REVISION	
REV	DESCRIPTION
C	RELEASE/CHANGE PER ECO-R195078

Power Software Requirements Specification
PB 540 – PB560

1.0 REVISION HISTORY

Revision	Date	Author	Change Description
A	07/15/08	[redacted]	Initial Release.
B	11/26/08	[redacted]	Corrections and clarifications
C	03/15/11	[redacted]	Additionnal requirement for cooling fan management PSFSYST2.1

2.0 INTRODUCTION

2.1 Objective

The objective of this document is to specify the AL01XXXX software requirements.

2.2 Scope

This document is the Software Requirement Specification for the PB 540 and PB560 Power management board software.

2.3 Reference Documents

10023275: Risk Management Plan.
10023276: PB 540 Product Requirements Document
10023274: General Development Plan PB 540

Reference	Part Number	Revision	Document Title
	10023274	N/A	General Development Plan

2.4 Definitions, Acronyms and Threshold Values

AMBIENT_TEMP_MAX : Maximum ambient temperature allowed in 1/100°C
Value: 6000

AC : Mains power supply.
Value: NA

BAT : Internal battery power supply.
Value: NA

BAT_AGEING : Battery ageing in % (0% means new battery, 20% means old battery)
Value: NA

BAT_AGEING_MAX : Maximum battery ageing value in %
Value: 110

BAT_AGEING_MIN : Minimum battery ageing value in %
Value: 50

BAT_CAPACITY : Remaining capacity in 1/10000A.hour
Value: NA

BAT_CYCLES : Number of battery discharges since first use
Value: NA

BAT_IMPEDANCE : battery impedance measurement in 1/1000 ohm
Value: NA

BAT_IMPEDANCE_MAX : Maximum battery impedance value in mOhm
Value: 1500

BAT_IMPEDANCE_MIN : Minimum battery impedance value in mOhm
Value: 200

BAT_MAX_LEVEL : Maximum voltage allowed at battery inlet in 1/100V
Value: 2975

BATTERY_ABSENT_TEMP_LEVEL : Temperature threshold indicating a battery absence in 1/100°C
Value: -2500

BATTERY_ABSENT_TENSION_LEVEL : Voltage threshold indicating a battery absence in 1/100V
Value: 1400

BATTERY_CHARGE_MAX_TEMP_LEVEL : Maximum battery temperature allowed for battery charge restart in 1/100°C
Value: 4000

BATTERY_CHARGE_MIN_TEMP_LEVEL : Minimum battery temperature allowed for battery charge restart in 1/100°C
Value: 500

BATTERY_DISCHARGE_MAX_TEMP_LEVEL : Maximum battery temperature allowed for battery restart discharge in 1/100°C
Value: 5500

BATTERY_DISCHARGE_MIN_TEMP_LEVEL : Minimum battery temperature allowed for battery restart discharge in 1/100°C
Value: -500

BATTERY_GAUGE_AVAILABLE_FLAG : Battery gauge availability flag: TRUE; FALSE
Value: NA

BATTERY_NO_CHARGE_MAX_TEMP_LEVEL : Maximum battery temperature allowed for battery charge in 1/100°C
Value: 4500

BATTERY_NO_CHARGE_MIN_TEMP_LEVEL : Minimum battery temperature allowed for battery charge in 1/100°C
Value: 0

BATTERY_NO_DISCHARGE_MAX_TEMP_LEVEL : Maximum battery temperature allowed for battery discharge in 1/100°C
Value: 6000

BATTERY_NO_DISCHARGE_MIN_TEMP_LEVEL : Minimum battery temperature allowed for battery discharge in 1/100°C
Value: -1000

BATTERY_TEMP : Battery temperature in 1/100 °C
Value: NA

CAPACITY_PERCENT : Theoretical battery capacity with no consumption in %.

Value: NA

CAPACITY_DELIVERED : Battery capacity estimated during the charge in 1/1000A.hour
Value: NA

CAPACITY_MAX_LEVEL : Battery capacity maximum threshold delivered during a charge in 1/1000A.hour
Value: 7200

CHARGE_BAT_STATE : DELETED
Value: NA

COMMUNICATION_FAILURE_FLAG : Loss of communication between supply board and cpu board alarm status: TRUE; FALSE.
Value: NA

COMPENSATED_TYPICAL_BAT_CAPACITY : Battery capacity corrected with BAT_AGEING in %
Value: NA

CONSUMMATE_CAPACITY : Measurement of battery discharge current consumption 1/1000A.hour
Value: NA

CPU_ON_FLAG : CPU board ON: TRUE; FALSE
Value: NA

DC : External battery power supply.
Value: NA

DISCHARGE_BAT_STATE : Battery discharge state.
Value: NA

END_OF_BATTERY_DETECTION_MINUTE_LEVEL : Detection threshold of END OF BATTERY alarm in minutes
Value: 10

END_OF_BATTERY_DETECTION_PERCENTAGE_LEVEL : Detection threshold of END OF BATTERY alarm in %
Value: 3

END_OF_CHARGE_VOLTAGE : End charge battery voltage in 1/100 V
Value: 2940

END_OF_CHARGE_VOLTAGE_TOLERANCE : End voltage charge tolerance in %
Value: 0.5

FAN_COMMAND_MAX : Maximum pwm control value of cooling fan
Value: 0x3F

FAN_COMMAND_VALUE : pwm control value of cooling fan
Value: NA

FAN_SPEED : cooling fan measurement speed in rpm
Value: NA

FAN_SPEED_SETPOINT : cooling fan control speed in rpm
Value: NA

GAS_GAUGE_MINUTE : Remaining battery autonomy in minutes
Value: NA

GAS_GAUGE_PERCENT : Remaining battery autonomy in %
Value: NA

HIGH_VDC_LEVEL : Maximum DC supply voltage in 1/100V
Value: 3300

I_BAT : Battery charge current measurement when > 0 and Battery discharge current when < 0 in 1/10000 A
Value: NA

I_BAT_AVERAGE : Battery discharge average consumed current in one minute in 1/10000 A
Value: NA

ICHARGE_MAX_MEASURED : Maximum charge current measurement in 1/10000A
Value: NA

I_BAT_MEASURE_FILTERED : 2 s filtered battery current in 1/10000A
Value: NA

ICHARGE_CUT_OFF : Battery end charge current in 1/10000A
Value: 1500

ICHARGE_MIN_LEVEL : Minimum required battery charge current in1/10000A.
Value: 2000

ICHARGE_SETPOINT : Battery charge current set point in 1/10000 A
Value: NA

ICHARGE_SETPOINT_MAX : Maximum battery charge current set point in 1/10000A
Value: 15000

