CDR of the

Wire Scanner Acquisition System

Interface to ESS: the cabling system

Author	Checked by – date	Approved by – date
Sandi Grulja	Mario Ferianis	

Table of Contents

1. Introduction

1.1. Purpose of this document

This documents presents the interfacing of the WS ACQ SYS to the ESS. In this context, the term *interfacing* has a general meaning intending the overall interfacing, excluding the software related issues. Therefore, in the present document we are dealing with:

- the cables, copper and fiber
- the cable ways – penetration used
- the connectors
- the connecting boxes or plates
- the racks hosting ACQ SYS hardware modules, including motion controllers
- the support system hosting WS ACQ SYS items in the machine tunnel, mainly the AFE and the SCINT
- the interfacing to the Machine Protection System

The document has been subdivided machine wise, starting with the MEBT section and ending with the A2T section.

1.2. Definition and acronyms

Abbreviation	***Explanation of abbreviation***
WS	Wire Scanner
ST	Elettra Sincrotrone Trieste
ESS	ESS ERIC
ACQ SYS	Acquisition System
AFE	Analogue Front End module
OFE	Optical Front End module
BE	Back End module
BE_{mod}	Modified Back End module
SEM	Secondary Emission Monitor
SCINT	Scintillator
MEBT	Medium Energy Beam Transport ESS accelerator section
ELLIPTICAL	Elliptical ESS accelerator section
MBL	Medium Beta Linac of ESS accelerator
HBL	High Beta Linac of ESS accelerator
A2T	Accelerator to Target ESS accelerator section
AT	Accelerator tunnel
GSA	Service Area

2. Interfaces of the WS ACQ SYS to the ESS

In this section we present all the physical interfaces that have been identified and worked out between the WS ACQ SYS and the ESS accelerator complex.

In the previous PDR -1 data package (ref. [1]) the different existing interfaces have been listed per categories:

- mechanical interfaces
- electrical interfaces
- optical interfaces

In this document, we present the detailed arrangement for all these interfaces.

2.1. THE WS ACQ SYS block diagram and layout

The WS ACQ SYS is intended for the control of eleven (11) wire scanners located along most of the ESS accelerator tunnel. Figure 1 shows the WS ACQ SYS block diagram.

To better present the existing interfaces of the WS ACQ SYS, in figure 1 the overall block diagram and layout is presented.

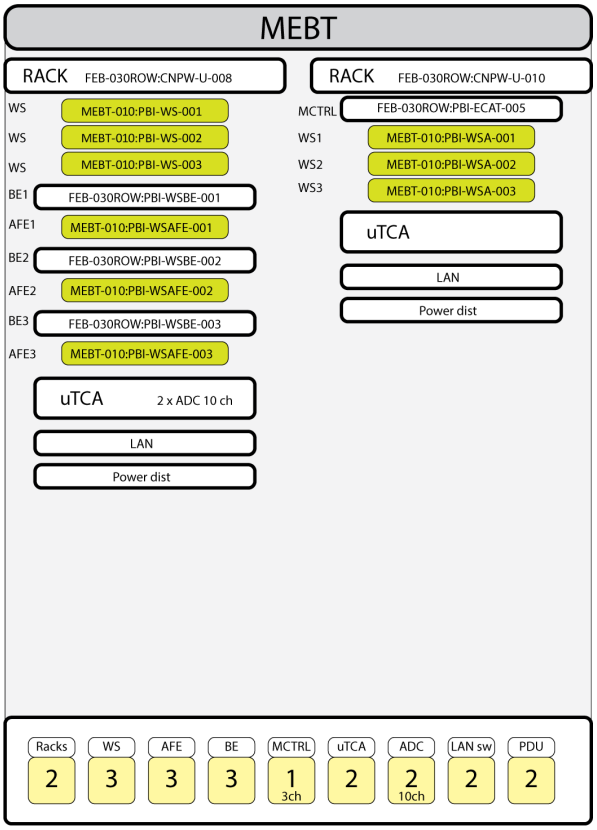

Figure 1a – WS ACQ SYS general layout

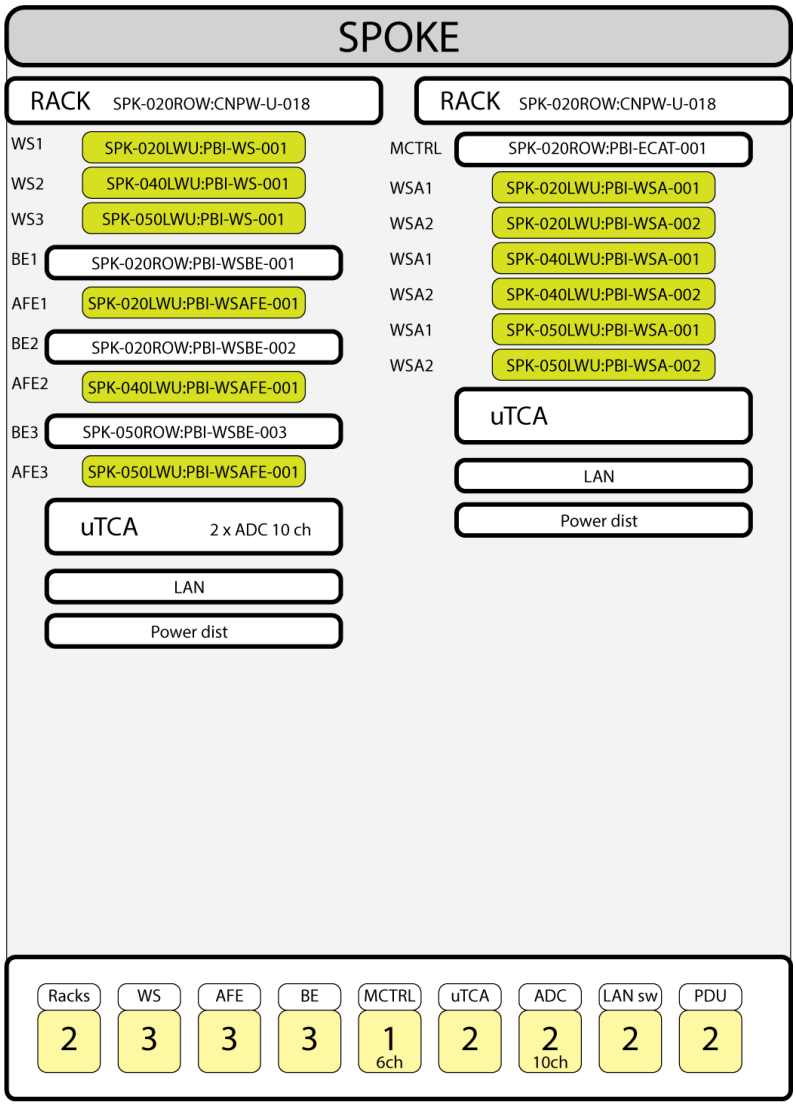

Figure 1b – WS ACQ SYS general layout

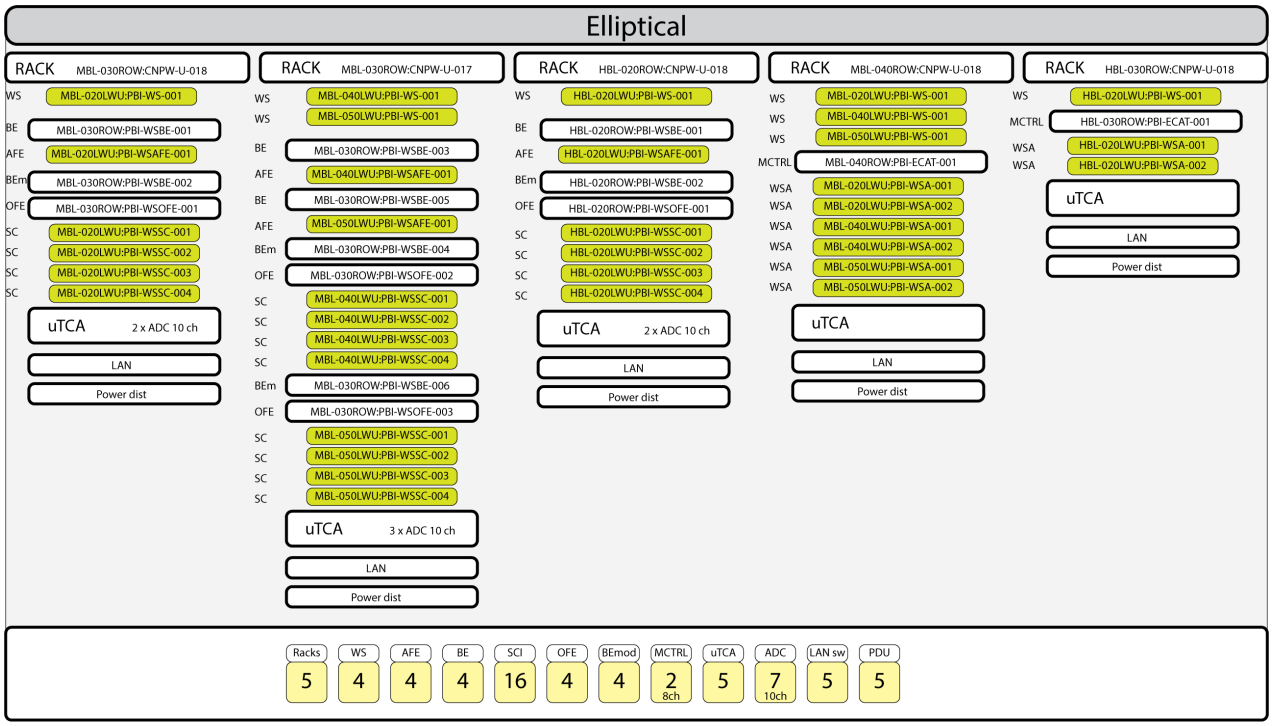

Figure 1c – WS ACQ SYS general layout

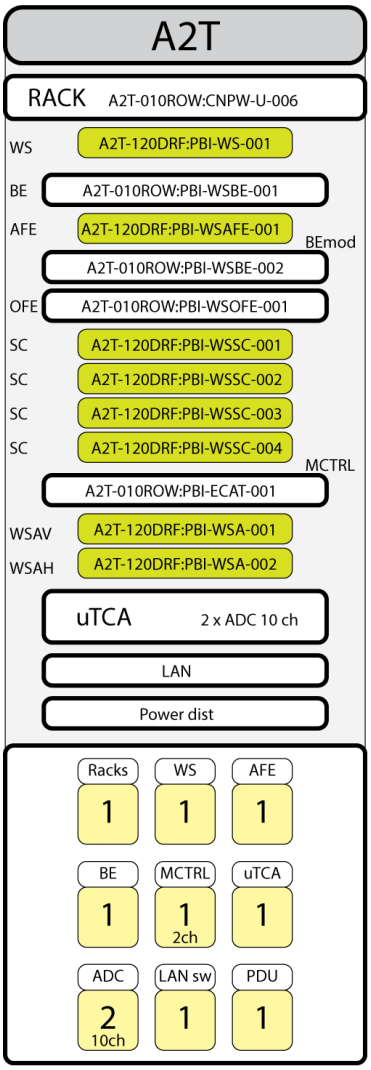

Figure 1d – WS ACQ SYS general layout

In figure 1(a-d), the different parts of the WS ACQ SYS are indicated along with their location in the ESS accelerator complex; it has also to be noted here that the WS ACQ SYS deploys both copper cables and fiber optics. Therefore, its cabling and routing needs to be shared well in advance, in full detail, with the ESS cabling and installation staff.

The WS ACQ SYS starts right off the accelerator vacuum chamber where the AFE will be mounted on-board the accelerator and as close as possible to the wire scanner itself.

Mechanically speaking the WS ACQ SYS ends at the specific racks hosting the BEs and the OFEs, not to forget the μ-TCA crates and the motion controllers.

3. MEBT section WS ACQ SYS interfaces

In this section, the mechanical interfaces and the cabling needed for the MEBT WS ACQ SYS is presented.

3.1. MEBT in-tunnel mechanical interfaces

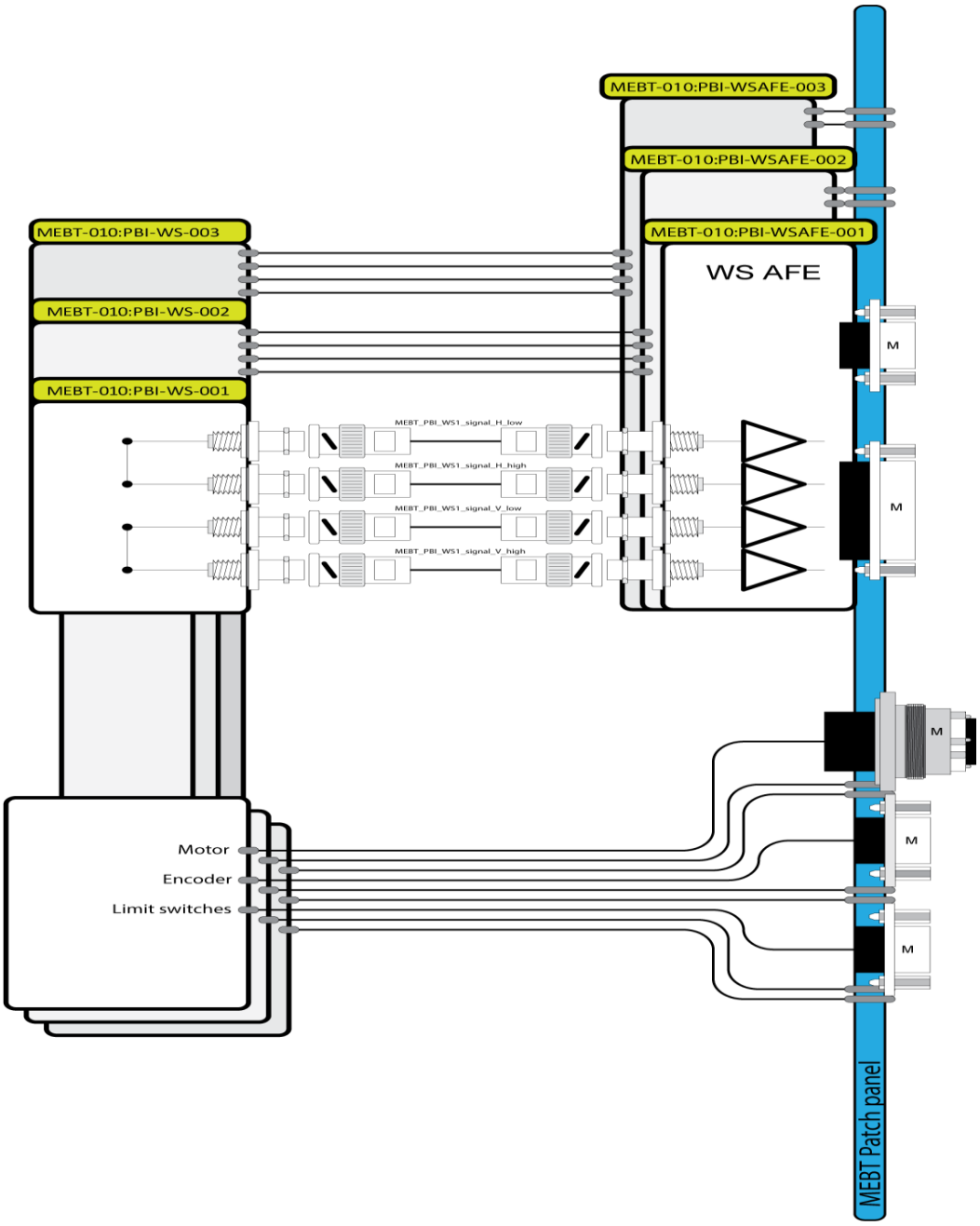

Figure 2: MEBT cables and connectors from WS to MEBT patch panel.

3.2. MEBT WS ACQ SYS cabling (long run)

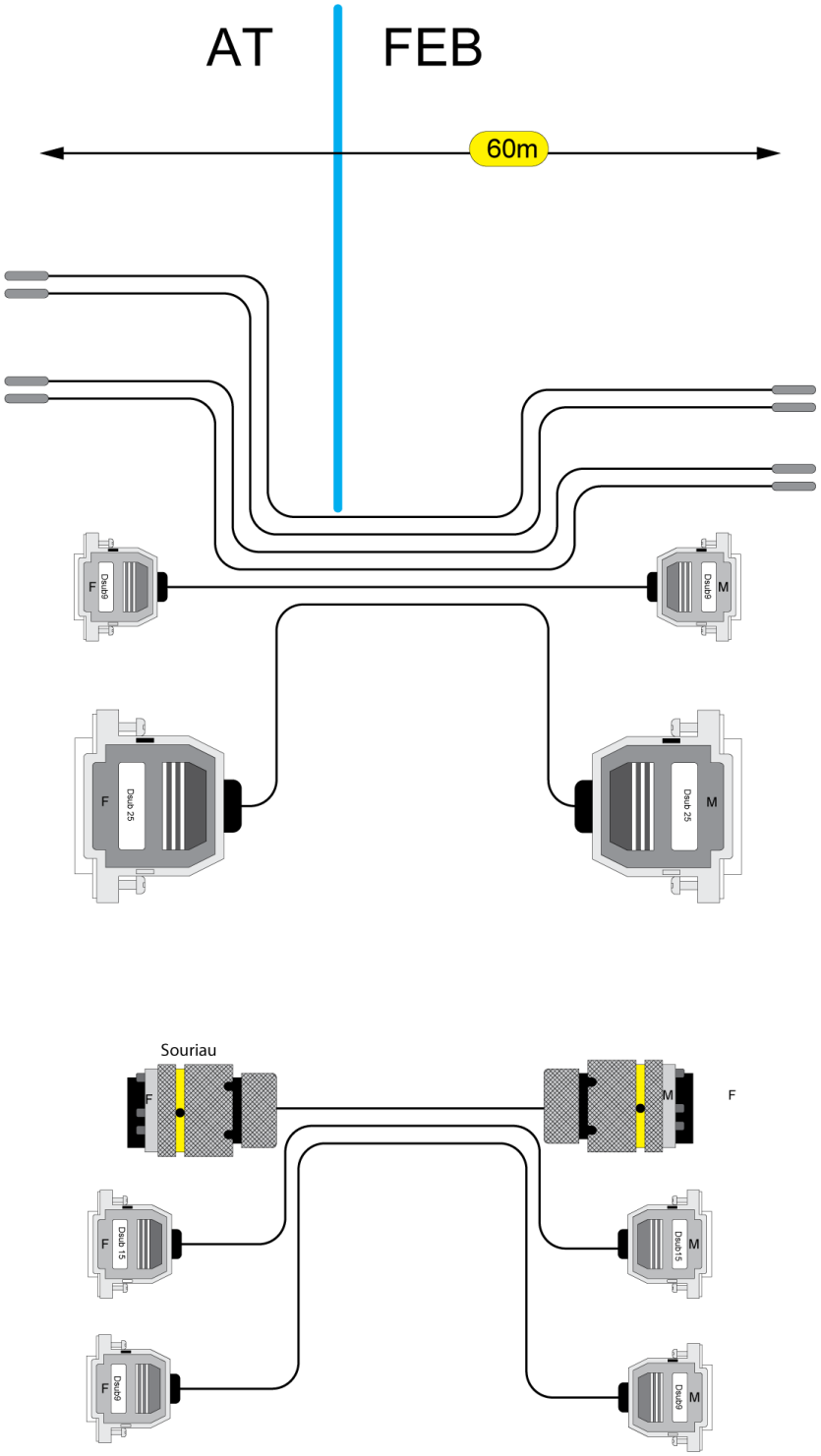

Figure 3 Long run cables (≈ 60 m) from MEBT (AT area) patch panel to the MEBT racks in FEB area.

