XRO Test Documentation

Release 0.1

Some Body

Jun 16, 2021

Contents

Contents:

CHAPTER 1

Intro

Something

1.1 Subheader

- a
- list
- here

1.1.1 Subsubheader

Nothing to see

1.1.2 Subheader

An edited text

CHAPTER 2

Some Content

|european-xfel- logo-497x497|	**DAQ and Control Sys-tems** nd-control-syst ems		
on	**EQU** **IPMENT** Requirement Document :name: equip ment-requiremen t-document		
on-1	This form must be used to define all requirements relevant for DAQ & CTRL.		
Sum **mary** **name** summa ry Hint: Fill all fields as much as possible			
Equipment (short)[4]	ANDOR-MARANA	Equipment (long):sup:*a*	ANDOR-MARANA
Equipment Group [b]/ XIM-Group if available	Commercial Cameras	Equipment Group (long) [c]/ XIM-Group if available	cMOS Cameras
Controller/Inte rface Model	MARANA	Vendor XIM-vendor if available	Princeton Instruments
Controller (Vendor Part Number)/ XIM-item type if available [d]	Integrated-in-e quipment[5]	Equipment (Vendor Part Number)/ XIM-item type if available	• ANDOR Marana • IPC (GG please add details if you know them)
ePlan ID	*Filled in by DAQ and CTRL experts*	Redmine ID[6]	
Creation date	08.01.2021	First Requester WP	SCS
Short description			
Requestor contacts	G. Mercurio (SCS)	Email and phone if non-XFEL	
Expert contacts (EEE/CAS/ITDM)	G. Giovanetti (CTRL)		
Expected first usage time(?)			
Installation location(s) XIM-Location if available	SCS	XIM-Location (if avail-able)	

Revisions			
Version	Date	Author	Comment
0.1	08.01.2021		Document Created

[4] , a,b,c,d To be validated by ERD-pickup person

[5] Other example: PT G25 400.

[6] In the best of cases, there should be only 1 task ID

CHAPTER 3

**

3.1 Table of Content

3.2 Contents

3.2.1 How this document works

Aim:

For a piece of equipment to be integrated into the EuXFEL control environment the equipment's interfaces to the service groups involved need to be specified. Only once the **Equipment Requirement Document (in the following ERD)** is approved and integration work started, is the related equipment regarded as "under integration". Since only supported equipment can be part of the CRD (Component Requirement Document), the approval of the ERD is a prerequisite and, if not present, will delay CRD approval. All new equipment requires an ERD.

Workflow:

The Equipment Requirement Document (ERD) records interfacing decisions made whilst passing through the following steps:

- The requester initiates the ERD request by emailing erd-request@xfel.eu whereupon the requester will be contacted by email. Which ERD contact depends on the information specified in the email request template. The process of filling in the form is performed by the requester with help from the contact and may require the requester to provide additional information (manuals, operation requirements, etc.) to clarify whether the equipment has to be controlled and/or monitored by PLC, FPGA or directly by Karabo, whether interlock IO is required, and whether interfaces need to be clarified for the other service groups.
- If no requirement is seen for the other service groups, then the ERD can be completed by EEE and/or CTRL quickly. Should requirements exist then the services concerned must review the equipment interface.
- When completed, the ERD will be sent to DATA department groups as well as to SRP and TS (electrical safety) for approval. This step is important as a backstop for those groups who were initially not considered to have interface requirements.
- Before the actual integration work can start and the equipment is seen as "under integration"., it has to be evaluated, if the estimated effort for all involved groups exceeds the threshold for which a formal MB project request and approval is required.

Interface tracking:

The ERD contains preliminary classification and interface integration checklists (checkbox panels) which are used to record interfacing decisions. Additional service group interface clarification text can be added in the special comments from experts for integration space.

Roles:

Requester – makes the initial request and provides additional information and implementation details during the ERD process.

Service groups – service group members responsible for evaluating the interface requirements

Lifetime:

Ideally there should be a 1:1 relationship between a piece of equipment and an ERD as the functionality defined in the interface definitions should not change. In order to reduce the risk of significant changes requested later, a board of stake holders will be formed during the ERD writing process to collect possible further requirements, to reach a potentially complete integration. However, this does not imply, that all features have to be implemented from the very

beginning. If at any time the supported functionalities should be modified, a modified ERD should be submitted and re-evaluated.

3.2.2 Preliminary classification checklist

Direct integration through: PLC Karabo MicroTCA ToBeClarified **Communication channels present: IO-signals RS232/RS485 EtherCAT Ethernet (GigE) Ethernet (10G) USB-2 USB-3 PCIe Modbus IEEE-488 CAN**

3.2.3 Board of stake holders and deadline statement

To be filled by Data Department

Role / Expertise	Group	Person	Initials
Author&Coord ERD process	EEE	Nicola Coppola	
PLC FW developer&tester	EEE	NN	
EET Coordinator	EEE	Joern Reifschlaeger	
FPGA Expert/Coordinator	EEE	Bruno Fernandes	
EDS Coordinator	EEE	Janna Eilers	
CTRL Expert/Coordinator	CTRL	G. Giovanetti/ S.Hauf	
ITDM Expert/Coordinator	ITDM	Janusz Szuba	
External Requester	*ChooseWP*		
Internal Requester	*ChooseWP*		
	ChooseWP		

