

Customer:



Association of Universities for Research in Astronomy (AURA)

N. Cherry Avenue
85719 Tucson, Arizona
Estados Unidos (USA)

Project:

f083_LSSTSupport f083 Automatic Test System for LSST

Number of pages: 76

Made by:



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V1.0	First version	11/11/2025	EBEGIRISTAIN
V1.1	Stetic Corrections	12/11/2025	EBEGIRISTAIN
Review	Review description	Date	Reviewed
Project Manager:			
Drew by:		E. Begiristain	
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Date:		04/11/2025	
Replaces:			
Replaced by:			

TECHNICAL IMPLEMENTATION REGULATIONS

IEC81346
Industrial systems, installations and equipment and industrial products
Structuring principles and reference designations
Part 2: Classification of objects and codes for classes

IEC61082
Preparation of documents used in electrotechnology
Part 1: Rules

IEC61355
Classification and designation of documents for plants, systems and equipment
Part 1: Rules and classification tables

Abbreviations identification code
for cable colors

BK		
BN		
RD		
OG		
YE		
GN		
BU		
VT		
GY		
WH		
PK		
GD		
TQ		
SR		
GNYE		

WIRING COLORS

Halogen free wires H05K-xx H07K-xx

Main current AC

Black (BK)

Control circuit AC

Red (RD)

Non-sectionable voltage

Orange (OG)

Main current DC

Black (BK)

Control circuit DC

Dark Blue (BU)

Neutral conductor

Light Blue (BU)

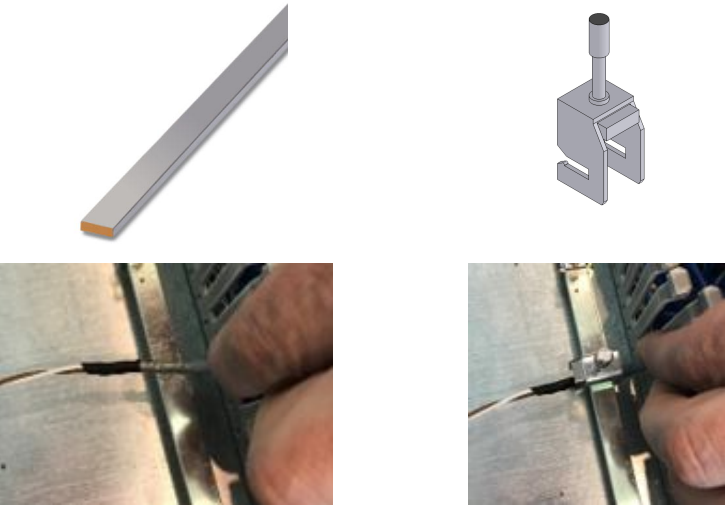
0v Control circuit DC

Blue/White Bu/Wh

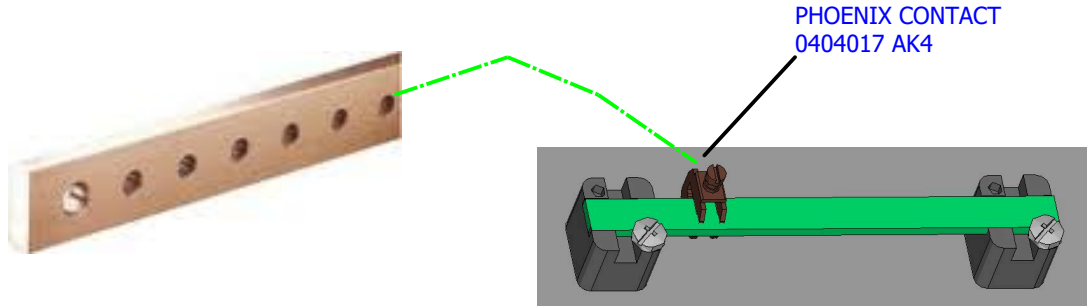
Protective wire

Green-yellow (GNYE)

360° Cable Shielding



wire from PE busbar to Sh busbar with gn/ye 6mm2 cable

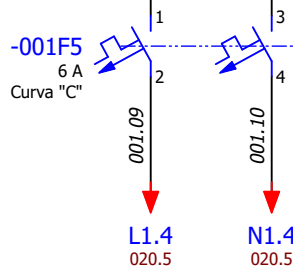
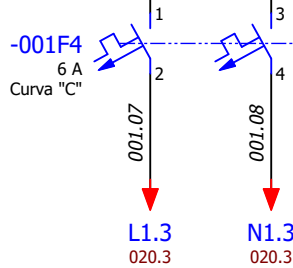
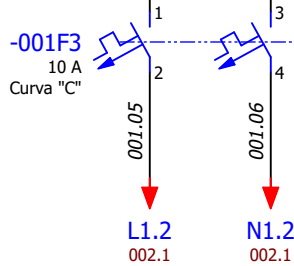
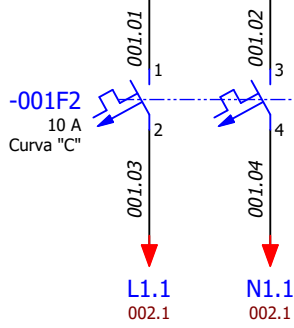
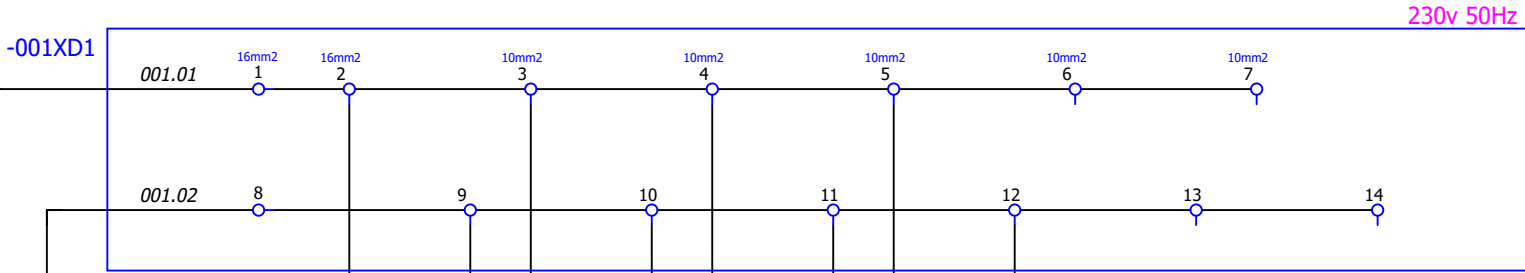
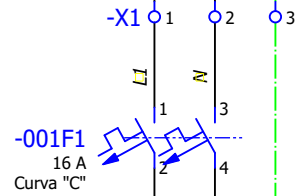
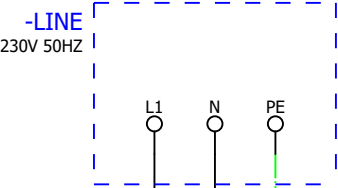


Assignment	Page	Page description
()	AAA (Cover sheet)	
	001	Title page / cover sheet
	002	TECHNICAL IMPLEMENTATION REGULATIONS
	005	Table of contents : &AAA/001 - &EFA1+EC1/201
	006	Table of contents : &EFA1+EC1/202 - &EMB1+EC1/111
	007	Table of contents : &EMB1+EC1/112 - &EMB1+EC1/136
	001	Structure identifier overview
EC1 (Electrical cabinet 1)	EFS3 (Electrical engineering schematic)	
	001	Power
	002	AC Distribution
	020	DC Power
	200	Speedgoat machine
	205	Windows Machine
	210	Mount control computer (MCC)
	215	TMA PXI
	220	AXES PXI
	225	AUX PXI
	230	VM Hypervisor
	235	cRIO System
	236	cRIO DIO Module
	240	EIB Front side
	241	EIB Rear side 1
	242	EIB Rear side 2
	245	Managed switch
	250	Unmanaged switch
	501	Safety PILZ
	502	Safety PILZ digital outputs
700	WiFi router (for tekniker implementation)	
201	cRIO System and Safety PLC	

Table of contents

F06_004_TK-2023

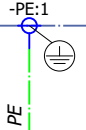
Assignment	Page	Page description
EC1 (Electrical cabinet 1)		EMB1 (Cable overview)
	112	Cable diagram +EC1-200W1
	113	Cable diagram +EC1-200W2
	114	Cable diagram +EC1-220W1
	115	Cable diagram +EC1-235W1
	116	Cable diagram +EC1-236W2
	117	Cable diagram +EC1-236W3
	118	Cable diagram +EC1-245W2
	119	Cable diagram +EC1-245W3
	120	Cable diagram +EC1-245W4
	121	Cable diagram +EC1-245W5
	122	Cable diagram +EC1-245W7
	123	Cable diagram +EC1-245W8
	124	Cable diagram +EC1-245W9
	125	Cable diagram +EC1-245W10
	126	Cable diagram +EC1-245W11
	127	Cable diagram +EC1-245W13
	128	Cable diagram +EC1-245W14
	129	Cable diagram +EC1-245W23
	130	Cable diagram +EC1-250W1
	131	Cable diagram +EC1-250W3
	132	Cable diagram +EC1-250W9
	133	Cable diagram +EC1-250W10
	134	Cable diagram +EC1-250W11
	135	Cable diagram +EC1-250W12
	136	Cable diagram +EC1-700W1

