**Plan**

I&C Integration Kit Cubicle Monitoring System(HMU) Electrical Diagram Example

An example of the detailed configuration of the Cubicle Monitoring Unit as used in I&C Integration Kit

Approval Process			
	Name	*Action*	*Affiliation*
Author	**Sgarbi M.**	**10 Dec 2021:signed**	**IO/DG/SCOP/SCOD/CD/DCS**
Co-Authors			
Reviewers	**Makijarvi P.**	**10 Dec 2021:recommended**	**IO/DG/SCOP/SCOD/CD/DCS**
Approver	**Wallander A.**	**10 Dec 2021:approved**	**IO/DG/SCOP/SCOD/CD**
Document Security: Internal Use			
RO: Makijarvi Petri			
Read Access	**LG: PCDH Fast Controllers, LG: InC Kit Deployment Design Team, LG: CODAC team, AD: ITER, AD: External Collaborators, AD: IO_Director-General, AD: External Management Advisory Board, AD: Auditors, AD: ITER Management Assessor, project administrator, RO**		

Change Log			
I&C Integration Kit Cubicle Monitoring System(HMU) Electrical Diagram Example (QTD994)			
Version	*Latest Status*	*Issue Date*	*Description of Change*
v0.0	In Work	15 Oct 2015	
v1.0	Signed	15 Oct 2015	Electrical Diagrams for I&C Cubicle Monitoring - Design Document
v1.1	Signed	18 Nov 2015	
v1.2	Approved	24 Nov 2015	Problem related to Terrminal Block X4 ; placement of the signals IP1, IP2, IP3 and IP4, has been fixed.
v1.3	Approved	26 Feb 2018	This document is upgraded to a higher version to follow : - Normative IEC 60617 - NFC 15-1500 (Poles protection for the DC Voltage)
v1.4	Revision Required	16 May 2018	-Update of Circuit Breakers Tags inside the Terminal Blocks representation. -The cables to the position switches have been replaced by 2 conductors cables.
v1.5	Approved	10 Jul 2018	Comments from previous version have been integrated.
v1.6	Approved	18 Mar 2021	0Vdc connected to the ground (XCA)
v1.7	Approved	10 Dec 2021	Added ground symbol on Sheet 4

LEGEND:

SSS

SSS-1
BU
1.5mm²

Signal Number

Wire Name + Wire Color+Cross-Section Area

▷────────────▷ 01-B1

01-B2 ▷────────────▷

Off Page reference (OPR): XX-AB
XX: Page Number
A: Column Number
B: Row Number

INDEX	MODIFICATION	DATE	DRAWN	CHECKED	APPROVED
1.7	Added ground on sheet 4	10/12/2021	sgarbim	makijap	wallana
1.6	Add ground and commentary	18/03/2021	Avellam	ASO	PPS
1.5	More details added on T.Blocks	09/07/2018	FJT	ASO	PPS
1.4	Circuit Breaker tags Update	15/05/2018	FJT	ASO	AWS
1.3	Overall Update	20/02/2018	FJT	ASO	AWS
1.2	X4 & PT-100 Problems Solving	24/11/2015	ASO	MPI	JDG
1.1		18/11/2015	ASO	MPO	
1.0	First Issue	15/10/2015	ASO	MPI	

