

[REDACTED]

1. Technology: Solar PV

2. Maximum Power: 100 kW

3. Contribution to fault levels: N/A

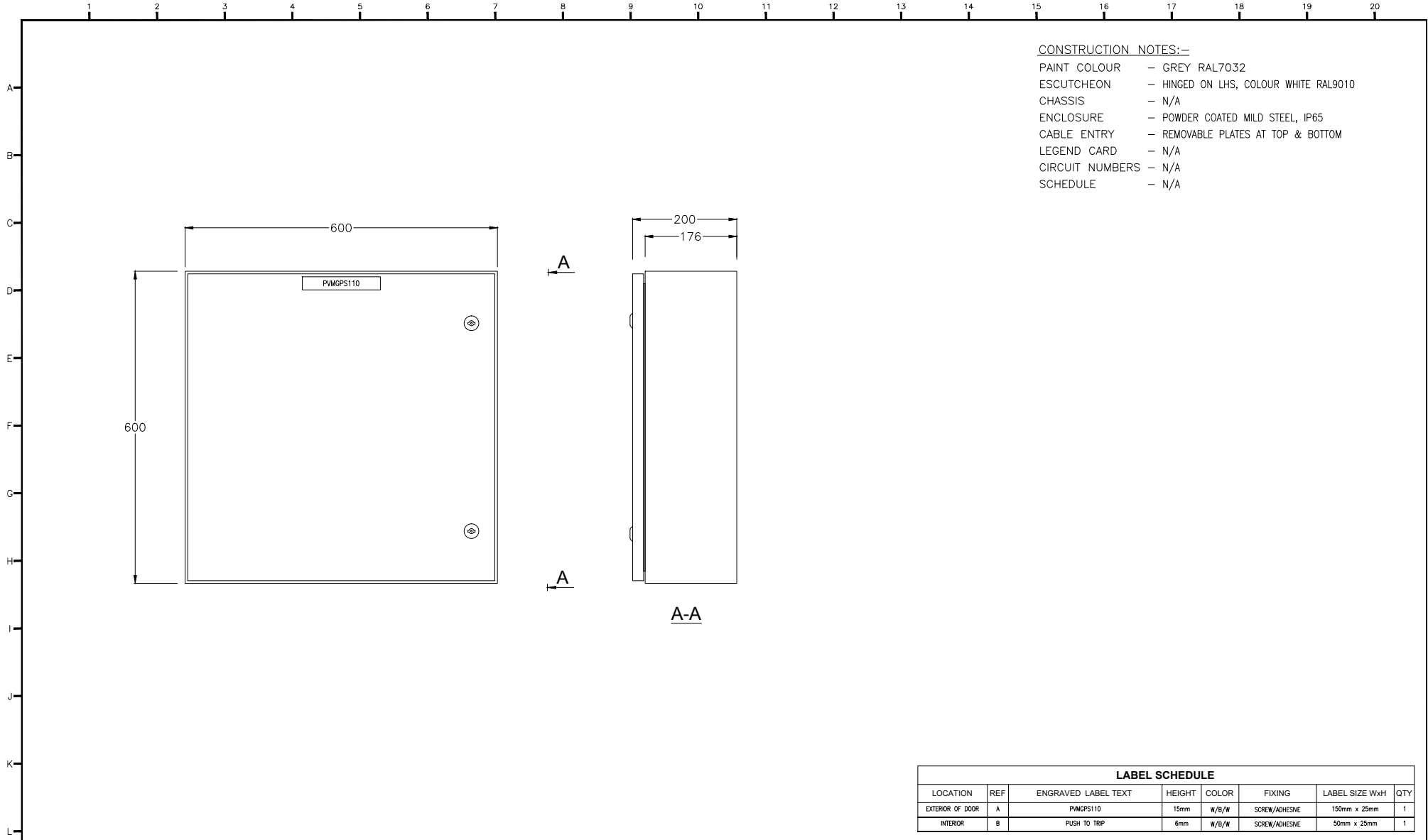
4. Size & rating of the relevant Transformer: N/A

5. Single line diagram: refer to following page

6. Protection Systems & Communication Systems: refer to following page

7. Voltage Control and reactive power capability: N/A


8. Details specific to the location of facility: N/A



- CONSTRUCTION NOTES:-**
- PAINT COLOUR - GREY RAL7032
  - ESCUTCHEON - HINGED ON LHS, COLOUR WHITE RAL9010
  - CHASSIS - N/A
  - ENCLOSURE - POWDER COATED MILD STEEL, IP65
  - CABLE ENTRY - REMOVABLE PLATES AT TOP & BOTTOM
  - LEGEND CARD - N/A
  - CIRCUIT NUMBERS - N/A
  - SCHEDULE - N/A

LABEL SCHEDULE							
LOCATION	REF	ENGRAVED LABEL TEXT	HEIGHT	COLOR	FIXING	LABEL SIZE WxH	QTY
EXTERIOR OF DOOR	A	PVMGPS110	15mm	W/B/W	SCREW/ADHESIVE	150mm x 25mm	1
INTERIOR	B	PUSH TO TRIP	6mm	W/B/W	SCREW/ADHESIVE	50mm x 25mm	1

REV:	DRAWN	CHECKED	APPROVED	DATE	REMARKS:	SHEET CONTENT:
0				16/09/13	INITIAL SUBMISSION	FRONT VIEW DOOR CLOSED
1				23/09/13	DISCONNECTED TYPE TERMINALS ARE ADDED & PANEL ID CHANGED	QUO.No : QNM64-R6
2				16/02/2014	ADDED TWO TERMINALS	W/O : DIMENSIONS IN MILLIMETRES
3				23/02/2015	CHANGED THE DRAWING NUMBER	S/O : 3RD ANGLE PROJECTION
						NOT TO SCALE
						DWG.REF. 9PV0014-010
						LAB : 7



**IPD GROUP LIMITED**

PROJECT:

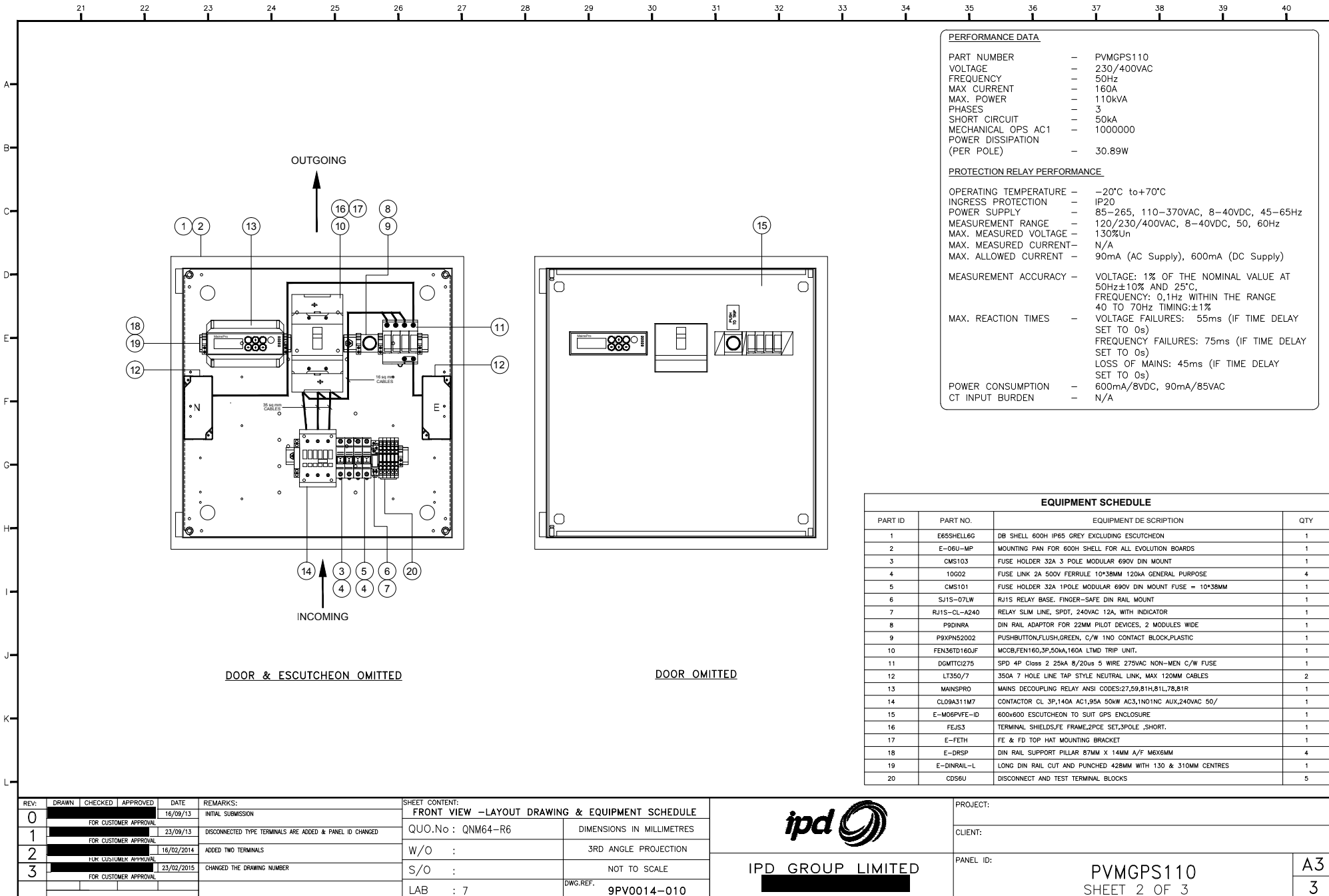
CLIENT:

PANEL ID: **PVMGPS110**

SHEET 1 OF 3

**A3**

**3**



PERFORMANCE DATA	
PART NUMBER	- PVMGPS110
VOLTAGE	- 230/400VAC
FREQUENCY	- 50Hz
MAX CURRENT	- 160A
MAX. POWER	- 110kVA
PHASES	- 3
SHORT CIRCUIT	- 50kA
MECHANICAL OPS AC1	- 1000000
POWER DISSIPATION (PER POLE)	- 30.89W
PROTECTION RELAY PERFORMANCE	
OPERATING TEMPERATURE	- -20°C to +70°C
INGRESS PROTECTION	- IP20
POWER SUPPLY	- 85-265, 110-370VAC, 8-40VDC, 45-65Hz
MEASUREMENT RANGE	- 120/230/400VAC, 8-40VDC, 50, 60Hz
MAX. MEASURED VOLTAGE	- 130%Un
MAX. MEASURED CURRENT	- N/A
MAX. ALLOWED CURRENT	- 90mA (AC Supply), 600mA (DC Supply)
MEASUREMENT ACCURACY	- VOLTAGE: 1% OF THE NOMINAL VALUE AT 50Hz±10% AND 25°C, FREQUENCY: 0.1Hz WITHIN THE RANGE 40 TO 70Hz TIMING:±1% SET TO 0s)
MAX. REACTION TIMES	- VOLTAGE FAILURES: 55ms (IF TIME DELAY SET TO 0s) FREQUENCY FAILURES: 75ms (IF TIME DELAY SET TO 0s) LOSS OF MAINS: 45ms (IF TIME DELAY SET TO 0s)
POWER CONSUMPTION	- 600mA/8VDC, 90mA/85VAC
CT INPUT BURDEN	- N/A

