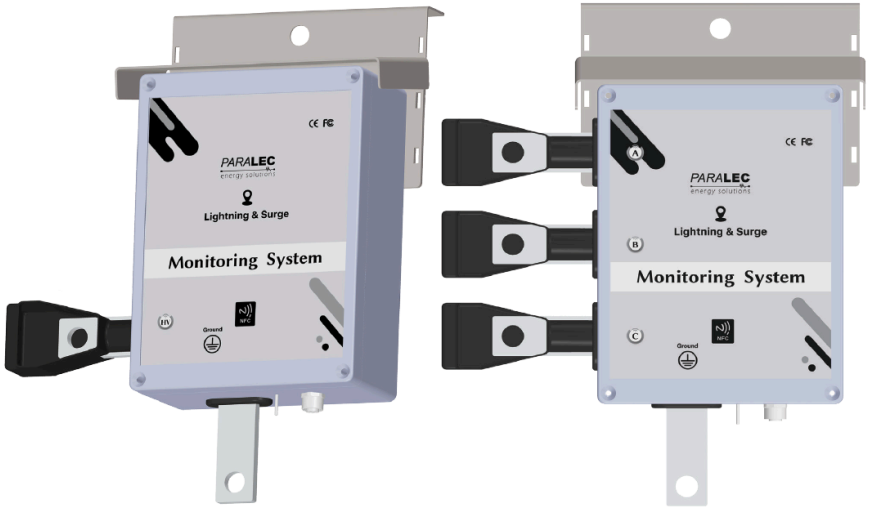
MODBUS TABLES



SMC & SLC

monitoring of metal
oxide surge arresters
from 6 to 800 kV AC

PARALEC
energy solutions

PARALEC
energy solutions

Table of Contents

PARALEC
energy solutions

1. MODBUS TABLES

#	DEVICE PARAMETERS	Unit	Per Phase	Data type	Size, Bytes	Access Type	Protected	Registers	Address	FC
#	Factory Parameters (Read-Only)	Unit	Per Phase	Data type	Size, Bytes	Access Type	Protected	Registers	Address	FC
F1	Series	ASCII	NO	CHAR [2]	2	READ	NO	1	0	3
F2	Type	ASCII	NO	CHAR [2]	2	READ	NO	1	1	3
F3	Generation	ASCII	NO	CHAR [2]	2	READ	NO	1	2	3
F4	Model	ASCII	NO	CHAR [2]	2	READ	NO	1	3	3
F5	Firmware Version	N/A	NO	U8 [4]	4	READ	NO	2	4	3
F6	Build Timestamp	Date & Time	NO	I64	8	READ	NO	4	6	3
F7	Hardware Version	N/A	NO	U8 [4]	4	READ	NO	2	10	3
F8	Serial Number	N/A	NO	CHAR [12]	12	READ	NO	6	12	3
#	Diagnostic Parameters	Unit	Per Phase	Data type	Size, Bytes	Access Type	Protected	Registers	Address	FC
S1	State Bits	Bit String	NO	U64	8	READ	NO	4	2000	3
S2	Last index of Events Log	N/A	NO	U32	4	READ	NO	2	2004	3
S3	Last Index of Leakage Components	N/A	NO	U32	4	READ	NO	2	2006	3
S4	Last Index of Leakage Waveforms	N/A	NO	U32	4	READ	NO	2	2008	3
S5	Last Index of S/L/F Components	N/A	NO	U32	4	READ	NO	2	2010	3
S6	Last Index of S/L/F Waveforms	N/A	NO	U32	4	READ	NO	2	2012	3
S7	Config Change Timestamp	Date & Time	NO	I64	8	READ	NO	4	2014	3
S8	Counters Change Timestamp	Date & Time	NO	I64	8	READ	NO	4	2018	3
S#	reserved	N/A	NO	N/A	24	READ	NO	12	2022	3
S10	System Current Time	Date & Time	NO	I64	8	READ	NO	4	2034	3
S11	System Uptime	Date & Time	NO	I64	8	READ	NO	4	2038	3
S12	Digital Output State	N/A	NO	BOOL	1	READ	NO	1	2042	3

S13	GPS Latitude	°	NO	I32	4	READ	NO	2	2043	3
S14	GPS Longitude	°	NO	I32	4	READ	NO	2	2045	3
S15	GPS Altitude	N/A	NO	I32	4	READ	NO	2	2047	3
S16	GPS Visible Satelites	N/A	NO	U8	1	READ	NO	1	2049	3
S17	GPS Used Satelites	N/A	NO	U8	1	READ	NO	1	2050	3
S#	reserved	N/A	NO	N/A	33	READ	NO	17	2051	3
S300	LoRaWAN Activation (join) status	Enum	NO	U8	2	READ	NO	1	2068	3
S301	LoRaWAN Activation Timestamp	Date & Time	NO	I64	8	READ	NO	4	2069	3
S302	LoRaWAN Last Uplink Status	Enum	NO	U8	1	READ	NO	1	2073	3
S303	LoRaWAN Last Uplink Timestamp	Date & Time	NO	I64	8	READ	NO	4	2074	3
S304	LoRaWAN Last Downlink RSSI	dBm	NO	I16	2	READ	NO	1	2078	3
S305	LoRaWAN Last Downlink SNR	dB	NO	I16	2	READ	NO	1	2079	3
S306	LoRaWAN Last Downlink Window	N/A	NO	U8	1	READ	NO	1	2080	3
S307	LoRaWAN Last Downlink Timestamp	Date & Time	NO	I64	8	READ	NO	4	2081	3
S#	reserved	N/A	NO	N/A	32	READ	NO	16	2085	3
#	**User Defined Parameters**	**Unit**	**Per Phase**	**Data type**	**Size, Bytes**	**Access Type**	**Protected**	**Registers**	**Address**	**FC**
U1	Config Protection Password	ASCII	NO	CHAR [8]	8	READ WRITE	YES*	4	3000	3, 16
U2	Config Protection Timeout	seconds	NO	U16	2	READ WRITE	YES*	1	3004	3, 6, 16
U3	Log Level for System Events	Enum	NO	U8	1	READ WRITE	YES*	1	3005	3, 6, 16
U4	Log Level for Application Events	Enum	NO	U8	1	READ WRITE	YES*	1	3006	3, 6, 16
U5	Digital Output Setting Level	Enum	NO	U8	1	READ WRITE	YES*	1	3007	3, 6, 16
U6	Config Access Detection	BOOL	NO	BOOL	1	READ WRITE	YES*	1	3008	3, 6, 16
U7	Max time deviation for synchronisation	seconds	NO	U16	2	READ WRITE	YES*	1	3009	3, 6, 16
U#	reserved for system config	N/A	NO	N/A	50	READ WRITE	YES*	25	3010	3, 6, 16
U101	Line Frequency	Hz	NO	U8	1	READ WRITE	YES*	1	3035	3, 6, 16

