# Introduction

## Purpose

The purpose of this document is to define the tests needed to validate the functionality of the ICU Application Software of the EPD of Solar Orbiter.

# Applicable Documents

AD1 Flight Software Requirements Document, EPD (Energetic Particle Detector). SO-EPD-ICU-RS-0002 issue 1 rev 15

AD2 EPD TM/TC Interface Control Document. SO-EPD-PO-IF-0003 issue 2 rev 10

AD3 EPD Sensors Data Interface Control Document. SO-EPD-PO-IF-0005 issue 1 rev 6

AD4 ICU Software Validation & Verification Plan. SO-EPD-ICU-PL-0005 issue 1 rev 3

# Reference Documents

RD1 Space engineering - Software general requirements. ECSS-E-ST-40 issue 3

RD2 Space product assurance – Software product assurance. ECSS-Q-ST-80 issue 3

# Terms, Definitions and Abbreviations

ACK Acknowledgement

AD Applicable Document

ASW Application Software

BSW Boot Software

CDPU Common Data Processing Unit

CRC Cyclic redundancy check

EBB Elegant Bread Board

EPD Energetic Particle Detector

EM Engineering Model

GSS Ground Support Software

HW Hardware

ICOR Item Configured On Report

ICU Instrument Control

ICUSW Instrument Control Unit Software

OSA Operating System

OSAPI Operating System API

PC Personal Computer

RD Reference Document

S/C Spacecraft

SpW SpaceWire

SVN Subversion version control system

SW Software

TBC To Be Confirmed

TBD To Be Defined

TBW To Be Written

TC Telecommand

TM Telemetry

UART Universal Asynchronous Receiver-Transmitter

# Software Overview

This document applies to the ICU Software of the EPD of Solar Orbiter. This software consists on a set of items that will be configured on the report according to their version and the specific deployment platform. These elements, and any others that need to be configured during the validation process, will be identified using the acronym ICOR (Item Configured On Report) and numbered in order of appearance in the document.

# Task Identification

## Task Criteria

The elements that form the software are the following:

* The Baseline ICU-ASW (ICOR-1)
* The Nominal ICU-ASW (ICOR-2).
* The ICU-BSW will be also necessary to deploy any of the ASW, so will be also configured during the test as (ICOR-3).

The version and subversion of the Baseline ICU-ASW and the Nominal ICU-ASW must be different, in order to distinguish between both. In the last section of the document will be collected all of them in a table. This table should be used in each of the test reports to specify the particular setting of each of the elements used in each deployment platform.

## Features To Be Tested

These tests tries to verify the correct functionality of the ICU ASW and the acceptance and correct execution of defined TC.

## Features Not To Be Tested

## Test Pass Fail Criteria

### Acceptance/Rejection Criteria

Every test case shall establish the general acceptance and rejection criteria for this test case. In each step of the associated procedure can be defined own criteria too.

### Reporting Results

In a result report for each test case shall be documented:

* **Acceptance:** The output received is recorded and the acceptance criterion applied shall be registered.
* **Rejection:** The report is recorded in the step that has failed and the rejection criterion.

## Items Can Not Be Validated

## Manually Auto Generated Code

# Testing Specification Design

## General

### Elements required for tests

#### Required HW for tests

* **Model of the EPD.** Developed by Space Research Group from the University of Alcala. This HW element must be configured in the test report (ICOR-4)
* **HET-EPT-1 sensor unit (or equivalent emulator).** This HW element must be configured in the test report (ICOR-5). Required only in Scenario 4.
* **HET-EPT-2 sensor unit (or equivalent emulator).** This HW element must be configured in the test report (ICOR-6). Required only in Scenario 1 and 4.
* **STEP sensor unit (or equivalent emulator).** This HW element must be configured in the test report (ICOR-7). Required only in Scenario 4.
* **SIS sensor unit (or equivalent emulator).** This HW element must be configured in the test report (ICOR-8). Required only in Scenario 1, 4 and 5.
* **SUE: Sensor Unit Emulator.** This HW element must be configured in the test report (ICOR-9). Required only in Scenario 5.
* **GSS Host Unit (Windows PC).** Computer connected to the ICU which can send telecommands and receive telemetry to/from using the GSS software.
* Minimum Requirements:
  + Intel Core 2 Quad CPU @2.50 GHz
  + 2.00 GB RAM Memory
  + Windows XP Service Pack 3
  + 5 USB Ports
  + Notepad++
* **1 SpW-Brick: Star-Dundee SpaceWire-USB Brick Mk2.** Star-Dundee STAR-System v2.0 must be installed in Host Unit
* **1 SpW-cable: SpaceWire cable.** Wire that connects SpW-Brick to ICU.
* **1 USB cable.** Wire that connects GSS Host Unit to SpW-Brick.
* **STEP Harness.** Wire that connects STEP sensor unit (or equivalent emulator) to ICU. Required only in Scenario 4.
* **HET-EPT-1 Harness.** Wire that connects HET-EPT-1 sensor unit (or equivalent emulator) to ICU. Required only in Scenario 4.
* **HET-EPT-2 Harness.** Wire that connects HET-EPT-2 sensor unit (or equivalent emulator) to ICU. Required only in Scenario 1 and 4.
* **SIS Harness.** Wire that connects SIS sensor unit (or equivalent emulator) to ICU. Required only in Scenarios 1, 4 and 5.
* **SUE Harness.** Wire that connects SUE to 3 ICU sensor unit interfaces (HET-EPT1, HET-EPT2 and STEP). Required only in Scenario 5.
* **4 EPD Sensor Harness.** Wires (UART-USB converters) that connects 4 GSS Host Unit sensor emulators to 4 ICU sensor unit interfaces. Required only in Scenario 2.

#### SW items used to check tests rightness

* **ICUSW-GSS.** It runs in a Windows PC, and it must be configured in the test report (ICOR-10). It can send telecommands and monitor the telemetry received through SpaceWire or serial ports.

