power)	R/W	Not available	Not available
0xFA1D	Not available	User Apparent Power Limit. Max "User Apparent (User Apparent Power Limit. Max "User Apparent Power Limit" is limited by the value of "Rated Apparent Power")	R/W	Not available	Not available
0xFA34	Not available	P(f) Control, Slope (Active power slope)	R/W	Not available	Not available
0xFA35	Not available	Power Ramp Time Time it takes to get from current active power limit, to the new active power limit. The actual ramp time may be less than the value set in this parameter because the ramp step assumes that the device starts at 0% power.	R/W	Not available	Not available
0xFA58	Not available	P(f) Control, Reset Time The time to recover from active power control as a function of frequency. The actual time may be less than the value set in this parameter because the ramp step assumes that the device starts at 0% power. Full power slew rate reset time. The slew rate step = Pn / (Reset Time).	R/W	Not available	Not available

Reactive Power Control Registers					
0xFA60	E	Reactive Power mode select	R/W	Type: Enum Default: Disable 1 : Fixed cos(φ) 2 : cos(φ) as fn of P 3 : Fixed kVAr 4 : kVAr as fn of U	Uint16
Reactive Power Control – Method -1					
0xFA61	E	Fixed_Cos(Φ)	R/W	Increment = 1 unit Default: 1000(unity pf) Range: capacitive 0.80 to 1.00 Enter: +800 to +1000 Inductive: 0.80 to 1.00 Enter: -800 to -999 Note: Enter +1000 for unity power factor	Sint16
0xFA81	E	Time delay	R/W	Increment: 1Sec Default: 0(no delay) Range: 0to 100 Enter: 0 to 100	Uint16
Reactive Power Control – Method -2					
0xFA62	E	Cos(Φ)(P) with Power upper limit	R/W	Increment = 1 unit Default: 10000 Range: Capacitive: 8000 to 9999 Enter: 800 to +9999	Sint16
0xFA63	E	Cos(Φ)(P) with Power Lower limit	R/W	Increment = 1 unit Default: 9000 Range: Inductive: 8000 to 9999 Enter: 8000 to 9999	Sint16
0xFA64	E	Cos(Φ)(P) with % power Lower limit	R/W	Increment = 1% Default:20% Range: 10~30% Enter: 10 to 30	Uint16
0xFA80	E	Cos(Φ)(P) with % power Mid limit	R/W	Increment = 1% Default:50% Range: 30~70% Enter: 30 to 70	Uint16
0xFA65	E	Cos(Φ)(P) with % power Higher limit	R/W	Increment = 1% Default:100% Range: 70~100% Enter: 70 to 100	Uint16
0xF9EE	E	Cos(Φ) (P) Lock-in Voltage %	R/W	Increment: 1% Default: 100% Range: 100-110 Enter: 100 to 110	Uint16
0xF9EF	E	Cos(Φ) (P) Lock-out Voltage %	R/W	Increment: 1% Default: 98% Range: 90-100 Enter: 90 to 100	Uint16

0xFA82	E	Response delay	R/W	Increment:1Sec Default: 1 Range: 0to 100Sec Enter: 0 to 100	Uint16
Reactive Power Control – Method- 3					
0xFA66	E	Fixed kVAr %	R/W	Increment: 1% Default: 0% Resolution 0.01% Range: -60(Inductive-Lagging) to +60(capacitive-Leading) Enter: -6000 to +6000	Sint16
0xFA83	E	Lock in Power(% of Sn) (no Reactive power in Lock in Power Zone	R/W	Increment: 1% Default: 20% Range: 5-80 Enter: 50 to 80	Uint16
0xFA84	E	Time Delay(seconds)	R/W	Increment: 1 Default: 0 Range: 0-100 Enter: 0 to 100	Uint16
Reactive Power Control – Method -4					
0xFA67	E	kVAr(U) as % of VA upper limit or (Q(U)_Upper Limit)	R/W	Increment = 1% Default: +45% Range: 0 to +60% Enter: 0 to 60	Uint16
0xFA68	E	kVAr(U) as % of VA lower limit or (Q(U)_Lower Limit)	R/W	Increment = 1% Default: +45% Range: 0 to +60% Enter: 0 to 60	Uint16
0xFA69	E	kVAr(U) Min (VLowSet)	R/W	Scale: 0.1V Default: 2100 Increment: 1 Range: 1100 to 2300 Enter: 1100 to 2300	Uint16
0xFA6A	E	kVAr(U) Max (VHigh set)	R/W	Scale: 0.1V Increment: 1 Default: 2400 Range: 2300 to 2760 Enter: 2300 to 2760	Uint16
0xFA6B	E	kVar(U) Uac Lower limit (VMin)	R/W	Scale: 0.1V Default: 2070 Range: 1100~2300 Enter: 1100 to 2300	Uint16
0xFA6C	E	kVar(U) Uac Upper limit (VMax)	R/W	Scale: 0.1V Default: 2530 V Range: 2300~2760 Enter: 2300 to 2760	Uint16