ICHARGE_SETPOINT_MAX_APPLIED : Maximum battery charge current set point acquired during the charge in 1/10000 A
Value: NA

ICHARGE_SETPOINT_MIN : Minimum battery charge current set point in 1/10000A
Value: 5000

ICHARGE_SETPOINT_TOLERANCE : Charge current measurement tolerance compared to current set point in %
Value: 20

INT0 : Interruption triggered when an DC loss is detected by hardware
Value: NA

INT1 : Interruption triggered when an AC loss is detected by hardware
Value: NA

LOW_BATTERY_DETECTION_MINUTE_LEVEL : Detection battery gauge threshold for LOW BATTERY alarm in minute
Value: 30

LOW_BATTERY_DETECTION_PERCENTAGE_LEVEL : Detection threshold of LOW BATTERY alarm in %
Value: 8

DC_DETECTION_RESUME_LEVEL : DC presence threshold in 1/100V
Value: 1280

MEASURE_24VUTIL : Outlet 24 V voltage measurement in 1/100 V
Value: NA

MEASURE_24VUTIL_TOLERANCE : 24 V voltage tolerance in %
Value: 5

MEASURE_5V : 5 V supply voltage measurement in 1/100 V
Value: NA

MEASURE_5V_TOLERANCE : 5 V voltage tolerance in %
Value: 5

MEASURE_VACDC : ACDC supply voltage measurement in 1/100 V
Value: NA

MEASURE_VACDC_TOLERANCE : VACDC voltage tolerance in %
Value: 6

MEASURE_VBAT : Battery voltage measure in 1/100 V
Value: NA

MEASURE_VCHARGE : End charge battery voltage in 1/100 V
Value: NA

MEASURE_VDC : Inlet DC external supply voltage measurement in 1/100 V
Value: NA

NEUTRAL_VOLTAGE : Electromotive force e.m.f (Theoretical battery voltage with no current consumption) in 1/100V
Value: NA

POWER_TYPE
: DELETED
Value: NA

PREVIOUS_BAT_CYCLES : Number of battery discharges stored in the battery memory when a discharge starts
Value: NA

START_DISCHARGE_PERCENT : Battery capacity when a discharge starts in%.
Value: NA

SUPPLY_STATE : Active power supply source : AC_SUPPLY, DC_SUPPLY or BAT_SUPPLY
Value: NA

TEMP_AMB : Ambient temperature measurement in 1/100°C
Value: NA

TEMP_AMB : Ambient temperature measured on the supply board in 1/100°C
Value: NA

TEMP_BAT_RETURN_LEVEL : Battery temperature threshold for cancellation of NO BATTERY alarm in 1/100 °C
Value: -2000

TEMP_SENSOR_FAILURE_MAX : Maximum ambient temperature threshold for ambient sensor default detection in 1/100°C
Value: 7500

TEMP_SENSOR_FAILURE_MIN : Minimum ambient temperature threshold for ambient sensor default detection in 1/100°C
Value: -2500

TENSION_BAT_RETURN_LEVEL : Battery voltage threshold for cancellation of NO BATTERY alarm in 1/100 V
Value: 1600

TENSION_LEVEL_FOR_CONSTANT_CURRENT : Maximum voltage threshold for constant current charge phase in 1/100V
Value: 2850

THEORETICAL_CONSMMATE_CAPACITY : Computed theoretical battery discharge consumption 1/1000Ah
Value: NA

TYPICAL_24VUTIL_VALUE : Nominal 24V supply value in 1/100V.

Value: 2400

TYPICAL__5V_VALUE : Nominal 5V supply value in 1/100V
Value: 500

TYPICAL_BAT_CAPACITY : Nominal battery capacity in 1/1000A.hour. Data retrieval from battery memory: 2400 for PB540; 4800 for PB540 and PB560.
Value: NA

TYPICAL_VACDC_VALUE : Nominal ACDC supply voltage in 1/100V
Value: 3300

VBAT_MEASURE_FILTERED : 2 s filtered battery voltage in 1/100 V
Value: NA

VBAT-STARTING_CHARGE : Charge starting battery voltage in 1/100V
Value: 2850

VENTIL_AUTHORIZATION_FLAG : Ventilation running flag: TRUE; FALSE. coming from the CPU.
Value: NA

ZERO_NEGATIVE_LEVEL : Negative threshold level of battery current measurement in 1/10 mA
Value: -3000

ZERO_POSITIVE_LEVEL : Positive threshold level of battery current measurement in 1/10 mA
Value: 3000

AC_DETECTION_LEVEL : AC presence threshold l in 1/100V
Value: 3000

DC_DETECTION_LOW_LEVEL : DC loss threshold in 1/100V
Value: 900

DC_DETECTION_HIGH_LEVEL : DC presence threshold when a new DC source is detected in 1/100V
Value: 1050

DISCHARGE_MIN_POSITIVE_LEVEL : Minimum threshold level of battery current discharge in 1/10000A
Value: 1000

BATTERY_STATE : Battery state: BAT_IDLE; BAT_CHARGE; BAT_DISCHARGE
Value: NA

COMPUTE_CAPACITY_READY_FLAG : Clearance to allow the battery capacity calculation: TRUE; FALSE
Value: NA

BATTERY_CHARGE_AUTHORIZATION_FLAG : Battery charge clearance flag: TRUE;FALSE
Value: NA

CHARGE_RUNNING_FLAG : Charge in progress flag: TRUE;FALSE
Value: NA

VOLT_OUT_OF_BOUNDS_FLAG : Battery Voltage out of bounds alarm status: TRUE; FALSE.
Value: NA

CHARGE_TIME_TOO_LONG_FLAG : Charge time too long alarm status: TRUE; FALSE
Value: NA

CHARGE_FAIL_FLAG : Charge failure alarm status: TRUE; FALSE
Value: NA

INIT_BAT_STATE_FLAG : Flag warning that the battery charger initialization is in progress: TRUE; FALSE
Value: NA

BATTERY_TEMP_COOLINGFAN_MAX_SPEED : Battery temperature for Cooling Fan Maximum Speed in 1/00°C.
Value: 4000

AMBIENT_TEMP_COOLINGFAN_MAX_SPEED : Ambient temperature for Cooling Fan Maximum Speed in 1/00°C.
Value: 6000

AMBIENT_TEMP_COOLINGFAN_MIN_SPEED : Ambient temperature for Cooling Fan Minimum Speed in 1/00°C.
Value: 2000

BATTERY_TEMP_COOLINGFAN_MIN_SPEED : Battery temperature for Cooling Fan Minimum Speed in 1/00°C.
Value: 2500