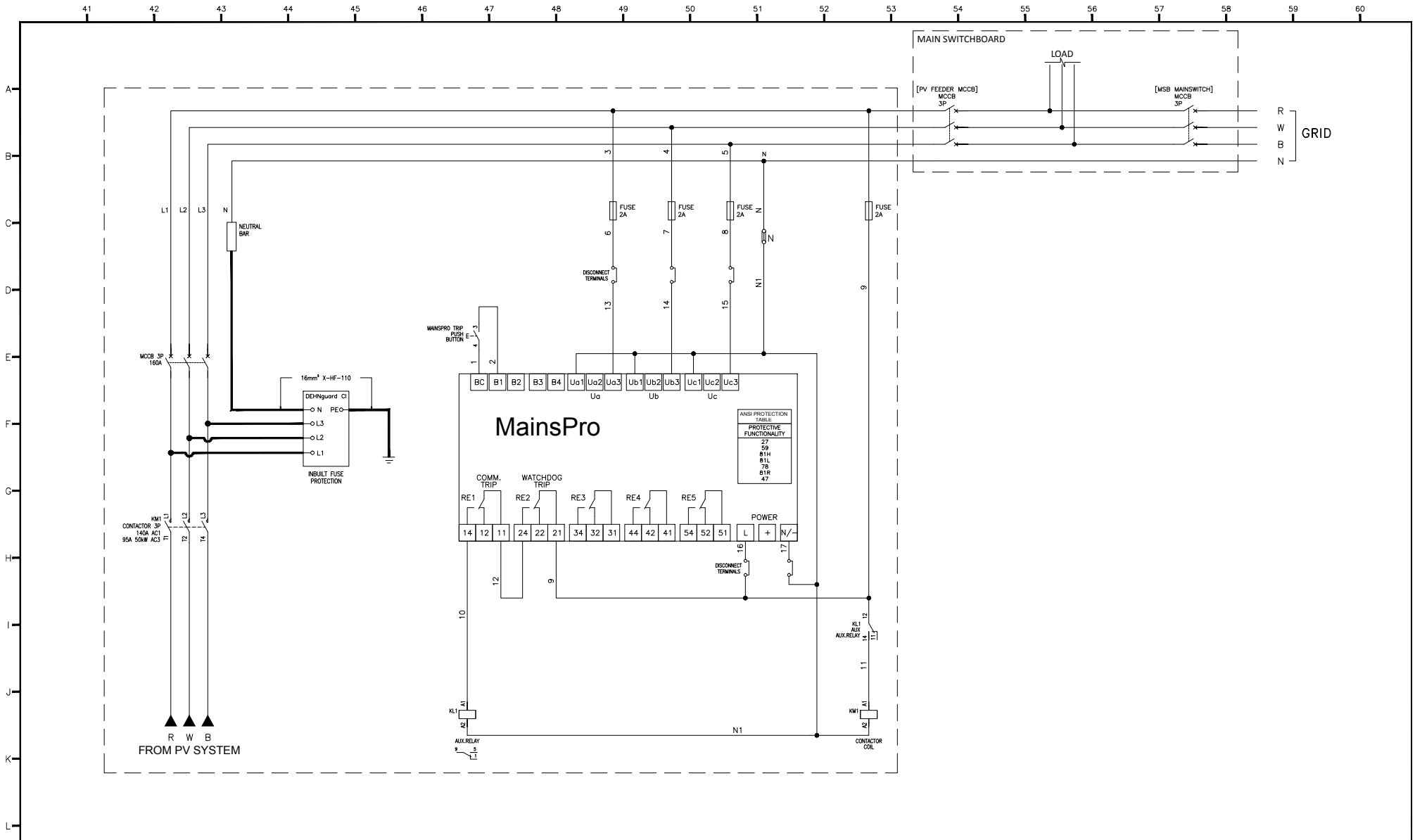
EQUIPMENT SCHEDULE			
PART ID	PART NO.	EQUIPMENT DESCRIPTION	QTY
1	E65SHELL6G	DB SHELL 600H IP65 GREY EXCLUDING ESCUTCHEON	1
2	E-06U-MP	MOUNTING PAN FOR 600H SHELL FOR ALL EVOLUTION BOARDS	1
3	CMS103	FUSE HOLDER 32A 3 POLE MODULAR 690V DIN MOUNT	1
4	10G02	FUSE LINK 2A 500V FERRULE 10*38MM 120KA GENERAL PURPOSE	4
5	CMS101	FUSE HOLDER 32A 1POLE MODULAR 690V DIN MOUNT FUSE = 10*38MM	1
6	SJ1S-07LW	RJ1S RELAY BASE, FINGER-SAFE DIN RAIL MOUNT	1
7	RJ1S-CL-A240	RELAY SLIM LINE, SPDT, 240VAC 12A, WITH INDICATOR	1
8	P9DINRA	DIN RAIL ADAPTOR FOR 22MM PILOT DEVICES, 2 MODULES WIDE	1
9	P9XPN52002	PUSHBUTTON,FLUSH,GREEN, C/W 1NO CONTACT BLOCK,PLASTIC	1
10	FEN36TD160JF	MCCB,FEN160,3P,50KA,160A LTMD TRIP UNIT.	1
11	DGMTIC275	SPD 4P Class 2 25kA 8/20us 5 WIRE 275VAC NON-MEN C/W FUSE	1
12	LT350/7	350A 7 HOLE LINE TAP STYLE NEUTRAL LINK, MAX 120MM CABLES	2
13	MAINSPRO	MAINS DECOUPLING RELAY ANSI CODES:27,59,81H,81L,78,81R	1
14	CLO9A311M7	CONTACTOR CL 3P,140A AC1,95A 50KW AC3,1NO1NC AUX,240VAC 50/	1
15	E-MO6PVFE-ID	600x600 ESCUTCHEON TO SUIT GPS ENCLOSURE	1
16	FEJ53	TERMINAL SHIELDS,FE FRAME,2PCE SET,3POLE ,SHORT.	1
17	E-FETH	FE & FD TOP HAT MOUNTING BRACKET	1
18	E-DRSP	DIN RAIL SUPPORT PILLAR 87MM x 14MM A/F M6X6MM	4
19	E-DINRAIL-L	LONG DIN RAIL CUT AND PUNCHED 428MM WITH 130 & 310MM CENTRES	1
20	CDS6U	DISCONNECT AND TEST TERMINAL BLOCKS	5

REV:	DRAWN	CHECKED	APPROVED	DATE	REMARKS:
0				16/09/13	INITIAL SUBMISSION
1				23/09/13	DISCONNECTED TYPE TERMINALS ARE ADDED & PANEL ID CHANGED
2				16/02/2014	ADDED TWO TERMINALS
3				23/02/2015	CHANGED THE DRAWING NUMBER

SHEET CONTENT:	
FRONT VIEW -LAYOUT DRAWING & EQUIPMENT SCHEDULE	
QUO.No :	QNM64-R6
W/O :	3RD ANGLE PROJECTION
S/O :	NOT TO SCALE
LAB :	7
DWG.REF.	9PV0014-010