3.2.1. MEBT WS ACQ SYS cabling diagram

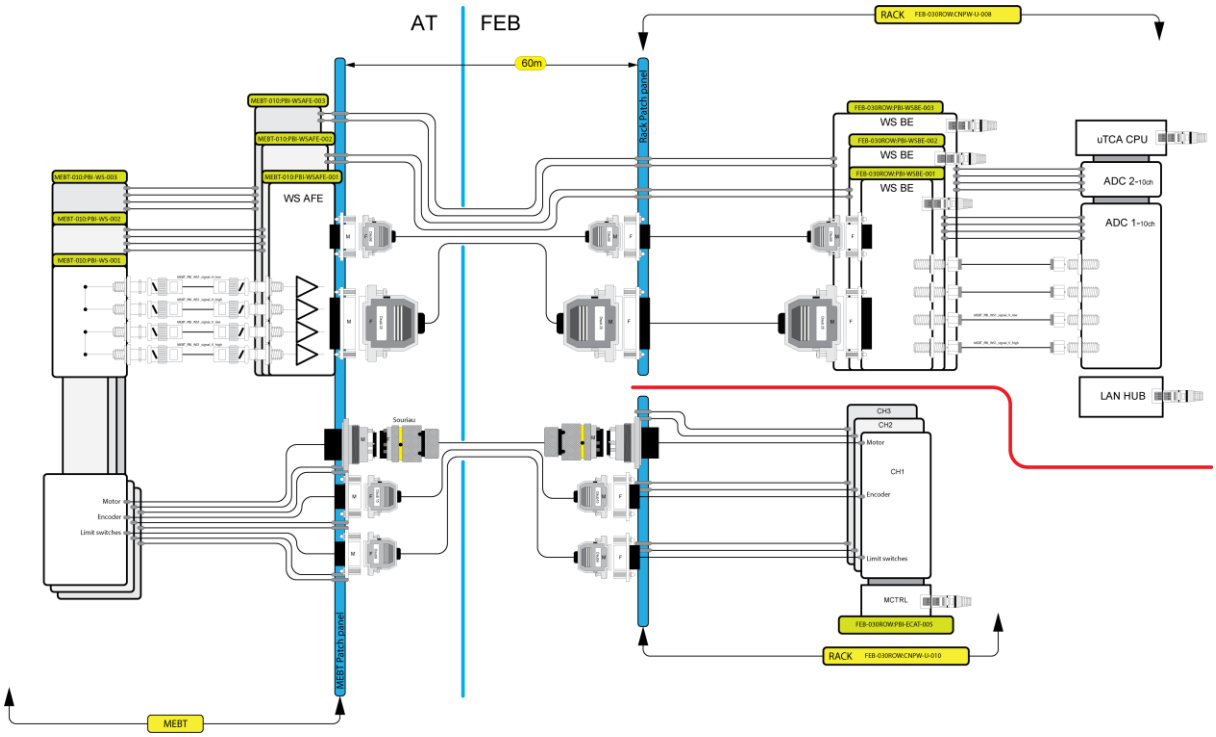

Figure 4 MEBT with motion controller and WS acq illustration

3.2.2. MEBT WS ACQ SYS cabling table

DEVICE A (FROM)						DEVICE B (TO)					
NAME	BUILDING	RACK	CONNECTOR	WIRING	USER LABEL	NAME	BUILDING	RACK	CONNECTOR	WIRING	USER LABEL
MEBT-010:PBI-WS-001	AT		DB-9 male, All metal, EMC, Pins Crimp		MEBT-010:PBI-WS-001 Actuator encoder	FEB-030ROW:CNPW-U-010	FEB	FEB-030ROW:CNPW-U-010	DB-9 male, All metal, EMC, Pins Crimp		MEBT-010:PBI-WS-001 Actuator encoder
MEBT-010:PBI-WS-001	AT		DB-9 male, All metal, EMC, Pins Crimp		MEBT-010:PBI-WS-001 Actuator LS	FEB-030ROW:CNPW-U-010	FEB	FEB-030ROW:CNPW-U-010	DB-9 male, All metal, EMC, Pins Crimp		MEBT-010:PBI-WS-001 Actuator LS
MEBT-010:PBI-WS-001	AT		Souriau UT06128PH male		MEBT-010:PBI-WS-001 Actuator motor	FEB-030ROW:CNPW-U-010	FEB	FEB-030ROW:CNPW-U-010	Souriau UT06128PH male		MEBT-010:PBI-WS-001 Actuator motor
MEBT-010:PBI-WS-001	AT		DB-9 Female, All metal, EMC, Pins Crimp		MEBT-010:PBI-WS-001 AFE control	FEB-030ROW:CNPW-U-008	FEB	FEB-030ROW:CNPW-U-008	DB-9 male, All metal, EMC, Pins Crimp		MEBT-010:PBI-WS-001 AFE control
MEBT-010:PBI-WS-001	AT		FCT FL2SS7-K121 DB-25		MEBT-010:PBI-WS-001 AFE signal	FEB-030ROW:CNPW-U-008	FEB	FEB-030ROW:CNPW-U-008	DB-25 male, metal housing		MEBT-010:PBI-WS-001 AFE signal
MEBT-010:PBI-WS-002	AT		DB-9 male, All metal, EMC, Pins Crimp		MEBT-010:PBI-WS-002 Actuator encoder	FEB-030ROW:CNPW-U-010	FEB	FEB-030ROW:CNPW-U-010	DB-9 male, All metal, EMC, Pins Crimp		MEBT-010:PBI-WS-002 Actuator encoder
MEBT-010:PBI-WS-002	AT		DB-9 male, All metal, EMC, Pins Crimp		MEBT-010:PBI-WS-002 Actuator LS	FEB-030ROW:CNPW-U-010	FEB	FEB-030ROW:CNPW-U-010	DB-9 male, All metal, EMC, Pins Crimp		MEBT-010:PBI-WS-002 Actuator LS
MEBT-010:PBI-WS-002	AT		Souriau UT06128PH male		MEBT-010:PBI-WS-002 Actuator motor	FEB-030ROW:CNPW-U-010	FEB	FEB-030ROW:CNPW-U-010	Souriau UT06128PH male		MEBT-010:PBI-WS-002 Actuator motor
MEBT-010:PBI-WS-002	AT		DB-9 Female, All metal, EMC, Pins Crimp		MEBT-010:PBI-WS-002 AFE control	FEB-030ROW:CNPW-U-008	FEB	FEB-030ROW:CNPW-U-008	DB-9 male, All metal, EMC, Pins Crimp		MEBT-010:PBI-WS-002 AFE control
MEBT-010:PBI-WS-002	AT		FCT FL2SS7-K121 DB-25		MEBT-010:PBI-WS-002 AFE signal	FEB-030ROW:CNPW-U-008	FEB	FEB-030ROW:CNPW-U-008	DB-25 male, metal housing		MEBT-010:PBI-WS-002 AFE signal
MEBT-010:PBI-WS-003	AT		DB-9 male, All metal, EMC, Pins Crimp		MEBT-010:PBI-WS-003 Actuator encoder	FEB-030ROW:CNPW-U-010	FEB	FEB-030ROW:CNPW-U-010	DB-9 male, All metal, EMC, Pins Crimp		MEBT-010:PBI-WS-003 Actuator encoder
MEBT-010:PBI-WS-003	AT		DB-9 male, All metal, EMC, Pins Crimp		MEBT-010:PBI-WS-003 Actuator LS	FEB-030ROW:CNPW-U-010	FEB	FEB-030ROW:CNPW-U-010	DB-9 male, All metal, EMC, Pins Crimp		MEBT-010:PBI-WS-003 Actuator LS
MEBT-010:PBI-WS-003	AT		Souriau UT06128PH male		MEBT-010:PBI-WS-003 Actuator motor	FEB-030ROW:CNPW-U-010	FEB	FEB-030ROW:CNPW-U-010	Souriau UT06128PH male		MEBT-010:PBI-WS-003 Actuator motor
MEBT-010:PBI-WS-003	AT		DB-9 Female, All metal, EMC, Pins Crimp		MEBT-010:PBI-WS-003 AFE control	FEB-030ROW:CNPW-U-008	FEB	FEB-030ROW:CNPW-U-008	DB-9 male, All metal, EMC, Pins Crimp		MEBT-010:PBI-WS-003 AFE control
MEBT-010:PBI-WS-003	AT		FCT FL2SS7-K121 DB-25		MEBT-010:PBI-WS-003 AFE signal	FEB-030ROW:CNPW-U-008	FEB	FEB-030ROW:CNPW-U-008	DB-25 male, metal housing		MEBT-010:PBI-WS-003 AFE signal

Figure 5 Cabling from AFE to ADC board
ref. WS cable database extract 20180220.xlsx – ESS (File by J. Norin).

3.3. MEBT WS ACQ SYS cabling at the rack level

In this paragraph the cabling of the WS ACQ SYS foreseen in the Service Gallery is presented.

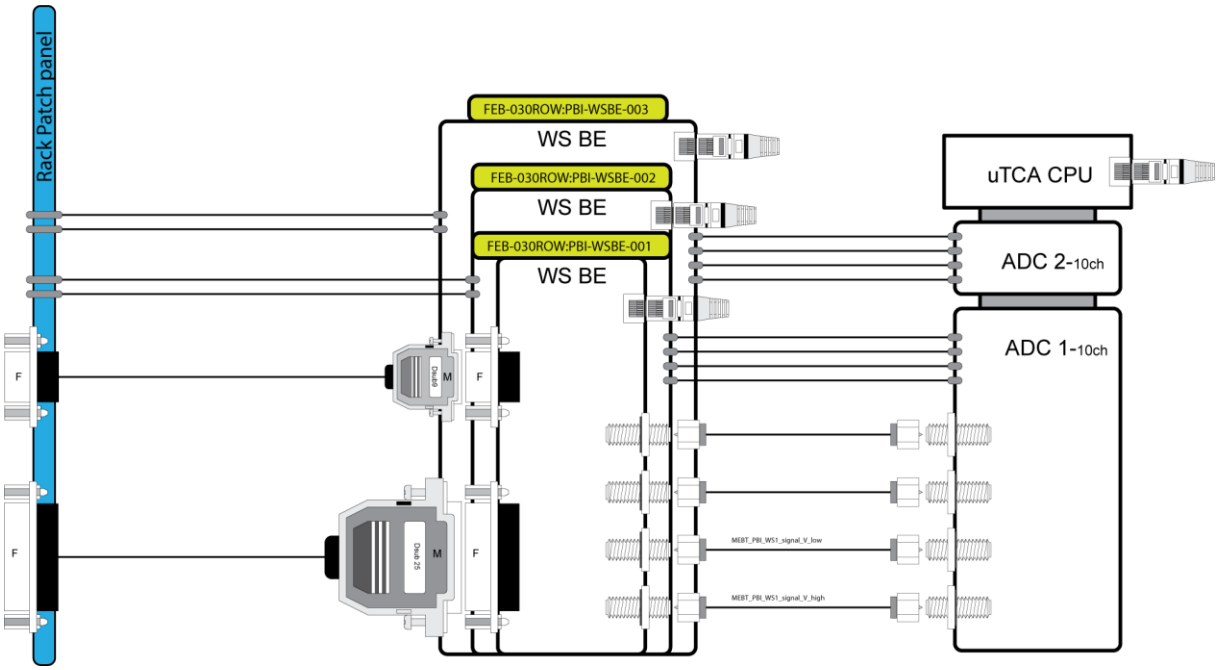

Figure 6 MEBT in rack acquisition connection.

3.3.1. MEBT WS ACQ SYS rack list

MEBT rack configuration with rack numbers and names with installed units and their sub units installed in the tunnel.

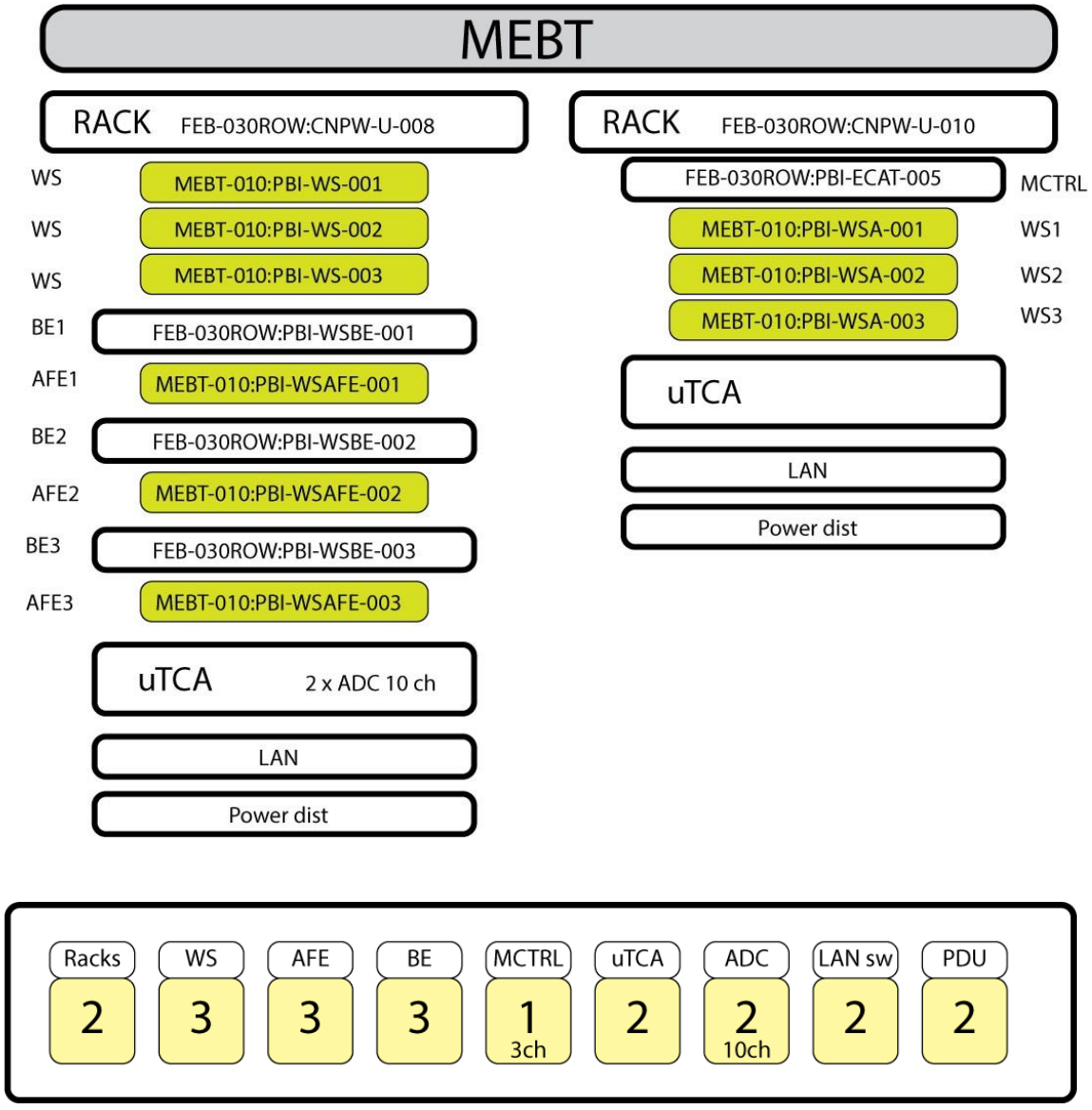

Figure 7 MEBT rack list numbers with in rack unit's names.

3.3.2. MEBT WS ACQ SYS rack layout

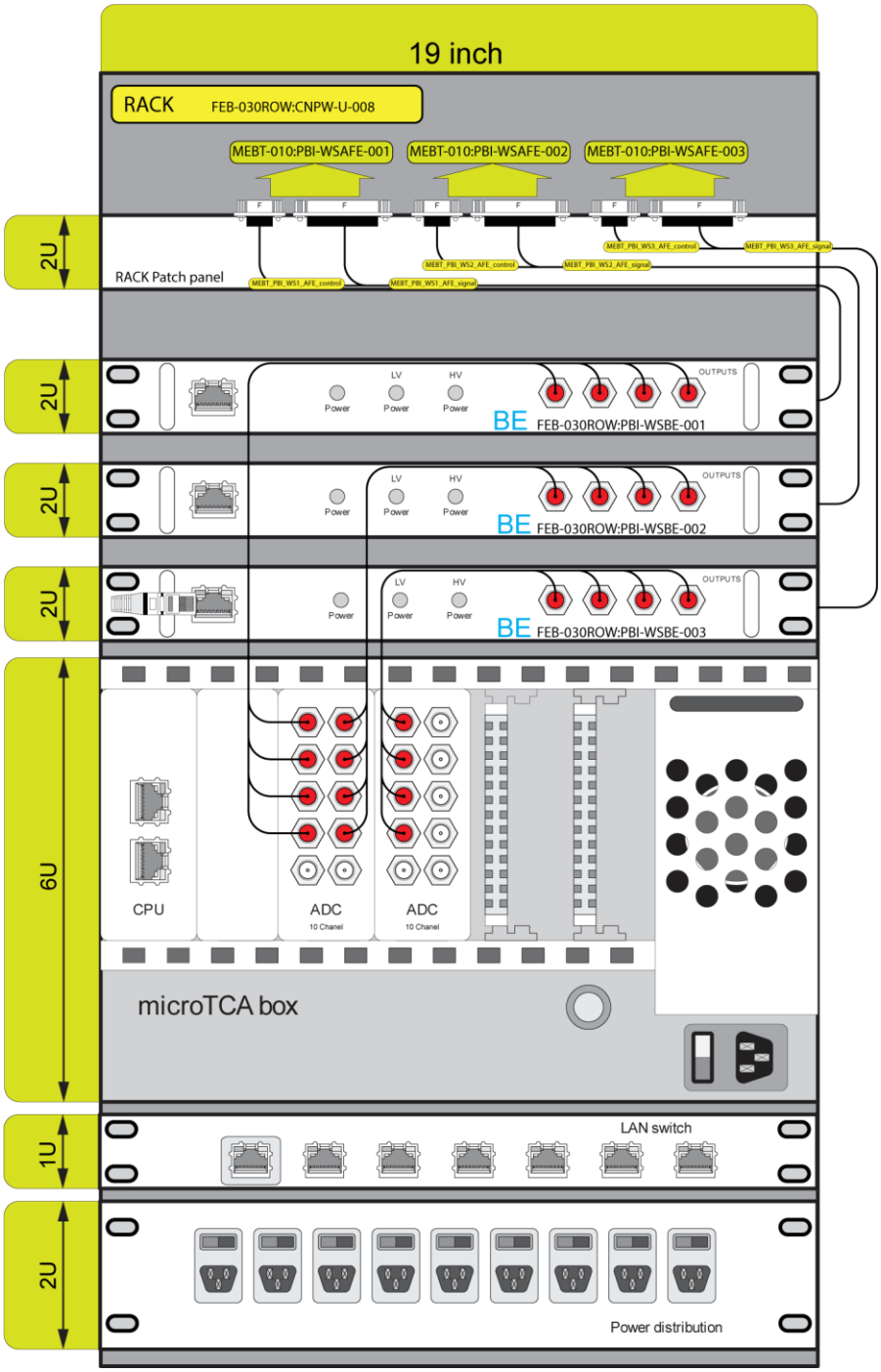

Figure 8 MEBT diagnostic rack layout with all needed units, with names and numbering.

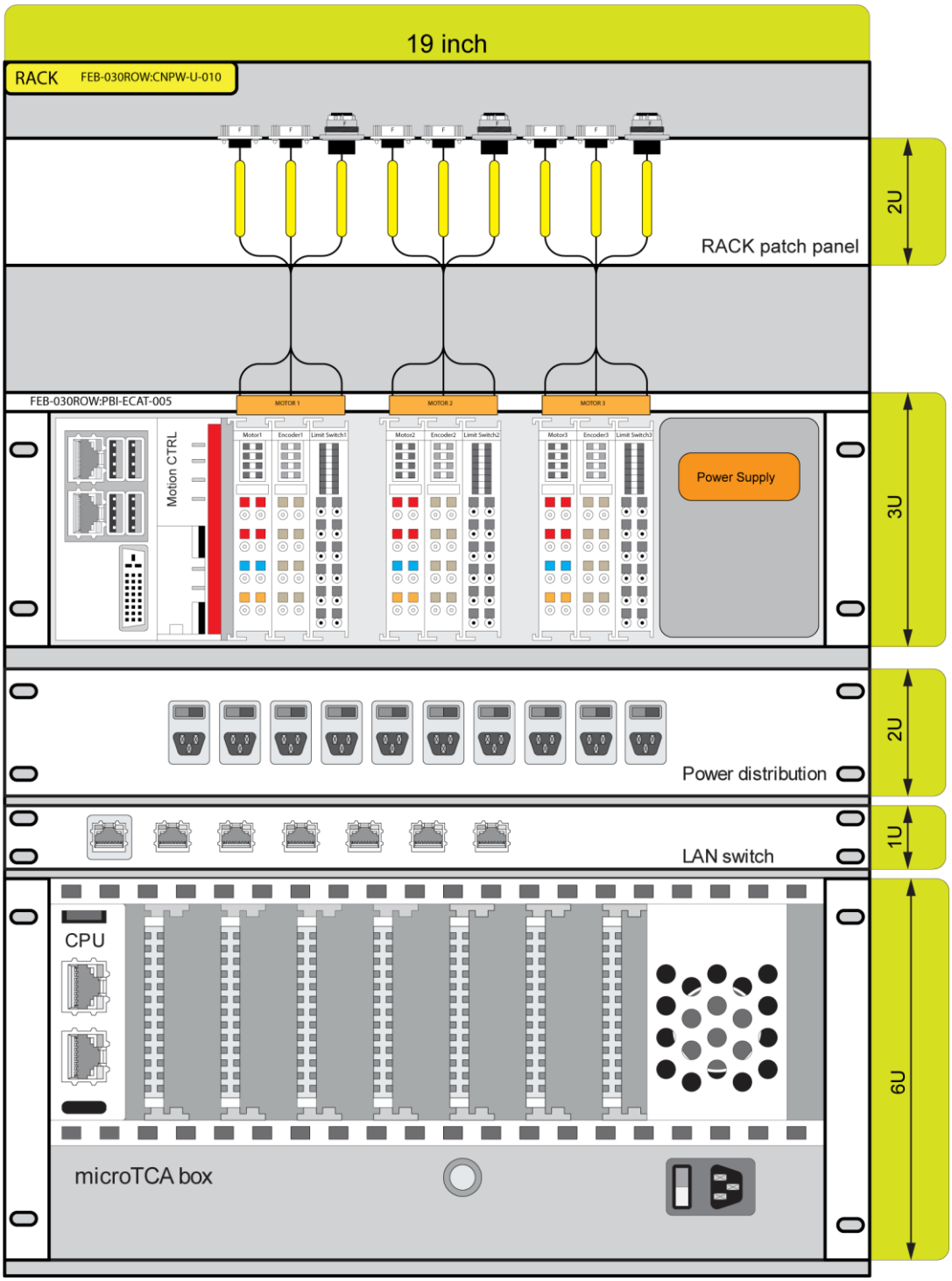

Figure 9 MEBT MCTRL rack layout, all needed units, with names and numbering.