### Environmental needs

#### Auxiliary HW

* **N/A**

#### Auxiliary devices used

* **1 Power Supply with integrated multimeter.** It must provide at least 26 V and 0.5 A
* **2 Power Supply wires (positive / negative)**
* **1 Power Board.** To provide the power-on pulse and the power to the ICU

## Scenarios

### Scenario 1

* ICU with BSW stored in PROM, and both nominal and baseline ASW stored in EEPROM.
* Power Supply
* GSS Host Unit
* SpW USB-Brick connected to GSS Host Unit
* SpW cable connected to ICU and SpW-Brick
* HET-EPT-2 sensor unit or emulator
* SIS sensor unit or emulator

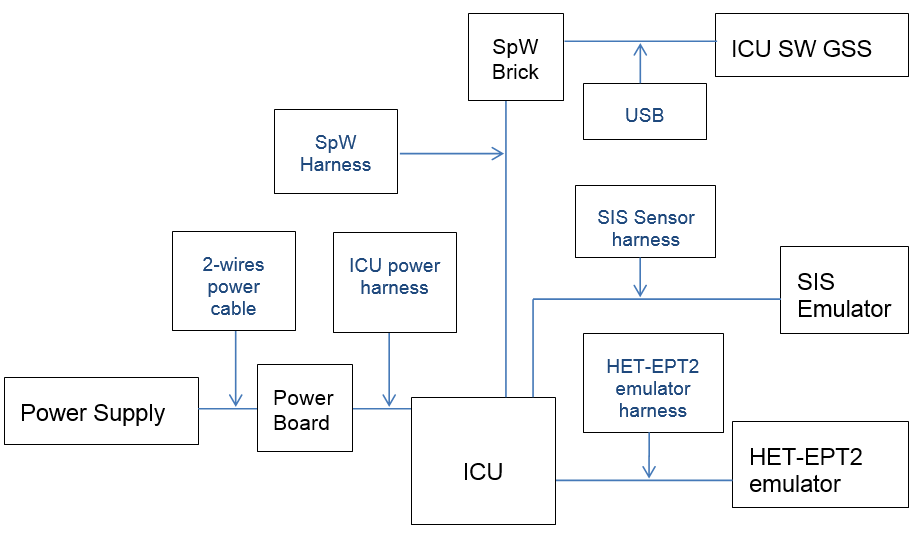


Figure 1: Test Scenario 1

### Scenario 2

* ICU with BSW stored in PROM, and both nominal and baseline ASW stored in EEPROM.
* Power Supply
* GSS Host Unit
* SpW USB-Brick connected to GSS Host Unit
* SpW cable connected to ICU and SpW-Brick
* 4 UART cables to connect the ICU with the GSS Host Unit through the USB-Serial converters. The ICUSW GSS application emulates the sensor units behavior.

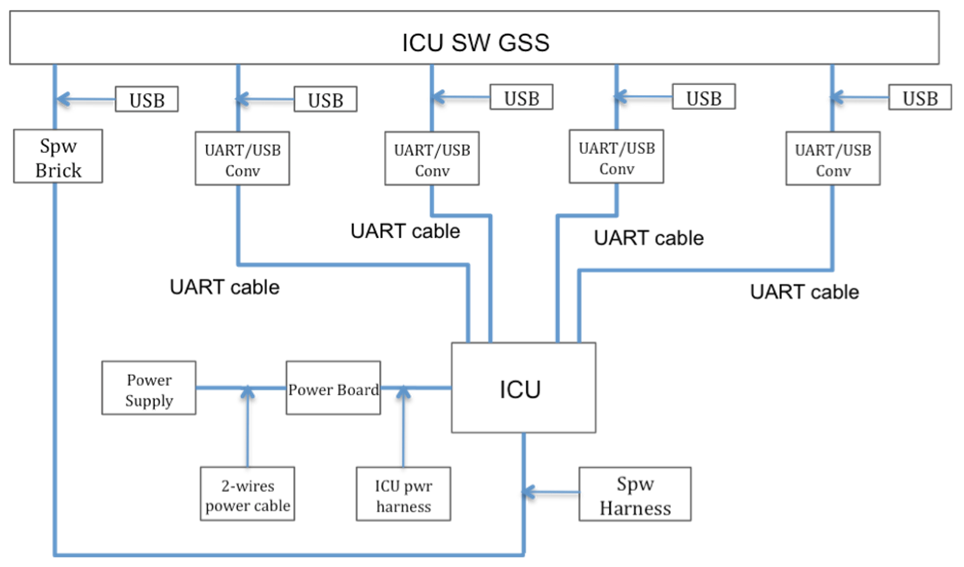


Figure 2: Test Scenario 2

### Scenario 3

* Same as scenario 2 but with different (wrong) configuration of SpW brick writing port.

### Scenario 4

* ICU with BSW stored in PROM, and both nominal and baseline ASW stored in EEPROM.
* Power Supply
* GSS Host Unit
* SpW USB-Brick connected to GSS Host Unit
* SpW cable connected to ICU and SpW-Brick
* HET-EPT-1 sensor unit or emulator
* HET-EPT-2 sensor unit or emulator
* STEP sensor unit or emulator
* SIS sensor unit or emulator