U102	Leakage Recording Period	minutes	NO	U16	2	READ WRITE	YES*	1	3036	3, 6, 16
U103	Trigger Current	A	NO	U16	2	READ WRITE	YES*	1	3037	3, 6, 16
U104	Trigger Fault Recording Current (50Hz)	A	NO	U16	2	READ WRITE	YES*	1	3038	3, 6, 16
U105	Protection Device Type (PD)	Enum	NO	U8	2	READ WRITE	YES*	1	3039	3, 6, 16
U106	Nominal Discharge Capabilities of PD	kA	NO	U16	2	READ WRITE	YES*	1	3040	3, 6, 16
U107	Energy Handling Capabilities of PD	kJ/kV	NO	U8	1	READ WRITE	YES*	1	3041	3, 6, 16
U108	MCOV of PD	kV	NO	U16	2	READ WRITE	YES*	1	3042	3, 6, 16
U109	Maximum Follow Current of PD	kA	NO	U16	2	READ WRITE	YES*	1	3043	3, 6, 16
U110	Nominal Voltage of PD (P-P)	kV	NO	U16	2	READ WRITE	YES*	1	3044	3, 6, 16
U111	Maximum Total I2t of PD	A2.s	NO	U32	4	READ WRITE	YES*	2	3045	3, 6, 16
U112	Maximum Leakage Current	mA	NO	I32	4	READ WRITE	YES*	2	3047	3, 6, 16
U113	Maximum Resistive Leakage Current	mA	NO	I32	4	READ WRITE	YES*	2	3049	3, 6, 16
U114	Max Unbalance Leakage between phases	%	NO	U8	1	READ WRITE	YES*	1	3051	3, 6, 16
U115	Warning Threshold as % of life remaining	%	NO	U8	1	READ WRITE	YES*	1	3052	3, 6, 16
U116	e to wait for leakage after an overvoltage event	minutes	NO	U16	2	READ WRITE	YES*	1	3053	3, 6, 16
U117	Number of measure for leakage average		NO	U16	2	READ WRITE	YES*	1	3054	3, 6, 16
U#	reserved for application settings	N/A	NO	N/A	92	READ WRITE	YES*	46	3055	3, 6, 16
U200	Modbus RTU Address	N/A	NO	U8	1	READ WRITE	YES*	1	3101	3, 6, 16
U201	Modbus RTU Baudrate	N/A	NO	U32	4	READ WRITE	YES*	2	3102	3, 6, 16
U#	reserved for Modbus settings	N/A	NO	N/A	59	READ WRITE	YES*	30	3104	3, 6, 16
U#	reserved	N/A	NO	N/A	128	READ WRITE	YES*	64	3134	3, 6, 16
U400	LoRaWAN supervisory cycle	minutes	NO	U16	2	READ WRITE	YES*	1	3198	3, 6, 16
U401	LoRaWAN session lifetime	seconds	NO	U32	4	READ WRITE	YES*	2	3199	3, 6, 16
U402	LoRaWAN frame counters limit	N/A	NO	U32	4	READ WRITE	YES*	2	3201	3, 6, 16
U403	LoRaWAN data uplinks delay	ms	NO	U32	4	READ WRITE	YES*	2	3203	3, 6, 16
U404	LoRaWAN max fragments number	N/A	NO	U8	1	READ WRITE	YES*	1	3205	3, 6, 16