4. SPOKE section WS ACQ SYS interfaces

4.1. SPOKE in-tunnel mechanical interfaces

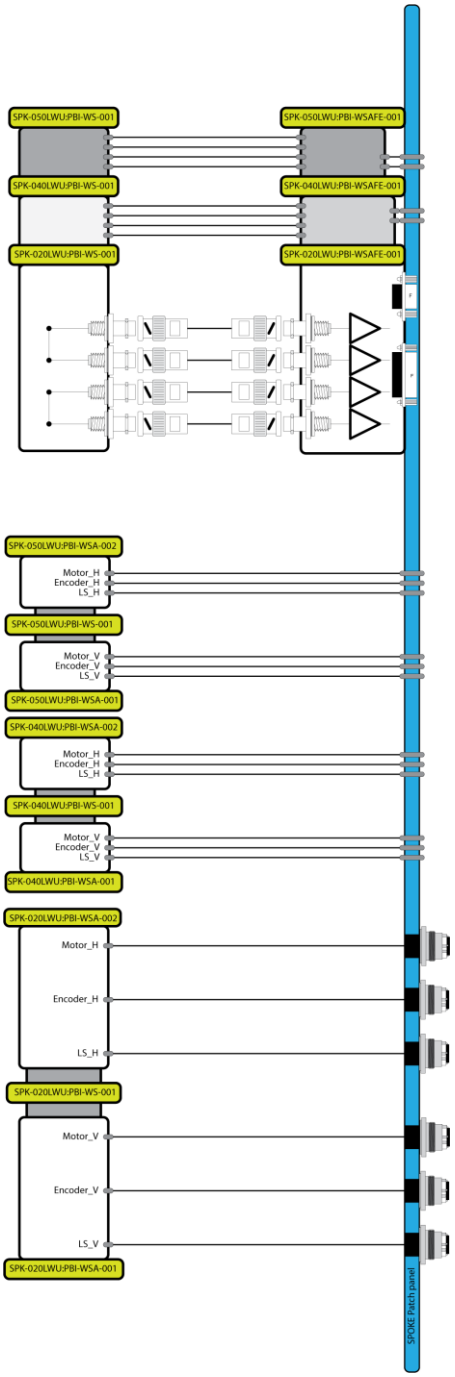

Figure 10 SPOKE cables and connectors, from WS to SPOKE patch panel.

4.2. SPOKE WS ACQ SYS cabling (long run)

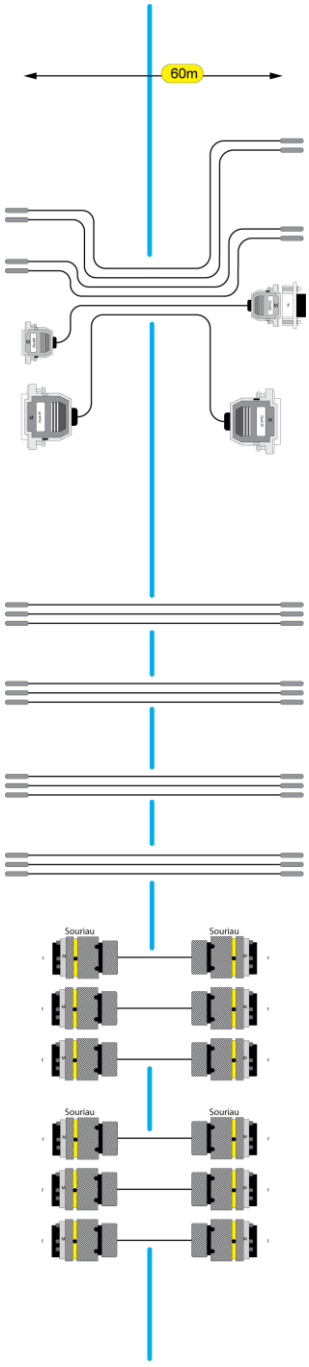

Figure 11 Long run cables (≈ 60m) from SPOKE (AT area) patch panel to the SPOKE rack patch panel in KG area.

4.2.1. SPOKE WS ACQ SYS cabling diagram

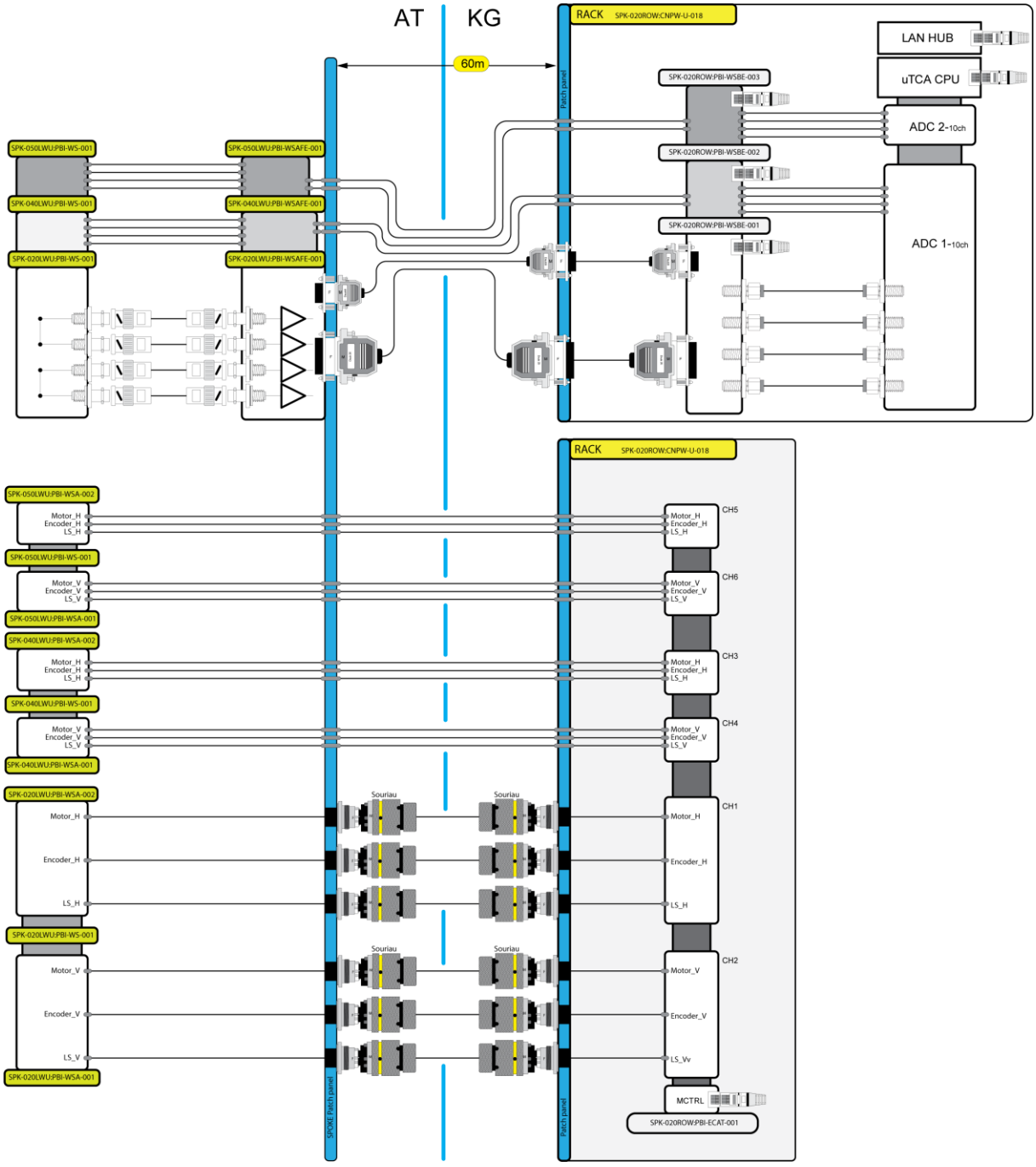

Figure 12 SPOKE with motion controller and WS acquisition system.

4.2.2. SPOKE WS ACQ SYS cabling table

DEVICE A (FROM)						DEVICE B (TO)					
NAME	BUILDING	RACK	CONNECTOR	WIRING	USER LABEL	NAME	BUILDING	RACK	CONNECTOR	WIRING	USER LABEL
SPK-020LWU:PBI-WS-001	AT		DB-9 Female, All metal, EMC, Pins Crimp		SPK-020LWU:PBI-WS-001 AFE control	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	DB-9 male, All metal, EMC, Pins Crimp		SPK-020LWU:PBI-WS-001 AFE control
SPK-020LWU:PBI-WS-001	AT		FCT FL2S57-K121 DB-25		SPK-020LWU:PBI-WS-001 AFE signal	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	DB-25 male, metal housing		SPK-020LWU:PBI-WS-001 AFE signal
SPK-020LWU:PBI-WS-001	AT		Souriau UTOW61210SH female		SPK-020LWU:PBI-WS-001 H actuator encoder	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	Souriau UTOW61210PH male		SPK-020LWU:PBI-WS-001 H actuator encoder
SPK-020LWU:PBI-WS-001	AT		Souriau UTOW61065H female		SPK-020LWU:PBI-WS-001 H actuator LS	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	Souriau UTOW6106PH male		SPK-020LWU:PBI-WS-001 H actuator LS
SPK-020LWU:PBI-WS-001	AT		Souriau UT06128SH female		SPK-020LWU:PBI-WS-001 H actuator motor	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	Souriau UT06128PH male		SPK-020LWU:PBI-WS-001 H actuator motor
SPK-020LWU:PBI-WS-001	AT		Souriau UTOW61210SH female		SPK-020LWU:PBI-WS-001 V actuator encoder	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	Souriau UTOW61210PH male		SPK-020LWU:PBI-WS-001 V actuator encoder
SPK-020LWU:PBI-WS-001	AT		Souriau UTOW61065H female		SPK-020LWU:PBI-WS-001 V actuator LS	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	Souriau UTOW6106PH male		SPK-020LWU:PBI-WS-001 V actuator LS
SPK-020LWU:PBI-WS-001	AT		Souriau UT06128SH female		SPK-020LWU:PBI-WS-001 V actuator motor	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	Souriau UT06128PH male		SPK-020LWU:PBI-WS-001 V actuator motor
SPK-040LWU:PBI-WS-001	AT		DB-9 Female, All metal, EMC, Pins Crimp		SPK-040LWU:PBI-WS-002 AFE control	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	DB-9 male, All metal, EMC, Pins Crimp		SPK-040LWU:PBI-WS-002 AFE control
SPK-040LWU:PBI-WS-001	AT		FCT FL2S57-K121 DB-25		SPK-040LWU:PBI-WS-002 AFE signal	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	DB-25 male, metal housing		SPK-040LWU:PBI-WS-002 AFE signal
SPK-040LWU:PBI-WS-001	AT		Souriau UTOW61210SH female		SPK-040LWU:PBI-WS-002 H actuator encoder	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	Souriau UTOW61210PH male		SPK-040LWU:PBI-WS-002 H actuator encoder
SPK-040LWU:PBI-WS-001	AT		Souriau UTOW61065H female		SPK-040LWU:PBI-WS-002 H actuator LS	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	Souriau UTOW6106PH male		SPK-040LWU:PBI-WS-002 H actuator LS
SPK-040LWU:PBI-WS-001	AT		Souriau UT06128SH female		SPK-040LWU:PBI-WS-002 H actuator motor	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	Souriau UT06128PH male		SPK-040LWU:PBI-WS-002 H actuator motor
SPK-040LWU:PBI-WS-001	AT		Souriau UTOW61210SH female		SPK-040LWU:PBI-WS-002 V actuator encoder	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	Souriau UTOW61210PH male		SPK-040LWU:PBI-WS-002 V actuator encoder
SPK-040LWU:PBI-WS-001	AT		Souriau UTOW61065H female		SPK-040LWU:PBI-WS-002 V actuator LS	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	Souriau UTOW6106PH male		SPK-040LWU:PBI-WS-002 V actuator LS
SPK-040LWU:PBI-WS-001	AT		Souriau UT06128SH female		SPK-040LWU:PBI-WS-002 V actuator motor	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	Souriau UT06128PH male		SPK-040LWU:PBI-WS-002 V actuator motor
SPK-050LWU:PBI-WS-001	AT		DB-9 Female, All metal, EMC, Pins Crimp		SPK-050LWU:PBI-WS-003 AFE control	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	DB-9 male, All metal, EMC, Pins Crimp		SPK-050LWU:PBI-WS-003 AFE control
SPK-050LWU:PBI-WS-001	AT		FCT FL2S57-K121 DB-25		SPK-050LWU:PBI-WS-003 AFE signal	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	DB-25 male, metal housing		SPK-050LWU:PBI-WS-003 AFE signal
SPK-050LWU:PBI-WS-001	AT		Souriau UTOW61210SH female		SPK-050LWU:PBI-WS-003 H actuator encoder	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	Souriau UTOW61210PH male		SPK-050LWU:PBI-WS-003 H actuator encoder
SPK-050LWU:PBI-WS-001	AT		Souriau UTOW61065H female		SPK-050LWU:PBI-WS-003 H actuator LS	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	Souriau UTOW6106PH male		SPK-050LWU:PBI-WS-003 H actuator LS
SPK-050LWU:PBI-WS-001	AT		Souriau UT06128SH female		SPK-050LWU:PBI-WS-003 H actuator motor	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	Souriau UT06128PH male		SPK-050LWU:PBI-WS-003 H actuator motor
SPK-050LWU:PBI-WS-001	AT		Souriau UTOW61210SH female		SPK-050LWU:PBI-WS-003 V actuator encoder	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	Souriau UTOW61210PH male		SPK-050LWU:PBI-WS-003 V actuator encoder
SPK-050LWU:PBI-WS-001	AT		Souriau UTOW61065H female		SPK-050LWU:PBI-WS-003 V actuator LS	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	Souriau UTOW6106PH male		SPK-050LWU:PBI-WS-003 V actuator LS
SPK-050LWU:PBI-WS-001	AT		Souriau UT06128SH female		SPK-050LWU:PBI-WS-003 V actuator motor	SPK-020ROW:CNPW-U-018	KG	SPK-020ROW:CNPW-U-018	Souriau UT06128PH male		SPK-050LWU:PBI-WS-003 V actuator motor

Figure 13 Cabling from AFE to ADC board
ref. WS cable database extract 20180220.xlsx – ESS (File by Johan Norin).

4.3. SPOKE WS ACQ SYS cabling at the rack level

In this paragraph the cabling of the WS ACQ SYS foreseen in the KG is presented.

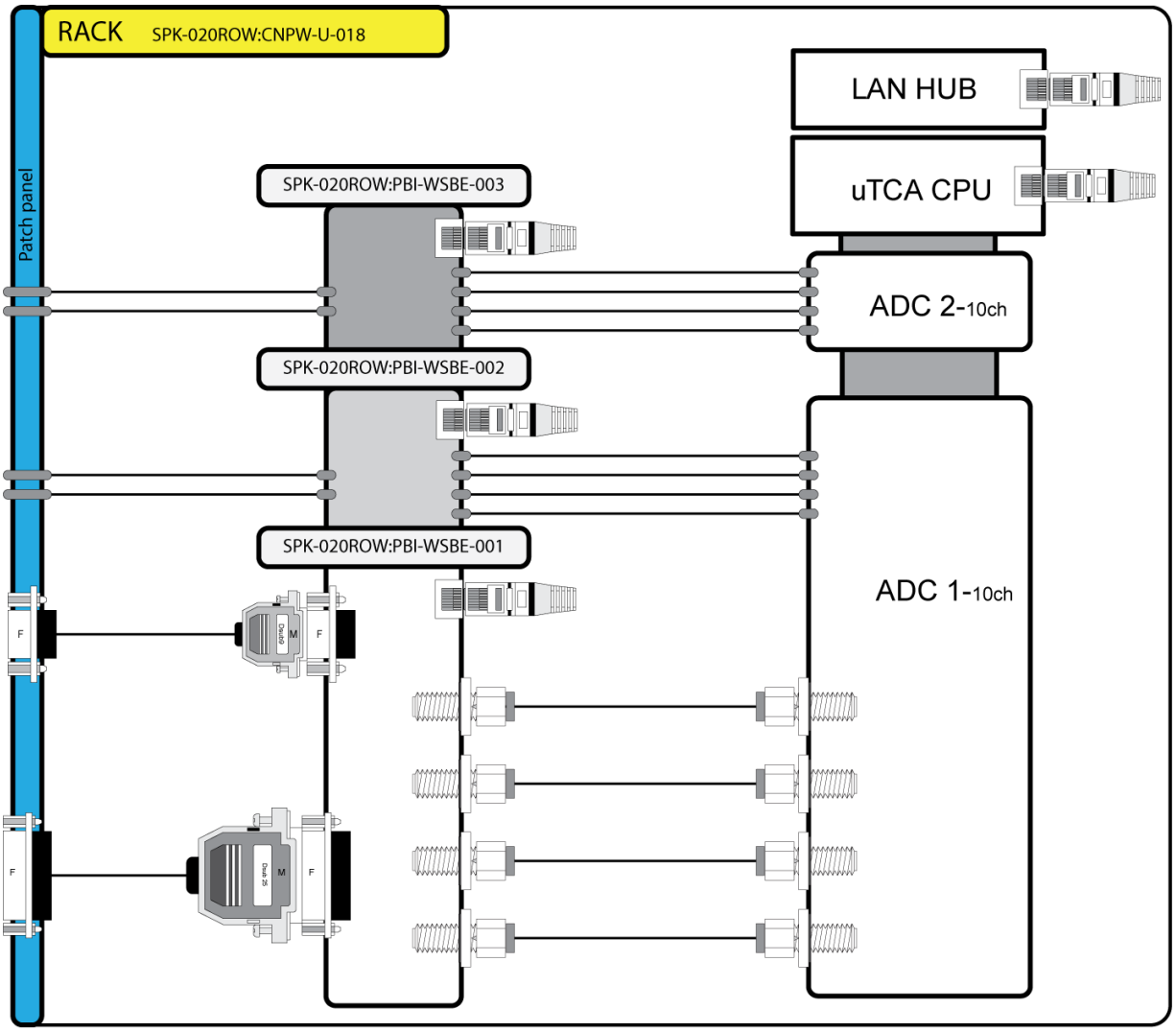

Figure 14 SPOKE in rack acquisition connection.

4.3.1. SPOKE WS ACQ SYS rack list

SPOKE rack configuration with rack numbers and names with installed units and their sub units installed in the tunnel.