  
**IPD GROUP LIMITED**  


PROJECT:	
CLIENT:	
PANEL ID:	PVMGPS110 SHEET 2 OF 3
	A3 3

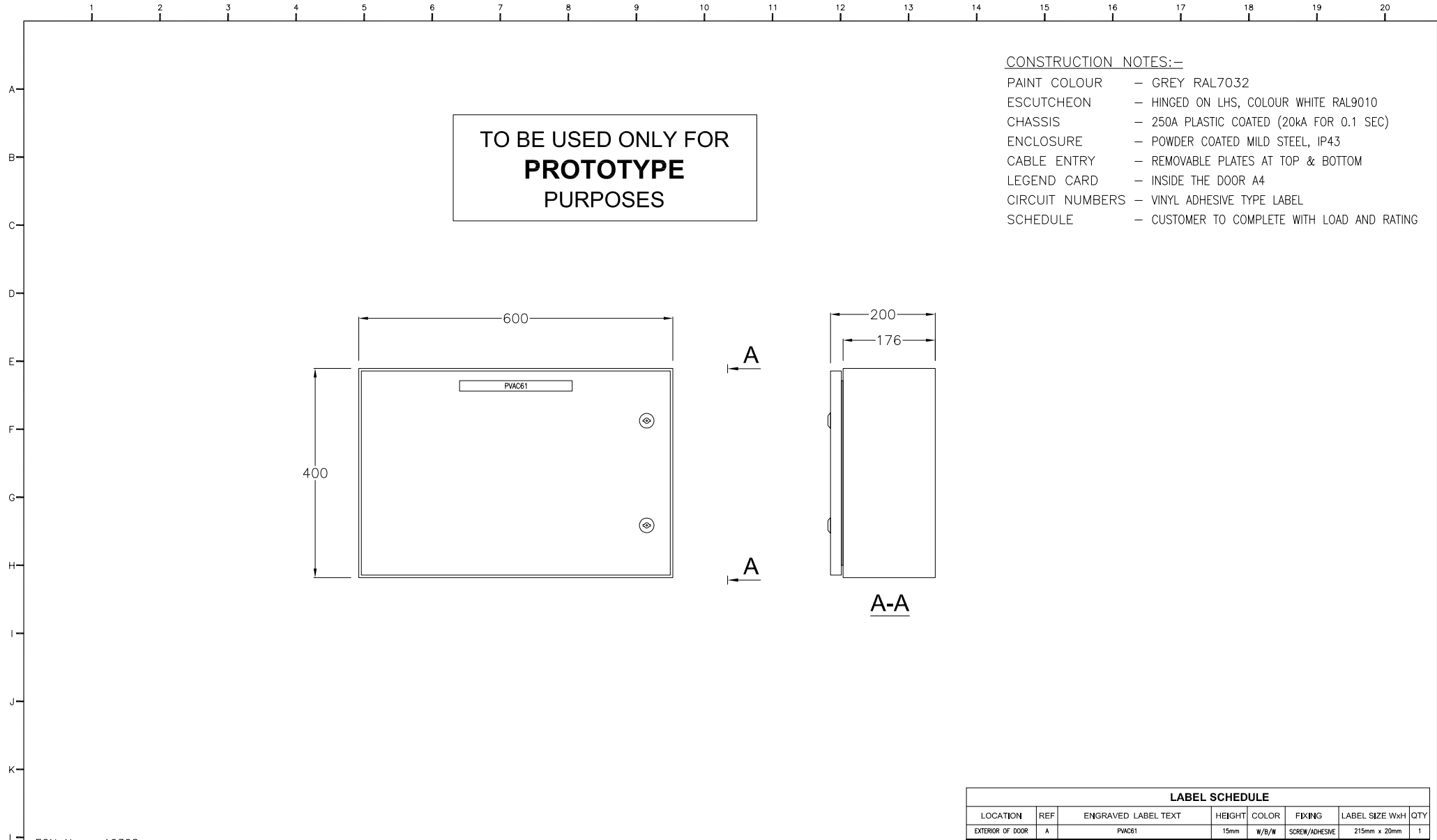


REV:	DRAWN	CHECKED	APPROVED	DATE	REMARKS:
0				16/09/13	INITIAL SUBMISSION
1				23/09/13	DISCONNECTED TYPE TERMINALS ARE ADDED & PANEL ID CHANGED
2				16/02/2014	ADDED TWO TERMINALS
3				23/02/2015	CHANGED THE DRAWING NUMBER

SHEET CONTENT:	
<b>CONTROL CIRCUIT DIAGRAM</b>	
QUO.No :	QNM64-R6
W/O :	DIMENSIONS IN MILLIMETRES
S/O :	3RD ANGLE PROJECTION
LAB :	7
DWG.REF.	NOT TO SCALE
	9PV0014-010

  
**IPD GROUP LIMITED**  
 [Redacted]

PROJECT:	
CLIENT:	
PANEL ID:	PVMGPS110
	SHEET 3 OF 3
	A3 3



- CONSTRUCTION NOTES:-**
- PAINT COLOUR – GREY RAL7032
  - ESCUTCHEON – HINGED ON LHS, COLOUR WHITE RAL9010
  - CHASSIS – 250A PLASTIC COATED (20kA FOR 0.1 SEC)
  - ENCLOSURE – POWDER COATED MILD STEEL, IP43
  - CABLE ENTRY – REMOVABLE PLATES AT TOP & BOTTOM
  - LEGEND CARD – INSIDE THE DOOR A4
  - CIRCUIT NUMBERS – VINYL ADHESIVE TYPE LABEL
  - SCHEDULE – CUSTOMER TO COMPLETE WITH LOAD AND RATING

LABEL SCHEDULE							
LOCATION	REF	ENGRAVED LABEL TEXT	HEIGHT	COLOR	FIXING	LABEL SIZE WxH	QTY
EXTERIOR OF DOOR	A	PVAC61	15mm	W/B/W	SCREW/ADHESIVE	215mm x 20mm	1

ECN No – 10308

REV:	DRAWN	CHECKED	APPROVED	DATE	REMARKS:	SHEET CONTENT:
0				05/12/2014	INITIAL SUBMISSION	FRONT VIEW DOOR CLOSED
1				16/12/2014	AMENDED AS PER MARKED-UP DRAWING	QUO.No : QNM130
						DIMENSIONS IN MILLIMETRES
						W/O : 3RD ANGLE PROJECTION
						S/O : – NOT TO SCALE
						DWG.REF. 9PV0013-010
						LAB : 1