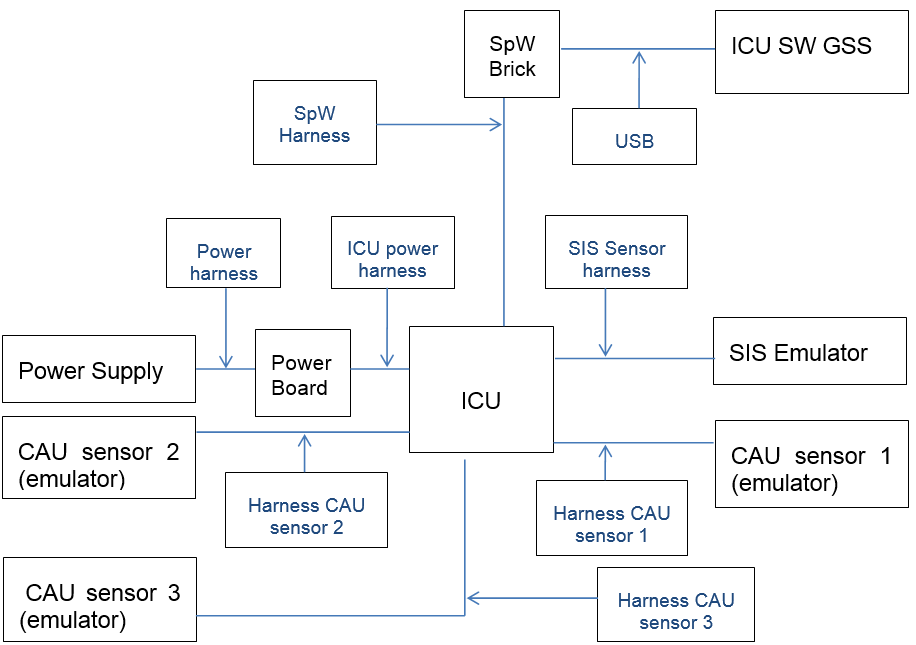


Figure 3: Test Scenario 4

### Scenario 5

* ICU with BSW stored in PROM, and both nominal and baseline ASW stored in EEPROM.
* Power Supply
* GSS Host Unit
* SpW USB-Brick connected to GSS Host Unit
* SpW cable connected to ICU and SpW-Brick
* SUE
* SIS sensor unit or emulator

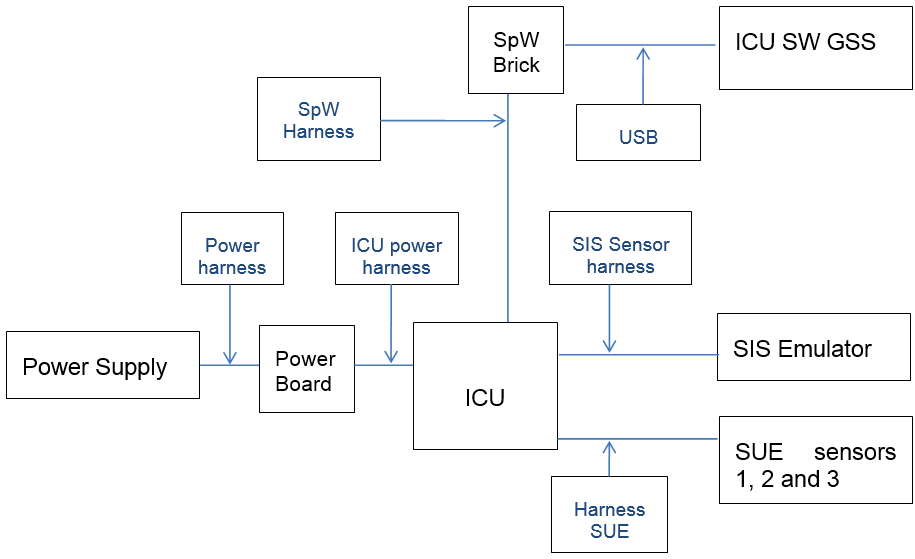


Figure 4: Test Scenario 5

**Note: Tests are only needed to be performed over Scenario 4 or Scenario 5.**

## Solar Orbiter EPD Application Software Test Design

### General

#### Tests Identification

Each test case will identify through the sequence FT\_SOLO\_EPD\_ICU\_ASW\_XXXX\_YYYY-NNN, where XXXX is the test identifier and YYYY is the test case identifier and NNN is a numeric identification field. Test procedures shall be identified with the sequence TP\_FT\_SOLO\_EPD\_ASW\_XXXX\_YYYY, with the same criterion.

### Features To Be Tested

### Approach Refinements

# Test Cases

## General

## FT\_SOLO\_EPD\_NOM\_ASW\_OPER\_SERV\_17-10200

**Identifier**

* A TC 17.1 is sent and a TM 17.2 is received.

**Inputs**

N/A

**Outputs**

N/A

**Pass Fail Criteria**

The test is passed if TM (17.2) is received.

**Environmental Needs**

ICU ASW is in OPERATIONAL mode, NOMINAL version.

**Validating Items**

FU R-00390, GE R-00010, GE R-00030, IF R-00390

## FT\_SOLO\_EPD\_NOM\_ASW\_OPER\_SERV\_1-10300

**Identifier**

* For valid commands, 4 TC 17.1 are sent, each one with a different ACK configuration: Both, only acceptance, only execution and none ACK.
* For not acceptable commands, 4 TC 128.6 (not valid subtype) are sent, each one with a different ACK configuration: Both, only acceptance, only execution and none ACK.
* For not executable commands, 4 TC (128.3) with bad CRC are sent, each one with a different ACK configuration: Both, only acceptance, only execution and none ACK.

**Inputs**

N/A

**Outputs**

N/A

**Pass Fail Criteria**

The test is passed if the HK TM is not received when disabled and received when enabled, and if the period is modified properly.

**Environmental Needs**

ICU ASW is in OPERATIONAL mode, NOMINAL version.

**Interface Dependencies**

This test must be executed after the test FT\_SOLO\_EPD\_NOM\_ASW\_OPER\_SERV\_17-10200.

Before starting test, "Reset Global Variables" button must clicked on the interface to reset the sequence control.

**Validating Items**

GE R-00010, GE R-00030, IF R-00150

## FT\_SOLO\_EPD\_NOM\_ASW\_OPER\_SERV\_3\_TC-10310

**Identifier**

* All HK SIDs are enabled by default.
* Disable HK TM SID100 and enable back.
* Change period of HK TM SID0 and restore period back.

**Inputs**

N/A

**Outputs**

N/A

**Pass Fail Criteria**

The test is passed if TM (17.2) is received.

**Environmental Needs**

ICU ASW is in OPERATIONAL mode, NOMINAL version.

**Interface Dependencies**

This test must be executed after the test FT\_SOLO\_EPD\_NOM\_ASW\_OPER\_SERV\_1-10300.

**Validating Items**

FU R-00370, FU R-00380, GE R-00010, GE R-00030, IF R-00160

## FT\_SOLO\_EPD\_NOM\_ASW\_OPER\_SERV\_5\_TC-10320

**Identifier**

* Events are enabled by default.
* Disable TRANSITION\_TO\_OPERATIONAL event TM and enable back .

**Inputs**

N/A

**Outputs**

N/A

**Pass Fail Criteria**

o The test is passed if the event is not received when disabled and received when enabled.