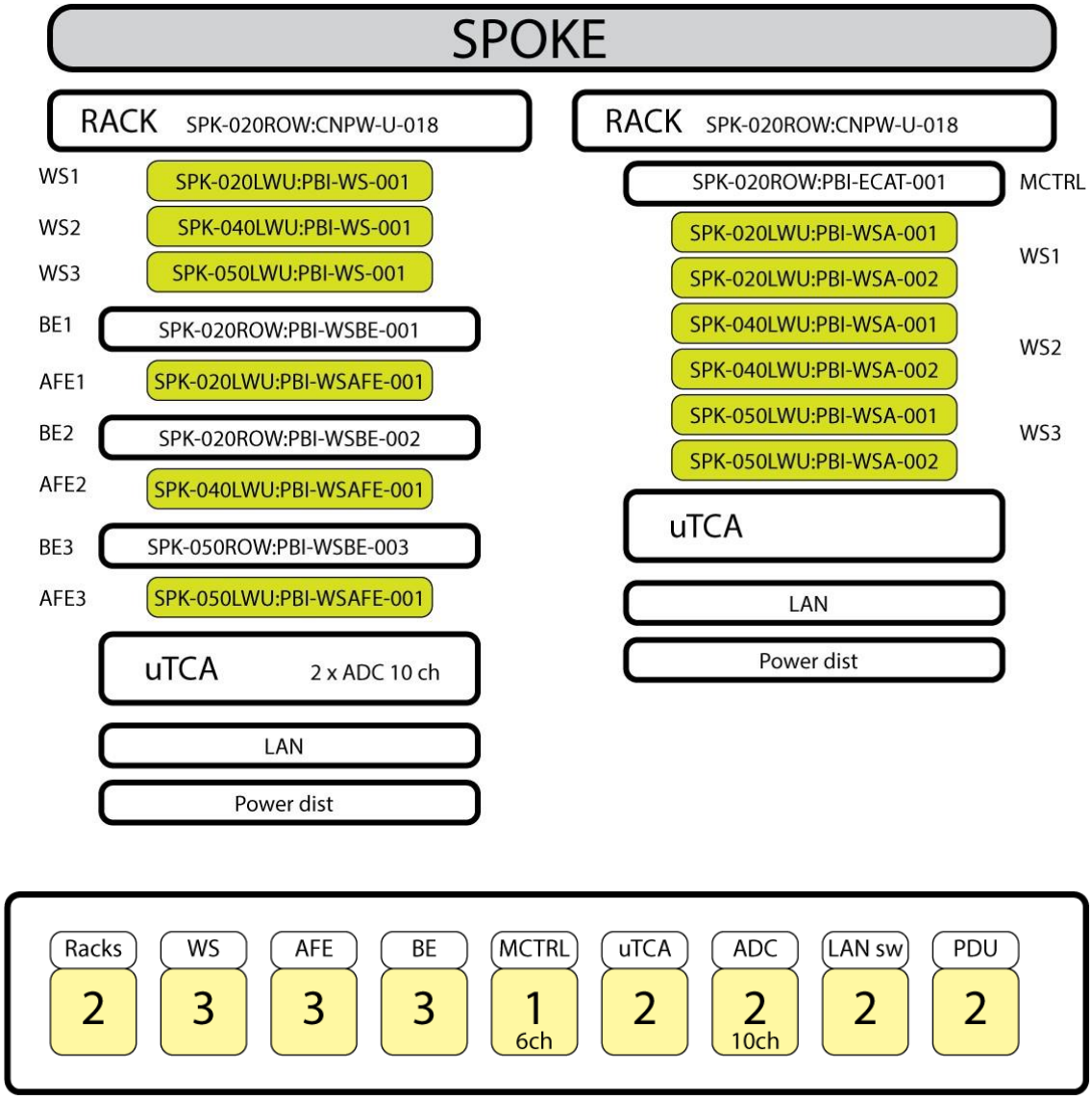

Figure 15 SPOKE rack list numbers with in rack unit's names

4.3.2. SPOKE WS ACQ SYS rack layout

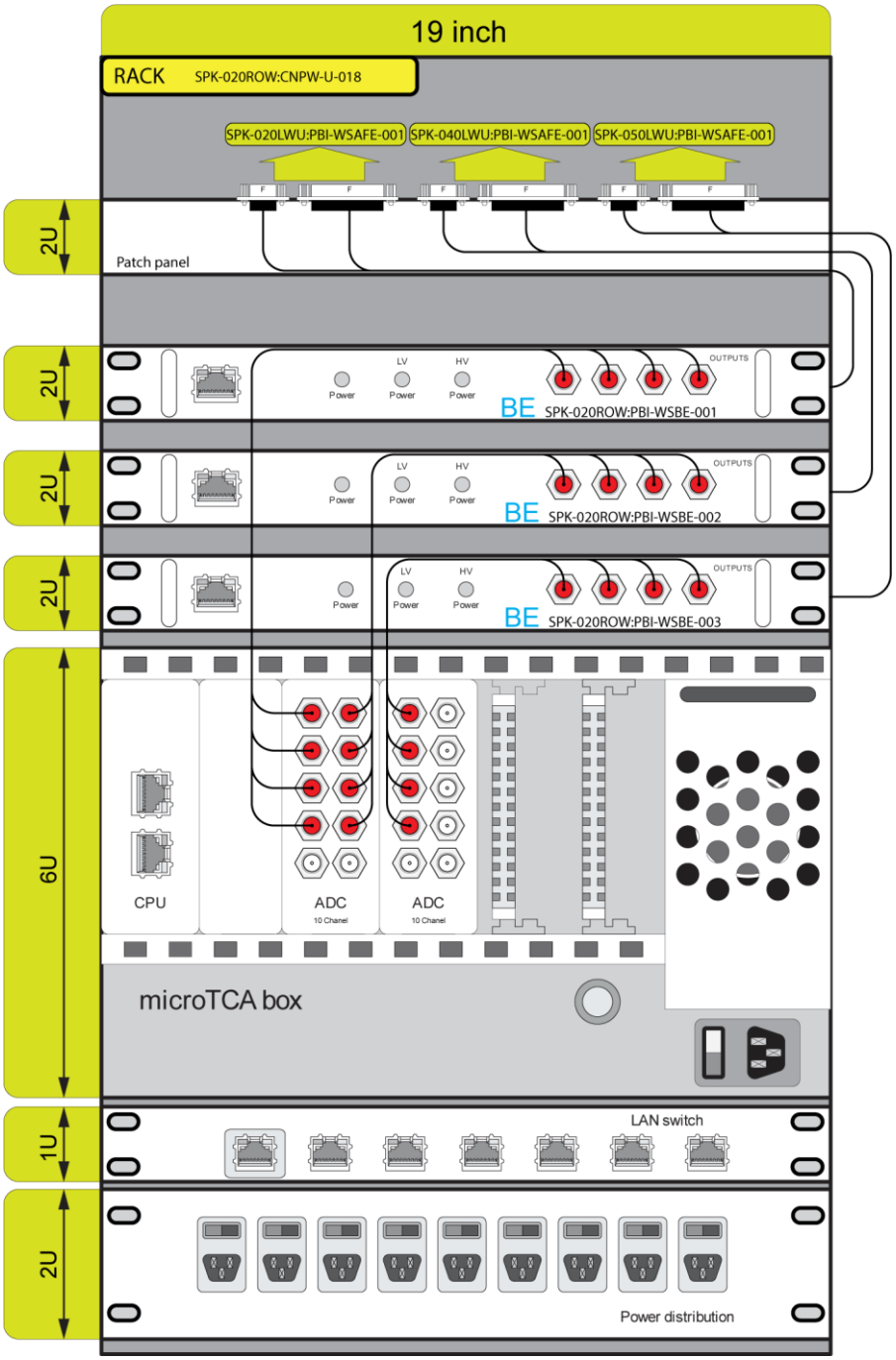

Figure 16 SPOKE MCTRL rack layout with necessary units their names and numbers.

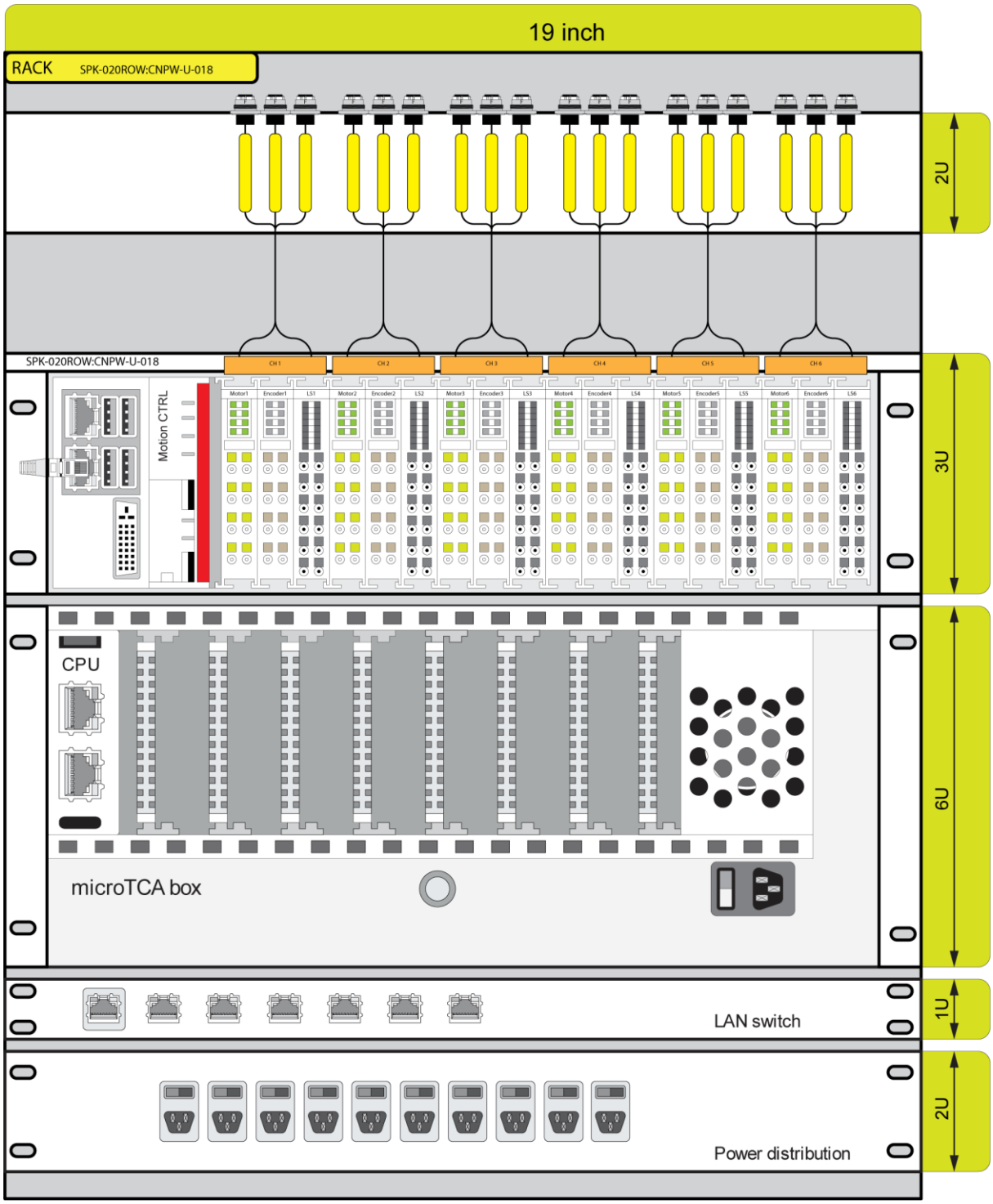

Figure 17 SPOKE MCTRL rack layout with necessary units their names and numbers.

5. ELLIPTICAL WS ACQ SYS interfaces

5.1. Elliptical in-tunnel mechanical interfaces

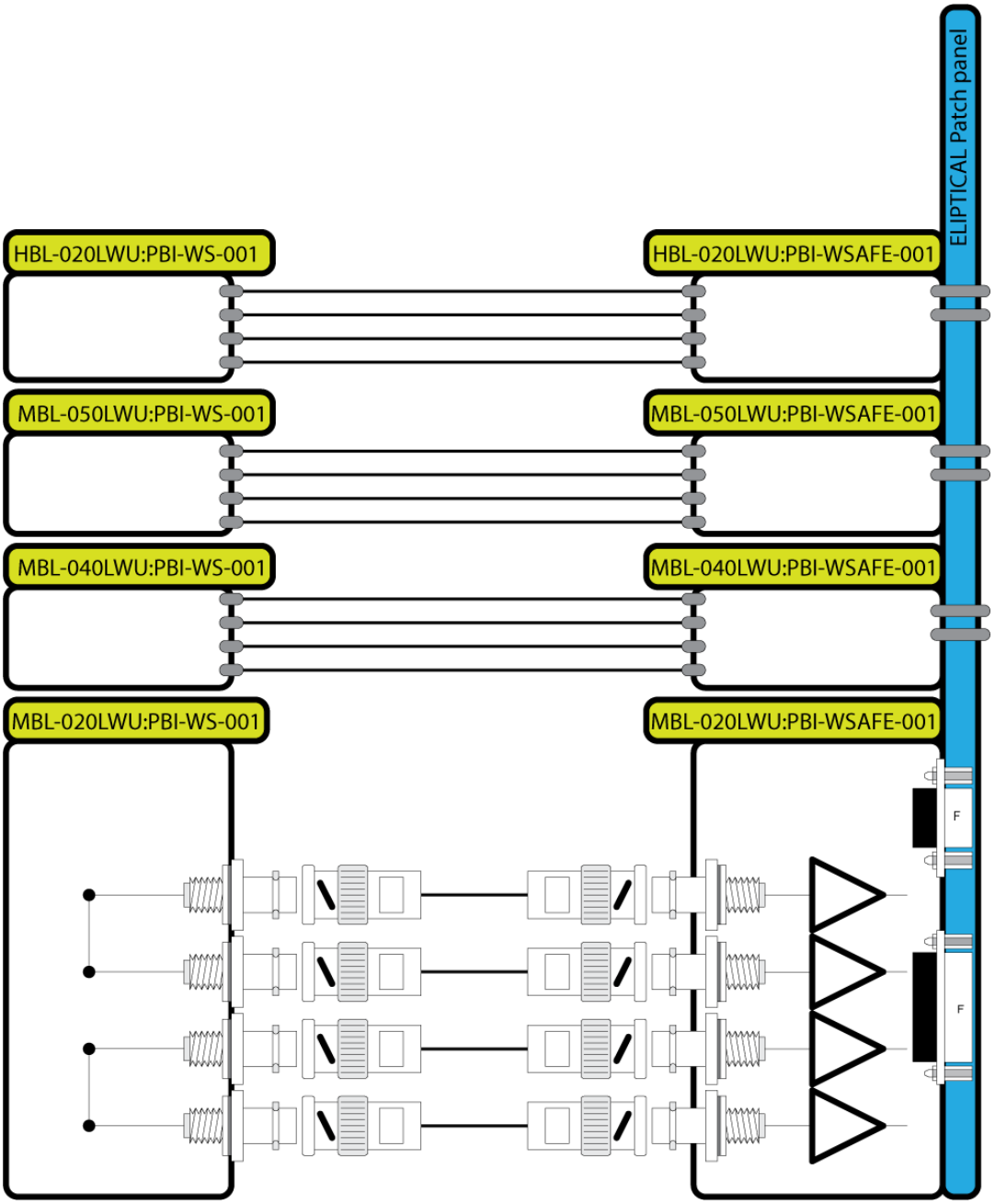

Figure 18 ELLIPTICAL cables and connectors: from WS to ELLIPT. patch panel with AFE.

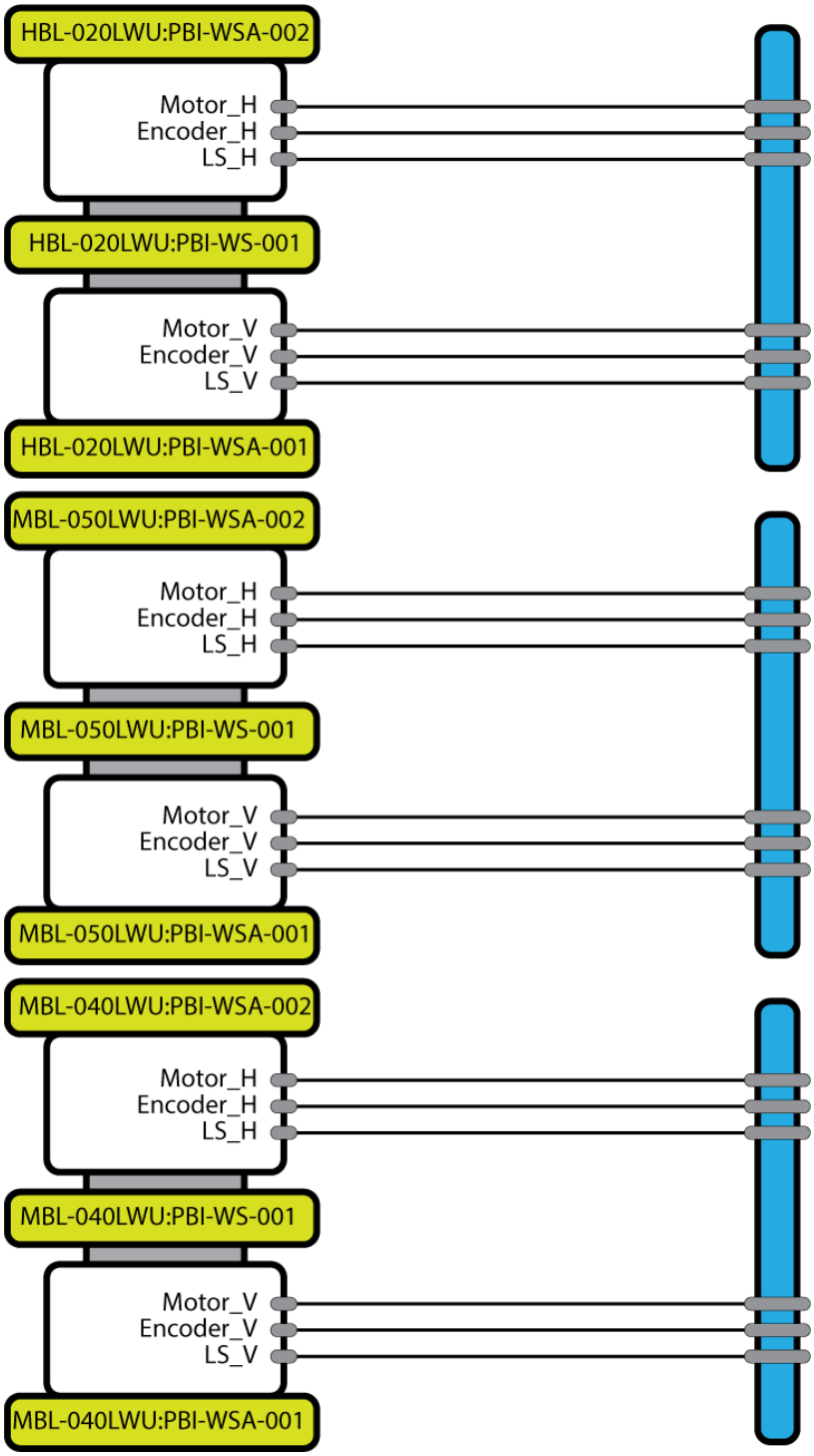

Figure 19 ELLIPTICAL cables and connectors from WS to ELLIPTICAL patch panel.

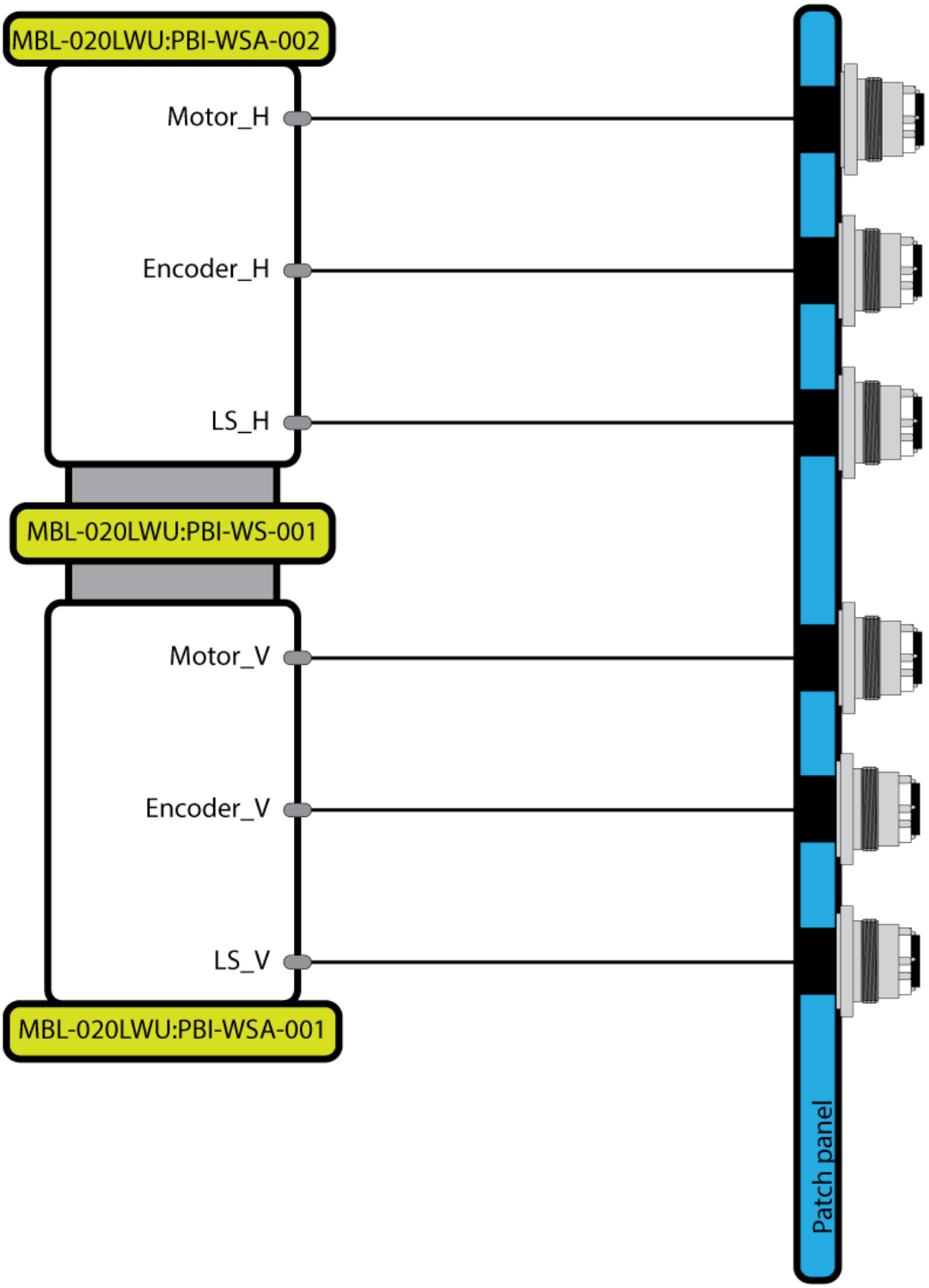

Figure 20 ELLIPTICAL cables and connectors from WS to ELLIPTICAL patch panel, with Horizontal and Vertical actuators.