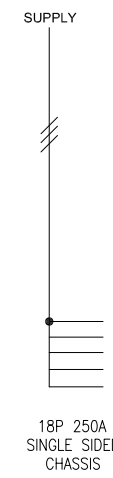
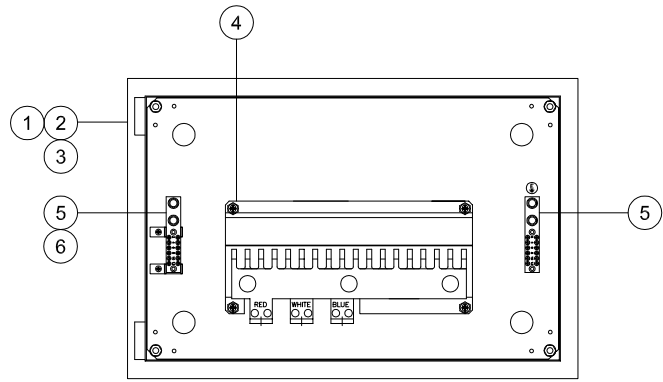
**IPD GROUP LIMITED**

PROJECT:	AC COMBINER BOX 6 IN 1 OUT	
CLIENT:	IPD SALEABLE PRODUCT	
PANEL ID:	PVAC61	A3
	SHEET 1 OF 2	0

21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

A  
B  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L

TO BE USED ONLY FOR  
**PROTOTYPE**  
PURPOSES



SINGLE LINE DIAGRAM

EQUIPMENT SCHEDULE			
PART ID	PART NO.	EQUIPMENT DESCRIPTION	QTY
1	E65SHELL4G	DB SHELL 400H IP65 GREY EXCLUDING ESCUTCHEON	1
2	E-04U-MP	MOUNTING PAN FOR 400H SHELL FOR ALL EVOLUTION HEADER BOXES	1
3	E-04S-ID	ESCUTCHEON FOR 400H SHELL STANDARD CUTOUT DIN HEADER BOX	1
4	GE18AC-3P	18P SINGLE SIDED CHASSIS	1
5	EB6	EARTH BAR 6 WAY LENGTH = 101mm	2
6	NLSB	NEUTRAL LINK SUPPORT (2 BLOCKS, 2 SCREWS)	1

CIRCUIT SCHEDULE			
POLE NO.	RATING	PART NUMBER	CIRCUIT DESCRIPTION
R	1		
W	2		
B	3		
R	4		
W	5		
B	6		
R	7		
W	8		
B	9		
R	10		
W	11		
B	12		
R	13		
W	14		
B	15		
R	16		
W	17		
B	18		

REV.	DRAWN	CHECKED	APPROVED	DATE	REMARKS:
0				05/12/2014	INITIAL SUBMISSION
1				16/12/2014	AMENDED AS PER MARKED-UP DRAWING

SHEET CONTENT:	
DOOR & ESCUTCHEON REMOVED, EQUIPMENT SCHEDULE	
QUO.No : QNM130	DIMENSIONS IN MILLIMETRES
W/O :	3RD ANGLE PROJECTION
S/O : -	NOT TO SCALE
LAB : 1	DWG.REF. 9PV0013-010

  
**IPD GROUP LIMITED**  


PROJECT:	AC COMBINER BOX 6 IN 1 OUT	
CLIENT:	IPD SALEABLE PRODUCT	
PANEL ID:	PVAC61	A3
	SHEET 2 OF 2	0

# MainsPro

## MAINS DECOUPLING RELAY



### Efficient installation:

- ▶ Flexible supply voltage and measurement range
- ▶ Suitable for standard DIN rail installation or panel-mount (optional)
- ▶ Friendly interface with easy setting of values
- ▶ Compact design allows installation into restricted spaces
- ▶ Simple wiring with detachable connectors
- ▶ Increased efficiency of commissioning tests
- ▶ Integrated mechanical lock to secure your setting

**Are you generating power in parallel to the mains?**

**You will need 'loss of mains' protection.**

**Essential to avoid supplying your electricity into an islanded grid, leading to possible equipment damage or safety issues.**

The solution is MainsPro, the new microprocessor based mains decoupling relay from ComAp, which offers unequalled mains protection for a wide range of mains connected applications. These include generator sets and renewable energy sources such as photovoltaic plants, wind turbine and other forms of micro cogeneration.

With MainsPro, no special knowledge is needed for installation and no additional units are required, making the ideal solution for both untrained personnel and professionals alike. The unit is designed to fully comply with Utilities' connexion requirements and statutory codes, offering a high level of protection and safety when working in parallel to the mains.

**Reduces your costs for installation and commissioning workload expenses.**



ComAp is a member of AMPS  
(The Association of Manufacturers  
of Power generating Systems).



ComAp products meet the highest standards, with every stage of production undertaken in accordance with the ISO certification obtained in 1998.

**DESIGNED TO COMPLY: IEC 602 55 • G59 and G59/2 • UL • VDE-V-0126-1-1 • IEn NR 005/2012**

**ANSI****Protective functionality****27**

Undervoltage

**59**

Overvoltage

**81H**

Overfrequency

**81L**

Underfrequency

**78**

Vector shift

**81R**

Rate of change of frequency + ROCOF filter

**47**

Voltage asymmetry

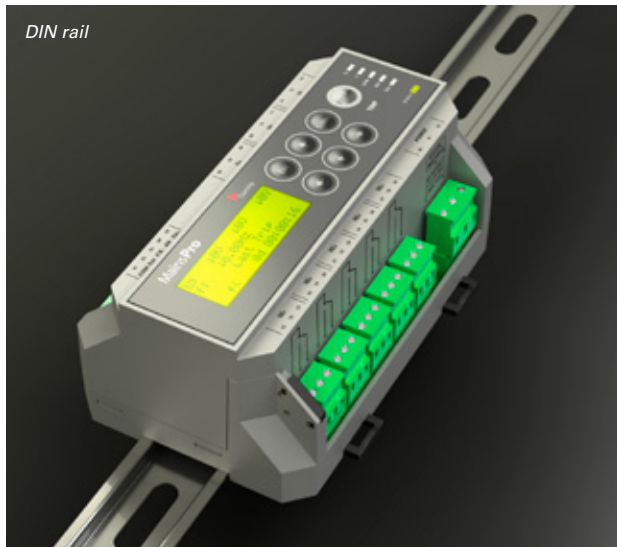
Positive sequence undervoltage

Negative sequence overvoltage

Phase sequence supervision

Binary switches: Ext. trip, Fault reset, Activate/  
de-activate, Alternative parameters