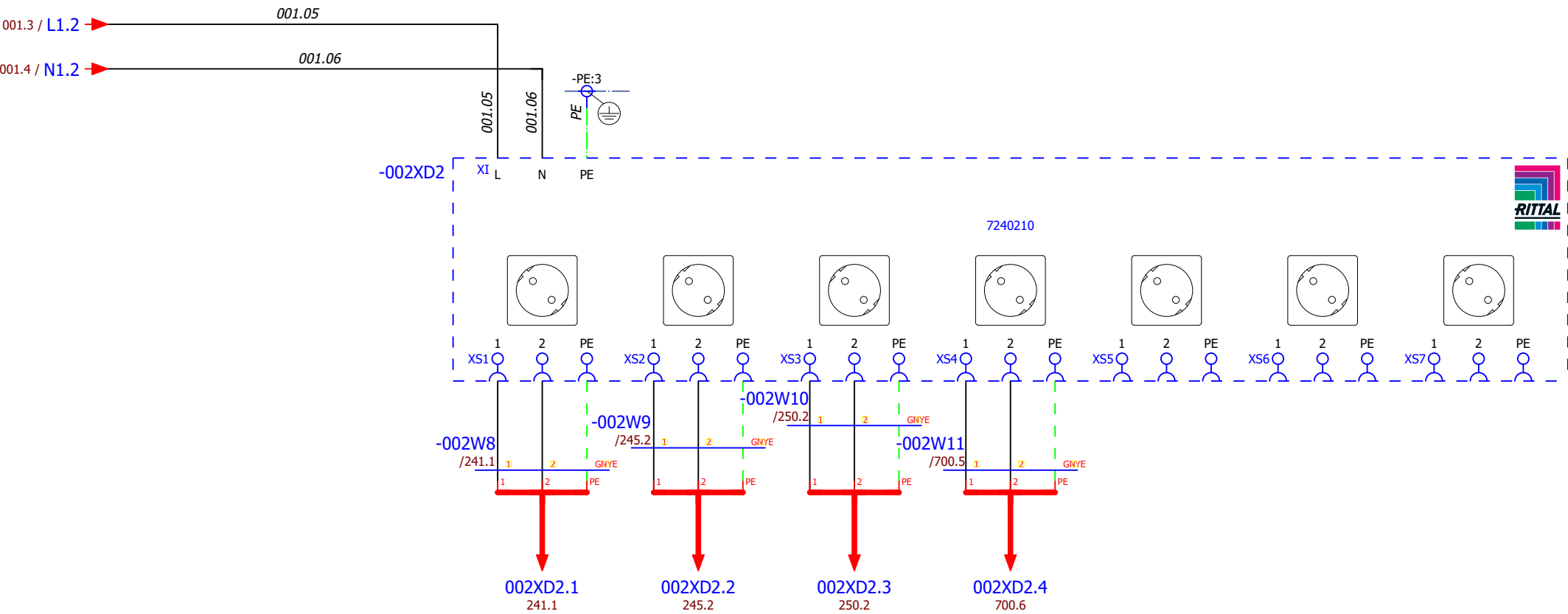
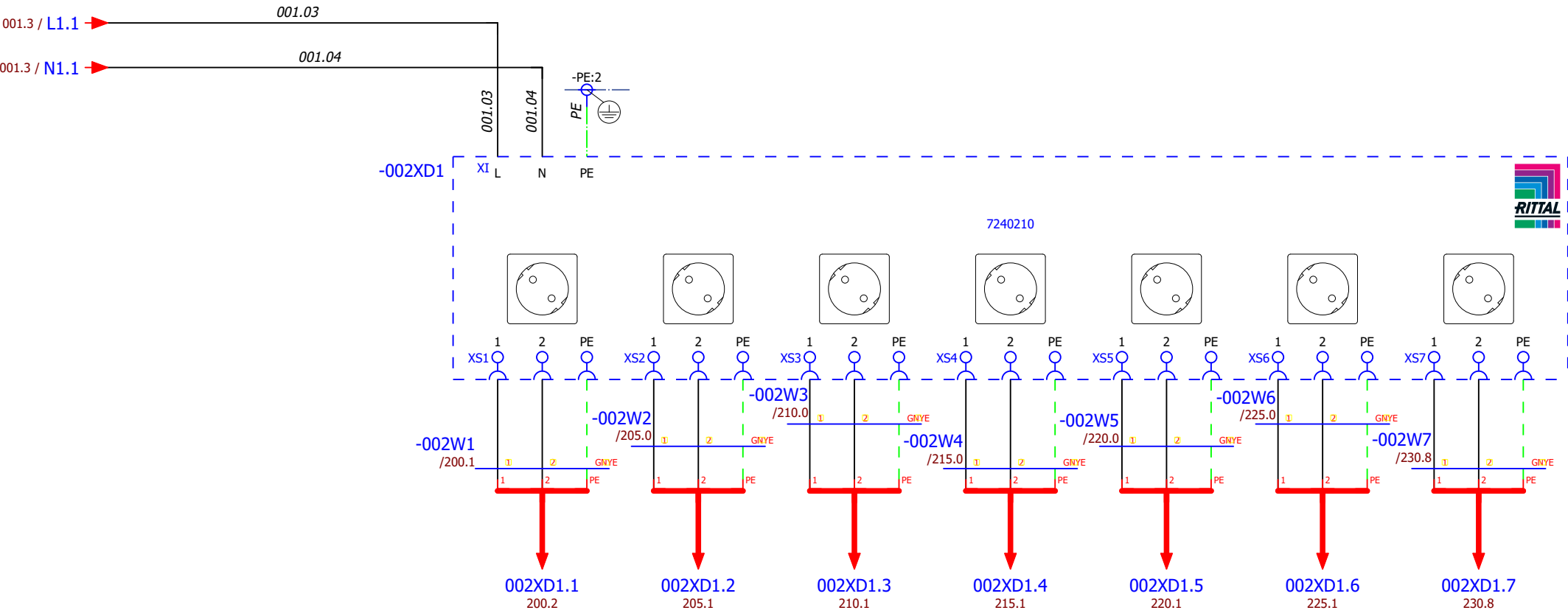


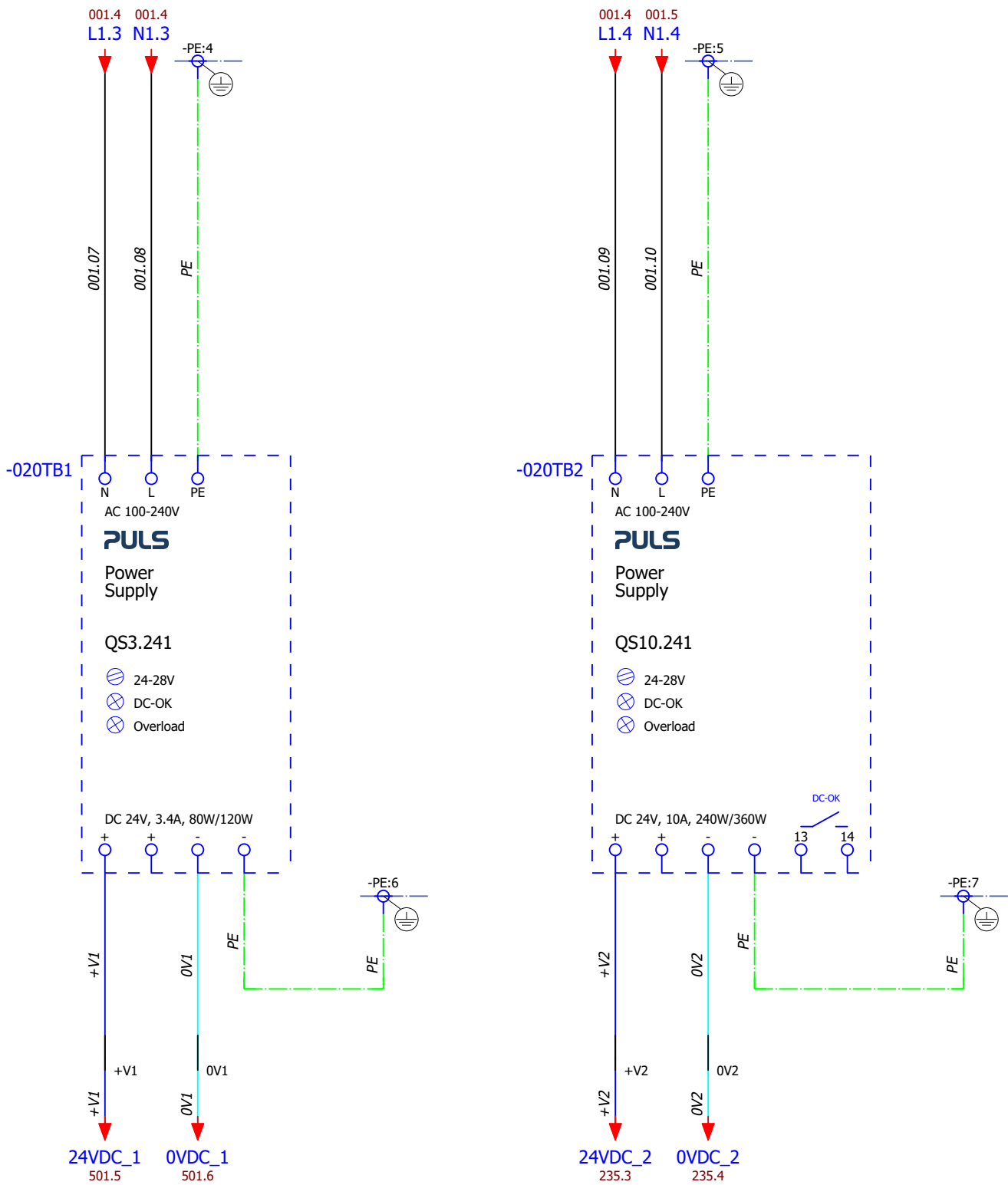
- X1 = POWER
- XD10 = DISTRIBUTION
- X20 = FIELD OUTPUT
- X30 = FIELD OUTPUT DETECTORS
- X40 = FIELD OUTPUT ACTUATORS