**Environmental Needs**

ICU ASW is in OPERATIONAL mode, NOMINAL version.

**Interface Dependencies**

This test must be executed after the test FT\_SOLO\_EPD\_NOM\_ASW\_OPER\_SERV\_3\_TC-10310.

**Validating Items**

RE R-00070, GE R-00010, GE R-00030, IF R-00170, IF R-00180

## FT\_SOLO\_EPD\_NOM\_ASW\_CONF\_SERV\_17-10800

**Identifier**

* A TC 17.1 is sent and a TM 17.2 is received.

**Inputs**

N/A

**Outputs**

N/A

**Pass Fail Criteria**

The test is passed if TM (17.2) is received.

**Environmental Needs**

ICU ASW is in CONFIGURATION mode, NOMINAL version.

**Validating Items**

FU R-00390, GE R-00010, GE R-00030, IF R-00390

## FT\_SOLO\_EPD\_NOM\_ASW\_CONF\_SERV\_1-10900

**Identifier**

* For valid commands, 4 TC 17.1 are sent, each one with a different ACK configuration: Both, only acceptance, only execution and none ACK.
* For not acceptable commands, 4 TC 128.6 (not valid subtype) are sent, each one with a different ACK configuration: Both, only acceptance, only execution and none ACK.
* For not executable commands, 4 TC (128.3) with bad CRC are sent, each one with a different ACK configuration: Both, only acceptance, only execution and none ACK.

**Inputs**

N/A

**Outputs**

N/A

**Pass Fail Criteria**

The test is passed if the HK TM is not received when disabled and received when enabled, and if the period is modified properly.

**Environmental Needs**

ICU ASW is in CONFIGURATION mode, NOMINAL version.

**Interface Dependencies**

This test must be executed after the test FT\_SOLO\_EPD\_NOM\_ASW\_CONF\_SERV\_17-10800.

Before starting test, "Reset Global Variables" button must clicked on the interface to reset the sequence control.

**Validating Items**

GE R-00010, GE R-00030, IF R-00150

## FT\_SOLO\_EPD\_NOM\_ASW\_CONF\_SERV\_3\_TC-10910

**Identifier**

* All HK SIDs are enabled by default.
* Disable HK TM SID100 and enable back.
* Change period of HK TM SID0 and restore period back.

**Inputs**

N/A

**Outputs**

N/A

**Pass Fail Criteria**

The test is passed if TM (17.2) is received.

**Environmental Needs**

ICU ASW is in CONFIGURATION mode, NOMINAL version.

**Interface Dependencies**

This test must be executed after the test FT\_SOLO\_EPD\_NOM\_ASW\_CONF\_SERV\_1-10900.

**Validating Items**

FU R-00370, FU R-00380, GE R-00010, GE R-00030, IF R-00160

## FT\_SOLO\_EPD\_NOM\_ASW\_CONF\_SERV\_5\_TC-10920

**Identifier**

* Events are enabled by default.
* Disable TRANSITION\_TO\_CONFIGURATION event TM and enable back .

**Inputs**

N/A

**Outputs**

N/A

**Pass Fail Criteria**

o The test is passed if the event is not received when disabled and received when enabled.

**Environmental Needs**

ICU ASW is in CONFIGURATION mode, NOMINAL version.

**Interface Dependencies**

This test must be executed after the test FT\_SOLO\_EPD\_NOM\_ASW\_CONF\_SERV\_3\_TC-10910.

**Validating Items**

RE R-00070, GE R-00010, GE R-00030, IF R-00170, IF R-00180

## FT\_SOLO\_EPD\_BASE\_ASW\_CONF\_SERV\_17-11300

**Identifier**

* A TC 17.1 is sent and a TM 17.2 is received.

**Inputs**

N/A

**Outputs**

N/A

**Pass Fail Criteria**

The test is passed if TM (17.2) is received.

**Environmental Needs**

ICU ASW is in CONFIGURATION mode, BASELINE version.

**Validating Items**

FU R-00390, GE R-00010, GE R-00030, IF R-00390

## FT\_SOLO\_EPD\_BASE\_ASW\_CONF\_SERV\_1-11400

**Identifier**

* For valid commands, 4 TC 17.1 are sent, each one with a different ACK configuration: Both, only acceptance, only execution and none ACK.
* For not acceptable commands, 4 TC 128.6 (not valid subtype) are sent, each one with a different ACK configuration: Both, only acceptance, only execution and none ACK.
* For not executable commands, 4 TC (128.3) with bad CRC are sent, each one with a different ACK configuration: Both, only acceptance, only execution and none ACK.

**Inputs**

N/A

**Outputs**

N/A

**Pass Fail Criteria**

The test is passed if the HK TM is not received when disabled and received when enabled, and if the period is modified properly.

**Environmental Needs**

ICU ASW is in CONFIGURATION mode, BASELINE version.

**Interface Dependencies**

This test must be executed after the test FT\_SOLO\_EPD\_BASE\_ASW\_CONF\_SERV\_17-11300.

Before starting test, "Reset Global Variables" button must clicked on the interface to reset the sequence control.

**Validating Items**

GE R-00010, GE R-00030, IF R-00150

## FT\_SOLO\_EPD\_BASE\_ASW\_CONF\_SERV\_3\_TC-11410

**Identifier**

* All HK SIDs are enabled by default.
* Disable HK TM SID100 and enable back.
* Change period of HK TM SID0 and restore period back.

**Inputs**

N/A

**Outputs**

N/A

**Pass Fail Criteria**

The test is passed if TM (17.2) is received.

**Environmental Needs**

ICU ASW is in CONFIGURATION mode, BASELINE version.

**Interface Dependencies**

This test must be executed after the test FT\_SOLO\_EPD\_BASE\_ASW\_CONF\_SERV\_1-11400.

**Validating Items**

FU R-00370, FU R-00380, GE R-00010, GE R-00030, IF R-00160

## FT\_SOLO\_EPD\_BASE\_ASW\_CONF\_SERV\_5\_TC-11420

**Identifier**

* Events are enabled by default.
* Disable TRANSITION\_TO\_CONFIGURATION event TM and enable back.

**Inputs**

N/A

**Outputs**

N/A

**Pass Fail Criteria**

The test is passed if the event is not received when disabled and received when enabled.

