



**INGECON SUN INVERTERS
GENERAL DEFINITIONS – ALARMS,
STOP EVENTS AND WARNINGS**

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1 Introduction

This document defines standard names for used variables, alarms, stop events and warnings of 1Play, 3Play and PowerMax B inverters.

2 Alarms, Warnings and Stop Events

2.1 Alarm Event (AE)

An alarm is defined by an event producing the stopping of the normal working state of the unit. Alarm event may be a transient or a stable condition. An alarm code is described by both a bit code variable and a number reflecting the bit position within the bit code. Alarm code is defined by a 16bit code and a number. There are four alarm codes that is alarm code 0, 1, 3 and 4. Every alarm code is intended to be general and has a display test associated.

The event of an alarm will be described on the display by means of an associated text to each bit within the alarm bit code. Hence, the user will be able to know the meaning of one of more alarm events being produced.

Every time an alarm event is produced, the corresponding bit field of the alarm code will be set. This will last one second and thereafter this condition will be reset. Therefore transient alarm events will only be recorded for one second.

Further, a maintained alarm code is set every second with the value of the alarm code, before the latter is reset.

Regarding design issues, alarm events are described by means of two different values. That is, alarm value and alarm bit code. Apart from that, a text is associated to each alarm event.

- Uint16 alarmValue: Alarm value is a 16 bits variable.
- Uint64 alarmCode: Alarm bit Code is a 64 bits variable.

2.2 Special alarm cases

Grid power consumption: The unit has been connected to the grid and it is consuming energy (or producing very little energy) longer than a specified time. This event is implemented to disconnect the unit from the grid at dusk or very dark days without reasonable energy yielding. This event will not have an alarm code.

Low power to connect: The unit has not enough power at the input to be connected to the public grid. This is implemented to avoid the unit to consume energy in excess every dawn or at very dark days. This event will not have an alarm code.

This two alarm cases will not show any text in the display. They are considered events of a properly working unit.

2.3 Stop Event (SE)

Since alarm code are intended to be general events and something understandable by users, stop events are also defined. Stop events are more specific and more descriptive codes. Therefore, one alarm code may be associated to several stop event codes. At the end, stop event will fully describe the produced alarm. It will depend on the hardware, device and any factor the developer might take into account.

Every alarm event has associated an unique alarm bit code and alarm value. However this is a general value where only 64 possible sources of event might be defined.

In order to tackle all possible alarm events for the different units, and bearing in mind that an Uint16 has 65535 possible combinations, stop event has been defined.

Uint16 stopEvent: Stop event value is a 16 bits value.

Val.	Fw Definition	Description
1	SE_VPV1_MAX_INST	Instantaneous overvoltage at DC input 1.
2	SE_VPV1_MAX_AVG	Average overvoltage at DC input.
3	SE_VPV2_MAX_INST	Instantaneous overvoltage at DC input 2.
4	SE_VPV2_MAX_AVG	Average overvoltage at DC input 2.
5	SE_IDC1_MAX_INST	Instantaneous overcurrent at DC input 1.
6	SE_IDC1_MAX_AVG	Average overcurrent at DC input 1.
7	SE_IDC2_MAX_INST	Instantaneous overcurrent at DC input 2.
8	SE_IDC2_MAX_AVG	Average overcurrent at DC input 2.
9	SE_VBUS_MAX_INST	Instantaneous inverter Vbus overvoltage.
10	SE_VBOOST_MAX_INST	Instantaneous boost high frequency half bridge overvoltage.
11	SE_VAC1_MAX_INST	Instantaneous Overvoltage at Vac1
12	SE_VAC2_MAX_INST	Instantaneous Overvoltage at Vac2
13	SE_VAC3_MAX_INST	Instantaneous Overvoltage at Vac3
14	SE_VAC1_RMS_HH	Vac1 Rms value higher than HH limit
15	SE_VAC1_RMS_H	Vac1 Rms value higher than H limit
16	SE_VAC1_RMS_L	Vac1 Rms value lower than L limit
17	SE_VAC1_RMS_LL	Vac1 Rms value lower than LL limit
18	SE_VAC2_RMS_HH	Vac2 Rms value higher than HH limit
19	SE_VAC2_RMS_H	Vac2 Rms value higher than H limit
20	SE_VAC2_RMS_L	Vac2 Rms value lower than L limit
21	SE_VAC2_RMS_LL	Vac2 Rms value lower than LL limit
22	SE_VAC3_RMS_HH	Vac3 Rms value higher than HH limit
23	SE_VAC3_RMS_H	Vac3 Rms value higher than H limit
24	SE_VAC3_RMS_L	Vac3 Rms value lower than L limit
25	SE_VAC3_RMS_LL	Vac3 Rms value lower than LL limit
26	SE_IAC1_MAX_INST	Instantaneous Iac1 overcurrent.
27	SE_IAC2_MAX_INST	Instantaneous Iac2 overcurrent.
28	SE_IAC3_MAX_INST	Instantaneous Iac3 overcurrent.
29	SE_IAC1_RMS	Iac1 Rms value out of range.
30	SE_IAC2_RMS	Iac2 Rms value out of range.
31	SE_IAC3_RMS	Iac3 Rms value out of range.
32	SE_FAC1_HH	Fac1 value higher than HH limit
33	SE_FAC1_H	Fac1 value higher than H limit
34	SE_FAC1_L	Fac1 value lower than L limit
35	SE_FAC1_LL	Fac1 value lower than LL limit
36	SE_FAC2_HH	Fac2 value higher than HH limit
37	SE_FAC2_H	Fac2 value higher than H limit

38	SE_FAC2_L	Fac2 value lower than L limit
39	SE_FAC2_LL	Fac2 value lower than LL limit
40	SE_FAC3_HH	Fac3 value higher than HH limit
41	SE_FAC3_H	Fac3 value higher than H limit
42	SE_FAC3_L	Fac3 value lower than L limit
43	SE_FAC3_LL	Fac3 value lower than LL limit
44	SE_PWM_BOOST1_FAULT	PWM fault at boost number 1
45	SE_PWM_BOOST2_FAULT	PWM fault at boost number 2
46	SE_PWM_HALF_BRIDGE_FAULT	PWM fault at high frequency DC/DC half bridge
47	SE_PWM_INV_L1_FAULT	PWM fault at full bridge inverter leg number 1
48	SE_PWM_INV_L2_FAULT	PWM fault at full bridge inverter leg number 2
49	SE_PWM_INV_L3_FAULT	PWM fault at full bridge inverter leg number 3
50	SE_HW_BOOST1_FAULT	Hardware fault alarm at boost number 1
51	SE_HW_BOOST2_FAULT	Hardware fault alarm at boost number 2
52	SE_HW_HALF_BRIDGE_FAULT	Hardware fault alarm at high frequency half bridge switch
53	SE_HW_INV_O1_FAULT	Hardware fault alarm at full bridge inverter leg number 1
54	SE_HW_INV_O2_FAULT	Hardware fault alarm at full bridge inverter leg number 2
55	SE_HW_INV_O3_FAULT	Hardware fault alarm at full bridge inverter leg number 3
56	SE_HIGH_INTERNAL_TEMP	High Internal temperature alarm
57	SE_HIGH_SINK_TEMP	High Sink temperature alarm
58	SE_LOW_INTERNAL_TEMP	Low Internal temperature alarm
59	SE_LOW_SINK_TEMP	Low Sink temperature alarm
60	SE_GRID_POWER_CONSUMPTION	Time established to be consuming from the grid overpassed.
61	SE_LOW_POWER_TO_CONNECT	Low power to connect the unit to the grid.
62	SE_FATAL_ERROR	Fatal error is the event of continuous occurrences of errors.
63	SE_LOCAL_MANUAL_STOP	Manual Stop state event produced in local mode.
64	SE_MANUAL_STOP_BY_COMMS	Manual Stop state event produced by communication and configured.
65	SE_PWM_FAULT_UNKNOWN	
66	SE_VBUS_MAX_AVG	Average Inverter Vbus average value high.
67	SE_VBOOST_MAX_AVG	Average boost high frequency average voltage value high.
68	SE_RCD_SW_MAX_INST	Instantaneous RCD software overcurrent.
69	SE_RCD_HW_MAX_INST	Instantaneous RCD hardware overcurrent.
70	SE_RCD_SW_MAX_RMS	Full RMS RCD software overcurrent.
71	SE_MVBUS_MAX_INST	Instantaneous Medium Vbus (Positive Vbus – Negative Vbus) overvoltage.
72	SE_HIGH_INV1_TEMP	High temperature alarm phase 1.
73	SE_HIGH_BOOST1_TEMP	High boost 1 module temperature alarm.
74	SE_HIGH_BOOST2_TEMP	High boost 2 module temperature alarm.
75	SE_HW_EXPIO_ERROR	IO expander communications errors.
76	SE_HW_DAC_ERROR	Digital to Analog Converter communications errors.
77	SE_RELAY_EXT_ERROR	External relay error detected.
78	SE_RELAY_INT_ERROR	Internal relay error detected.
79	SE_DSP_FW_UPDATE_SD	DSP FW Update petition through SD Card