iter
china eu india japan korea russia usa

Component N°: CMU

ITER ORGANIZATION

Route de Vinon sur Verdon

13115 Saint Paul Lez Durance

+33 4 42 17 83 00   +33 4 42 17 83 00

CMU
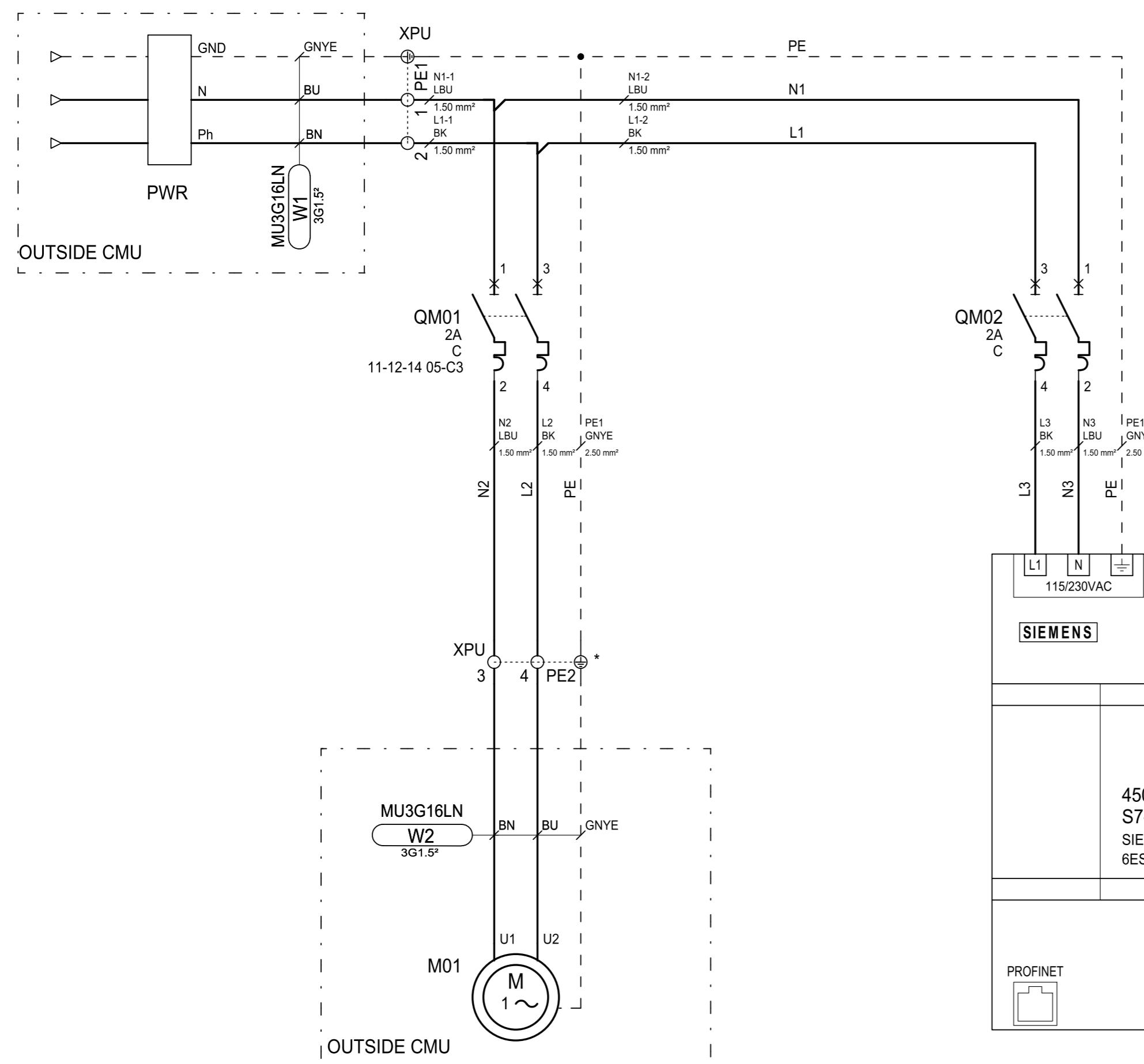
Cubicle Monitoring Unit

Integration Kit

DOCUMENT N° : **ITER_D_QTD994**   01 / 14

CMU 230V Power Supply

CPU power budget		24VDC
CPU 1214C AC/DC/Relay		400mA
System requirements		**24VDC**
CPU 1214C, 2 inputs	(2*4mA)	8 mA
1 relay		19 mA
Digital indicator		50 mA
Zelio analog interface		40 mA
2 round pilots	(18*2)=	36 mA
TOTAL		**153**
Current balance	(400-153=)	**247mA**

XPU

PE

N1

L1

PWR

GND — GNYE

N — BU

Ph — BN

MU3G16LN W1 3G1.5²

XPU
PE1
N1-1 LBU 1.50 mm²
L1-1 BK 1.50 mm²

N1-2 LBU 1.50 mm²
L1-2 BK 1.50 mm²

OUTSIDE CMU

QM01
2A
C
11-12-14 05-C3

1 3

2 4

N2 LBU 1.50 mm²
L2 BK 1.50 mm²
PE1 GNYE 2.50 mm²

N2 L2 PE

QM02
2A
C

3 1

4 2

L3 BK 1.50 mm²
N3 LBU 1.50 mm²
PE1 GNYE 2.50 mm²

L3 N3 PE

XPU
3 4 PE2 *

L1 N ⏚
115/230VAC

SIEMENS

SIMATIC
S7-1200

4505XX-PLC-NNNN
S7-1200
SIEMENS
6ES7214-1BG40-0XB0

PROFINET

MU3G16LN W2 3G1.5²

BN BU GNYE

U1 U2

M01

M
1 ~

OUTSIDE CMU

* Earth Bounding of PE1 and PE2 is done directly on the rail.

DRAWN :	FJT	1.3	23/02/2018	Overall Update	FJT	ITER ORGANIZATION	CMU	SHEET
		1.2	24/11/2015	X4 & PT-100 Problems Solving	ASO		230V Power Supply	03
CHECKED :	GCO	1.1	18/11/2015		ASO			
DATE OF CREATION :		1.0	15/10/2015	First Issue	ASO	Document n° : **ITER_D_QTD994**		◄ 02 04 ►
15/10/2015		INDEX	DATE	MODIFICATION	DES.			

PT100 schematic / circuit diagram — ITER 24VDC Distribution

Labels and component text visible in the diagram:

- 05-D1 / S7-1200:L+ — L+ / BU — L+ — 3 — 4 — 24V-1 BU — 1.5mm² — 24V — 24V — 05-B1 / S7-1200:1L
- 05-D1 / S7-1200:M — M / BU — M — 1 — 2 — 24V-1 BU
- QM03 — 2A — C
- 0V-1 BU — 1.5mm²
- PT100 — 2 — 1 — 14 — 12 — 11 — 13
- YE — WH — BN — GN T20422GN — W3 — LiY-CY (TP) 2x2x0,34²
- IP1 — IP2 — IP3 — IP4
- OUTSIDE CMU
- XCU — 1 — 16 — 17 — 18 — 19 — 2
- 24V-2 BU 0.75 mm² — IP1 BU 0.75 mm² — IP2 BU 0.75 mm² — IP3 BU 0.75 mm² — IP4 BU 0.75 mm²
- A1 24VDC — IP1 RL1 — IP2 — IP3 RL3 — IP4 RL2
- T° U/I
- U01 — SCHNEIDER ELECTRIC — RMPT30BD
- 0VDC A2 — Vo — OPG
- T20422GN — W4 — LiY-CY (TP) 2x2x0,34²
- P01 — FAB: PHOENIX CONTACT — TYPE: MCR-SL-D-U-I 2864011
- 24V — YE — 1 — 10-30VDC
- 0V — WH — 2
- 3 — 4 — LATCH
- 14 — BN — 6 — I — 5
- 13 — GN — 7 — U
- µC — A/D
- OPG-2 BU 0.75 mm² — 15 — OPG — OPG-1 BU 0.75 mm² — OPG — 06-C8 / S7-1200:X11.2M
- V0-2 BU 0.75 mm² — 12 — Vo — V0-1 BU 0.75 mm² — Vo — 06-C7 / S7-1200:X11.1
- XCU — 6 — 7
- 0V-1 BU 1.5mm²
- 0V — 0V — 05-A1 / H03:X2