**Environmental Needs**

ICU ASW is in CONFIGURATION mode, BASELINE version.

**Interface Dependencies**

This test must be executed after the test FT\_SOLO\_EPD\_BASE\_ASW\_CONF\_SERV\_3\_TC-11410.

**Validating Items**

RE R-00070, GE R-00010, GE R-00030, IF R-00170, IF R-00180

## FT\_SOLO\_EPD\_BASE\_ASW\_OPER\_SERV\_17-11800

**Identifier**

* A TC 17.1 is sent and a TM 17.2 is received.

**Inputs**

N/A

**Outputs**

N/A

**Pass Fail Criteria**

The test is passed if TM (17.2) is received.

**Environmental Needs**

ICU ASW is in OPERATIONAL mode, BASELINE version.

**Validating Items**

FU R-00390, GE R-00010, GE R-00030, IF R-00390

## FT\_SOLO\_EPD\_BASE\_ASW\_OPER\_SERV\_1-11900

**Identifier**

* For valid commands, 4 TC 17.1 are sent, each one with a different ACK configuration: Both, only acceptance, only execution and none ACK.
* For not acceptable commands, 4 TC 128.6 (not valid subtype) are sent, each one with a different ACK configuration: Both, only acceptance, only execution and none ACK.
* For not executable commands, 4 TC (128.3) with bad CRC are sent, each one with a different ACK configuration: Both, only acceptance, only execution and none ACK.

**Inputs**

N/A

**Outputs**

N/A

**Pass Fail Criteria**

The test is passed if the HK TM is not received when disabled and received when enabled, and if the period is modified properly.

**Environmental Needs**

ICU ASW is in OPERATIONAL mode, BASELINE version.

**Interface Dependencies**

This test must be executed after the test FT\_SOLO\_EPD\_BASE\_ASW\_OPER\_SERV\_17-11800.

Before starting test, "Reset Global Variables" button must clicked on the interface to reset the sequence control.

**Validating Items**

GE R-00010, GE R-00030, IF R-00150

## FT\_SOLO\_EPD\_BASE\_ASW\_OPER\_SERV\_3\_TC-11910

**Identifier**

* All HK SIDs are enabled by default.
* Disable HK TM SID100 and enable back.
* Change period of HK TM SID0 and restore period back.

**Inputs**

N/A

**Outputs**

N/A

**Pass Fail Criteria**

The test is passed if TM (17.2) is received.

**Environmental Needs**

ICU ASW is in OPERATIONAL mode, BASELINE version.

**Interface Dependencies**

This test must be executed after the test FT\_SOLO\_EPD\_BASE\_ASW\_OPER\_SERV\_1-11900.

**Validating Items**

FU R-00370, FU R-00380, GE R-00010, GE R-00030, IF R-00160

## FT\_SOLO\_EPD\_BASE\_ASW\_OPER\_SERV\_5\_TC-11920

**Identifier**

* Events are enabled by default.
* Disable TRANSITION\_TO\_OPERATIONAL event TM and enable back.

**Inputs**

N/A

**Outputs**

N/A

**Pass Fail Criteria**

The test is passed if the event is not received when disabled and received when enabled.

**Environmental Needs**

ICU ASW is in OPERATIONAL mode, BASELINE version.

**Interface Dependencies**

This test must be executed after the test FT\_SOLO\_EPD\_BASE\_ASW\_OPER\_SERV\_3\_TC-11910.

**Validating Items**

RE R-00070, GE R-00010, GE R-00030, IF R-00170, IF R-00180

# Test Procedures

## General

## TP\_FT\_SOLO\_EPD\_NOM\_ASW\_OPER\_SERV\_17-10200

**Identifier**

TP\_FT\_SOLO\_EPD\_NOM\_ASW\_OPER\_SERV\_17-10200

**Scenario**

Scenario 1

**Test Cases**

FT\_SOLO\_EPD\_NOM\_ASW\_OPER\_SERV\_17-10200

### Procedure Steps

**Step 0: Test connection**

Send Test connection

Receive TM 1.1, Test connection report (17.2) and TM 1.7

## TP\_FT\_SOLO\_EPD\_NOM\_ASW\_OPER\_SERV\_1-10300

**Identifier**

TP\_FT\_SOLO\_EPD\_NOM\_ASW\_OPER\_SERV\_1-10300

**Scenario**

Scenario 1

**Test Cases**

FT\_SOLO\_EPD\_NOM\_ASW\_OPER\_SERV\_1-10300

### Procedure Steps

**Step 0: Valid TC both ack flags**

Send Test connection

Receive TM 1.1 seqCtrl 0, Test connection report (17.2) and TM 1.7 seqCtrl 1

**Step 1: Valid TC accept ack flag**

Send Test connection

Receive TM 1.1 seqCtrl 1 and Test connection report (17.2)

**Step 2: Valid TC exec ack flag**

Send Test connection

Receive Test connection report (17.2) and TM 1.7 seqCtrl 2

**Step 3: Valid TC none ack flag**

Send Test connection

Receive Test connection report (17.2)

