Elettra Sincrotrone Trieste

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Trieste

LWU Magnet Power Converters

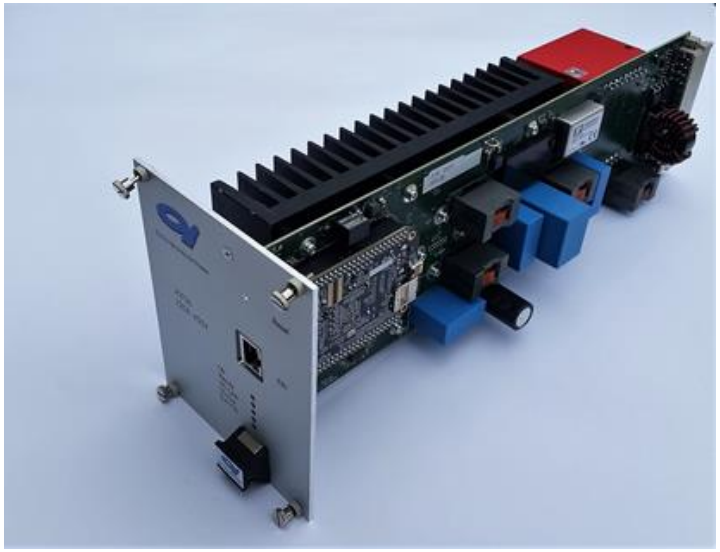
R. Visintini

Elettra WU Coordinator for AIK 17.2
Head of the Power Supplies Laboratory

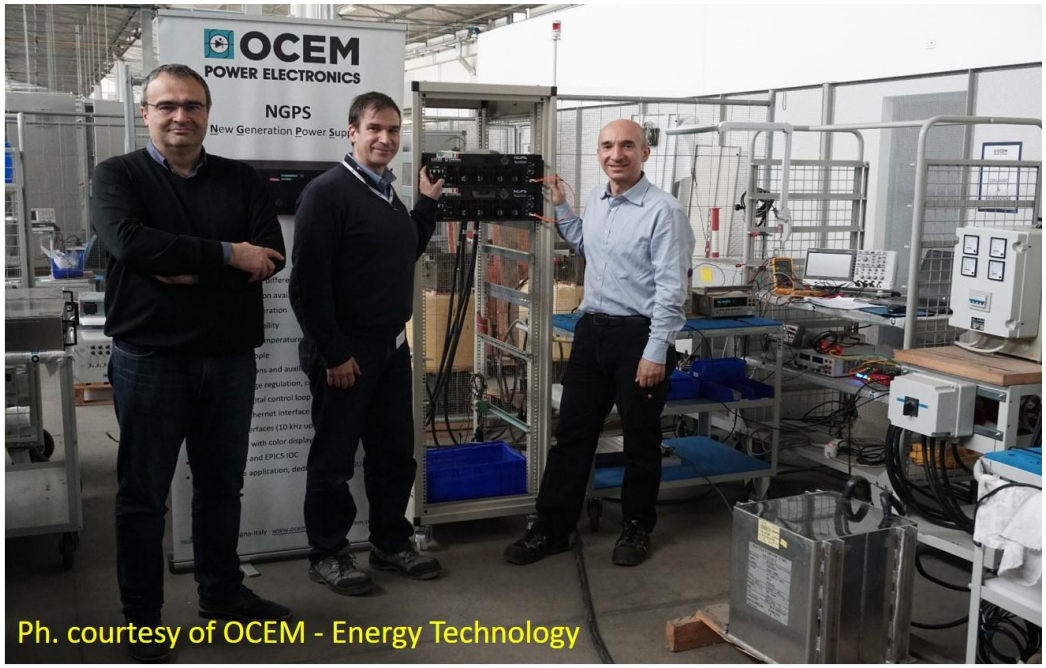
Elettra's contribution to ESS

LWU Magnet Power Converters (PCs):

- **133** x Quadrupole PCs, 50 V / 200 A – OCEM's "NGPS" model
- **6** x Big Quadrupole PCs, 50 V / 400 A – 2 x NGPS in parallel
- **1**x Dipole PC, 100 V / 400 A – 4 x NGPS "Special" (100 V / 100 A) in parallel
- **144** x Corrector Power Converters – Elettra's "A2720" (±20 V / ±20 A)