CABINET FRONT DOOR CLOSED	CABINET REAR DOOR CLOSED	FAN STATUS	SPARE	SPARE	SPARE	SPARE	SPARE

04-F8 0V   QM03:2 → 0V → 08-F1 H03:X2

04-A8 24V   XCU:2 → 24V → 08-E1 S7-1200:1L

XCU 5 4 3 2

24V-3 BU

W5 W6 12 14

S01 S02 QM01 03-B3

W5 W6 11

24V-5 BU

OUTSIDE CMU

0V

8 9 10

IO.0 BU 0.75 mm²   IO.1 BU 0.75 mm²   IO.2 BU 0.75 mm²

04-A1 Q03:3   04-A1 QM03:1

L+ BU 1.50 mm²   M BU 1.50 mm²   0V-3 BU 1.00 mm²

L+   M   *   I0.0   I0.1   I0.2

L+	M	1M	X10a.0	X10a.1	X10a.2	X10a.3	X10a.4	X10a.5	X10a.6	X10a.7
24VDC	0VDC	1M								

S7-1200

STATION: 4505XX-PLC-NNNN

* Always ensure that all non-isolated M Terminals in an S7-1200 system are connected to the same reference potential

For additional noise immunity, connect "M" to chassis ground even if not using sensor supply

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

A

| SPARE | SPARE | SPARE | SPARE | SPARE | SPARE | CABINET TEMPERATURE | CABINET TEMPERATURE |

B

C

Vo 04-E8 XCU:12

OPG 04-E8 XCU:15

D

V0-1
BU
0.75 mm²

OPG-1
BU
0.75 mm²

Vo

V0-3
BU
0.75 mm²

OPG

E

X10b.0   X10b.1   X10b.2   X10b.3   X10b.4   X10b.5   X11.0   X11.1   X11.2M
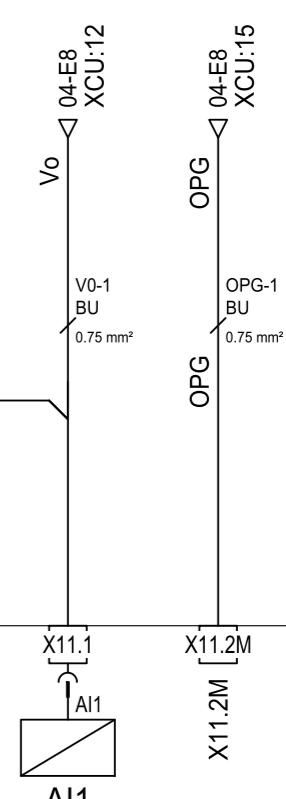
AI0   AI1   X11.2M

AI0   AI1

S7-1200

STATION: 4505XX-PLC-NNNN

F

Column headers (top and bottom): 1 2 3 4 5 6 7 8

Row labels (left and right): A B C D E F

SPARE | SPARE | SPARE | SPARE | SPARE | SPARE | SPARE | SPARE

S7-1200

STATION: 4505XX-PLC-NNNN

1L

1L | X12a.0 | X12a.1 | X12a.2 | X12a.3 | X12a.4 | 2L | 2L | X12b.5 | X12b.6 | X12b.7