**Step 4: Not acceptable TC both ack flags**

Send TC 128.6

Receive TM 1.2.9C44 seqCtrl 4

**Step 5: Not acceptable TC accept ack flag**

Send TC 128.6

Receive TM 1.2.9C44 seqCtrl 5

**Step 6: Not acceptable TC exec ack flag**

Send TC 128.6

**Step 7: Not acceptable TC none ack flag**

Send TC 128.6

**Step 8: Not executable TC both ack flags**

Send Exec exception reset

Receive TM 1.1 seqCtrl 8 and TM 1.8.9C5E 19 seqCtrl 8

**Step 9: Not executable TC accept ack flag**

Send Exec exception reset

Receive TM 1.1 seqCtrl 9

**Step 10: Not executable TC none ack flag**

Send Exec exception reset

**Step 11: Not executable TC exec ack flag**

Send Exec exception reset

Receive TM 1.8.9C5E 19 seqCtrl 11

## TP\_FT\_SOLO\_EPD\_NOM\_ASW\_OPER\_SERV\_3\_TC-10310

**Identifier**

TP\_FT\_SOLO\_EPD\_NOM\_ASW\_OPER\_SERV\_3\_TC-10310

**Scenario**

Scenario 1

**Test Cases**

FT\_SOLO\_EPD\_NOM\_ASW\_OPER\_SERV\_3\_TC-10310

### Procedure Steps

**Step 0: Disable HK SID 100**

Send Disable HK SID 100

Receive TM 1.1 and TM 1.7

**Step 1: 30 seconds wait**

Send Dummy packet

**Step 2: Enable HK SID 100**

Send Enable HK SID 100

Receive TM 1.1 and TM 1.7

**Step 3: 30 seconds wait**

Send Dummy packet

**Step 4: Change period 5 seconds HK SID 0**

Send Change period 5 seconds HK SID 0

Receive TM 1.1 and TM 1.7

**Step 5: 30 seconds wait**

Send Dummy packet

**Step 6: Change period 10 seconds HK SID 0**

Send Change period 10 seconds HK SID 0

Receive TM 1.1 and TM 1.7

**Step 7: 30 seconds wait**

Send Dummy packet

**Step 8: Disable print SID 0**

Send Dummy packet

## TP\_FT\_SOLO\_EPD\_NOM\_ASW\_OPER\_SERV\_5\_TC\_OPER-10320

**Identifier**

TP\_FT\_SOLO\_EPD\_NOM\_ASW\_OPER\_SERV\_5\_TC\_OPER-10320

**Scenario**

Scenario 1

**Test Cases**

FT\_SOLO\_EPD\_NOM\_ASW\_OPER\_SERV\_5\_TC-10320

### Procedure Steps

**Step 0: Disable event 1003**

Send Disable event 1003

Receive TM 1.1 and TM 1.7

**Step 1: Reset to asw no sensors no 1003**

Send Reset

Receive TM 1.1, TM 1.7, TM 5.1 SIS in safe state, TM 5.1 SpW ready, TM 5.1 boot mode entry, TM 5.1 SpW ready, TM 5.1 STEP off, TM 5.1 SIS off, TM 5.1 HET EPT 1 off, TM 5.1 HET EPT 2 off and TM 5.1 readout ended

**Step 2: Enable event 1003**

Send Enable event 1003

Receive TM 1.1 and TM 1.7

**Step 3: Reset to oper no sensors**

Send Reset

Receive TM 1.1, TM 1.7, TM 5.1 SIS in safe state, TM 5.1 SpW ready, TM 5.1 boot mode entry, TM 5.1 SpW ready, TM 5.1 oper entry, TM 5.1 STEP off, TM 5.1 SIS off, TM 5.1 HET EPT 1 off, TM 5.1 HET EPT 2 off and TM 5.1 readout ended

## TP\_FT\_SOLO\_EPD\_NOM\_ASW\_CONF\_SERV\_17-10800

**Identifier**

TP\_FT\_SOLO\_EPD\_NOM\_ASW\_CONF\_SERV\_17-10800

**Scenario**

Scenario 1

**Test Cases**

FT\_SOLO\_EPD\_NOM\_ASW\_CONF\_SERV\_17-10800

### Procedure Steps

**Step 0: Test connection**

Send Test connection

Receive TM 1.1, Test connection report (17.2) and TM 1.7

## TP\_FT\_SOLO\_EPD\_NOM\_ASW\_CONF\_SERV\_1-10900

**Identifier**

TP\_FT\_SOLO\_EPD\_NOM\_ASW\_CONF\_SERV\_1-10900

**Scenario**

Scenario 1

**Test Cases**

FT\_SOLO\_EPD\_NOM\_ASW\_CONF\_SERV\_1-10900

### Procedure Steps

**Step 0: Valid TC both ack flags**

Send Test connection

Receive TM 1.1 seqCtrl 0, Test connection report (17.2) and TM 1.7 seqCtrl 1

**Step 1: Valid TC accept ack flag**

Send Test connection

Receive TM 1.1 seqCtrl 1 and Test connection report (17.2)

**Step 2: Valid TC exec ack flag**

Send Test connection

Receive Test connection report (17.2) and TM 1.7 seqCtrl 2

**Step 3: Valid TC none ack flag**

Send Test connection

Receive Test connection report (17.2)