TEMP_SENSOR_FAILURE_FLAG :
Value: NA

BAT_IMPEDANCE_DEFAULT_VALUE : Battery Impedance Default Value in ohm
Value: 500

BAT_AGEING_DEFAULT_VALUE : Battery Ageing Default Value in %
Value: 90

FAILURE_MES_VACDC_FLAG :
Value: NA

FAILURE_MES_VDC_FLAG :
Value: NA

AC_POWER_LOSS_FLAG : AC power source presence flag: TRUE; FALSE
Value: NA

DC_POWER_LOSS_FLAG : DC power source presence Flag: TRUE; FALSE.
Value: NA

COOLINGFAN_MAX_SPEED : Cooling fan maximum speed in rpm
Value: 10000

COOLINGFAN_MIN_SPEED : Cooling fan minimum speed in rpm
Value: 3000

24V_FAIL_FLAG : 24V Output failure alarm status: TRUE; FALSE
Value: NA

3V_FAIL_FLAG : 3V supply failure alarm status: TRUE; FALSE.
Value: NA

5V_FAIL_FLAG : 5V supply failure alarm status: TRUE; FALSE.
Value: NA

ABNORMAL_IBAT_FLAG : Abnormal battery current alarm status: TRUE; FALSE.
Value: NA

TEMP_SENSOR_FAILURE_FLAG : Ambient sensor failure alarm status: TRUE; FALSE.
Value: NA

AMBIENT_TEMP_FLAG : Ambient temperature too high alarm status: TRUE; FALSE.
Value: NA

UNKNOWN_BATTERY_FLAG : Unknown battery alarm status: TRUE; FALSE.
Value: NA

INT_CHARGE_FLAG : charger initialization failure alarm status: TRUE; FALSE
Value: NA

BAT_DISCHARGE_TEMP_FAIL_FLAG : Unsuitable temperature for battery discharge alarm status: TRUE; FALSE
Value: NA

BAT_CHARGE_TEMP_FAIL_FLAG : Unsuitable temperature for battery charge alarm status: TRUE; FALSE.
Value: NA

BAT_OPENED_FLAG : Battery opened alarm status: TRUE; FALSE
Value: NA

NO_BAT_FLAG : No battery presence alarm status: TRUE; FALSE
Value: NA

LOW_BATTERY_FLAG : Low Battery alarm status: TRU; FALSE
Value: NA

END_OF_BATTERY_FLAG : End of battery alarm status: TRUE; FALSE
Value: NA

BATTERY_UNCHARGEABLE_FLAG : Battery unchargeable alarm status: TRUE;FALSE
Value: NA

COOLING_FAN_FAILURE_FLAG : Cooling fan failure alarm status: TRUE; FALSE.
Value: NA

MAINTENANCE_MODE_FLAG : Maintenance mode flag: TRUE; FALSE coming from the CPU
Value: NA

NO_COMMUNICATION_CPU_FLAG : No communication between CPU/Supply Board: TRUE; FALSE
Value: NA

VCHARGE_LOW_LEVEL : Lower level of end of battery charge voltage regulation in 1/100V.
Value: 2926

VCHARGE_HIGH_LEVEL : Higher level of end of battery charge voltage regulation in 1/100V.
Value: 2954

BAD_FRAME_FLAG : Corrupted data from CPU to Supply Board or from Supply Board to CPU: TRUE; FALSE.
Value: NA

BATTERY_CHANGE_FLAG : New battery flag: TRUE; FALSE.
Value:

BATTERY_AGE1 : Theoretical age for referenced NEURTAL_VOLTAGE vs CAPACITY_PERCENT tables, in%
Value: 100

BATTERY_AGE2 : Theoretical age for referenced NEURTAL_VOLTAGE vs. CAPACITY_PERCENT tables, in%
Value: 91

BAT_AGEING_FIRST_USE_VALUE : Battery ageing value for first use, in%.
Value: 100

BAD_FRAME_TIME_OUT : Time out to set the BAD_FRAME_FLAG to TRUE, in msec
Value:

3.0 Functional requirements

3.1 General requirements

PSFSYST1 : Battery charge
No text (title)

PSFSYST1.2 : If (SUPPLY_STATE =! AC_SUPPLY or CHARGE_FAIL_FLAG=TRUE or BAT_CHARGE_TEMP_FAIL_FLAG=TRUE or BATTERY_VOLTAGE_FLAG=TRUE or CHARGE_TIME_TOO_LONG_FLAG=TRUE or (COOLING_FAN_FAILURE_FLAG=TRUE

and AMBIENT_TEMP_FLAG=TRUE)),Then (The software must stop the battery charge and CHARGE_RUNNING_FLAG= FALSE and BATTERY_STATE= BAT_IDLE)

If I_BAT < ICHARGE_CUT_OFF during 10 s, Then (The software must stop the battery charge and CHARGE_RUNNING_FLAG= FALSE and BATTERY_STATE= BAT_IDLE)

PSFSYST1.3 : DELETED

PSFSYST1.4 : If (VENTIL_AUTHORIZATION_FLAG = TRUE or MAINTENANCE_MODE_FLAG = TRUE or COMMUNICATION_FAILURE_FLAG = TRUE or ABNORMAL_IBAT_FLAG = TRUE or AMBIENT_TEMP_FLAG = TRUE),Then the software must adapt ICHARGE_ SETPOINT= ICHARGE_SETPOINT_MIN else ICHARGE_ SETPOINT= ICHARGE_SETPOINT_MAX.

PSFSYST1.5 : During the charger initialization phase the software must adapt the end battery charge voltage to END_OF_CHARGE_VOLTAGE - END_OF_CHARGE_VOLTAGE_TOLERANCE.<END_OF_CHARGE_VOLTAGE< END_OF_CHARGE_VOLTAGE + END_OF_CHARGE_VOLTAGE_TOLERANCE.

