Interlock PLC commissioning 03 - 07 July 2017

Inputs / outputs tests

PLC (GND2)

I/O Type	Electrical Type	Slot	Channel	Supersection	Section	Subsection	Discipline	Device	Index	Property	Comment	Closed	Tested	Cabled on PLC	To the electrical connector	To the sensor	Correct	Incorrect	Commentaire	Date
DI	24V		0	LNS	ISRC	010	ISS	HVPf		MPSOK	Yes	Machine Protection System Status	OK	Yes	Yes	Yes	Yes	Yes		Connected to an output of the EMU PLC	
DI	24V		1	LNS	ISRC	010	ISS	HVPf		LNSSafetyOK	LNS Safety System Status	OK	Yes	Yes	Yes	Yes	Yes				
DI	24V		2	LNS	ISRC	010	ISS	HVPf		AccessOK	Access Status key	OK	Yes	Yes	Yes	Yes	Yes				
DI	24V		3	LNS	LEBT	010	PBI	FC		In	Faraday Cup In	In	Yes	Yes	Yes	Yes	Yes				
DI	24V		4	LNS	LEBT	010	PBI	FC		Out	Faraday Cup Out	Out	Yes	Yes	Yes	Yes	Yes				
DI	24V		5	LNS	LEBT	010	PBI	FC		CoolingWaterFlowOK	Faraday Cup Cooling Water Flow Status	Flow OK	Yes	Yes	Yes	Yes	Yes				
DI	24V		6	LNS	ISRC	010	BMD	PrChop		PowerSystemOk	Chopper Power System Status	OK	Yes	Yes	Yes	Yes	Yes				
DI	24V		7	LNS	ISRC	010	BMD	PrChop		ChoppingVoltageAlarm	Chopper Chopping Voltage Alarm	Alarm	Yes	Yes	Yes	Yes	Yes				
DI	24V	2	8	LNS	LEBT	010	PBI	EMU	001	Out	EMU Inserted Status	Out	Yes	Yes	Yes	Yes	Yes				
DI	24V		9	LNS	LEBT	010	BMD	Sol	01	TemperatureOK	Solenoid 1 Temperature Status	Temp OK	Yes	Yes	Yes	Yes	Yes				
DI	24V		10	LNS	LEBT	010	BMD	Sol	02	TemperatureOK	Solenoid 2 Temperature Status	Temp OK	Yes	Yes	Yes	Yes	Yes				
DI	24V		11	LNS	LEBT	010	BMD	Sol	01	CoolingWaterFlowOK	Solenoid 1 Cooling Water Flow Status	Flow OK	Yes	Yes	Yes	Yes	Yes				
DI	24V		12	LNS	LEBT	010	BMD	Sol	02	CoolingWaterFlowOK	Solenoid 2 Cooling Water Flow Status	Flow OK	Yes	Yes	Yes	Yes	Yes		Tested without water first		
DI	24V		13	LNS	LEBT	010	BMD	PrCDmp		CoolingWaterFlowOK	Beam Stop Cooling Water Flow Status	Flow OK	Yes	Yes	Yes	Yes	Yes		Tested without water first		
DI	24V		14	LNS	LEBT	010	ID	Coil	01	CoolingWaterFlowOK	Collimator Cooling Water Flow Status	Flow OK	Yes	Yes	Yes	Yes	Yes		Tested without water first		
DI	24V		15	LNS	ISRC	010	BMD	Rep		CoolingWaterFlowOK	Electrodes Cooling Water Flow Status	Flow OK	Yes	Yes	Yes	Yes	Yes				
DI	24V		0	LNS	ISRC	010	BMD	PrChop		CoolingWaterFlowOK	Chopper Cooling Water Flow Status	Flow OK	Yes	Yes	Yes	Yes	Yes				
DI	24V		1	LNS	LEBT	010	PBI	Iris		CoolingWaterFlowOK	IRIS Cooling Water Flow Status	Flow OK	Yes	Yes	Yes	Yes			Not used in a first time		
DI	24V		2	LNS	LEBT	010	PBI	EMU	001	HorizontalCoolingWaterFlowOK	EMU Horizontal Plane Cooling Water Flow Status	Flow OK	Yes	Yes	Yes	Yes	Yes		Tested without water first		
DI	24V		3	LNS	LEBT	010	PBI	EMU	002	VerticalCoolingWaterFlowOK	EMU Vertical Plane Cooling Water Flow Status	Flow OK	Yes	Yes	Yes	Yes	Yes		Copy to EMU PLC		