**Step 4: Not acceptable TC both ack flags**

Send TC 128.6

Receive TM 1.2.9C44 seqCtrl 4

**Step 5: Not acceptable TC accept ack flag**

Send TC 128.6

Receive TM 1.2.9C44 seqCtrl 5

**Step 6: Not acceptable TC exec ack flag**

Send TC 128.6

**Step 7: Not acceptable TC none ack flag**

Send TC 128.6

**Step 8: Not executable TC both ack flags**

Send Exec exception reset

Receive TM 1.1 seqCtrl 8 and TM 1.8.9C5E 19 seqCtrl 8

**Step 9: Not executable TC accept ack flag**

Send Exec exception reset

Receive TM 1.1 seqCtrl 9

**Step 10: Not executable TC none ack flag**

Send Exec exception reset

**Step 11: Not executable TC exec ack flag**

Send Exec exception reset

Receive TM 1.8.9C5E 19 seqCtrl 11

## TP\_FT\_SOLO\_EPD\_NOM\_ASW\_CONF\_SERV\_3\_TC-10910

**Identifier**

TP\_FT\_SOLO\_EPD\_NOM\_ASW\_CONF\_SERV\_3\_TC-10910

**Scenario**

Scenario 1

**Test Cases**

FT\_SOLO\_EPD\_NOM\_ASW\_CONF\_SERV\_3\_TC-10910

### Procedure Steps

**Step 0: Disable HK SID 100**

Send Disable HK SID 100

Receive TM 1.1 and TM 1.7

**Step 1: 30 seconds wait**

Send Dummy packet

**Step 2: Enable HK SID 100**

Send Enable HK SID 100

Receive TM 1.1 and TM 1.7

**Step 3: 30 seconds wait**

Send Dummy packet

**Step 4: Change period 5 seconds HK SID 0**

Send Change period 5 seconds HK SID 0

Receive TM 1.1 and TM 1.7

**Step 5: 30 seconds wait**

Send Dummy packet

**Step 6: Change period 10 seconds HK SID 0**

Send Change period 10 seconds HK SID 0

Receive TM 1.1 and TM 1.7

**Step 7: 30 seconds wait**

Send Dummy packet

**Step 8: Disable print SID 0**

Send Dummy packet

## TP\_FT\_SOLO\_EPD\_NOM\_ASW\_CONF\_SERV\_5\_TC-10920

**Identifier**

TP\_FT\_SOLO\_EPD\_NOM\_ASW\_CONF\_SERV\_5\_TC-10920

**Scenario**

Scenario 1

**Test Cases**

FT\_SOLO\_EPD\_NOM\_ASW\_CONF\_SERV\_5\_TC-10920

### Procedure Steps

**Step 0: Disable event 1002**

Send Disable event 1002

Receive TM 1.1 and TM 1.7

**Step 1: Reset to asw no sensors no 1002**

Send Reset

Receive TM 1.1, TM 1.7, TM 5.1 SIS in safe state, TM 5.1 SpW ready, TM 5.1 boot mode entry, TM 5.1 SpW ready, TM 5.1 STEP off, TM 5.1 SIS off, TM 5.1 HET EPT 1 off, TM 5.1 HET EPT 2 off and TM 5.1 readout ended

**Step 2: Enable event 1002**

Send Enable event 1002

Receive TM 1.1 and TM 1.7

**Step 3: Reset to oper no sensors**

Send Reset

Receive TM 1.1, TM 1.7, TM 5.1 SIS in safe state, TM 5.1 SpW ready, TM 5.1 boot mode entry, TM 5.1 SpW ready, TM 5.1 conf entry, TM 5.1 STEP off, TM 5.1 SIS off, TM 5.1 HET EPT 1 off, TM 5.1 HET EPT 2 off and TM 5.1 readout ended

## TP\_FT\_SOLO\_EPD\_BASE\_ASW\_CONF\_SERV\_17-11300

**Identifier**

TP\_FT\_SOLO\_EPD\_BASE\_ASW\_CONF\_SERV\_17-11300

**Scenario**

Scenario 1

**Test Cases**

FT\_SOLO\_EPD\_BASE\_ASW\_CONF\_SERV\_17-11300

### Procedure Steps

**Step 0: Test connection**

Send Test connection

Receive TM 1.1, Test connection report (17.2) and TM 1.7

## TP\_FT\_SOLO\_EPD\_BASE\_ASW\_CONF\_SERV\_1-11400

**Identifier**

TP\_FT\_SOLO\_EPD\_BASE\_ASW\_CONF\_SERV\_1-11400

**Scenario**

Scenario 1

**Test Cases**

FT\_SOLO\_EPD\_BASE\_ASW\_CONF\_SERV\_1-11400

### Procedure Steps

**Step 0: Valid TC both ack flags**

Send Test connection

Receive TM 1.1 seqCtrl 0, Test connection report (17.2) and TM 1.7 seqCtrl 1

**Step 1: Valid TC accept ack flag**

Send Test connection

Receive TM 1.1 seqCtrl 1 and Test connection report (17.2)

**Step 2: Valid TC exec ack flag**

Send Test connection

Receive Test connection report (17.2) and TM 1.7 seqCtrl 2

**Step 3: Valid TC none ack flag**

Send Test connection

Receive Test connection report (17.2)

**Step 4: Not acceptable TC both ack flags**

Send TC 128.6

Receive TM 1.2.9C44 seqCtrl 4

**Step 5: Not acceptable TC accept ack flag**

Send TC 128.6

Receive TM 1.2.9C44 seqCtrl 5

**Step 6: Not acceptable TC exec ack flag**

Send TC 128.6

**Step 7: Not acceptable TC none ack flag**

Send TC 128.6

**Step 8: Not executable TC both ack flags**

Send Exec exception reset

Receive TM 1.1 seqCtrl 8 and TM 1.8.9C5E 19 seqCtrl 8

**Step 9: Not executable TC accept ack flag**

Send Exec exception reset

Receive TM 1.1 seqCtrl 9

**Step 10: Not executable TC none ack flag**

Send Exec exception reset

**Step 11: Not executable TC exec ack flag**

Send Exec exception reset

Receive TM 1.8.9C5E 19 seqCtrl 11

## TP\_FT\_SOLO\_EPD\_BASE\_ASW\_CONF\_SERV\_3\_TC-11410

**Identifier**

TP\_FT\_SOLO\_EPD\_BASE\_ASW\_CONF\_SERV\_3\_TC-11410

**Scenario**

Scenario 1

**Test Cases**

FT\_SOLO\_EPD\_BASE\_ASW\_CONF\_SERV\_3\_TC-11410

### Procedure Steps

**Step 0: Disable HK SID 100**

Send Disable HK SID 100

Receive TM 1.1 and TM 1.7

**Step 1: 30 seconds wait**

Send Dummy packet

**Step 2: Enable HK SID 100**

Send Enable HK SID 100

Receive TM 1.1 and TM 1.7

**Step 3: 30 seconds wait**

Send Dummy packet

**Step 4: Change period 5 seconds HK SID 0**

Send Change period 5 seconds HK SID 0

Receive TM 1.1 and TM 1.7

**Step 5: 30 seconds wait**

Send Dummy packet

**Step 6: Change period 10 seconds HK SID 0**

Send Change period 10 seconds HK SID 0

Receive TM 1.1 and TM 1.7

**Step 7: 30 seconds wait**

Send Dummy packet

**Step 8: Disable print SID 0**

Send Dummy packet

## TP\_FT\_SOLO\_EPD\_BASE\_ASW\_CONF\_SERV\_5\_TC-11420

**Identifier**

TP\_FT\_SOLO\_EPD\_BASE\_ASW\_CONF\_SERV\_5\_TC-11420

**Scenario**

Scenario 1

**Test Cases**

FT\_SOLO\_EPD\_BASE\_ASW\_CONF\_SERV\_5\_TC-11420

### Procedure Steps

**Step 0: Disable event 1002**

Send Disable event 1002

Receive TM 1.1 and TM 1.7

**Step 1: Reset to asw no sensors no 1002**

Send Reset

Receive TM 1.1, TM 1.7, TM 5.1 SIS in safe state, TM 5.1 SpW ready, TM 5.1 boot mode entry, TM 5.1 SpW ready, TM 5.1 STEP off, TM 5.1 SIS off, TM 5.1 HET EPT 1 off, TM 5.1 HET EPT 2 off and TM 5.1 readout ended

