

CCU Sensors monitoring
File: H_FCP_CCU_MONS.xls
Author: E. Picallo



Procedure Summary

Objectives

This procedure describes the steps needed to monitor the measured data from CCU to check the cryostat health status of:

- Cryostat temperatures and pressures sensors
- CCU internal voltages and internal temperatures

Summary of Constraints

Note that only the cryostat data indicated in parameters on the start monitoring command will be acquired (word#2 to word#6). Then, make sure which data are being monitored before starting the check (ignore the verification of TM parameters not currently monitored)

Normally, all the cryostat parameters should be monitored.

Expected H-PLM temperatures are attached to the procedure according to the predictions after the TV/TB

Spacecraft Configuration

Start of Procedure

Payload management function running
CCU A/B ON and declared ON and valid on 1553 bus
CCU A/B monitoring status enabled

End of Procedure

Payload management function running
CCU A/B ON and declared ON and valid on 1553 bus
CCU A/B monitoring status enabled

Reference File(s)

Input Command Sequences

Output Command Sequences

Referenced Displays

ANDs	GRDs	SLDs
ZAZ9N999		
ZAZ9O999		
ZAZ9J999		
KA013302		
KA015303		
ZAK03999		
ZAK07999		

CCU Sensors monitoring
 File: H_FCP_CCU_MONS.xls
 Author: E. Picallo



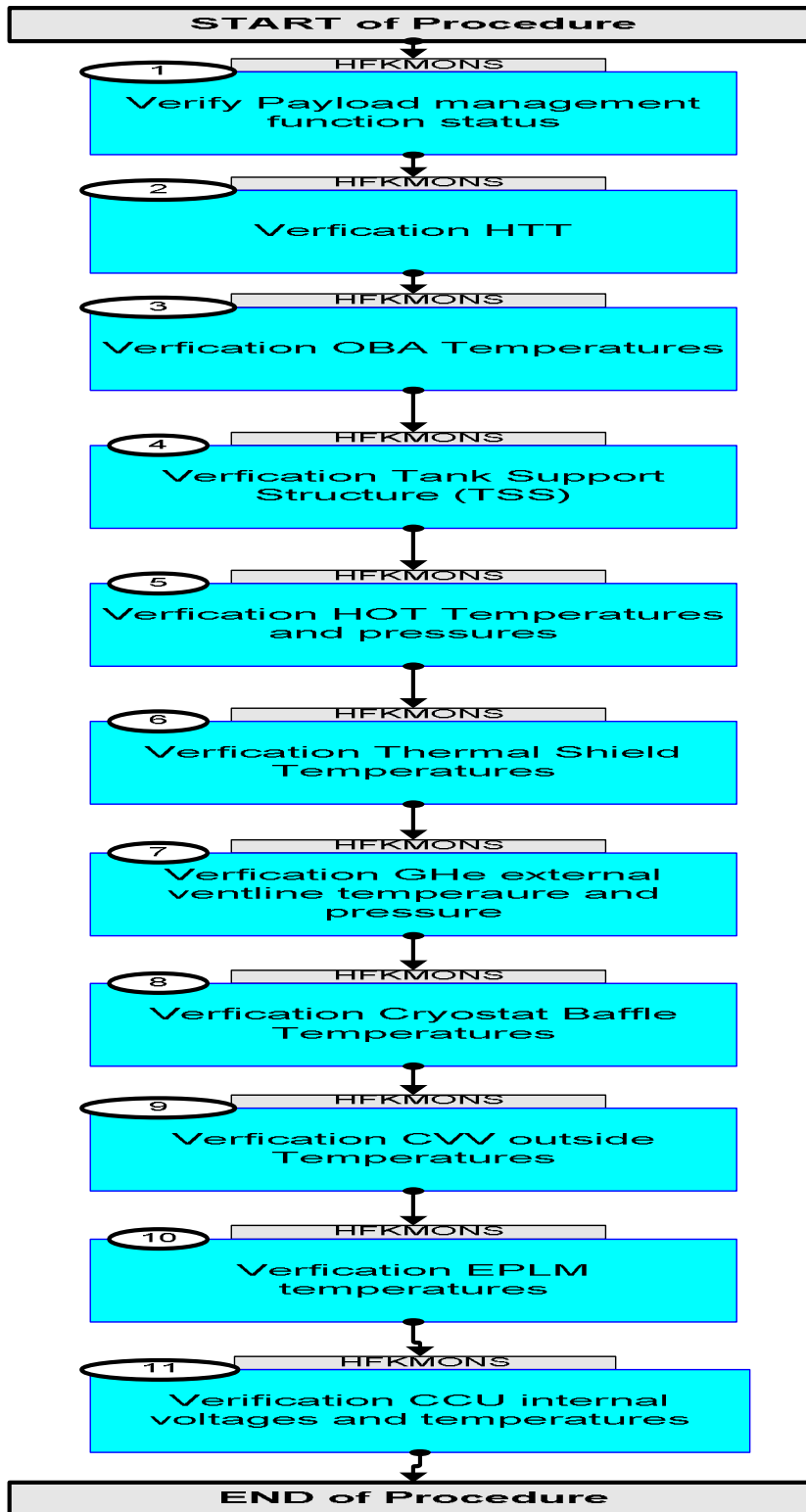
Configuration Control Information

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
29/07/08	1	1	Created	E. Picallo	
21/10/08	2	2	Display mode update	E. Picallo	
18/03/09	2.2	3	Alignment with database related to CDMU 3.8.2	E. Picallo	
09/04/09	2.3	4	Expected H-PLM temperatures are attached to the procedure according to the predictions after the TV/TB	E. Picallo	
14/07/09	2.5	4.01	Validation : Telemetry parameters " Zero reference" limits reviewed	E. Picallo	