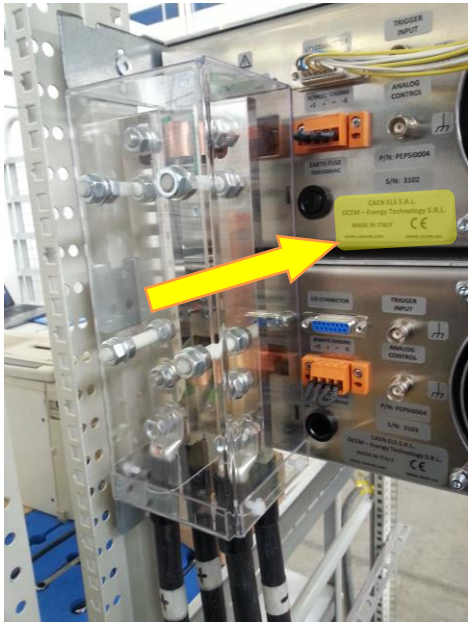
NGPS: Industrial Product

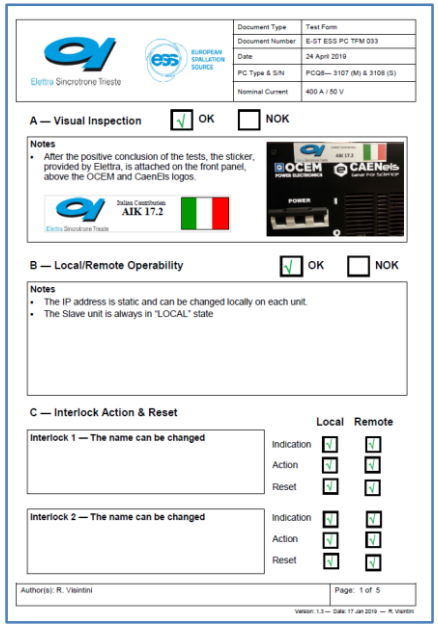


Ph. courtesy of OCEM - Energy Technology

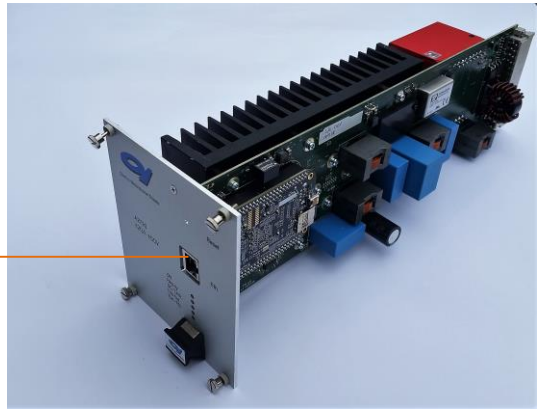
NGPS: Quality Assurance

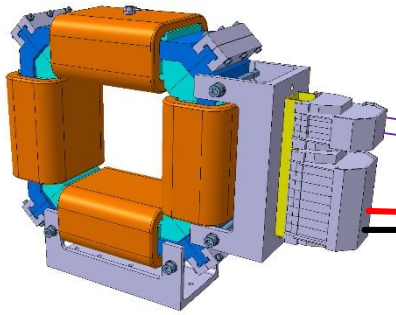
- Full Documentation (Manuals & Drawings)
- ISO 9001:2008
- CE Marking
- Factory Test protocols and reports
- FAT by Elettra on >25% of PCs
  (PCD1 + 5 out 6 PCQ8 + 27 out 133 PCQx)