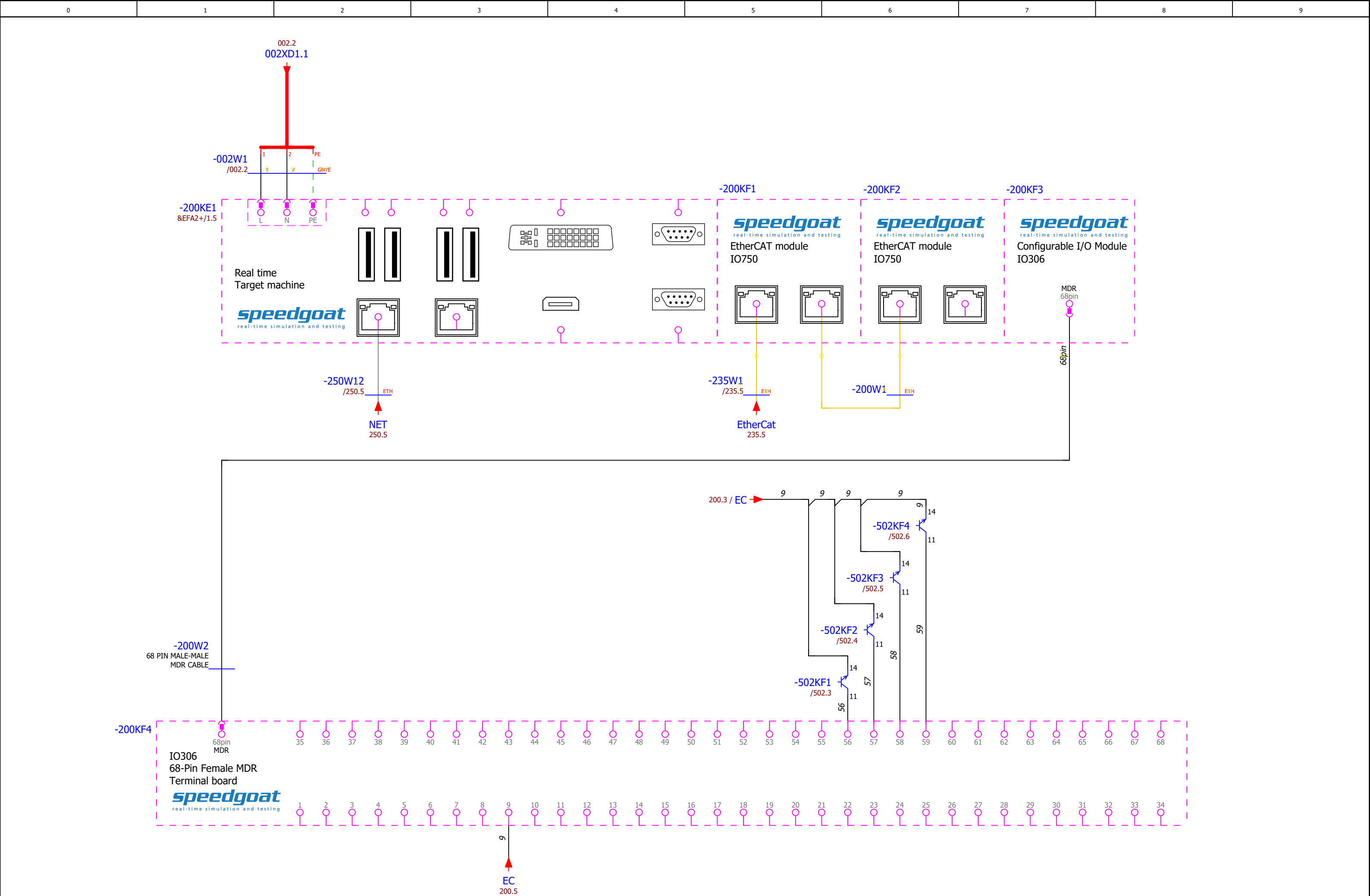


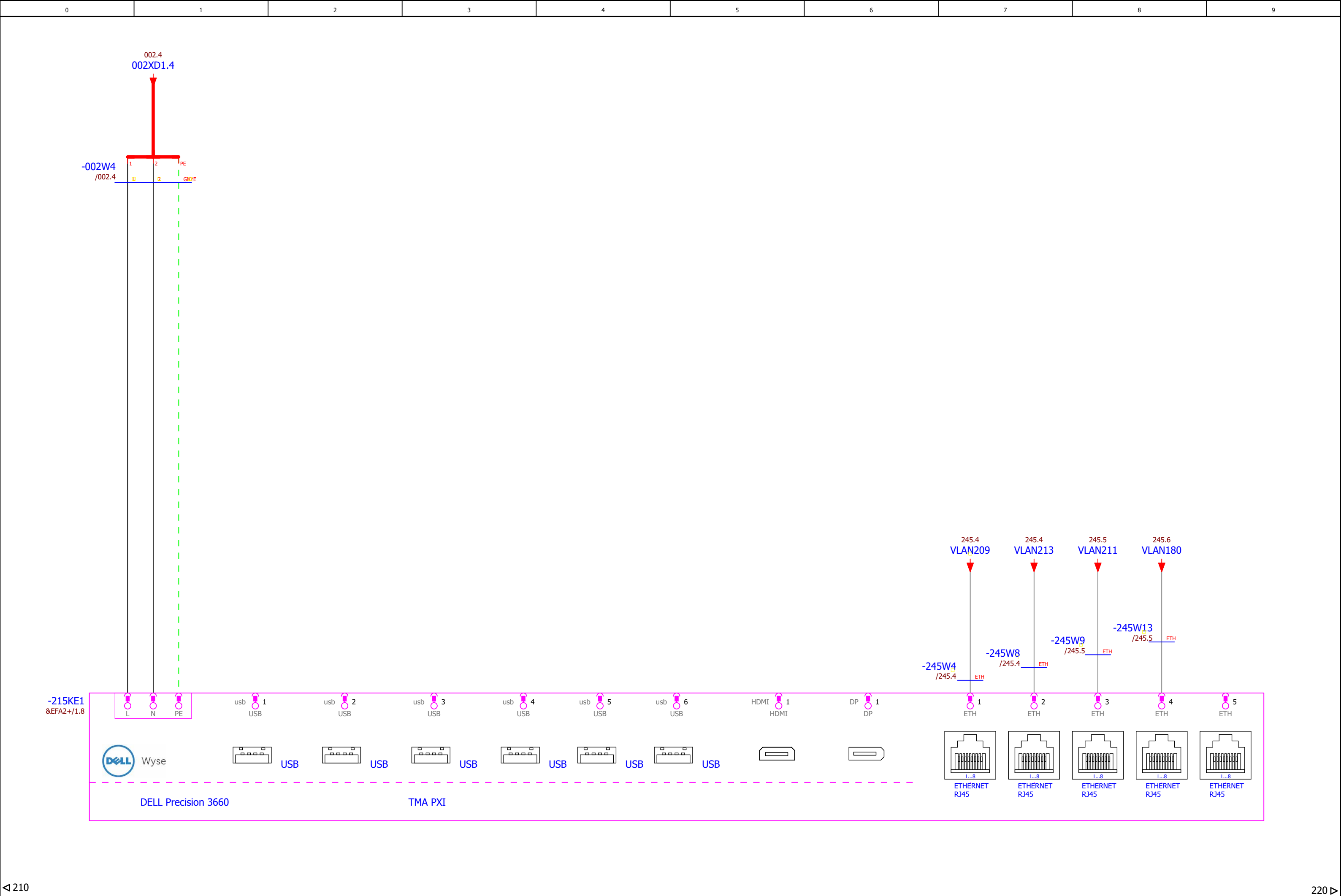
PE busbar

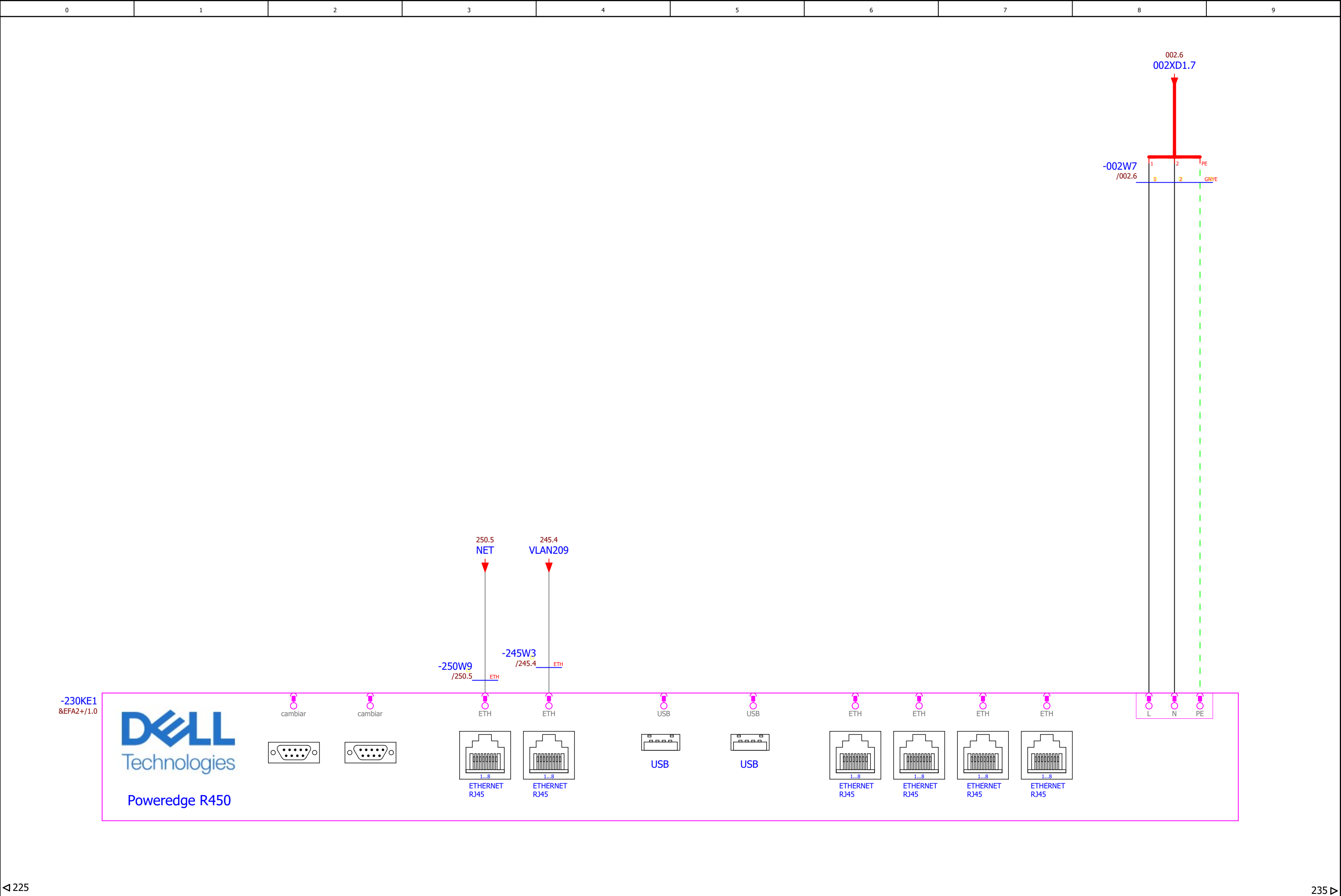


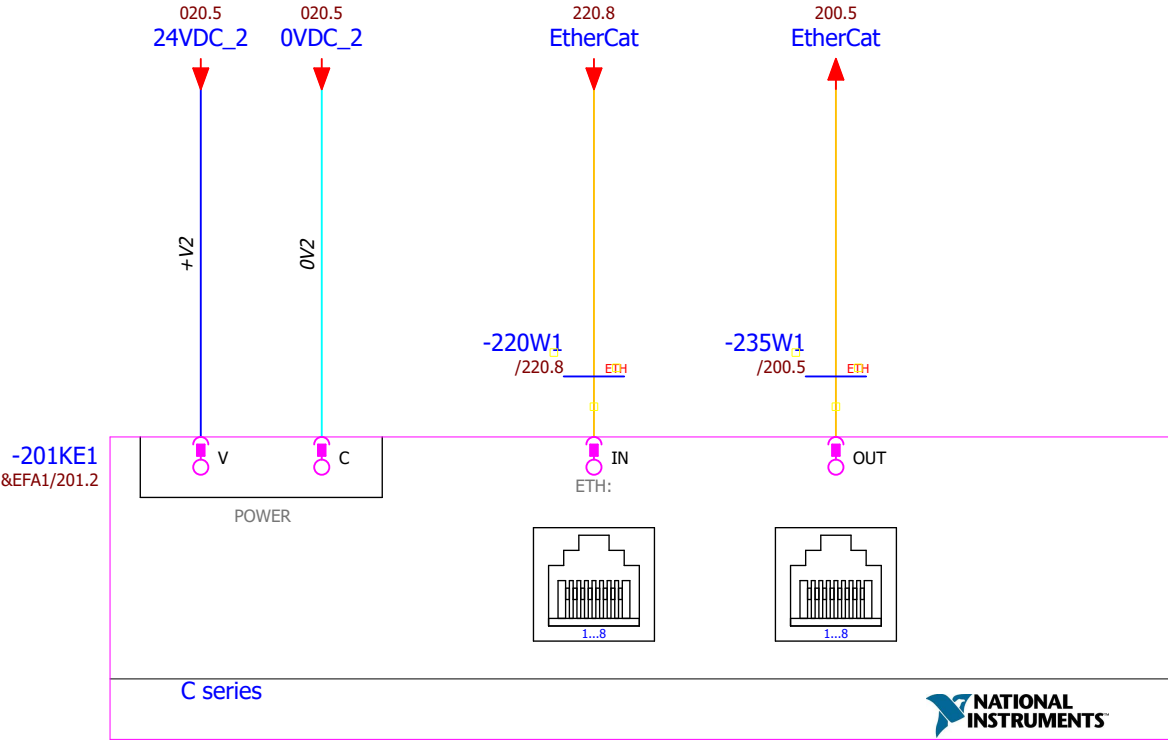