10 minute floating average overvoltage

**Technical information:**

- ▶ **True RMS** measurement for increased accuracy, reliable evaluation of failures
- ▶ **Vector Shift** and **Rate of change of frequency (ROCOF)** protections available in one unit to choose the best fit to secure your site
- ▶ Symmetrical components for better detection of **voltage asymmetry** failures
- ▶ **Two stage settings** of voltage and frequency protections to cover short term as well as long term disturbances with appropriate priority
- ▶ Free assignment of **5 relay outputs** allows wide range of signaling and trip methods
- ▶ **4 binary switches** to remotely change operation of the unit
- ▶ Adjustable time delay of **Automatic fault reset** to avoid necessity of on-site personnel
- ▶ **Universal power supply** 8-40 VDC, 85-265 VAC, 110-370 VDC
- ▶ Selectable voltage range 120/230/400 VAC with over-range to 156/290/520 VAC makes the unit **independent on application**
- ▶ Supports **3-phase and 1-phase** applications
- ▶ **Last trip recorded** in order to provide the evidence of cause of trip



MANUFACTURER:



LOCAL DISTRIBUTOR / PARTNER:

[www.comap.cz/distributors](http://www.comap.cz/distributors)**Customer satisfaction is our mission. We continuously develop the best people to succeed in our mission.**



**ComAp MAINSPRO RELAY SETTINGS**

SETTING - PARAMETER	SETPOINT GROUP	SETPOINT NAME	DEFAULT VALUE	STEP	UNIT	SET VALUE
Overvoltage Limit 1	V<>	V>	264	1	[V]	260
Overvoltage Delay 1	V<>	V> Del	1	0.01	[s]	2
Overvoltage Limit 2	V<>	V>>	276	1	[V]	264
Overvoltage Delay 2	V<>	V>> Del	2.5	0.01	[s]	2
Undervoltage Limit 1	V<>	V<	209	1	[V]	209
Undervoltage Delay 1	V<>	V< Del	2.5	0.01	[V]	2
Undervoltage Limit 2	V<>	V<<	192	1	[s]	200
Undervoltage Delay 2	V<>	V<< Del	0.5	0.01	[V]	2
10min Floating Average Overvoltage	V<>	Avg V>	0 (OFF)	1	[s]	0 (OFF)
Overvoltage Hysteresis	V<>	RstV>, RstV>>	100	1	[%]	100
Undervoltage Hysteresis	V<>	RstV<, RstV<<	100	1	[%]	100
Voltage Asymmetry Limit	dU	Vunb	0 (OFF)	0.1	[%]	0 (OFF)
Negative Sequence Overvoltage Limit	dU	V> neg	0 (OFF)	0.1	[%]	0 (OFF)
Positive Sequence Undervoltage Limit	dU	V< pos	0 (OFF)	0.1	[%]	0 (OFF)
Common Delay of all Voltage Asymmetry Protections	dU	dU Del	2.5	0.01	[s]	2.5
Overfrequency Limit 1	f<>	f>	51.5	0.1	[Hz]	51.5
Overfrequency Delay 1	f<>	f> Del	90	0.01	[s]	2
Overfrequency Limit 2	f<>	f>>	52	0.1	[Hz]	52
Overfrequency Delay 2	f<>	f>> Del	0.5	0.01	[s]	2
Underfrequency Limit 1	f<>	f<	47.5	0.1	[Hz]	48.5
Underfrequency Delay 1	f<>	f< Del	20	0.01	[s]	2
Underfrequency Limit 2	f<>	f<<	47	0.1	[Hz]	48
Underfrequency Delay 2	f<>	f<< Del	0.5	0.01	[s]	2
Overfrequency Hysteresis	f<>	Rstf>, Rstf>>	100	0.1	[%]	100
Underfrequency Hysteresis	f<>	Rstf<, Rstf<<	100	0.1	[%]	100
Vector Shift Limit	LOM	Vs Lim	6	1	[Deg]	8
RoCof Limit	LOM	RoCoF	0 (OFF)	0.01	[Hz/s]	1
Rocof Filter	LOM	RoCoF Filt	5	1	[s]	5
Delay of Vector Shift & RoCoF Evalat. After Measured Voltage Connection	LOM	LOM Init Del	3	1	[s]	3
Vector Shift & RoCoF Signalisation Time (Trip Duration)	LOM	LOM Init Del	3	1	[s]	3
Measurement Range	Basic	Uin	230	-	[V]	230
Measured System	Basic	System	3ph	-	-	3ph
Display Timeout	Basic	DispT	0	1	[min]	0
Automatic Fault Reset Enabling	Basic	Auto FR	enabled	-	-	enabled
Automatic Fault Reset Timer	Basic	Auto FR Del	0	1	[s]	60
Trip at the Unit Startup	Basic	Start Trip	disabled	-	-	enabled
Common Impulse Length	Basic	Imp Len	3	1	[s]	3
Back-up Trip Output Delay	Basic	Bak Trp Del	0.5	0.1	[s]	0.5
Enabling the External Binary Switch	Basic	Ext	enabled	-	-	enabled
Enabling the Fault Reset Binary Switch	Basic	F.R.	disabled	-	-	disabled
Common Impulse Length	Basic	Alt	enabled	-	-	enabled
Back-up Trip Output Delay	Basic	Dis	disabled	-	-	disabled
Function of 1st Relay Output	f(RE)	f(RE1)	!CommTrpPer	-	-	!CommTrpPer
Function of 2nd Relay Output	f(RE)	f(RE2)	CommTrpImp	-	-	!InternFail
Function of 3rd Relay Output	f(RE)	f(RE3)	BakTrpImp	-	-	
Function of 4th Relay Output	f(RE)	f(RE4)	!InternFail	-	-	
Function of 5th Relay Outout	f(RE)	f(RE5)	TrpEndImp	-	-	

### REQUIREMENTS

#### NS194 (>30kW)

5.4	under voltage	200Vph (2s max)
5.4	over voltage	270Vph (2s max)
5.5	under frequency	48Hz (2s max)
5.5	over frequency	52Hz (2s max)
5.8	Vector Shift	8-12 deg
5.8	ROCOF	1Hz/sec

#### AS4777.3 (<30kW)

5.3(a)	under voltage	200Vph (2s max)
5.3(b)	over voltage	270Vph (2s max)
5.3(c)	under frequency	45Hz (2s max)
5.3(d)	over frequency	55Hz (2s max)
5.5	active anti islanding	2s max