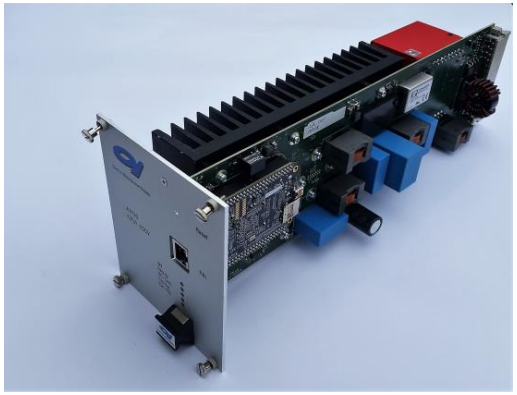
A2720: The System



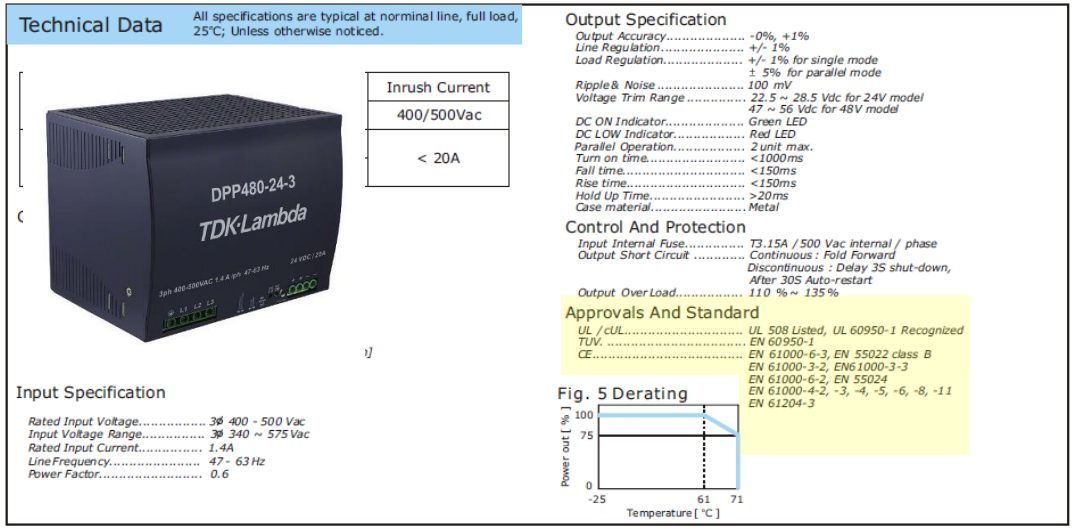


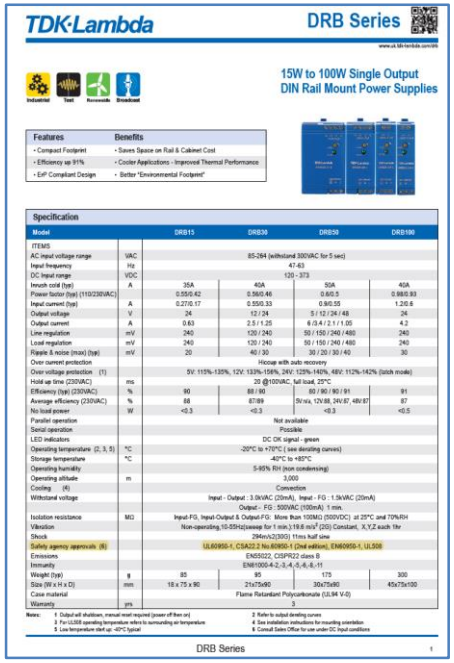
Common

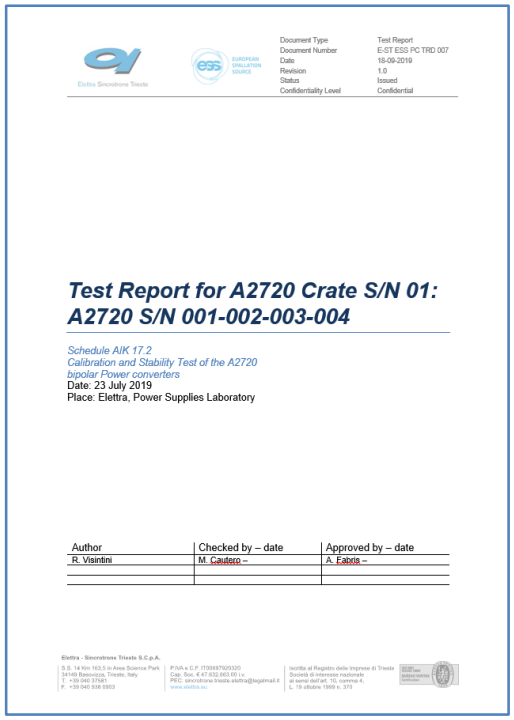
A2720: Certification



- CE certification process started and running
- Industrial AC/DC units
- Low DC voltage (Max 24 VDC)
- Full Documentation (Test reports, Manuals and Drawings)