24V
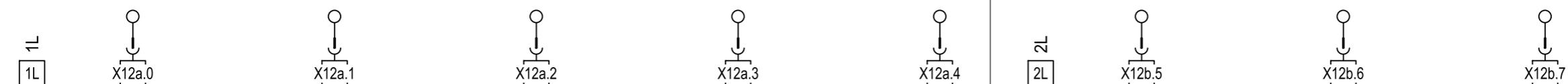
O0.0

O0.0
BU
0.75 mm²

XCU 11

1 W7

X1 H03

X2 FAULT

2 W7

OUTSIDE CMU

0V

24V-4
BU
1.5mm²

XCU 7

05-B8 ▷ 24V
XCU:2

05-A8 ▷ 0V
QM03:2
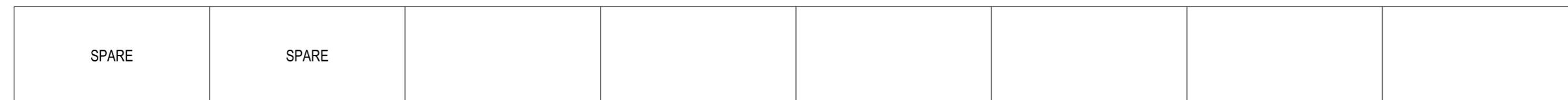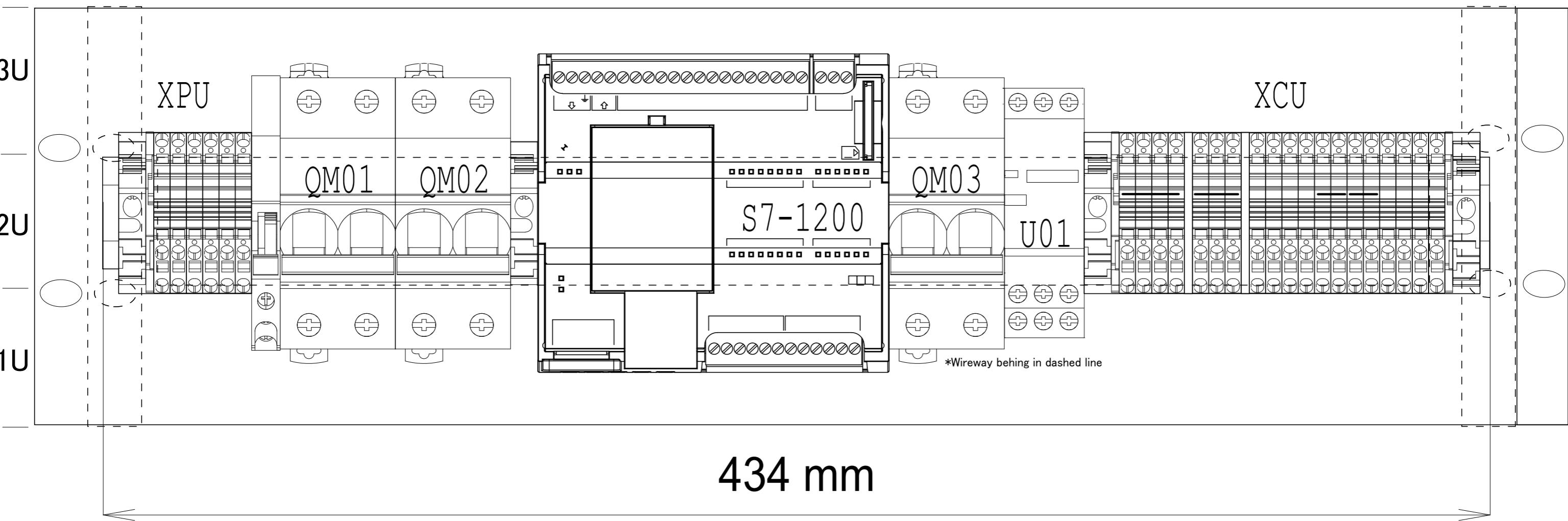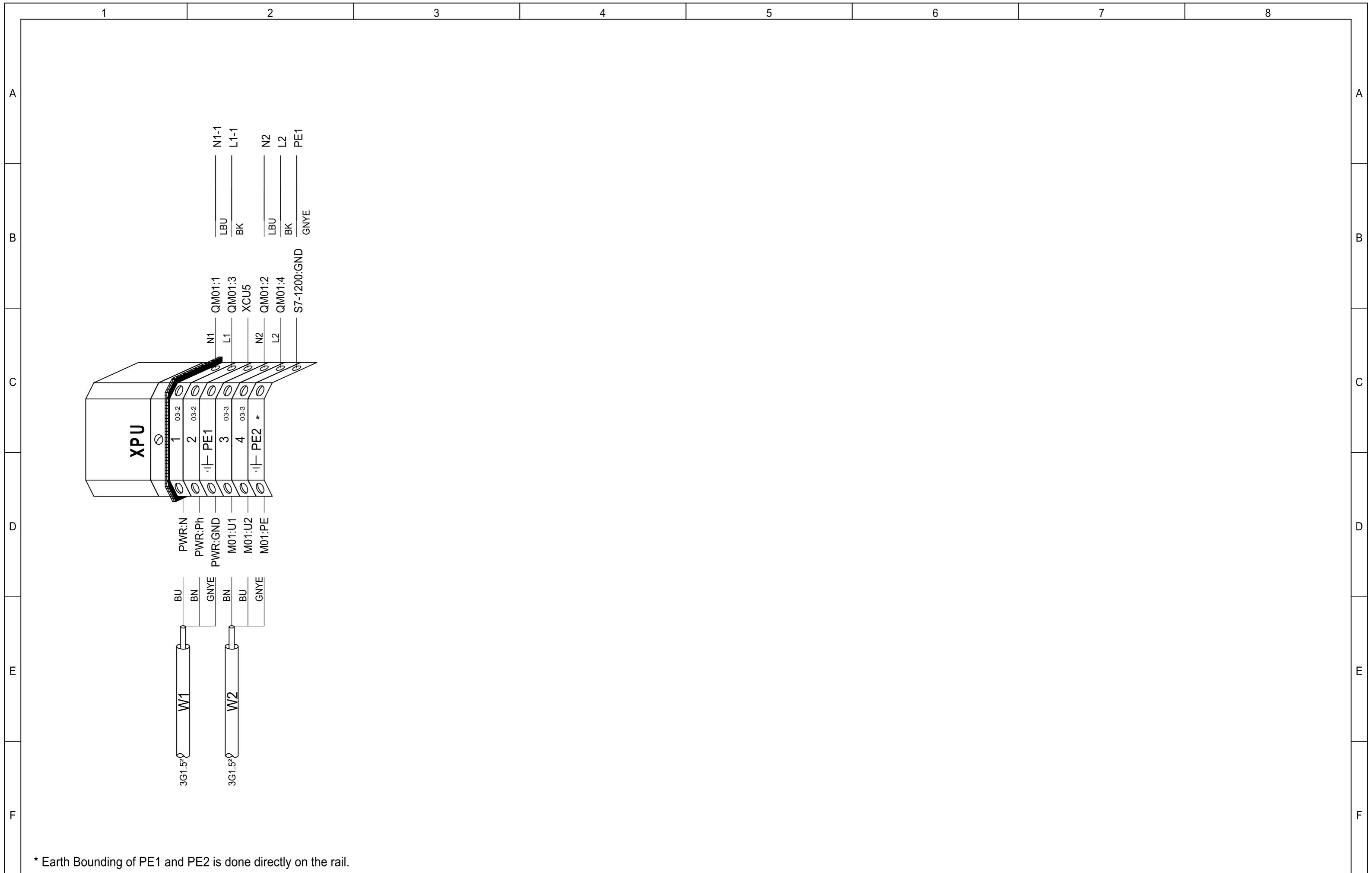
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