5.2. Elliptical WS ACQ SYS fibers and cabling (long run)

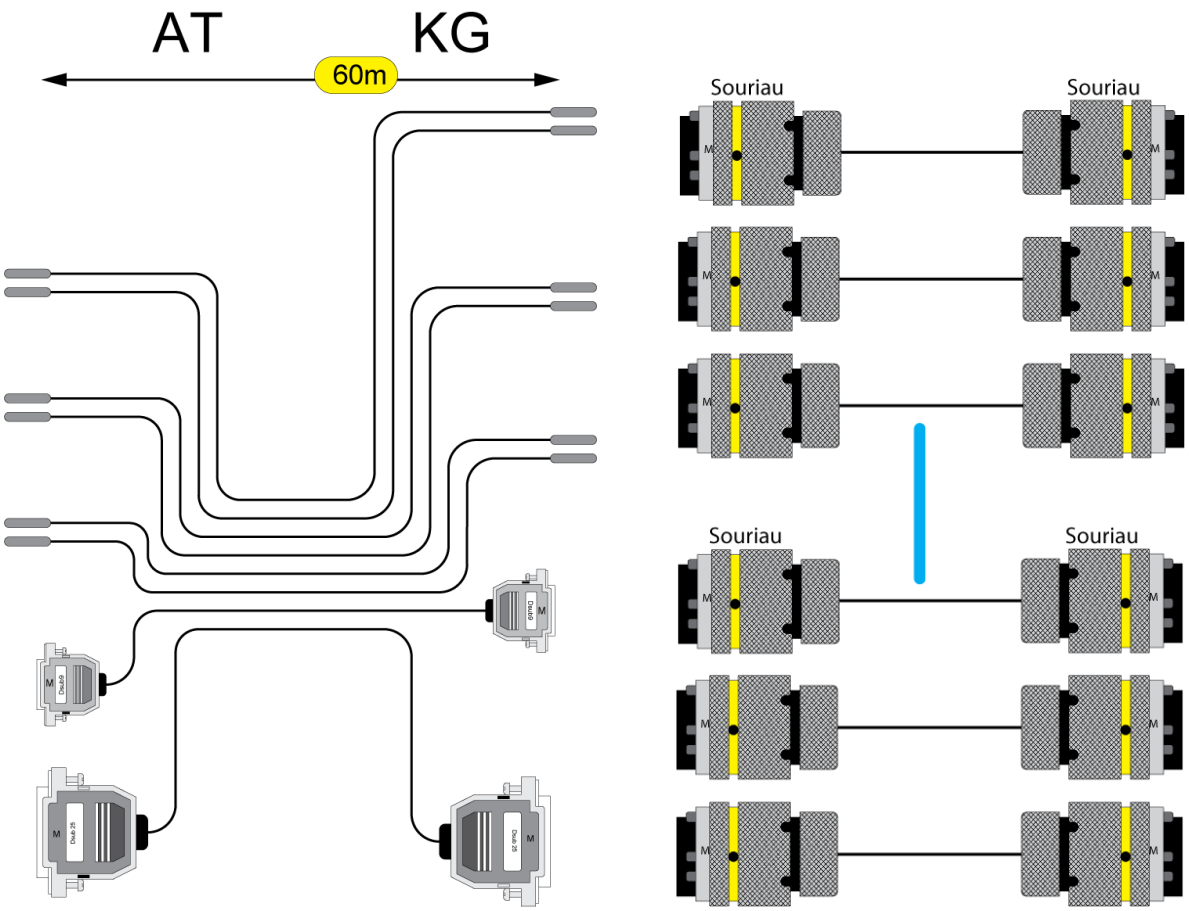

Figure 21 Long run cables (≈ 60m) from ELLIPTICAL (AT area) patch panel to the ELLIPTICAL rack patch panel in KG area.

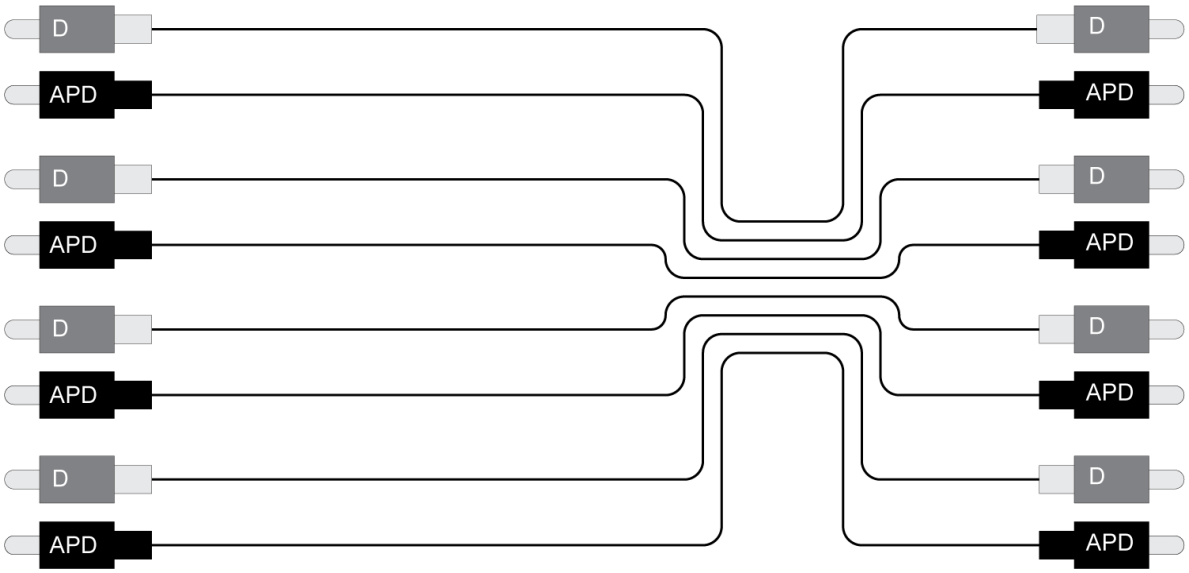

Figure 22 Long run scintillator fibers (≈60m) from ELLIPTICAL (AT area) patch panel to OFE patch panel in the ELLIPTICAL rack in KG area.

5.2.1. Elliptical WS ACQ SYS cabling diagram

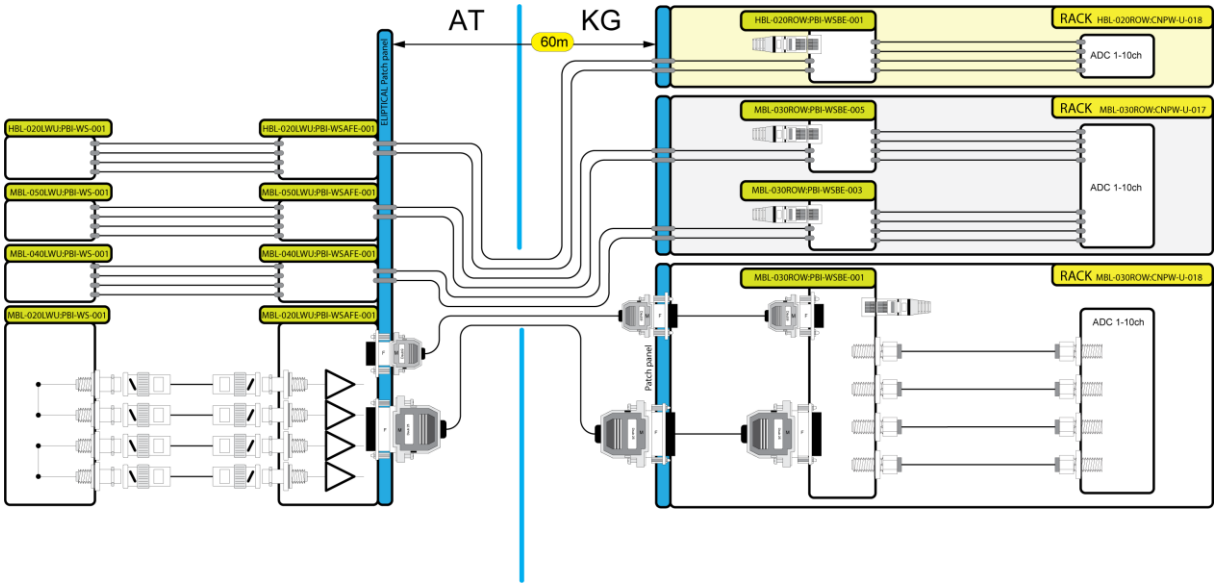

Figure 23 ELLIPTICAL motion controller and WS acquisition illustration.

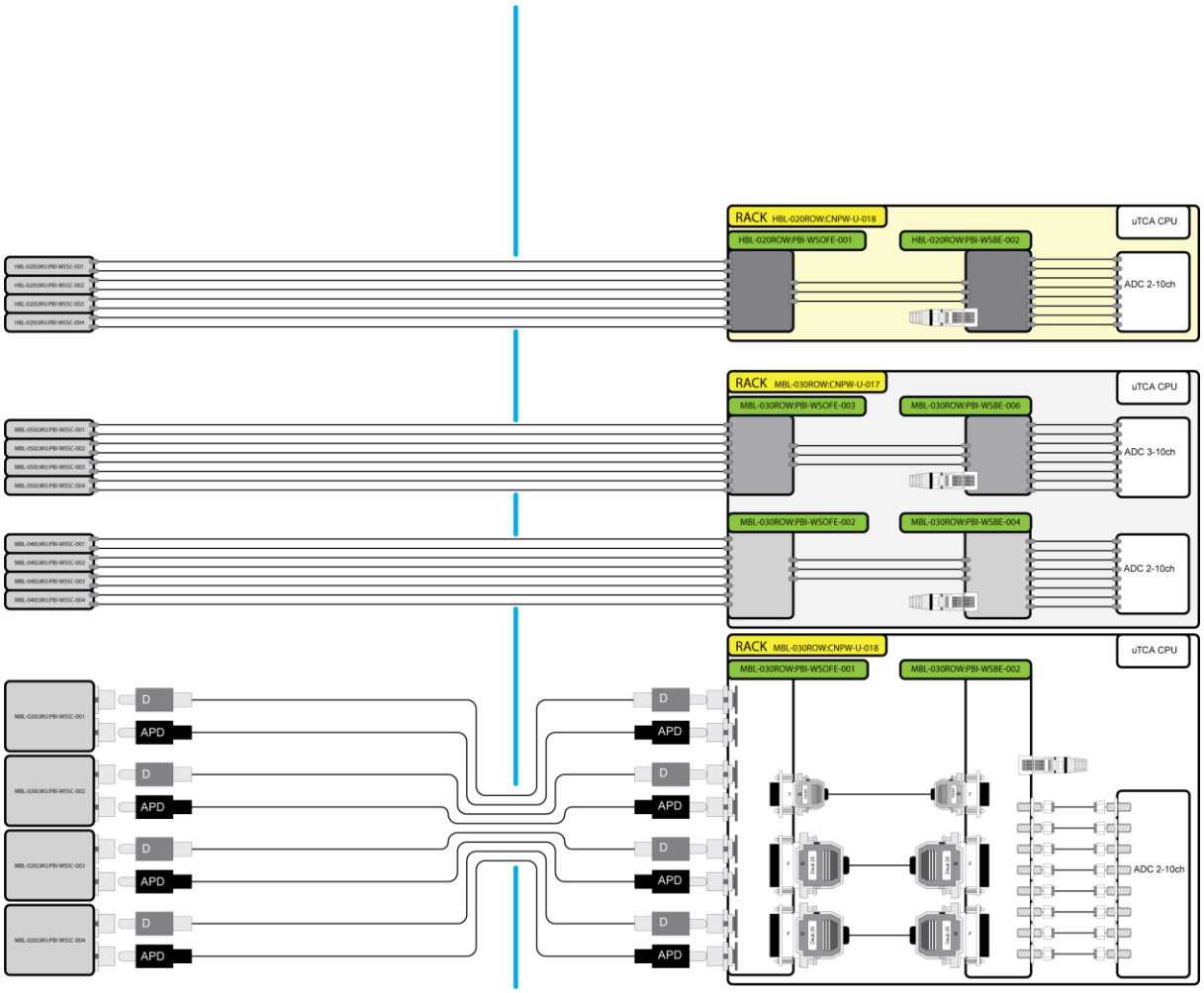

Figure 24 ELLIPTICAL scintillators with their fibers and acquisition system.

