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Amara Raja Power Systems Limited, Tirupati

DRAWINGS

FOR

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APPROVAL

RATING : **220VDC/22A FLOAT CHARGER AND 220VDC/25A FLOAT CUM BOOST CHARGER WITH DC DISTRIBUTION BOARD (Suitable for 220V/200AH VRLA/NVRLA Battery of 110 Cells)**

CUSTOMER : **M/s APTRANSCO**

PROJECT : **As Applicable to M/s APTRANSCO**

P. O. NO. : **As Applicable**

SAP. NO. : **--**

Line. NO. : **--**

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Manufacturer : **AMARA RAJA POWER SYSTEMS LIMITED**
Renigunta - Kadapa Road, Karakambadi – 517520
Tirupati, Andhra Pradesh, India
Ph:0877-2265000

REV.0

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SPECIAL NOTE

DRAWINGS/DOCUMENTS MAY UNDERGO FEW CHANGES/ MODIFICATIONS DURING DETAILED ENGINEERING STAGE WHICH DOESN'T AFFECT THE CUSTOMER REQUIREMENT

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GENERAL DESCRIPTION

The Battery Charger is for charging the Battery in various modes and at the same time to meet the Load requirement. The system consists of two Battery Chargers (Float and Float cum Boost Chargers) with interlocking contactor circuit. Each Battery Charger consists of Double Wound Charger Input Transformer, Rectifier Bridge Circuit, Filter Circuit, Common Alarm Indicator and Interlocking Circuit.

During normal operation, the Mode Selector Switch remains in AUTO position where the Float Charger Supplies Load current and Battery Trickle charging requirement and the Float cum Boost Charger remains in OFF condition. Whenever the Battery requires Boost charging, the same can be selected by through the AUTO/FLOAT/BOOST Selector Switch to BOOST mode in Float cum Boost Charger. Also, provision is available to select the charging modes Float/Boost automatically by keeping the same switch in AUTO position.

The Battery Chargers work on 415V AC, Three Phase,4 wire 50 Hz. supply. The Chargers are capable of delivering the full rated Load at the specified voltage at output terminals. This voltage is maintained for AC input variation of ±15% and Load variation from 0-100% full Load.

The Battery Chargers, FC & FCBC will be housed in suitable cabinet(s) of free standing sheet steel construction. The cabinets will be provided with front and back doors for easy accessibility. Panel Meters, Meter Selector Switches are provided on the front panel of the cabinet and also cable entry is provided at front bottom of the cabinet. By opening the front bottom door, one can reach the termination easily.

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TECHNICAL SPECIFICATION OF THE BATTERY CHARGER

SCHEME : FLOAT CHARGER & FLOAT CUM BOOST CHARGER

TYPE : FULL WAVE FULL CONTROLLED

TYPE OF BATTERY : VRLA/NVRLA Battery with 110Cells

INPUT

a) Three phase Input : 415V AC ±15% (Three Phase, Four Wire)

b) Frequency : 50Hz ± 5%

OUTPUT

a) Nominal Voltage : **220V**

b) Ripple : 2% RMS (Without Battery connected)

c) Efficiency : > 90%

TYPE OF BATTERY	VRLA	NVRLA
NO. OF CELLS	110	110
FLOAT VOLTAGE	247.5	247.5
BOOST VOLTAGE	253.0	291.5
EQUALIZING VOLTAGE	----	302.5
CHARGER O/P VOLTAGE	247.5	247.5
CHARGER O/P CURRENT FC	22A	22A
CHARGER O/P CURRENT FCBC	25A	25A

VOLTAGE REGULATION

Charger output is **±1%** of the set value in the following conditions in set mode (FLOAT /BOOST/AUTO)

Load variation : 10-100%

Line variation : ± 15%

Frequency Variations : ± 5%

Temperature Variations : 0 ºC to +50 ºC

The following Analogue Meters of size 96x96Sqmm with 240° deflection 1.5% accuracy will be Provided:

a) Battery Charge/Discharge Ammeter

b) Earth leakage Ammeter.

The following Digital Multifunction Meters with RS-485 port of size 96x96Sqmm with 1.0% accuracy will be provided:

c) AC Voltage & Current

d) FC Voltage & Current

e) FCBC Voltage & Current

f) Battery Input Voltage & Current

g) Load Voltage & Current

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INDICATIONS

1. **Clustered LEDs will be provided for the following conditions**

   AC Mains ON (R, Y & B)

   Float Charger ON

   Float Cum Boost Charger ON

2. **Alarm Annunciator (Facia Display Unit) with RS-485 port will be provided for the following conditions with audio alarm for abnormalities:**

   a. AC Mains Fail
   b. FC AC I/P Circuit Breaker Trip/Off
   c. FC DC O/P Circuit Breaker Trip/Off
   d. FCBC AC I/P Circuit Breaker Trip/Off
   e. FCBC DC O/P Circuit Breaker Trip/Off
   f. DC Under Voltage
   g. DC Over Voltage
   h. Battery Earth fault
   i. FC Rectifier/Thyristor fuse fail
   j. FCBC Rectifier/Thyristor fuse fail
   k. FC Filter/Capacitor fuse fail
   l. FCBC Filter/Capacitor fuse fail
   m. DC Contactor OFF
   n. Battery Input Circuit Breaker Trip/Off
   o. Phase Fail