A

SPARE   SPARE

S7-1200   STATION: 4505XX-PLC-NNNN

B

X12b.0   X12b.1

C

D

E

F

DRAWN :		FJT	1.3	23/02/2018	Overall Update	FJT	ITER ORGANIZATION		CMU	SHEET
			1.2	24/11/2015	X4 & PT-100 Problems Solving	ASO				09
CHECKED :			1.1	18/11/2015		ASO			S7-1200 Outputs (2/2)	
DATE OF CREATION :			1.0	15/10/2015	First Issue	ASO	Document n° : ITER_D_QTD994			◄ 08 10 ►
15/10/2015			INDEX	DATE	MODIFICATION	DES.				

Front layout diagram: Monitoring Rack + Temperature Rack

Labels visible in diagram:
- 3U, 2U, 1U (rack unit markers)
- XPU
- QM01, QM02
- S7-1200
- QM03
- U01
- XCU
- 434 mm
- *Wireway behing in dashed line
- P01
- 1.2345
- PHŒNIX CONTACT
- R2
- 483 mm

* Earth Bounding of PE1 and PE2 is done directly on the rail.

DRAWN :	FJT	1.5	18/03/2021	Add Pin 3 commentary	Avellam
CHECKED :	GCO	1.4	15/05/2018	Circuit Breaker tags Update	FJT
		1.3	15/05/2018	Overall Update	FJT
DATE OF CREATION : 15/10/2015		INDEX	DATE	MODIFICATION	DES.

ITER ORGANIZATION

Document n° : **ITER_D_QTD994**

CMU
Terminal Strip: XPU
XPU - 1/1
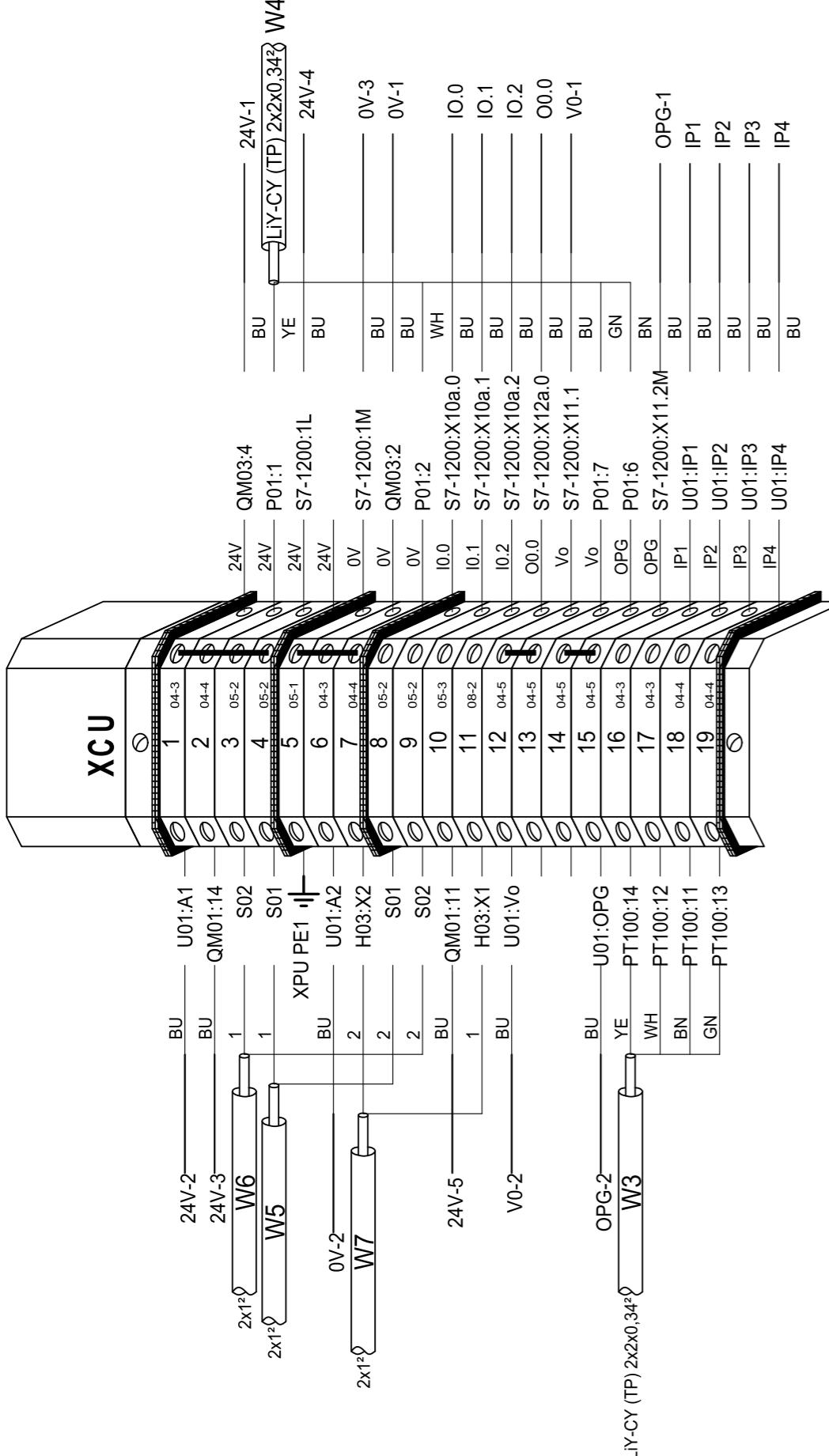
*XCU5-XPU PE1 : This connection is by default, remove it if the Plant System I&C require floating voltages.