Test Report for A2720 Crate S/N 01: A2720 S/N 001-002-003-004

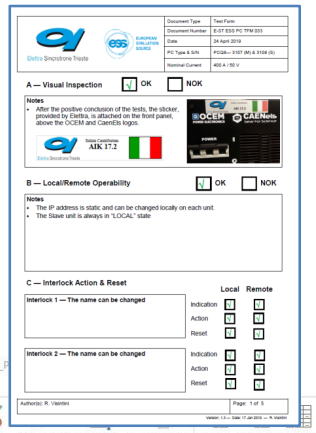
Schedule AIK 17.2
Calibration and Stability Test of the A2720 bipolar Power converters
Date: 23 July 2019
Place: Elettra, Power Supplies Laboratory

Author	Checked by – date	Approved by – date
R. Visintini	M. Cautero –	A. Fabris –

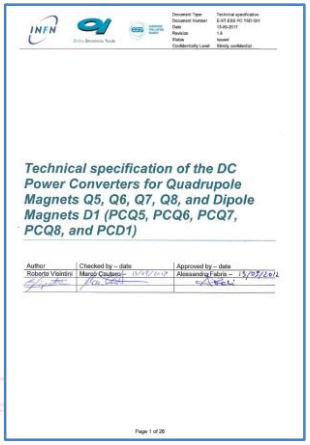
LWU Magnet PCs: Docs from Elettra

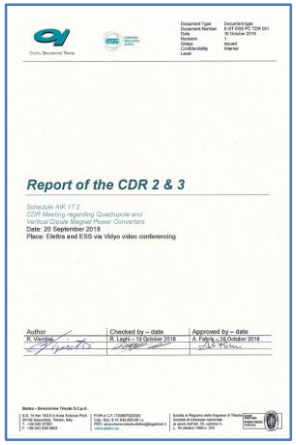
97 Technical Docs (so far)

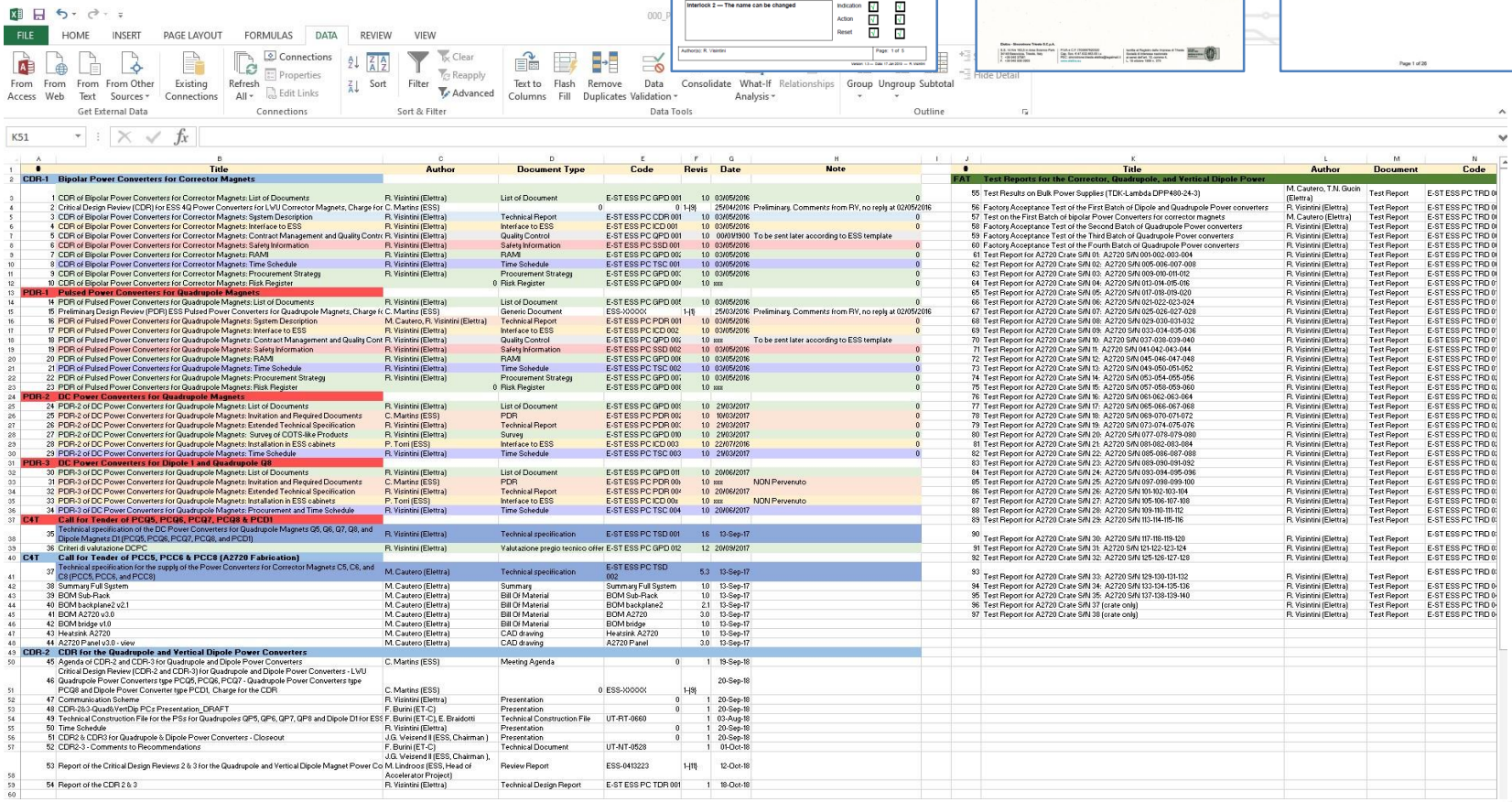
- PDR & CDR
- Tech Specs for C4T
- Test Forms & Reports