DI	24V		4	LNS	LEBT	010	Vac	PLC	11111	VacuumOK	Vacuum Status	OK	Yes	Yes	Yes	Yes	Yes				
DI	24V		5	LNS	LEBT	010	PWRC	PSCH	01	Polarity	Horizontal Steerer 1 Power Supply Polarity	Positive	Yes	Yes	Yes	Yes	Yes				
DI	24V		6	LNS	LEBT	010	PWRC	PSCH	02	Polarity	Horizontal Steerer 2 Power Supply Polarity	Positive	Yes	Yes	Yes	Yes	Yes				
DI	24V	3	7	LNS	LEBT	010	PWRC	PSCV	01	Polarity	Vertical Steerer 1 Power Supply Polarity	Positive	Yes	Yes	Yes	Yes	Yes				
DI	24V		8	LNS	LEBT	010	PWRC	PSCV	02	Polarity	Vertical Steerer 2 Power Supply Polarity	Positive	Yes	Yes	Yes	Yes	Yes				
DI	24V		9	LNS							DI Spare			No							
DI	24V		10	LNS							DI Spare			No							
DI	24V		11	LNS							DI Spare			No							
DI	24V		12	LNS							DI Spare			No							
DI	24V		13	LNS							DI Spare			No							
DI	24V		14	LNS							DI Spare			No							
DI	24V		15	LNS							DI Spare			No							
AI	4-20 mA		0	LNS	ISRC	010	WTRC	PT	001	Pressure	GND Cooling Water Inlet Pressure		Yes	Yes	Yes	Yes	Yes				
AI	4-20 mA		1	LNS	ISRC	010	WTRC	PT	002	Pressure	GND Cooling Water Outlet Pressure		Yes	Yes	Yes	Yes	Yes				
AI	4-20 mA		2	LNS	ISRC	010	WTRC	TT	001	Temperature	GND Cooling Water Inlet Temperature		Yes	Yes	Yes	Yes	Yes				
AI	0-10V	4	3	LNS	LEBT	010	PWRC	PSCH	01	Current	Horizontal Steerer 1 Current		Yes	Yes	Yes	Yes					
AI	0-10V		4	LNS	LEBT	010	PWRC	PSCH	02	Current	Horizontal Steerer 2 Current		Yes	Yes	Yes	Yes					
AI	0-10V		5	LNS	LEBT	010	PWRC	PSCV	01	Current	Vertical Steerer 1 Current		Yes	Yes	Yes	Yes					
AI	0-10V		6	LNS	LEBT	010	PWRC	PSCV	02	Current	Vertical Steerer 2 Current		Yes	Yes	Yes	Yes					
AI	0-10V		7	LNS	LEBT	010	PWRC	SolPS	01	Current	Solenoid 1 Current		Yes	Yes		Yes					
AI	0-10V		0	LNS	LEBT	010	PWRC	SolPS	02	Current	Solenoid 2 Current		Yes	Yes	Yes	Yes					
AI	20 mA/0-10V		1	LNS							AI Spare			No							
AI	20 mA/0-10V		2	LNS							AI Spare			No							
AI	20 mA/0-10V	5	3	LNS							AI Spare			No							
AI	20 mA/0-10V		4	LNS							AI Spare			No							
AI	20 mA/0-10V		5	LNS							AI Spare			No							
AI	20 mA/0-10V		6	LNS							AI Spare			No							
AI	20 mA/0-10V		7	LNS							AI Spare			No							
DO	24V		0	LNS	ISRC	010	Ctrl	PLC	01	SourceOK1	Source Status to Machine Protection System	OK	No	Yes	Yes	No			MPS missing		
DO	24V		1	LNS							DO Spare			No							
DO	24V		2	LNS	ISRC	010	ISS	HVPS		InterlockEnableCmd	High Voltage Power Supply Interlock Command	Enable	Yes	Yes	Yes	Yes	Yes				
DO	24V		3	LNS	LEBT	010	PWRC	SolPS	01	EnableCmd	Solenoid 1 Power Supply Enable Command	Enable	Yes	Yes	Yes	Yes	Yes				
DO	24V		4	LNS	LEBT	010	PWRC	SolPS	02	EnableCmd	Solenoid 2 Power Supply Enable Command	Enable	Yes	Yes	Yes	Yes	Yes				
DO	24V		5	LNS	LEBT	010	PWRC	PSCH	01	InterlockEnableCmd	Horizontal Steerer 1 Power Supply Interlock Command	Enable	Yes	Yes	Yes	Yes	Yes				