U405	LoRaWAN activation type	Enum	NO	U8	1	READ WRITE	YES*	1	3206	3, 6, 16
U406	LoRaWAN network type	N/A	NO	BOOL	1	READ WRITE	YES*	1	3207	3, 6, 16
U407	LoRaWAN region	N/A	NO	U8	1	READ WRITE	YES*	1	3208	3, 6, 16
U408	LoRaWAN join EUI (application EUI)	Hex	NO	BYTE [8]	8	READ WRITE	YES*	4	3209	3, 6, 16
U409	LoRaWAN network root key	Hex	NO	BYTE [16]	16	READ WRITE	YES*	8	3213	3, 6, 16
U410	LoRaWAN application root key	Hex	NO	BYTE [16]	16	READ WRITE	YES*	8	3221	3, 6, 16
U411	LoRaWAN application session key	Hex	NO	BYTE [16]	16	READ WRITE	YES*	8	3229	3, 6, 16
U412	LoRaWAN network session key	Hex	NO	BYTE [16]	16	READ WRITE	YES*	8	3237	3, 6, 16
U413	LoRaWAN device address	Hex	NO	BYTE [4]	4	READ WRITE	YES*	2	3245	3, 6, 16
U414	LoRaWAN network ID	N/A	NO	U8	1	READ WRITE	YES*	1	3247	3, 6, 16
U415	LoRaWAN adaptive data rate	N/A	NO	BOOL	1	READ WRITE	YES*	1	3248	3, 6, 16
U416	LoRaWAN data rate	N/A	NO	U8	1	READ WRITE	YES*	1	3249	3, 6, 16
U417	LoRaWAN uplinks confirmation	N/A	NO	BOOL	1	READ WRITE	YES*	1	3250	3, 6, 16
U418	LoRaWAN retransmissions count	N/A	NO	U8	1	READ WRITE	YES*	1	3251	3, 6, 16
U419	LoRaWAN application port	N/A	NO	U8	1	READ WRITE	YES*	1	3252	3, 6, 16
U420	LoRaWAN data rate offset of the Rx window 1	N/A	NO	U8	1	READ WRITE	YES*	1	3253	3, 6, 16
U421	LoRaWAN data rate of the Rx window 2	N/A	NO	U8	2	READ WRITE	YES*	1	3254	3, 6, 16
U422	LoRaWAN frequency of the Rx window 2	Hz	NO	U32	4	READ WRITE	YES*	2	3255	3, 6, 16
U423	LoRaWAN join accept delay on Rx window 1	10 ms	NO	U32	4	READ WRITE	YES*	2	3257	3, 6, 16
U424	LoRaWAN join accept delay on Rx window 2	10 ms	NO	U32	4	READ WRITE	YES*	2	3259	3, 6, 16
U425	LoRaWAN delay of the Rx window 1	ms	NO	U32	4	READ WRITE	YES*	2	3261	3, 6, 16
U426	LoRaWAN delay of the Rx window 2	ms	NO	U32	4	READ WRITE	YES*	2	3263	3, 6, 16
U427	LoRaWAN max number of channel	N/A	NO	U8	1	READ WRITE	YES*	1	3265	3, 6, 16
U#	reserved for LoRaWAN settings	N/A	NO	N/A	68	READ WRITE	YES*	34	3266	3, 6, 16
U450	LoRaWAN requested channel index	N/A	NO	U8	1	READ WRITE	YES*	1	3300	3, 6, 16
U451	LoRaWAN channel enabled	N/A	NO	BOOL	1	READ WRITE	YES*	1	3301	3, 6, 16

U452	LoRaWAN channel frequency	Hz	NO	U32	4	READ WRITE	YES*	2	3302	3, 6, 16
U453	LoRaWAN channel min data rate index	N/A	NO	U8	1	READ WRITE	YES*	1	3304	3, 6, 16
U454	LoRaWAN channel max data rate index	N/A	NO	U8	1	READ WRITE	YES*	1	3305	3, 6, 16
U455	LoRaWAN channel bandwidth index	N/A	NO	U8	1	READ WRITE	YES*	1	3306	3, 6, 16
U#	rved for the single LoRaWAN channel settings	N/A	NO	N/A	23	READ WRITE	YES*	12	3307	3, 6, 16
#	**Events Log**	**Unit**	**Per Phase**	**Data type**	**Size, Bytes**	**Access Type**	**Protected**	**Registers**	**Address**	**FC**
E0	Requested Index	N/A	NO	U32	4	READ WRITE	NO	2	4000	3, 6
E5	Index written in modbus table	N/A	NO	U32	4	READ	NO	2	4002	3
E1	Timestamp	Date & Time	Req	I64	8	READ	NO	4	4004	3
E2	Level	N/A	Req	U8	1	READ	NO	1	4008	3
E3	Code	N/A	Req	U8	1	READ	NO	1	4009	3
E4	Arguments	N/A	Req	N/A	18	READ	NO	9	4010	3
E1	Timestamp	Date & Time	Last	I64	8	READ	NO	4	4019	3
E2	Level	N/A	Last	U8	1	READ	NO	1	4023	3
E3	Code	N/A	Last	U8	1	READ	NO	1	4024	3
E4	Arguments	N/A	Last	N/A	18	READ	NO	9	4025	3
#	**Counters Parameters**	**Unit**	**Per Phase**	**Data type**	**Size, Bytes**	**Access Type**	**Protected**	**Registers**	**Address**	**FC**
C1	Counter I2t of Switchings	A2.s	L1	U32	4	READ	NO	2	5000	3
C2	Counter I2t of Lightnings	A2.s	L1	U32	4	READ	NO	2	5002	3
C3	Counter I2t of Faults	A2.s	L1	U32	4	READ	NO	2	5004	3
C4	Counter I2t of Leakage	A2.s	L1	U32	4	READ	NO	2	5006	3
C5	Counter I2t Total	A2.s	L1	U32	4	READ	NO	2	5008	3
C6	Max Current of Lightnings	kA	L1	U16	2	READ	NO	1	5010	3
C7	Max Current of Switchings	A	L1	U16	2	READ	NO	1	5011	3