Acceptance Test


Technical specification of the DC Power Converters for Quadrupole Magnets Q5, Q6, Q7, Q8, and Dipole Magnets D1 (PCQ5, PCQ6, PCQ7, PCQ8, and PCD1)


Report of the CDR 2 & 3



		Title	Author	Document Type	Code	Revis	Date	Note
CDR-1		Bipolar Power Converters for Corrector Magnets						
	1	CDR of Bipolar Power Converters for Corrector Magnets: List of Documents	R. Visintini (Elettra)	List of Document	E-ST ESS PC GPD 001	10	03/05/2016	
	2	Critical Design Review (CDR) for ESS 4Q Power Converters for LVU Corrector Magnets, Charge for	C. Martins (ESS)		0	0 1-[8]	25/04/2016	Preliminary. Comments from RV, no reply at 02/05/2016
	3	CDR of Bipolar Power Converters for Corrector Magnets: System Description	R. Visintini (Elettra)	Technical Report	E-ST ESS PC CDR 001	10	03/05/2016	
	4	CDR of Bipolar Power Converters for Corrector Magnets: Interface to ESS	R. Visintini (Elettra)	Interface to ESS	E-ST ESS PC ICD 001	10	03/05/2016	
	5	CDR of Bipolar Power Converters for Corrector Magnets: Contract Management and Quality Contr	R. Visintini (Elettra)	Quality Control	E-ST ESS PC QPD 001	10	00/01/1900	To be sent later according to ESS template
	6	CDR of Bipolar Power Converters for Corrector Magnets: Safety Information	R. Visintini (Elettra)	Safety Information	E-ST ESS PC SSD 001	10	03/05/2016	
	7	CDR of Bipolar Power Converters for Corrector Magnets: RAMI	R. Visintini (Elettra)	RAMI	E-ST ESS PC GPD 002	10	03/05/2016	
	8	CDR of Bipolar Power Converters for Corrector Magnets: Time Schedule	R. Visintini (Elettra)	Time Schedule	E-ST ESS PC TSC 001	10	03/05/2016	
	9	CDR of Bipolar Power Converters for Corrector Magnets: Procurement Strategy	R. Visintini (Elettra)	Procurement Strategy	E-ST ESS PC GPD 003	10	03/05/2016	
	10	CDR of Bipolar Power Converters for Corrector Magnets: Risk Register		0 Risk Register	E-ST ESS PC GPD 004	10	xxx	
PDR-1		Pulsed Power Converters for Quadrupole Magnets						
	14	PDR of Pulsed Power Converters for Quadrupole Magnets: List of Documents	R. Visintini (Elettra)	List of Document	E-ST ESS PC GPD 001	10	03/05/2016	
	15	Preliminary Design Review (PDR) ESS Pulsed Power Converters for Quadrupole Magnets, Charge f	C. Martins (ESS)	Generic Document	ESS-XXXXXX	1-[1]	25/03/2016	Preliminary. Comments from RV, no reply at 02/05/2016
	16	PDR of Pulsed Power Converters for Quadrupole Magnets: System Description	M. Cautero, R. Visintini (Elettra)	Technical Report	E-ST ESS PC PDR 001	10	03/05/2016	
	17	PDR of Pulsed Power Converters for Quadrupole Magnets: Interface to ESS	R. Visintini (Elettra)	Interface to ESS	E-ST ESS PC ICD 002	10	03/05/2016	