80	SE_DSP_FW_UPDATE_MB	DSP FW Update petition through Modbus
81	SE_HW_RCD_ERROR	Residual current detector error. The test was failed.
82	SE_RCD_SW_MAX_INC	Incremental RCD software overcurrent
83	SE_VBUS_POS_MAX_INST	Instantaneous inverter Positive to Neutral Vbus overvoltage.
84	SE_VBUS_NEG_MAX_INST	Instantaneous inverter Neutral to Negative Vbus overvoltage.
85	SE_VBUS_MIN_AVG	Average Inverter Vbus value low
86	SE_VAC1_MAX_SLOPE	Maximum VAC1 slope has been detected.
87	SE_VAC2_MAX_SLOPE	Maximum VAC2 slope has been detected.
88	SE_VAC3_MAX_SLOPE	Maximum VAC3 slope has been detected.
89	SE_HIGH_INV2_TEMP	High temperature alarm phase 2.
90	SE_HIGH_INV3_TEMP	High temperature alarm phase 3.
91	SE_HIGH_TEMP_INSIDE_ANB_TEMP	Overtemperature in Inside Ambient
92	SE_HIGH_TEMP_OUTSIDE_ANB_TEMP	Overtemperature in Outside Ambient
93	SE_HIGH_TEMP_INDUCT	Overtemperature in Induct
94	SE_AC_CONTACTOR	AC Contactor failure.
95	SE_DC_CONTACTOR	DC Contactor failure.
96	SE_AC_SWITCH	AC Switch failure.
97	SE_SURGE_ARRESTOR	AC Switch failure.
98	SE_PHASE_R_BLOWER_FAIL	Phase R Blower Failure
99	SE_PHASE_S_BLOWER_FAIL	Phase S Blower Failure
100	SE_PHASE_T_BLOWER_FAIL	Phase T Blower Failure
101	SE_AC_PRECHARGE	Failure on the AC Precharge
102	SE_VENT_BOARD_FAILURE	Failure on the ventilation electronic board
103	SE_INDUCTOR_BLOWER	Failure on the Inductor Blower.
104	SE_INTERCOOLER_SYS	Failure on the Intercooler Sys.
105	SE_ELECTRON_SUPP_15D	Electronic Boards 15Drivers Supply Failure.
106	SE_ELECTRON_SUPP_24	Electronic Boards 24 Supply Failure.
107	SE_ELECTRON_SUPP_15C	Electronic Boards 15Control Supply Failure.
108	SE_ELECTRON_SUPP_5C	Electronic Boards 5Control Supply Failure.
109	SE_IAC0_MAX_AVG	Homopolar average current value higher than limit.
110	SE_CONFIG_MOD	To be updated or extended
111	SE_IRD_ABS	Isolation resistance failure.
112	SE_FIRM_WM_CHANGED	Working Mode has been changed
113	SE_ISLAND_SAT_MAX	Overflow in Iac saturation limit
114	SE_LOW_VDC_INPUT	Low input DC voltage
115	SE_VAC1_RMS_HAVG	Vac1 Rms moving window average value higher than H limit
116	SE_VAC2_RMS_HAVG	Vac2 Rms moving window average value higher than H limit
117	SE_VAC3_RMS_HAVG	Vac3 Rms moving window average value higher than H limit
118	SE_BURNING_BLOCK	Inverter disconnect during burning test
119	SE_GRID_POWER_CONSUM_INST	Instantaneous grid power consumption overpassed.
120	SE_INCORRECT_SERIAL_NUMBER	Incorrect Serial Number
121	SE_ARC_DISCHARGE_PV1	Arc Discharge in photovoltaic field 1 detected
122	SE_ARC_DISCHARGE_PV2	Arc Discharge in photovoltaic field 2 detected

123	SE_PWM_PHASE_R_MISWIRED	Misswired the Optic Fiber of Phase R
124	SE_PWM_PHASE_S_MISWIRED	Misswired the Optic Fiber of Phase S
125	SE_PWM_PHASE_T_MISWIRED	Misswired the Optic Fiber of Phase T
126	SE_OVER_CURR_PHASE_R	Overcurrent in phase R
127	SE_OVER_CURR_PHASE_S	Overcurrent in phase S
128	SE_OVER_CURR_PHASE_T	Overcurrent in phase T
129	SE_CONTROL_SATURATION	Saturation of the Duty cycle
130	SE_POSITIVE_GROUNDING_FAIL	Positive Grounding Fail
131	SE_NEGATIVE_GROUNDING_FAIL	Negative Grounding Fail
132	SE_VBUS_POS_MAX_AVG	Average inverter Positive to Neutral Vbus overvoltage.
133	SE_VBUS_NEG_MAX_AVG	Average inverter Neutral to Negative Vbus overvoltage.
134	SE_MVBUS_MAX_AVG	Average Medium Vbus (Positive Vbus – Negative Vbus) overvoltage.
135	SE_AUXILIARY_SUPPLY_FAIL	Auxiliary supply failure.
136	SE_FAULT_OF_SYNC	Inverter synchronization failure
137	SE_LVRT_SYSTEM_FAIL	LVRT system failure
138	SE_HW_ADC_OVERSAMP_ERROR	Oversampling interruption error
139	SE_IAC_FILT_1_MAX_INST	Overcurrent in the AC filter 1
140	SE_IAC_FILT_2_MAX_INST	Overcurrent in the AC filter 2
141	SE_CONTACTOR_VENT_ERROR	Ventilation contactor error
142	SE_VBUS_DERIVATE_FAULT	Derivate VBus Fault
143	SE_INTERCOOLER_FAILURE	Fail in the intercooler system.
144	SE_IACFILTER1_RMS	Overcurrent in the filter line R
145	SE_IACFILTER2_RMS	Overcurrent in the filter line S
146	SE_NO_MASTER_FAILURE	No Master connected.
147	SE_MULTIMAST_FAILURE	Multi-master assignation
148	SE_MANUAL_STOP_BY_DI_AUX	Inverter Stop by auxiliary digital input.
149	SE_HIGH_INV4_TEMP	High temperature alarm inverter module 4.
150	SE_HIGH_INV5_TEMP	High temperature alarm inverter module 5.
151	SE_HIGH_INV6_TEMP	High temperature alarm inverter module 6.
152	SE_HW_ADC_IAC1	Hardware error on IAC1 measurement.
153	SE_HW_ADC_IAC2	Hardware error on IAC2 measurement.
154	SE_HW_ADC_IAC3	Hardware error on IAC3 measurement.
155	SE_HW_ADC_VAC1	Hardware error on VAC1 measurement.
156	SE_HW_ADC_VAC2	Hardware error on VAC2 measurement.
157	SE_HW_ADC_VAC3	Hardware error on VAC3 measurement.
158	SE_HW_ADC_IRES	Hardware error on Residual Current measurement.
159	SE_ILEAK_RMS_HH	Homopolar current out of range HH
160	SE_ILEAK_RMS_H	Homopolar current out of range H
161	SE_GNDBOARD_KIT	Hardware error on the Ground board kit
162	SE_MANUAL_STOP_BY_DI_1	Inverter Stop by digital input 1.
163	SE_GNDBOARD_ISOLATION_UNBALANCE	Autotest error on the ground board kit
164	SE_GNDBOARD_DISCHARGE_TIMEOUT	Dicharge timeout error on the ground Board Kit.
165	SE_GNDBOARD_POLE_MISWIR	Misswiring on the ground board kit

