Elettra Sincrotrone Trieste

The ESS WS SCINT Overview

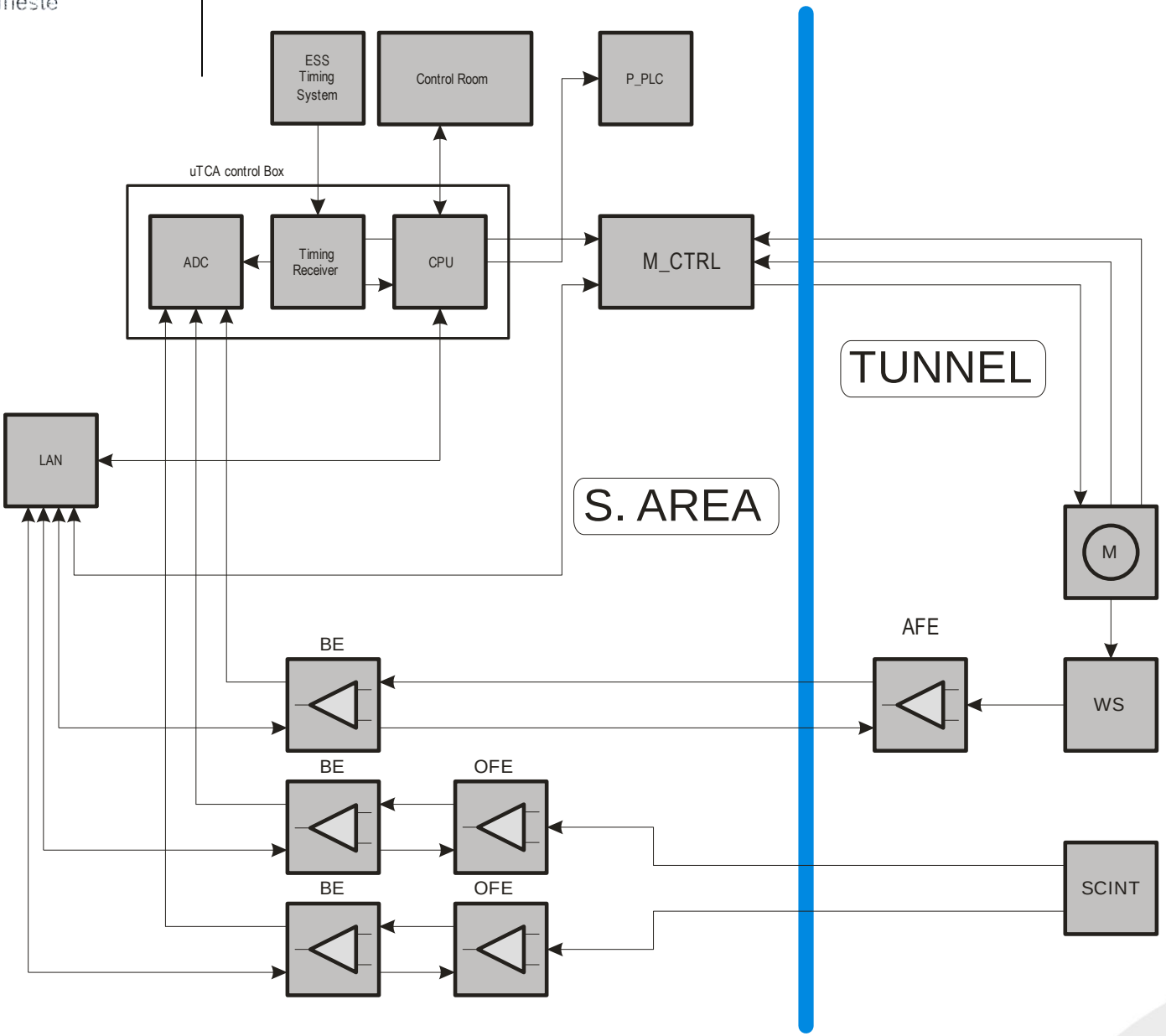
Sandi Grulia

Introduction

Main view of presentation:

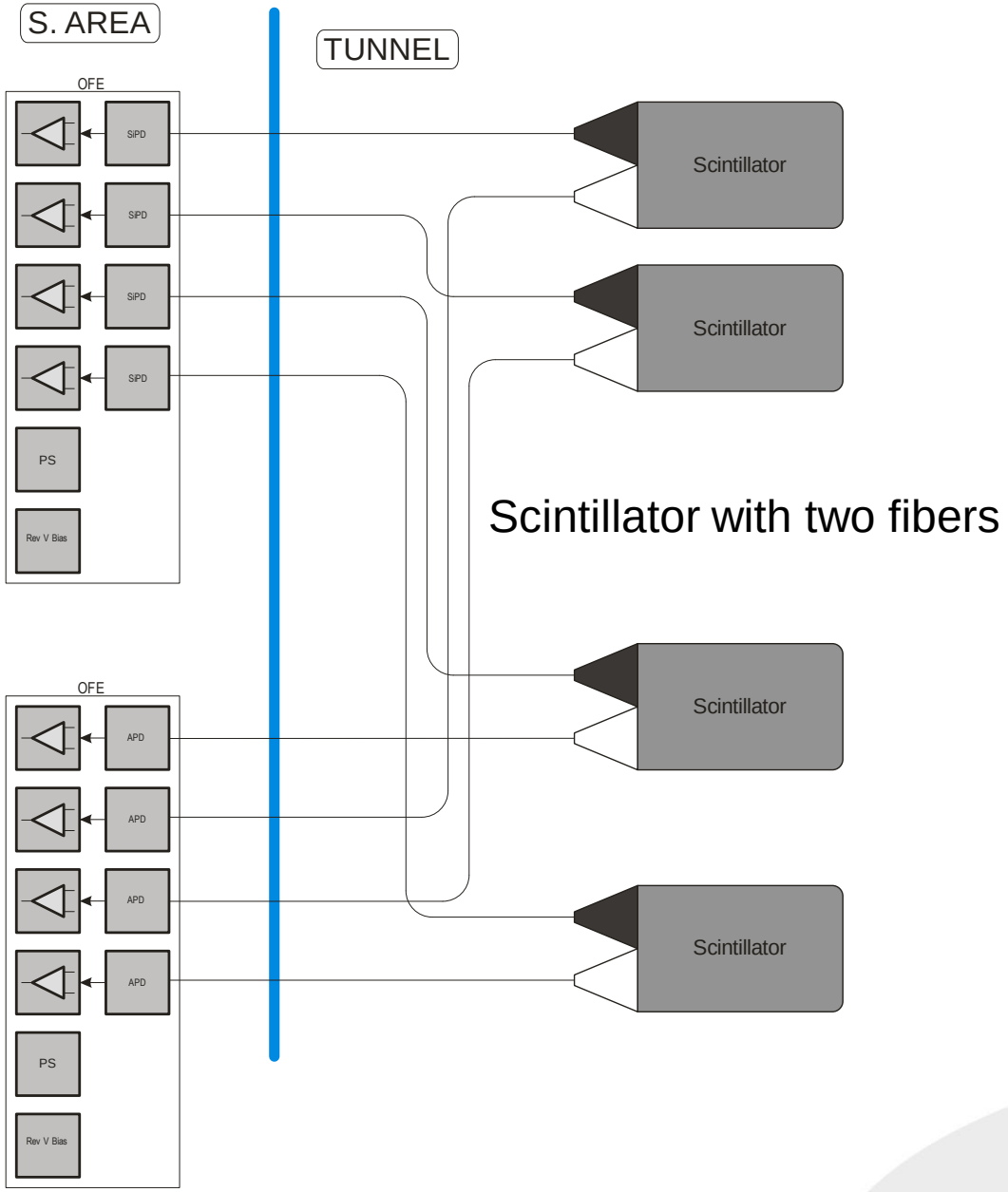
- General view of WS control and diagnostics
- OFE block schematic design
- BE block schematic
- OFE electronic schematic test and graph
- Mechanical design of OFE, BE
- Cabling and length issues
- WS basis and mechanical issues, solutions