C8	Max Current of Faults	A	L1	U32	4	READ	NO	2	5012	3
C9	Max Leakage	mA	L1	U32	4	READ	NO	2	5014	3
C10	Max Leakage Resitive	mA	L1	U32	4	READ	NO	2	5016	3
C11	Max Leakage Capacitive	mA	L1	U32	4	READ	NO	2	5018	3
C12	Counter Coulomb (I.t) of Switchings	A.s	L1	U32	4	READ	NO	2	5020	3
C13	Counter Coulomb (I.t) of Lightnings	A.s	L1	U32	4	READ	NO	2	5022	3
C14	Counter Coulomb (I.t) of Faults	A.s	L1	U32	4	READ	NO	2	5024	3
C15	Counter Coulomb (I.t) of Leakage	A.s	L1	U32	4	READ	NO	2	5026	3
C16	Counter Coulomb (I.t) Total	A.s	L1	U32	4	READ	NO	2	5028	3
C17	Total Switchings	N/A	L1	U16	2	READ	NO	1	5030	3
C18	Total Lightnings	N/A	L1	U16	2	READ	NO	1	5031	3
C19	Total Faults	N/A	L1	U16	2	READ	NO	1	5032	3
C20	Protection device % of life remaining	%	L1	U8	1	READ	NO	1	5033	3
C21	Protection device prospective end of life	days	L1	U32	4	READ	NO	2	5034	3
C#	reserved	N/A	L1	N/A	25	READ	NO	13	5036	3
C1	Counter I2t of Switchings	A2.s	L2	U32	4	READ	NO	2	5049	3
C2	Counter I2t of Lightnings	A2.s	L2	U32	4	READ	NO	2	5051	3
C3	Counter I2t of Faults	A2.s	L2	U32	4	READ	NO	2	5053	3
C4	Counter I2t of Leakage	A2.s	L2	U32	4	READ	NO	2	5055	3
C5	Counter I2t Total	A2.s	L2	U32	4	READ	NO	2	5057	3
C6	Max Current of Lightnings	kA	L2	U16	2	READ	NO	1	5059	3
C7	Max Current of Switchings	A	L2	U16	2	READ	NO	1	5060	3
C8	Max Current of Faults	A	L2	U32	4	READ	NO	2	5061	3
C9	Max Leakage	mA	L2	U32	4	READ	NO	2	5063	3
C10	Max Leakage Resitive	mA	L2	U32	4	READ	NO	2	5065	3
C11	Max Leakage Capacitive	mA	L2	U32	4	READ	NO	2	5067	3

C12	Counter Coulomb (I.t) of Switchings	A.s	L2	U32	4	READ	NO	2	5069	3
C13	Counter Coulomb (I.t) of Lightnings	A.s	L2	U32	4	READ	NO	2	5071	3
C14	Counter Coulomb (I.t) of Faults	A.s	L2	U32	4	READ	NO	2	5073	3
C15	Counter Coulomb (I.t) of Leakage	A.s	L2	U32	4	READ	NO	2	5075	3
C16	Counter Coulomb (I.t) Total	A.s	L2	U32	4	READ	NO	2	5077	3
C17	Total Switchings	N/A	L2	U16	2	READ	NO	1	5079	3
C18	Total Lightnings	N/A	L2	U16	2	READ	NO	1	5080	3
C19	Total Faults	N/A	L2	U16	2	READ	NO	1	5081	3
C20	Protection device % of life remaining	%	L2	U8	1	READ	NO	1	5082	3
C21	Protection device prospective end of life	days	L2	U32	4	READ	NO	2	5083	3
C#	reserved	N/A	L2	N/A	25	READ	NO	13	5085	3
C1	Counter I2t of Switchings	A2.s	L3	U32	4	READ	NO	2	5098	3
C2	Counter I2t of Lightnings	A2.s	L3	U32	4	READ	NO	2	5100	3
C3	Counter I2t of Faults	A2.s	L3	U32	4	READ	NO	2	5102	3
C4	Counter I2t of Leakage	A2.s	L3	U32	4	READ	NO	2	5104	3
C5	Counter I2t Total	A2.s	L3	U32	4	READ	NO	2	5106	3
C6	Max Current of Lightnings	kA	L3	U16	2	READ	NO	1	5108	3
C7	Max Current of Switchings	A	L3	U16	2	READ	NO	1	5109	3
C8	Max Current of Faults	A	L3	U32	4	READ	NO	2	5110	3
C9	Max Leakage	mA	L3	U32	4	READ	NO	2	5112	3
C10	Max Leakage Resitive	mA	L3	U32	4	READ	NO	2	5114	3
C11	Max Leakage Capacitive	mA	L3	U32	4	READ	NO	2	5116	3
C12	Counter Coulomb (I.t) of Switchings	A.s	L3	U32	4	READ	NO	2	5118	3
C13	Counter Coulomb (I.t) of Lightnings	A.s	L3	U32	4	READ	NO	2	5120	3
C14	Counter Coulomb (I.t) of Faults	A.s	L3	U32	4	READ	NO	2	5122	3
C15	Counter Coulomb (I.t) of Leakage	A.s	L3	U32	4	READ	NO	2	5124	3

C16	Counter Coulomb (I.t) Total	A.s	L3	U32	4	READ	NO	2	5126	3
C17	Total Switchings	N/A	L3	U16	2	READ	NO	1	5128	3
C18	Total Lightnings	N/A	L3	U16	2	READ	NO	1	5129	3
C19	Total Faults	N/A	L3	U16	2	READ	NO	1	5130	3
C20	Protection device % of life remaining	%	L3	U8	1	READ	NO	1	5131	3
C21	Protection device prospective end of life	days	L3	U32	4	READ	NO	2	5132	3
C#	reserved	N/A	L3	N/A	25	READ	NO	13	5134	3
#	**Leakage components**	**Unit**	**Per Phase**	**Data type**	**Size, Bytes**	**Access Type**	**Protected**	**Registers**	**Address**	**FC**
L0	Requested Index	N/A	NO	U32	4	READ WRITE	NO	2	6000	3, 6
L20	Index written in modbus table	N/A	NO	U32	4	READ	NO	2	6002	3
L1	Timestamp	Date & Time	L1 Req	I64	8	READ	NO	4	6004	3
L2	Peak mA	mA	L1 Req	U16	2	READ	NO	1	6008	3
L3	Peak Res mA (Algo Sa)	mA	L1 Req	U16	2	READ	NO	1	6009	3
L4	Peak Cap mA (Algo Sa)	mA	L1 Req	U16	2	READ	NO	1	6010	3
L5	Peak H3 mA (Algo Ha)	mA	L1 Req	U16	2	READ	NO	1	6011	3
L6	ElecFi V	V	L1 Req	U16	2	READ	NO	1	6012	3
L7	Deph ms (Algo Sa)	ms	L1 Req	U16	2	READ	NO	1	6013	3
L8	Temp C	*C	L1 Req	U16	2	READ	NO	1	6014	3
L9	I2t (A2s)	A2s	L1 Req	U32	4	READ	NO	2	6015	3
L10	Capacitance (Algo Sa or Sb)	pF	L1 Req	U16	2	READ	NO	1	6017	3
L11	Peak Sec mA	mA	L1 Req	U16	2	READ	NO	1	6018	3
L12	Peak Sec Res mA (Algo Sa)	mA	L1 Req	U16	2	READ	NO	1	6019	3
L13	Peak H3b mA (Algo Hb)	mA	L1 Req	U16	2	READ	NO	1	6020	3
L14	Peak Res mA (Algo Sb)	mA	L1 Req	U16	2	READ	NO	1	6021	3
L15	Peak Cap mA (Algo Sb)	mA	L1 Req	U16	2	READ	NO	1	6022	3