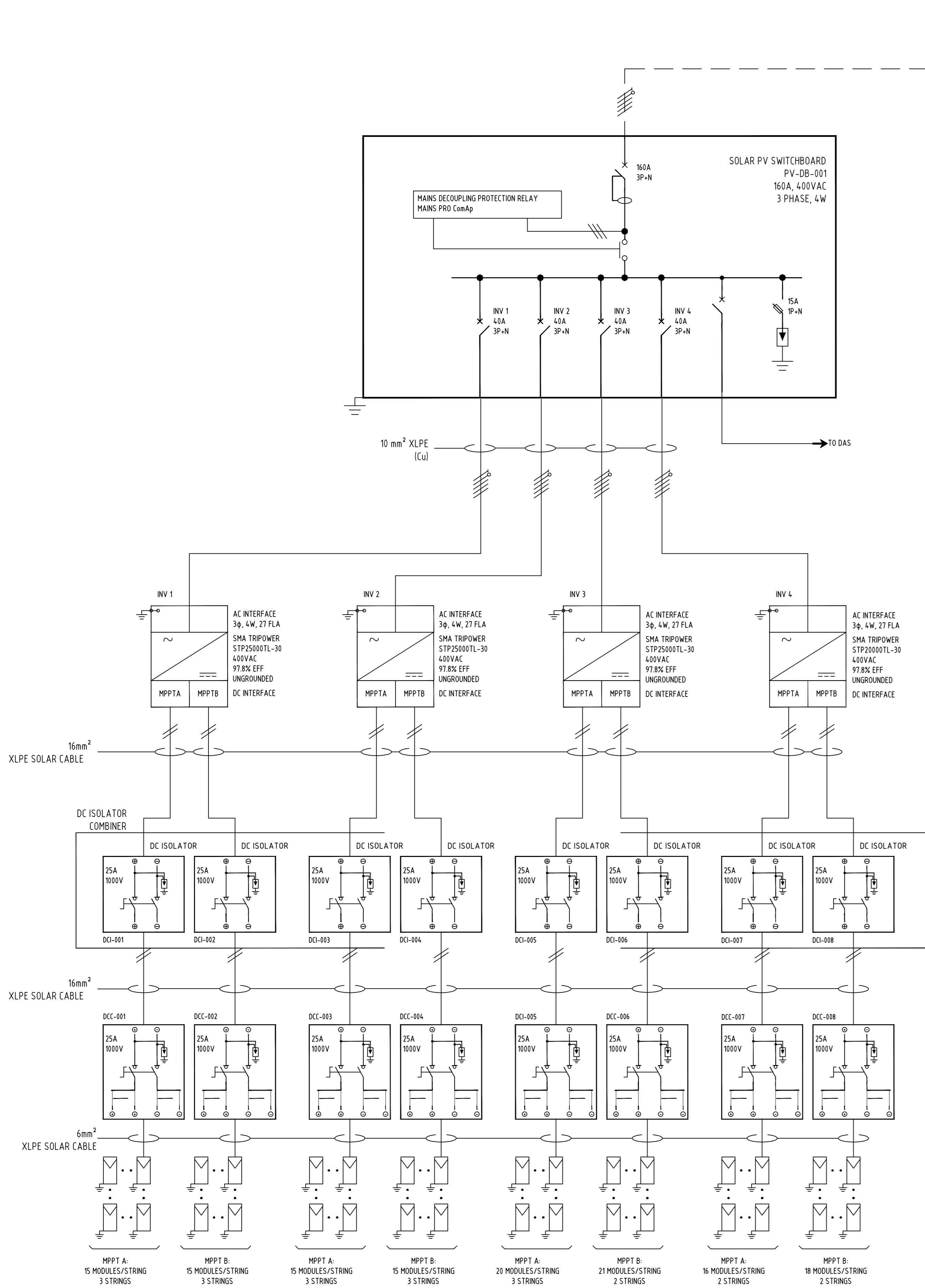
### PROTECTION SETTINGS

LEVEL	PRIMARY
DEVICE	SMA STP25000TL-30

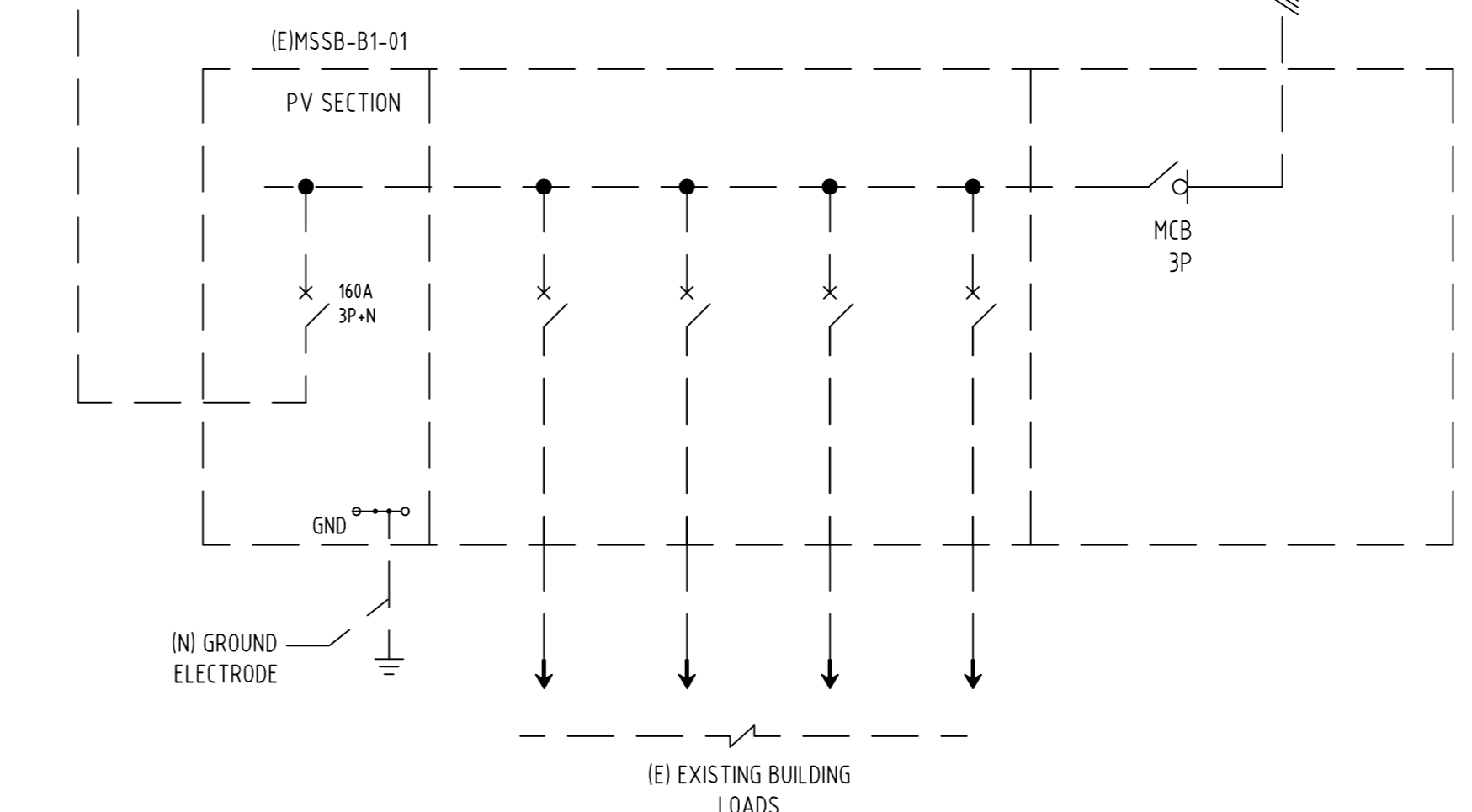
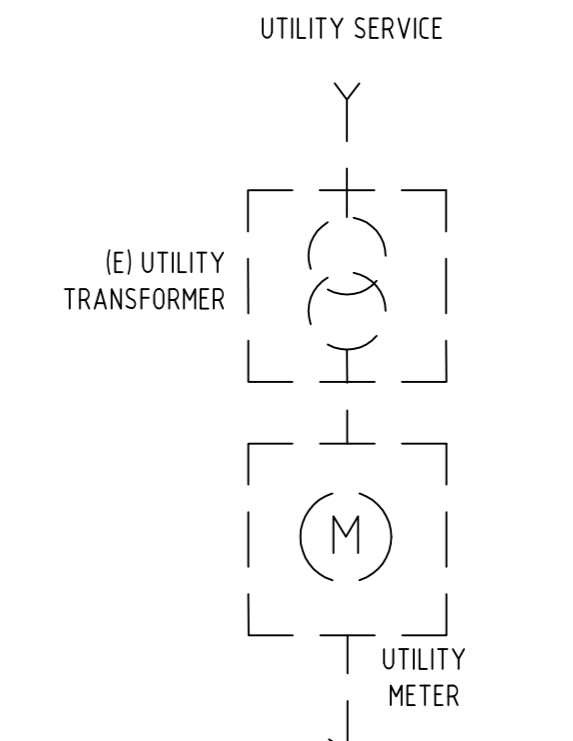
VARIABLE	PROPOSED SETPOINT
under voltage limit (Vph)	200
under voltage delay (s)	2
over voltage limit (Vph)	270
over voltage delay (s)	2
under frequency limit (Hz)	48
under frequency delay (s)	2
over frequency limit (Hz)	52
over frequency delay (s)	2
vector shift limit (degrees)	8
RoCoF limit (Hz/sec)	1
LoM trip delay (s)	2

LEVEL	SECONDARY
DEVICE	CDA MAINSPRO 1.5

VARIABLE	PROPOSED SETPOINT
under voltage limit (Vph)	200
under voltage delay (s)	2
over voltage limit (Vph)	264
over voltage delay (s)	2
under frequency limit (Hz)	48
under frequency delay (s)	2
over frequency limit (Hz)	50.7
over frequency delay (s)	2
vector shift limit (degrees)	8
RoCoF limit (Hz/sec)	1
LoM trip delay (s)	3



NOTE:  
MAIN SWITCHBOARD INFORMATION AND TIE-IN CONNECTION ARE TO BE  
DEFINED BY ????????



VOLTAGE RISE CALCULATION

TYPE	SIZE	LENGTH	AM%VD	VD
SERVICE MAINS	185MM2	15M	15326	0.53869
SUBMAINS	70MM2	40M	6712	3.28010
FINAL SUB CIRCUIT	10MM2	5M	1034	0.69632

SYSTEM CONFIGURATION					
BUILDING	LEVEL	(#) INVERTER TYPE	STRING CONFIGURATION	NO. OF MODULES	DC POWER (kWp)