0xFA6D	E	kVar(U) Hysteresis (Vhist)	R/W	Scale: 0.1V Default: 0 Range: 0-100 Enter: 0 to 100	Uint16
0xFA6E	E	kVar(U) response time (Time delay)	R/W	Unit: 1 sec Default: 0 sec Range: 0~100 sec Enter: 1 to 100	Uint16
0xF9F0	E	KVAr(U) Lock-in Power %	R/W	Increment: 1% Default: 10 Range: 0 to 30 % Enter: 0 to 30	Unit16
0xF9F1	E	KVAr(U) Lock-out Power %	R/W	Increment: 1% Default: 5 Range: 0 to 30 % Enter: 0 to 30	Uint16
LVRT control registers					
0xFA23	Not available	LVRT Types Enable or disable LVRT 0 = Disabled 1 = SYM (Warning: When Anti-islanding is enabled, LVRT shall be disabled by the unit)	R/W	Not available	Not available
0xFA25	Not available	LVRT low voltage threshold (Voltage1)	R/W	Not available	Not available
0xFA26	Not available	LVRT fast low voltage threshold(L) (V-Drop) (V2)	R/W	Not available	Not available
0xFA27	Not available	LVRT fast low voltage de-bounce time	R/W	Not available	Not available
0xFA77	Not available	K factor	R/W	Not available	Not available
0xFA78	Not available	Dead Band –Vh	R/W	Not available	Not available
0xFA79	Not available	Dead band -VL	R/W	Not available	Not available
0xFA7A	Not available	Time1	R/W	Not available	Not available
0xFA7B	Not available	Time2	R/W	Not available	Not available
0xFA7C	Not available	Time3	R/W	Not available	Not available
OFF Grid Mode					
0xFA90	NA,E	Inverter Modes **Local Consumption Mode:** Power ramp (10 min) after grid fault and Active Power derating with frequency functionalities are disabled. **Grid Tie Mode:** Resume the Power ramp (10 min) and Active power derating with frequency functionalities as per country setting.	R/W	Default: 0 0= Grid Tie Mode 6B45= local Consumption Mode	Uint16
Multi Function Relay configuration Registers					
0xFAF5	NA,E	Multifunction relay Modes	R/W	Default : 0 0 : Disable (No Multi function relay operation) 1 :Fault/Error/warning (any 3) 2 : Power production (basic mode)	Uint16