DRAWN :	FJT	1.6	18/03/2021	Add ground and commentary	Avellam	ITER ORGANIZATION	CMU	SHEET
		1.5	09/07/2018	More details added on T.Blocks	FJT		Terminal Strip: XCU	12
CHECKED :	GCO	1.4	15/05/2018	Circuit Breaker tags Update	FJT			
		1.3	23/02/2018	Overall Update	FJT	Document n° : ITER_D_QTD994	XCU - 1/1	◄ 11 13 ►
DATE OF CREATION : 15/10/2015		INDEX	DATE	MODIFICATION	DES.			
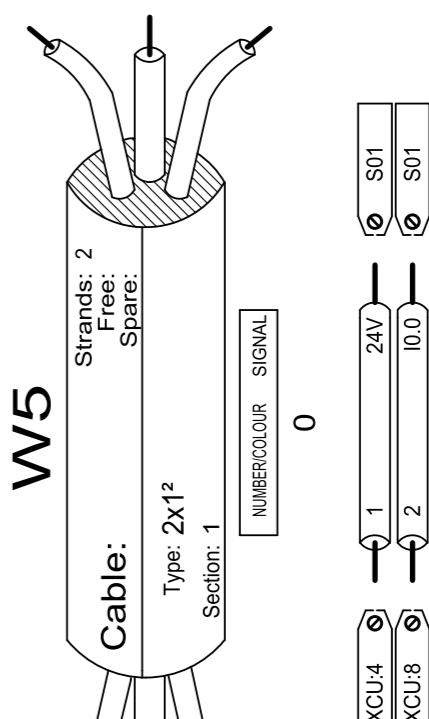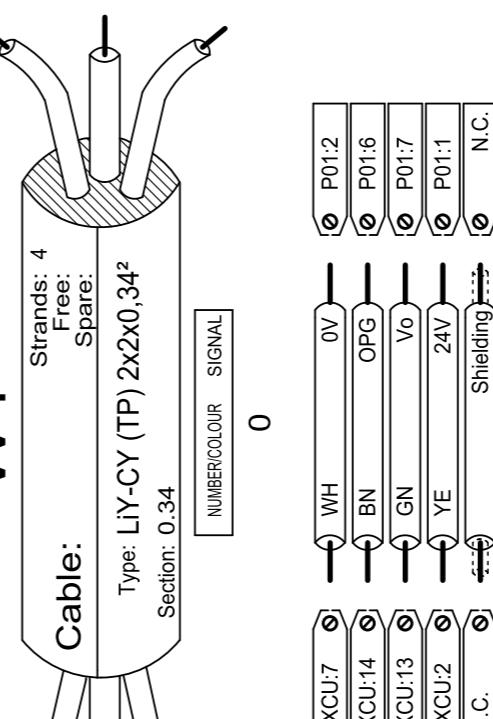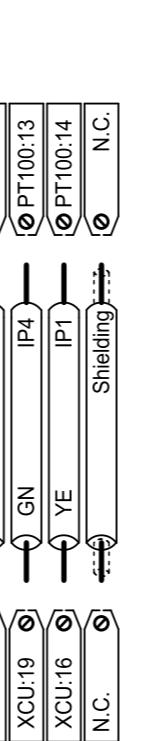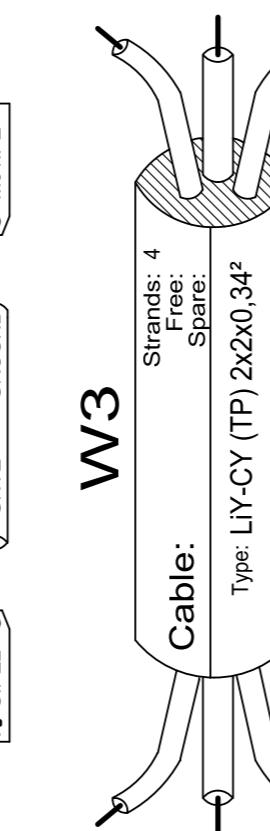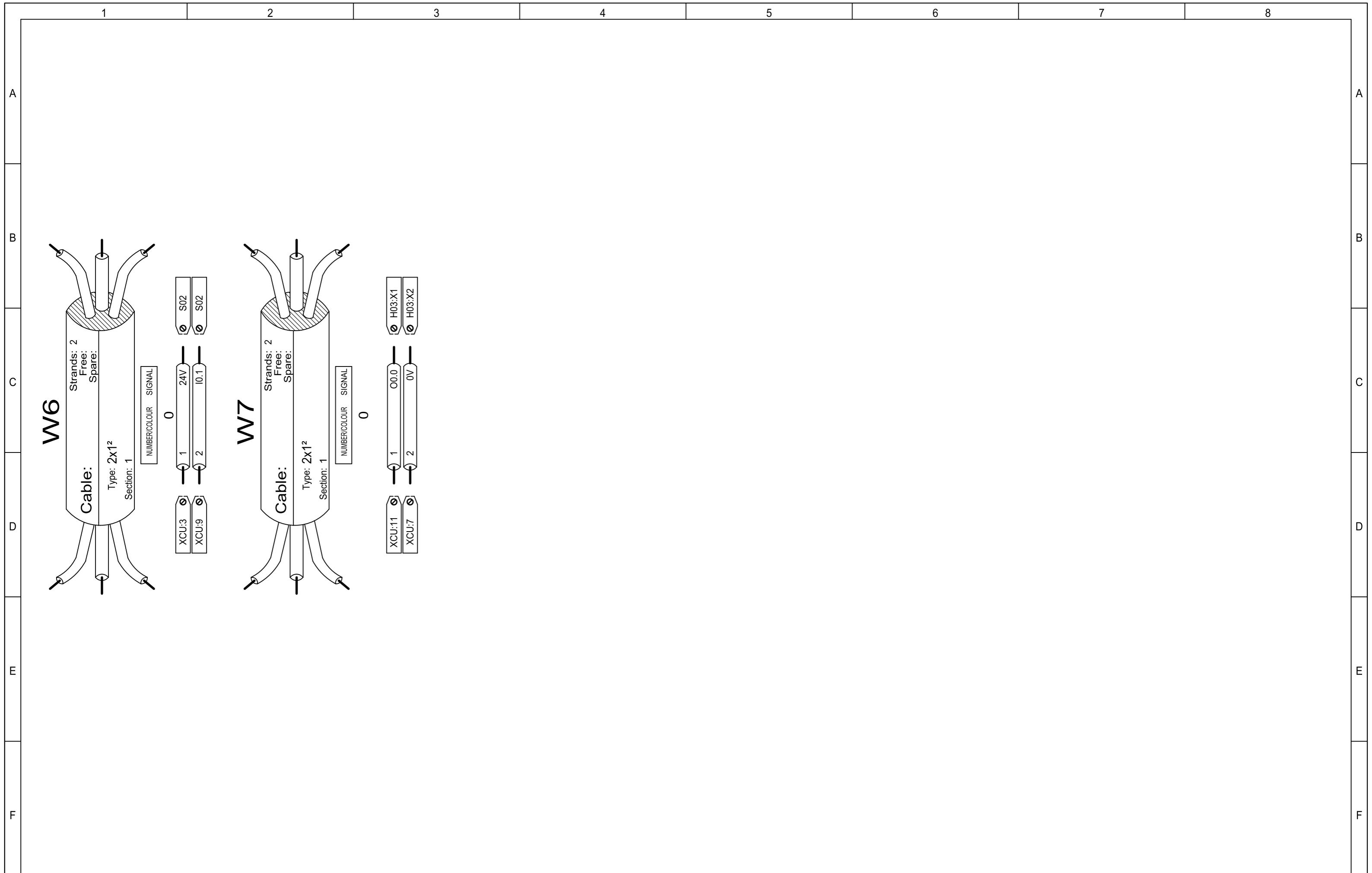
TAG	SHEET	DESCRIPTION	CATALOG No	MANUFACTURER	QTY
	10	ACCESSORIES, END BRACKET EW 35	038356	WEIDMULLER	1
EQ	10	Square 15x12.5	PP01800-A-001A	ECRIN Systems	1
G1	10	Wireway 40x40x398	PP01799-A-001A	ECRIN Systems	1
P01	04	MCR DIGITAL DISPLAY	2864011	PHOENIX CONTACT	1
QM01	03	ACTI 9 - AUXILIARY CONTACT IOF - 1 C/O - AC/DC	A9A26924	SCHNEIDER ELECTRIC	1
QM01	03	IC60N - MINIATURE CIRCUIT BREAKER - 2P - 2A - C CURVE	A9F74202	SCHNEIDER ELECTRIC	1
QM02	03	IC60N - MINIATURE CIRCUIT BREAKER - 2P - 2A - C CURVE	A9F74202	SCHNEIDER ELECTRIC	1
QM03	04	IC60N - MINIATURE CIRCUIT BREAKER - 2P - 2A - C CURVE	A9F74202	SCHNEIDER ELECTRIC	1
R1	10	TS35 Rail - 434mm	PP01798-A-001A	ECRIN Systems	1
R2	10	Display Rail 19"	PP-01797-A-001B	ECRIN Systems	1
RCK	10	Distributor 19"	PP01796-A-001B	ECRIN Systems	1
S7-1200	03	SIMATIC S7-1200, CPU 1214C, CPU COMPACT, 85-264VAC, 14I/10O TOR RELAY 2A, 2	6ES7214-1BG40-0XB0	SIEMENS	1