DO	24V		6	LNS	LEBT	010	PWRC	PSCH	02	InterlockEnableCmd	Horizontal Steerer 2 Power Supply Interlock Command	Enable	Yes	Yes	Yes	Yes	Yes				
DO	24V	6	7	LNS	LEBT	010	PWRC	PSCV	01	InterlockEnableCmd	Vertical Steerer 1 Power Supply Interlock Command	Enable	Yes	Yes	Yes	Yes	Yes				
DO	24V		8	LNS	LEBT	010	PWRC	PSCV	02	InterlockEnableCmd	Vertical Steerer 2 Power Supply Interlock Command	Enable	Yes	Yes	Yes	Yes	Yes				
DO	24V		9	LNS	LEBT	010	PBI	FC		InsertCmd	Faraday Cup Insert Command	Insert	Yes	Yes	Yes	Yes	Yes				
DO	24V		10	LNS	ISRC	010	BMD	PrChop		HighVoltageEnableCmd	Chopper High Voltage Enable Command	Enable	Yes	Yes	Yes	Yes	Yes				
DO	24V		11	LNS							DO Spare			No							
DO	24V		12	LNS	ISRC	010	Ctrl	PLC	01	FCNOTInserted	Faraday Cup NOT Inserted Status	Out	Yes	Yes	Yes	Yes	Yes				
DO	24V		13	LNS	ISRC	010	Ctrl	PLC	01	SourceOK2	Source Status to LNS Safety System	Safe	Yes	Yes	Yes	Yes	Yes				
DO	24V		14	LNS							DO Spare			No							
DO	24V		15	LNS							DO Spare			No							
DO	24V		0	LNS	LEBT	010	PWRC	PSCH	01	PolarityPositiveCmd	Horizontal Steerer 1 Power Supply Positive Polarity Command	On	Yes	Yes	Yes	Yes	Yes				
DO	24V		1	LNS	LEBT	010	PWRC	PSCH	02	PolarityPositiveCmd	Horizontal Steerer 2 Power Supply Positive Polarity Command	On	Yes	Yes	Yes	Yes	Yes				
DO	24V		2	LNS	LEBT	010	PWRC	PSCV	01	PolarityPositiveCmd	Vertical Steerer 1 Power Supply Positive Polarity Command	On	Yes	Yes	Yes	Yes	Yes				
DO	24V		3	LNS	LEBT	010	PWRC	PSCV	02	PolarityPositiveCmd	Vertical Steerer 2 Power Supply Positive Polarity Command	On	Yes	Yes	Yes	Yes	Yes				
DO	24V		4	LNS	LEBT	010	PWRC	PSCH	01	PolarityNegativeCmd	Horizontal Steerer 1 Power Supply Negative Polarity Command	On	Yes	Yes	Yes	Yes	Yes				
DO	24V		5	LNS	LEBT	010	PWRC	PSCH	02	PolarityNegativeCmd	Horizontal Steerer 2 Power Supply Negative Polarity Command	On	Yes	Yes	Yes	Yes	Yes				
DO	24V		6	LNS	LEBT	010	PWRC	PSCV	01	PolarityNegativeCmd	Vertical Steerer 1 Power Supply Negative Polarity Command	On	Yes	Yes	Yes	Yes	Yes				
DO	24V	7	7	LNS	LEBT	010	PWRC	PSCV	02	PolarityNegativeCmd	Vertical Steerer 2 Power Supply Negative Polarity Command	On	Yes	Yes	Yes	Yes	Yes				
DO	24V		8	LNS							DO Spare			No							
DO	24V		9	LNS							DO Spare			No							
DO	24V		10	LNS							DO Spare			No							
DO	24V		11	LNS							DO Spare			No							
DO	24V		12	LNS							DO Spare			No							
DO	24V		13	LNS	LNS	LEBT	PLC		04	STATUS	Copy of source status (FC inserted) to EMU		Yes	Yes	Yes	Yes	Yes				
DO	24V		14	LNS	LNS	LEBT	PLC		03	VAC	Copy of vacuum status to EMU	Vacuum Status	Yes	Yes	Yes	Yes	Yes				
DO	24V		15	LNS	LEBT	010	PLC		02	WFS	Vertical EMU water flow switch copy		Yes	Yes	Yes	Yes	Yes				