CCU Sensors monitoring
File: H_FCP_CCU_MONS.xls
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Procedure Flowchart Overview



CCU Sensors monitoring
 File: H_FCP_CCU_MONS.xls
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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
Beginning of Procedure				
TC Seq. Name : HFKMONS (CCU SensorMonitoring) CCU Temperature and Pressure Sensors Monitoring TimeTag Type: N Sub Schedule ID: <input type="checkbox"/>				
1		Verify Payload management function status		Next Step: 2
1.1		Report payload management function and monitoring status		<input type="checkbox"/>
		Execute Procedure: H_FCP_CCU_REPO Payload management status Report		
1.2		Verify reception of the CCU A monit#1 or CCU A monit#2 monitoring packet		<input type="checkbox"/>
		Verify Packet Reception Her Monitoring 1 Data from CCUA - generation period 512 s Packet Details:	D_H_CCU_A_M1	
		APID: 18 Type: 3 Subtype: 25 PI1: 9752 PI2:		
		Verify Packet Reception Her Monitoring 2 Data from CCUA - generation period 8 s Packet Details:	D_H_CCU_A_M1	
		APID: 18 Type: 3 Subtype: 26 PI1: 22820 PI2:		
1.3		Verify reception of CCU B monit#1 or CCU B monit#2 monitoring packet		<input type="checkbox"/>
		Verify Packet Reception Her Monitoring 1 Data from CCUB - generation period 512 s Packet Details:	D_H_CCU_B_M1	
		APID: 18 Type: 3 Subtype: 25 PI1: 10922 PI2:		

CCU Sensors monitoring
 File: H_FCP_CCU_MONS.xls
 Author: E. Picallo



Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch										
		Verify Packet Reception Her Monitoring 2 Data from CCUB - generation period 8 s Packet Details: <table style="margin-left: 200px;"> <tr><td>APID:</td><td>18</td></tr> <tr><td>Type:</td><td>3</td></tr> <tr><td>Subtype:</td><td>26</td></tr> <tr><td>PI1:</td><td>23600</td></tr> <tr><td>PI2:</td><td></td></tr> </table>	APID:	18	Type:	3	Subtype:	26	PI1:	23600	PI2:		D_H_CCUB_B_M1	
APID:	18													
Type:	3													
Subtype:	26													
PI1:	23600													
PI2:														
2		Verification HTT		Next Step: 3										
2.1		Verification DLCM-1 Temperatures		<input type="checkbox"/>										
		Verify DLCM-1 tank lower bulkhead -x-y ; T1-0 (B) C100_0_T101 KD200303		AND=ZAZ9N999										
		Verify DLCM-1, tank lower bulkhead; -x-y; T2-0 (A) C100_0_T105 KD201302		AND=ZAZ9N999										
2.2		Verification DLCM-2 Temperatures		<input type="checkbox"/>										
		Verify DLCM-2, tank lower bulkhead; -x+y; T2-0 (B) C100_0_T104 KD201303		AND=ZAZ9N999										
		Verify DLCM-2, tank lower bulkhead; -x+y ; T1-0 (A) C100_0_T102 KD200302		AND=ZAZ9N999										
2.3		Verification tank bulkhead Temperatures		<input type="checkbox"/>										
		Verify tank lower bulkhead; -x-z+y; T1-2 (A) C100_2_T106 KD204302		AND=ZAZ9N999										
		Verify tank upper bulkhead; +x-z+y; T1-2 (B) C100_2_T107 KD204303		AND=ZAZ9N999										
		Verify tank upper bulkhead; +x-y-z; T2-2 (A) C100_2_T111 KD205302		AND=ZAZ9N999										
		Verify tank upper bulkhead; +x-y-z; T2-2 (B) C100_2_T112 KD205303		AND=ZAZ9N999										
3		Verification OBA Temperatures		Next Step: 4										
3.1		Level 0 Temperatures		<input type="checkbox"/>										
		Verify L0; on cooling strap to "PACS RED Detector" ; T1-1 (A) C100_1_T221 KD202302		AND=ZAZ9N999										