L16	Deph ms (Algo Sb)	ms	L1 Req	U16	2	READ	NO	1	6023	3
L17	Peak Sec Res mA (Algo Sb)	mA	L1 Req	U16	2	READ	NO	1	6024	3
L#	reserved	N/A	L1 Req	N/A	22	READ	NO	11	6025	3
L1	Timestamp	Date & Time	L2 Req	I64	8	READ	NO	4	6036	3
L2	Peak mA	mA	L2 Req	U16	2	READ	NO	1	6040	3
L3	Peak Res mA (Algo Sa)	mA	L2 Req	U16	2	READ	NO	1	6041	3
L4	Peak Cap mA (Algo Sa)	mA	L2 Req	U16	2	READ	NO	1	6042	3
L5	Peak H3 mA (Algo Ha)	mA	L2 Req	U16	2	READ	NO	1	6043	3
L6	ElecFi V	V	L2 Req	U16	2	READ	NO	1	6044	3
L7	Deph ms (Algo Sa)	ms	L2 Req	U16	2	READ	NO	1	6045	3
L8	Temp C	*C	L2 Req	U16	2	READ	NO	1	6046	3
L9	I2t (A2s)	A2s	L2 Req	U32	4	READ	NO	2	6047	3
L10	Capacitance (Algo Sa or Sb)	pF	L2 Req	U16	2	READ	NO	1	6049	3
L11	Peak Sec mA	mA	L2 Req	U16	2	READ	NO	1	6050	3
L12	Peak Sec Res mA (Algo Sa)	mA	L2 Req	U16	2	READ	NO	1	6051	3
L13	Peak H3b mA (Algo Hb)	mA	L2 Req	U16	2	READ	NO	1	6052	3
L14	Peak Res mA (Algo Sb)	mA	L2 Req	U16	2	READ	NO	1	6053	3
L15	Peak Cap mA (Algo Sb)	mA	L2 Req	U16	2	READ	NO	1	6054	3
L16	Deph ms (Algo Sb)	ms	L2 Req	U16	2	READ	NO	1	6055	3
L17	Peak Sec Res mA (Algo Sb)	mA	L2 Req	U16	2	READ	NO	1	6056	3
L#	reserved	N/A	L2 Req	N/A	22	READ	NO	11	6057	3
L1	Timestamp	Date & Time	L3 Req	I64	8	READ	NO	4	6068	3
L2	Peak mA	mA	L3 Req	U16	2	READ	NO	1	6072	3
L3	Peak Res mA (Algo Sa)	mA	L3 Req	U16	2	READ	NO	1	6073	3
L4	Peak Cap mA (Algo Sa)	mA	L3 Req	U16	2	READ	NO	1	6074	3
L5	Peak H3 mA (Algo Ha)	mA	L3 Req	U16	2	READ	NO	1	6075	3

L6	ElecFi V	V	L3 Req	U16	2	READ	NO	1	6076	3
L7	Deph ms (Algo Sa)	ms	L3 Req	U16	2	READ	NO	1	6077	3
L8	Temp C	*C	L3 Req	U16	2	READ	NO	1	6078	3
L9	I2t (A2s)	A2s	L3 Req	U32	4	READ	NO	2	6079	3
L10	Capacitance (Algo Sa or Sb)	pF	L3 Req	U16	2	READ	NO	1	6081	3
L11	Peak Sec mA	mA	L3 Req	U16	2	READ	NO	1	6082	3
L12	Peak Sec Res mA (Algo Sa)	mA	L3 Req	U16	2	READ	NO	1	6083	3
L13	Peak H3b mA (Algo Hb)	mA	L3 Req	U16	2	READ	NO	1	6084	3
L14	Peak Res mA (Algo Sb)	mA	L3 Req	U16	2	READ	NO	1	6085	3
L15	Peak Cap mA (Algo Sb)	mA	L3 Req	U16	2	READ	NO	1	6086	3
L16	Deph ms (Algo Sb)	ms	L3 Req	U16	2	READ	NO	1	6087	3
L17	Peak Sec Res mA (Algo Sb)	mA	L3 Req	U16	2	READ	NO	1	6088	3
L#	reserved	N/A	L3 Req	N/A	22	READ	NO	11	6089	3
L1	Timestamp	Date & Time	L1 Last	I64	8	READ	NO	4	6100	3
L2	Peak mA	mA	L1 Last	U16	2	READ	NO	1	6104	3
L3	Peak Res mA (Algo Sa)	mA	L1 Last	U16	2	READ	NO	1	6105	3
L4	Peak Cap mA (Algo Sa)	mA	L1 Last	U16	2	READ	NO	1	6106	3
L5	Peak H3 mA (Algo Ha)	mA	L1 Last	U16	2	READ	NO	1	6107	3
L6	ElecFi V	V	L1 Last	U16	2	READ	NO	1	6108	3
L7	Deph ms (Algo Sa)	ms	L1 Last	U16	2	READ	NO	1	6109	3
L8	Temp C	*C	L1 Last	U16	2	READ	NO	1	6110	3
L9	I2t (A2s)	A2s	L1 Last	U32	4	READ	NO	2	6111	3
L10	Capacitance (Algo Sa or Sb)	pF	L1 Last	U16	2	READ	NO	1	6113	3
L11	Peak Sec mA	mA	L1 Last	U16	2	READ	NO	1	6114	3
L12	Peak Sec Res mA (Algo Sa)	mA	L1 Last	U16	2	READ	NO	1	6115	3
L13	Peak H3b mA (Algo Hb)	mA	L1 Last	U16	2	READ	NO	1	6116	3