Distributed I/O System (HV1)

I/O Type	Electrical Type	Slot	Channel	Supersection	Section	Subsection	Discipline	Device	Index	Property	Comment	Closed	Tested	Cabled on PLC	To the electrical connector	To the sensor	Correct	Incorrect	Commentaire	Date
DI	24V		0	LNS	ISRC	010	ISS	Magtr		MWPowerOn	Magnetron MW Power Status	On	Yes	Yes	Yes	Yes	Yes			
DI	24V		1	LNS	ISRC	010	ISS	Coil	01	CoolingWaterFlowOK	Coil 1 Cooling Water Flow Status	Flow OK	Yes	Yes	Yes	Yes	Yes			
DI	24V		2	LNS	ISRC	010	ISS	Coil	02	CoolingWaterFlowOK	Coil 2 Cooling Water Flow Status	Flow OK	Yes	Yes	Yes	Yes	Yes			
DI	24V		3	LNS	ISRC	010	ISS	Coil	03	CoolingWaterFlowOK	Coil 3 Cooling Water Flow Status	Flow OK	Yes	Yes	Yes	Yes	Yes			
DI	24V		4	LNS	ISRC	010	ISS	MatTr		CoolingWaterFlowOK	Matching Transformer Cooling Water Flow Status	Flow OK	Yes	Yes	Yes	Yes	Yes			
DI	24V		5	LNS	ISRC	010	ISS	PlasCh		CoolingWaterFlowOK	Plasma Chamber Cooling Water Flow Status	Flow OK	Yes	Yes	Yes	Yes	Yes			
DI	24V		6	LNS	ISRC	010	Vac	VEVMC	01100	VacuumOK	Vacuum Status (H2 injection)	OK	Yes	Yes	Yes	Yes	Yes		Not used, ground vacuum status used	
DI	24V		7	LNS	ISRC	010	Vac	VVA	01100	Open	H2 Isolation Valve Open Feedback	Open	Yes	Yes	Yes	Yes	Yes			
DI	24V	2	8	LNS	ISRC	010	Vac	VVA	01100	Closed	H2 Isolation Valve Closed Feedback	Closed	Yes	Yes	Yes	Yes	Yes			
DI	24V		9	LNS	ISRC	010	PWRC	CoilPS	01	OK	Coil 1 Power Supply Status	OK	Yes	Yes	Yes	Yes	Yes			
DI	24V		10	LNS	ISRC	010	PWRC	CoilPS	02	OK	Coil 2 Power Supply Status	OK	Yes	Yes	Yes	Yes	Yes			
DI	24V		11	LNS	ISRC	010	PWRC	CoilPS	03	OK	Coil 3 Power Supply Status	OK	Yes	Yes	Yes	Yes	Yes			
DI	24V		12	LNS	ISRC	010	ISS	Coil	01	TemperatureOK	Coil 1 Temperature Status	Temp OK	Yes	Yes	Yes	Yes	Yes			
DI	24V		13	LNS	ISRC	010	ISS	Coil	02	TemperatureOK	Coil 2 Temperature Status	Temp OK	Yes	Yes	Yes	Yes	Yes			
DI	24V		14	LNS	ISRC	010	ISS	Coil	03	TemperatureOK	Coil 3 Temperature Status	Temp OK	Yes	Yes	Yes	Yes	Yes			
DI	24V		15	LNS	ISRC	010	ISS	HVPS		AccessOK	Access Status doors	OK	Yes	Yes	Yes	Yes	Yes			
DI	24V		0	LNS	ISRC	010	ISS	HVPf		NeutralToGndOK	Neutral To Ground Resistor Switch Status	OK	Yes	Yes	Yes	Yes	Yes			
DI	24V		1	LNS							DI Spare			No						
DI	24V		2	LNS							DI Spare			No						
DI	24V		3	LNS							DI Spare			No						
DI	24V		4	LNS							DI Spare			No						
DI	24V		5	LNS							DI Spare			No						
DI	24V		6	LNS							DI Spare			No						
DI	24V	3	7	LNS							DI Spare			No						
DI	24V		8	LNS							DI Spare			No						
DI	24V		9	LNS							DI Spare			No						
DI	24V		10	LNS							DI Spare			No						
DI	24V		11	LNS							DI Spare			No						
DI	24V		12	LNS							DI Spare			No						
DI	24V		13	LNS							DI Spare			No						
DI	24V		14	LNS							DI Spare			No						
DI	24V		15	LNS							DI Spare			No						
AI	0-10V		0	LNS	ISRC	010	Vac	VEVMC	01100	Vacuum	Vacuum Level (H2 injection)		Yes	Yes	Yes	Yes			Not used	
AI	4-20 mA		1	LNS	ISRC	010	WTRC	PT	011	Pressure	HV Cooling Water Inlet Pressure		Yes	Yes	Yes	Yes	Yes			