	18	PDR of Pulsed Power Converters for Quadrupole Magnets: Contract Management and Quality Cont	R. Visintini (Elettra)	Quality Control	E-ST ESS PC QPD 002	10	xxx	To be sent later according to ESS template
	19	PDR of Pulsed Power Converters for Quadrupole Magnets: Safety Information	R. Visintini (Elettra)	Safety Information	E-ST ESS PC SSD 002	10	03/05/2016	
	20	PDR of Pulsed Power Converters for Quadrupole Magnets: RAMI	R. Visintini (Elettra)	RAMI	E-ST ESS PC GPD 005	10	03/05/2016	
	21	PDR of Pulsed Power Converters for Quadrupole Magnets: Time Schedule	R. Visintini (Elettra)	Time Schedule	E-ST ESS PC TSC 002	10	03/05/2016	
	22	PDR of Pulsed Power Converters for Quadrupole Magnets: Procurement Strategy	R. Visintini (Elettra)	Procurement Strategy	E-ST ESS PC GPD 007	10	03/05/2016	
	23	PDR of Pulsed Power Converters for Quadrupole Magnets: Risk Register		0 Risk Register	E-ST ESS PC GPD 008	10	xxx	
PDR-2		DC Power Converters for Quadrupole Magnets						
	24	PDR-2 of DC Power Converters for Quadrupole Magnets: List of Documents	R. Visintini (Elettra)	List of Document	E-ST ESS PC GPD 003	10	21/03/2017	
	25	PDR-2 of DC Power Converters for Quadrupole Magnets: Invitation and Required Documents	C. Martins (ESS)	PDR	E-ST ESS PC PDR 002	10	10/03/2017	
	26	PDR-2 of DC Power Converters for Quadrupole Magnets: Extended Technical Specification	R. Visintini (Elettra)	Technical Report	E-ST ESS PC PDR 003	10	21/03/2017	
	27	PDR-2 of DC Power Converters for Quadrupole Magnets: Survey of COTS-like Products	R. Visintini (Elettra)	Survey	E-ST ESS PC GPD 010	10	21/03/2017	
	28	PDR-2 of DC Power Converters for Quadrupole Magnets: Installation in ESS cabinets	P. Torri (ESS)	Interface to ESS	E-ST ESS PC ICD 003	10	22/07/2016	
	29	PDR-2 of DC Power Converters for Quadrupole Magnets: Time Schedule	R. Visintini (Elettra)	Time Schedule	E-ST ESS PC TSC 003	10	21/03/2017	
PDR-3		DC Power Converters for Dipole 1 and Quadrupole Q8						
	30	PDR-3 of DC Power Converters for Quadrupole Magnets: List of Documents	R. Visintini (Elettra)	List of Document	E-ST ESS PC GPD 011	10	20/06/2017	
	31	PDR-3 of DC Power Converters for Quadrupole Magnets: Invitation and Required Documents	C. Martins (ESS)	PDR	E-ST ESS PC PDR 004	10	xxx	NON Pervenuto
	32	PDR-3 of DC Power Converters for Quadrupole Magnets: Extended Technical Specification	R. Visintini (Elettra)	Technical Report	E-ST ESS PC PDR 005	10	20/06/2017	
	33	PDR-3 of DC Power Converters for Quadrupole Magnets: Installation in ESS cabinets	P. Torri (ESS)	Interface to ESS	E-ST ESS PC ICD 004	10	xxx	NON Pervenuto
	34	PDR-3 of DC Power Converters for Quadrupole Magnets: Procurement and Time Schedule	R. Visintini (Elettra)	Time Schedule	E-ST ESS PC TSC 004	10	20/06/2017	
C4T		Call for Tender of PCQ5, PCQ6, PCQ7, PCQ8 & PCD1						