PSFSYST1.6 : Consider this requirement as PSFSYST1.1
If (MEASURE_VBAT < VBAT_STARTING_CHARGE and SUPPLY_STATE = AC_SUPPLY and CHARGE_FAIL_FLAG=FALSE and BAT_CHARGE_TEMP_FAIL_FLAG=FALSE and BATTERY_VOLTAGE_FLAG=FALSE and CHARGE_TIME_TOO_LONG_FLAG=FALSE and BATTERY_UNCHARGEABLE_FLAG=FALSE and (COOLING_FAN_FAILURE_FLAG=FALSE or AMBIENT_TEMP_FLAG=FALSE)),Then software must start battery charger initialization.
While battery charger initialization is in progress INIT_BAT_STATE_FLAG= TRUE else INIT_BAT_STATE_FLAG= FALSE
If the battery charger initialization succeed then BATTERY_CHARGE_AUTHORIZATION_FLAG= TRUE else BATTERY_CHARGE_AUTHORIZATION_FLAG= FALSE.
If BATTERY_CHARGE_AUTHORIZATION= TRUE then (the battery charge starts and CHARGE_RUNNING_FLAG=TRUE and BATTERY_STATE= BAT_CHARGE)

PSFSYST2 : Cooling fan
No text (title)

PSFSYST2.1 : The software must compute two control Commands for FAN_SPEED_SETPOINT:
COMMAND1: the software must compute a proportional FAN_SPEED_SETPOINT according to BATTERY_TEMP between COOLINGFAN_MIN_SPEED for AMBIENT_TEMP_COOLINGFAN_MIN_SPEED and COOLINGFAN_MAX_SPEED for AMBIENT_TEMP_COOLINGFAN_MAX_SPEED
COMMAND2: the software must compute a proportional FAN_SPEED_SETPOINT according to TEMP_AMB between COOLINGFAN_MIN_SPEED for

BATTERY_TEMP_COOLINGFAN_MIN_SPEED and COOLINGFAN_MAX_SPEED for BATTERY_TEMP_COOLINGFAN_MAX_SPEED
The software must control the fan speed according to MAX[COMMAND1, COMMAND2]
The software must limit the control of the fan speed to a minimum of 4000 rpm

PSFSYST2.2 : The software must control the cooling fan to FAN_COMMAND_MAX if TEMP_SENSOR_FAILURE_FLAG = TRUE.

PSFSYST3 : Alarms
No text (title)

PSFSYST3.1 : The software must cancel all alarms when starting and force them to FALSE during the 3 first seconds.

PSFSYST3.2 : At startup of the power supply management system, a FLASH computed checksum test and a RAM read/write test on the overall memory shall be performed.
If a RAM error is detected at device starting, the software shall bloc its execution and blink the AC and BAT leds.

PSFSYST4 : Supply/Cpu Communication
No text (title)

PSFSYST4.1 : The software must send the data described in the CPU BOARD / POWER SUPPLY BOARD COMMUNICATION REQUIREMENTS on CPU request.

PSFSYST4.2 : The software must retrieve the VENTIL_AUTHORIZATION_FLAG and MAINTENANCE_MODE_FALG from the CPU board according to CPU BOARD / POWER SUPPLY BOARD COMMUNICATION REQUIREMENTS.

PSFSYST4.3 : If the Device (/CPU) is switched on then CPU_ON_FLAG=TRUE else CPU_ON_FLAG= FALSE.
If communication with CPU is impossible (two consecutive frames missing) then NO_COMMUNICATION_CPU_FLAG=TRUE else NO_COMMUNICATION_CPU_FLAG= FALSE.
If data received from the CPU are corrupted during more than BAD_FRAME_TIME_OUT then BAD_FRAME_FLAG= TRUE else BAD_FRAME_FLAG= FALSE

PSFSYST5 : Battery Gauge
No text (title)

PSFSYST5.1 : IF 2 min. (VENTIL_AUTHORIZATION = TRUE during 2min and COMMUNICATION_FAILURE = FALSE and UNKNOWN_BATTERY = FALSE and SUPPLY_STATE = BAT) Then BATTERY_GAUGE_AVAILABLE_FLAG =TRUE.
IF (VENTIL_AUTHORIZATION = FALSE or COMMUNICATION_FAILURE = TRUE or UNKNOWN_BATTERY = TRUE) Then BATTERY_GAUGE_AVAILABLE_FLAG = FALSE.

PSFSYST5.2 : At starting, the software must read the BAT_AGEING in the battery memory. If (BAT_AGEING > BAT_AGEING_MAX or BAT_AGEING < BAT_AGEING_MIN or UNKNOWN_BATTERY = TRUE) then BAT_AGEING= BAT_AGEING_DEFAULT_VALUE. If the battery is running its first use BAT_AGEING= BAT_AGEING_FIRST_USE_VALUE.

PSFSYST5.3 : At starting, the software must read the BAT_IMPEDANCE in the battery memory. If (BAT_IMPEDANCE_MAX < BAT_IMPEDANCE < BAT_IMPEDANCE_MIN or UNKNOWN_BATTERY = TRUE), Then BAT_IMPEDANCE= BAT_IMPEDANCE_DEFAULT_VALUE

PSFSYST5.4 : The software must compute the battery autonomy in percent. GAS_GAUGE_PERCENT = BAT_CAPACITY x 100 / COMPENSATED_TYPICAL_BAT_CAPACITY

PSFSYST5.5 : The software must compute the battery capacity corrected with the battery aging. COMPENSATED_TYPICAL_BAT_CAPACITY = (TYPICAL_BAT_CAPACITY x (100 - BAT_AGEING))/100

PSFSYST5.6 : The software must compute the remaining BAT_CAPACITY based on BAT_AGEING and on tables giving CAPACITY_PERCENT vs. NEUTRAL_VOLTAGE = MEASURE_VBAT - BAT_IMPEDANCE x I_BAT for different battery ages.

Tables are:
BATTERY_AGE1 (Brand new battery).
for NEUTRAL_VOLTAGE<= 22.40V CAPACITY_PERCENT=0%,
for NEUTRAL_VOLTAGE=25.34V CAPACITY_PERCENT=5%,
for NEUTRAL_VOLTAGE=25.72V CAPACITY_PERCENT=10%,
for NEUTRAL_VOLTAGE =26.11V CAPACITY_PERCENT=20%,
for NEUTRAL_VOLTAGE=26.32V CAPACITY_PERCENT=30%,
for NEUTRAL_VOLTAGE=26.53V CAPACITY_PERCENT=40%,
for NEUTRAL_VOLTAGE=26.77V CAPACITY_PERCENT=50%,
for NEUTRAL_VOLTAGE=27.16V CAPACITY_PERCENT=60%,
for NEUTRAL_VOLTAGE=27.58V CAPACITY_PERCENT=70%,
for NEUTRAL_VOLTAGE=28.01V CAPACITY_PERCENT=80%,
for NEUTRAL_VOLTAGE=28.61V CAPACITY_PERCENT=90%,
for NEUTRAL_VOLTAGE>=29.20V CAPACITY_PERCENT=100%.