CCU Sensors monitoring
 File: H_FCP_CCU_MONS.xls
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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify L0; on cooling strap to "PACS Sorption Cooler Evaporator" ; T3-2 (B) C100_2_T222 KD206303		AND=ZAZ9N999
		Verify L0; on cooling strap to "PACS Sorption Cooler Pump" ; T1-3 (A) C100_3_T223 KD209302		AND=ZAZ9N999
		Verify L0; on cooling strap to "PACS BLUE Detector" ; T1-1 (B) C100_1_T224 KD202303		AND=ZAZ9N999
		Verify L0; on cooling strap to "SPIRE SM Detector enclosure" ; T2-1 (B) C100_1_T225 KD203303		AND=ZAZ9N999
		Verify L0; on cooling strap to "SPIRE Cooler Pump HS" ; T1-3 (B) C100_3_T226 KD209303		AND=ZAZ9N999
		Verify L0; on cooling strap to "SPIRE Cooler Evaporator HS" ; T3-2 (A) C100_2_T227 KD206302		AND=ZAZ9N999
		Verify L0; on cooling strap to "HIFI L0" ; T4-2 (A) C100_2_T228 KD207302		AND=ZAZ9N999
3.2		Level 1 Temperatures		☐
		Verify L1; on Ventline upstream cooling strap to "PACS Photometer Optics"; T4-2 (B) C100_2_T231 KD207303		AND=ZAZ9N999
		Verify L1; on Ventline downstream cooling strap to "PACS Photometer Optics" ; T5-2 (A) C100_2_T232 KD208302		AND=ZAZ9N999
		Verify L1; on cooling strap to "PACS Photometer Optics", on FPU Side ; T4-3 (A) C100_3_T242 KD212302		AND=ZAZ9N999
		Verify L1; on Ventline downstream cooling strap to "PACS Collimator" ; T2-3 (B) C100_3_T233 KD210303		AND=ZAZ9N999
		Verify L1; on Ventline downstream cooling strap to "PACS Spectrometer Housing" ; T2-3 (A) C100_3_T234 KD210302		AND=ZAZ9N999
		Verify L1; on Ventline upstream cooling strap to "SPIRE Optical Bench" ; T3-3 (B) C100_3_T235 KD211303		AND=ZAZ9N999
		Verify L1; on Ventline downstream cooling strap to "SPIRE Optical Bench" ; T3-3 (A) C100_3_T236 KD211302		AND=ZAZ9N999
		Verify L1; on cooling strap to "SPIRE Optical Bench" , on FPU side ; T5-3 (B) C100_3_T248 KD213303		AND=ZAZ9N999
		Verify L1; on Ventline downstream cooling strap to "HIFI L1" Interface ; T4-3 (B) C100_3_T237 KD212303		AND=ZAZ9N999
		Verify L1, on cooling strap to "HIFI L1" Interface , on FPU side ; T5-3 (A) C100_3_T244 KD213302		AND=ZAZ9N999
3.3		Level 2 Temperatures		☐

CCU Sensors monitoring
 File: H_FCP_CCU_MONS.xls
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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify OB Plate near PACS mounting foot; T1-4 (A) C100_4_T202 KD221302		AND=ZAZ9N999
		Verify OB Plate near HIFI mounting foot; T1-4 (B) C100_4_T208 KD221303		AND=ZAZ9N999
		Verify OB Shield +x, close to PACS ; T2-4 (A) C100_4_T212 KD222302		AND=ZAZ9N999
		Verify OB Shield +x, close to SPIRE ; T2-4 (B) C100_4_T213 KD222303		AND=ZAZ9N999
		Verify OB Plate near SPIRE foot; center ; T5-4 (A) C100_4_T254 KD225302		AND=ZAZ9N999
		Verify OB Plate near SPIRE foot; -z+y ; T5-4 (B) C100_4_T256 KD225303		AND=ZAZ9N999
		Verify OB Plate near SPIRE foot; -y-z ; T6-4 (A) C100_4_T258 KD226302		AND=ZAZ9N999
3.4		<i>Level 3 Temperatures</i>		□
		Verify L3; on Ventline downstream cooling to 6-JFET (JFET-Phot) ; T3-4 (A) C100_4_T246 KD223302		AND=ZAZ9N999
		Verify L3; on Ventline downstream cooling strap to 2-JFET (JFET-Spec) ; T3-4 (B) C100_4_T247 KD223303		AND=ZAZ9N999
		Verify L3; on cooling strap on Spire 2-JFET (JFET-Spec), on FPU side ; T4-4 (A) C100_4_T250 KD224302		AND=ZAZ9N999
		Verify L3; on cooling strap on Spire 6-JFET (JFET-Phot), on FPU side ; T4-4 (B) C100_4_T252 KD224303		AND=ZAZ9N999
4		<i>Verification Tank Support Structure (TSS)</i>		Next Step: 5
		Verify on upper SFW; +z; nearby chain 03/04 ; T7-4 (B) C100_4_T862 KD227303		AND=ZAZ9N999
5		<i>Verification HOT Temperatures and pressures</i>		Next Step: 6
		Verify tank upper side; +x-y-z; nearby center ; T15-5 (B) PT1000_T701 KD246303		AND=ZAZ9N999
		Verify tank lower side; -x-z; nearby center ; T6-4 (B) C100_4_T703 KD226303		AND=ZAZ9N999
		Verify Pressure lower SFW; +z; SV123 bracket ; P1 (A) Pres_P701 KD264302		AND=ZAZ9N999
		The pressure sensor P701 is associated to HOT, that is not used in-flight.		