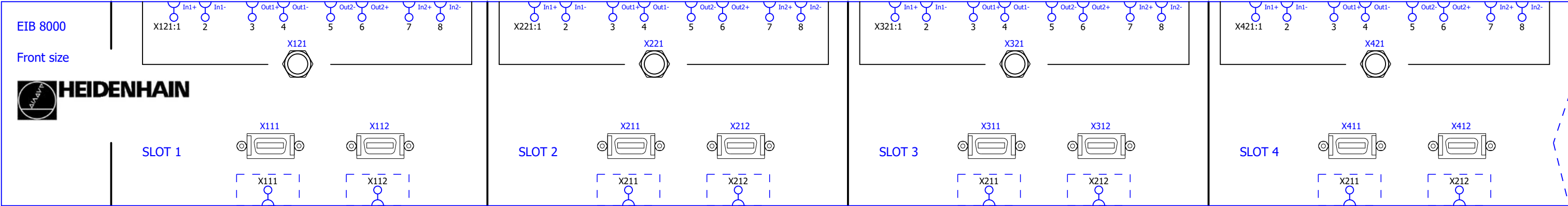


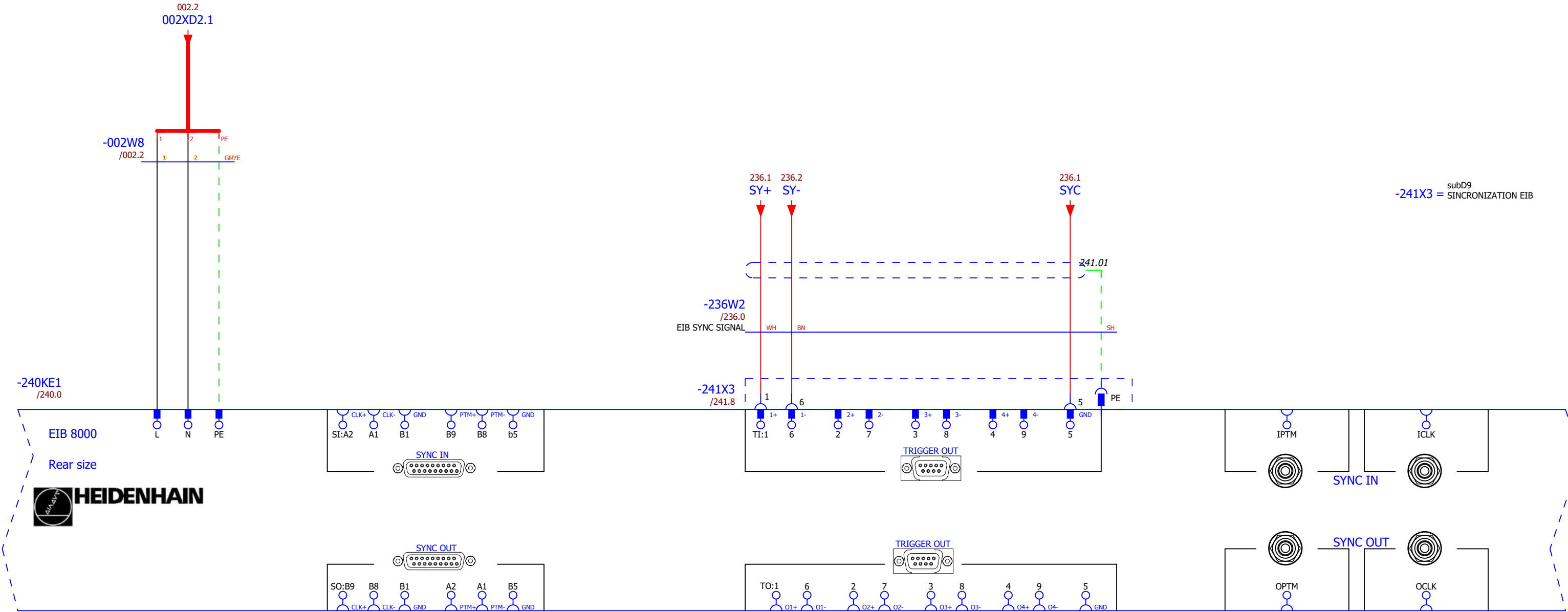


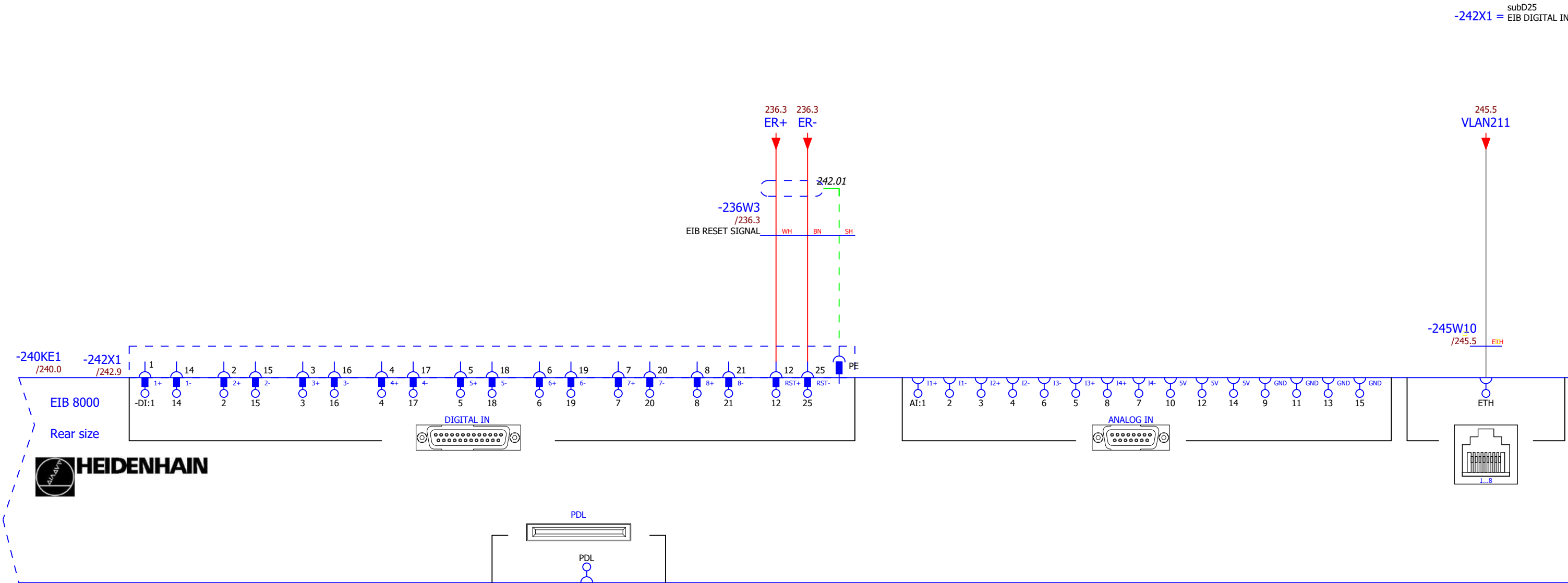


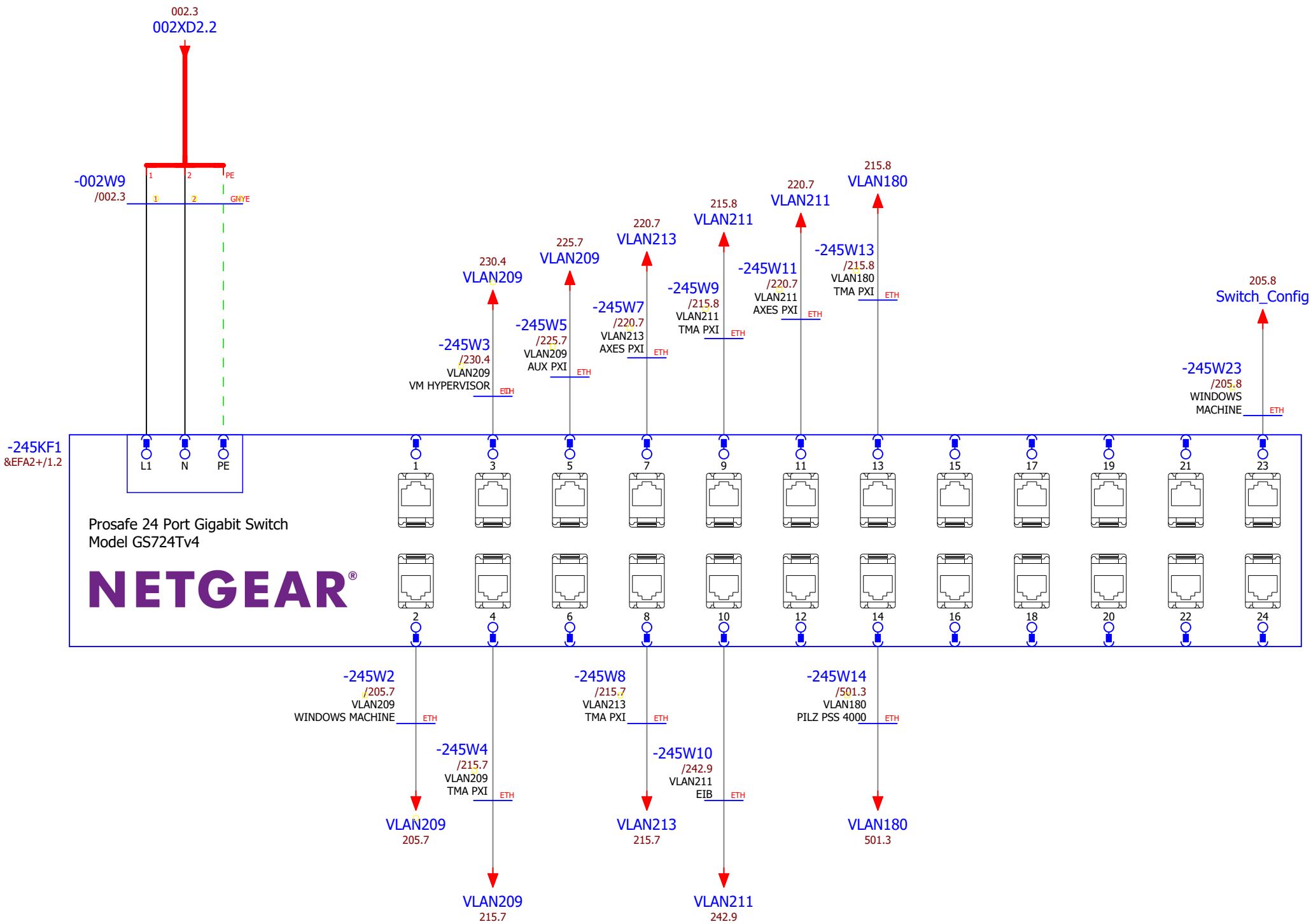
240 ▶