BATTERY_AGE2.
for NEUTRAL_VOLTAGE<= 22.40V CAPACITY_PERCENT=0%,
for NEUTRAL_VOLTAGE=24.50V CAPACITY_PERCENT=5%,
for NEUTRAL_VOLTAGE=25.30V CAPACITY_PERCENT=10%,
for NEUTRAL_VOLTAGE =25.90V CAPACITY_PERCENT=20%,

for NEUTRAL_VOLTAGE=26.20V CAPACITY_PERCENT=30%,
for NEUTRAL_VOLTAGE=26.30V CAPACITY_PERCENT=40%,
for NEUTRAL_VOLTAGE=26.50V CAPACITY_PERCENT=50%,
for NEUTRAL_VOLTAGE=27.00V CAPACITY_PERCENT=60%,
for NEUTRAL_VOLTAGE=27.50V CAPACITY_PERCENT=70%,
for NEUTRAL_VOLTAGE=27.90V CAPACITY_PERCENT=80%,
for NEUTRAL_VOLTAGE=28.61V CAPACITY_PERCENT=90%,
for NEUTRAL_VOLTAGE>=29.20V CAPACITY_PERCENT=100%.

If the BAT_AGEING is equal or greater than BATTERY_AGE1, the BATTERY_AGE1 table is used to compute the CAPACITY_PERCENT.
If the BAT_AGEING is lower than BATTERY_AGE2, the BATTERY_AGE2 table is used to compute the CAPACITY_PERCENT.
If the BAT_AGEING is between BATTERY_AGE1 and BATTERY_AGE2 a custom table is created from both BATTERY_AGE1 and BATTERY_AGE2 tables according to the BAT_AGEING value with a linear interpolation.

Once the table has been chosen the BAT_CAPACITY is computed as following:
Between two tables values of NEUTRAL_VOLTAGE, the CAPACITY_PERCENT is computed with a linear interpolation.
BAT_CAPACITY = (COMPENSATED_TYPICAL_BAT_CAPACITY x CAPACITY PERCENT)/100.

PSFSYST5.7 : The software must compute the number of battery discharge cycles BAT_CYCLES as total accumulation of discharge percents.
According to the previous sentence one Charge & Discharge cycle represents 100 BAT_CYCLES units.

If SUPPLY_STATE= BAT_SUPPLY then (Sum= START_DISCHARGE_PERCENT-GAS_GAUGE_PERCENT)

IF Sum>= 5% then
(START_DISCHARGE_PERCENT= Current GAS_GAUGE_PERCENT and BAT_CYCLES = BAT_CYCLES + Sum)

PSFSYST5.8 : The software must estimate the battery autonomy in minute GAS_GAUGE_MINUTE.
GAS_GAUGE_MINUTE = BAT_CAPACITY / I_BAT_AVERAGE

PSFSYST5.9 : The software must compute the average device current consumption I_BAT_AVERAGE every 2 minutes.

PSFSYST5.10 : The software must compute the BAT_AGEING.

Each time the battery NEUTRAL_VOLTAGE decreases by 1V of discharge a BAT_AGEING compute is done:

The current THEORICAL_CAPACITY is stored for both an BATTERY_AGE1 and an BATTERY_AGE2.
The THEORETICAL_CONSMMATE_CAPACITY is computed for both an BATTERY_AGE1 and an BATTERY_AGE2. They are computed from the previous THEORICAL_CAPACITY stored (previous BAT_AGEING compute) minus the current one.
The computed CONSMMATE_CAPACITY value is stored.

If CONSMMATE_CAPACITY is equal or greater than THEORETICAL_CONSMMATE_CAPACITY computed for BATTERY_AGE1,
BAT_AGEING = CONSUMMATE_CAPACITY / THEORETICAL_CONSMMATE_CAPACITY computed for BATTERY_AGE1 X 100
with folowing limitations:
BAT_AGEING < BAT_AGEING_MAX.
BAT_AGEING >BATTERY_AGE1.

If CONSMMATE_CAPACITY is between THEORETICAL_CONSMMATE_CAPACITY computed for battery BATTERY_AGE1 and BATTERY_AGE2 ,
BAT_AGEING = CONSUMMATE_CAPACITY / THEORETICAL_CONSMMATE_CAPACITY computed for BATTERY_AGE1 X 100
BAT_AGEING < BATTERY_AGE1.
BAT_AGEING > BATTERY_AGE2.

If CONSMMATE_CAPACITY is equal or greater than THEORETICAL_CONSUMMATE_CAPACITY computed for BATTERY_AGE2,
BAT_AGEING = CONSUMMATE_CAPACITY / THEORETICAL_CONSUMMATE_CAPACITY computed for BATTERY_AGE2 X 100
BAT_AGEING < BATTERY_AGE2.
BAT_AGEING > BAT_AGEING_MIN.

CONSUMMATE_CAPACITY is reset to O for the next CONSUMMATE_CAPACITY computing.

PSFSYST6 : Supply Switch
No text (title)

PSFSYST6.1 : When several supply sources are available, the software must use one supply source according to the following order of priority : AC, DC, BAT
SUPPLY_STATE is AC_SUPLY; DC_SUPPY or BAT_SUPPLY according to the current supply source.

PSFSYST6.2 : DELETED

PSFSYST6.3 : DELETED

PSFSYST6.4 : AC power loss detection:

If (MEASURE_VACDC < AC_DETECTION_LEVEL or when the interruption INT1 is triggered.), Then AC_POWER_LOSS= TRUE

PSFSYST6.5 : DC Power loss detection:
If (MEASURE_VDC < DC_DETECTION_LOW_LEVEL or when the interruption INT0 is triggered), Then DC_POWER_LOSS= TRUE.

PSFSYST6.6 : AC detection:
IF (MEASURE_VACDC>= AC_DETECTION_LEVEL) Then AC_POWER_LOSS= FALSE.

PSFSYST6.7 : DC power detection:
If ((MEASURE_VDC >= DC_DETECTION_HIGH_LEVEL and DC change detected) or MEASURE_VDC >= DC_DETECTION_RESUME_LEVEL) then DC_LOSS_DETECTED= FALSE.

PSFSYST6.8 : During Power supply transition trigged by interruption INT1 the switch actuators shall be controlled in order to avoid MEASURE_24VUTIL< TYPICAL__24VUTIL_VALUE+ MEASURE_24VUTIL_TOLERANCE

PSFSYST6.9 : During Power supply transition trigged by interruption INT0 the switch actuators shall to be controlled in order to avoid MEASURE_24VUTIL< TYPICAL__24VUTIL_VALUE- MEASURE_24VUTIL_TOLERANCE

PSFSYST6.10 : To switch from a supply to another, the software must apply a transition diode state.
The software must wait at least 30 us for each transistor state to have an effective transistors state change.

PSFSYST7 : Supply LEDs
No text (title)

PSFSYST7.1 : The software must light on the AC LED if SUPPLY_STATE = AC_SUPPLY.

PSFSYST7.3 : The software must light on the BAT LED if SUPPLY_STATE = BAT_SUPPLY.