	35	Technical specification of the DC Power Converters for Quadrupole Magnets Q5, Q6, Q7, Q8, and Dipole Magnets D1 (PCQ5, PCQ6, PCQ7, PCQ8, and PCD1)	R. Visintini (Elettra)	Technical specification	E-ST ESS PC TSD 001	16	13-Sep-17	
	36	Criteri di valutazione DCPC	R. Visintini (Elettra)	Valutazione pregio tecnico offer	E-ST ESS PC GPD 012	12	20/09/2017	
C4T		Call for Tender of PCC5, PCC6 & PCC8 (A2720 Fabrication)						
	37	Technical specification for the supply of the Power Converters for Corrector Magnets C5, C6, and C8 (PCC5, PCC6, and PCC8)	M. Cautero (Elettra)	Technical specification	E-ST ESS PC TSD 002	5.3	13-Sep-17	
	38	Summary Full System	M. Cautero (Elettra)	Summary	Summary Full System	1.0	13-Sep-17	
	39	BOM Sub-Rack	M. Cautero (Elettra)	Bill Of Material	BOM Sub-Rack	1.0	13-Sep-17	
	40	BOM backplane2 v2.1	M. Cautero (Elettra)	Bill Of Material	BOM backplane2	2.1	13-Sep-17	
	41	BOM A2720 v3.0	M. Cautero (Elettra)	Bill Of Material	BOM A2720	3.0	13-Sep-17	
	42	BOM bridge v1.0	M. Cautero (Elettra)	Bill Of Material	BOM bridge	1.0	13-Sep-17	
	43	Heatsink A2720	M. Cautero (Elettra)	CAD drawing	Heatsink A2720	1.0	13-Sep-17	
	44	A2720 Panel v3.0 - view	M. Cautero (Elettra)	CAD drawing	A2720 Panel	3.0	13-Sep-17	
CDR-2		CDR for the Quadrupole and Vertical Dipole Power Converters						
	45	Agenda of CDR-2 and CDR-3 for Quadrupole and Dipole Power Converters	C. Martins (ESS)	Meeting Agenda		0 1	19-Sep-18	
	46	Critical Design Review (CDR-2 and CDR-3) for Quadrupole and Dipole Power Converters - LVU Quadrupole Power Converters type PCQ5, PCQ6, PCQ7 - Quadrupole Power Converters type PCQ8 and Dipole Power Converter type PCD1. Charge for the CDR.	C. Martins (ESS)		0	ESS-XXXXXX 1-[8]	20-Sep-18	
	47	Communication Scheme	R. Visintini (Elettra)	Presentation		0 1	20-Sep-18	
	48	CDR-2&3-Quad&VertDip PCs Presentation_DRAFT	F. Burini (ET-C)	Presentation		0 1	20-Sep-18	
	49	Technical Construction File for the PSs for Quadrupoles QP5, QP6, QP7, QP8 and Dipole DI for ESS	F. Burini (ET-C), E. Biraldotti	Technical Construction File	UT-RT-0660	1	03-Aug-18	
	50	Time Schedule	R. Visintini (Elettra)	Presentation		0 1	20-Sep-18	
	51	CDR2 & CDR3 for Quadrupole & Dipole Power Converters - Closeout	J.G. Weisend II (ESS, Chairman)	Presentation		0 1	20-Sep-18	
	52	CDR2-3 - Comments to Recommendations	F. Burini (ET-C)	Technical Document	UT-NT-0528	1	01-Oct-18	
	53	Report of the Critical Design Reviews 2 & 3 for the Quadrupole and Vertical Dipole Magnet Power Co	J.G. Weisend II (ESS, Chairman), M. Lindroos (ESS, Head of Accelerator Project)	Review Report	ESS-0413223	1-[1]	12-Oct-18	
	54	Report of the CDR 2 & 3	R. Visintini (Elettra)	Technical Design Report	E-ST ESS PC TDR 001	1	18-Oct-18	