General view of control and diagnostics

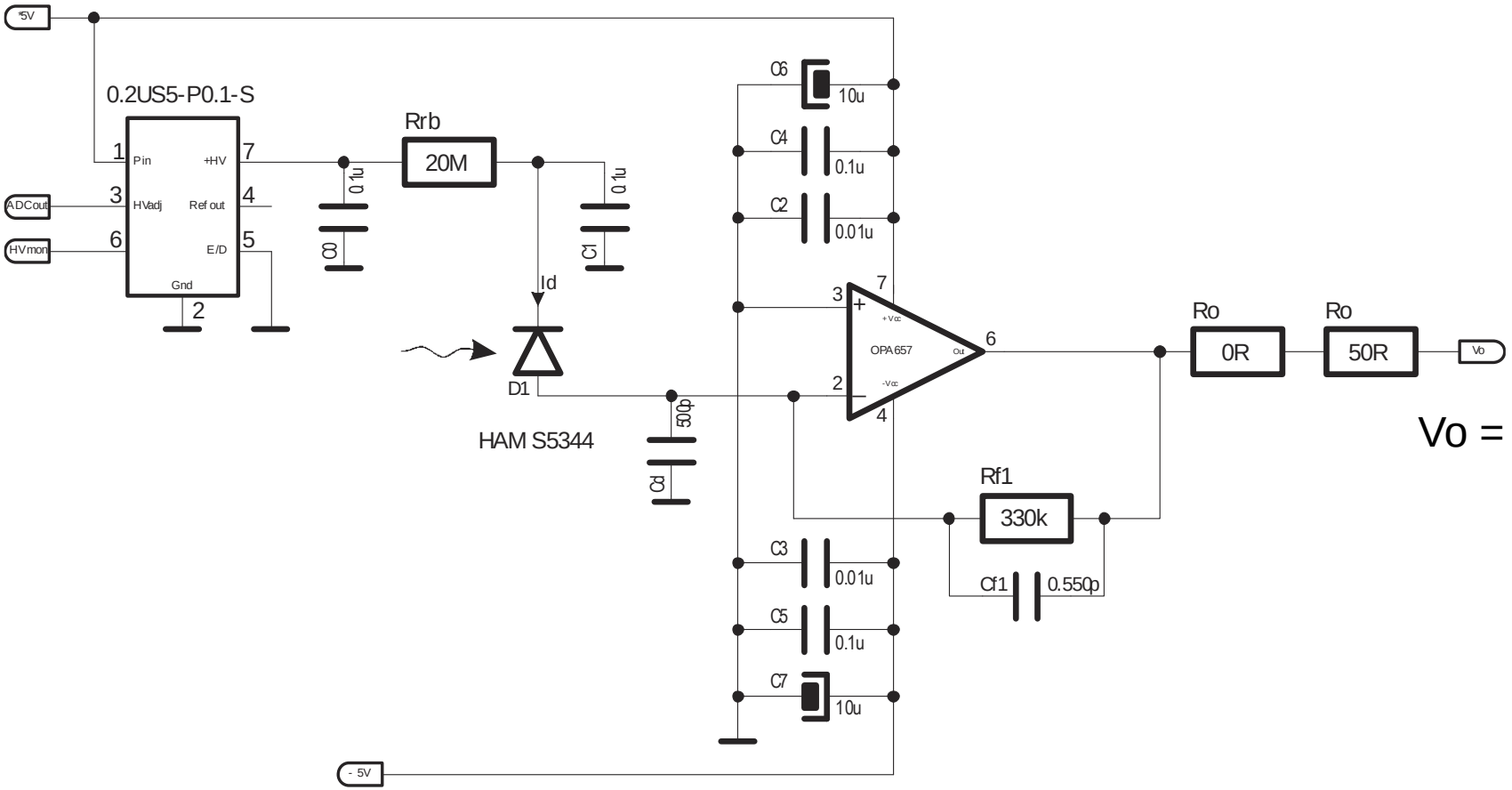


OFE block schematic

- Two separated units
- 4 optical inputs for SiPd
- 4 optical inputs for SiAPD
- Low voltage power supply



OFE electronic schematic

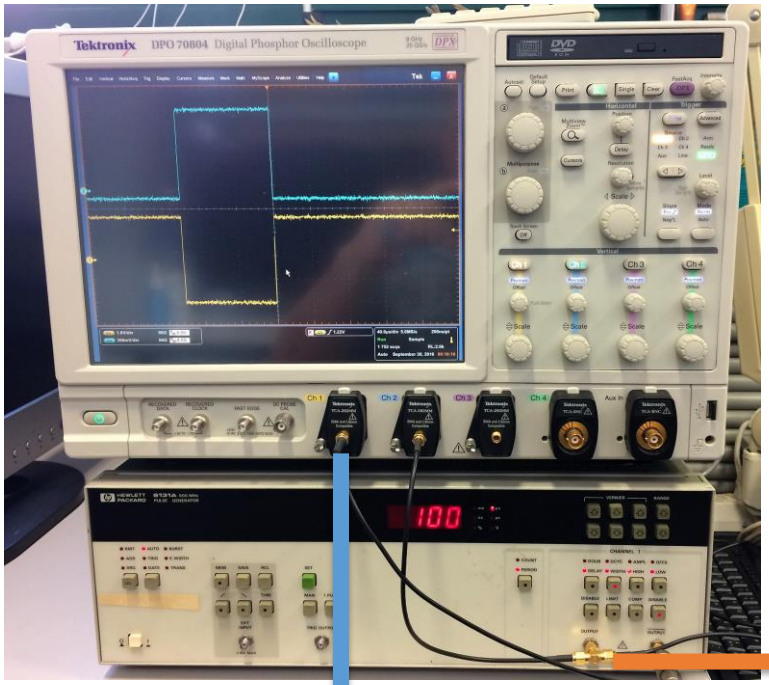


Vo = Id x Rf

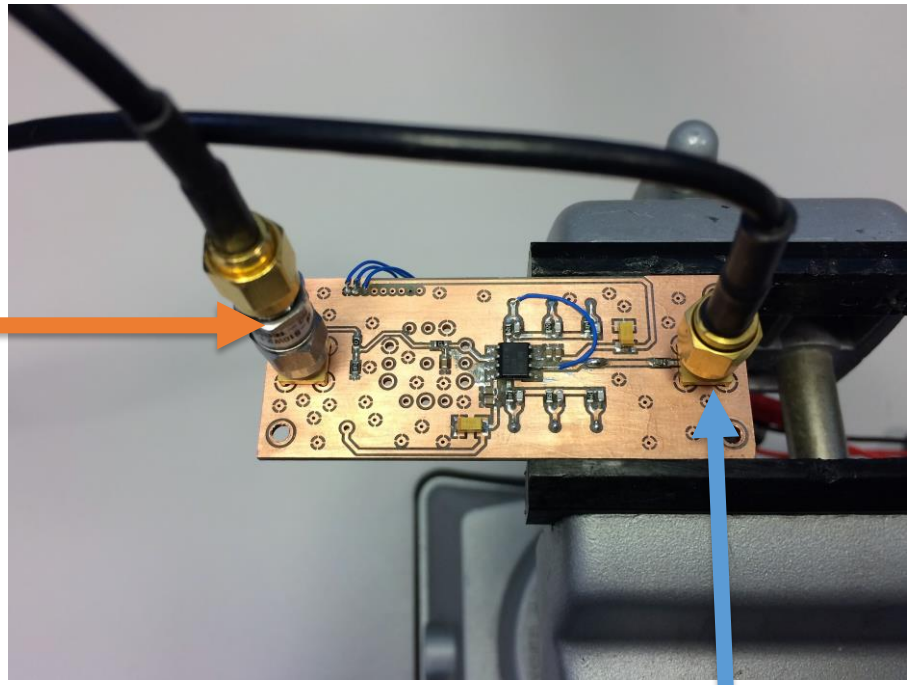
Current to Voltage converter for Photodetector

OFE 1st prototype

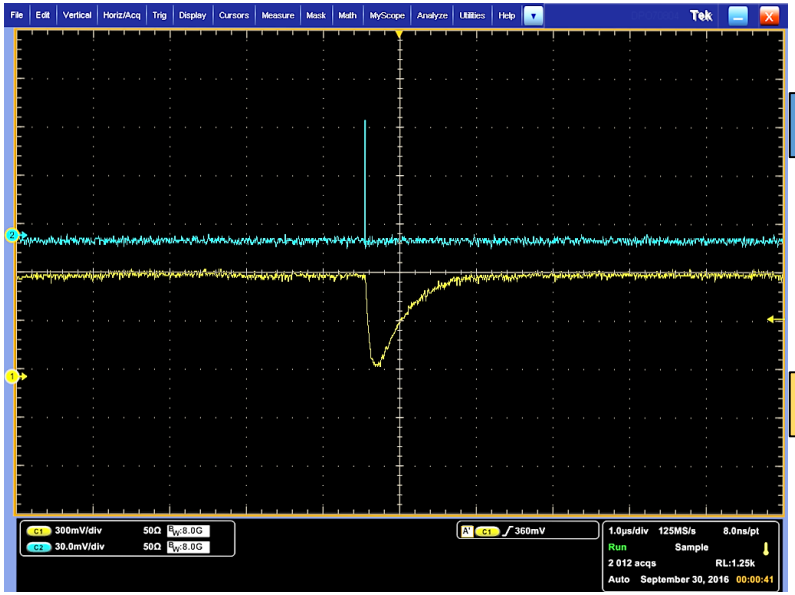
Instrumentation



OFE prototype under test

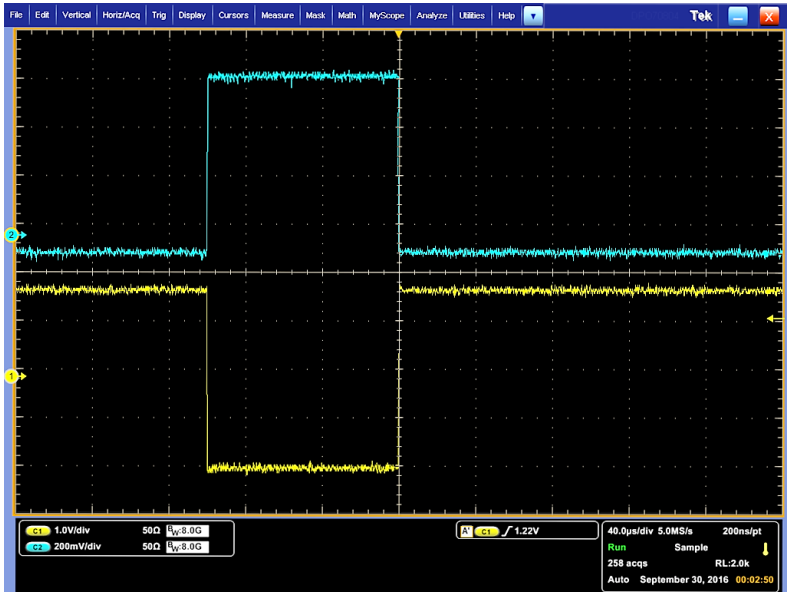


OFE results graph



Graf 1

Input amplitude100mV
f - 10Hz
Pulse width – 1ns



Graf 2

Input amplitude 1V
f – 10Hz
Pulse width 100us

OFE Photo detector Characteristics and calculations

SiPD - HAM S1226-44BQ Characteristics:

- Active Area of photo diode 3.6 x 3.6 mm
- Reverse bias voltage 5V
- Wave length 190 to 1000nm peak 720nm
- Photo sensitivity - 0.36A/W
- Dark current Id 10pA
- Cd 500pF

$$Responsivity_{PhD} = \frac{I_d}{W}$$

$$Area = a^2(cm^2)$$

$$O_p = \frac{W}{Area}$$

SiPD Id 5uA = 107.25uW of optical power

OFE Photo detector Characteristics and calculations

SiAPD - HAM S5344 Characteristics:

- Active Area of photo diode dia 3mm
- Reverse bias voltage to 200V
- Wave length 200 to 1000nm peak 620nm
- Photo sensitivity - 0.42A/W
- Dark current Id 1nA
- Cd 120pF

$$Responsivity_{PhD} = \frac{I_d}{W}$$

$$Area = \pi r^2 (cm^2)$$

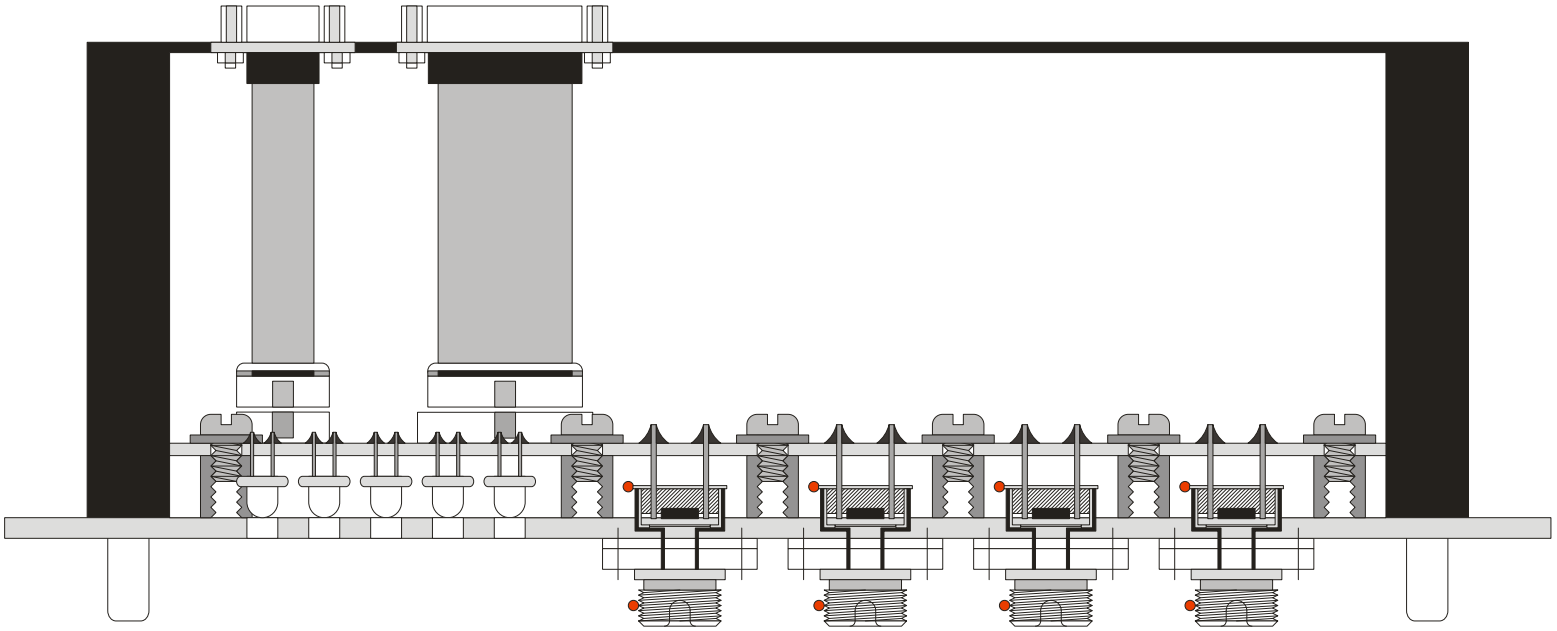
$$O_p = \frac{W}{Area}$$

SiAPD Id 5uA = 168.36uW of optical power

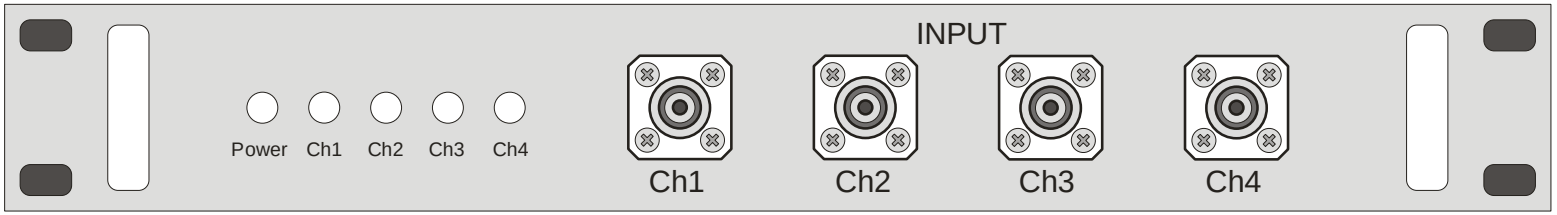
Mechanical design

OFE

Top view

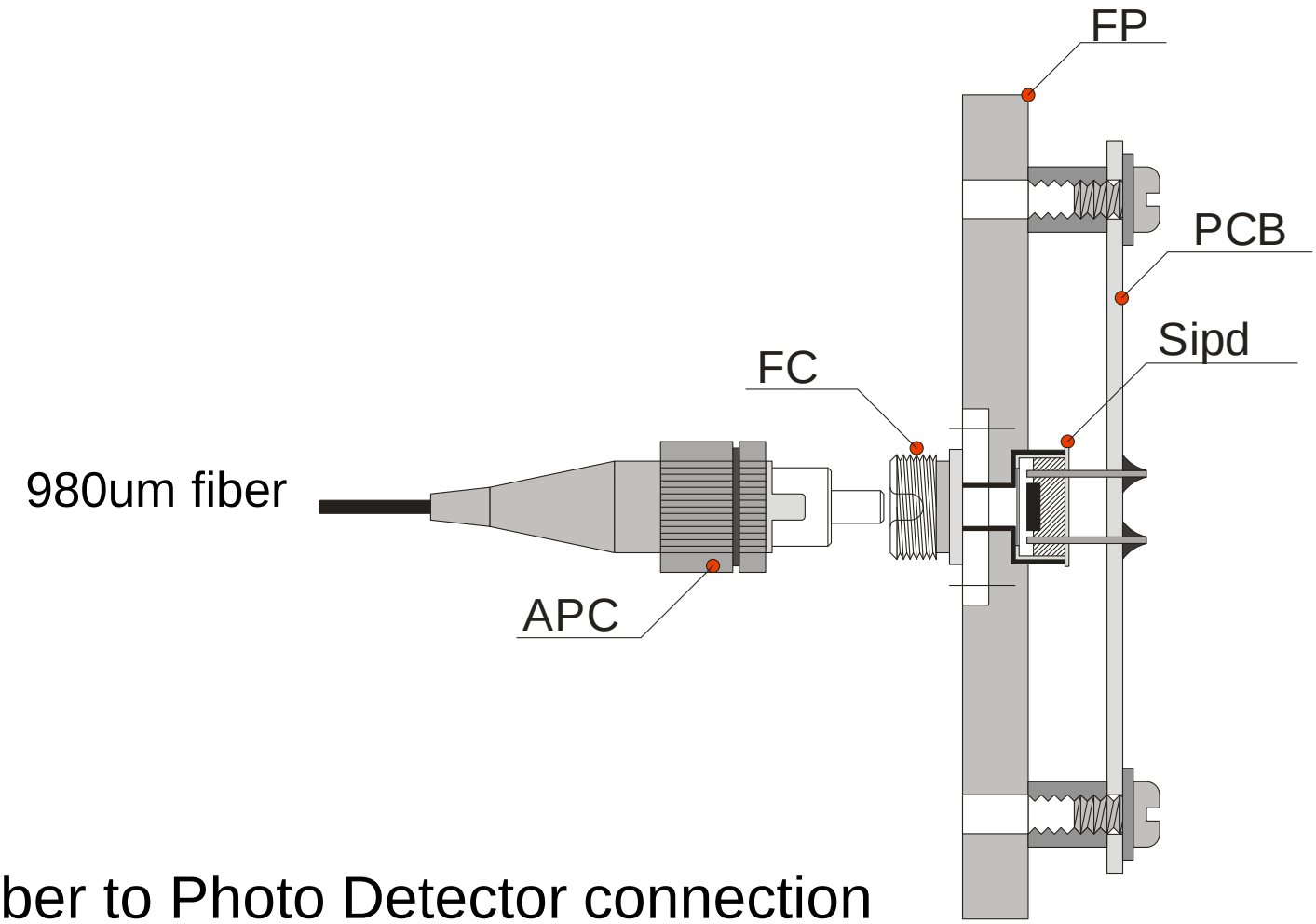


Front view



Rear view

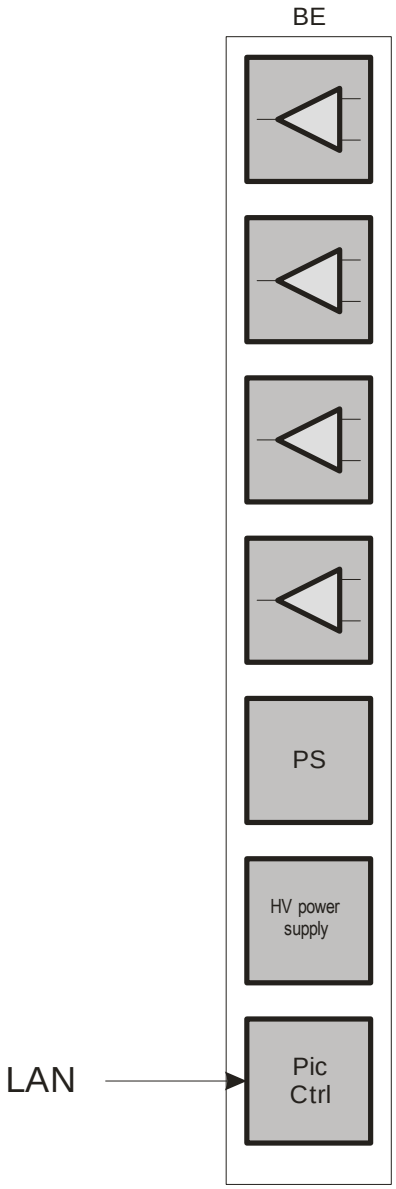
Mechanical design



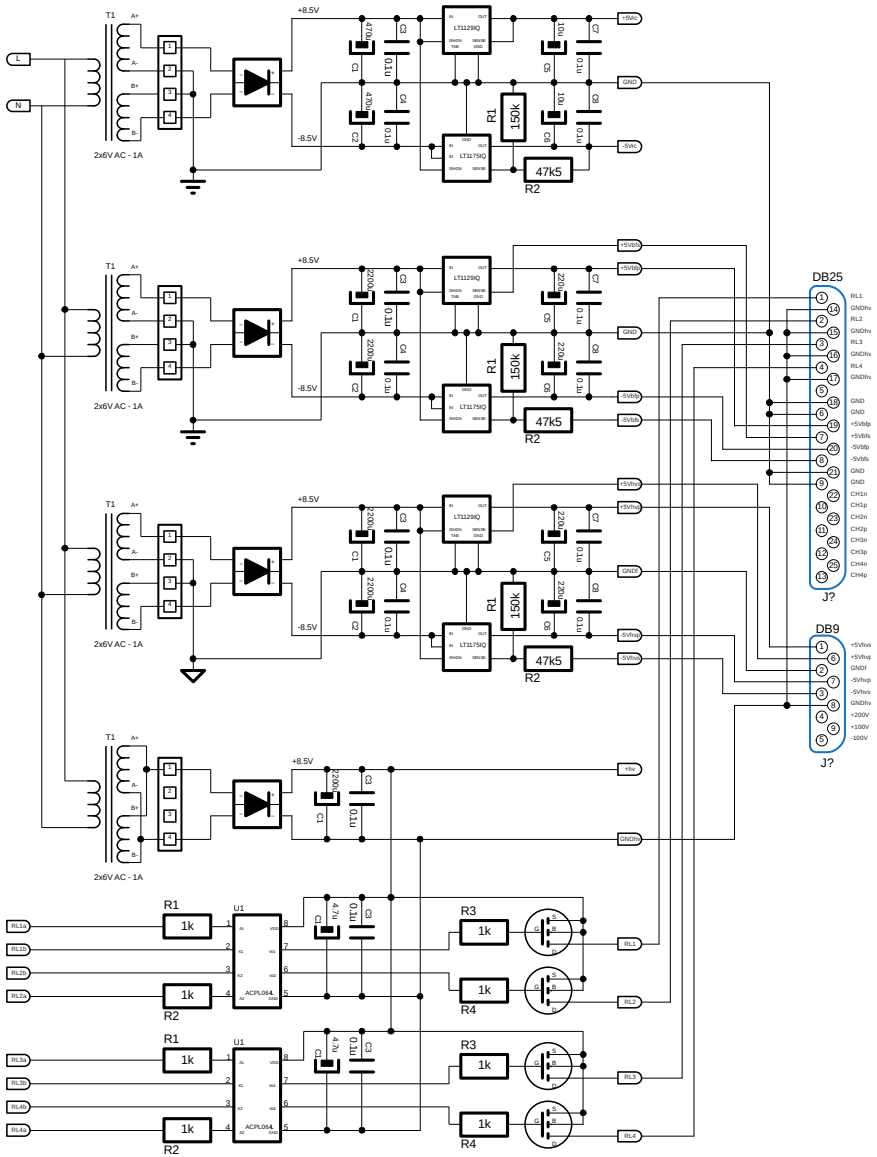
Fiber to Photo Detector connection

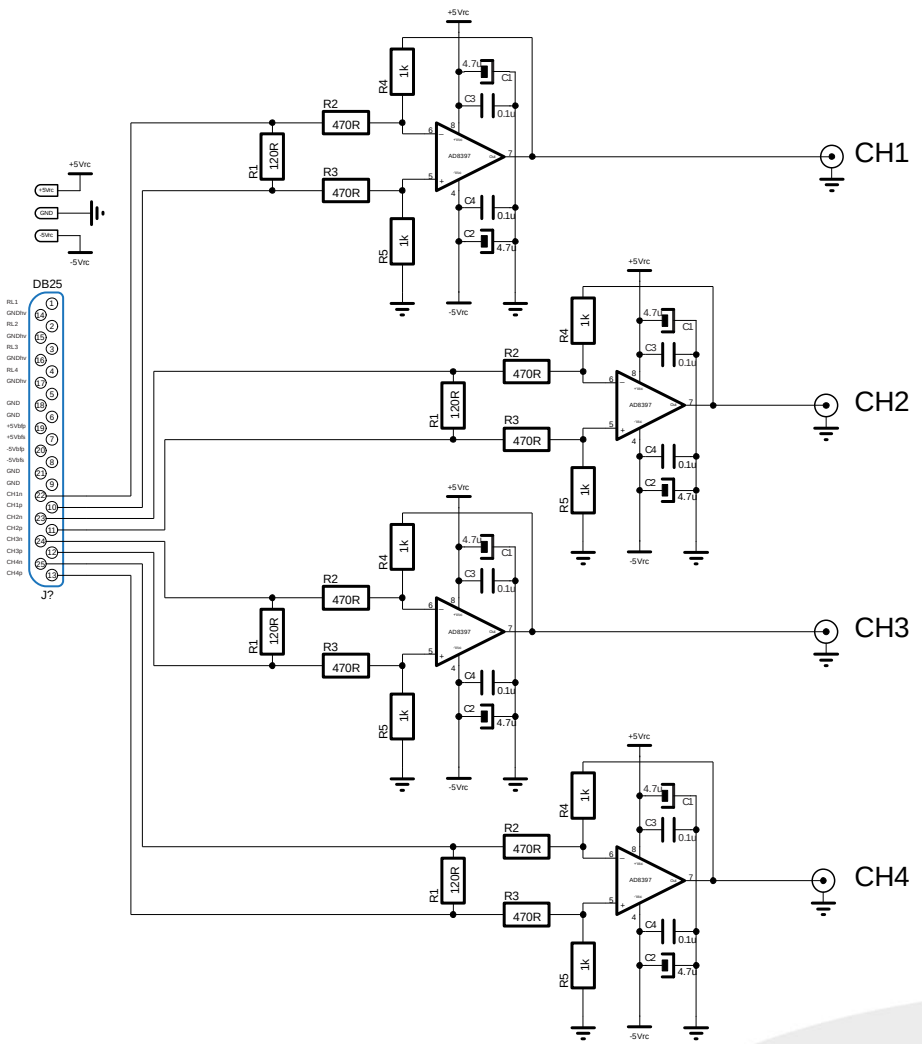
BE block schematic

- Unit with microcontroller
- LAN port
- 4 inputs
- 4 amplified outputs
- 5V low voltage power supply
- High voltage power supply