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POTENTIAL FREE CONTACTS

The following Potential Free Contacts will be available on FC & FCBC:

a. AC Mains Fail
b. FC AC I/P Circuit Breaker Trip
c. FCBC AC I/P Circuit Breaker Trip
d. FC DC O/P Circuit Breaker Trip
e. FCBC DC O/P Circuit Breaker Trip
f. Battery Earth Fault
g. FC Rectifier Fuse Fail
h. FCBC Rectifier Fuse Fail
i. FC Filter Fuse Fail
j. FCBC Filter Fuse Fail
k. DC Over Voltage
l. DC Under Voltage
m. Battery Input Circuit Breaker Trip/Off
n. DC Contactor OFF
o. Phase Fail
p. Group alarm
q. Alarm Accept
r. Alarm Rest

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PROTECTIONS

The following protections will be provided:

a. AC input Circuit Breaker is provided for both FC & FCBC
b. DC output Circuit Breaker is provided for both FC & FCBC
c. Filter Cap fuses for both FC & FCBC
d. Over voltage cutback protection for both FC & FCBC
e. Fast acting semiconductor fuses for rectifier bridge for both FC & FCBC
f. Battery input Circuit Breaker
g. Charger Current Limit
h. Battery Current Limit
i. Blocking Diodes
j. DC Short Circuit

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CONTROLS & SWITCHES

a. AC input MCCB for both FC & FCBC
b. DC output MCCB for both FC & FCBC
c. Auto/Float/Boost mode selector switch
d. Float & Boost voltage variable potentiometers.
e. Mode selector switch (VRLA Battery)
f. Mode selector switch (NVRLA Battery)
g. Door lamp power supply ON/OFF toggle switch with fuse
h. Socket power supply ON/OFF toggle switch with fuse
i. Heater power supply ON/OFF toggle switch with fuse.
j. Battery Selection Switch
k. Battery input Circuit Breaker

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SPECIAL FEATURES

a) Auto Phase Reversal Operation
b) Soft Start on DC side
c) Class-F Insulation with Class-F Temperature Limits for all Magnetic
d) Automatic Voltage Regulation using Digital Control Logic
e) Filter Circuit to Limit Ripple
f) Charger Current Limiting
g) Automatic Float to Boost changeover based on current drawn by Battery
h) Automatic Boost to Float changeover based on Current or Voltage.
i) Anti-condensation Heater with Thermostat Control

TRANSDUCER

Following 4–20mA (Single I/P & Single O/P) Transducer will be provided:

a. DC Earth Leakage Transducer– 1No

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CHARGER INBUILT DC DISTRIBUTION BOARD

- **INCOMER** : 100A DC MCCB - 1 No.

- **OUTGOING FEEDERS** :
  20A DC MCB - 12 Nos.
  10A DC MCB - 24 Nos.

- **INDICATION** : LED Indication will be provided for the following Conditions:
  a. Incomer ON with 5mm LED
  b. Outgoing Feeder ON with 5mm LEDs

GENERAL

Cabinet	:	Freestanding Cabinet; Floor Mounting Type, Sheet Steel Construction; Easy for Installation and Maintenance; Components are accessible from Front & Rear; Cable entry at Front Bottom of the Cabinet
Protection	:	IP – 42
Paint Shade	:	Exterior/Interior: 631 of IS-5 Component Mounting Plates: Glossy White
CRCA Sheet Thickness	:	Load bearing sections – **2.5mm** Non-load bearing sections – **2.0mm** Undrilled Cable Gland Plate – 3.0mm
Nature of Cooling	:	Natural Air Cooling
Dimensions in mm	:	As per the Dimensional Drawings enclosed

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CHARGER THEORY

The system consists of one Float Charger, one Float cum Boost Charger, Interlocking contactor circuit, Alarm Indicator Circuit. The Float and Float cum Boost Chargers are similar in nature and works on the same principle. These Chargers are rated to meet the requirement of Load and Battery Charging current as specified. For clear understanding of system description, refer schematic drawing enclosed.

The Float and Float cum Boost Chargers will be connected to the AC input power through individual circuit breaker Q 401/501. The transformer T 401/501 steps down the AC input to the required level and this AC power is fed to the respective power bridge. (SCR (401-406/501-506)). The Charger control board PC 401/501 provides the regulation and current limit to the Charger circuit, in addition to supply gate pulses to the power SCRs. The output voltage of Float/ Float cum Boost Charger is adjusted using the potentiometer R 401/501-502 respectively.

The DC power is filtered and smoothened using filter chokes L 401/501 and DC capacitors bank C 401/501.

Proper operation of the Charger is a matter of carefully determining the precise moment to fire the SCRs by supplying proper gate pulses. The Charger control board PC 401/501 accomplishes this function. The control board PC 401/501 detects the zero cross over (-ve to +ve) of input sine wave and send the gate pulses to SCRs at appropriate timings. The DC output voltage is fed back to the control board PC 401/501 for regulation.