		Title	Author	Document	Code
FAT		Test Reports for the Corrector, Quadrupole, and Vertical Dipole Power			
	55	Test Results on Bulk Power Supplies (TDK-Lambda DPP480-24-3)	M. Cautero, T.N. Gucin (Elettra)	Test Report	E-ST ESS PC TRD 0
	56	Factory Acceptance Test of the First Batch of Dipole and Quadrupole Power converters	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	57	Test on the First Batch of bipolar Power Converters for corrector magnets	M. Cautero (Elettra)	Test Report	E-ST ESS PC TRD 0
	58	Factory Acceptance Test of the Second Batch of Quadrupole Power converters	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	59	Factory Acceptance Test of the Third Batch of Quadrupole Power converters	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	60	Factory Acceptance Test of the Fourth Batch of Quadrupole Power converters	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	61	Test Report for A2720 Crate S/N 01: A2720 S/N 001-002-003-004	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	62	Test Report for A2720 Crate S/N 02: A2720 S/N 005-006-007-008	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	63	Test Report for A2720 Crate S/N 03: A2720 S/N 009-010-011-012	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	64	Test Report for A2720 Crate S/N 04: A2720 S/N 013-014-015-016	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	65	Test Report for A2720 Crate S/N 05: A2720 S/N 017-018-019-020	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	66	Test Report for A2720 Crate S/N 06: A2720 S/N 021-022-023-024	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	67	Test Report for A2720 Crate S/N 07: A2720 S/N 025-026-027-028	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	68	Test Report for A2720 Crate S/N 08: A2720 S/N 029-030-031-032	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	69	Test Report for A2720 Crate S/N 09: A2720 S/N 033-034-035-036	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	70	Test Report for A2720 Crate S/N 10: A2720 S/N 037-038-039-040	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	71	Test Report for A2720 Crate S/N 11: A2720 S/N 041-042-043-044	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	72	Test Report for A2720 Crate S/N 12: A2720 S/N 045-046-047-048	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	73	Test Report for A2720 Crate S/N 13: A2720 S/N 049-050-051-052	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	74	Test Report for A2720 Crate S/N 14: A2720 S/N 053-054-055-056	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	75	Test Report for A2720 Crate S/N 15: A2720 S/N 057-058-059-060	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	76	Test Report for A2720 Crate S/N 16: A2720 S/N 061-062-063-064	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	77	Test Report for A2720 Crate S/N 17: A2720 S/N 065-066-067-068	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	78	Test Report for A2720 Crate S/N 18: A2720 S/N 069-070-071-072	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	79	Test Report for A2720 Crate S/N 19: A2720 S/N 073-074-075-076	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	80	Test Report for A2720 Crate S/N 20: A2720 S/N 077-078-079-080	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	81	Test Report for A2720 Crate S/N 21: A2720 S/N 081-082-083-084	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	82	Test Report for A2720 Crate S/N 22: A2720 S/N 085-086-087-088	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	83	Test Report for A2720 Crate S/N 23: A2720 S/N 089-090-091-092	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	84	Test Report for A2720 Crate S/N 24: A2720 S/N 093-094-095-096	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	85	Test Report for A2720 Crate S/N 25: A2720 S/N 097-098-099-100	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	86	Test Report for A2720 Crate S/N 26: A2720 S/N 101-102-103-104	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	87	Test Report for A2720 Crate S/N 27: A2720 S/N 105-106-107-108	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	88	Test Report for A2720 Crate S/N 28: A2720 S/N 109-110-111-112	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	89	Test Report for A2720 Crate S/N 29: A2720 S/N 113-114-115-116	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	90	Test Report for A2720 Crate S/N 30: A2720 S/N 117-118-119-120	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	91	Test Report for A2720 Crate S/N 31: A2720 S/N 121-122-123-124	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	92	Test Report for A2720 Crate S/N 32: A2720 S/N 125-126-127-128	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	93	Test Report for A2720 Crate S/N 33: A2720 S/N 129-130-131-132	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	94	Test Report for A2720 Crate S/N 34: A2720 S/N 133-134-135-136	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	95	Test Report for A2720 Crate S/N 35: A2720 S/N 137-138-139-140	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	96	Test Report for A2720 Crate S/N 37 (crate only)	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0
	97	Test Report for A2720 Crate S/N 38 (crate only)	R. Visintini (Elettra)	Test Report	E-ST ESS PC TRD 0

Elettra
Sincrotrone
Trieste

…any Question?

Archivio Barcolana/StudioBorlenghi