5.2.2. Elliptical WS ACQ SYS cabling table

DEVICE A (FROM)						DEVICE B (TO)					
NAME	BUILDING	RACK	CONNECTOR	WIRING	USER LABEL	NAME	BUILDING	RACK	CONNECTOR	WIRING	USER LABEL
MBL-020LWU:PBI-WS-001	AT		DB-9 Female, All metal, EMC, Pins Crimp		MBL-020LWU:PBI-WS-001 AFE control	MBL-030ROW:CNPW-U-018	KG	MBL-030ROW:CNPW-U-018	DB-9 male, All metal, EMC, Pins Crimp		MBL-020LWU:PBI-WS-001 AFE control
MBL-020LWU:PBI-WS-001	AT		FCT FL2S57-K121 DB-25		MBL-020LWU:PBI-WS-001 AFE signal	MBL-030ROW:CNPW-U-018	KG	MBL-030ROW:CNPW-U-018	DB-25 male, metal housing		MBL-020LWU:PBI-WS-001 AFE signal
MBL-020LWU:PBI-WS-001	AT		Souriau UTDW61210SH female		MBL-020LWU:PBI-WS-001 H actuator encoder	MBL-040ROW:CNPW-U-018	KG	MBL-040ROW:CNPW-U-018	Souriau UTDW61210PH male		MBL-020LWU:PBI-WS-001 H actuator encoder
MBL-020LWU:PBI-WS-001	AT		Souriau UTDW61065H female		MBL-020LWU:PBI-WS-001 H actuator LS	MBL-040ROW:CNPW-U-018	KG	MBL-040ROW:CNPW-U-018	Souriau UTDW6106PH male		MBL-020LWU:PBI-WS-001 H actuator LS
MBL-020LWU:PBI-WS-001	AT		Souriau UTD61285H female		MBL-020LWU:PBI-WS-001 H actuator motor	MBL-040ROW:CNPW-U-018	KG	MBL-040ROW:CNPW-U-018	Souriau UTD6128PH male		MBL-020LWU:PBI-WS-001 H actuator motor
MBL-020LWU:PBI-WS-001	AT				MBL-020LWU:PBI-WS-001 Scintillator D APD	MBL-030ROW:CNPW-U-018	KG	MBL-030ROW:CNPW-U-018			MBL-020LWU:PBI-WS-001 Scintillator D APD
MBL-020LWU:PBI-WS-001	AT				MBL-020LWU:PBI-WS-001 Scintillator D PD	MBL-030ROW:CNPW-U-018	KG	MBL-030ROW:CNPW-U-018			MBL-020LWU:PBI-WS-001 Scintillator D PD
MBL-020LWU:PBI-WS-001	AT				MBL-020LWU:PBI-WS-001 Scintillator L APD	MBL-030ROW:CNPW-U-018	KG	MBL-030ROW:CNPW-U-018			MBL-020LWU:PBI-WS-001 Scintillator L APD
MBL-020LWU:PBI-WS-001	AT				MBL-020LWU:PBI-WS-001 Scintillator L PD	MBL-030ROW:CNPW-U-018	KG	MBL-030ROW:CNPW-U-018			MBL-020LWU:PBI-WS-001 Scintillator L PD
MBL-020LWU:PBI-WS-001	AT				MBL-020LWU:PBI-WS-001 Scintillator R APD	MBL-030ROW:CNPW-U-018	KG	MBL-030ROW:CNPW-U-018			MBL-020LWU:PBI-WS-001 Scintillator R APD
MBL-020LWU:PBI-WS-001	AT				MBL-020LWU:PBI-WS-001 Scintillator R PD	MBL-030ROW:CNPW-U-018	KG	MBL-030ROW:CNPW-U-018			MBL-020LWU:PBI-WS-001 Scintillator R PD
MBL-020LWU:PBI-WS-001	AT				MBL-020LWU:PBI-WS-001 Scintillator U APD	MBL-030ROW:CNPW-U-018	KG	MBL-030ROW:CNPW-U-018			MBL-020LWU:PBI-WS-001 Scintillator U APD
MBL-020LWU:PBI-WS-001	AT				MBL-020LWU:PBI-WS-001 Scintillator U PD	MBL-030ROW:CNPW-U-018	KG	MBL-030ROW:CNPW-U-018			MBL-020LWU:PBI-WS-001 Scintillator U PD
MBL-020LWU:PBI-WS-001	AT		Souriau UTDW61210SH female		MBL-020LWU:PBI-WS-001 V actuator encoder	MBL-040ROW:CNPW-U-018	KG	MBL-040ROW:CNPW-U-018	Souriau UTDW61210PH male		MBL-020LWU:PBI-WS-001 V actuator encoder
MBL-020LWU:PBI-WS-001	AT		Souriau UTDW61065H female		MBL-020LWU:PBI-WS-001 V actuator LS	MBL-040ROW:CNPW-U-018	KG	MBL-040ROW:CNPW-U-018	Souriau UTDW6106PH male		MBL-020LWU:PBI-WS-001 V actuator LS
MBL-020LWU:PBI-WS-001	AT		Souriau UTD61285H female		MBL-020LWU:PBI-WS-001 V actuator motor	MBL-040ROW:CNPW-U-018	KG	MBL-040ROW:CNPW-U-018	Souriau UTD6128PH male		MBL-020LWU:PBI-WS-001 V actuator motor
MBL-040LWU:PBI-WS-001	AT		DB-9 Female, All metal, EMC, Pins Crimp		MBL-040LWU:PBI-WS-001 AFE control	MBL-030ROW:CNPW-U-017	KG	MBL-030ROW:CNPW-U-017	DB-9 male, All metal, EMC, Pins Crimp		MBL-040LWU:PBI-WS-001 AFE control
MBL-040LWU:PBI-WS-001	AT		FCT FL2S57-K121 DB-25		MBL-040LWU:PBI-WS-001 AFE signal	MBL-030ROW:CNPW-U-017	KG	MBL-030ROW:CNPW-U-017	DB-25 male, metal housing		MBL-040LWU:PBI-WS-001 AFE signal
MBL-040LWU:PBI-WS-001	AT		Souriau UTDW61210SH female		MBL-040LWU:PBI-WS-001 H actuator encoder	MBL-040ROW:CNPW-U-018	KG	MBL-040ROW:CNPW-U-018	Souriau UTDW61210PH male		MBL-040LWU:PBI-WS-001 H actuator encoder
MBL-040LWU:PBI-WS-001	AT		Souriau UTDW61065H female		MBL-040LWU:PBI-WS-001 H actuator LS	MBL-040ROW:CNPW-U-018	KG	MBL-040ROW:CNPW-U-018	Souriau UTDW6106PH male		MBL-040LWU:PBI-WS-001 H actuator LS
MBL-040LWU:PBI-WS-001	AT		Souriau UTD61285H female		MBL-040LWU:PBI-WS-001 H actuator motor	MBL-040ROW:CNPW-U-018	KG	MBL-040ROW:CNPW-U-018	Souriau UTD6128PH male		MBL-040LWU:PBI-WS-001 H actuator motor
MBL-040LWU:PBI-WS-001	AT				MBL-040LWU:PBI-WS-001 Scintillator D APD	MBL-030ROW:CNPW-U-017	KG	MBL-030ROW:CNPW-U-017			MBL-040LWU:PBI-WS-001 Scintillator D APD
MBL-040LWU:PBI-WS-001	AT				MBL-040LWU:PBI-WS-001 Scintillator D PD	MBL-030ROW:CNPW-U-017	KG	MBL-030ROW:CNPW-U-017			MBL-040LWU:PBI-WS-001 Scintillator D PD
MBL-040LWU:PBI-WS-001	AT				MBL-040LWU:PBI-WS-001 Scintillator L APD	MBL-030ROW:CNPW-U-017	KG	MBL-030ROW:CNPW-U-017			MBL-040LWU:PBI-WS-001 Scintillator L APD
MBL-040LWU:PBI-WS-001	AT				MBL-040LWU:PBI-WS-001 Scintillator L PD	MBL-030ROW:CNPW-U-017	KG	MBL-030ROW:CNPW-U-017			MBL-040LWU:PBI-WS-001 Scintillator L PD
MBL-040LWU:PBI-WS-001	AT				MBL-040LWU:PBI-WS-001 Scintillator R APD	MBL-030ROW:CNPW-U-017	KG	MBL-030ROW:CNPW-U-017			MBL-040LWU:PBI-WS-001 Scintillator R APD
MBL-040LWU:PBI-WS-001	AT				MBL-040LWU:PBI-WS-001 Scintillator R PD	MBL-030ROW:CNPW-U-017	KG	MBL-030ROW:CNPW-U-017			MBL-040LWU:PBI-WS-001 Scintillator R PD
MBL-040LWU:PBI-WS-001	AT				MBL-040LWU:PBI-WS-001 Scintillator U APD	MBL-030ROW:CNPW-U-017	KG	MBL-030ROW:CNPW-U-017			MBL-040LWU:PBI-WS-001 Scintillator U APD
MBL-040LWU:PBI-WS-001	AT				MBL-040LWU:PBI-WS-001 Scintillator U PD	MBL-030ROW:CNPW-U-017	KG	MBL-030ROW:CNPW-U-017			MBL-040LWU:PBI-WS-001 Scintillator U PD
MBL-040LWU:PBI-WS-001	AT		Souriau UTDW61210SH female		MBL-040LWU:PBI-WS-001 V actuator encoder	MBL-040ROW:CNPW-U-018	KG	MBL-040ROW:CNPW-U-018	Souriau UTDW61210PH male		MBL-040LWU:PBI-WS-001 V actuator encoder
MBL-040LWU:PBI-WS-001	AT		Souriau UTDW61065H female		MBL-040LWU:PBI-WS-001 V actuator LS	MBL-040ROW:CNPW-U-018	KG	MBL-040ROW:CNPW-U-018	Souriau UTDW6106PH male		MBL-040LWU:PBI-WS-001 V actuator LS
MBL-040LWU:PBI-WS-001	AT		Souriau UTD61285H female		MBL-040LWU:PBI-WS-001 V actuator motor	MBL-040ROW:CNPW-U-018	KG	MBL-040ROW:CNPW-U-018	Souriau UTD6128PH male		MBL-040LWU:PBI-WS-001 V actuator motor
MBL-050LWU:PBI-WS-001	AT		DB-9 Female, All metal, EMC, Pins Crimp		MBL-050LWU:PBI-WS-001 AFE control	MBL-030ROW:CNPW-U-017	KG	MBL-030ROW:CNPW-U-017	DB-9 male, All metal, EMC, Pins Crimp		MBL-050LWU:PBI-WS-001 AFE control
MBL-050LWU:PBI-WS-001	AT		FCT FL2S57-K121 DB-25		MBL-050LWU:PBI-WS-001 AFE signal	MBL-030ROW:CNPW-U-017	KG	MBL-030ROW:CNPW-U-017	DB-25 male, metal housing		MBL-050LWU:PBI-WS-001 AFE signal
MBL-050LWU:PBI-WS-001	AT		Souriau UTDW61210SH female		MBL-050LWU:PBI-WS-001 H actuator encoder	MBL-040ROW:CNPW-U-018	KG	MBL-040ROW:CNPW-U-018	Souriau UTDW61210PH male		MBL-050LWU:PBI-WS-001 H actuator encoder
MBL-050LWU:PBI-WS-001	AT		Souriau UTDW61065H female		MBL-050LWU:PBI-WS-001 H actuator LS	MBL-040ROW:CNPW-U-018	KG	MBL-040ROW:CNPW-U-018	Souriau UTDW6106PH male		MBL-050LWU:PBI-WS-001 H actuator LS
MBL-050LWU:PBI-WS-001	AT		Souriau UTD61285H female		MBL-050LWU:PBI-WS-001 H actuator motor	MBL-040ROW:CNPW-U-018	KG	MBL-040ROW:CNPW-U-018	Souriau UTD6128PH male		MBL-050LWU:PBI-WS-001 H actuator motor
MBL-050LWU:PBI-WS-001	AT				MBL-050LWU:PBI-WS-001 Scintillator D APD	MBL-030ROW:CNPW-U-017	KG	MBL-030ROW:CNPW-U-017			MBL-050LWU:PBI-WS-001 Scintillator D APD
MBL-050LWU:PBI-WS-001	AT				MBL-050LWU:PBI-WS-001 Scintillator D PD	MBL-030ROW:CNPW-U-017	KG	MBL-030ROW:CNPW-U-017			MBL-050LWU:PBI-WS-001 Scintillator D PD
MBL-050LWU:PBI-WS-001	AT				MBL-050LWU:PBI-WS-001 Scintillator L APD	MBL-030ROW:CNPW-U-017	KG	MBL-030ROW:CNPW-U-017			MBL-050LWU:PBI-WS-001 Scintillator L APD
MBL-050LWU:PBI-WS-001	AT				MBL-050LWU:PBI-WS-001 Scintillator L PD	MBL-030ROW:CNPW-U-017	KG	MBL-030ROW:CNPW-U-017			MBL-050LWU:PBI-WS-001 Scintillator L PD
MBL-050LWU:PBI-WS-001	AT				MBL-050LWU:PBI-WS-001 Scintillator R APD	MBL-030ROW:CNPW-U-017	KG	MBL-030ROW:CNPW-U-017			MBL-050LWU:PBI-WS-001 Scintillator R APD
MBL-050LWU:PBI-WS-001	AT				MBL-050LWU:PBI-WS-001 Scintillator R PD	MBL-030ROW:CNPW-U-017	KG	MBL-030ROW:CNPW-U-017			MBL-050LWU:PBI-WS-001 Scintillator R PD
MBL-050LWU:PBI-WS-001	AT				MBL-050LWU:PBI-WS-001 Scintillator U APD	MBL-030ROW:CNPW-U-017	KG	MBL-030ROW:CNPW-U-017			MBL-050LWU:PBI-WS-001 Scintillator U APD
MBL-050LWU:PBI-WS-001	AT				MBL-050LWU:PBI-WS-001 Scintillator U PD	MBL-030ROW:CNPW-U-017	KG	MBL-030ROW:CNPW-U-017			MBL-050LWU:PBI-WS-001 Scintillator U PD
MBL-050LWU:PBI-WS-001	AT		Souriau UTDW61210SH female		MBL-050LWU:PBI-WS-001 V actuator encoder	MBL-040ROW:CNPW-U-018	KG	MBL-040ROW:CNPW-U-018	Souriau UTDW61210PH male		MBL-050LWU:PBI-WS-001 V actuator encoder
MBL-050LWU:PBI-WS-001	AT		Souriau UTDW61065H female		MBL-050LWU:PBI-WS-001 V actuator LS	MBL-040ROW:CNPW-U-018	KG	MBL-040ROW:CNPW-U-018	Souriau UTDW6106PH male		MBL-050LWU:PBI-WS-001 V actuator LS
MBL-050LWU:PBI-WS-001	AT		Souriau UTD61285H female		MBL-050LWU:PBI-WS-001 V actuator motor	MBL-040ROW:CNPW-U-018	KG	MBL-040ROW:CNPW-U-018	Souriau UTD6128PH male		MBL-050LWU:PBI-WS-001 V actuator motor
HBL-020LWU:PBI-WS-001	AT		DB-9 Female, All metal, EMC, Pins Crimp		HBL-020LWU:PBI-WS-001 AFE control	HBL-020ROW:CNPW-U-018	KG	HBL-020ROW:CNPW-U-018	DB-9 male, All metal, EMC, Pins Crimp		HBL-020LWU:PBI-WS-001 AFE control
HBL-020LWU:PBI-WS-001	AT		FCT FL2S57-K121 DB-25		HBL-020LWU:PBI-WS-001 AFE signal	HBL-020ROW:CNPW-U-018	KG	HBL-020ROW:CNPW-U-018	DB-25 male, metal housing		HBL-020LWU:PBI-WS-001 AFE signal
HBL-020LWU:PBI-WS-001	AT		Souriau UTDW61210SH female		HBL-020LWU:PBI-WS-001 H actuator encoder	HBL-030ROW:CNPW-U-018	KG	HBL-030ROW:CNPW-U-018	Souriau UTDW61210PH male		HBL-020LWU:PBI-WS-001 H actuator encoder
HBL-020LWU:PBI-WS-001	AT		Souriau UTDW61065H female		HBL-020LWU:PBI-WS-001 H actuator LS	HBL-030ROW:CNPW-U-018	KG	HBL-030ROW:CNPW-U-018	Souriau UTDW6106PH male		HBL-020LWU:PBI-WS-001 H actuator LS
HBL-020LWU:PBI-WS-001	AT		Souriau UTD61285H female		HBL-020LWU:PBI-WS-001 H actuator motor	HBL-030ROW:CNPW-U-018	KG	HBL-030ROW:CNPW-U-018	Souriau UTD6128PH male		HBL-020LWU:PBI-WS-001 H actuator motor
HBL-020LWU:PBI-WS-001	AT				HBL-020LWU:PBI-WS-001 Scintillator D APD	HBL-020ROW:CNPW-U-018	KG	HBL-020ROW:CNPW-U-018			HBL-020LWU:PBI-WS-001 Scintillator D APD
HBL-020LWU:PBI-WS-001	AT				HBL-020LWU:PBI-WS-001 Scintillator D PD	HBL-020ROW:CNPW-U-018	KG	HBL-020ROW:CNPW-U-018			HBL-020LWU:PBI-WS-001 Scintillator D PD
HBL-020LWU:PBI-WS-001	AT				HBL-020LWU:PBI-WS-001 Scintillator L APD	HBL-020ROW:CNPW-U-018	KG	HBL-020ROW:CNPW-U-018			HBL-020LWU:PBI-WS-001 Scintillator L APD
HBL-020LWU:PBI-WS-001	AT				HBL-020LWU:PBI-WS-001 Scintillator L PD	HBL-020ROW:CNPW-U-018	KG	HBL-020ROW:CNPW-U-018			HBL-020LWU:PBI-WS-001 Scintillator L PD
HBL-020LWU:PBI-WS-001	AT				HBL-020LWU:PBI-WS-001 Scintillator R APD	HBL-020ROW:CNPW-U-018	KG	HBL-020ROW:CNPW-U-018			HBL-020LWU:PBI-WS-001 Scintillator R APD
HBL-020LWU:PBI-WS-001	AT				HBL-020LWU:PBI-WS-001 Scintillator R PD	HBL-020ROW:CNPW-U-018	KG	HBL-020ROW:CNPW-U-018			HBL-020LWU:PBI-WS-001 Scintillator R PD
HBL-020LWU:PBI-WS-001	AT				HBL-020LWU:PBI-WS-001 Scintillator U APD	HBL-020ROW:CNPW-U-018	KG	HBL-020ROW:CNPW-U-018			HBL-020LWU:PBI-WS-001 Scintillator U APD
HBL-020LWU:PBI-WS-001	AT				HBL-020LWU:PBI-WS-001 Scintillator U PD	HBL-020ROW:CNPW-U-018	KG	HBL-020ROW:CNPW-U-018			HBL-020LWU:PBI-WS-001 Scintillator U PD
HBL-020LWU:PBI-WS-001	AT		Souriau UTDW61210SH female		HBL-020LWU:PBI-WS-001 V actuator encoder	HBL-030ROW:CNPW-U-018	KG	HBL-030ROW:CNPW-U-018	Souriau UTDW61210PH male		HBL-020LWU:PBI-WS-001 V actuator encoder
HBL-020LWU:PBI-WS-001	AT		Souriau UTDW61065H female		HBL-020LWU:PBI-WS-001 V actuator LS	HBL-030ROW:CNPW-U-018	KG	HBL-030ROW:CNPW-U-018	Souriau UTDW6106PH male		HBL-020LWU:PBI-WS-001 V actuator LS
HBL-020LWU:PBI-WS-001	AT		Souriau UTD61285H female		HBL-020LWU:PBI-WS-001 V actuator motor	HBL-030ROW:CNPW-U-018	KG	HBL-030ROW:CNPW-U-018	Souriau UTD6128PH male		HBL-020LWU:PBI-WS-001 V actuator motor

Figure 25 ELLIPTICAL cabling, ref. WS cable database extract 20180220.xlsx – ESS (File by Johan Norin).

5.3. Elliptical WS ACQ SYS cabling at the rack level

In this paragraph the cabling of the WS ACQ SYS foreseen in the Service Gallery is presented.

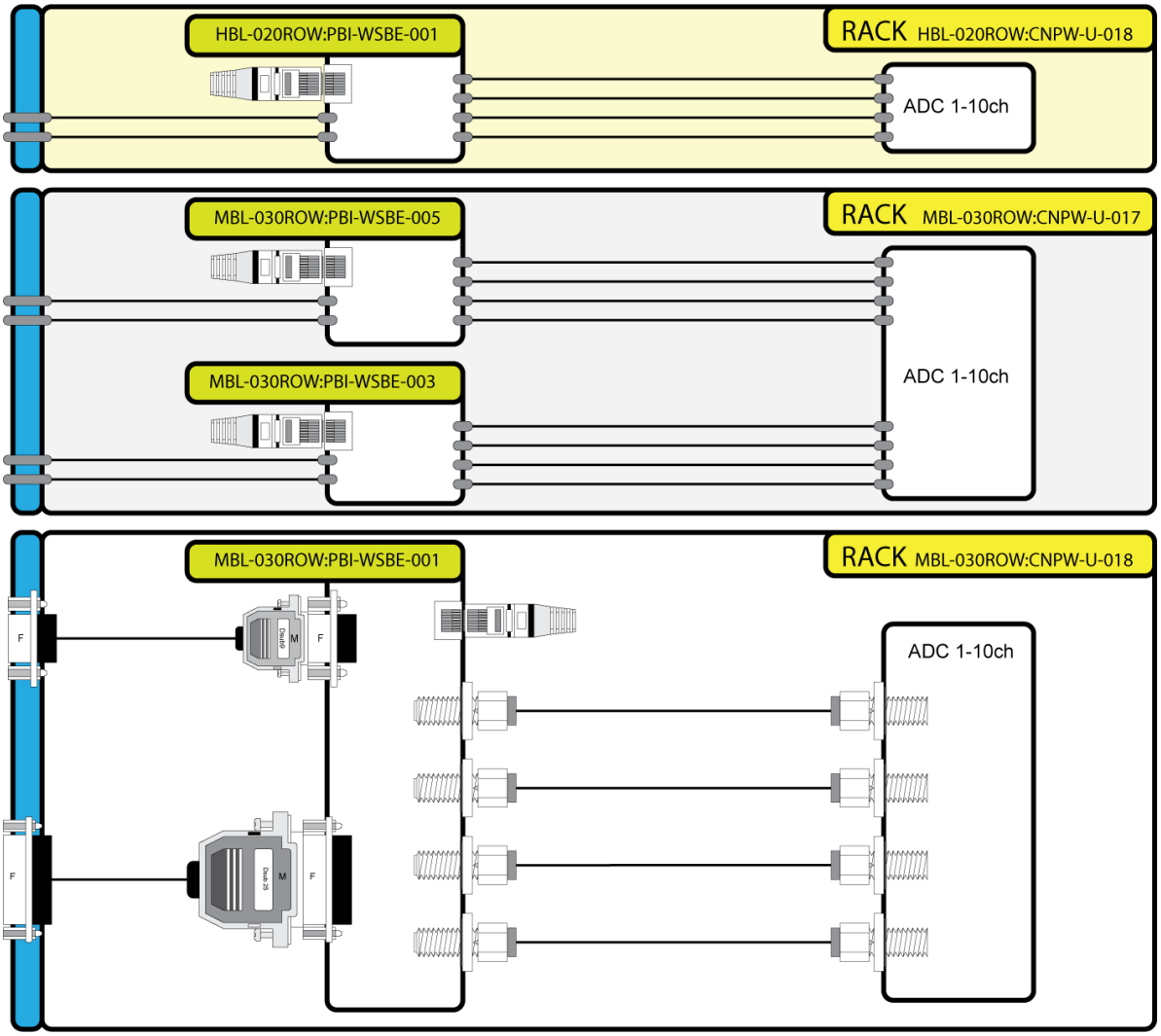

Figure 26 ELLIPTICAL in rack WS acquisition connection.

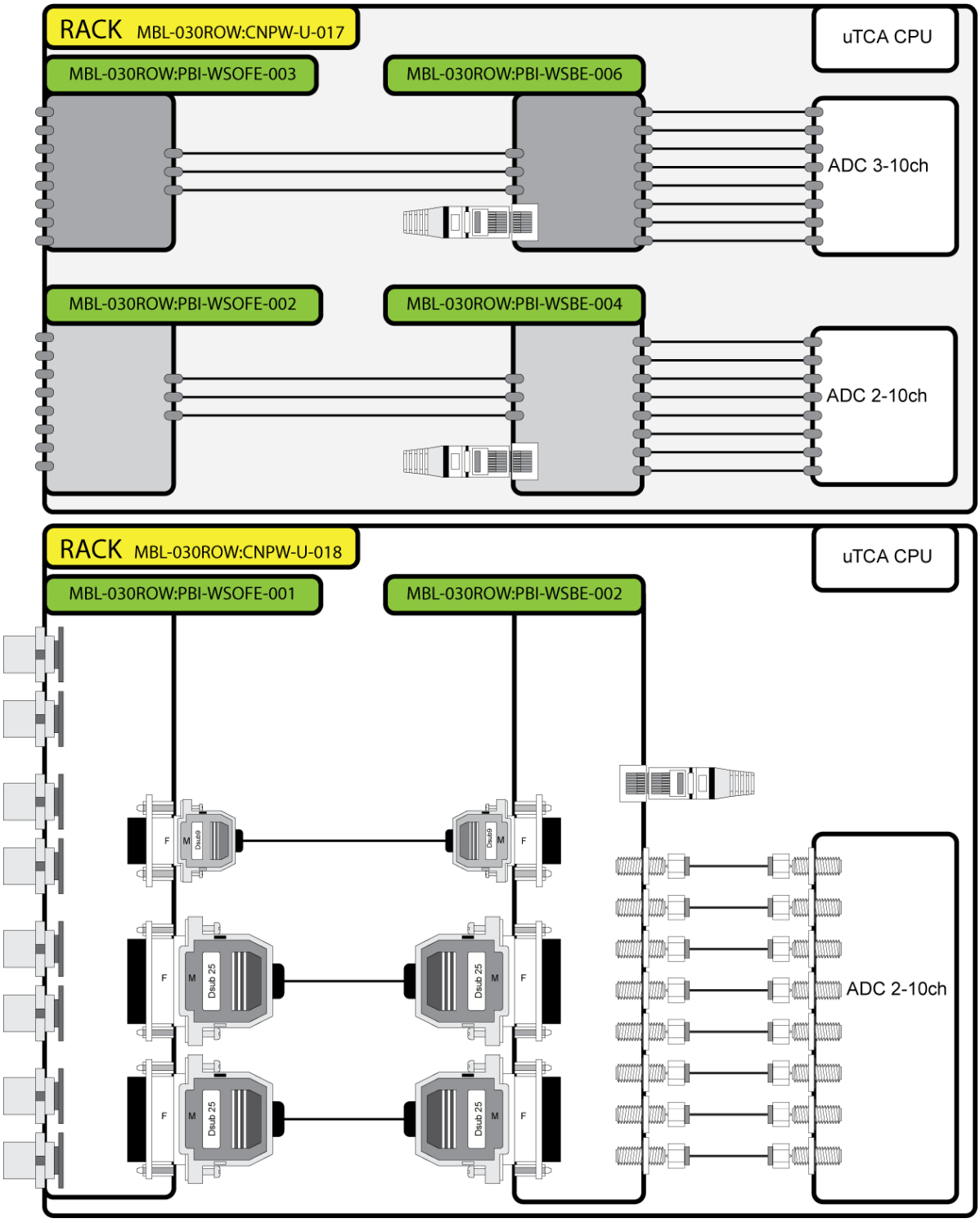

Figure 27 ELLIPTICAL in rack OFE acquisition connection.

5.3.1. Elliptical WS ACQ SYS rack list

ELLIPTICAL rack configuration with rack numbers and names with installed units and their sub units installed in the tunnel.