AI	4-20 mA	4	2	LNS	ISRC	010	WTRC	PT	012	Pressure	HV Cooling Water Outlet Pressure		Yes	Yes	Yes	Yes	Yes			
AI	4-20 mA		3	LNS	ISRC	010	WTRC	TT	011	Temperature	HV Cooling Water Inlet Temperature		Yes	Yes	Yes	Yes	Yes			
AI	4-20 mA		4	LNS	ISRC	010	WTRC	TT	012	Temperature	HV Cooling Water Outlet Temperature		Yes	Yes	Yes	Yes	Yes			
AI	20 mA/0-10V		5	LNS							AI Spare			No						
AI	20 mA/0-10V		6	LNS							AI Spare			No						
AI	20 mA/0-10V		7	LNS							AI Spare			No						
DO	24V	5	0	LNS	ISRC	010	ISS	Magtr		EnableCmd	Magnetron Enable Command	Enable	Yes	Yes	Yes	Yes	Yes			
DO	24V		1	LNS	ISRC	010	PWRC	CoilPS	01	EnableCmd	Coil 1 Power Supply Enable Command	Enable	Yes	Yes	Yes	Yes	Yes			
DO	24V		2	LNS	ISRC	010	PWRC	CoilPS	02	EnableCmd	Coil 2 Power Supply Enable Command	Enable	Yes	Yes	Yes	Yes	Yes			
DO	24V		3	LNS	ISRC	010	PWRC	CoilPS	03	EnableCmd	Coil 3 Power Supply Enable Command	Enable	Yes	Yes	Yes	Yes	Yes			
DO	24V		4	LNS	ISRC	010	Vac	VVA	01100	OpenCmdCmd	H2 Isolation Valve Open Command	Open	Yes	Yes	Yes	Yes	Yes			
DO	24V		5	LNS							DO Spare			No						
DO	24V		6	LNS							DO Spare			No						
DO	24V		7	LNS							DO Spare			No						
DO	24V		8	LNS							DO Spare			No						
DO	24V		9	LNS							DO Spare			No						
DO	24V		10	LNS							DO Spare			No						
DO	24V		11	LNS							DO Spare			No						
DO	24V		12	LNS							DO Spare			No						
DO	24V		13	LNS							DO Spare			No						
DO	24V		14	LNS							DO Spare			No						
DO	24V		15	LNS							DO Spare			No						