166	SE_GNDBOARD_ISOLATION_CURRENT	High Avg isolation current on the ground board kit.
167	SE_GNDBOARD_FUSE_FAULT	Fuse fault on the ground board kit.
168	SE_CPLD_FIRMWARE_VERSION	Incompatible CPLD firmware version.
169	SE_GNDBOARD_ADC_WD	ADC of the Ground Board Kit error.
170	SE_GNDBOARD_DISCH_ENERGY_ISOLATION	High energy during discharge period on the ground board kit.
171	SE_GNDBOARD_DISCH_SC_FUSE_FAULT	Fuse Fault detected during the discharge period.
172	SE_GNDBOARD_HIGH_FREQ_INST_CURRENT	High frequency instantaneous overcurrent
173	SE_GNDBOARD_HIGH_FREQ_TEMP_CURRENT	High frequency temporary overcurrent.
174	SE_HIGH_FREQUENCY_GND_TEMP_CURRENT	High frequency overcurrent. Emergency stop send to inverter from Ground Board Kit
175	SE_CANCOM_INV1_ERROR	CAN Communication Error on the Inverter 1.
176	SE_CANCOM_INV2_ERROR	CAN Communication Error on the Inverter 2.
177	SE_CANCOM_INV3_ERROR	CAN Communication Error on the Inverter 3.
178	SE_CANCOM_INV4_ERROR	CAN Communication Error on the Inverter 4.
179	SE_CANCOM_GNDBOARD_ERROR	CAN Communication Error on the ground board kit.
180	SE_MASTER_POWER_CONSUMPTION	Power Consumption Stop in the Master.
181	SE_MANUAL_STOP_BY_DI_2	Inverter Stop by digital input 2.
182	SE_MANUAL_STOP_BY_DI_3	Inverter Stop by digital input 3.
183	SE_VAC1_MAX_INST_SLOW	Inverter over voltage instantaneous stop
184	SE_VAC2_MAX_INST_SLOW	Inverter over voltage instantaneous stop
185	SE_VAC3_MAX_INST_SLOW	Inverter over voltage instantaneous stop
186	SE_VAC1_MAX_INST_UFAST	Inverter over voltage instantaneous stop
187	SE_VAC2_MAX_INST_UFAST	Inverter over voltage instantaneous stop
188	SE_VAC3_MAX_INST_UFAST	Inverter over voltage instantaneous stop
189	SE_VAC1_RMS_WITHOUT_AVG_MIN	R rms value lower than AC rated minimum voltage.
190	SE_VAC2_RMS_WITHOUT_AVG_MIN	S rms value lower than AC rated minimum voltage.
191	SE_VAC3_RMS_WITHOUT_AVG_MIN	T rms value lower than AC rated minimum voltage.
192	SE_VAC0_RMS_MAX	AC homopolar voltage higher than the limit. KGRID and phase angles have to be checked.
193	SE_VAC1_RMS_WITHOUT_AVG_MAX	The inverter measures voltage between KINT and KGRID and it should not be. KGRID and R voltage probe have to be checked.
194	SE_VAC2_RMS_WITHOUT_AVG_MAX	The inverter measures voltage between KINT and KGRID and it should not be. KGRID and S voltage probe have to be checked.
195	SE_VAC3_RMS_WITHOUT_AVG_MAX	The inverter measures voltage between KINT and KGRID and it should not be. KGRID and T voltage probe have to be checked.
196	SE_VAC1GEN_RMS_MIN	The inverter measures voltage between KINT and KGRID and it should not be. KINT and R voltage probe have to be checked.
197	SE_VAC2GEN_RMS_MIN	The inverter measures voltage between KINT and KGRID and it should not be. KINT and S voltage probe have to be checked.
198	SE_VAC3GEN_RMS_MIN	The inverter measures voltage between KINT and KGRID and it should not be. KINT and T voltage probe have to be checked.

199	SE_VAC1GEN_RMS_MAX	The inverter does not measure voltage between KINT and KGRID and it should be. KINT and R voltage probe have to be checked.
200	SE_VAC2GEN_RMS_MAX	The inverter does not measure voltage between KINT and KGRID and it should be. KINT and S voltage probe have to be checked.
201	SE_VAC3GEN_RMS_MAX	The inverter does not measure voltage between KINT and KGRID and it should be. KINT and T voltage probe have to be checked.
202	SE_STACK_OVERFLOW_ERROR	Overflow in the processor stack
203	SE_VAC12_RMS_WITHOUT_AVG_MAX	The inverter measures voltage between KINT and KGRID and it should not be. KGRID and R_ext, S_ext and N_ext voltage probes have to be checked.
204	SE_VAC23_RMS_WITHOUT_AVG_MAX	The inverter measures voltage between KINT and KGRID and it should not be. KGRID and S_ext, T_ext and N_ext voltage probes have to be checked.
205	SE_VAC31_RMS_WITHOUT_AVG_MAX	The inverter measures voltage between KINT and KGRID and it should not be. KGRID and T_ext, R_ext and N_ext voltage probes have to be checked.
206	SE_VAC12_SUB_VAC12GEN_RMS_MAX	The inverter does not measure voltage between KINT and KGRID and it should be. KINT and R_int and S_int voltage probes have to be checked.
207	SE_VAC23_SUB_VAC23GEN_RMS_MAX	The inverter does not measure voltage between KINT and KGRID and it should be. KINT and S_int and T_int voltage probes have to be checked.
208	SE_VAC31_SUB_VAC31GEN_RMS_MAX	The inverter does not measure voltage between KINT and KGRID and it should be. KINT and T_int and R_int voltage probes have to be checked.
209	SE_VAC12_RMS_MAX	The inverter measures voltage between KINT and KGRID and it should not be. KINT and R_int and S_int voltage probes have to be checked.
210	SE_VAC23_RMS_MAX	The inverter measures voltage between KINT and KGRID and it should not be. KINT and S_int and T_int voltage probes have to be checked.
211	SE_VAC31_RMS_MAX	The inverter measures voltage between KINT and KGRID and it should not be. KINT and T_int and R_int voltage probes have to be checked.
212	SE_VAC12_SUB_VAC12GRID_RMS_WITHOUT_AVG_MAX	The inverter does not measure voltage between KINT and KGRID and it should be. KGRID and R_ext, S_ext N_ext, R_int and S_int voltage probes have to be checked.
213	SE_VAC23_SUB_VAC23GRID_RMS_WITHOUT_AVG_MAX	The inverter does not measure voltage between KINT and KGRID and it should be. KGRID and S_ext, T_ext N_ext, S_int and T_int voltage probes have to be checked.
214	SE_VAC31_SUB_VAC31GRID_RMS_WITHOUT_AVG_MAX	The inverter does not measure voltage between KINT and KGRID and it should be. KGRID and T_ext, R_ext N_ext, T_int and R_int voltage probes have to be checked.
215	SE_DC_PRECHARGE_SYS	DC precharge fault
216	SE_VDC_MEASURES_DIFF_VALUES	Voltages of the PV and Bus are not equal.
217	SE_VBUS_DERIVATIVE_POS_FAULT	Positive Vbus difference
218	SE_SYNC_PWM_PHASE_FAULT	Synchronization Phase fault
219	SE_SYNC_OVERSAMPLING_PERIOD_FAULT	Oversampling Period is out of range
220	SE_IAC_RMS_UNBALANCED	Umbalanced Rms Filter currents.
221	SE_NUM_MAX_OVERCURRENTS	Max num of overcurrent reached.