L14	Peak Res mA (Algo Sb)	mA	L1 Last	U16	2	READ	NO	1	6117	3
L15	Peak Cap mA (Algo Sb)	mA	L1 Last	U16	2	READ	NO	1	6118	3
L16	Deph ms (Algo Sb)	ms	L1 Last	U16	2	READ	NO	1	6119	3
L17	Peak Sec Res mA (Algo Sb)	mA	L1 Last	U16	2	READ	NO	1	6120	3
L#	reserved	N/A	L1 Last	N/A	22	READ	NO	11	6121	3
L1	Timestamp	Date & Time	L2 Last	I64	8	READ	NO	4	6132	3
L2	Peak mA	mA	L2 Last	U16	2	READ	NO	1	6136	3
L3	Peak Res mA (Algo Sa)	mA	L2 Last	U16	2	READ	NO	1	6137	3
L4	Peak Cap mA (Algo Sa)	mA	L2 Last	U16	2	READ	NO	1	6138	3
L5	Peak H3 mA (Algo Ha)	mA	L2 Last	U16	2	READ	NO	1	6139	3
L6	ElecFi V	V	L2 Last	U16	2	READ	NO	1	6140	3
L7	Deph ms (Algo Sa)	ms	L2 Last	U16	2	READ	NO	1	6141	3
L8	Temp C	*C	L2 Last	U16	2	READ	NO	1	6142	3
L9	I2t (A2s)	A2s	L2 Last	U32	4	READ	NO	2	6143	3
L10	Capacitance (Algo Sa or Sb)	pF	L2 Last	U16	2	READ	NO	1	6145	3
L11	Peak Sec mA	mA	L2 Last	U16	2	READ	NO	1	6146	3
L12	Peak Sec Res mA (Algo Sa)	mA	L2 Last	U16	2	READ	NO	1	6147	3
L13	Peak H3b mA (Algo Hb)	mA	L2 Last	U16	2	READ	NO	1	6148	3
L14	Peak Res mA (Algo Sb)	mA	L2 Last	U16	2	READ	NO	1	6149	3
L15	Peak Cap mA (Algo Sb)	mA	L2 Last	U16	2	READ	NO	1	6150	3
L16	Deph ms (Algo Sb)	ms	L2 Last	U16	2	READ	NO	1	6151	3
L17	Peak Sec Res mA (Algo Sb)	mA	L2 Last	U16	2	READ	NO	1	6152	3
L#	reserved	N/A	L2 Last	N/A	22	READ	NO	11	6153	3
L1	Timestamp	Date & Time	L3 Last	I64	8	READ	NO	4	6164	3
L2	Peak mA	mA	L3 Last	U16	2	READ	NO	1	6168	3
L3	Peak Res mA (Algo Sa)	mA	L3 Last	U16	2	READ	NO	1	6169	3

L4	Peak Cap mA (Algo Sa)	mA	L3 Last	U16	2	READ	NO	1	6170	3
L5	Peak H3 mA (Algo Ha)	mA	L3 Last	U16	2	READ	NO	1	6171	3
L6	ElecFi V	V	L3 Last	U16	2	READ	NO	1	6172	3
L7	Deph ms (Algo Sa)	ms	L3 Last	U16	2	READ	NO	1	6173	3
L8	Temp C	*C	L3 Last	U16	2	READ	NO	1	6174	3
L9	I2t (A2s)	A2s	L3 Last	U32	4	READ	NO	2	6175	3
L10	Capacitance (Algo Sa or Sb)	pF	L3 Last	U16	2	READ	NO	1	6177	3
L11	Peak Sec mA	mA	L3 Last	U16	2	READ	NO	1	6178	3
L12	Peak Sec Res mA (Algo Sa)	mA	L3 Last	U16	2	READ	NO	1	6179	3
L13	Peak H3b mA (Algo Hb)	mA	L3 Last	U16	2	READ	NO	1	6180	3
L14	Peak Res mA (Algo Sb)	mA	L3 Last	U16	2	READ	NO	1	6181	3
L15	Peak Cap mA (Algo Sb)	mA	L3 Last	U16	2	READ	NO	1	6182	3
L16	Deph ms (Algo Sb)	ms	L3 Last	U16	2	READ	NO	1	6183	3
L17	Peak Sec Res mA (Algo Sb)	mA	L3 Last	U16	2	READ	NO	1	6184	3
L#	reserved	N/A	L3 Last	N/A	22	READ	NO	11	6185	3
#	**Leakage Waveforms**	**Unit**	**Per Phase**	**Data type**	**Size, Bytes**	**Access Type**	**Protected**	**Registers**	**Address**	**FC**
X0	Requested Index	N/A	NO	U32	4	READ WRITE	NO	2	7000	3, 6
X3	Index written in modbus table	N/A	NO	U32	4	READ	NO	2	7002	3
X2	Timestamp	Date & Time	Req	I64	8	READ	NO	4	7004	3
X1	Leakage record	table, mA	L1 Req	U16 [52]	104	READ	NO	52	7008	3
X1	Leakage record	table, mA	L2 Req	U16 [52]	104	READ	NO	52	7060	3
X1	Leakage record	table, mA	L3 Req	U16 [52]	104	READ	NO	52	7112	3
X2	Timestamp	Date & Time	Last	I64	8	READ	NO	4	7164	3
X1	Leakage record	table, mA	L1 Last	U16 [52]	104	READ	NO	52	7168	3
X1	Leakage record	table, mA	L2 Last	U16 [52]	104	READ	NO	52	7220	3