**Step 2: Enable event 1002**

Send Enable event 1002

Receive TM 1.1 and TM 1.7

**Step 3: Reset to oper no sensors**

Send Reset

Receive TM 1.1, TM 1.7, TM 5.1 SIS in safe state, TM 5.1 SpW ready, TM 5.1 boot mode entry, TM 5.1 SpW ready, TM 5.1 conf entry, TM 5.1 STEP off, TM 5.1 SIS off, TM 5.1 HET EPT 1 off, TM 5.1 HET EPT 2 off and TM 5.1 readout ended

## TP\_FT\_SOLO\_EPD\_BASE\_ASW\_OPER\_SERV\_17-11800

**Identifier**

TP\_FT\_SOLO\_EPD\_BASE\_ASW\_OPER\_SERV\_17-11800

**Scenario**

Scenario 1

**Test Cases**

FT\_SOLO\_EPD\_BASE\_ASW\_OPER\_SERV\_17-11800

### Procedure Steps

**Step 0: Test connection**

Send Test connection

Receive TM 1.1, Test connection report (17.2) and TM 1.7

## TP\_FT\_SOLO\_EPD\_BASE\_ASW\_OPER\_SERV\_1-11900

**Identifier**

TP\_FT\_SOLO\_EPD\_BASE\_ASW\_OPER\_SERV\_1-11900

**Scenario**

Scenario 1

**Test Cases**

FT\_SOLO\_EPD\_BASE\_ASW\_OPER\_SERV\_1-11900

### Procedure Steps

**Step 0: Valid TC both ack flags**

Send Test connection

Receive TM 1.1 seqCtrl 0, Test connection report (17.2) and TM 1.7 seqCtrl 1

**Step 1: Valid TC accept ack flag**

Send Test connection

Receive TM 1.1 seqCtrl 1 and Test connection report (17.2)

**Step 2: Valid TC exec ack flag**

Send Test connection

Receive Test connection report (17.2) and TM 1.7 seqCtrl 2

**Step 3: Valid TC none ack flag**

Send Test connection

Receive Test connection report (17.2)

**Step 4: Not acceptable TC both ack flags**

Send TC 128.6

Receive TM 1.2.9C44 seqCtrl 4

**Step 5: Not acceptable TC accept ack flag**

Send TC 128.6

Receive TM 1.2.9C44 seqCtrl 5

**Step 6: Not acceptable TC exec ack flag**

Send TC 128.6

**Step 7: Not acceptable TC none ack flag**

Send TC 128.6

**Step 8: Not executable TC both ack flags**

Send Exec exception reset

Receive TM 1.1 seqCtrl 8 and TM 1.8.9C5E 19 seqCtrl 8

**Step 9: Not executable TC accept ack flag**

Send Exec exception reset

Receive TM 1.1 seqCtrl 9

**Step 10: Not executable TC none ack flag**

Send Exec exception reset

**Step 11: Not executable TC exec ack flag**

Send Exec exception reset

Receive TM 1.8.9C5E 19 seqCtrl 11

## TP\_FT\_SOLO\_EPD\_BASE\_ASW\_OPER\_SERV\_3\_TC-11910

**Identifier**

TP\_FT\_SOLO\_EPD\_BASE\_ASW\_OPER\_SERV\_3\_TC-11910

**Scenario**

Scenario 1

**Test Cases**

FT\_SOLO\_EPD\_BASE\_ASW\_OPER\_SERV\_3\_TC-11910

### Procedure Steps

**Step 0: Disable HK SID 100**

Send Disable HK SID 100

Receive TM 1.1 and TM 1.7

**Step 1: 30 seconds wait**

Send Dummy packet

**Step 2: Enable HK SID 100**

Send Enable HK SID 100

Receive TM 1.1 and TM 1.7

**Step 3: 30 seconds wait**

Send Dummy packet

**Step 4: Change period 5 seconds HK SID 0**

Send Change period 5 seconds HK SID 0

Receive TM 1.1 and TM 1.7

**Step 5: 30 seconds wait**

Send Dummy packet

**Step 6: Change period 10 seconds HK SID 0**

Send Change period 10 seconds HK SID 0

Receive TM 1.1 and TM 1.7

**Step 7: 30 seconds wait**

Send Dummy packet

**Step 8: Disable print SID 0**

Send Dummy packet

## TP\_FT\_SOLO\_EPD\_BASE\_ASW\_OPER\_SERV\_5\_TC-11920

**Identifier**

TP\_FT\_SOLO\_EPD\_BASE\_ASW\_OPER\_SERV\_5\_TC-11920

**Scenario**

Scenario 1

**Test Cases**

FT\_SOLO\_EPD\_BASE\_ASW\_OPER\_SERV\_5\_TC-11920

### Procedure Steps

**Step 0: Disable event 1003**

Send Disable event 1003

Receive TM 1.1 and TM 1.7

**Step 1: Reset to asw no sensors no 1003**

Send Reset

Receive TM 1.1, TM 1.7, TM 5.1 SIS in safe state, TM 5.1 SpW ready, TM 5.1 boot mode entry, TM 5.1 SpW ready, TM 5.1 STEP off, TM 5.1 SIS off, TM 5.1 HET EPT 1 off, TM 5.1 HET EPT 2 off and TM 5.1 readout ended

**Step 2: Enable event 1003**

Send Enable event 1003

Receive TM 1.1 and TM 1.7

**Step 3: Reset to oper no sensors**

Send Reset

Receive TM 1.1, TM 1.7, TM 5.1 SIS in safe state, TM 5.1 SpW ready, TM 5.1 boot mode entry, TM 5.1 SpW ready, TM 5.1 oper entry, TM 5.1 STEP off, TM 5.1 SIS off, TM 5.1 HET EPT 1 off, TM 5.1 HET EPT 2 off and TM 5.1 readout ended

# Analysis Inspection Review

# Test Platform Requirements

# Additional Information