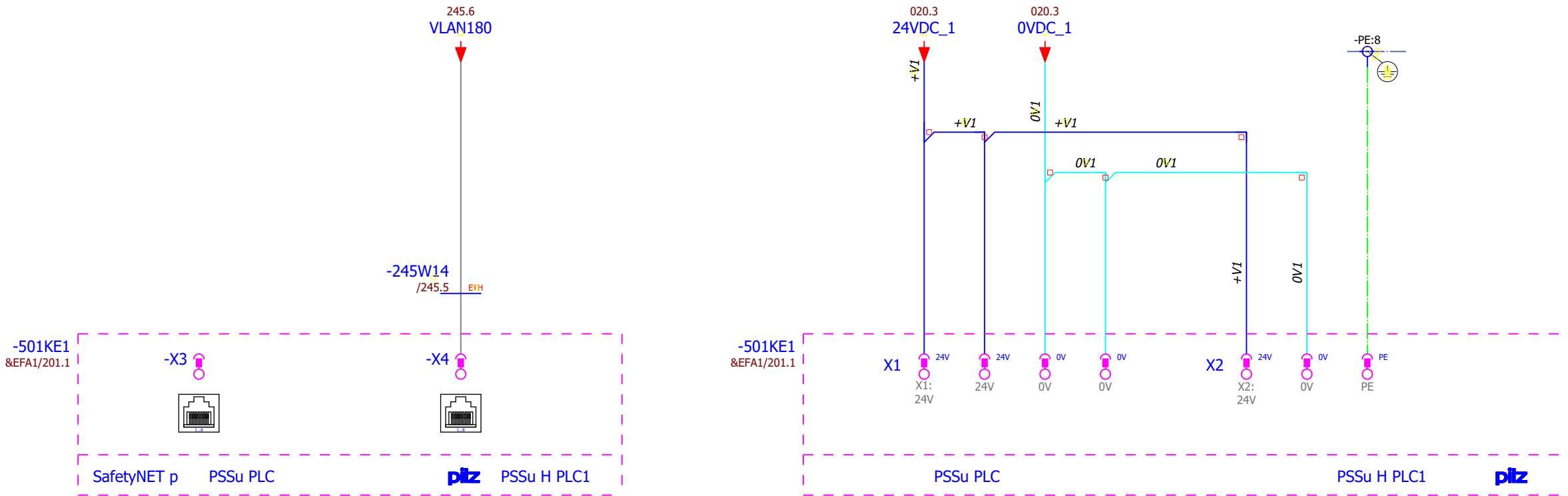
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/242.0
&EFA2+/1.3

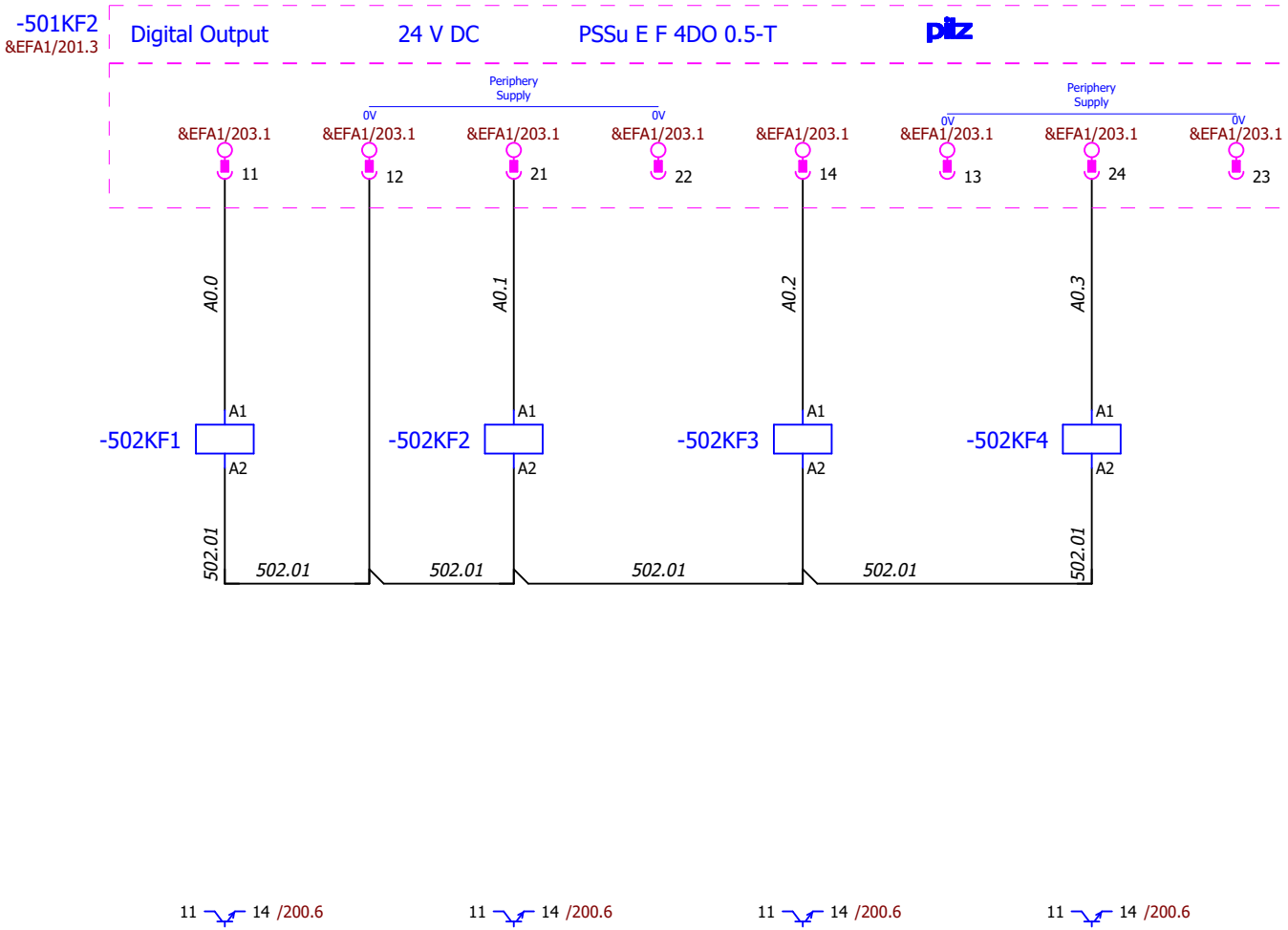
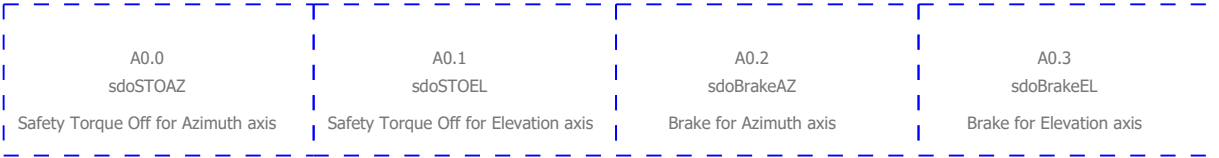