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 File: H_FCP_CCU_MONS.xls
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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
6		Verification Thermal Shield Temperatures		Next Step: 7
6.1		Verification TS1 Temperatures		<input type="checkbox"/>
		Verify Thermalshield 1, outside on lower bulkhead under MLI, in +x+y plane ; T11-5 (A) PT1000_T421 KD242302		AND=ZAZ90999
		Verify Thermalshield 1, outside on cylinder under MLI, in +x+y plane ; T11-5 (B) PT1000_T422 KD242303		AND=ZAZ90999
		Verify Thermalshield 1, outside on upper cone close to beam entrance under MLI, in +x+y plane ; T12-5 (A) PT1000_T424 KD243302		AND=ZAZ90999
6.2		Verification TS2 Temperatures		<input type="checkbox"/>
		Verify Thermalshield 2, outside on lower bulkhead under MLI, in +x+y plane ; T12-5 (B) PT1000_T441 KD243303		AND=ZAZ90999
		Verify Thermalshield 2, outside on cylinder under MLI, in +x+y plane ; T13-5 (A) PT1000_T442 KD244302		AND=ZAZ90999
		Verify Thermalshield 2, outside on upper cone close to beam entrance under MLI, in +x+y plane ; T13-5 (B) PT1000_T444 KD244303		AND=ZAZ90999
6.3		Verification TS3 Temperatures		<input type="checkbox"/>
		Verify Thermalshield 3, outside on lower bulkhead under MLI, in +x+y plane ; T14-5 (A) PT1000_T461 KD245302		AND=ZAZ90999
		Verify Thermalshield 3, outside on cylinder under MLI, in +x+y plane ; T14-5 (B) PT1000_T462 KD245303		AND=ZAZ90999
		Verify Thermalshield 3, outside on upper cone close to beam entrance under MLI, in +x+y plane ; T15-5 (A) PT1000_T464 KD246302		AND=ZAZ90999
7		Verification GHe external ventline temperaure and pressure		Next Step: 8
7.1		Verification Ventline Temperatures		<input type="checkbox"/>
		Verify integrated into ventline unit ; T29-5 (B) PT1000_T507 KD261303		AND=ZAZ9N999
		Verify on outlet of ventline unit ; T3-5 (A) PT1000_T501 KD234302		AND=ZAZ9N999

CCU Sensors monitoring
 File: H_FCP_CCU_MONS.xls
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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
7.2		Verification near Nozzles Temperatures and pressure		<input type="checkbox"/>
		Verify near nozzle N513, CVV Cylinder external -z ; T23-5 (B) PT1000_T504 KD255303		AND=ZAZ9N999
		Verify near nozzle N511, CVV Cylinder external -z ; T45 (A) PT1000_T505 KD235302		AND=ZAZ9N999
		Verify near nozzle N512, CVV Cylinder external -z ; T24-5 (B) PT1000_T506 KD256303		AND=ZAZ9N999
		Verify Pressure external tubing inlet to nozzle N511/N512 ; P1 (B) Pres_P502 KD264303		AND=ZAZ9N999
8		Verification Cryostat Baffle Temperatures		Next Step: 9
		Verify On Baffle; cylinder outside; -z ; T5-5 (A) PT1000_T651 KD236302		AND=ZAZ9O999
		Verify On Baffle; cylinder outside; +z ; T25-5 (B) PT1000_T652 KD257303		AND=ZAZ9O999
9		Verification CVV outside Temperatures		Next Step: 10
9.1		Verification bulkhead Temperatures		<input type="checkbox"/>
		Verify CVV outside upper bulkhead, on upper plane; -z ; T6-5 (A) PT1000_T901 KD237302		AND=ZAZ9O999
		Verify CVV outside upper bulkhead, on lower spline; -z ; T26-5 (B) PT1000_T902 KD258303		AND=ZAZ9O999
		Verify CVV outside lower bulkhead - z ; T7-5 (A) PT1000_T903 KD238302		AND=ZAZ9O999
		Verify CVV outside lower bulkhead +z ; T4-5 (B) PT1000_T904 KD235303		AND=ZAZ9O999
		Verify CVV outside upper bulkhead, on lower spline; +z ; T19-5 (A) PT1000_T905 KD251302		AND=ZAZ9O999
		Verify CVV outside upper bulkhead, on lower spline; +y ; T5-5 (B) PT1000_T906 KD236303		AND=ZAZ9O999
9.2		Verification +y Radiator Temperatures		<input type="checkbox"/>
		Verify CVV outside; on +y Radiator upper part ; T8-5 (A) PT1000_T907 KD239302		AND=ZAZ9O999
		Verify CVV outside; on +y Radiator lower part ; T27-5 (B) PT1000_T908 KD259303		AND=ZAZ9O999