The meter P 401/501 with shunt SH 401/501 provides the current feedback to the Charger control board PC 401/501 which causes the unit to go into current limit beyond the set value. These characteristics cause the output voltage to go down when the battery is run down, so as to maintain a constant level of charging current.

The Meters P 401/501 with shunt SH 401/501 monitors the respective Charger output DC current & Voltages. P 402 is used to measure Charger AC input current & Voltage. The DC Meters P1/P2 monitors the Battery / Load voltage & Currents. P 3 is used to measure battery Erath leakage current. P 4 is used to measure battery Charger/discharge current.

The battery input is connected to the DC bus through interlocking contactor K1. The Tap cell diode of the battery bank is connected to positive DC bus through Diode V 1.

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INTERLOCKING CONTACTOR (K1) OPERATION:

Provision is made to close the K1 for various conditions of operation. The contactor operates on battery through potential free contacts of FC & FCBC output voltage sensing boards PC 404 & relay board PC 504. The precautions are taken for the following conditions.

a. If mains power supply failed, through PC 404 and PC 504 energized the contactor and ensures total Battery bank on DC bus.
b. In Float cum Boost Charger, if F 501 or 502 is blown or Charger fails (when the batteries on Float cum boost Charger) the contactor K1 closes through FCBC output relay sensing board PC 503 so that the battery is connected to Float Charger.
c. If Float Charger or Float cum Boost Charger failed then also the contactor K1 is closed and providing full battery voltage to load.
d. If float Charger fails, then the Float cum Boost Charger should come in to Float mode automatically (whatever may be the mode selector switch position) and supplies Load requirement by closing the contactor K1 through FC output PC 404.

PRINCIPLE OF OPERATION

During normal operation the float Charger supplies load current and Battery Trickle current and Float cum Boost Charger will be in Off condition and Inter locking contactor K 1 in Closed condition. The Float cum Boost Charger is kept in auto mode (switch S 501 in auto position) to select the battery charging mode (Float or Boost) automatically based on battery condition.

The Master Auto current detector board PC 1 senses the battery charging current, and whenever the Float charging current is more than the preset value, the relay board PC 2 connected through the Master Auto Current Detect Board will change the status of its relay potential free contacts and makes the FCBC to come into Boost mode.

Provision is available to put the batteries in boost charge mode manually by using the selector switch SW 501. This manual mode over rides the battery condition and the batteries will be kept in boost mode. During this mode, if FLOAT CHAGER fails, then tap cell will supply load momentarily, soon after the Interlocking Contactor closes and the FLOAT CUM BOOST CHARGER come into Float mode automatically and supplies Load
and Battery Trickle Current.

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Amara Raja Power System Limited, Tirupati

LOGIC SHEET FOR FLOAT CHARGER & FLOAT CUM BOOST CHARGER (In VRLA Mode)

System Condition	Mode Selection	Condition of Float Charger (FC)	Condition of Float cum Boost Charger (FCBC)	Battery Current	Interlocking Contactor (K1)	Load	Battery
AC Mains Available	AUTO	Healthy	Healthy	Less than Set value	ON	Supplied by FC (On Float Voltage)	On Float Voltage (By FC)
AC Mains Available	AUTO	Healthy	Healthy	Greater than Set value	OFF	Supplied by FC (On Float Voltage)	On Boost Voltage (By FCBC)
AC Mains Available	AUTO	Fail	Healthy	Less / Greater than Set value	ON	Supplied by FCBC (On Float Voltage)	On Float Voltage (By FCBC)
AC Mains Available	AUTO	Healthy	Fail	Less / Greater than Set value	ON	Supplied by FC (On Float Voltage)	On Float Voltage (By FC)
AC Mains Available	MANUAL FLOAT	Healthy	Healthy	Less / Greater than Set value	ON	Supplied by FCBC (On Float Voltage) and FC Shall be Automatically OFF	On Float Voltage (By FCBC)
AC Mains Available	MANUAL BOOST	Healthy	Healthy	Less / Greater than Set value	OFF	Supplied by FC	On Boost Voltage (By FCBC)
AC Mains Available	MANUAL FLOAT/BOOST	Fail	Healthy	Less / Greater than Set value	ON	Supplied by FCBC (On Float Voltage)	On Float Voltage (By FCBC)
AC Mains Available	MANUAL FLOAT/BOOST	Healthy	Fail	Less / Greater than Set value	ON	Supplied by FC (On Float Voltage)	On Float Voltage (By FC)
AC Mains Available	ANY MODE	Fail	Fail	Less / Greater than Set value	ON	Supplied by Battery	On Discharge
AC Mains Fail	ANY MODE	Healthy	Healthy	Less / Greater than Set value	ON	Supplied by Battery	On Discharge

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LOGIC SHEET FOR FLOAT CHARGER & FLOAT CUM BOOST CHARGER (In TUBULAR Mode)