U01	04	TEMPERATURE TRANSMITTER - 0..100 °C/32..212 °F - FOR UNIVERSAL PT100 PROBES	RMPT30BD	SCHNEIDER ELECTRIC	1
XCU	12	ACCESSORIES, END BRACKET EW 35	038356	WEIDMULLER	2
XCU	12	CROSS-CONNECTION - ZQV 2.5/2	1608860000	WEIDMULLER	4
XCU	12	CROSS-CONNECTION - ZQV 2.5/3, SERIE Z,	1608870000	WEIDMULLER	2
XCU	12	CROSS-CONNECTION - ZQV 2.5/4, SERIE Z,	1608880000	WEIDMULLER	2
XCU	05	Z-ROOFSTYLE TERMINAL BLOCK - ZDU 2.5-2/3 AN, DARK BEIGE WEMID, 250V, 26-12A	1706010000	WEIDMULLER	38
XCU	08	Z-ROOFSTYLE TERMINAL BLOCK - ZDU 2.5-2/3 AN, DARK BEIGE WEMID, 250V, 26-12A	1706010000	WEIDMULLER	
XCU	04	Z-ROOFSTYLE TERMINAL BLOCK - ZDU 2.5-2/3 AN, DARK BEIGE WEMID, 250V, 26-12A	1706010000	WEIDMULLER	
XCU	12	Z-ROOFSTYLE TERMINAL BLOCK - ZDU 2.5-2/3 AN, DARK BEIGE WEMID, 250V, 26-12A	1706010000	WEIDMULLER	
XCU	12	END PLATE/PARTITION - ZAP/TW7, DARK BEIGE WEMID, THICKNESS 2.5MM,	1706110000	WEIDMULLER	4
XPU	11	ACCESSORIES, END BRACKET EW 35	038356	WEIDMULLER	1
XPU	03	Z-ROOFSTYLE TERMINAL BLOCK - ZDU 2.5-2/3 AN, DARK BEIGE WEMID, 250V, 26-12A	1706010000	WEIDMULLER	10
XPU	11	Z-ROOFSTYLE TERMINAL BLOCK - ZDU 2.5-2/3 AN, DARK BEIGE WEMID, 250V, 26-12A	1706010000	WEIDMULLER	
XPU	03	Z-ROOFSTYLE TERMINAL BLOCK - ZPE 2.5-2/3 AN, GREEN/YELLOW WEMID, 26-12AWG,	1706090000	WEIDMULLER	4
XPU	11	Z-ROOFSTYLE TERMINAL BLOCK - ZPE 2.5-2/3 AN, GREEN/YELLOW WEMID, 26-12AWG,	1706090000	WEIDMULLER	
XPU	11	END PLATE/PARTITION - ZAP/TW7, DARK BEIGE WEMID, THICKNESS 2.5MM,	1706110000	WEIDMULLER	1