CCU Sensors monitoring
 File: H_FCP_CCU_MONS.xls
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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
9.3		<i>Verification -y Radiator Temperatures</i>		<input type="checkbox"/>
		Verify CVV outside; on -y Radiator lower part ; T20-5 (A) PT1000_T909 KD252302		AND=ZAZ90999
		Verify CVV outside; on -y Radiator upper part ; T6-5 (B) PT1000_T910 KD237303		AND=ZAZ90999
9.4		<i>Verification -z Radiator Temperatures</i>		<input type="checkbox"/>
		Verify CVV outside; on -z Radiator upper par ; T9-5 (A) PT1000_T911 KD240302		AND=ZAZ90999
		Verify CVV outside; on -z Radiator lower part ; T28-5 (B) PT1000_T912 KD260303		AND=ZAZ90999
9.5		<i>Verification LOU radiator Temperature</i>		<input type="checkbox"/>
		Verify LOU Radiator ; T28-5 (A) PT1000_T933 KD260302		AND=ZAZ90999
9.6		<i>Verification LOU Baseplate Temperatures</i>		<input type="checkbox"/>
		Verify LOU Baseplate; on -Z ; T27-5 (A) PT1000_T931 KD259302		AND=ZAZ90999
		Verify LOU Baseplate; on +Z ; T7-5 (B) PT1000_T932 KD238303		AND=ZAZ90999
9.7		<i>Verification HIFI Wave Guides Temperatures</i>		<input type="checkbox"/>
		Verify On Wave Guide nearby LOU; T8-5 (B) PT1000_T934 KD239303		AND=ZAZ90999
		Verify On Wave Guide nearby SVM ; T29-5 (A) PT1000_T935 KD261302		AND=ZAZ90999
10		<i>Verification EPLM temperatures</i>		Next Step: 11
10.1		<i>Verification SVM Shield Temperatures</i>		<input type="checkbox"/>
		Verify SVM Shield; on top +y ; T1-5 (A) PT1000_T321 KD232302		AND=ZAZ90999
		Verify SVM Shield; on top +y-z ; T21-5 (B) PT1000_T322 KD253303		AND=ZAZ90999

CCU Sensors monitoring
 File: H_FCP_CCU_MONS.xls
 Author: E. Picallo



Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify SVM Shield; on top -z-y ; T2-5 (A) PT1000_T323 KD233302		AND=ZAZ90999
		Verify SVM Shield; on top -y ; T22-5 (B) PT1000_T324 KD254303		AND=ZAZ90999
10.2		<i>Verification Sunshade Temperatures</i>		□
		Verify Sunshade structure; +y panel top ; T1-5 (B) PT1000_T311 KD232303		AND=ZAZ90999
		Verify Sunshade structure; +y panel bottom ; T16-5 (A) PT1000_T312 KD248302		AND=ZAZ90999
		Verify Sunshade structure; -y panel top ; T2-5 (B) PT1000_T313 KD233303		AND=ZAZ90999
		Verify Sunshade structure; -y panel bottom ; T17-5 (A) PT1000_T314 KD249302		AND=ZAZ90999
		Verify Sunshade structure; center panel bottom ; T3-5 (B) PT1000_T315 KD234303		AND=ZAZ90999
		Verify Sunshade structure; center panel top ; T18-5 (A) PT1000_T316 KD250302		AND=ZAZ90999
10.3		<i>Verification telescope Temperatures</i>		□
		Verify on telescope; M1 THA ; T21-5 (A) PT1000_T331 KD253302		AND=ZAZ9J999
		Verify on telescope; M1 THA'' ; T16-5 (B) PT1000_T332 KD248303		AND=ZAZ9J999
		Verify on telescope; M1 THA' ; T22-5 (A) PT1000_T333 KD254302		AND=ZAZ9J999
		Verify on telescope; M1 THB ; T17-5 (B) PT1000_T334 KD249303		AND=ZAZ9J999
		Verify on telescope; M1 THC ; T23-5 (A) PT1000_T335 KD255302		AND=ZAZ9J999
		Verify on telescope; M1 THB' ; T18-5 (B) PT1000_T336 KD250303		AND=ZAZ9J999
		Verify on telescope; M1 THC' ; T24-5 (A) PT1000_T337 KD256302		AND=ZAZ9J999
		Verify on telescope; M1 THB'' ; T19-5 (B) PT1000_T338 KD251303		AND=ZAZ9J999
		Verify on telescope; M2 THX ; T25-5 (A) PT1000_T339 KD257302		AND=ZAZ9J999