222	SE_VAC1_RMS_HW_H	Vac1 Rms value higher than HW H limit
223	SE_VAC1_RMS_HW_L	Vac1 Rms value lower than HW L limit
224	SE_VAC2_RMS_HW_H	Vac2 Rms value higher than HW H limit
225	SE_VAC2_RMS_HW_L	Vac2 Rms value lower than HW L limit
226	SE_VAC3_RMS_HW_H	Vac3 Rms value higher than HW H limit
227	SE_VAC3_RMS_HW_L	Vac3 Rms value lower than HW L limit
228	SE_FAC1_HW_H	Fac1 value higher than HW H limit
229	SE_FAC1_HW_L	Fac1 value lower than HW L limit
230	SE_FAC2_HW_H	Fac2 value higher than HW H limit
231	SE_FAC2_HW_L	Fac2 value lower than HW L limit
232	SE_FAC3_HW_H	Fac3 value higher than HW H limit
233	SE_FAC3_HW_L	Fac3 value lower than HW L limit
234	SE_AUTORESET_INIT	After DSP initialization, a reset is forced
235	SE_HW_INV_O1_FAULT_OVERCURRENT	IGBT fault and overcurrent in phase R
236	SE_HW_INV_O2_FAULT_OVERCURRENT	IGBT fault and overcurrent in phase S
237	SE_HW_INV_O3_FAULT_OVERCURRENT	IGBT fault and overcurrent in phase T
238	SE_WATCHDOG_EMSPANT	EMS plant controller watch dog time ended
239	SE_VAC1_RMS_HHH	Vac1 value higher than HHH limit
240	SE_VAC1_RMS_LLL	Vac1 value lower than LLL limit
241	SE_VAC2_RMS_HHH	Vac2 value higher than HHH limit
242	SE_VAC2_RMS_LLL	Vac2 value lower than LLL limit
243	SE_VAC3_RMS_HHH	Vac3 value higher than HHH limit
244	SE_VAC3_RMS_LLL	Vac3 value lower than LLL limit
245	SE_FAC1_HHH	Fac1 value higher than HHH limit
246	SE_FAC1_LLL	Fac1 value lower than LLL limit
247	SE_FAC2_HHH	Fac2 value higher than HHH limit
248	SE_FAC2_LLL	Fac2 value lower than LLL limit
249	SE_FAC3_HHH	Fac3 value higher than HHH limit
250	SE_FAC3_LLL	Fac3 value lower than LLL limit
251	SE_PLL_NO_OK	PLL not synchronized with grid frequency
252	SE_GRID_POWER_CONSUMPTION_ISOLATION	Isolation failure with very low output power
253	SE_INTERNAL_TEMP_UNBALANCED	Difference between highest and lowest phase temperature out of limits
254	SE_HIGH_TEMPERATURE_INCREMENT	Difference between highest phase temperature and ambient temperature out of limits
255	SE_HW_ADC_IDC1	Hardware error on IDC1 measurement.
256	SE_BATTERY_CONTACTOR_FAIL	Extern battery contactor fail.
257	SE_AC_CONTACTOR_MVSG_TRIGGER	Medium voltage switch gear trigger.
258	SE_MANUAL_STOP_CUSTOMER_DI	External stop by customer digital input
259	SE_CAN_CONFIG_ERROR	Smart CAN kit configuration is wrong
260	SE_MAX_OVERCURRENTS_IGBT_CUTOFF	Overcurrent persist after stop switching
261	SE_INTERCOOLER_SYS_FAN1	Fan 1 of Intercooler is not working
262	SE_INTERCOOLER_SYS_FAN2	Fan 2 of Intercooler is not working
263	SE_IACFILTER3_RMS	Overcurrent in the filter line T
264	SE_IACFILTER_FUS	AC filter current measure is zero. Any fuses is broken

265	SE_IGBTS_NTC_MEAS_BOARD_SYNC_FAIL	NTC measure board hardware fault
266	SE_OVERTEMP_NTC_IGBT_PHASE_R	Maximum over-temperature in phase R NTC
267	SE_OVERTEMP_NTC_IGBT_PHASE_S	Maximum over-temperature in phase S NTC
268	SE_OVERTEMP_NTC_IGBT_PHASE_T	Maximum over-temperature in phase T NTC
269	SE_REMOTE_MANUAL_STOP	Manual Stop state event produced in remote mode.
270	SE_REMOTE_MANUAL_E_STOP	Manual Emergency Stop state event produced in remote mode.
271	SE_DELTATEMP_IGBT_NTC_SINK_PHASE_R	Maximum temperature increment in phase R NTC
272	SE_DELTATEMP_IGBT_NTC_SINK_PHASE_S	Maximum temperature increment in phase S NTC
273	SE_DELTATEMP_IGBT_NTC_SINK_PHASE_T	Maximum temperature increment in phase T NTC
274	SE_VAC_RMS_HIGH_OFFGRID	VAC voltage is reading in OFF grid inverters
275	SE_AC_ISOLATION_FAULT	AC side isolation fault

2.4 Warning Event (WE)

The occurrence of an event to be warned or a warning event is such that the unit is not able (or will not be able in a near future) to function at the maximum power. A warning event will be highlighted by the blinking of the orange led and the corresponding bit code in the warning code.

2.5 Alarms and Stop Events resume table

In the Table 6 all alarms are defined with their meaning and the associated unified text.

Each alarm has also associated a plant controller or monitoring System Event, each event consists of three different fields that are used to determine the severity of the alarm, the origin and also the action that might be performed once the alarm takes place.

The remote control system developed by Ingeteam **ISMonitor** will use this information to decide if is necessary to call the technical support center. Tables from Table 1 Table 5 describe that information.

Level	Warning	Error Level1	Error Level2	Comm	Cfg
Code	0x100	0x200	0x300	0x400	0x500
Description	Warning: The device has an issue but can work properly. It requires a revision.	Error: The device has an issue and may fail. Requires a revision as soon as possible.	Continuous: The device is stopped. Revision is absolutely necessary	Communication error: A communication error has happened. The comms have to be checked.	The system is misconfigured. This alarm is related with EMS facilities.

Table 1: Ingeteam Plant Controller Levels description

Origin	Comm Board	Inv	Bat	Watt	Plant
Code	0x100	0x200	0x300	0x400	0x500
Description	Communication Boards	Inverter	Batteries	Wattmeter This origin is related with EMS facilities.	Plant (General Error)

Table 2: Ingeteam Plant Controller Origins description

Email and App Notification lap time	Time	Frequency	Immediately	No
Code	1h	Freq	Inme	no
Description	Alarm duration	Alarm's number of times during a day (5 times)	Immediately	No user notification

Table 3: Ingeteam Plant Controller User notification description

Minimal User level for notification and visualization	Client	Installer	Ingeteam
Code	1	2	3

Table 4: Minimal user level notification and visualization

Action required	None	Rem	Asis		
Code	0x100	0x200	0x300		
Description	Not required	Remote action (issue can be solved remotely)	Technical Service Action required.		

Table 5: Ingeteam Plant Controller Action required description

ALARMS						STOP EVENTS						
n	FW Definition	Display Text	Bit Code 1	LED	Description	n	Fw Definition	Level	Origin	Not	User level	Act.
1	AL_CODE1_VDC1_MAX	Vdc1 overvoltage	0x0001	Orange 6	Overvoltage at DC input number 1.	1	SE_VPV1_MAX_INST	0x200	0x500	1h	2	0x300
						2	SE_VPV1_MAX_AVG					
						256	SE_BATTERY_CONTACTOR_FAIL					
2	AL_CODE1_VDC2_MAX	Vdc2 overvoltage	0x0002	Orange 6	Overvoltage at DC input number 2.	3	SE_VPV2_MAX_INST	0x200	0x500	1h	2	0x300
						4	SE_VPV2_MAX_AVG					
						216	SE_VDC_MEASURES_DIFF_VALUES					
3	AL_CODE1_IDC1_MAX	Idc1 overcurrent	0x0004	Red 1	Overcurrent at DC input number 1.	5	SE_IDC1_MAX_INST	0x200	0x200	1h	1	0x200
						6	SE_IDC1_MAX_AVG					
4	AL_CODE1_IDC2_MAX	Idc2 overcurrent	0x0008	Red 1	Overcurrent at DC input number 2.	7	SE_IDC2_MAX_INST	0x200	0x200	1h	1	0x200
						8	SE_IDC2_MAX_AVG					
						159	SE_ILEAK_RMS_HH					
						160	SE_ILEAK_RMS_H					
5	AL_CODE1_VDCLINK_MAX	Vbus overvoltage	0x0010	Red 2	Internal unit DC link voltage out of range	9	SE_VBUS_MAX_INST	0x200	0x200 0x500	1h	3	0x200 0x300
						10	SE_VBOOST_MAX_INST					
						66	SE_VBUS_MAX_AVG					
						85	SE_VBUS_MIN_AVG					
						67	SE_VBOOST_MAX_AVG					
						71	SE_MVBUS_MAX_INST					
						83	SE_VBUS_POS_MAX_INST					
						84	SE_VBUS_NEG_MAX_INST					
						216	SE_VDC_MEASURES_DIFF_VALUES					
6 7	AL_CODE1_VAC_MAX_INST AL_CODE1_VAC_RMS	Inst. Vac overvolt. Vac out of range	0x0020 0x0040	Orange 2 Orange 2	Instantaneous Overvoltage at the AC output.	11	SE_VAC1_MAX_INST	0x200	0x500	No	-	0x300
						12	SE_VAC2_MAX_INST					
						13	SE_VAC3_MAX_INST					
						86	SE_VAC1_MAX_SLOPE					
						87	SE_VAC2_MAX_SLOPE					
						88	SE_VAC3_MAX_SLOPE					
						183	SE_VAC1_MAX_INST_SLOW					