X1	Leakage record	table, mA	L3 Last	U16 [52]	104	READ	NO	52	7272	3
#	**S/L/F Components**	**Unit**	**Per Phase**	**Data type**	**Size, Bytes**	**Access Type**	**Protected**	**Registers**	**Address**	**FC**
R0	Requested Index	N/A	NO	U32	4	READ WRITE	NO	2	8000	3, 6
R8	Index written in modbus table	N/A	NO	U32	4	READ	NO	2	8002	3
R1	Timestamp	Date & Time	Req	I64	8	READ	NO	4	8004	3
R2	Component type	ASCII	Req	CHAR	1	READ	NO	1	8008	3
R3	Phase	Enum	Req	U8	1	READ	NO	1	8009	3
R4	Peak Current	kA	Req	I16	2	READ	NO	1	8010	3
R5	Coulomb	C	Req	U16	2	READ	NO	1	8011	3
R6	Duration	us	Req	U32	4	READ	NO	2	8012	3
R7	I2t (A2s)	A2s	Req	U32	4	READ	NO	2	8014	3
R#	reserved	N/A	Req	N/A	12	READ	NO	6	8016	3
R1	Timestamp	Date & Time	Last	I64	8	READ	NO	4	8022	3
R2	Component type	ASCII	Last	CHAR	1	READ	NO	1	8026	3
R3	Phase	Enum	Last	U8	1	READ	NO	1	8027	3
R4	Peak Current	kA	Last	I16	2	READ	NO	1	8028	3
R5	Coulomb	C	Last	U16	2	READ	NO	1	8029	3
R6	Duration	us	Last	U32	4	READ	NO	2	8030	3
R7	I2t (A2s)	A2s	Last	U32	4	READ	NO	2	8032	3
R#	reserved	N/A	Last	N/A	12	READ	NO	6	8034	3
#	**S/L/F Waveforms**	**Unit**	**Per Phase**	**Data type**	**Size, Bytes**	**Access Type**	**Protected**	**Registers**	**Address**	**FC**
W0	Requested Index	N/A	NO	U32	4	READ WRITE	NO	2	9000	3, 6
W4	Index written in modbus table	N/A	NO	U32	4	READ	NO	2	9002	3
W1	Lightning record	table, kA	Req	U16 [100]	200	READ	NO	100	9004	3

W2	Timestamp	Date & Time	Req	I64	8	READ	NO	4	9104	3
W3	Phase	Enum	Req	Enum	1	READ	NO	1	9108	3
W1	Lightning record	table, kA	Last	U16 [100]	200	READ	NO	100	9109	3
W2	Timestamp	Date & Time	Last	I64	8	READ	NO	4	9209	3
W3	Phase	Enum	Last	Enum	1	READ	NO	1	9213	3
#	**Commands**	**Unit**	**Per Phase**	**Data type**	**Size, Bytes**	**Access Type**	**Protected**	**Registers**	**Address**	**FC**
Y1	Reset Application	N/A	NO	BOOL	1	WRITE	YES*	1	10000	6, 16
Y2	Reset Config	N/A	NO	BOOL	1	WRITE	YES*	1	10001	6, 16
Y3	Reset Events Log	N/A	NO	BOOL	1	WRITE	YES*	1	10002	6, 16
Y4	Software reset	N/A	NO	BOOL	1	WRITE	YES*	1	10003	6, 16
Y#	reserved	N/A	NO	N/A	5	WRITE	YES*	3	10004	6, 16
Y20	LoRaWAN Force Join	N/A	NO	U8	1	WRITE	YES*	1	10007	6, 16
Y21	LoRaWAN Send Test Data	N/A	NO	U8 [2]	2	WRITE	YES*	1	10008	6, 16
Y22	LoRaWAN Link Check	N/A	NO	U8	1	WRITE	YES*	1	10009	6, 16
Y#	reserved	N/A	NO	N/A	18	WRITE	YES*	9	10010	6, 16
Y30	Trigger overvoltage event	N/A	NO	U8	1	WRITE	YES*	1	10019	6, 16
Y31	Trigger leakage event	N/A	NO	U8	1	WRITE	YES*	1	10020	6, 16
Y32	Set time	N/A	NO	I64	8	WRITE	YES*	4	10021	6, 16
Y#	reserved	N/A	NO	N/A	16	WRITE	YES*	8	10025	6, 16

2. ENUMARATIONS

S1	General State	Bit String	U64
	Name	**Bit**	**Note**
	System Alarm	0	Indicates active alarms
	System Warning	1	Indicates active warnings
	Application Alarm	2	
	Application Warning	3	
	reserved for general indication bits	up to 8	reserved
	MCU Alarm	8	
	MCU Warning	9	
	DSP1 Alarm	10	
	DSP1 Warning	11	
	DSP2 Alarm	12	
	DSP2 Warning	13	
	DSP3 Alarm	14	
	DSP3 Warning	15	
	DSP1 no communication	16	
	DSP2 no communication	17	
	DSP3 no communication	18	
	GPS Alarm	20	
	GPS Warning	21	
	NFC Alarm	22	
	NFC Warning	23	
	Low Voltage Warning	24	

	reserved for hardware Alarms & Warnings	up to 32	reserved
	Time Sync Warning	32	
	Config Access Warning	33	
	LoRaWAN Warning	34	
	reserved for firmware alarms & warnings	up to 48	reserved
	reserved for app alarms & warnings	up to 63	reserved
S300	**LoRaWAN Activation Status**	**Enum**	**U8**
	Name	**Value**	**Note**
	Success	0	
	Disabled	1	
	Error	2	
S300	**LoRaWAN Uplink Status**	**Enum**	**U8**
	Name	**Value**	**Note**
	Success	0	
	Error	1	
	should be the same as the related Enumeration in the Source code		
U3; U4; E2	**Events Log Level**	**Enum**	**U8**
	Name	**Value**	**Note**
	Trace App	0	The most detailed messages that may contain sensitive application data. Should never be enabled in a production environment
	Trace Sys	1	
	Debug App	10	For interactive investigation during development
	Debug Sys	11	