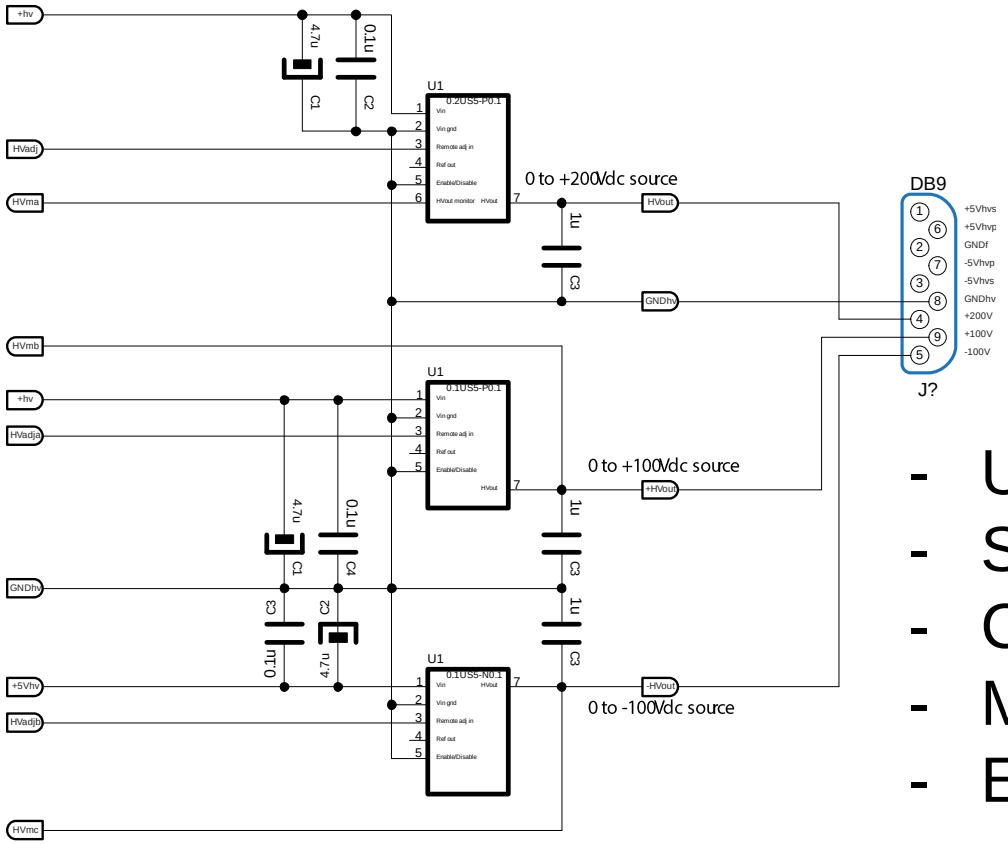


BE electronic schematic





BE electronic schematic

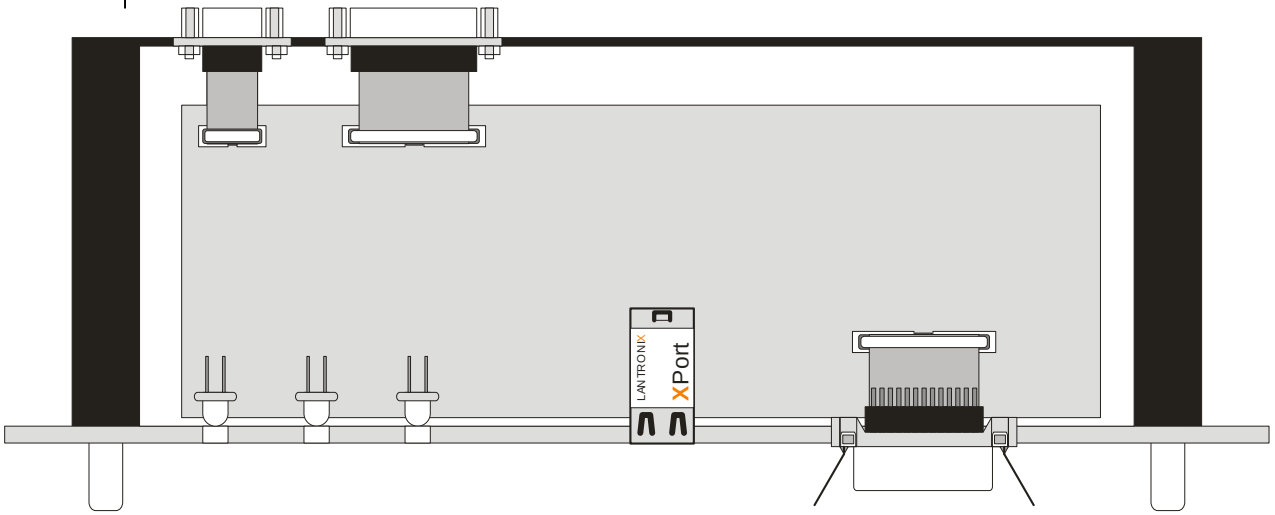


- Universal unit for AFE and OFE
- Separated linear power supply
- Chanel buffers
- Micro controlled
- Ethernet connection

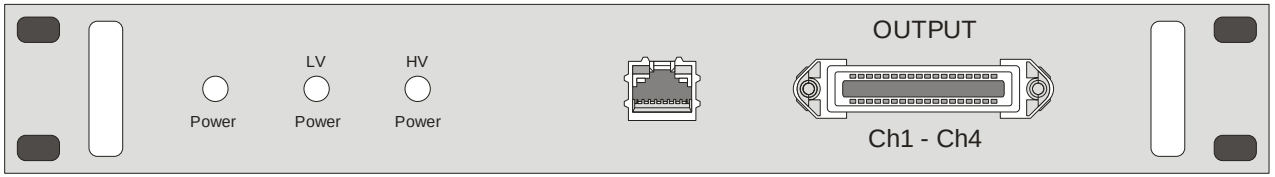
Mechanical design

BE

Top view



Front view



Rear view

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The ESS WS Cabling, mechanical Issues and solutions