System Condition	Mode Selection	Condition of Float Charger (FC)	Condition of Float cum Boost Charger (FCBC)	Interlocking Contactor (K1)	Load	Battery
AC Mains Available	MANUAL FLOAT	Healthy	Healthy	OFF	Supplied by FC (On Float Voltage)	On Float Voltage (By FCBC)
AC Mains Available	MANUAL FLOAT	Healthy	Fail	ON	Supplied by FC (On Float Voltage)	On Float Voltage (By FC)
AC Mains Available	MANUAL FLOAT	Fail	Healthy	ON	Supplied by FCBC (On Float Voltage)	On Float Voltage (By FCBC)
AC Mains Available	MANUAL BOOST	Healthy	Healthy	OFF	Supplied by FC (On Float Voltage)	On Boost Voltage (By FCBC)
AC Mains Available	MANUAL BOOST	Healthy	Fail	ON	Supplied by FC (On Float Voltage)	On Float Voltage (By FC)
AC Mains Available	MANUAL BOOST	Fail	Healthy	ON	Supplied by FCBC (On Float Voltage)	On Float Voltage (By FCBC)
AC Mains Available	ANY MODE	Fail	Fail	ON	Supplied by Battery	On Discharge
AC Mains Fail	ANY MODE	Healthy	Healthy	ON	Supplied by Battery	On Discharge

SPECIAL NOTE: This Battery Charger is provided with a mode called Equalize Mode which will be provided only in FCBC (Float cum Boost Charger). Generally, Load should be disconnected from Battery Charger during Equalize Charging.

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ANNEXURE - 1

GUARANTEED TECHNICAL PARTICULARS

FOR BATTERY CHARGING EQUIPEMENT (220V)

S.No.	Description		220V DC, 200AH (NVRLA)
1.	Type of rectifier	:	3phase, Full wave Full controlled using Thyristors
2.	No. of units	:	Two i.e. One FC and One FCBC
3.	Manufacturer's type designation	:	Float and Float Cum Boost Charger
4.	AC supply	:	
	a) Voltage (Volts)	:	415 V AC ± 15%
	b) Current (Amps)	:	
	i.) Float Charger	:	Around 11.7A
	ii) Boost Charger	:	Around 16.3A
c)	No. of phases	:	Three Phase, Four Wire
d)	Frequency, cycles / Sec	:	50Hz ± 5%
e)	Power factor	:	0.7 lag at nominal AC Input
5.	Percentage taps provided on transformer	:	Nil, Not required for Thyristor based rectifier.
6.	Rated D.C output for	:	
	a) Boost Charger (k W)	:	7.3KW
	b) Float Charger (k W)	:	5.44KW
7.	Rated D.C. output voltage for	:	
	a) Boost Charger (Volts)	:	291.5V DC
	b) Float Charger (Volts)	:	247.5V DC
8.	Rated D.C. output current for	:	
	a) Boost Charger (amps)	:	25A
	b) Float Charger (amps)	:	22A
9.	Rate of D.C. voltage control for	:	
	a) Boost Charger (Volts)	:	291.5V DC
	b) Float Charger (Volts)	:	247.5V DC

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GUARANTEED TECHNICAL PARTICULARS

FOR BATTERY CHARGING EQUIPEMENT (220V)

S.No.	Description		220V DC, 200AH (VRLA)
1.	Type of rectifier	:	3phase, Full wave Full controlled using Thyristors
2.	No. of units	:	Two i.e. One FC and One FCBC
3.	Manufacturer's type designation	:	Float and Float Cum Boost Charger
4.	AC supply	:	
	a) Voltage (Volts)	:	415 V AC ± 15%
	b) Current (Amps)	:	
	i.) Float Charger	:	Around 11.7A
	ii) Boost Charger	:	Around 13.6A
c)	No. of phases	:	Three Phase, Four Wire
d)	Frequency, cycles / Sec	:	50Hz ± 5%
e)	Power factor	:	0.7 lag at nominal AC Input
5.	Percentage taps provided on transformer	:	Nil, Not required for Thyristor based rectifier.
6.	Rated D.C output for	:	
	a) Boost Charger (k W)	:	6.32KW
	b) Float Charger (k W)	:	5.4KW
7.	Rated D.C. output voltage for	:	
	a) Boost Charger (Volts)	:	253.0V DC
	b) Float Charger (Volts)	:	247.5V DC
8.	Rated D.C. output current for	:	
	a) Boost Charger (amps)	:	25A
	b) Float Charger (amps)	:	22A
9.	Rate of D.C. voltage control for	:	
	a) Boost Charger (Volts)	:	253.0V DC
	b) Float Charger (Volts)	:	247.5V DC

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GUARANTEED TECHNICAL PARTICULARS

FOR BATTERY CHARGING EQUIPEMENT (220V)

S.No.	Description		220V DC, 200AH(NVRLA/VRLA)
10.	D.C. output voltage regulation from no load to full load volts	:	Better than ± 1% of set value
11.	Maximum ripple content %	:	Less than 2% RMS
12.	Maximum permissible temperature rise over an ambient temperature of 50 Deg.C	:	
	Magnetics	:	90°C
	SCR's	:	70°C
	Diode's	:	90°C
13.	Overall efficiency	:	Not less than 85% at full load
14.	Unit dimensions (With Canopy panel) Width x Height x Depth mm	:	Refer enclosed dimensional Dwgs.
15.	Unit shipping weight Kgs.	:	Refer enclosed dimensional Dwgs.
16.	Load limiting feature (Please attach characteristics showing variation of voltage with increase in load)	:	Current is limited at 110% of rated load
17.	Recommended settings for thermostat	:	
	a) Operation temperature Deg.C	:	50°C
	b) Reset temperature Deg.C	:	0°C
18.	List of major accessories provided	:	Not applicable