						184	SE_VAC2_MAX_INST_SLOW							
						185	SE_VAC3_MAX_INST_SLOW							
						186	SE_VAC1_MAX_INST_UFAST							
						187	SE_VAC2_MAX_INST_UFAST							
						188	SE_VAC3_MAX_INST_UFAST							
					Vac RMS value out of defined range.	14	SE_VAC1_RMS_HH	0x200	0x500	1h	1	0x300		
						15	SE_VAC1_RMS_H							
						16	SE_VAC1_RMS_L							
						17	SE_VAC1_RMS_LL							
						18	SE_VAC2_RMS_HH							
						19	SE_VAC2_RMS_H							
						20	SE_VAC2_RMS_L							
						21	SE_VAC2_RMS_LL							
						22	SE_VAC3_RMS_HH							
						23	SE_VAC3_RMS_H							
						24	SE_VAC3_RMS_L							
						25	SE_VAC3_RMS_LL							
						115	SE_VAC1_RMS_HAVG							
						116	SE_VAC2_RMS_HAVG							
						117	SE_VAC3_RMS_HAVG							
						189	SE_VAC1_RMS_WITHOUT_AVG_MIN							
						190	SE_VAC2_RMS_WITHOUT_AVG_MIN							
						191	SE_VAC3_RMS_WITHOUT_AVG_MIN							
						192	SE_VAC0_RMS_MAX							
						193	SE_VAC1_RMS_WITHOUT_AVG_MAX							
					194	SE_VAC2_RMS_WITHOUT_AVG_MAX								
					195	SE_VAC3_RMS_WITHOUT_AVG_MAX								
					196	SE_VAC1GEN_RMS_MIN								
					197	SE_VAC2GEN_RMS_MIN								
					198	SE_VAC3GEN_RMS_MIN								
					199	SE_VAC1GEN_RMS_MAX								
					200	SE_VAC2GEN_RMS_MAX								

						201	SE_VAC3GEN_RMS_MAX						
						203	SE_VAC12_RMS_WITHOUT_AVG_MAX						
						204	SE_VAC23_RMS_WITHOUT_AVG_MAX						
						205	SE_VAC31_RMS_WITHOUT_AVG_MAX						
						206	SE_VAC12_SUB_VAC12GEN_RMS_MAX						
						207	SE_VAC23_SUB_VAC23GEN_RMS_MAX						
						208	SE_VAC31_SUB_VAC31GEN_RMS_MAX						
						209	SE_VAC12_RMS_MAX						
						210	SE_VAC23_RMS_MAX						
						211	SE_VAC31_RMS_MAX						
						212	SE_VAC12_SUB_VAC12GRID_RMS_WITHOUT_AVG_MAX						
						213	SE_VAC23_SUB_VAC23GRID_RMS_WITHOUT_AVG_MAX						
						214	SE_VAC31_SUB_VAC31GRID_RMS_WITHOUT_AVG_MAX						
						222	SE_VAC1_RMS_HW_H						
						223	SE_VAC1_RMS_HW_L						
						224	SE_VAC2_RMS_HW_H						
						225	SE_VAC2_RMS_HW_L						
						226	SE_VAC3_RMS_HW_H						
						227	SE_VAC3_RMS_HW_L						
						239	SE_VAC1_RMS_HHH						
						240	SE_VAC1_RMS_LLL						
						241	SE_VAC2_RMS_HHH						
						242	SE_VAC2_RMS_LLL						
						243	SE_VAC3_RMS_HHH						
						244	SE_VAC3_RMS_LLL						
						274	SE_VAC_RMS_HIGH_OFFGRID						
8	AL_CODE1_IAC_MAX_INST	Inst. Iacovercur.	0x0080	Red 1	Instantaneous output current.	26	SE_IAC1_MAX_INST	0x200	0x200	1h	1	0x200	
						27	SE_IAC2_MAX_INST						
						28	SE_IAC3_MAX_INST						
						221	SE_NUM_MAX_OVERCURRENTS						
						260	SE_MAX_OVERCURRENTS_IGBT_CUTOFF						
9	AL_CODE1_IAC_MAX_RMS	Iac out of range	0x0100	Red 1		29	SE_IAC1_RMS	0x200	0x200	No	-	0x200	

					iac RMS value out of defined range.	30	SE_IAC2_RMS						
						31	SE_IAC3_RMS						
						144	SE_IACFILTER1						
						145	SE_IACFILTER2						
						263	SE_IACFILTER3						
10	AL_CODE1_FAC	Fac out of range	0x0200	Orange 3	AC grid Frequency value out of defined range.	32	SE_FAC1_HH	0x200	0x500	1h	1	0x300	
						33	SE_FAC1_H						
						34	SE_FAC1_L						
						35	SE_FAC1_LL						
						36	SE_FAC2_HH						
						37	SE_FAC2_H						
						38	SE_FAC2_L						
						39	SE_FAC2_LL						
						40	SE_FAC3_HH						
						41	SE_FAC3_H						
						42	SE_FAC3_L						
						43	SE_FAC3_LL						
						228	SE_FAC1_HW_H						
						229	SE_FAC1_HW_L						
						230	SE_FAC2_HW_H						
						231	SE_FAC2_HW_L						
						232	SE_FAC3_HW_H						
						233	SE_FAC3_HW_L						
						245	SE_FAC1_HHH						
						246	SE_FAC1_LLL						
247	SE_FAC2_HHH												
248	SE_FAC2_LLL												
249	SE_FAC3_HHH												
250	SE_FAC3_LLL												
251	SE_PLL_NO_OK												
11	AL_CODE1_PWM_DC_DC_FAULT	DC/DC pwm fault	0x0400	Red 3	PWM Fault at DC/DC Converter stage.	44	SE_PWM_BOOST1_FAULT	0x200	0x200	1h	1	0x300	
						45	SE_PWM_BOOST2_FAULT						

						46	SE_PWM_HALF_BRIDGE_FAULT						
12	AL_CODE1_PWM_DC_AC_FAULT	DC/AC pwm fault	0x0800	Red 3	PWM Fault at DC/AC Converter stage.	47	SE_PWM_INV_L1_FAULT	0x200	0x200	1h	1	0x300	
						48	SE_PWM_INV_L2_FAULT						
						49	SE_PWM_INV_L3_FAULT						
						65	SE_HW_PWM_FAULT_UNKNOWN						
13	AL_CODE1_HW_DC_DC_FAULT	DC/DC hw fault	0x1000	Red 3	Hardware Fault at DC/DC Converter stage.	50	SE_HW_BOOST1_FAULT	0x200	0x200	1h	1	0x300	
						51	SE_HW_BOOST2_FAULT						
						52	SE_HW_HALF_BRIDGE_FAULT						
						142	SE_VBUS_DERIVATIVE_FAULT						
217	SE_VBUS_DERIVATIVE_POS_FAULT												
14	AL_CODE1_HW_DC_AC_FAULT	DC/AC hw fault	0x2000	Red 3	Hardware Fault at DC/AC Converter stage.	53	SE_HW_INV_O1_FAULT	0x200	0x200	1h	1	0x300	
						54	SE_HW_INV_O2_FAULT						
						55	SE_HW_INV_O3_FAULT						
15	AL_CODE1_TEMPERATURE	Temperature alarm	0x4000	Orange 4	Temperature out of defined operative range.	56	SE_HIGH_INTERNAL_TEMP	0x100	0x200	No	-	0x200	
						57	SE_HIGH_SINK_TEMP						
						58	SE_LOW_INTERNAL_TEMP						
						59	SE_LOW_SINK_TEMP						
						72	SE_HIGH_INV1_TEMP						
						73	SE_HIGH_BOOST1_TEMP						
						74	SE_HIGH_BOOST2_TEMP						
						89	SE_HIGH_INV2_TEMP						
						90	SE_HIGH_INV3_TEMP						
						149	SE_HIGH_INV4_TEMP						
						150	SE_HIGH_INV5_TEMP						
						151	SE_HIGH_INV6_TEMP						
253	SE_INTERNAL_TEMP_UNBALANCED												
254	SE_HIGH_TEMPERATURE_INCREMENT												
16	AL_CODE1_FATAL_ERROR	Fatal error	0x8000	Red Fix	Fatal Error for continuous error.	62	SE_FATAL_ERROR	0x300	0x200	Inme	3	0x300	