PSFSYST7.4 : If (CHARGE_RUNNING_FLAG= TRUE and ICHARGE_SETPOINT= ICHARGE_SETPOINT_MIN) then the system must light on the BAT LED blinking at 0.5 Hz.
If (CHARGE_RUNNING_FLAG= TRUE and ICHARGE_SETPOINT= ICHARGE_SETPOINT_MAX) then the system must light on the BAT LED blinking at 0.12 Hz.

PSFSYST7.5 : When the supply board starts, a Supply LEDs test shall be launched when connecting the AC supply.

PSFSYST8 : PC communication

No text (title)

PSFSYST8.1 : The software must communicate with a PC through the USB port identified PC

PSFSYST8.2 : The software must send monitoring data upon request by the RS232 interface. If the software does not receive a monitoring during 2 minutes the sending of monitoring data will stop.
The software must allow the supply board control by the RS232 interface when the NO_COMMUNICATION_CPU_FLAG = TRUE corresponding to the loss of communication between supply board and cpu board.

PSFSYST9 : Battery data management

PSFSYST9.1 : The software must store the BAT_AGEING each 15 minutes in the battery memory.

PSFSYST9.2 : The software must store the BAT_IMPEDANCE each 15 minutes in the battery memory.

PSFSYST9.3 : The software must store the BAT_CYCLES each 15 minutes in the battery memory.

PSFSYST9.4 : The software shall be able to retrieve the SUPPLIER_INFORMATION, TYPICAL_BAT_CAPACITY, BAT_AGEING, BAT_IMPEDANCE and BAT_CYCLES form the battery memory.

PSFSYST10 : Alarm reset on battery change detection
If a transition from TRUE to FALSE on the NO_BATTERY_FLAG then BATTERY_CHANGE_FLAG = TRUE; else BATTERY_CHANGE_FLAG = FALSE.
If BATTERY_CHANGE_FLAG = TRUE then (CHARGE_TIME_TOO_LONG_FLAG= FALSE and CHARGE_FAIL_FLAG= FALSE and BATTERY_VOLTAGE_OUT_ OF BOUNDS_FLAG=FALSE and ABNORMAL_IBAT_FLAG=FALSE and UNKNOWN_BATTERY_FLAG= FALSE and BAT_UNCHARGEABLE_FLAG = FLASE)

PSFSYST20 : Power On Self Test (POST)
DELETED -Merged with PSFSYS3.2- At startup of the power supply management system, a FLASH computed checksum test and a RAM read/write test on the overall memory shall be performed.

3.2 Alarm requirements

PSFSYSTAL1 : END OF BATTERY
Detection Conditions: SUPPLY_STATE = BAT_SUPPLY
and
COMPUTE_CAPACITY_READY_FLAG = TRUE.
and
((BATTERY GAUGE < END_OF_BATTERY_DETECTION_MINUTE_LEVEL and
BATTERY_GAUGE_AVAILABLE_FLAG = TRUE)
or
CAPACITY_PERCENT <END_OF_BATTERY_DETECTION_PERCENTAGE_LEVEL)
Cancellation Conditions: SUPPLY_STATE! = BAT_SUPPLY
Action: Alarm flag update:END_OF_BATTERY_FLAG= TRUE
(END_OF_BATTERY_FLAG= FALSE when the alarm is not activated)

PSFSYSTAL2 : LOW BATTERY
DetectionConditions: SUPPLY_STATE = BAT_SUPPLY
and
COMPUTE_CAPACITY_READY_FLAG = TRUE.
and
END_OF_BATTERY_FLAG = FALSE
and
((BATTERY GAUGE <LOW_BATTERY_DETECTION_MINUTE_LEVEL and
BATTERY_GAUGE_AVAILABLE_FLAG = TRUE)
or
CAPACITY_PERCENT<LOW_BATTERY_DETECTION_PERCENTAGE_LEVEL)
CancellationConditions: SUPPLY_STATE ! = BAT_SUPPLY
or
END_OF_BATTERY_FLAG = TRUE
Action: Alarm flag update:LOW_BATTERY_FLAG= TRUE
(LOW_BATTERY_FLAG= FALSE when the alarm is not activated)

PSFSYSTAL3 : NO BAT
DetectionConditions: TEMP_BAT < BATTERY_ABSENT_TEMP_LEVEL and
SUPPLY_STATE != BAT_SUPPLY during 500 ms
CancellationConditions: TEMP_BAT >= BATTERY_ABSENT_TEMP_LEVEL
or
SUPPLY_STATE = BAT_SUPPLY
Action: Alarm flag update:NO_BAT_FLAG= TRUE
(NO_BAT_FLAG= FALSE when the alarm is not activated)

PSFSYSTAL4 : BAT OPENED
Detection Conditions: (SUPPLY_STATE != BAT_SUPPLY
and

CHARGE_RUNNING_FLAG = FALSE
and
VBAT_MEASURE_FILTRED < BATTERY_ABSENT_TENSION_LEVEL
and
TEMP_BAT > TEMP_BAT_RETURN_LEVEL) during 2s.
CancellationConditions: VBAT_MEASURE_FILTRED > TENSION_BAT_RETURN_LEVEL
and
TEMP_BAT > TEMP_BAT_RETURN_LEVEL
and
CHARGE_RUNNING_FLAG = FALSE
Action: Alarm flag update:BAT_OPENED_FLAG= TRUE
(BAT_OPENED_FLAG= FALSE when the alarm is not activated)

PSFSYSTAL5 : BAT CHARGE TEMP FAIL
DetectionConditions: (INT_CHARGE_FLAG = TRUE
or
CHARGE_RUNNING_FLAG = TRUE)
and
((TEMP_BAT < BATTERY_NO_CHARGE_MIN_TEMP_LEVEL
or
(TEMP_BAT > BATTERY_NO_CHARGE_MAX_TEMP_LEVEL))
CancellationConditions: BATTERY_CHARGE_MAX_TEMP_LEVEL > TEMP_BAT
or
>BATTERY_CHARGE_MIN_TEMP_LEVEL
or
TEMP_BAT > TEMP_BAT_RETURN_LEVEL
or
SUPPLY_STATE!= AC_SUPPLY
Action: Alarm flag update: BAT_CHARGE_TEMP_FAIL_FLAG= TRUE
(BAT_CHARGE_TEMP_FAIL_FLAG= FALSE when the alarm is not activated)
Action1: STOP_CHARGE
(the action will be cancelled when the alarm is reset)
Action2: BATTERY_CHARGE_AUTHORIZATION_FLAG= FALSE.
(the action will be cancelled when the alarm is reset)