W1

Cable:
Type: 3G1.5²
Section: 1.5
Strands: 3
Free:
Spare:

NUMBER|COLOUR — SIGNAL
0

SIGNAL	Terminal (top)	Terminal (bottom)
L1 — BN	PWR:Ph	XPU:2
N1 — BU	PWR:N	XPU:1
GROUND — GNYE	PWR:GND	PU:PE1

W2

Cable:
Type: 3G1.5²
Section: 1.5
Strands: 3
Free:
Spare:

NUMBER|COLOUR — SIGNAL
0

SIGNAL	Terminal (top)	Terminal (bottom)
N2 — BN	M01:U1	XPU:3
L2 — BU	M01:U2	XPU:4
GROUND — GNYE	M01:PE	PU:PE2

W3

Cable:
Type: LiY-CY (TP) 2x2x0,34²
Section: 0.34
Strands: 4
Free:
Spare:

NUMBER|COLOUR — SIGNAL
0

SIGNAL	Terminal (top)	Terminal (bottom)
IP2 — WH	PT100:12	XCU:17
IP3 — BN	PT100:11	XCU:18
IP4 — GN	PT100:13	XCU:19
IP1 — YE	PT100:14	XCU:16
Shielding	N.C.	N.C.

W4

Cable:
Type: LiY-CY (TP) 2x2x0,34²
Section: 0.34
Strands: 4
Free:
Spare:

NUMBER|COLOUR — SIGNAL
0

SIGNAL	Terminal (top)	Terminal (bottom)
0V — WH	P01:2	XCU:7
OPG — BN	P01:6	XCU:14
Vo — GN	P01:7	XCU:13
24V — YE	P01:1	XCU:2
Shielding	N.C.	N.C.

W5

Cable:
Type: 2x1²
Section: 1
Strands: 2
Free:
Spare:

NUMBER|COLOUR — SIGNAL
0

SIGNAL	Terminal (top)	Terminal (bottom)
24V — 1	S01	XCU:4
I0.0 — 2	S01	XCU:8

W6

Strands: 2
Free:
Spare:

Cable:

Type: 2x1²
Section: 1

NUMBER	COLOUR	SIGNAL
0		

S02
S02

24V
I0.1

1
2

XCU:3
XCU:9

W7

Strands: 2
Free:
Spare:

Cable:

Type: 2x1²
Section: 1

NUMBER	COLOUR	SIGNAL
0		

H03:X1
H03:X2

O0.0
0V

1
2

XCU:11
XCU:7