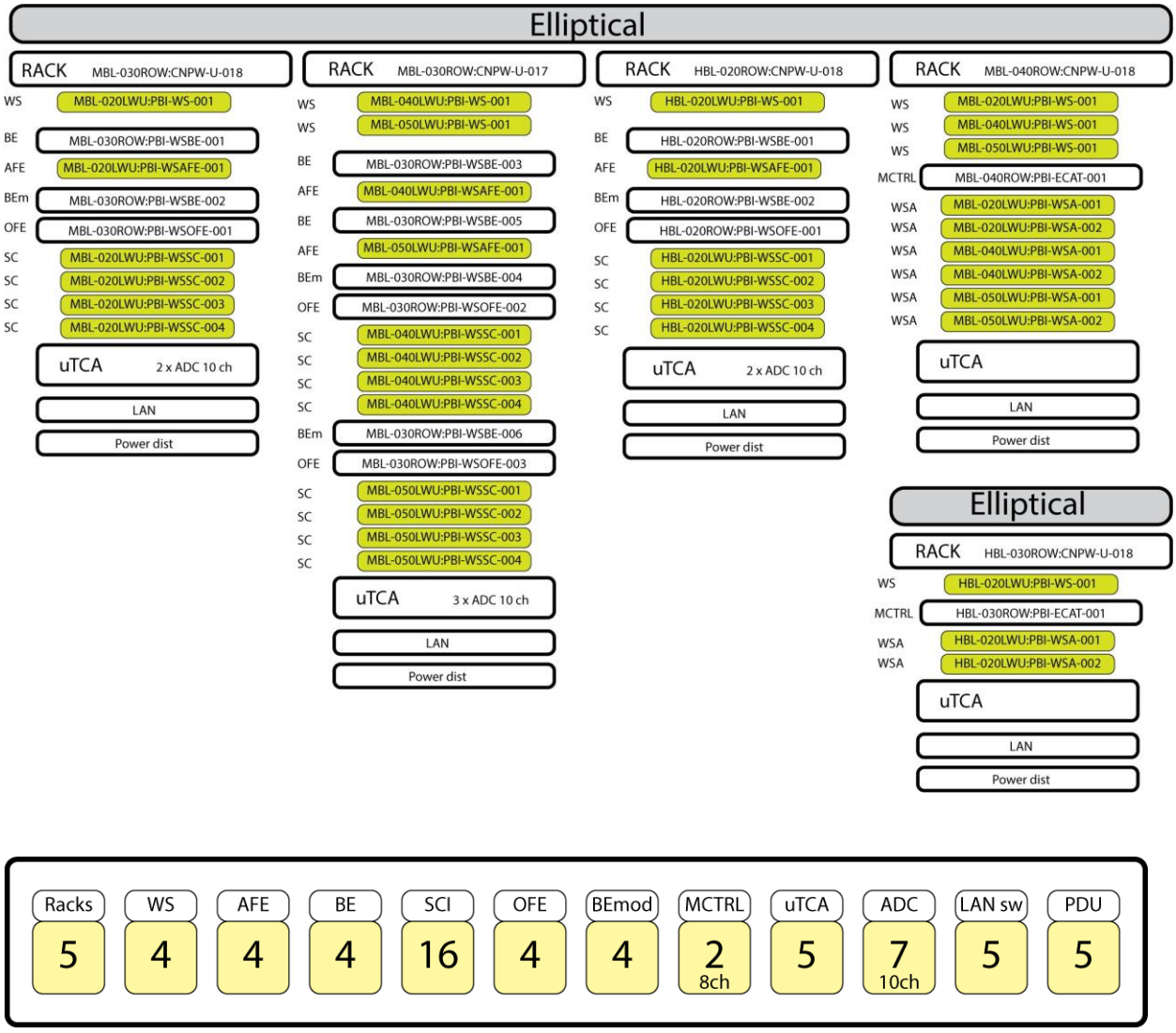

Figure 28 ELLIPTICAL rack list numbers with in rack unit's names

5.3.2. Elliptical WS ACQ SYS rack layout

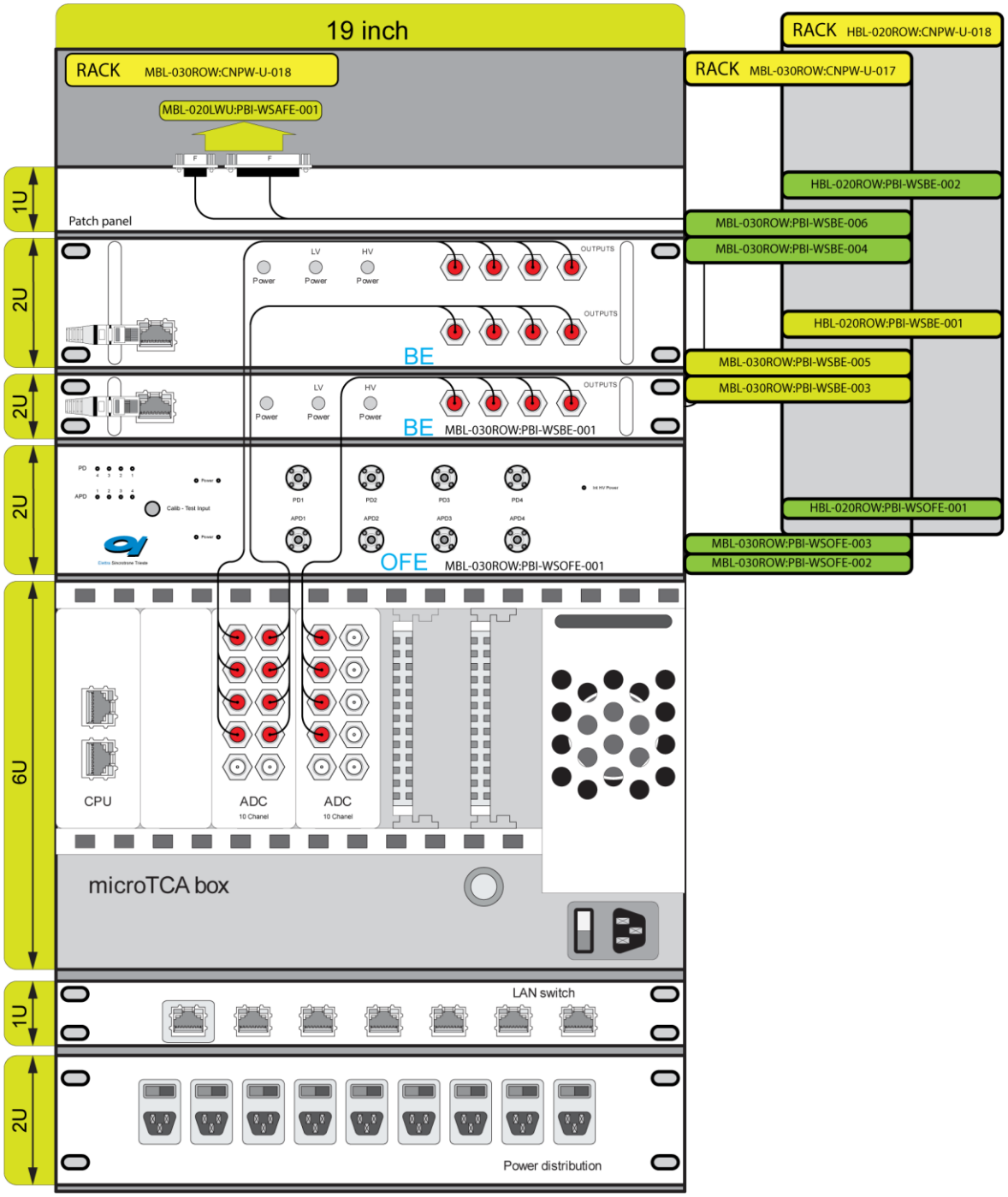

Figure 29 ELLIPTICAL WS and OFE acquisition rack layout,
with all needed units with names and numbers.

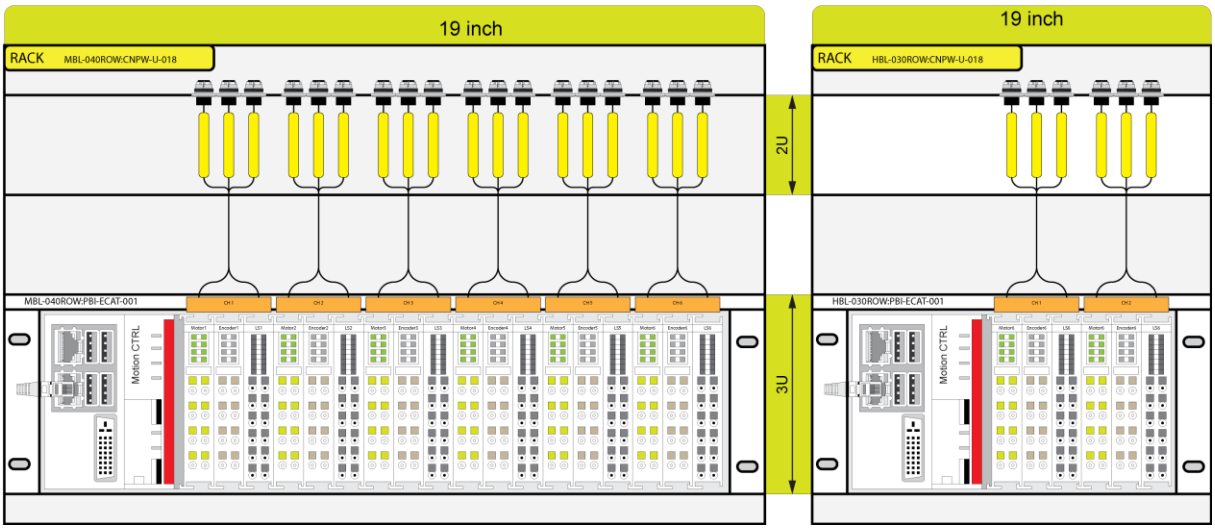

Figure 30 ELLIPTICAL MCTRL rack layout, with all units with names and numbering.

6. A2T section WS ACQ SYS interfaces

6.1. A2T in-tunnel mechanical interfaces

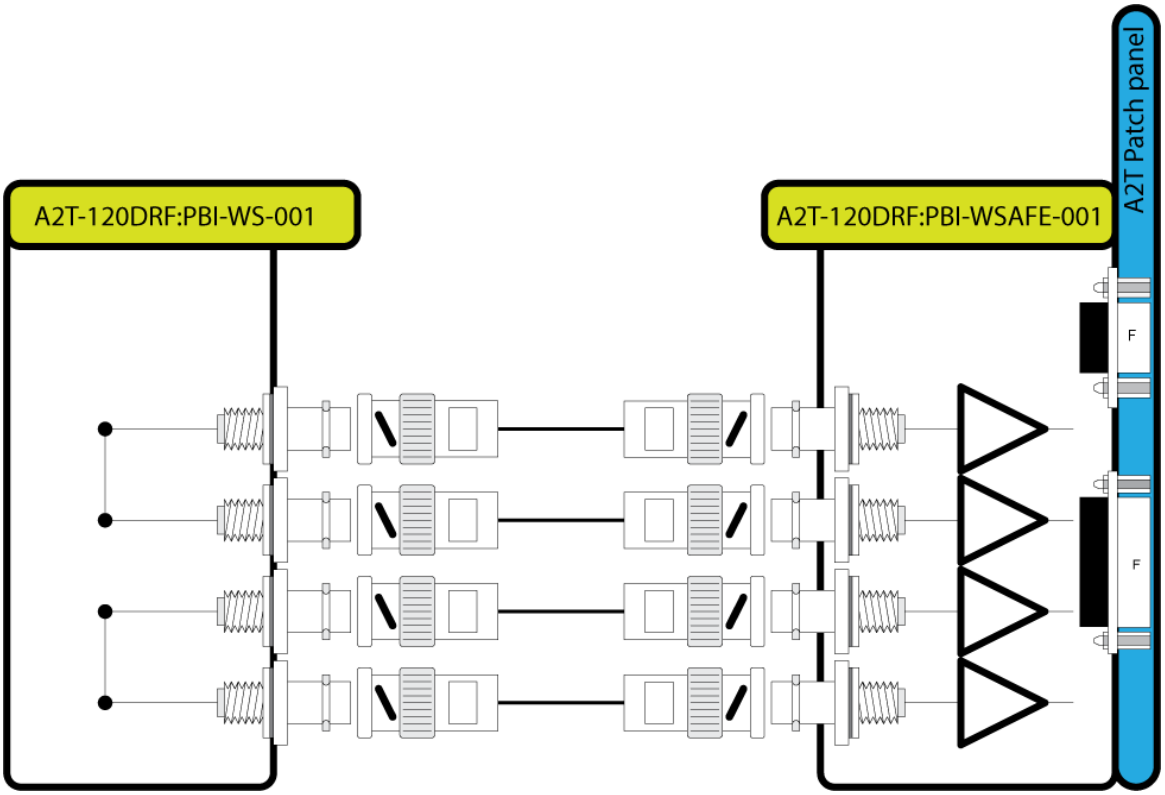

Figure 31 A2T cables and connectors from WS to A2T patch panel with AFE.

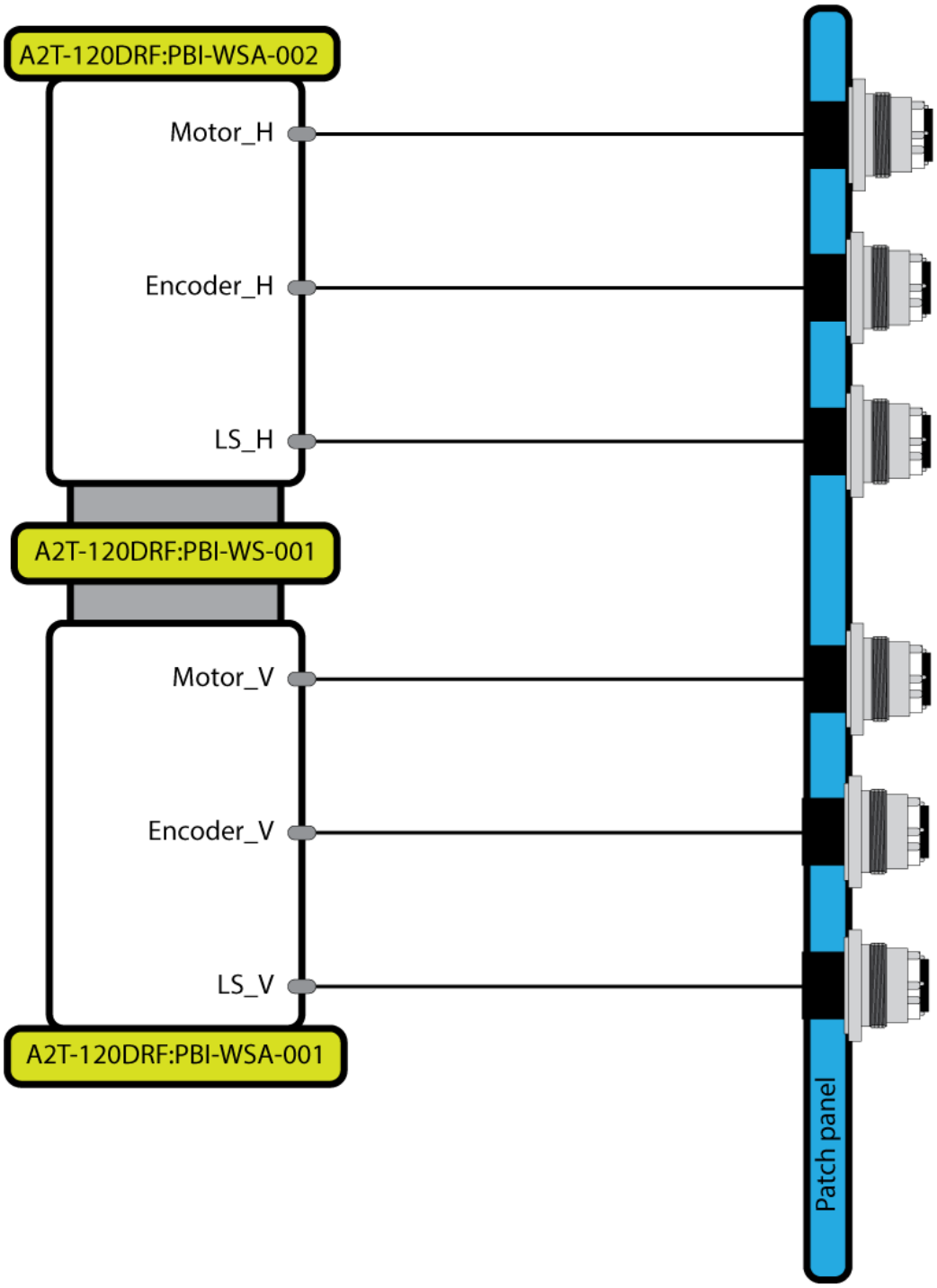

Figure 32 A2T cables and connectors from WS actuators to A2T patch panel.

6.2. A2T WS ACQ SYS cabling (long run)

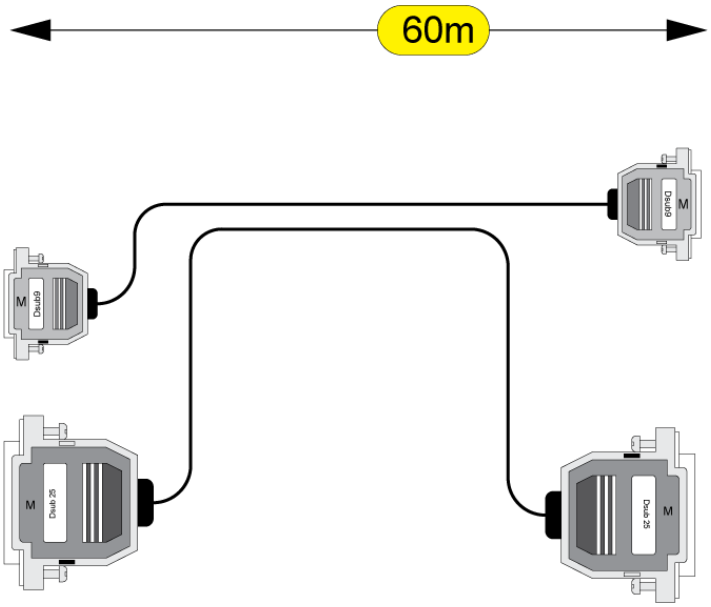

Figure 33 Long run cables (≈ 60m) from A2T (AT area) patch panel to the A2T rack patch panel in GSA area.

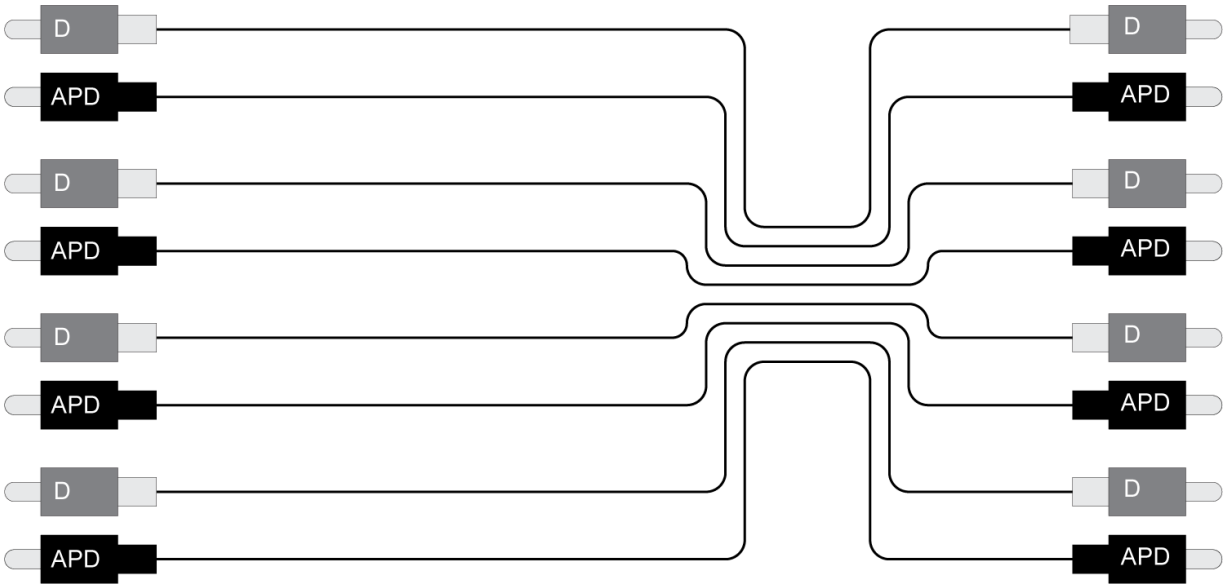

Figure 34 Long run scintillator fibers (≈ 60 m) from A2T (AT area) patch panel to OFE patch panel in the A2T rack in GSA area

6.2.1. A2T WS ACQ SYS cabling diagram

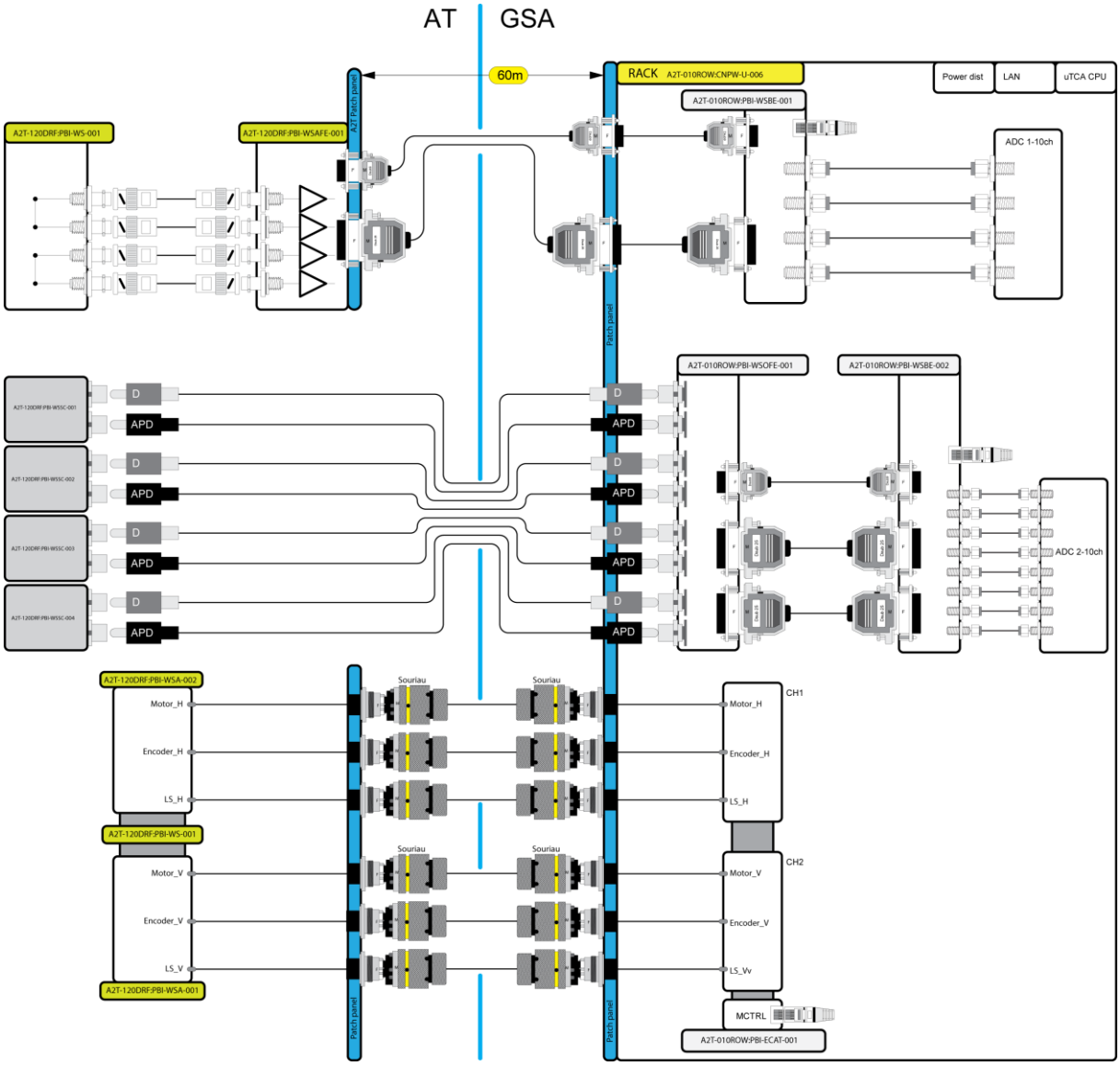

Figure 35 A2T WS acquisition OFE and motion controller system.