CCU Sensors monitoring
 File: H_FCP_CCU_MONS.xls
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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify on telescope; M1 THC'' ; T20-5 (B) PT1000_T340 KD252303		AND=ZAZ9J999
		Verify on telescope; M2 THY ; T26-5 (A) PT1000_T341 KD258302		AND=ZAZ9J999
		Verify on telescope; M2 THZ ; T30-5 (B) PT1000_T342 KD262303		AND=ZAZ9J999
11		Verification CCU internal voltages and temperatures		Next Step: END
11.1		Verification CCU A internal voltages and temperatures		□
		Verify CCU internal voltage (+5V) Telemetry Volt_CCUIV5 A KD275302	= 5.0 V	AND=KA013302
		Verify CCU internal voltage (+15V) Telemetry Volt_CCUIV15 A KD276302	= 15.0 V	AND=KA013302
		Verify CCU internal voltage (+9.5V) Telemetry Volt_CCUIV9_5 A KD277302	= 9.5 V	AND=KA013302
		Verify Telemetry Temp_CCUIVCM A KD278302		AND=KA013302
		Verify Zero reference (offset for Mx measurements) Telemetry Zero_Ref A KM279300	> 1545 <dec> < 1577 <dec>	AND=ZAK03999
11.2		Verification CCU B internal voltages and temperatures		□
		Verify CCU internal voltage (+5V) Telemetry Volt_CCUIV5 B KD275303	= 5.0 V	AND=KA015303
		Verify CCU internal voltage (+15V) Telemetry Volt_CCUIV15 B KD276303	= 15.0 V	AND=KA015303
		Verify CCU internal voltage (+9.5V) Telemetry Volt_CCUIV9_5 B KD277303	= 9.5 V	AND=KA015303
		Verify CCU internal temp. (VCM) Telemetry Temp_CCUIVCM B KD278303		AND=KA015303
		Verify Zero reference (offset for Mx measurements) Telemetry Zero_Ref B KM279301	> 1503 <dec> < 1535 <dec>	AND=ZAK07999
End of Procedure				

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TH#	Part	Measurement	Mounting Position	Type	CCU	Sensor Range	TM ID	Predicted in-flight temperature (°K) [after TVTB results]
T101	HTT	DLCM	DLCM-1, tank lower bulkhead; -x-y; integrated into DLCM housing	C100	B	1.5K - 2.2K (Temp. Mode)	KD200303	1.609
T102	HTT	DLCM	DLCM-2, tank lower bulkhead; -x+y; integrated into DLCM housing	C100	A	1.5K - 2.2K (Temp. Mode)	KD200302	1.609
T104	HTT	DLCM	DLCM-2, tank lower bulkhead; -x+y; integrated into DLCM housing	C100	B	1.5K - 2.2K (Temp. Mode)	KD201303	1.609
T105	HTT	DLCM	DLCM-1, tank lower bulkhead; -x-y; integrated into DLCM housing	C100	A	1.5K - 2.2K (Temp. Mode)	KD201302	1.609
T106	HTT	Tank Temperature	tank lower bulkhead; -x-z+y	C100	A	1.5K - 2.2K	KD204302	1.609
T107	HTT	Tank Temperature	tank upper bulkhead; +x-z+y	C100	B	1.5K - 2.2K	KD204303	1.609
T111	HTT	PPS	tank upper bulkhead; +x-y-z; integrated into PPS housing	C100	A	1.5K - 2.2K	KD205302	1.609
T112	HTT	PPS	tank upper bulkhead; +x-y-z; integrated into PPS housing	C100	B	1.5K - 2.2K	KD205303	1.609
T202	OBA	Optical Bench Plate Temperature near PACS FPU	OB Plate near PACS mounting foot; +x+z	C100	A	3.0K - 20.0K	KD221302	12.729
T208	OBA	Optical Bench Plate Temperature near HIFI FPU	OB Plate near HIFI mounting foot; +x+z-y	C100	B	3.0K - 20.0K	KD221303	12.602
T212	OBA	Optical Bench Shield Temperature	OB Shield +x, close to PACS	C100	A	3.0K - 20.0K	KD222302	12.749
T213	OBA	Optical Bench Shield Temperature	OB Shield +x, close to SPIRE	C100	B	3.0K - 20.0K	KD222303	12.749
T221	OBA	L0 I/F Verification	L0; on cooling strap to "PACS RED Detector"	C100	A	1.6K - 2.0K	KD202302	1.630
T222	OBA	L0 I/F Verification	L0; on cooling strap to "PACS Sorption Cooler Evaporator"	C100	B	1.5K - 2.2K	KD206303	1.616
T223	OBA	L0 I/F Verification	L0; on cooling strap to "PACS Sorption Cooler Pump"	C100	A	2.0K - 10.0K	KD209302	1.634
T224	OBA	L0 I/F Verification	L0; on cooling strap to "PACS BLUE Detector"	C100	B	1.6K - 2.0K	KD202303	1.635
T225	OBA	L0 I/F Verification	L0; on cooling strap to "SPIRE SM Detector enclosure"	C100	B	1.6K - 2.0K	KD203303	1.629
T226	OBA	L0 I/F Verification	L0; on cooling strap to "SPIRE Cooler Pump HS"	C100	B	2.0K - 10.0K	KD209303	1.653
T227	OBA	L0 I/F Verification	L0; on cooling strap to "SPIRE Cooler Evaporator HS"	C100	A	1.5K - 2.2K	KD206302	1.613
T228	OBA	L0 I/F Verification	L0; on cooling strap to "HIFI L0"	C100	A	1.5K - 2.2K	KD207302	1.801
T231	OBA	Level 1 Inlet Temperature	L1; on Ventline upstream cooling strap to "PACS Photometer Optics"	C100	B	1.5K - 2.2K	KD207303	1.889
T232	OBA	Level 1 Heatload	L1; on Ventline downstream cooling strap to "PACS Photometer Optics"	C100	A	1.5K - 2.2K	KD208302	2.436
T233	OBA	Level 1 Heatload	L1; on Ventline downstream cooling strap to "PACS Collimator"	C100	B	2.0K - 10.0K	KD210303	2.885
T234	OBA	Level 1 Heatload	L1; on Ventline downstream cooling strap to "PACS Spectrometer Housing"	C100	A	2.0K - 10.0K	KD210302	3.170
T235	OBA	Level 1 Heatload	L1; on Ventline upstream cooling strap to "SPIRE Optical Bench"	C100	B	2.0K - 10.0K	KD211303	4.021
T236	OBA	Level 1 Heatload	L1; on Ventline downstream cooling strap to "SPIRE Optical Bench"	C100	A	2.0K - 10.0K	KD211302	4.598
T237	OBA	Level 1 Heatload	L1; on Ventline downstream cooling strap to "HIFI L1" Interface	C100	B	2.0K - 10.0K	KD212303	5.460
T242	OBA	Level 1 Temperature	L1; on cooling strap to "PACS Photometer Optics", on FPU Side	C100	A	2.0K - 10.0K	KD212302	2.650
T244	OBA	Level 1 Temperature	L1; on cooling strap to "HIFI L1" Interface, on FPU side	C100	A	2.0K - 10.0K	KD213302	5.529
T246	OBA	Level 3 Heatload	L3; on Ventline downstream cooling to 6-JFET (JFET-Phot)	C100	A	3.0K - 20.0K	KD223302	13.350