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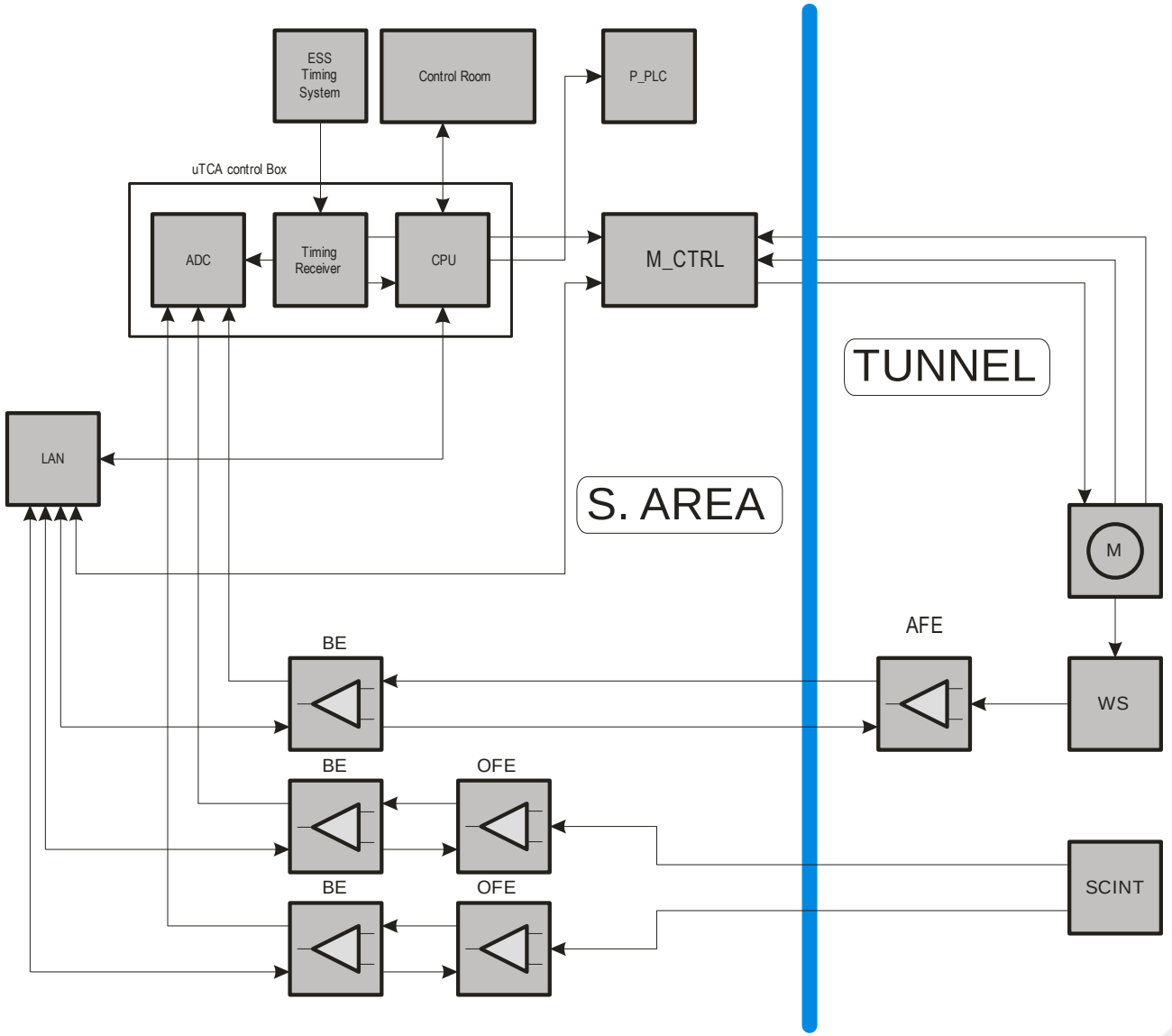
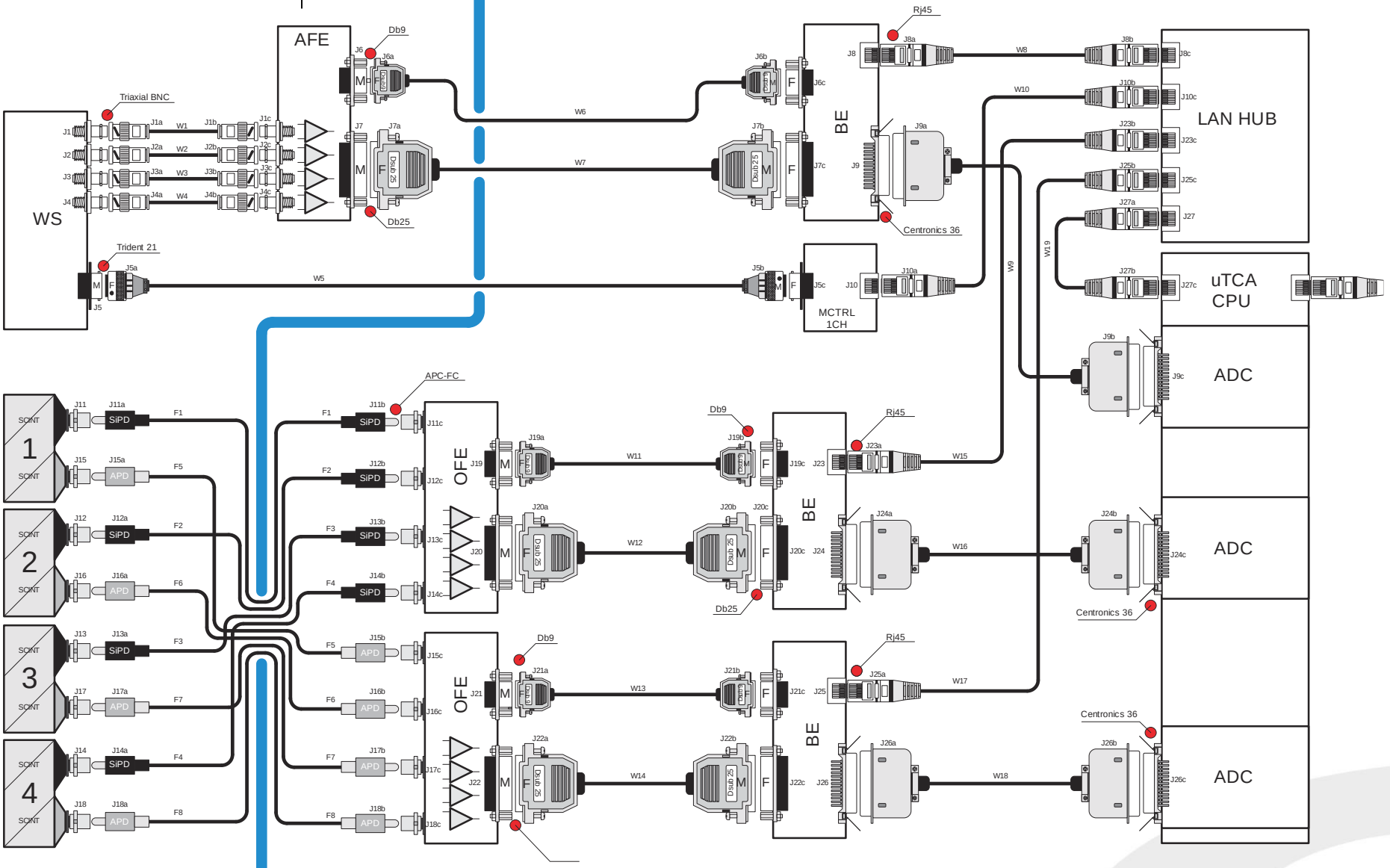
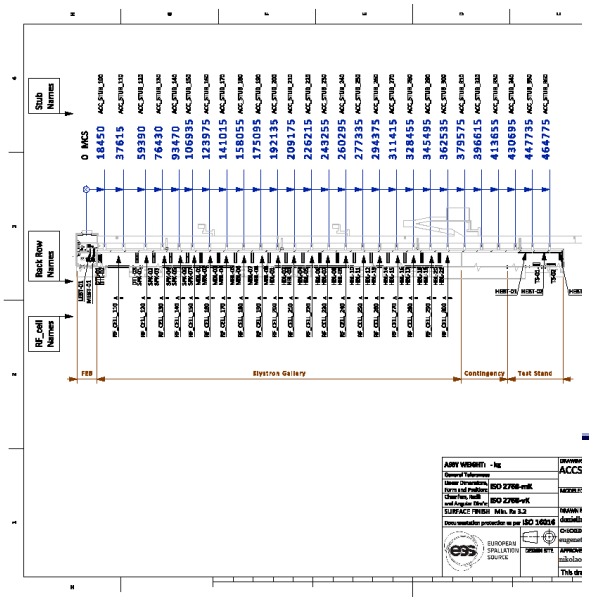
The ESS WS ACQ SYS Cabling

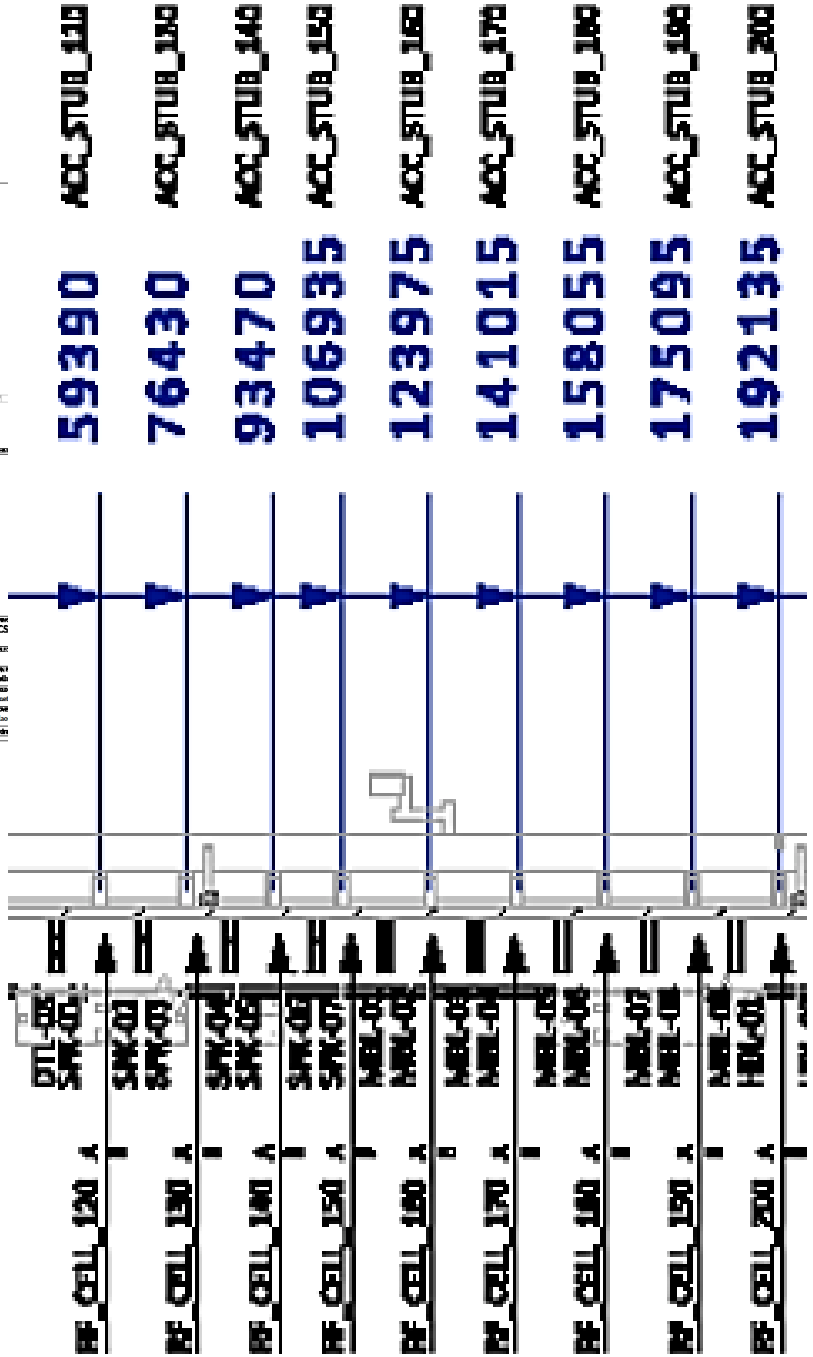


Cabling and connections



ESS layout with dimensions





Issues:

- Cable length
- High radiation
- Climatic condition
- Disturbances

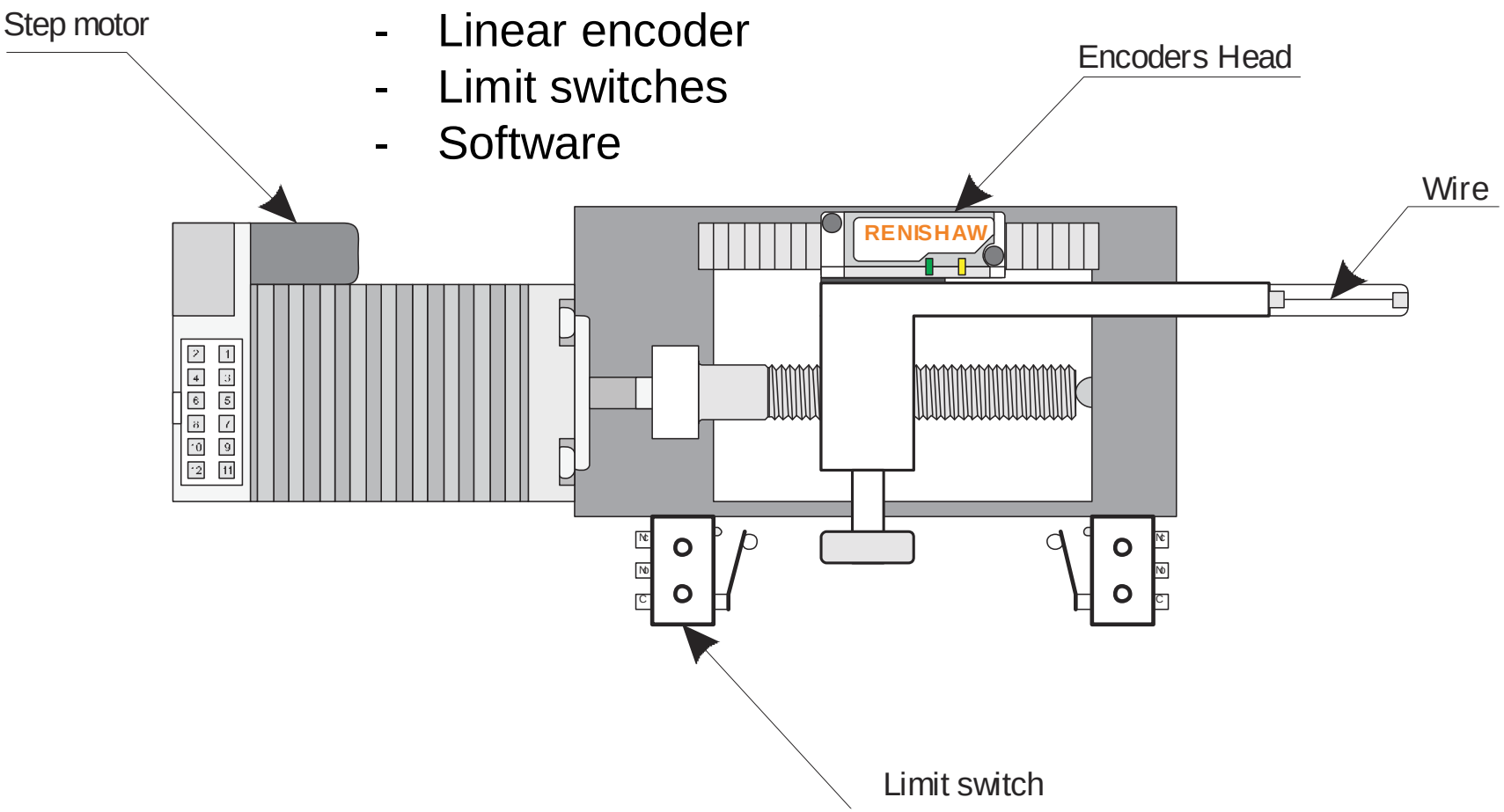
Cables and connections

Total for one WS:

- 19 Cables
- 8 Fibers
- 8 Triaxial BNC F connectors
- 8 Triaxial BNC M connectors
- 6 DB9 F connectors
- 6 DB9 M connectors
- 6 DB25 F connectors
- 6 DB25 M connectors
- 32 FC/APC fiber connectors
- 6 Centronics 36 M connectors
- 3 Centronics 36 F connectors
- 3 RJ45 F connectors

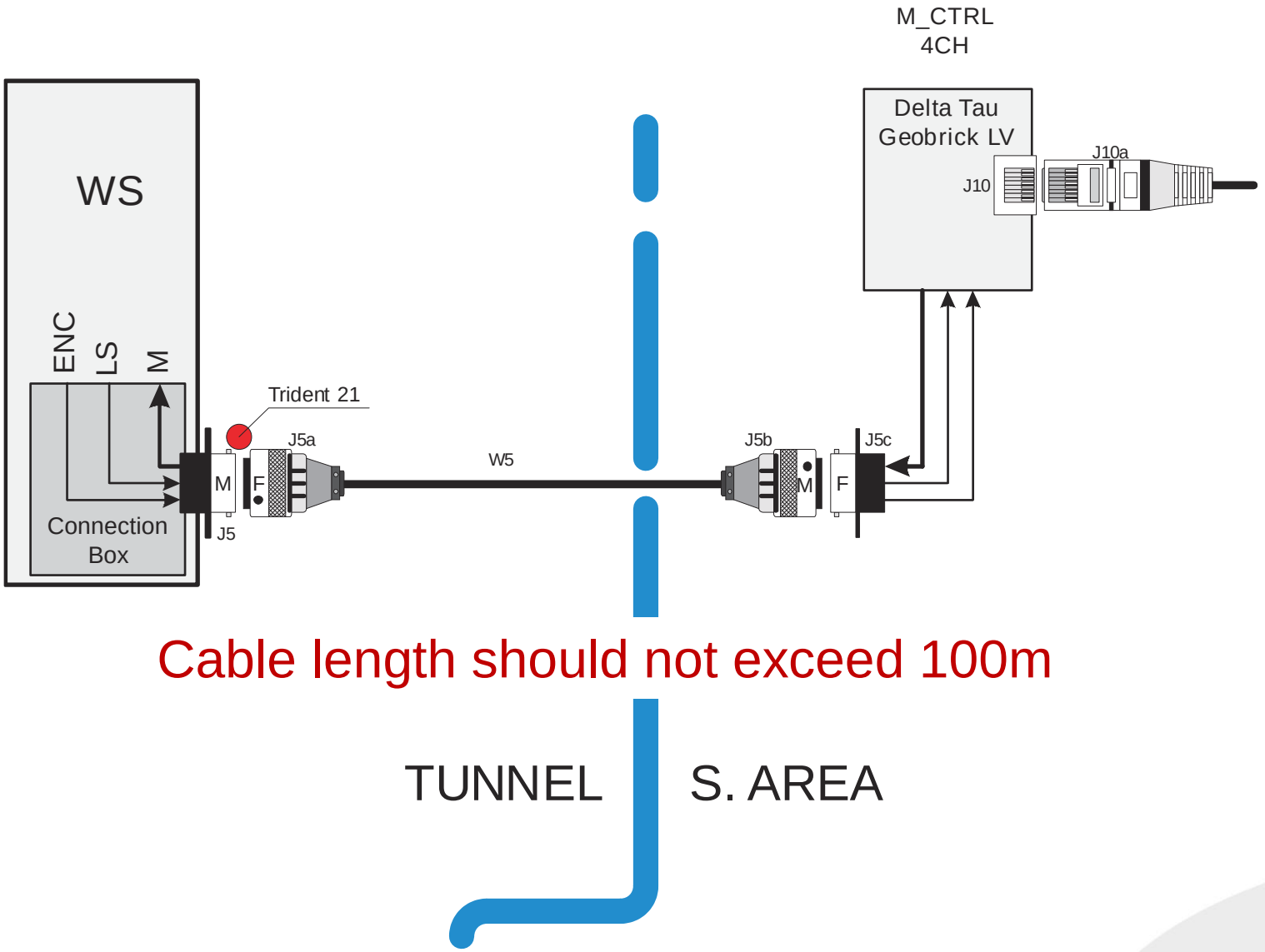
Wire Scanner basis

- Vacuum chamber
- 1 axis step motor
- Linear encoder
- Limit switches
- Software