B1	4	(1) SMA TRIPOWER STP25000TL-30	MPPT1: 3 x 15 MODULES	45	25.650
			MPPT2: 3 x 15 MODULES	45	
		(2) SMA TRIPOWER STP25000TL-30	MPPT1: 3 x 15 MODULES	45	25.650
			MPPT2: 3 x 15 MODULES	45	
B2	4	(3) SMA TRIPOWER STP25000TL-30	MPPT1: 3 x 20 MODULES	60	29.070
			MPPT2: 2 x 21 MODULES	42	
B3	4	(4) SMA TRIPOWER STP20000TL-30	MPPT1: 2 x 16 MODULES	32	19.380
			MPPT2: 2 x 18 MODULES	36	
TOTAL		4		350	99.7500

- NOTES:
- THE INSTALLATION SHALL BE DONE BY A LICENSED ELECTRICAL CONTRACTOR AS PER RELEVANT AUSTRALIAN STANDARDS AND UTILITY/OFFICE OF ENERGY REQUIREMENTS.
  - THE CABLES/SWITCHES SHALL BE DESIGNED AND INSTALLED AS PER RELEVANT AUSTRALIAN STANDARDS.
  - ALL THE SAFETY RELATED ISSUES SHALL BE ADDRESSED AS PER RELEVANT AUSTRALIAN STANDARDS.
  - EACH INVERTER TO BE PARALLELED INTERNALLY SHALL BE ACCDG TO SMA AUSTRALIA INSTALLATION GUIDE.



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REV.	DESCRIPTION	DRAWN	APPD	Date
A	ISSUED FOR APPROVAL			04/04/16

PROJECT:  
[Redacted]

TITLE:  
SOLAR PV SERVICES  
PV SYSTEM - SINGLE LINE DIAGRAM

**PRELIMINARY DESIGN**  
**NOT FOR CONSTRUCTION**

DESIGN	VERIFIED	DATE
[Redacted]	-	//
DRAWN	APPROVED FOR CHECK	DATE
[Redacted]	-	07/03/16
SCALE	APPROVED FOR CONSTRUCTION	DATE
-	-	//

DRAWING NO. **2016\_04\_04\_13052\_L-1.1** Revision **01**