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AMARA RAJA STANDARD SUB-VENDOR LIST

SL. NO.	ITEM / COMPONENT	SUB-VENDOR / SUPPLIER
1.	AC CONTACTOR (POWER & CONTROL)	ABB / SCHNEIDER / L&T / C&S / LS / CHINT
2.	DC CONTACTOR (POWER & CONTROL)	ABB / SCHNEIDER / L&T / C&S / LS / CHINT
3.	COPPER BUS BAR	CUBEX TUBINGS / BHAGYA NAGAR INDIA LIMITED
4.	ALUMINUM BUS BAR	PERFECT MACHINES CENTRE / GLOBAL ALUMINUM / MAHA SAI
5.	CONTROL SWITCH	SALZER (L&T) / RG KESHWANI / RECOM
6.	CABLE / WIRE	ANY IS OR BIS APPROVED MAKES
7.	ELECTROLYTIC CAPACITOR	ALCON / SARADA /KENDEIL-INDFARAD
8.	FUSE (HRC / HBC / SEMICONDUCTOR) & FUSE BASE	BUSSMANN (EATON)
9.	FUSE (GLASS)	PROTECTRON
10.	FUSE BASE FOR GLASS FUSE	CONNECTWELL
11.	ALARM ANNUNCIATOR (FACIA DISPLAY UNIT)	SUN INDUSTRIAL AUTOMATION & SOLUTIONS / SECO
12.	HEAVY DUTY SWITCH	SALZER (L&T) / KAYCEE
13.	HEAT SINK	PERFECT MACHINES CENTRE / GLOBAL ALUMINUM / MAHA SAI
14.	SPACE HEATER	ENCORE / PYRO
15.	INDICATING LAMP (CLUSTER LED TYPE)	ESBEE (L&T) / C&S / SECO / SIEMENS
16.	LED	SANKEN / KWALITY
17.	ANALOG / DIGITAL METER	BEEMET / RISHABH / AE / ELMEASURE / MECO
18.	METAL OXIDE VARISTOR (MOV)	EPCOS
19.	OLR (THERMAL OVER LOAD RELAY)	ABB / L&T / C&S
20.	CONTROL CARD (POPULATED PCB)	AMARA RAJA
21.	PUSH BUTTON	RECOM / RG KESHWANI / TEKNIC / SECO
22.	POTENTIOMETER	POTEL / BOURNS / PANKAJ / SURAJ
23.	POLYESTER CAPACITOR	EL-CI-AR
24.	PANEL / CABINET	AMARA RAJA
25.	SHUNT	BEEMET / RISHABH / AE / MECO
26.	TOGGLE SWITCH	RG KESHWANI / RECOM

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Amara Raja Power Systems Limited **Date: 25.04.2022**

SL. NO.	ITEM / COMPONENT	SUB-VENDOR / SUPPLIER
27.	TOGGLE SWITCH	RG KESHWANI / RECOM
28.	THYRISTOR (SCR)	SEMIKRON / HIRECT / RIR / NAINA
29.	POWER DIODE	SEMIKRON / HIRECT / RIR / NAINA
30.	CONTROL DIODE	VISHAY / MIC / KHEL / PHILIPS
31.	TERMINAL BLOCK	ELMEX / CONNECTWELL
32.	THERMAL SWITCH	UTILITY APPLIANCES
33.	TRANSFORMER / CHOKE	AMARA RAJA
34.	WIRE WOUND / CF / MF RESISTORS	DEL / PEC / VEPL / WATTS
35.	DOOR LAMP	PHILIPS / WIPRO / BAJAJ / HAVELLS
36.	DOOR LAMP HOLDER	ANCHOR
37.	FUSE TRIP INDICATOR	BUSSMANN (EATON)
38.	VOLTAGE & CURRENT TRANSDUCERS	ELMEASURE / RISHABH / SETO / MECO
39.	FAN	EBM / REXNORD / SUNON / NISIKI
40.	SWITCH FUSE UNIT	L&T / C&S / SCHNEIDER / LS / CHINT
41.	CURRENT TRANSFORMER (CT)	KALPA / KAPPA / GILBERT&MAX WELL
42.	MCCB (AC & DC)	C&S / SCHNEIDER / L&T / ABB / LS / CHINT
43.	MCB (AC & DC)	LEGRAND / SCHNEIDER / C&S / SIEMENS / LS / CHINT
44.	TIMER	GIC (L&T)
45.	AUXILIARY RELAY	PLA / OEN
46.	LED HOLDER	LALWANI
47.	DOOR LAMP PUSH BUTTON	SURAJ / PANKAJ / ELICO
48.	ROTARY & CAM OPERATED SWITCHES	SALZER (L&T) / KAYCEE / RECOM
49.	BUZZER	METRONIX
50.	CONNECTORS & CRIMPS	TYCO / WAGO / MOLEX / CONNECWELL

NOTE: 1. DRAWING APPROVAL SUBJECT TO VALID TYPE TEST REPORTS, TO BE CHECKED DURING ACCEPTEANCE TESTS
2. FOR EPC CONTRACTS ONLY

SPECIAL NOTE

THE ABOVE VENDOR NAMES SPECIFIED BY AMARA RAJA IS TO SELECT THE VENDORS BASED ON THEIR AVAILABILITY & DELIVERIES.