				3 : External load control 4 : Control external Fans 5 : All Services/Errors/Warnings	
0XFAF6	NA,E	Fault1/Error1 code	R/W	Default : 0000 (no services/errors/warnings) Range: 0000-FFFF(All faults/errors) Note: Refer the inverter manual to configure the required Service/Error/Warning.	Uint16
0XFAF7	NA,E	Fault2/Error2 code	R/W	Default : 0000 (no services/errors/warnings) Range: 0000-FFFF(All faults/errors) Note: Refer the inverter manual to configure the required Service/Error/Warning.	Uint16
0XFAF8	NA,E	Fault3/Erro3 code	R/W	Default : 0000 (no services/errors/warnings) Range: 0000-FFFF(All faults/errors) Note: Refer the inverter manual to configure the required Service/Error/Warning.	Uint16
0XFAF9	NA,E	Power production	R/W	0 : Disable 1 : Enable when inverter goes to online 2: enable when inverter goes offline. Default : 0 (disable) Enable the relay when inverter is exporting the power to grid or online	Uint16
0xFAFA	NA,E	Output power upper limit	R/W	kW /x10 Range: 0 to 25KW Default: 0 Enter : 0 to 250 Note: Power level varies as per the inverter module. Configure as per the inverter model.	Uint16
0xFAFB	NA,E	Trip Count (relay will turn off after trip count value expires)	R/W	Range: 0 to 999 minutes Enter: 0 to999 Default: 5	Uint16
0xFAFC	NA,E	Minimum Duration (where configured inverter output power should be available during this time)	R/W	Range: 0 to 10 minutes Enter: 0 to 10 Default: 5	Uint16
0xFAFD	NA,E	ON Temperature	R/W	C/X10	Uint16

				Range: 0 to 900 Degree Enter : 0 to 900 Default : 90	
0xFAFE	NA,E	OFF Temperature (Ambient) Lower limit	R/W	C/X10 Range: 0 to899 Degree Enter : 0 to 899 Default : 0	Uint16

4. ALARM CODES

Three types of alarms are defined:

1. Warning: The unit reports the warning condition but continues to operate.
2. Error: The unit stops operation when the Error condition is detected and the unit automatically recovers if the condition that caused the error goes away.
3. Services: The unit stops operation when the Fault condition is detected. The unit requires manual intervention for clearing the fault to resume operation.
4. Internal Events: These are internal to inverter and useful for internal analysis.

The alarm codes shall be prioritized for reporting purposes since only one active alarm can be reported at a time. Highest priority alarms are faults, followed by errors, and then warnings.

If more than one alarm of the same type is active, the one will the higher priority shall be reported. Example: If there are 2 simultaneous active faults, the one with the higher priority shall be reported.

Priority numbers are such that the lower number is higher priority, e.g. priority 1 is highest.

Alarm Type	SE Alarm Codes	Priority	Message to display	Description
Services	0000	NA	No active alarms	No active alarms
	10	700	AC relay flt	AC Switch response
	31	900	AC curr snsr flt	AC Current Sensor fault
	32	400	AC temp snsr flt	AC Side Temperature sensor fault
	33	410	DC temp snsr flt	DC side Temperature sensor fault
	47	800	AC volt snsr flt	AC side Voltage sensor fault
	131	910	Low Eff flt	Low efficiency error and fault
	203	120	DC init flt	DC DSP Initialization fault
	204	210	DC BIST flt	DC BIST fault
	205	110	AC init flt	AC DSP Initialization fault
	206	200	AC BIST flt	AC BIST fault
	701	1200	DC injection err	DC current Injection error and fault
	706	1220	DC injection inst	DC_Injection high Current error Instantaneous