**Deadline for the integration is: YYYY/MM/DD **

3.2.4 Integration interface checklist

To be filled by Data Department

PLC control (write) channels: **IO Serial EtherCAT Ethernet Modbus CAN** **PLC monitor (read) channels:** **IO Serial EtherCAT Ethernet Modbus CAN** **Non-PLC control (write) channels:** **IO Serial EtherCAT Ethernet IEEE-488** **Non-PLC monitor (read) channels:** **IO Serial EtherCAT Ethernet IEEE-488** **Configuration by:** **PLC Non-PLC Display/Console Vendor tool** **Interlock requirements:** **PLC interlock source (Condition) PLC interlock target (action)** **FW, SW and Karabo interface requirements: use exisiting f/w and s/w: Astrotech integration (to be verified) develop new f/w and s/w: _____ EEE + CTRL pairing set up** **new Gui widgets** **Equipment requires:** **System library/Specific Operating System: Astrotech integration** **Licenses _____, to be acquired by _____**	**EEE-PLC & CTRL**
Equipment requires: **System library/Specific Operating System: _____** **PLC f/w requirements:** **if new f/w block is required, indicate which in SW/FW requirements PLC Library: _____**	**EEE-PLC**
Trigger interface: ETA train MTCA train ETA pulse MTCA pulse **MTCA digitizer interfaces: FastADC ADQ14 Other:** **MTCA interfaces: 10G Other: _____ _____** **FPGA requirements: new f/w development**	**EEE-FPGA**
Single function macro needed Function macro needed **Typical needed**	**EEE-EET**
DA requirements: extra s/w development	**DA**
IT server s/w: non-standard control server external libraries special kernel /dev driver **IT special hardware: PCIe PoE switch unmanaged switch Other: USB –> fibre range exenders** **DAQ requirements: high storage 10GEOther:**	**ITDM**
A test system is required **A test system is available** A demo test system can be organized **by SCS** A test system/demo test system is needed for long period	**All**
TS requirements: Chiller Power Other:	**TS**
SRP safety issues present: :	**SRP**
Ticked OFF when resp. group processed checklist: **PLC EET EDS FPGA Synch CTRL DAQ IT DA TS** **SRP**	**All**

3.2.5 Special comments from experts for integration

Integration is preferred to happen by Astrotech, as for other Andor products. Possibly this works out of the box with the the integration we have from them, but would need to be tested.

If additional development is needed, SCS is to contact Astrotech for integration, and CTRL will follow up.

3.2.6 Equipment description

Marana is Andor's high performance sCMOS camera platform for Astronomy and Physical Sciences, featuring **95% Quantum Efficiency (QE)** and **market-leading vacuum cooling to -45 °C**. The platform offers solutions for large field of view and high-speed imaging/spectroscopy.

3.2.7 Controller connectors (overview)

#	Connector Name	Connector Type	Quantity	Possible group which uses it
1	POWER		1	EEE-EETF
2	TTL	Sub D, adapter to BNC exists	1	EEE-FE
3	USB 3.0		1	CTRL-ICI
4	Cooling water		1	TS
5				

3.2.8 Connection overview (also mechanical)

Flexible Connectivity

1. **USB 3.0**[8]
   A convenient, universally available high speed interface.
2. **TTL / Logic**
   Connector type: 15-way D-type to BNC cable with
   Fire (Output), External Trigger (Input), Shutter (Output).
3. **CoaXPress (Marana 4.2B-6 only)**
   CoaXPress (2 lane) offers the highest speed data interface

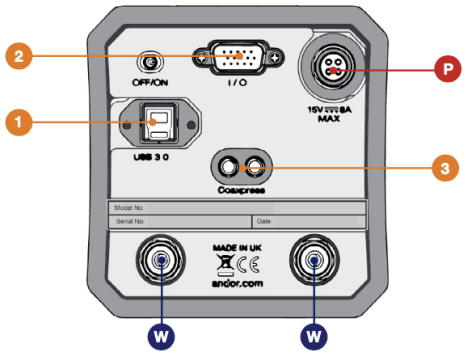
W **Water Cooling**
Connection to recirculator or other water/ liquid cooling system is possible for maximum sensitivity.

P **Power**
Connection to PSU refer to power requirements on page 16.

Notes: Minimum cable clearance required at rear of camera: 100 mm.

Marana 4.2B-6 Purchase Flexibility

Don't want to commit to CoaXPress connectivity from the outset? If preferred, order the less expensive USB 3.0-only version and later avail of a simple in-field upgrade to CoaXPress capability, using the **CHAM-UPG-CXP** code, if and when additional speed is needed. The upgrade includes CoaXPress card, cable and remote session to upgrade camera firmware and unlock CoaXPress capability. Please contact your sales representative for more information.



3.2.9 Electrical connection

Please add from the manual

3.2.10 Karabo Details (properties or commands)

These are listed and explicitly explained in the respective implementation documentation which can be found under implementation document and in the link section.

3.2.11 Device features and possible use diagram

- As a user I would like to be able to power the camera
- As a user I would like to be able to acquire images from the camera into the DAQ
- As a user I would like to be able to configure the integration time
- As a user I would like to be able to configure the image binning
- As a user I would like to be able to configure the image size
- As a user I would like to be able to configure the trigger timing
- ...

Resource estimation for integration work

Task	Service	SequenceNr	TaskNr	FTE days	Investments	Other groups involved
Provide test setup	SCS	1	1			ITDM, CTRL
Astrotech implement Camera interface	External	2	1			CTR;
Implement Karabo device	CTRL	3	1			
Setup triggers	EEE-FE	3	2			SCS?
Test system operation	CTRL	4	1			SCS, ITDM

Overall FTE requirements estimated: 0 FTEs

Overall investments estimated: 0 k€

3.2.12 Links

3.2.13 Notes

CHAPTER 4

Indices and tables

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- modindex
- search