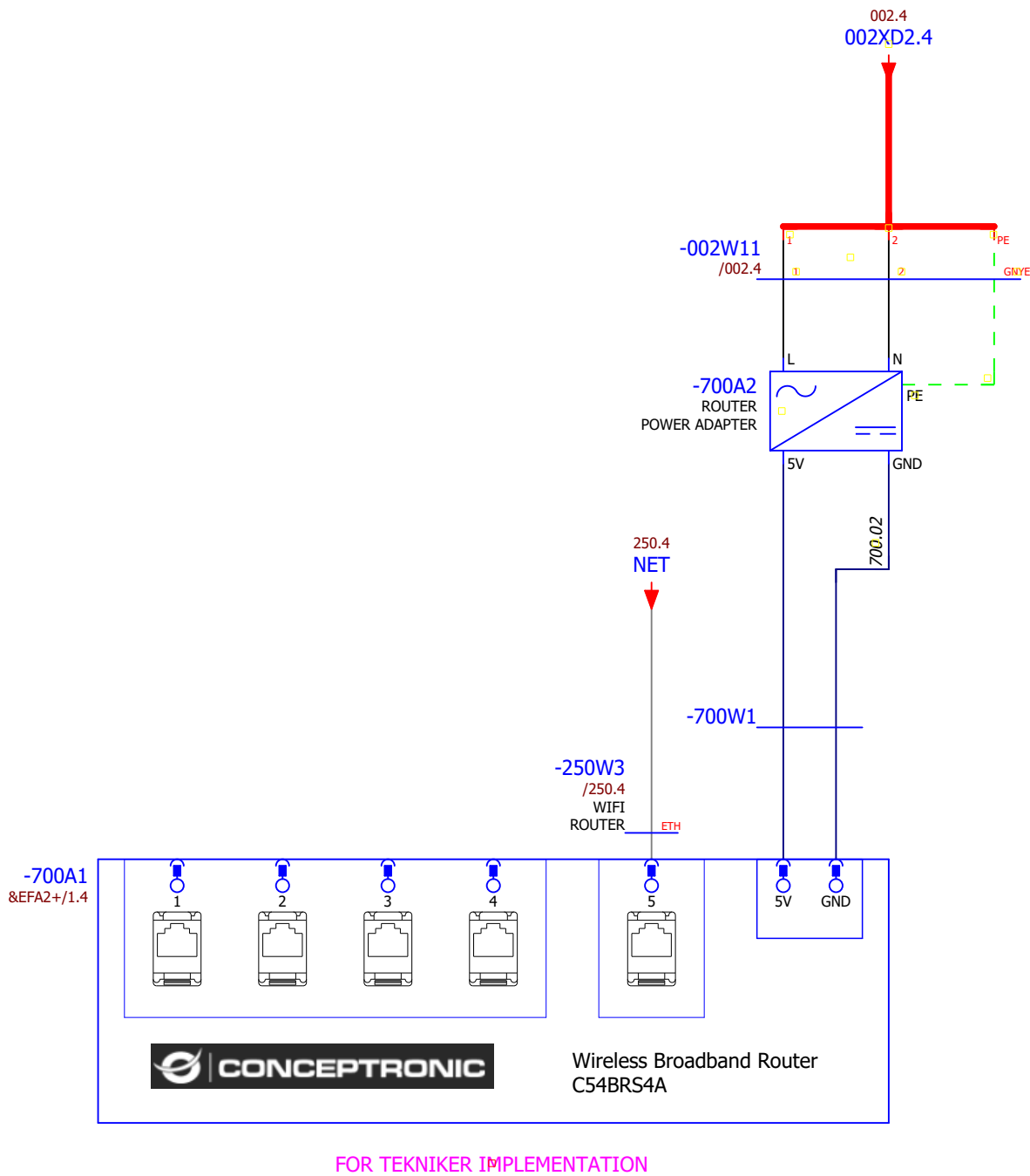


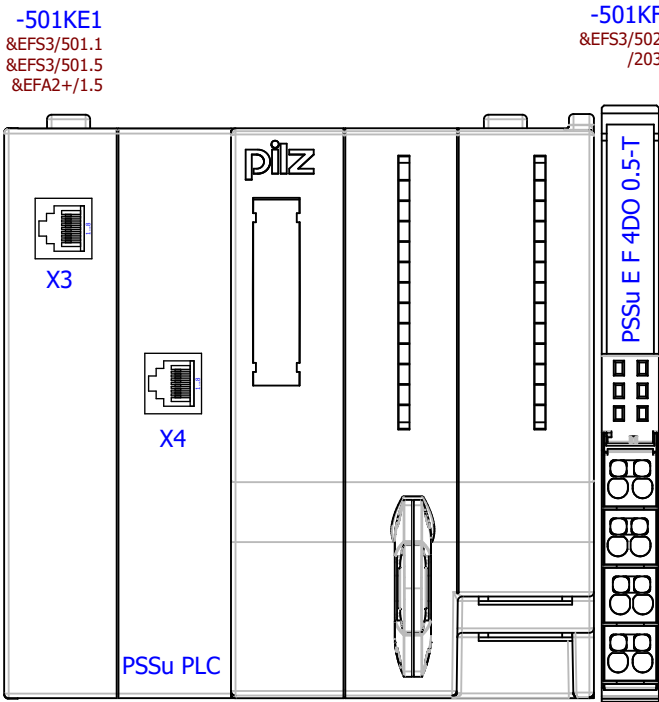
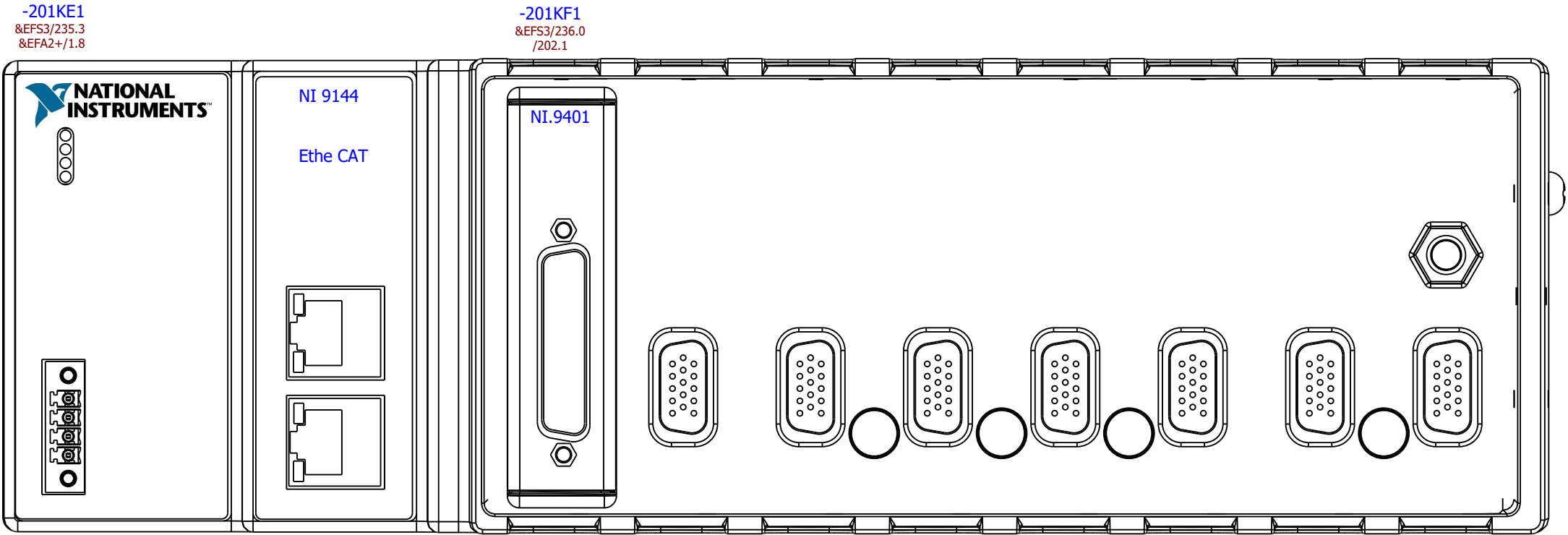












Date	10/11/2025	V1.0	11/11/2025	EBEGIRISTAIN				
Reviewed		V1.1	12/11/2025	EBEGIRISTAIN				
Drew by	E. Begiristain	Review	Date	Name	Review	Date	Name	












f083 Automatic Test System for LSST	
Replaces	Replaced by


cRIO System and Safety PLC

Customer:	Association of Universities for Research in Astronomy (AURA)
	N. Cherry Avenue
	85719 Tucson, Arizona

=	
+ EC1	
	Page 201
	Total number 76

-201KF1
/201.3

A0.0		14	&EFS3/236.1	EIB SYN+	EIB SYNC+
		1	&EFS3/236.1		
A0.1		16	&EFS3/236.2	EIB SYN-	EIB SYNC-
		3	&EFS3/236.2		
A0.2		17	&EFS3/236.3	EIB RST	RESET EIB
		4	&EFS3/236.3		
A0.3		19	&EFS3/236.4		
		6	&EFS3/236.4		
A0.4		20	&EFS3/236.5		
		7	&EFS3/236.6		
A0.5		22	&EFS3/236.6		
		9	&EFS3/236.7		
A0.6		23	&EFS3/236.8		
		10	&EFS3/236.8		
A0.7		25	&EFS3/236.9		
		12	&EFS3/236.9		