TANDU SUDEEVAN KUMAR

Digitally signed by TANDU SUDEEVAN KUMAR
Date: 2023.12.28 14:58:22 +05'30'

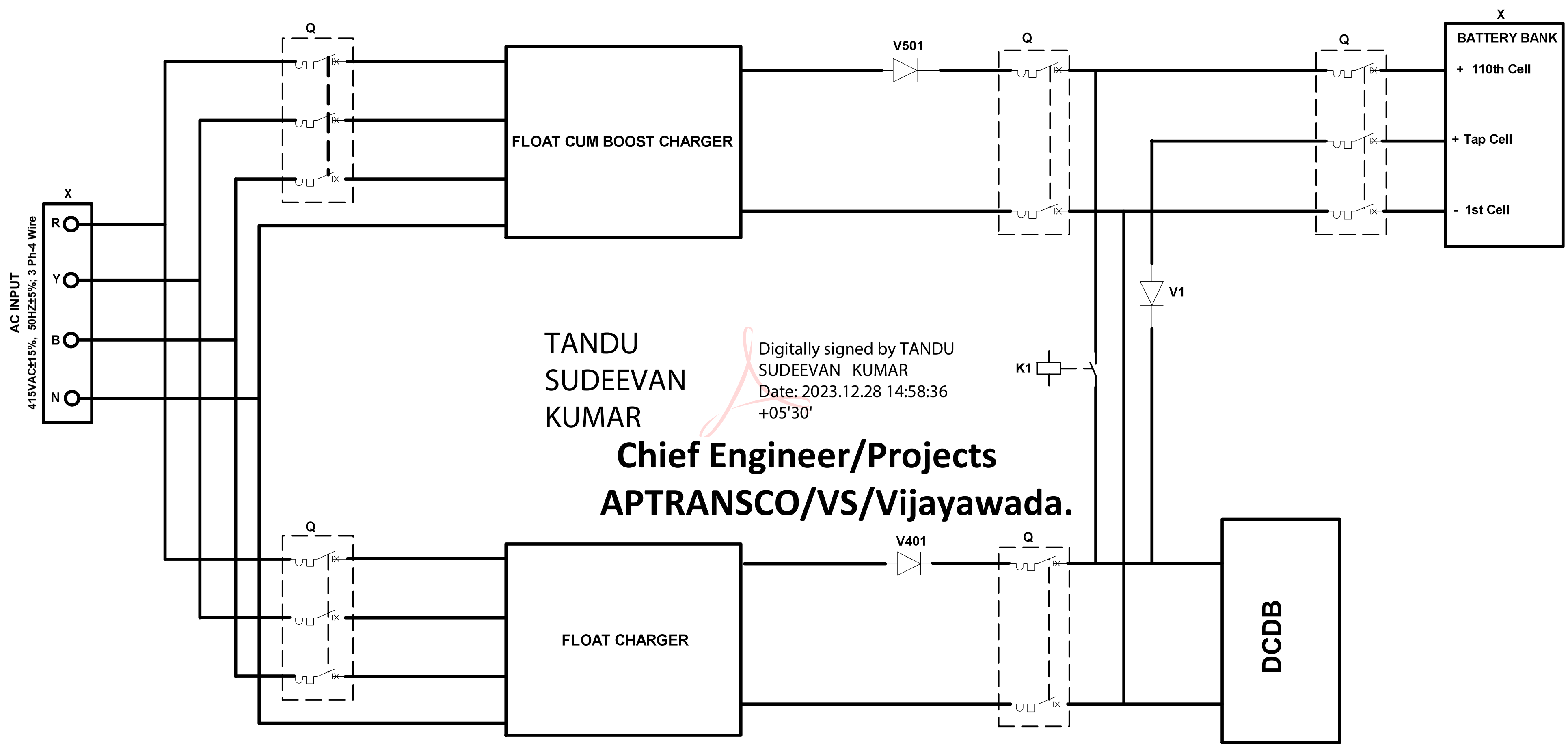
* * * * *

Chief Engineer/Projects

APTRANSCO/VS/Vijayawada.

NOTE: 1. DRAWING APPROVAL SUBJECT TO VALID TYPE TEST REPORTS, TO BE CHECKED DURING ACCEPTEANCE TESTS
2. FOR EPC CONTRACTS ONLY

Drawing approval subject to valid vendor registration



TANDU SUDEEVAN KUMAR

Digitally signed by TANDU SUDEEVAN KUMAR
Date: 2023.12.28 14:58:36 +05'30'

Chief Engineer/Projects
APTRANSCO/VS/Vijayawada.