n	FW Definition	Display Text	Bit Code 2	LED	Description	n	Fw Definition	Level	Origin	Not	User level	Act.
17	AL_CODE2_MANUAL_STOP	Manual stop	0x0001	Orange Fix		63	SE_LOCAL_MANUAL_STOP	0x100	0x200	No	-	0x200
						64	SE_MANUAL_STOP_BY_COMMS					
						148	SE_MANUAL_STOP_BY_DI_AUX					
						162	SE_MANUAL_STOP_BY_DI_1					
						181	SE_MANUAL_STOP_BY_DI_2					
						182	SE_MANUAL_STOP_BY_DI_3					
						258	SE_MANUAL_STOP_CUSTOMER_DI					
						269	SE_REMOTE_MANUAL_STOP					
						270	SE_REMOTE_MANUAL_E_STOP					
18	AL_CODE2_HW_ERROR	Hardware error	0x0002	Red 1	Hardware Error	65	SE_PWM_FAULT_UNKNOWN	0x200	0x200	1h	1	0x300
						75	SE_HW_EXPIO_ERROR					
						76	SE_HW_DAC_ERROR					
						77	SE_RELAY_EXT_ERROR					
						78	SE_RELAY_INT_ERROR					
						81	SE_HW_RCD_ERROR					
						112	SE_FIRM_WM_CHANGED					
						120	SE_INCORRECT_SERIAL_NUMBER					
						138	SE_HW_ADC_OVERSAMP_ERROR					
						152	SE_HW_ADC_IAC1					
						153	SE_HW_ADC_IAC2					
						154	SE_HW_ADC_IAC3					
						155	SE_HW_ADC_VAC1					
						156	SE_HW_ADC_VAC2					
						157	SE_HW_ADC_VAC3					
						158	SE_HW_ADC_IRES					
						168	SE_CPLD_FIRMWARE_VERSION					
216	SE_VDC_MEASURES_DIFF_VALUES											
202	SE_STACK_OVERFLOW_ERROR											
255	SE_HW_ADC_IDC1											
264	SE_IACFILTER_FUS											

						265	SE_IGBTS_NTC_MEAS_BOARD_SYNC_FAIL						
19	AL_CODE2_RCD_MAX	Residual current	0x0004	Orange 5	Residual current.	68	SE_RCD_SW_MAX_INST	0x200	0x500	1h	1	0x300	
						69	SE_RCD_HW_MAX_INST						
						70	SE_RCD_SW_MAX_RMS						
						82	SE_RCD_SW_MAX_INC						
20	AL_CODE2_FW_UPDATE	FW update	0x0008	Orange Fix	FW Update petition	79	SE_DSP_FW_UPDATE_SD	0x100	0x200	No	-	0x100	
						80	SE_DSP_FW_UPDATE_MB						
21	AL_CODE2_GRID_POWER_CONSUMPTION	Low PV power	0x0010	Orange 1	High Grid Power Consumption level.	60	SE_GRID_POWER_CONSUMPTION	0x100	0x500	No	-	0x100	
						119	SE_GRID_POWER_CONSUM_INST						
						180	SE_MASTER_POWER_CONSUMPTION						
						252	SE_GRID_POWER_CONSUMPTION_ISOLATION						
22	AL_CODE2_LOW_POWER_TO_CONNECT	Low PV power to conn.	0x0020	Orange 1	Low Input power to connect to grid.	61	SE_LOW_POWER_TO_CONNECT	0x100	0x500	No	-	0x100	
23	AL_CODE2_OVERTEMP_PHASE_1	Phase R overtemp	0x0040	Red, 5	Over temperature in Phase 1 Heatsink	72	SE_HIGH_INV1_TEMP	0x100	0x500	1min	2	0x200	
						266	SE_OVERTEMP_NTC_IGBT_PHASE_R						
						271	SE_DELTATEMP_IGBT_NTC_SINK_PHASE_R						
24	AL_CODE2_OVERTEMP_PHASE_2	Phase S overtemp	0x0080	Red, 5	Over temperature in Phase 2 Heatsink	89	SE_HIGH_INV2_TEMP	0x100	0x500	1min	2	0x200	
						267	SE_OVERTEMP_NTC_IGBT_PHASE_S						
						272	SE_DELTATEMP_IGBT_NTC_SINK_PHASE_S						
25	AL_CODE2_OVERTEMP_PHASE_3	Phase T overtemp	0x0100	Red, 5	Over temperature in Phase 3 Heatsink	90	SE_HIGH_INV3_TEMP	0x100	0x500	1min	2	0x200	
						268	SE_OVERTEMP_NTC_IGBT_PHASE_T						
						273	SE_DELTATEMP_IGBT_NTC_SINK_PHASE_T						
26	AL_CODE2_OVERTEMP_INSIDE_AMB	Converter overtemp	0x0200	Red, 5	Over temperature in Inside Ambient	91	SE_HIGH_TEMP_INSIDE_ANB_TEMP	0x100	0x500	1min	2	0x200	
27	AL_CODE2_OVERTEMP_OUTSIDE_AMB	Ambienteovertemp	0x0400	Red, 5	Over temperature in Outside Ambient	92	SE_HIGH_TEMP_OUTSIDE_ANB_TEMP	0x100	0x500	No	-	0x200	
28	AL_CODE2_OVERTEMP_INDUCTOR	Inductorovertemp	0x0800	Red, 1	Over temperature in Inductor	93	SE_HIGH_TEMP_INDUCT	0x100	0x500	1min	2	0x200	
29	AL_CODE2_FAULT_PHASE_1	Phase R electronics	0x1000	Red, 1	Fault on Phase 1 of Inverter Bridge	53	SE_HW_INV_O1_FAULT	0x200	0x200	5x/24h	3	0x300	
						235	SE_HW_INV_O1_FAULT_OVERCURRENT						
30	AL_CODE2_FAULT_PHASE_2	Phase S electronics	0x2000	Red, 1	Fault on Phase 2 of Inverter Bridge	54	SE_HW_INV_O2_FAULT	0x200	0x200	5x/24h	3	0x300	
						236	SE_HW_INV_O2_FAULT_OVERCURRENT						
31	AL_CODE2_FAULT_PHASE_3	Phase T electronics	0x4000	Red, 1	Fault on Phase 3 of Inverter Bridge	55	SE_HW_INV_O3_FAULT	0x200	0x200	5x/24h	3	0x300	
						237	SE_HW_INV_O3_FAULT_OVERCURRENT						
32	AL_CODE2_OVERCURRENT_1	Phase R overcurrent	0x8000	Red, 1		26	SE_IAC1_MAX_INST	0x200	0x200	5x/24h	3	0x200	