-501KF2
/201.3



A0.0 11
A0.1 21

&EFS3/502.3
&EFS3/502.4

sdoSTOAZ
sdoSTOEL

Safety Torque Off for Azimuth axis
Safety Torque Off for Elevation axis

Periphery
Supply

0V 12
0V 22

&EFS3/502.4
&EFS3/502.5

Periphery
Supply

0V 13
0V 23

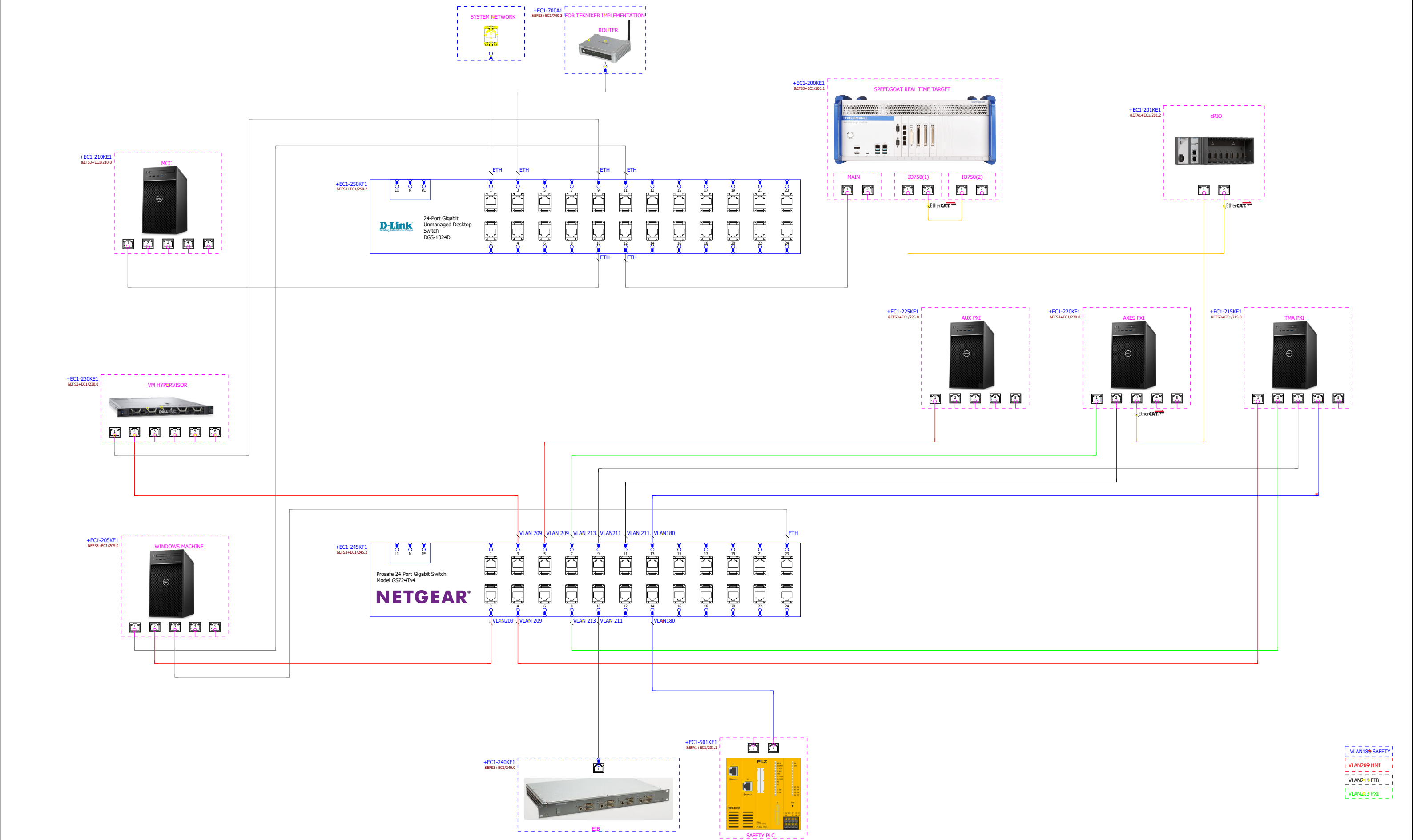
&EFS3/502.6
&EFS3/502.6

A0.2 14
A0.3 24

&EFS3/502.5
&EFS3/502.6

sdoBrakeAZ
sdoBrakeEL

Brake for Azimuth axis
Brake for Elevation axis



DEVICE TAG	PLACEMENT	DESCRIPTION	REFERENCE	MANUFACTURER
700A1	&EFS3/700.3	Wireless Broadband Router	C54BRS4A	CONCEPTRONIC
001F1	&EFS3/001.0	Automatico bipolar C 16A	A9F79216	Schneider Electric
001F2	&EFS3/001.3	Automatico bipolar C 10A	A9F79210	Schneider Electric
001F3	&EFS3/001.3	Automatico bipolar C 10A	A9F79210	Schneider Electric
001F4	&EFS3/001.4	Automatico bipolar C 6A	A9F79206	Schneider Electric
001F5	&EFS3/001.4	Automatico bipolar C 6A	A9F79206	Schneider Electric
200KE1	&EFS3/200.1	Real Time target machine	109301	SPEEDGOAT
201KE1	&EFA1/201.2	8-Slot EtherCAT Slave Chassis for C Series I/O Modules	NI 9144 780438-01	NATIONAL INSTRUMENTS
205KE1	&EFS3/205.0	Precision Tower	Dell Precision Tower "TBD"	DELL
210KE1	&EFS3/210.0	Precision Tower	Dell Precision Tower "TBD"	DELL
215KE1	&EFS3/215.0	Precision Tower	Dell Precision Tower "TBD"	DELL
220KE1	&EFS3/220.0	Precision Tower	Dell Precision Tower "TBD"	DELL
225KE1	&EFS3/225.0	Precision Tower	Dell Precision Tower "TBD"	DELL
230KE1	&EFS3/230.0	Poweredge R450	Dell Poweredge R450	DELL
240KE1	&EFS3/240.0	ENCODER INTERFACE	EIB8791	HEIDENHAIN
501KE1	&EFA1/201.1	Compact programmable safety system f. decent.	PSSu H PLC1 314 070	Pilz
200KF1	&EFS3/200.5	EtherCAT Subordinate Device I/O Module	SPE.IO750	SPEEDGOAT
200KF2	&EFS3/200.6	EtherCAT Subordinate Device I/O Module	SPE.IO750	SPEEDGOAT
200KF3	&EFS3/200.7	64 ESD-protected TTL lines	IO306	SPEEDGOAT
200KF4	&EFS3/200.1	64 ESD-protected TTL lines	IO306 Interface	SPEEDGOAT
201KF1	&EFA1/201.3	5 V/TTL, Bidirectional Digital I/O, 8 Ch Module	NI 9401 779351-01	NATIONAL INSTRUMENTS
245KF1	&EFS3/245.2	SWITCH ETHERNET	GS724Tv4	NETGEAR
250KF1	&EFS3/250.2	SWITCH ETHERNET 24 puertos 10/100/1000Mbps	DGS1024D	D-LINK
501KF2	&EFA1/201.3	Fail-safe I/O-Elektronic Module (Coated Version)	314210	Pilz
502KF1	&EFS3/502.3	Miniature solid-state relay	2966618	Phoenix Contact
502KF1	&EFS3/502.3	Relay base	2900443	Phoenix Contact
502KF2	&EFS3/502.4	Miniature solid-state relay	2966618	Phoenix Contact
502KF2	&EFS3/502.4	Relay base	2900443	Phoenix Contact
502KF3	&EFS3/502.5	Miniature solid-state relay	2966618	Phoenix Contact
502KF3	&EFS3/502.5	Relay base	2900443	Phoenix Contact
502KF4	&EFS3/502.6	Miniature solid-state relay	2966618	Phoenix Contact
502KF4	&EFS3/502.6	Relay base	2900443	Phoenix Contact
PE	&EFS3/001.7	earth busbar	550220 TCB 20x5	ERICO
PE	&EFS3/001.7	DH Distance Holder and Spacer	560660	EFX
PE	&EFS3/001.7	DH Distance Holder and Spacer	560660	EFX
PE	&EFS3/001.7	MBJ Grounding and Bonding Braid, Tinned Copper	556640	ERICO
020TB1	&EFS3/020.3	F.A. Monofasica 82w	QS3.241	PULS
020TB2	&EFS3/020.5	Fuente de alimentación 24V 10A	QS10.241	PULS
002W1	&EFS3/002.2	CABLE	3G1,5	...