PSFSYSTAL6 : BAT DISCHARGE TEMP FAIL
DetectionConditions: VBAT_MEASURE_FILTRED > TENSION_BAT_RETURN_LEVEL
and
SUPPLY TYPE= BAT_SUPPLY
and
((TEMP_BAT < BATTERY_NO_DISCHARGE_MIN_TEMP_LEVEL)
or
(TEMP_BAT > BATTERY_NO_DISCHARGE_MAX_TEMP_LEVEL))
CancellationConditions: BATTERY_DISCHARGE_MAX_TEMP_LEVEL > BATTERY_TEMP
> BATTERY_DISCHARGE_MIN_TEMP_LEVEL
or

SUPPLY_STATE!= BAT_SUPPLY
Action: Alarm flag update:BAT_DISCHARGE_TEMP_FAIL_FLAG= TRUE
(BAT_DISCHARGE_TEMP_FAIL_FLAG= FALSE when the alarm is not activated)

PSFSYSTAL7 : CHARGE FAIL
DetectionConditions: IBAT_MEASURE_FILTRED > ICHARGE_SETPOINT+
ICHARGE_SETPOINT_TOLERANCE) during 5 seconds.
or
(IBAT_MEASURE_FILTRED < ICHARGE_SETPOINT-
ICHARGE_SETPOINT_TOLERANCE) during 5 seconds.
and
VBAT_MESURE_FILTRED < TENSION_LEVEL_FOR_CONSTANT_CURRENT) and
CHARGE_RUNNING_FLAG = TRUE during 12s
CancellationConditions: None
Action: Alarm flag update:CHARGE_FAIL= TRUE
(CHARGE FAIL= FALSE when the alarm is not activated)
Action1: STOP_CHARGE
(the action will be cancelled when the alarm is reset)
Action2: BATTERY_CHARGE_AUTHORIZATION_FLAG= FALSE.
(the action will be cancelled when the alarm is reset)

PSFSYSTAL8 : BATTERY VOLTAGE OUT OF BOUNDS
DetectionConditions: VBAT_MESURE > BAT_MAX_LEVEL during 300 ms
CancellationConditions: None
Action: Alarm flag update:VOLT_OUT_OF_BOUNDS_FLAG= TRUE
(VOLT_OUT_OF_BOUNDS_FLAG= FALSE when the alarm is not activated)
Action1: STOP_CHARGE
(the action will be cancelled when the alarm is reset)
Action2: BATTERY_CHARGE_AUTHORIZATION_FLAG= FALSE.
(the action will be cancelled when the alarm is reset)

PSFSYSTAL9 : 5V FAIL
DetectionConditions: (MEASURE_5V < TYPICAL_5V_VALUE -
MEASURE_5V_TOLERANCE)
or
MEASURE_5V > TYPICAL_5V_VALUE + MEASURE_5V_TOLERANCE)
during 500 ms
CancellationConditions: MEASURE_5V >= TYPICAL__5V_VALUE -
MEASURE_5V_TOLERANCE)
and
MEASURE_5V <= TYPICAL_5V_VALUE + MEASURE_5V_TOLERANCE)
Action: Alarm flag update:5V_FAIL_FLAG= TRUE
(5V_FAIL_FLAG= FALSE when the alarm is not activated)

PSFSYSTAL10 : 3 V FAIL
DetectionConditions: FAILURE_5V_FLAG = TRUE and FAILURE_24V_FLAG = TRUE
CancellationConditions: FAILURE_5V_FLAG = FALSE
or
FAILURE_24V_FLAG = FALSE
Action: Alarm flag update:3V_FAIL_FLAG= TRUE
(3V_FAIL_FLAG= FALSE when the alarm is not activated)
Action1: FAN_SPEED_SETPOINT = FAN_COMMAND_MAX
(the action will be cancelled when the alarm is reset)

PSFSYSTAL11 : 24 V FAIL
DetectionConditions: (MEASURE_24VUTIL < TYPICAL__24VUTIL_VALUE - MEASURE_24VUTIL_TOLERANCE)
or
(MEASURE_24VUTIL > TYPICAL_24VUTIL_VALUE+ MEASURE_24VUTIL_TOLERANCE)
during 500 ms
CancellationConditions: (MEASURE_24VUTIL >= TYPICAL__24VUTIL_VALUE - MEASURE_24VUTIL_TOLERANCE)
and
(MEASURE_24VUTIL <= TYPICAL_24VUTIL_VALUE + MEASURE_24VUTIL_TOLERANCE)
Action: Alarm flag update:24V_FAIL_FLAG= TRUE
(24V_FAIL_FLAG= FALSE when the alarm is not activated)
Action1: CPU_ON_FLAG = FALSE
(CPU_ON_FLAG= TRUE when the alarm is not activated)
Action2: VENTIL_AUTHORIZATION = FALSE
(the action will be cancelled when the alarm is reset)
Action3: MAINTENANCE MODE = FALSE
(the action will be cancelled when the alarm is reset)

PSFSYSTAL12 : FAILURE MEASURE VACDC
DetectionConditions: ((MEASURE_VACDC < TYPICAL_VACDC_VALUE - MEASURE_VACDC_TOLERANCE)
and SUPPLY_STATE = AC_SUPPLY)
or (MEASURE_VACDC > TYPICAL_VACDC_VALUE + MEASURE_VACDC_TOLERANCE)
during 500 ms
CancellationConditions: ((MEASURE_VACDC >= TYPICAL_VACDC_VALUE - MEASURE_VACDC_TOLERANCE)
and
(MEASURE_VACDC <= TYPICAL_VACDC_VALUE + MEASURE_VACDC_TOLERANCE))
or
SUPPLY_STATE != AC_SUPPLY
Action: Alarm flag update: FAILURE_MEASURE VACDC_FLAG= TRUE
(FAILURE_MEASURE VACDC_FLAG= FALSE when the alarm is not activated)

Action1: When a FAILURE MEASURE VACDC occurs, no switch to AC is allowed if the power supply is other than AC, except if AC becomes the only power supply remaining.(The action will be cancelled when the alarm is reset)

PSFSYSTAL13 : FAILURE MEASURE VDC
DetectionConditions: SUPPLY_STATE != DC_SUPPLY and (MEASURE_VDC > HIGH_VDC_LEVEL)
CancellationConditions: MEASURE_VDC <= HIGH_VDC_LEVEL
Action: Alarm flag update: FAILURE_MEASURE VDC_FLAG= TRUE
(FAILURE_MEASURE VDC_FLAG= FALSE when the alarm is not activated)
Action1: When a FAILURE MEASURE VDC occurs, no switch to DC is allowed if the power supply is other than DC, except if DC becomes the only power supply remaining.(The action will be cancelled when the alarm is reset)

PSFSYSTAL14 : END OF CHARGE FAILURE
DetectionConditions: DELETED
CancellationConditions: DELETED
Action: DELETED