FUNCTIONAL BLOCK DIAGRAM OF A BATTERY CHARGER CUM DC DISTRIBUTION BOARD

DATE	27.06.23	SIGN	
DRAWN	JRB		
CHKD.	PSA		
APPD.	GJN		

REV | ECO | REMARKS | DATE | APPD.

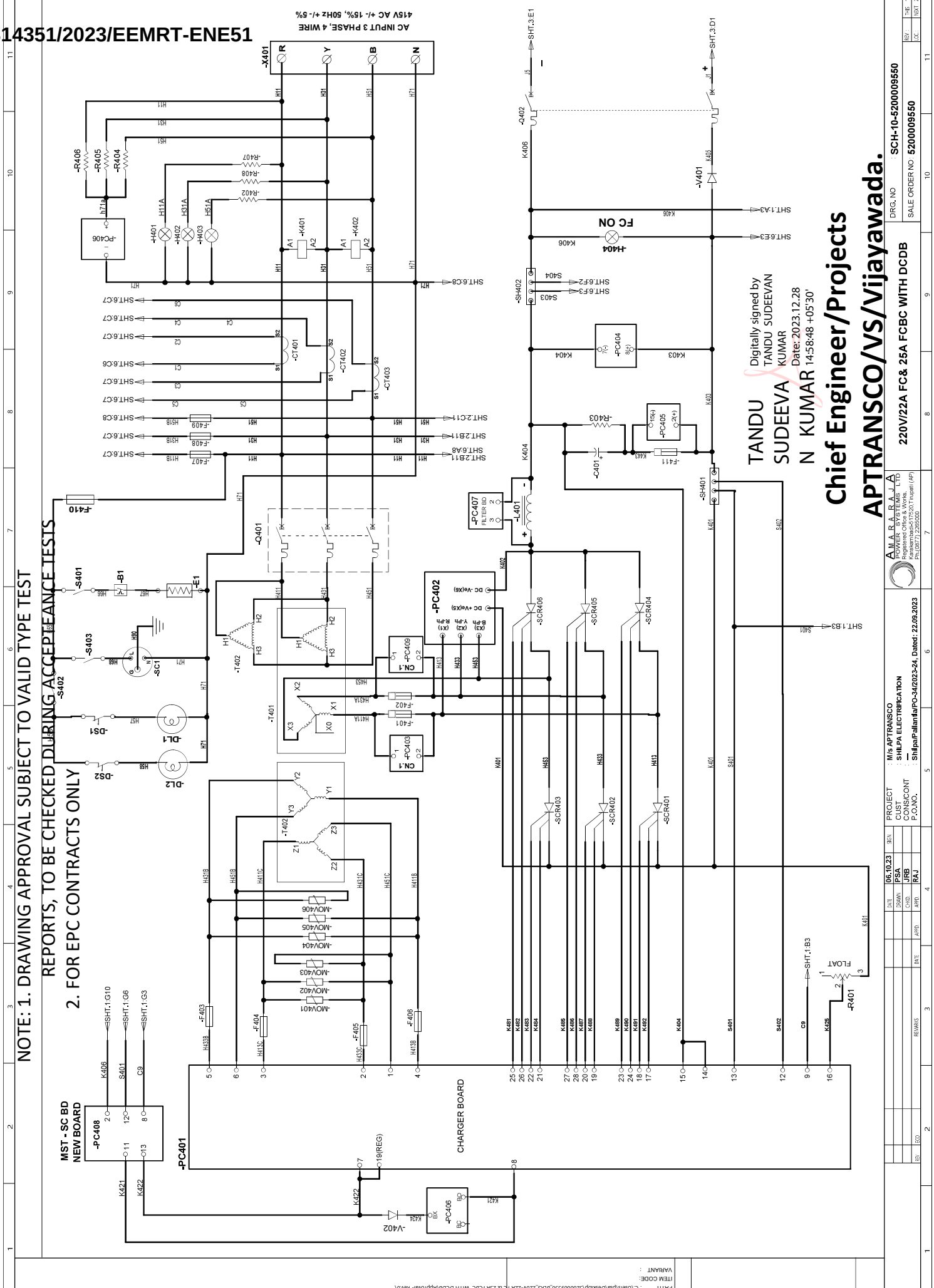
PROJECT : APTRANSCO
CUST : APTRANSCO
CONSULTANCY : APTRANSCO
P.O.NO. : ----

AMARA RAJA POWER SYSTEMS LTD
Registered Office & Works,
Karakambadi-517520, Tirupati (AP)
Ph.(0877) 2265000