Parts list

TEKNIKER_v5

DEVICE TAG	PLACEMENT	DESCRIPTION	REFERENCE	MANUFACTURER
002W2	&EFS3/002.3	CABLE	3G1,5	...
002W3	&EFS3/002.4	CABLE	3G1,5	...
002W4	&EFS3/002.4	CABLE	3G1,5	...
002W5	&EFS3/002.5	CABLE	3G1,5	...
002W6	&EFS3/002.6	CABLE	3G1,5	...
002W7	&EFS3/002.6	CABLE	3G1,5	...
002W8	&EFS3/002.2	CABLE	3G1,5	...
002W9	&EFS3/002.3	CABLE	3G1,5	...
002W10	&EFS3/002.4	CABLE	3G1,5	...
002W11	&EFS3/002.4	CABLE	3G1,5	...
200W1	&EFS3/200.6	BLUE ETH CABLE	C6PC70S-BL-07	BLACK BOX
200W2	&EFS3/200.1	68-Pin Male MDR to 68-Pin Male MDR	305163	SPEEDGOAT
220W1	&EFS3/220.8	BLUE ETH CABLE	C6PC70S-BL-07	BLACK BOX
235W1	&EFS3/235.5	BLUE ETH CABLE	C6PC70S-BL-07	BLACK BOX
236W2	&EFS3/236.0	SUPERTRONIC 330-C-PUR 3x0,25	49809	Helukabel
236W3	&EFS3/236.3	UL/CSA Cable for Drag Chains SUPER-PAAR-TRONIC 340-C-PUR 1x2x0,34 mm² (22 AWG) GY	49839	Helukabel
245W2	&EFS3/245.3	WHITE ETH CABLE	BLB.C6PC70S-WH-15	BLACK BOX
245W3	&EFS3/245.4	WHITE ETH CABLE	BLB.C6PC70S-WH-15	BLACK BOX
245W4	&EFS3/245.4	WHITE ETH CABLE	BLB.C6PC70S-WH-15	BLACK BOX
245W5	&EFS3/245.4	WHITE ETH CABLE	BLB.C6PC70S-WH-15	BLACK BOX
245W7	&EFS3/245.4	WHITE ETH CABLE	BLB.C6PC70S-WH-15	BLACK BOX
245W8	&EFS3/245.4	WHITE ETH CABLE	BLB.C6PC70S-WH-15	BLACK BOX
245W9	&EFS3/245.5	WHITE ETH CABLE	BLB.C6PC70S-WH-15	BLACK BOX
245W10	&EFS3/245.5	WHITE ETH CABLE	BLB.C6PC70S-WH-15	BLACK BOX
245W11	&EFS3/245.5	WHITE ETH CABLE	BLB.C6PC70S-WH-15	BLACK BOX
245W13	&EFS3/245.5	WHITE ETH CABLE	BLB.C6PC70S-WH-15	BLACK BOX
245W14	&EFS3/245.5	WHITE ETH CABLE	BLB.C6PC70S-WH-15	BLACK BOX
245W23	&EFS3/245.7	WHITE ETH CABLE	BLB.C6PC70S-WH-15	BLACK BOX
250W1	&EFS3/250.3	WHITE ETH CABLE	BLB.C6PC70S-WH-15	BLACK BOX
250W3	&EFS3/250.4	WHITE ETH CABLE	BLB.C6PC70S-WH-15	BLACK BOX
250W9	&EFS3/250.5	WHITE ETH CABLE	BLB.C6PC70S-WH-15	BLACK BOX
250W10	&EFS3/250.5	WHITE ETH CABLE	BLB.C6PC70S-WH-15	BLACK BOX
250W11	&EFS3/250.5	WHITE ETH CABLE	BLB.C6PC70S-WH-15	BLACK BOX
250W12	&EFS3/250.5	WHITE ETH CABLE	BLB.C6PC70S-WH-15	BLACK BOX
X1	&EFS3/001.8	End bracket	3022276	PHOENIX CONTACT
X20	&EFS3/001.8	End bracket	3022276	PHOENIX CONTACT
X30	&EFS3/001.8	End bracket	3022276	PHOENIX CONTACT
X40	&EFS3/001.8	End bracket	3022276	PHOENIX CONTACT
236X1	&EFS3/236.9	sub-db25 female Solder Cup, Gold Flash	5-747913-2	TE-CONNECTIVITY

Plug diagram

F22_001_TK

Function text									Cable name	Plug +EC1-236X1 subD25 cRIO SYNC.						Cable name	-236W2	-236W3			Page / column
									Cable type	Target	Connection point	Plug designation	Wire designation	device connection point	Source	Connection point	Cable type	SUPER-PAR-TRONIC 340-C-PUR 1x2X0,34 mm² SUPERTRONIC 330-C-PUR 3X0,25			
												1	236.02		-241X3	5		BN			&EFS3/236.1
												2									
												3									
												4	236.05		-242X1	25		BN			&EFS3/236.3
												5									
												6									
												7									
												8									
												9									
												10									
												11									
												12									
												13									
												14	236.01		-241X3	1		WH			&EFS3/236.1
												15									
												16	236.03		-241X3	6		GN			&EFS3/236.2
												17	236.04		-242X1	12		WH			&EFS3/236.3
												18									
												19									&EFS3/236.4
												20									
												21									
												22									
												23									
												24									
												25									
												PE									

Plug diagram

F22_001_TK

Function text									Cable name	Plug +EC1-241X3 subD9 SINCRONIZATION EIB						Cable name	-236W2					Page / column
										Target	Connection point	Plug designation	Wire designation	device connection point	Source							
												1	236.01		-236X1	14		WH			&EFS3/241.4	
												2										
												3										
												4										
												5	236.02		-236X1	1		BN			&EFS3/241.6	
												6	236.03		-236X1	16		GN			&EFS3/241.5	
												7										
												8										
												9										
												PE	241.01		-212W2			SH			&EFS3/241.6	

Cable overview

EC1 — Electrical cabinet 1

F10_003B - TK-

Cable designation	From	To	Manufact.	Reference	Type	Conductrs	∅	Diám.	Length	Function text
002W1	-002XD1	-200KE1	...	3G1,5	3G1.5	3	1.5			
002W2	-002XD1	-205KE1	...	3G1,5	3G1.5	3	1.5			
002W3	-002XD1	-210KE1	...	3G1,5	3G1.5	3	1.5			
002W4	-002XD1	-215KE1	...	3G1,5	3G1.5	3	1.5			
002W5	-002XD1	-220KE1	...	3G1,5	3G1.5	3	1.5			
002W6	-002XD1	-225KE1	...	3G1,5	3G1.5	3	1.5			
002W7	-002XD1	-230KE1	...	3G1,5	3G1.5	3	1.5			
002W8	-002XD2	-240KE1	...	3G1,5	3G1.5	3	1.5			
002W9	-002XD2	-245KF1	...	3G1,5	3G1.5	3	1.5			
002W10	-002XD2	-250KF1	...	3G1,5	3G1.5	3	1.5			
002W11	-002XD2	-700A2	...	3G1,5	3G1.5	3	1.5			FOR TEKNIKER IMPLEMENTATION
200W1	-200KF1	-200KF2	BLACK BOX	C6PC70S-BL-07	BL ETH CAT6	5	1	7,6	2,1	
200W2	-200KF3	-200KF4	SPEEDGOAT	305163	305163	68			1,82	68 PIN MALE-MALE MDR CABLE
220W1	-201KE1-ETH	-220KE1	BLACK BOX	C6PC70S-BL-07	BL ETH CAT6	5	1	7,6	2,1	
235W1	-200KF1	-201KE1-ETH	BLACK BOX	C6PC70S-BL-07	BL ETH CAT6	5	1	7,6	2,1	
236W2	-236X1	-241X3	HELU	49809	SUPERTRONIC 330-C-PUR 3x0,25	3	0,25	5mm		EIB SYNC SIGNAL
236W3	-236X1	-242X1	HELU	49839	SUPER-PAAR-TRONIC 340-C-PUR 1x2x0,34 mm ²		0,34	5,1mm		EIB RESET SIGNAL
245W2	-205KE1	-245KF1	BLACK BOX	BLB.C6PC70S-WH-15	WH ETH CAT6	5	1	7,6	4,6	VLAN209 WINDOWS MACHINE
245W3	-230KE1	-245KF1	BLACK BOX	BLB.C6PC70S-WH-15	WH ETH CAT6	5	1	7,6	4,6	VLAN209 VM HYPERVISOR
245W4	-215KE1	-245KF1	BLACK BOX	BLB.C6PC70S-WH-15	WH ETH CAT6	5	1	7,6	4,6	VLAN209 TMA PXI
245W5	-225KE1	-245KF1	BLACK BOX	BLB.C6PC70S-WH-15	WH ETH CAT6	5	1	7,6	4,6	VLAN209 AUX PXI
245W7	-220KE1	-245KF1	BLACK BOX	BLB.C6PC70S-WH-15	WH ETH CAT6	5	1	7,6	4,6	VLAN213 AXES PXI
245W8	-215KE1	-245KF1	BLACK BOX	BLB.C6PC70S-WH-15	WH ETH CAT6	5	1	7,6	4,6	VLAN213 TMA PXI
245W9	-215KE1	-245KF1	BLACK BOX	BLB.C6PC70S-WH-15	WH ETH CAT6	5	1	7,6	4,6	VLAN211 TMA PXI
245W10	-240KE1-ETH	-245KF1	BLACK BOX	BLB.C6PC70S-WH-15	WH ETH CAT6	5	1	7,6	4,6	VLAN211 EIB
245W11	-220KE1	-245KF1	BLACK BOX	BLB.C6PC70S-WH-15	WH ETH CAT6	5	1	7,6	4,6	VLAN211 AXES PXI
245W13	-215KE1	-245KF1	BLACK BOX	BLB.C6PC70S-WH-15	WH ETH CAT6	5	1	7,6	4,6	VLAN180 TMA PXI
245W14	-245KF1	-501KE1	BLACK BOX	BLB.C6PC70S-WH-15	WH ETH CAT6	5	1	7,6	4,6	VLAN180 PILZ PSS 4000
245W23	-205KE1	-245KF1	BLACK BOX	BLB.C6PC70S-WH-15	WH ETH CAT6	5	1	7,6	4,6	WINDOWS MACHINE

0	1	2	3	4	5	6	7	8	9	
<div>Cable overview<div>EC1 — Electrical cabinet 1</div><div>F10_003B - TK-</div></div>										
Cable designation	From	To	Manufact.	Reference	Type	Conductrs	Ø	Diám.	Length	Function text
250W1	-250KF1	-SYSTEM_NETWORK	BLACK BOX	BLB.C6PC70S-WH-15	WH ETH CAT6	5	1	7,6	4,6	SYSTEM NETWORK
250W3	-250KF1	-700A1	BLACK BOX	BLB.C6PC70S-WH-15	WH ETH CAT6	5	1	7,6	4,6	WIFI ROUTER
250W9	-230KE1	-250KF1	BLACK BOX	BLB.C6PC70S-WH-15	WH ETH CAT6	5	1	7,6	4,6	VM HYPERVISOR
250W10	-210KE1	-250KF1	BLACK BOX	BLB.C6PC70S-WH-15	WH ETH CAT6	5	1	7,6	4,6	MCC
250W11	-205KE1	-250KF1	BLACK BOX	BLB.C6PC70S-WH-15	WH ETH CAT6	5	1	7,6	4,6	WINDOWS MACHINE
250W12	-200KE1	-250KF1	BLACK BOX	BLB.C6PC70S-WH-15	WH ETH CAT6	5	1	7,6	4,6	SPEEDGOAT CONFIG
700W1	-700A1	-700A2								FOR TEKNIKER IMPLEMENTATION

Cable diagram

F09_001_TK-B

[illegible]

Cable diagram EC1—Electrical cabinet 1 F09_001_TK-B

[illegible]

Cable diagram EC1 — Electrical cabinet 1

F09_001_TK-B

[illegible]