CCU Sensors monitoring
 File: H_FCP_CCU_MONS.xls
 Author: E. Picallo

T311	HSS (Sunshade)	Sunshade Temperature	Sunshade structure; +y panel top	PT1000	B	13K - 370K	KD232303	261.553
T312	HSS (Sunshade)	Sunshade Temperature	Sunshade structure; +y panel bottom	PT1000	A	13K - 370K	KD248302	261.577
T313	HSS (Sunshade)	Sunshade Temperature	Sunshade structure; -y panel top	PT1000	B	13K - 370K	KD233303	261.553
T314	HSS (Sunshade)	Sunshade Temperature	Sunshade structure; -y panel bottom	PT1000	A	13K - 370K	KD249302	261.578
T315	HSS (Sunshade)	Sunshade Temperature	Sunshade structure; center panel bottom	PT1000	B	13K - 370K	KD234303	276.205
T316	HSS (Sunshade)	Sunshade Temperature	Sunshade structure; center panel top	PT1000	A	13K - 370K	KD250302	276.158
T321	SVM Shield	SVM Shield Temperature	SVM Shield; on top +y	PT1000	A	13K - 370K	KD232302	132.706
T322	SVM Shield	SVM Shield Temperature	SVM Shield; on top +y-z	PT1000	B	13K - 370K	KD253303	126.145
T323	SVM Shield	SVM Shield Temperature	SVM Shield; on top -z-y	PT1000	A	13K - 370K	KD233302	129.748
T324	SVM Shield	SVM Shield Temperature	SVM Shield; on top -y	PT1000	B	13K - 370K	KD254303	135.873
T331	Telescope	M1 Temperature	on telescope; M1	PT1000	A	50K - 370K	KD253302	85.116
T332	Telescope	M1 Temperature	on telescope; M1	PT1000	B	50K - 370K	KD248303	85.116
T333	Telescope	M1 Temperature	on telescope; M1	PT1000	A	50K - 370K	KD254302	85.117
T334	Telescope	M1 Temperature	on telescope; M1	PT1000	B	50K - 370K	KD249303	85.071
T335	Telescope	M1 Temperature	on telescope; M1	PT1000	A	50K - 370K	KD253302	85.074
T336	Telescope	M1 Temperature	on telescope; M1	PT1000	B	50K - 370K	KD250303	85.093
T337	Telescope	M1 Temperature	on telescope; M1	PT1000	A	50K - 370K	KD256302	85.074
T338	Telescope	M1 Temperature	on telescope; M1	PT1000	B	50K - 370K	KD251303	85.094
T339	Telescope	M2 Temperature	on telescope; M2	PT1000	A	50K - 370K	KD257302	82.494
T340	Telescope	M1 Temperature	on telescope; M1	PT1000	B	50K - 370K	KD252303	85.094
T341	Telescope	M2 Temperature	on telescope; M2	PT1000	A	50K - 370K	KD258302	82.494
T342	Telescope	M2 Temperature	on telescope; M2	PT1000	B	50K - 370K	KD262303	82.494
T421	TS1	Thermal Shield 1 Temperature	Thermalshield 1, outside on lower bulkhead under MLI, in +x+y plane	PT1000	A	13K - 370K	KD242302	34.069
T422	TS1	Thermal Shield 1 Temperature	Thermalshield 1, outside on cylinder under MLI, in +x+y plane	PT1000	B	13K - 370K	KD242303	33.844
T424	TS1	Thermal Shield 1 Temperature	Thermalshield 1, outside on upper cone close to beam entrance under MLI, in +x+y plane	PT1000	A	13K - 370K	KD243302	33.888
T441	TS2	Thermal Shield 2 Temperature	Thermalshield 2, outside on lower bulkhead under MLI, in +x+y plane	PT1000	B	13K - 370K	KD243303	45.323
T442	TS2	Thermal Shield 2 Temperature	Thermalshield 2, outside on cylinder under MLI, in +x+y plane	PT1000	A	13K - 370K	KD244302	45.317
T444	TS2	Thermal Shield 2 Temperature	Thermalshield 2, outside on upper cone close to beam entrance under MLI, in +x+y plane	PT1000	B	13K - 370K	KD244303	45.277
T461	TS3	Thermal Shield 3 Temperature	Thermalshield 3, outside on lower bulkhead under MLI, in +x+y plane	PT1000	A	13K - 370K	KD245302	54.517
T462	TS3	Thermal Shield 3 Temperature	Thermalshield 3, outside on cylinder under MLI, in +x+y plane	PT1000	B	13K - 370K	KD245303	54.384
T464	TS3	Thermal Shield 3 Temperature	Thermalshield 3, outside on upper cone close to beam entrance under MLI, in +x+y plane	PT1000	A	13K - 370K	KD246302	54.579
T501	GHe S/S external Ventline	CVV Outlet Temperature	on outlet of ventline unit	PT1000	A	13K - 370K	KD234302	61.658
T504	GHe S/S external Ventline	Ventline Temperature	near nozzle N513, CVV Cylinder external -z	PT1000	B	13K - 370K	KD255303	65.237
T505	GHe S/S external Ventline	Ventline Temperature	near nozzle N511, CVV Cylinder external -z	PT1000	A	13K - 370K	KD235302	65.591
T506	GHe S/S external Ventline	Small Nozzle Temperature	near nozzle N512, CVV Cylinder external -z	PT1000	B	13K - 370K	KD256303	65.591
T507	GHe S/S external Ventline	H501 Control Sensor red.	integrated into ventline unit	PT1000	B	13K - 370K	KD261303	60.669
T651	Cryostat Baffle	Straylight	On Baffle; cylinder outside; -z	PT1000	A	13K - 370K	KD236302	65.557
T652	Cryostat Baffle	Straylight	On Baffle; cylinder outside; +z	PT1000	B	13K - 370K	KD257303	66.896
T701	HOT	Filling and Depletion	tank upper side; +x-y-z; nearby center	PT1000	B	13K - 370K	KD246303	19.601
T703	HOT	Filling and Depletion	tank lower side; -x-z; nearby center	C100	B	3.0K - 20.0K	KD226303	19.601