	Information App	20	General flow of the application
	Information Sys	21	
	Warning App	30	Abnormal or unexpected events not requiring immediate attention
	Warning Sys	31	
	Alarm App	40	Abnormal or unexpected events requiring immediate attention
	Alarm Sys	41	
U105	**Protection Device Type**	**Enum**	**U8**
	Name	**Value**	**Note**
	MOA, SPD, TLA	1	Leakage = ON
	LLPD	2	Leakage = OFF
	EGLA, CLAH	3	Leakage = OFF
	Lightning rod	4	Leakage = OFF
R3	**Electrical Phase**	**Enum**	**U8**
	Name	**Value**	**Note**
	L1	1	
	L2	2	
	L3	3	
U7	**Variant leakage mode**	**Enum**	**U8**
	Name	**Value**	**Note**
	Leakage disable	0	
	Leakage only total peak (L2)	1	
	Leakage enable (all elements)	2	
U8	**Variant AUXs mode**	**Enum**	**U8**

	Name	Value	Note
	1 phase (L1)	1	
	3 phases	3	

3. LOGS

System Warnings (31)					
Name	**Value**		**State Bit**	**Arguments**	**Note**
GPS bad signal quality	40		SET	Visible satelites (U8); Used Satilites (U8)	GPS signal is weak (e.g. low satellites count)
Time Sync Error	70		SET	NO	Failed to sync system time
LoRaWAN activation failed	120		SET	NO	Failed to join a LoRaWAN network
Config Changed	220		NO	NO	Configuration Parameters were changed
Config Reset	221		NO	NO	Configuration was reset to Factory Defaults
Wrong Config Password	222		NO	NO	Wrong password for Configuration Parameters
Config Password Changed	223		NO	NO	Password was changed for Configuration Parameters
Config Password Disabled	224		NO	NO	Config Password was disabled
System Information (21)					
Name	**Value**		**State Bit**	**Arguments**	**Note**
DSP1 Recovered	10		RESET	NO	DSP1 is alright now
DSP2 Recovered	20		RESET	NO	DSP2 is alright now
DSP3 Recovered	30		RESET	NO	DSP3 is alright now

GPS Error	40		RESET	Visible satelites (U8); Used Satilites (U8)	GPS is alright now
Voltage Recovered	60		RESET	N/A	System voltage is alright now
Time Sync Success	70		RESET	NO	Time successfully synced
System Started	71		NO	NO	System Started
LoRaWAN Activated	120		NO	Activation Mode (U8)	Successfully joined a LoRaWAN network
LoRaWAN Disabled	121		NO	NO	LoRaWAN was disabled
Config Password Enabled	220		NO	NO	Config Password was enabled
System Debug (11)					
Name	**Value**		**State**	**Arguments**	**Note**
DSP1 busy	1		N/A	NO	The DSP1 has not stored the latest overvoltage data because the data was locked by the previous event.
DSP2 busy	2		N/A	NO	The DSP2 has not stored the latest overvoltage data because the data was locked by the previous event.
DSP3 busy	3		N/A	NO	The DSP3 has not stored the latest overvoltage data because the data was locked by the previous event.
Application Alarms (40)					
Name	**Value**		**State**	**Arguments**	**Note**
Reached Nominal Discharge Capabilities	1				for U102 = 1, 2 or 3 only
Reached Energy Handling Capabilities	2				for U102 = 1, 2 or 3 only

Reached Maximum Follow Current	3				for U102 = 1, 2 or 3 only
Reached Maximum Total I2t	4				for U102 = 2 only
Reached Maximum Leakage Current	5				for U102 = 1 only
Reached Maximum Resistive Leakage Current	6				for U102 = 1 only
Reached Max Unbalance Leakage between phases	7				for U102 = 1 only
Reached Threshold as % of life remaining	8				for U102 = 2 only
Surge arrester disconnected L1	9				for U102 = 2 only
Surge arrester disconnected L2	10				
Surge arrester disconnected L3	11				
Application Warnings (30)					
Name	**Value**		**State**	**Arguments**	**Note**
not used	0		NO	NO	not used
Counters Reset	1		NO	NO	Counters were reset
Reached 80% Nominal Discharge Capabilities	2		NO	NO	
Reached 80% Energy Handling Capabilities	3		NO	NO	
Reached 80% Maximum Follow Current	4		NO	NO	
Reached 80% Maximum Total I2t	5		NO	NO	
Reached 80% Maximum Leakage Current	6		NO	NO	

Reached 80% Maximum Resistive Leakage Current	7		NO	NO	
Reached 80% Max Unbalance Leakage between phases	8		NO	NO	
Reached 80% Threshold as % of life remaining	9		NO	NO	

4. Contact

Our email :
info@paralec.com

Our EUROPE office :
PARALEC Energy SAS

Le Mathis, 204 av de Colmar
67100 Strasbourg - FRANCE

Our ASIA office:
PARALEC Energy Co Ltd
Liberty Plaza, 20th Floor,
1000/5-6, Soi.Thonglor, Sukhumvit 55 Rd.,
Klongton Nua, Wattana,
10110 Bangkok – THAILAND

Our website :
www.paralec.com