Motor attached to linear translator – wire holder of WS

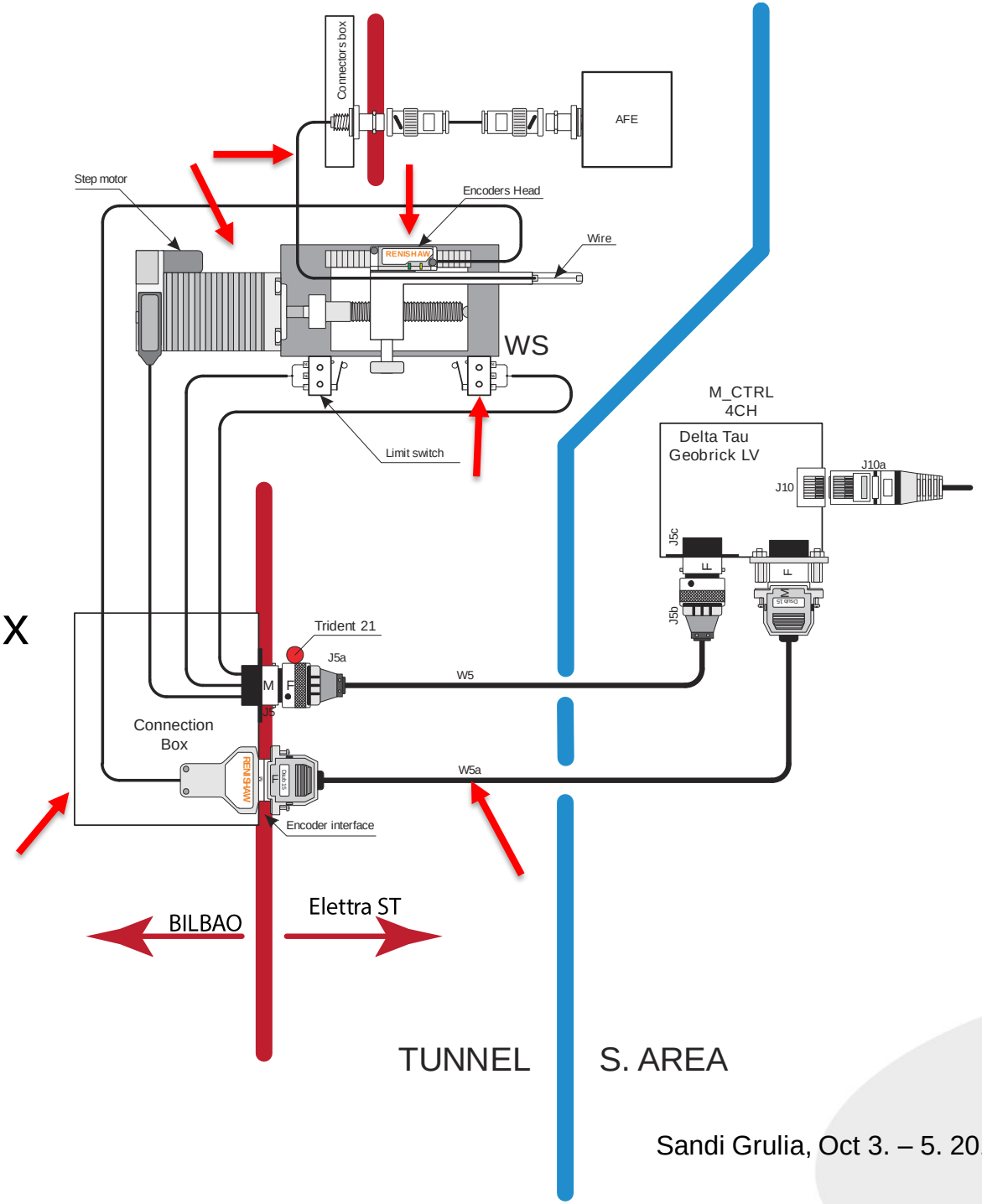
M_CTRL WS control system



Wire Scanner

Issues !

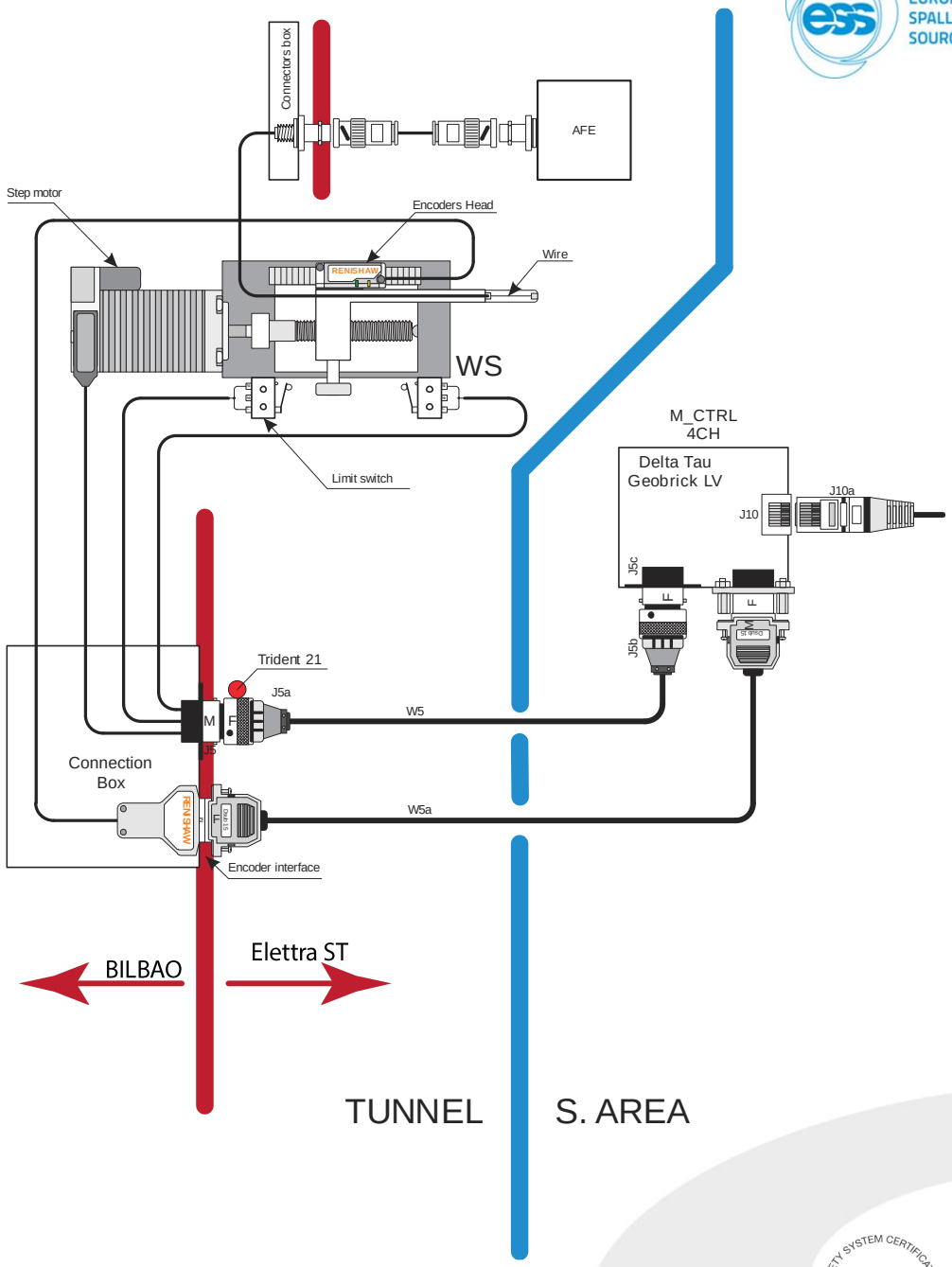
- Step motor
- Encoder
- Limit switches
- Connections, box
- Connectors
- Cable length



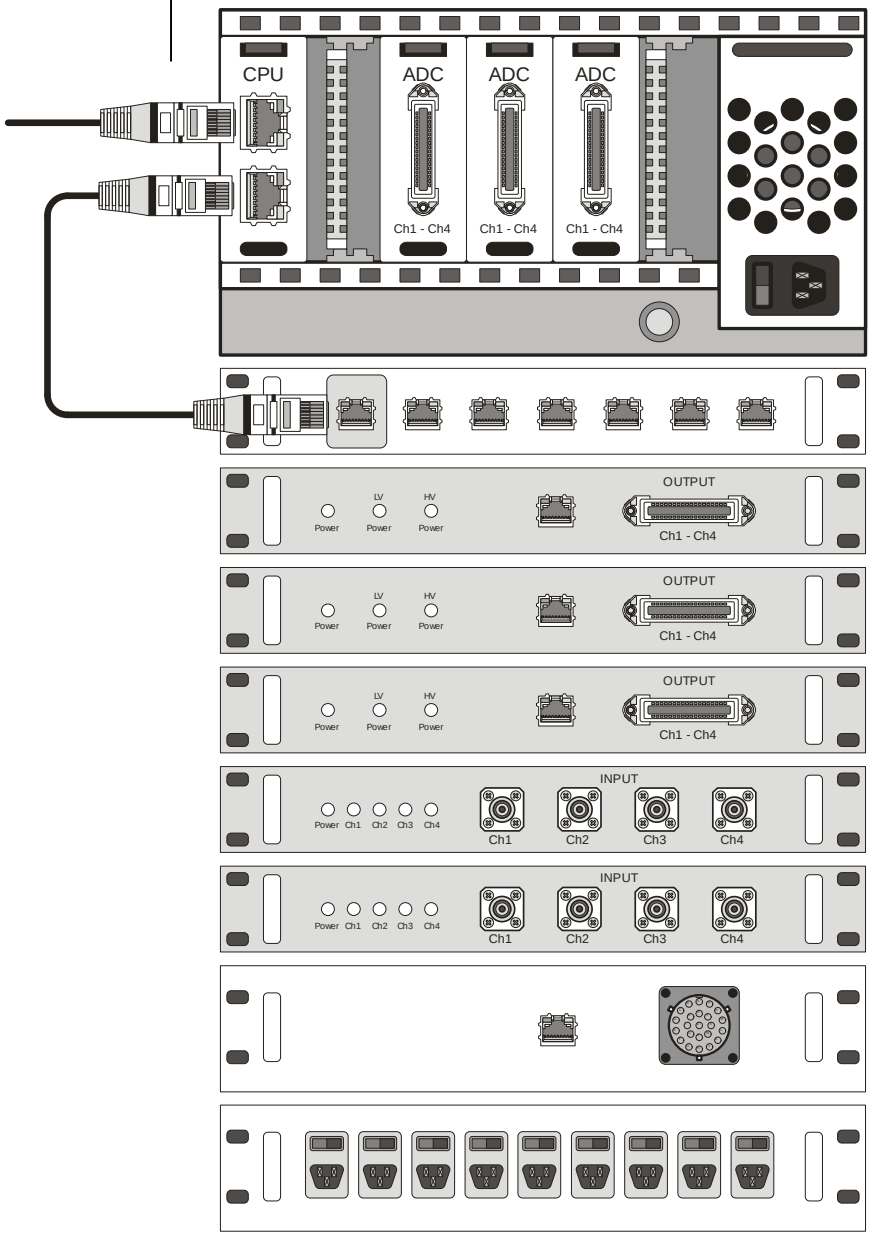
M_CTRL - WS control system

Expecting:

- Standard Nema size 2phs motor
- Encoder with D0 mark- TTL
- Standard NC limit SWs
- Box for connections
- Places on WS for CB
- Max care of cable length



19” Rack



microTCA box

LAN switch

BE

BE

BE

OFE SiPD

OFE SiAPD

Delta TAU Geobrick LV

Power distribution

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