	702	850	RCMU flt	AC MCU detected repeated error in RCD measurement and declared RCMU fault
	708	860	RCMU flt	DC MCU detected RCD Alarm fault
	703	9999	AFCI flt	Comm MCU detected Arc fault condition
	709	500	Arc flt	DC MCU detected Arc fault condition
	704	520	AFD self test fail	DC MCU detected ARC fault self test fail condition
	705	150	PV I/P reversed	PV input wiring reversed
	710	100	Sys cfg init flt	System configuration done by user/installer is incorrect
	711	105	Share sys cfg flt	Internal configuration shared between MCU is incorrect
	712	300	AC int cfg flt	Internal configuration is incorrect on the AC MCU
	713	310	DC int cfg flt	Internal configuration is incorrect on the DC MCU
	714	666	RPO power mod err	RPO power module err
Errors	2018	6820	AC inter-comm err	Internal Communication fault detected on DC AC processor
	2060	4500	AC low temp	Power Modules A_B_C and Ambient Low temperature Error
	2061	1300	AC modules OT	AC power module Over temperature
	2062	1320	DC mod12 OT	DC 1_2 &2_3 Power Modules Over Temperature
	2101	6840	DC inter-comm err	Internal communication fault detected on DCDC processor
	2102	9999	DCAC comm err	Communication error on DCAC porocessor detected by Comm processor
	2401	2140	AC UF fast err	AC grid under-frequency fast error
	2402	2160	AC OF fast err	AC grid over-frequency fast error
	2406	2100	AC UV fast err	AC grid undervoltage fast error
	2407	2120	AC OV fast err	AC grid overvoltage fast error
	2408	2820	AC UV inst	AC grid under voltage instantaneous error
	2410	2800	AC OV inst	AC grid overvoltage instantaneous error
	2411	5900	AC OC inst	AC grid overcurrent instantaneous fault
	2415	2580	AC OV avg err	AC grid overvoltage fault averaged over a period of 10 minutes
	2416	2540	AC UF slow err	AC grid under-frequency slow error
	2417	2560	AC OF slow err	AC grid over-frequency slow error
	2418	2500	AC UV slow err	AC grid undervoltage slow error
	2419	2520	AC OV slow err	AC grid overvoltage slow error
	2450	2050	No-Grid err	Grid not available
	2460	4100	AC OC err	AC overcurrent fault, if the current increase in any one phase beyond specified limits
	2605	6100	PV 1 OV err	Input PV terminal 1 over voltage
	2606	6120	PV 2 OV err	Input PV terminal 2 over voltage
	2616	1050	PV insulation err	PV insulation not within range
	2624	1500	PV12 OC err	PV 1 and PV 2 Over current
	2631	6500	PV UV err	Input PV undervoltage fault detected in PV1 and PV2 input channels
	2633	7100	PV1 OC wrn	PV1 Over current detected, hence the power output from PV1 is stopped
	2634	7110	PV2 OC wrn	PV2 Over current detected, hence the power output from PV2 is stopped

	2646	1110	RCMU err	DC MCU detected error in RCD measurement
	2647	1100	RCMU err	AC MCU detected error in RCD measurement (to be checked)
	2648	4300	Low Eff err	Low efficiency error (To be checked)
Warnings	4003	7040	Replace fan	Fault or FAN EOL detected and needs FAN replacement
	4004	7050	Loss of cooling	Fan circuit hardware failure detected and inverter replace needed
	4061	7150	Ambient OT wrn	Ambient tempoerature has crossed nominal operating range and the unit starts to derate
	4068	7060	DC mod1 OT trip	DC Module1 Over temperature detected and power output from PV1 channel is stopped/turned OFF
	4065	7250	DC mod1 OT wrn	DC module1 temperature crossed the nominal operating limits and the unit starts to derate
	4069	7070	DC mod2 OT trip	DC Module2 Over temperature detected and power output from PV2 channel is stopped/turned OFF
	4066	7260	DC mod2 OT wrn	DC module2 temperature crossed the nominal operating limits and the unit starts to derate
	4656	7300	PV1 UV wrn	Input PV voltage is lower than nominal operating limits on PV1 input terminal
	4657	7310	PV2 UV wrn	Input PV voltage is lower than nominal operating limits on PV2 input terminal
	4660	7200	AC mod OT wrn	The temperature on AC module crossed normal operating limit and the unit starts to derate
	4661	7010	PV1 SPD service	SPD module connected on the PV1 input channel reached EOL and needs replacement
	4662	7020	PV2 SPD service	SPD module connected on the PV2 input channel reached EOL and needs replacement
	4663	7030	AC SPD wrn	SPD module connected on the AC output channel reached EOL and needs replacement
	4680	150	Invalid Date Warning	When invalid date is set the warning will get displayed
	4700	9400	Low Power Wrn	Low Power Warning
Internal Events	7000	9999	Comm Internal Errors	Internal error reported by Communication Processor. Contact Schneider Electric with data displayed in DUI or refer the event bit map registers at address 0x1908-0x190B
	8000	9400	AC internal errors	Internal error reported by AC Processor. Contact Schneider Electric with data displayed in DUI or refer the event bit map registers at address 0x1900-0x1903
	9000	9500	DC internal errors	Internal error reported by DC Processor. Contact Schneider Electric with data displayed in DUI or refer the event bit map registers at address 0x1904-0x1907