					Overcurrent on Phase 1 of inverter bridge	126	SE_OVER_CURR_PHASE_R					
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n	FW Definition	Display Text	Bit Code 3	LED	Description	n	Fw Definition	Level	Origin	Not	User level	Act.
33	AL_CODE3_OVERCURRENT_2	Phase S overcurrent	0x0001	Red 1	Overcurrent on Phase 2 of inverter bridge	27	SE_IAC2_MAX_INST	0x200	0x200	5x/24h	3	0x200
						127	SE_OVER_CURR_PHASE_S					
34	AL_CODE3_OVERCURRENT_3	Phase T overcurrent	0x0002	Red 1	Overcurrent on Phase 3 of inverter bridge	28	SE_IAC3_MAX_INST	0x200	0x200	5x/24h	3	0x200
						128	SE_OVER_CURR_PHASE_T					
35	AL_CODE3_AC_CONTACTOR	AC contactor fault	0x0004	Red 4	Fault produced on the AC Contactor	94	SE_AC_CONTACTOR	0x200	0x200	Inme	2	0x300
						257	SE_AC_CONTACTOR_MVSG_TRIGGER					
36	AL_CODE3_DC_CONTACTOR	DC contactor fault	0x0008	Red 4	Fault produced on the DC Contactor	95	SE_DC_CONTACTOR	0x200	0x200	Inme	2	0x300
37	AL_CODE3_AC_SWITCH	AC protection	0x0010	Red 4	Fault produced on the AC Switch	96	SE_AC_SWITCH	0x200	0x200	Inme	2	0x300
38	AL_CODE3_SURGE_ARREST	Surge arrester Fault	0x0020	Red 4	Fault produced on the Surge Arrestors	97	SE_SURGE_ARRESTOR	0x200	0x200	Inme	2	0x300
39	AL_CODE3_PHASE_R_BLOWER	Phase R blower	0x0040	Red 5	Fault produced on the Phase R Blower	98	SE_PHASE_R_BLOWER_FAIL	0x200	0x200	Inme	2	0x300
40	AL_CODE3_PHASE_S_BLOWER	Phase S blower	0x0080	Red 5	Fault produced on the Phase S Blower	99	SE_PHASE_S_BLOWER_FAIL	0x200	0x200	Inme	2	0x300
41	AL_CODE3_PHASE_T_BLOWER	Phase T blower	0x0100	Red 5	Fault produced on the Phase T Blower	100	SE_PHASE_T_BLOWER_FAIL	0x200	0x200	Inme	2	0x300
42	AL_CODE3_AC_PRECHARGE_SYS	Fault AC prech.	0x0200	Red 5	Fault produced on the AC Precharge System	101	SE_AC_PRECHARGE	0x200	0x200	5x/24h	3	0x300
						215	SE_DC_PRECHARGE_SYS	0x200	0x200	5x/24h	3	0x300
43	AL_CODE3_VENT_BOARD	Vent detector board	0x0400	Red 5	Ventilation Electronic Board Failure	102	SE_VENT_BOARD_FAILURE	0x200	0x200	5x/24h	3	0x300
44	AL_CODE3_INDUCTOR_BLOWER	Inductor cooling	0x0800	Red 5	Inductor Blower Failure	103	SE_INDUCTOR_BLOWER	0x200	0x200	Inme	2	0x300
45	AL_CODE3_INTERCOOLER_SYS	Stack cooling	0x1000	Red 5	Intercooler Blower Failure	104	SE_INTERCOOLER_SYS	0x200	0x200	Inme	2	0x300
						141	SE_CONTACTOR_VENT_ERROR					
						141	SE_INTERCOOLER_SYS_FAN1					
						141	SE_INTERCOOLER_SYS_FAN2					
46	AL_CODE3_ELECTRONIC_SUPPLY	Fault elect. supply	0x2000	Red 3	Electronic Boards Supply Failure	105	SE_ELECTRON_SUPP_15D	0x200	0x200	5x/24h	2	0x300
						106	SE_ELECTRON_SUPP_24					
						107	SE_ELECTRON_SUPP_15C					
						108	SE_ELECTRON_SUPP_5C					
47	AL_CODE3_GRID_DC_INJECTION	Idc grid injection	0x4000	Red 3		109	SE_IAC0_MAX_AVG	0x200	0x200	5x/24h	3	0x300
48	AL_CODE3_CONFIG	Config. change	0x8000	Red 1	Configuration Unit modification.	110	SE_CONFIG_MOD	0x100	0x200	No	-	0x200
						234	SE_AUTORESET_INIT					

n	FW Definition	Display Text	Bit Code 4	LED	Description	n	Fw Definition	Level	Origin	Not	User level	Act.
49	AL_CODE4_IRD	Isolation alarm	0x0001	Orange 5	Isolation resistance value out of limits	111	SE_IRD_ABS	0x200	0x500	1h	2	0x300
						275	SE_AC_ISOLATION_FAULT					
50	AL_CODE4_ISLAND_SAT	Iac saturation alarm	0x0002	Orange 5	Overflow in Iac saturation limit.	113	SE_ISLAND_SAT_MAX	0x200	0x500	5x/24h	3	0x200
51	AL_CODE4_LOW_VDC_INPUT	Low Vdc	0x0004	Orange 1	Low input DC voltage	114	SE_LOW_VDC_INPUT	0x100	0x500	No	-	0x200
52	AL_CODE4_BURNING_BLOCK	Factory test	0x0008	Orange Fix	Inverter blocked during the burning test	118	SE_BURNING_BLOCK	N/A	N/A	N/A	-	N/A
53	AL_CODE4_ARC_DISCHARGE	Arc discharge detected	0x0010	Orange 8	Arc discharge detected	121	SE_ARC_DISCHARGE_PV1	0x300	0x500	Inme	2	0x300
						122	SE_ARC_DISCHARGE_PV2					
54	AL_CODE4_CTR_SATURATION	Control saturation	0x0020	Red 1	The control has saturated	129	SE_CONTROL_SATURATION	0x200	0x200	5x/24h	3	0x200
						139	SE_IAC_FILT_1_MAX_INST					
						140	SE_IAC_FILT_2_MAX_INST					
55	AL_CODE4_FAULT_OF_SYNC	Synchronization system failure	0x0040	Red 3	Synchronization Fault	136	SE_FAULT_OF_SYNC	0x300	0x200	Inme	2	0x300
56	AL_CODE4_PH_R_OPT_FIB_MISWIRE	Fiber ph. R misswired	0x0080	Red 3	The optic fiber is misswired in phase R	123	SE_PWM_PHASE_R_MISWIRED	0x300	0x200	Inme	2	0x300
57	AL_CODE4_PH_S_OPT_FIB_MISWIRE	Fiber ph. S misswired	0x0100	Red 3	The optic fiber is misswired in phase S	124	SE_PWM_PHASE_S_MISWIRED	0x300	0x200	Inme	2	0x300
58	AL_CODE4_PH_T_OPT_FIB_MISWIRE	Fiber ph. T misswired	0x0200	Red 3	The optic fiber is misswired in phase T	125	SE_PWM_PHASE_T_MISWIRED	0x300	0x200	Inme	2	0x300
59	AL_CODE4_AUXILIARY_SUPPLY	Aux. supply failure	0x0400	Red 3	Failure on the auxiliary supply system	135	SE_AUXILIARY_SUPPLY_FAIL	0x200	0x200	1h	2	0x300
60	AL_CODE4_LVRT_SYSTEM_FAIL	LVRT system failure	0x0800	Red 3	LVRT system fails to generate voltage	137	SE_LVRT_SYSTEM_FAIL	0x200	0x200	Inme	2	0x300
61	AL_CODE4_CAN_COMM_FAIL	CAN communication fail	0x1000	Red 3	Can communication failure between inverters/devices	146	SE_NO_MASTER_FAILURE	0x400	0x200	5x/24h	2	0x300
						147	SE_MULTIMAST_FAILURE					
						175	SE_CANCOM_INV1_ERROR					
						176	SE_CANCOM_INV2_ERROR					
						177	SE_CANCOM_INV3_ERROR					
						178	SE_CANCOM_INV4_ERROR					
						179	SE_CANCOM_GNDBOARD_ERROR					
						259	SE_CAN_CONFIG_ERROR					
62	AL_CODE4_GNDBOARD_KIT	Ground Board Kit	0x2000	Red 3	Ground Board Kit hardware error	161	SE_GNDBOARD_KIT	0x200	0x200	Inme	2	0x300
						163	SE_GNDBOARD_ISOLATION_UNBALANCE					
						164	SE_GNDBOARD_DISCHARGE_TIMEOUT					
						165	SE_GNDBOARD_POLE_MISWIR					
						166	SE_GNDBOARD_ISOLATION_CURRENT					

						167	SE_GNDBOARD_FUSE_FAULT					
						169	SE_GNDBOARD_ADC_WD					
						170	SE_GNDBOARD_DISCH_ENERGY_ISOLATION					
						171	SE_GNDBOARD_DISCH_SC_FUSE_FAULT					
						172	SE_GNDBOARD_HIGH_FREQ_INST_CURRENT					
						173	SE_GNDBOARD_HIGH_FREQ_TEMP_CURRENT					
						174	SE_HIGH_FREQUENCY_GND_TEMP_CURRENT					
						179	SE_CANCOM_GNDBOARD_ERROR					
63	AL_CODE4_COMMUNICATION_FAIL	Inverter communication fail	0x4000	Red 3	Inverter communication failure	238	SE_WATCHDOG_EMSPLANT	0x200	0x100 0x500	Inme	2	0x300

Table 6: Definition of alarms and Stop events.

2.6 Led management according to alarms

In priority order:

Green Led: (normal operation)

- OFF: Inverter Off.
- ON: Connected to the grid.
- 1 Blink: Conditions are not valid for start the connection process (Low Vdc or alarms).
- 6 Blinks: All the conditions are valid. The inverter is managing time counter before the connection (i.e. 300s after disconnection).