PSFSYSTAL15 : COOLING FAN FAILURE
DetectionConditions: (FAN_SPEED > FAN_SPEED_SETPOINT+ 20% during 4 sec.
Or
FAN_SPEED < FAN_SPEED_SETPOINT- 20% during 4 sec.)
And
3V_FAIL_FLAG= FALSE
And
TEMP_SENSOR_FAILURE_FLAG=FALSE
CancellationConditions: (FAN_SPEED <= FAN_SPEED_SETPOINT+ 20%
And
FAN_SPEED >= FAN_SPEED_SETPOINT- 20%)
Or
3V_FAIL_FLAG= TRUE
And
TEMP_SENSOR_FAILURE_FLAG=TRUE
Action: Alarm flag update: COOLING_FAN_FAILURE_FLAG= TRUE
(COOLING_FAN_FAILURE_FLAG= FALSE when the alarm is not activated)

PSFSYSTAL16 : BATTERIE UNCHARGEABLE
DetectionConditions: (ICHARGE_MAX_MEASURED < ICHARGE_MIN_LEVEL (detected only at end of charge)
CancellationConditions: Battery changing detected
Action: Alarm flag update: BATTERY_UNCHARGEABLE_FLAG= TRUE
(BATTERY_UNCHARGEABLE_FLAG= FALSE when the alarm is not activated)
Action1: STOP CHARGE

(the action will be cancelled when the alarm is reset)
Action2: BATTERY_CHARGE_AUTHORIZATION_FLAG= FALSE.
(the action will be cancelled when the alarm is reset)

PSFSYSTAL17 : CHARGE TIME TOO LONG
DetectionConditions: CAPACITY_DELIVERED > CAPACITY_MAX_LEVEL and CHARGE_RUNNING_FLAG = TRUE
CancellationConditions: Battery changing detected
Action: Alarm flag update: CHARGE_TIME_TO_LONG_FLAG= TRUE
(CHARGE_TIME_TO_LONG_FLAG= FALSE when the alarm is not activated)
Action1: STOP CHARGE
(the action will be cancelled when the alarm is reset)
Action2: BATTERY_CHARGE_AUTHORIZATION_FLAG= FALSE.
(the action will be cancelled when the alarm is reset)

PSFSYSTAL18 : ABNORMAL IBAT
DetectionConditions: (((IBAT_MEASURE_FILTRED < ZERO_NEGATIVE_LEVEL
or
IBAT_MEASURE_FILTRED > ZERO_POSITIVE_LEVEL))
and
BATTERY_STATE = BAT_IDLE
and
INIT_BAT_STATE_FLAG = FALSE
or
(IBAT_MEASURE_FILTRED < DISCHARGE_MIN_POSITIVE_LEVEL
and
BATTERY_STATE= BAT_DISCHARGE)
and
BAT OPENED = FALSE
during 500 ms.
CancellationConditions: Battery changing detected
Action: Alarm flag update: ABNORMAL_IBAT_FLAG=TRUE
(ABNORMAL_IBAT_FLAG=FALSE when the alarm is not activated)
Action1: ICHARGE_SETPOINT = ICHARGE_SETPOINT_MIN.
(The action will be cancelled when the alarm is reset)
Action2: BATTERY_GAUGE_AVAILABLE_FLAG= FALSE
(The action will be cancelled when the alarm is reset)

PSFSYSTAL19 : TEMP SENSOR FAILURE
DetectionConditions: TEMP_AMB > TEMP_SENSOR_FAILURE_MAX or TEMP_AMB < TEMP_SENSOR_FAILURE_MIN
CancellationConditions: Auto (reversed conditions)
Action: Alarm flag update: TEMP_SENSOR_FAILURE_FLAG=TRUE
(TEMP_SENSOR_FAILURE_FLAG= FALSE when the alarm is not activated)
Action1: FAN_SPEED_SETPOINT=FAN_COMMAND_MAX

(The action will be cancelled when the alarm is reset)

PSFSYSTAL20 : AMBIENT TEMP
Detection Conditions: (TEMP_AMB > AMBIENT_TEMP_MAX
and
TEMP_SENSOR_FAILURE_FLAG = FALSE
CancellationConditions: TEMP_AMB < (AMBIENT_TEMP_MAX - 5°C)
or
TEMP_SENSOR_FAILURE_FLAG =TRUE
Action: Alarm flag update: AMBIENT_TEMP_FLAG=TRUE
(AMBIENT_TEMP_FLAG= FALSE when the alarm is not activated)
Action1: ICHARGE_SETPOINT = ICHARGE_SETPOINT_MIN.
(The action will be cancelled when the alarm is reset)

PSFSYSTAL21 : COMMUNICATION FAILURE
Detection Conditions: BAD_FRAME_FLAG= TRUE
or
(NO_COMMUNICATION_ FLAG= TRUE
and
CPU_ON_FLAG = TRUE.)
CancellationConditions: Auto (reversed conditions)
Action: Alarm flag update: COMMUNICATION_FAILURE_FLAG= TRUE
(COMMUNICATION_FAILURE_FLAG= FALSE when the alarm is not activated)
Action1: ICHARGE_SETPOINT = ICHARGE_SETPOINT_MIN
(The action will be cancelled when the alarm is reset)

PSFSYSTAL22 : UNKNOWN BATTERY
Detection Conditions: Communication failure with battery eeprom
Cancellation Conditions: Battery changing detected
Action: Alarm flag update: UNKNOWN_BATTERY_FLAG= TRUE
(UNKNOWN_BATTERY_FLAG= FALSE when the alarm is not activated)
Action1: BATTERY_GAUGE_AVAILABLE_FLAG= FALSE
(The action will be cancelled when the alarm is reset)

PSFSYSTAL25 : INT CHARGE FAIL
DetectionConditions: (MEASURE_VCHARGE> VCHARGE_LOW_LEVEL
and
MEASURE_VCHARGE < VCHARGE_HIGH_LEVEL)
3 sec delay to reach this condition at the first charge attempt.
CancellationConditions: none
Action: Alarm flag update: INT_CHARGE_FLAG= TRUE
(INT_CHARGE_FLAG= FALSE when the alarm is not activated)
Action1: CHARGE AUTHORIZATION_FLAG= FALSE.
(The action will be cancelled when the alarm is reset)

3.3 Supplementary requirements

PSSOFT2: Program size
The executable software size must be less than 54.5 kb (90% of 64 kb)

PSSOFT7: Timing1
The sum of tasks timings during a scheduler step shall always be less than 9ms.

PSSOFT9: RAMemory
The software must use less than 7.2 kb of RAM (90% of 8 kb)