Events tests

Evenement A: No HV lan

Conditions	Actions	Tested	Cabled on PLC	To the electrical connector	To the sensor	Correct	Incorrect	Commentaire	Date
		Yes	Yes	Yes	Yes	Yes			07/09/2016
If the lan (Profinet) connection with the HV platform is lost									
	Source status to LNS Safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command: OFF	Yes	Yes	Yes	Yes	Yes			
	Coil 1 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
	Coil 2 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
	Coil 3 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
	H2 isolation valve open command : CLOSE	Yes	Yes	Yes	Yes	Yes			

Evenement B: Coils off

Conditions	Actions	Tested	Cabled on PLC	To the electrical connector	To the sensor	Correct	Incorrect	Commentaire	Date
If Coil 1 cooling water flow status is NOK									
	Coil 1 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
	Coil 2 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
	Coil 3 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If Coil 2 cooling water flow status is NOK									
	Coil 1 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
	Coil 2 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
	Coil 3 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If Coil 3 cooling water flow status is NOK									
	Coil 1 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
	Coil 2 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
	Coil 3 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If Coil 1 temperature status is NOK									
	Coil 1 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
	Coil 2 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
	Coil 3 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If Coil 2 temperature status is NOK									
	Coil 1 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
	Coil 2 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
	Coil 3 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If Coil 3 temperature status is NOK									
	Coil 1 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
	Coil 2 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
	Coil 3 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If HV cooling water temperature inlet temperature is NOK									
	Coil 1 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
	Coil 2 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			
	Coil 3 power supply enable command : OFF	Yes	Yes	Yes	Yes	Yes			

Evenement C: Magnetron off

Conditions	Actions	Tested	Cabled on PLC	To the electrical connector	To the sensor	Correct	Incorrect	Commentaire	Date
If Machine protection system is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If LNS safety system status is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If Chopper power system status is NOK		No							
	Source status to LNS safety system : OFF								
	Magnetron enable command : OFF								
If chopper chopping voltage alarm is NOK		No							
	Source status to LNS safety system : OFF								
	Magnetron enable command : OFF								
If solenoid 1 temperature status is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If solenoid 2 temperature status is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			

If solenoid 1 cooling water flow status is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If solenoid 2 cooling water flow status is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If beam stop cooling water flow status is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If collimator cooling water flow status is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If electrodes cooling water flow status is NOK		Yes							
	Source status to LNS safety system : OFF								
	Magnetron enable command : OFF								
If chopper cooling water flow status is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If IRIS cooling water flow status is NOK		No							
	Source status to LNS safety system : OFF								
	Magnetron enable command : OFF								
If Ground cooling water inlet temperature is NOK		No							
	Source status to LNS safety system : OFF								
	Magnetron enable command : OFF								
If coil 1 cooling water flow status is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If coil 2 cooling water flow status is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If coil 3 cooling water flow status is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If matching transformer cooling water flow status is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If plasma chamber cooling water flow status is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If vacuum status is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If coil 1 power supply status is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If coil 2 power supply status is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If coil 3 power supply status is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If coil 1 temperature status is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If coil 2 temperature status is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If coil 3 temperature status is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If HV cooling water inlet temperature is NOK									
	Source status to LNS safety system : OFF	Yes	Yes	Yes	Yes	Yes			
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			

Evenement D: Chopper/Gas off		Tested	Cabled on PLC	To the electrical connector	To the sensor	Correct	Incorrect	Commentaire	Date
Conditions	Actions								
If the vacuum status (ground) is NOK									
	Chopper high voltage enable command: OFF	Yes	Yes	Yes	Yes	Yes			
	H2 isolation valve open command: CLOSE	Yes	Yes	Yes	Yes	Yes			