6.2.2. A2T WS ACQ SYS cabling table

DEVICE A (FROM)						DEVICE B (TO)					
NAME	BUILDING	RACK	CONNECTOR	WIRING	USER LABEL	NAME	BUILDING	RACK	CONNECTOR	WIRING	USER LABEL
A2T-120Drf:PBI-WS-001	AT		DB-9 Female, All metal, EMC, Pins Crimp		A2T-120DRF:PBI-WS-001 AFE control	A2T-010ROW:CNPW-U-006	GSA	A2T-010ROW:CNPW-U-006	DB-9 male, All metal, EMC, Pins Crimp		A2T-120DRF:PBI-WS-001 AFE control
A2T-120Drf:PBI-WS-001	AT		FCT FL2S57-K121 DB-25		A2T-120DRF:PBI-WS-001 AFE signal	A2T-010ROW:CNPW-U-006	GSA	A2T-010ROW:CNPW-U-006	DB-25 male, metal housing		A2T-120DRF:PBI-WS-001 AFE signal
A2T-120Drf:PBI-WS-001	AT		Souriau UTOW61210SH female		A2T-120DRF:PBI-WS-001 H actuator encoder	A2T-010ROW:CNPW-U-006	GSA	A2T-010ROW:CNPW-U-006	Souriau UTOW61210PH male		A2T-120DRF:PBI-WS-001 H actuator encoder
A2T-120Drf:PBI-WS-001	AT		Souriau UTOW61065H female		A2T-120DRF:PBI-WS-001 H actuator LS	A2T-010ROW:CNPW-U-006	GSA	A2T-010ROW:CNPW-U-006	Souriau UTOW6106PH male		A2T-120DRF:PBI-WS-001 H actuator LS
A2T-120Drf:PBI-WS-001	AT		Souriau UT06128SH female		A2T-120DRF:PBI-WS-001 H actuator motor	A2T-010ROW:CNPW-U-006	GSA	A2T-010ROW:CNPW-U-006	Souriau UT06128PH male		A2T-120DRF:PBI-WS-001 H actuator motor
A2T-120Drf:PBI-WS-001	AT				A2T-120DRF:PBI-WS-001 Scintillator D APD	A2T-010ROW:CNPW-U-006	GSA	A2T-010ROW:CNPW-U-006			A2T-120DRF:PBI-WS-001 Scintillator D APD
A2T-120Drf:PBI-WS-001	AT				A2T-120DRF:PBI-WS-001 Scintillator D PD	A2T-010ROW:CNPW-U-006	GSA	A2T-010ROW:CNPW-U-006			A2T-120DRF:PBI-WS-001 Scintillator D PD
A2T-120Drf:PBI-WS-001	AT				A2T-120DRF:PBI-WS-001 Scintillator L APD	A2T-010ROW:CNPW-U-006	GSA	A2T-010ROW:CNPW-U-006			A2T-120DRF:PBI-WS-001 Scintillator L APD
A2T-120Drf:PBI-WS-001	AT				A2T-120DRF:PBI-WS-001 Scintillator L PD	A2T-010ROW:CNPW-U-006	GSA	A2T-010ROW:CNPW-U-006			A2T-120DRF:PBI-WS-001 Scintillator L PD
A2T-120Drf:PBI-WS-001	AT				A2T-120DRF:PBI-WS-001 Scintillator R APD	A2T-010ROW:CNPW-U-006	GSA	A2T-010ROW:CNPW-U-006			A2T-120DRF:PBI-WS-001 Scintillator R APD
A2T-120Drf:PBI-WS-001	AT				A2T-120DRF:PBI-WS-001 Scintillator R PD	A2T-010ROW:CNPW-U-006	GSA	A2T-010ROW:CNPW-U-006			A2T-120DRF:PBI-WS-001 Scintillator R PD
A2T-120Drf:PBI-WS-001	AT				A2T-120DRF:PBI-WS-001 Scintillator U APD	A2T-010ROW:CNPW-U-006	GSA	A2T-010ROW:CNPW-U-006			A2T-120DRF:PBI-WS-001 Scintillator U APD
A2T-120Drf:PBI-WS-001	AT				A2T-120DRF:PBI-WS-001 Scintillator U PD	A2T-010ROW:CNPW-U-006	GSA	A2T-010ROW:CNPW-U-006			A2T-120DRF:PBI-WS-001 Scintillator U PD
A2T-120Drf:PBI-WS-001	AT		Souriau UTOW61210SH female		A2T-120DRF:PBI-WS-001 V actuator encoder	A2T-010ROW:CNPW-U-006	GSA	A2T-010ROW:CNPW-U-006	Souriau UTOW61210PH male		A2T-120DRF:PBI-WS-001 V actuator encoder
A2T-120Drf:PBI-WS-001	AT		Souriau UTOW61065H female		A2T-120DRF:PBI-WS-001 V actuator LS	A2T-010ROW:CNPW-U-006	GSA	A2T-010ROW:CNPW-U-006	Souriau UTOW6106PH male		A2T-120DRF:PBI-WS-001 V actuator LS
A2T-120Drf:PBI-WS-001	AT		Souriau UT06128SH female		A2T-120DRF:PBI-WS-001 V actuator motor	A2T-010ROW:CNPW-U-006	GSA	A2T-010ROW:CNPW-U-006	Souriau UT06128PH male		A2T-120DRF:PBI-WS-001 V actuator motor

Figure 36 A2T cabling, ref. WS cable database extract 20180220.xlsx – ESS (by J. Norin)

6.3. A2T WS ACQ SYS cabling at the rack level

In this paragraph the cabling of the WS ACQ SYS foreseen in the GSA Gallery is presented.

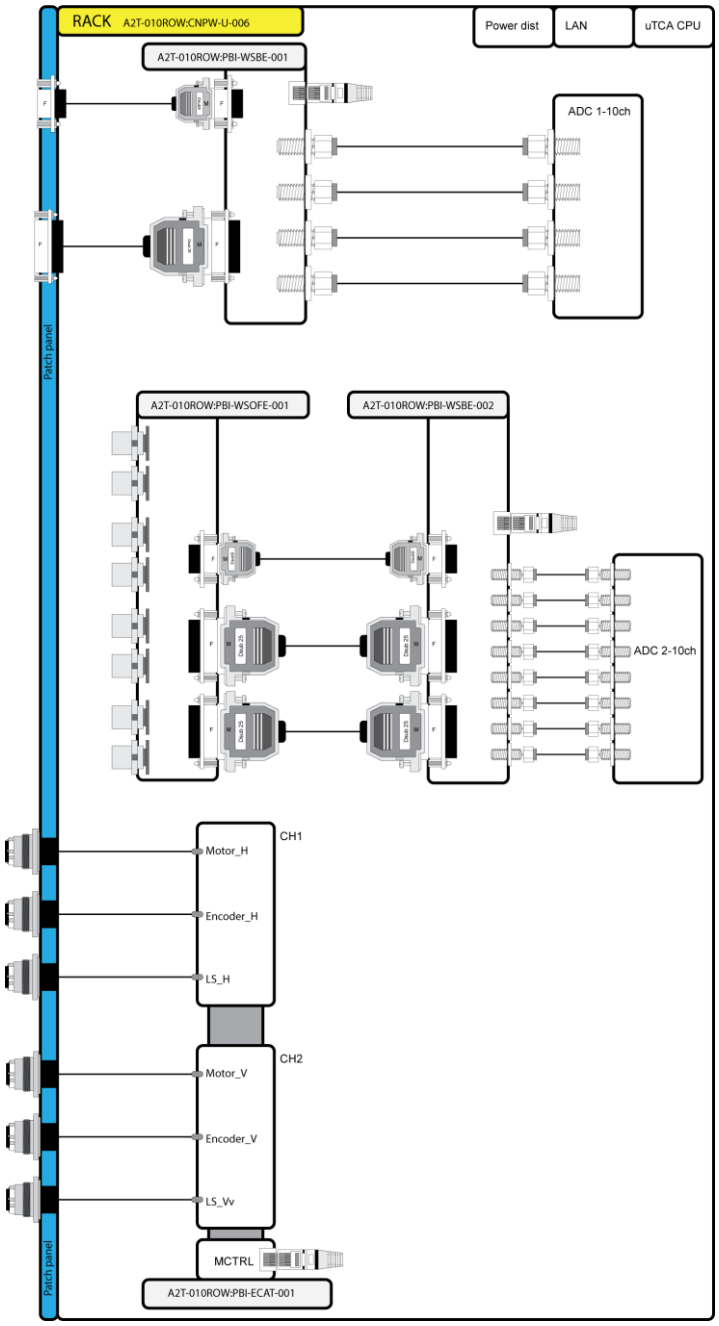

Figure 37 A2T in rack acquisition and motion controller connection

6.3.1. A2T WS ACQ SYS rack list

A2T rack configuration with rack numbers and names with installed units and their sub units installed in the tunnel.

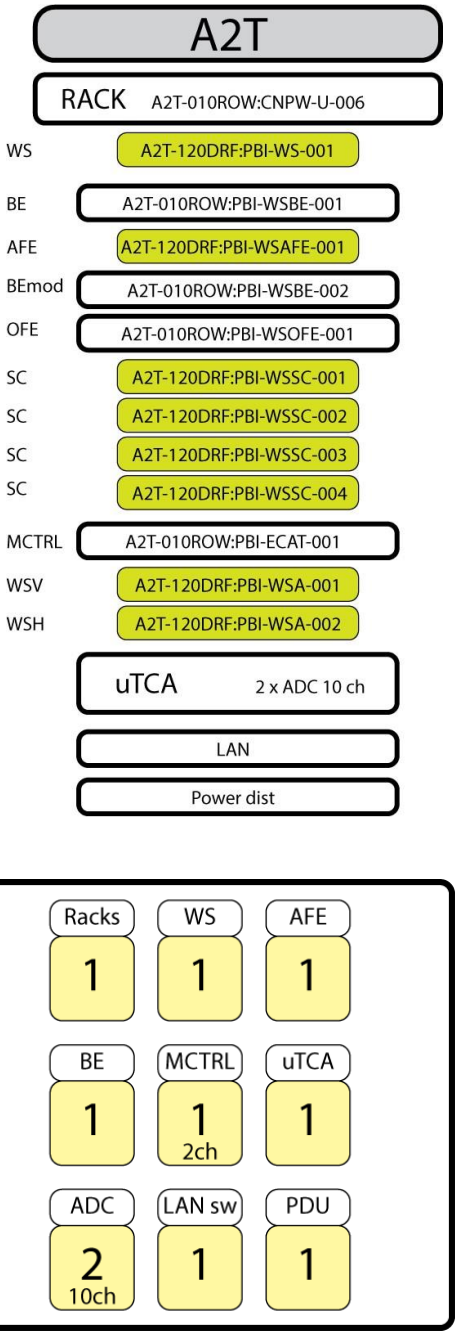

Figure 38 A2T rack list numbers with in rack unit's names

6.3.2. A2T WS ACQ SYS rack layout

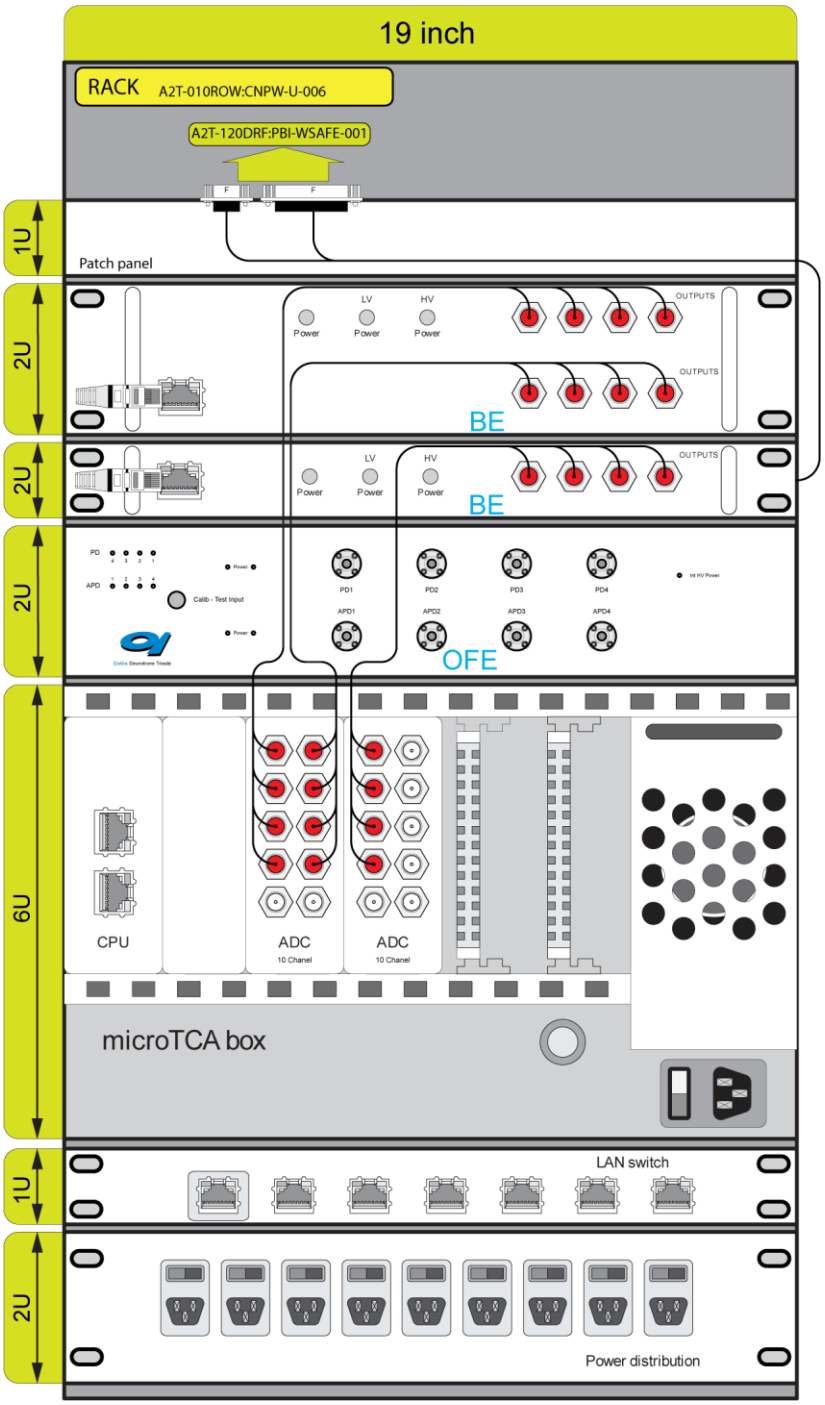

Figure 39 A2T WS and OFE acquisition rack layout with necessary units their names and numbering.

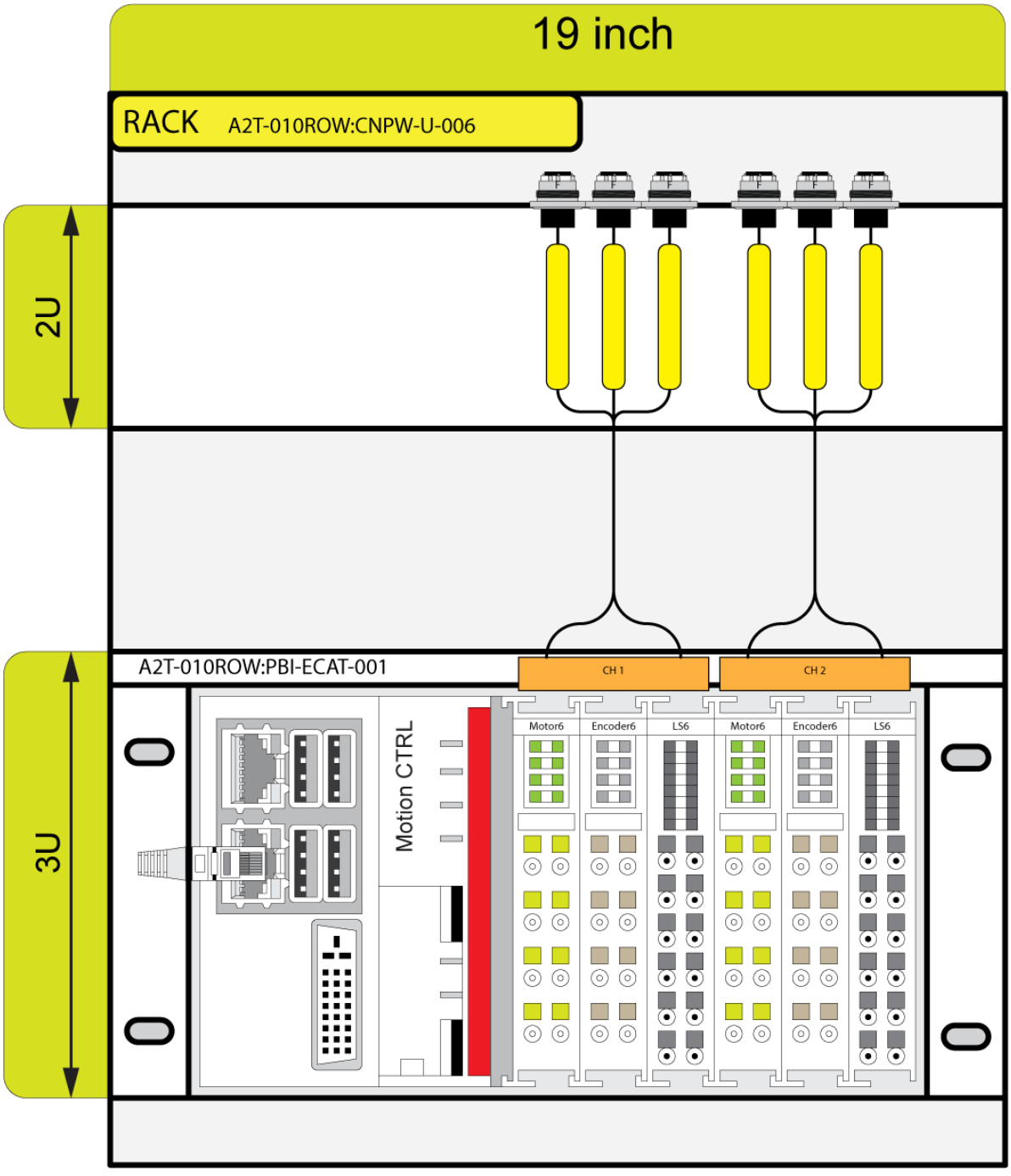

Figure 40 A2T Motion Controller rack layout with necessary units their names and numbering.