CCU Sensors monitoring
 File: H_FCP_CCU_MONS.xls
 Author: E. Picallo

T901	CVV	CVV temperature	CVV outside upper bulkhead, on upper plane; -z	PT1000	A	13K - 370K	KD237302	65.205
T902	CVV	CVV temperature	CVV outside upper bulkhead, on lower spline; -z	PT1000	B	13K - 370K	KD258303	65.370
T903	CVV	CVV temperature	CVV outside lower bulkhead -z	PT1000	A	13K - 370K	KD238302	67.391
T904	CVV	CVV temperature	CVV outside lower bulkhead +z	PT1000	B	13K - 370K	KD235303	68.656
T905	CVV	CVV temperature	CVV outside upper bulkhead, on lower spline; +z	PT1000	A	13K - 370K	KD251302	67.814
T906	CVV	CVV temperature	CVV outside upper bulkhead, on lower spline; +y	PT1000	B	13K - 370K	KD236303	66.524
T907	CVV	CVV temperature	CVV outside; on +y Radiator upper part	PT1000	A	13K - 370K	KD239302	65.830
T908	CVV	CVV temperature	CVV outside; on +y Radiator lower part	PT1000	B	13K - 370K	KD259303	65.830
T909	CVV	CVV temperature	CVV outside; on -y Radiator lower part	PT1000	A	13K - 370K	KD252302	66.296
T910	CVV	CVV temperature	CVV outside; on -y Radiator upper part	PT1000	B	13K - 370K	KD237303	66.296
T911	CVV	CVV temperature	CVV outside; on -z Radiator upper part	PT1000	A	13K - 370K	KD240302	64.402
T912	CVV	CVV temperature	CVV outside; on -z Radiator lower part	PT1000	B	13K - 370K	KD260303	65.526
T931	CVV	LOU temperature	LOU Baseplate; on -Z	PT1000	A	13K - 370K	KD259303	125.362
T932	CVV	LOU temperature	LOU Baseplate; on +Z	PT1000	B	13K - 370K	KD238303	125.374
T933	CVV	LOU temperature	LOU Radiator;	PT1000	A	13K - 370K	KD260302	116.079
T934	CVV	Waveguide temperature	On Wave Guide nearby LOU;	PT1000	B	13K - 370K	KD239303	131.216
T935	CVV	Waveguide temperature	On Wave Guide nearby SVM	PT1000	A	13K - 370K	KD261302	182.277