Orange Led: (Installation alarms)

- OFF: No Installation alarms
- ON: Manual Stop or FW Update petition
- 1 Blink: Low power on DC side.
- 2 Blinks: Vac out of range.
- 3 Blinks: Fac out of range.
- 4 Blinks: Temperature alarm.
- 5 Blinks: Isolation failure.
- 6 Blinks: High vdc.
- 7 Blinks: Any warning.
- 8 Blinks: Arc discharge.

Red Led: (Inverter internal alarms)

- OFF: No Inverter internal alarms
- ON: Fatal error.
- 1 Blink: Overcurrent.
- 2 Blinks: Dc link Overvoltage.
- 3 Blinks: Driver or HW Fault.
- 4 Blinks: Error on relays.

Each warning has also associated a plant controller event, each event has three different fields that are used to determine the severity of the warning, the origin and also the action that might be performed once the alarm takes place. The monitoring developed by Ingeteam will use this information to decide if is necessary to call the technical support center.

Warning Code					Plant Controller Event		
Value	LED	FW Definition	Display Text	Description	Level	Orig.	Act.
0x0001	Orange 7	WARNING_FAN_FAULT	Blocked Fan warning	The fan could be blocked	NA	NA	NA
0x0002	Orange 7	WARNING_UNIT_POWER_DERATING_BY_TEMP	Inverter Temperature Power derating.	The unit is in power derating mode due to a high temperature.	Warning	Plant	No
0x0004	Orange 7	WARNING_LOW_TEMP	Low Temperature	The temperature is below the lower limit.	Warning	Plant	No
0x0008	Orange 7	WARNING_HIGH_VDC_AVG	High voltage input		Warning	Plant	No
0x0010	Orange 7	WARNING_STRING_KIT_COMS_ERROR	String kit communications error		Comm	Inv	No

0x0020	Orange 7	WARNING_SELF_CONSUMPTION_COMM_ERROR	Self consumption comm. error	Communication with either EMS home or wattmeter fails	Comm	Plant	No
0x0040	Orange 7	WARNING_SURGE_ARRESTER	Surge arrester error	DC or AC surge arrester needs replacement.	Warning	Inv	No
0x0080	Orange 7	WARNING_LVRT_SYSTEM_FAIL	LVRT_System	LVRT System Failure.	Warning	Inv	No
0x0100	Orange 7	WARNING_ISOLATION	Isolation Fault	Ground fault detection	Warning	Plant	No
0x0200	Orange 7	WARNING_LOW_VDC_INPUT	Low Voltage	Low DC Voltage	Warning	Plant	No
0x0400	Orange 7	WARNING_POWER_CONSUMPTION_WAIT	Pow Consump Wait	Power Consumption Wait.	Warning	Plant	No
0x0800	Orange 7	WARNING_CAN_COM_PERIP_ERRORS	Error in communication	Error in communication	Warning	Plant	No
0x1000	Orange 7	WARNING_FAN_FAULT2	Blocked Fan warning	The fan could be blocked	NA	NA	NA
0x2000	Orange 7	WARNING_COMMPARALLEL_PAC_LIMITATION	Inverter limiting power	Inverter limiting power because difference of power with other inverters connected thorough CAN	NA	NA	NA
0x4000	Orange 7	WARNING_GRID_CONFIGURATION_FAILURE	Default configuration has been overwritten	Default grid configuration has been overwritten. Inverter could connect but country grid configuration has been lost.	Warning	Inv	No
0x8000	Orange 7	WARNING_HIGH_DELTATEMP_PHASES	High temperature difference between phases	More than 10°C temperature difference between hottest and coldest phases	Warning	Inv	No

- 5 Blinks: Error on fans.

2.7 Warnings resume table

A warning is a situation of the unit that requires maintenance, however it does not mean a stop event.

Warning StringKit Code				
Value	LED	FW Definition	Display Text	Description
0x0001	Orange 7	WARNING_UNEXPECTED_IDC_SERIES_1	Unexpected current on series 1	Unexpected current on series 1
0x0002	Orange 7	WARNING_UNEXPECTED_IDC_SERIES_2	Unexpected current on series 2	Unexpected current on series 2
0x0004	Orange 7	WARNING_UNEXPECTED_IDC_SERIES_3	Unexpected current on series 3	Unexpected current on series 3
0x0008	Orange 7	WARNING_UNEXPECTED_IDC_SERIES_4	Unexpected current on series 4	Unexpected current on series 4
0x0010	Orange 7	WARNING_UNEXPECTED_IDC_SERIES_5	Unexpected current on series 5	Unexpected current on series 5
0x0020	Orange 7	WARNING_UNEXPECTED_IDC_SERIES_6	Unexpected current on series 6	Unexpected current on series 6
0x0040	Orange 7	WARNING_UNEXPECTED_IDC_SERIES_7	Unexpected current on series 7	Unexpected current on series 7
0x0080	Orange 7	WARNING_UNEXPECTED_IDC_SERIES_8	Unexpected current on series 8	Unexpected current on series 8
0x0100	Orange 7	WARNING_UNEXPECTED_IDC_SERIES_9	Unexpected current on series 9	Unexpected current on series 9
0x0200	Orange 7	WARNING_UNEXPECTED_IDC_SERIES_10	Unexpected current on series 10	Unexpected current on series 10
0x0400	Orange 7	WARNING_UNEXPECTED_IDC_SERIES_11	Unexpected current on series 11	Unexpected current on series 11
0x0800	Orange 7	WARNING_UNEXPECTED_IDC_SERIES_12	Unexpected current on series 12	Unexpected current on series 12
0x1000	Orange 7	WARNING_UNEXPECTED_IDC_SERIES_13	Unexpected current on series 13	Unexpected current on series 13
0x2000	Orange 7	WARNING_UNEXPECTED_IDC_SERIES_14	Unexpected current on series 14	Unexpected current on series 14
0x4000	Orange 7	WARNING_UNEXPECTED_IDC_SERIES_15	Unexpected current on series 15	Unexpected current on series 15
0x8000	Orange 7	WARNING_UNEXPECTED_IDC_SERIES_16	Unexpected current on series 16	Unexpected current on series 16

3 Inverter standardized variable names

In all documents, software's, displays, etc the names used for the variable names is the same. These unified names are described in next table:

Name	Explanation
Vac	Grid RMS voltage
Vac1	Grid RMS voltage of phase 1
Vac2	Grid RMS voltage of phase 2
Vac3	Grid RMS voltage of phase 3
Iac	Output grid current RMS
Iac1	Output grid RMS current of phase 1
Iac2	Output grid RMS current of phase 2
Iac3	Output grid RMS current of phase 3
Pac	Output active power
Sac	Output apparent power
Qac	Output reactive power
Fac	Grid frequency
Vdc	PV voltage
Vdc1	PV1 voltage
Vdc2	PV2 voltage
Idc	PV current
Idc1	PV1 current
Idc2	PV2 current
Pdc	PV power
Pdc1	PV1 power
Pdc2	PV2 power
CosPhi	Cosine of Phi
Partial Energy	Injected partial energy
Isolation resistance - Riso	Isolation resistance of PV field
Residual current - Ires	Injected Residual current
VnegBus	Negative bus voltage
VposBus	Positive bus voltage
VBus	Bus voltage
VBoost	Boost voltage
TempAc	Temperature of AC side power electronic
TempAc1	Temperature of AC side phase 1 power electronic
TempAc2	Temperature of AC side phase 2 power electronic
TempAc3	Temperature of AC side phase 3 power electronic
TempDc	Temperature of DC side power electronic
TempDc1	Temperature of DC side input 1 power electronic
TempDc2	Temperature of DC side input 2 power electronic
TempPCB	Temperature of printed circuit board (PCB)
TempSink	Sink Temperature
TempCoil	Coil temperature
TempAmb	Ambient temperature

TempStack	Stack temperature
AlarmCode1	Alarm code 1
AlarmCode2	Alarm code 2
AlarmCode3	Alarm code 3
AlarmCode4	Alarm code 4
WarningCode	Warning code
InternalStatus1	Internal status 1
InternalStatus2	Internal status 2
InternalData1	Internal data 1
InternalData2	Internal data 2
InternalData3	Internal data 3
InternalData4	Internal data 4
Istring1	Current of PV string 1
Istring2	Current of PV string 2