Evenement E: Solenoid 1 off		Tested	Cabled on PLC	To the electrical connector	To the sensor	Correct	Incorrect	Commentaire	Date
Conditions	Actions								
If the solenoid 1 temperature status is NOK									
	Solenoid 1 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
	Horizontal steerer 1 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
	Vertical steerer 1 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			

Conditions	Actions								
If the solenoid 1 cooling water flow status is NOK									
	Solenoid 1 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
	Horizontal steerer 1 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
	Vertical steerer 1 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
If the ground cooling water inlet temperature is NOK									
	Solenoid 1 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
	Horizontal steerer 1 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
	Vertical steerer 1 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			

Evenement F: Solenoid 2 off

Conditions	Actions	Tested	Cabled on PLC	To the electrical connector	To the sensor	Correct	Incorrect	Commentaire	Date
If the solenoid 2 temperature status is NOK									
	Solenoid 2 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
	Horizontal steerer 2 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
	Vertical steerer 2 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
If the solenoid 2 cooling water flow status is NOK									
	Solenoid 2 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
	Horizontal steerer 2 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
	Vertical steerer 2 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
If the ground cooling water inlet temperature is NOK									
	Solenoid 2 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
	Horizontal steerer 2 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
	Vertical steerer 2 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			

Evenement G: HV off

Conditions	Actions	Tested	Cabled on PLC	To the electrical connector	To the sensor	Correct	Incorrect	Commentaire	Date
If the vacuum status is NOK									
	High voltage power supply interlock command: OFF	Yes	Yes	Yes	Yes	Yes			
If the access status (HV platform) is NOK and the HV key is inserted									
	High voltage power supply interlock command: OFF	Yes	Yes	Yes	Yes	Yes			
If the neutral to ground resistor switch status is NOK									
	High voltage power supply interlock command: OFF	Yes	Yes	Yes	Yes	Yes			
If the HV key is not inserted									
	High voltage power supply interlock command: OFF	Yes	Yes	Yes	Yes	Yes			

Evenement H: No ground lan

Conditions	Actions	Tested	Cabled on PLC	To the electrical connector	To the sensor	Correct	Incorrect	Commentaire	Date
If the ground to HMI connection is lost									
	High voltage power supply interlock command: OFF	Yes	Yes	Yes	Yes	Yes			
	Solenoid 1 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
	Solenoid 2 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
	Horizontal Steerer 1 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
	Horizontal Steerer 2 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
	Vertical steerer 1 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
	Vertical steerer 2 power supply enable command: OFF	Yes	Yes	Yes	Yes	Yes			
	Chopper high voltage enable command: OFF	Yes	Yes	Yes	Yes	Yes			

Evenement I: Chopper off 2

Conditions	Actions	Tested	Cabled on PLC	To the electrical connector	To the sensor	Correct	Incorrect	Commentaire	Date
If the chopper power system status is NOK									
	After 5 ms, chopper high voltage enable command : OFF	Yes	Yes	Yes	Yes	Yes			
If the chopper chopping voltage alarm is NOK									
	After 5 ms, chopper high voltage enable command : OFF	Yes	Yes	Yes	Yes	Yes			

Evenement J: Faraday cup off

Conditions	Actions	Tested	Cabled on PLC	To the electrical connector	To the sensor	Correct	Incorrect	Commentaire	Date
If water is NOK									
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
	High voltage power supply interlock command: OFF	Yes	Yes	Yes	Yes	Yes			
	Faraday cup : Go to garage position	Yes	Yes	Yes	Yes	Yes			
If water temperature is NOK									
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
	High voltage power supply interlock command: OFF	Yes	Yes	Yes	Yes	Yes			
	Faraday cup : Go to garage position	Yes	Yes	Yes	Yes	Yes			
If vacuum is NOK									
	Magnetron enable command : OFF	Yes	Yes	Yes	Yes	Yes			
	High voltage power supply interlock command: OFF	Yes	Yes	Yes	Yes	Yes			
	Faraday cup : Go to garage position	Yes	Yes	Yes	Yes	Yes			