220V FC & FCBC WITH DCDB

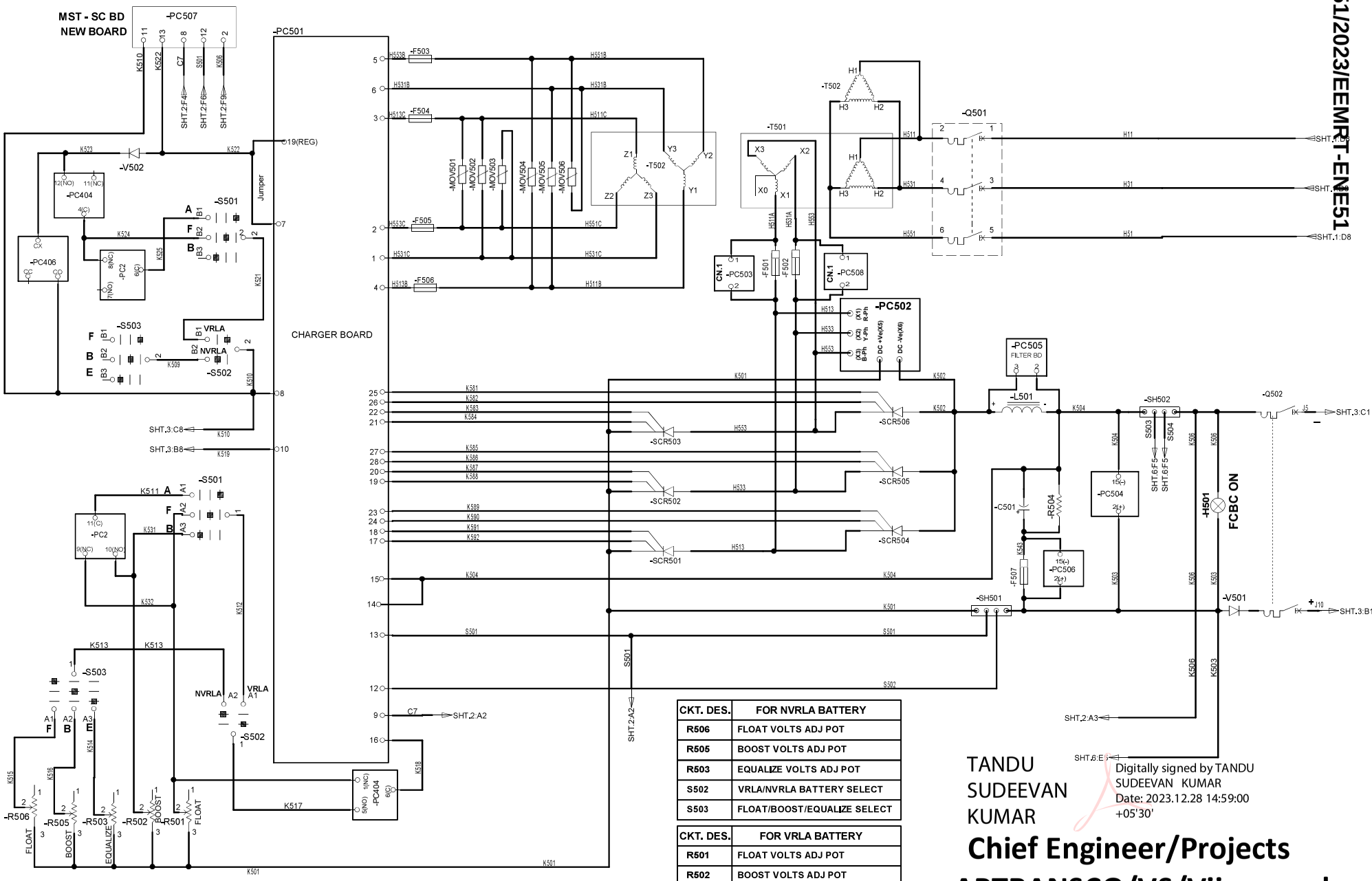
DRG. NO :FBD
SALE ORDER NO: XXXXXX
REV : 0
LOC. :

PATH : \\psdt1094tr2006\scan\YOGIPRIYA\Approval\5200008792-HYDS_220V-10A FC & 16A FCBC WITH INBUILT DCDB-24OG-latest Spec\Approval-Rev.0\
ITEM CODE :
VARIANT :


NOTE: 1. DRAWING APPROVAL SUBJECT TO VALID TYPE TEST
REPORTS, TO BE CHECKED DURING ACCEPTEANCE TESTS
2. FOR EPC CONTRACTS ONLY
AC INPUT 3 PHASE, 4 WIRE
415V AC +/- 15%, 50Hz +/- 5%
-X401
R
Y
B
N
-R406
-R405
-R404
-R407
-R408
-R402
-PC406
-H401
-H402
-H403
-K401
-K402
-CT401
-CT402
-CT403
-F410
-F409
-F408
-F407
-Q401
-S401
-B1
-E1
-S403
-SC1
-S402
-DS1
-DL1
-DS2
-DL2
-T402
-T401
-PC409
CN.1
-PC403
-F402
-F401
-PC402
DC -Ve(X6)
DC +Ve(X5)
R-ph (X1)
Y-ph (X2)
B-ph (X3)
-SCR406
-SCR405
-SCR404
-SCR403
-SCR402
-SCR401
-PC407
FILTER BD
-L401
-PC404
-PC405
-R403
-C401
-F411
-SH401
-SH402
-J402
-V401
-H404
FC ON
-R401
FLOAT
-MOV406
-MOV405
-MOV404
-MOV403
-MOV402
-MOV401
-F403
-F404
-F405
-F406
-PC408
MST - SC BD
NEW BOARD
-PC401
CHARGER BOARD
-V402
-PC406
SHT.1:G10
SHT.1:G6
SHT.1:G3
SHT.1:B3
SHT.1:A3
SHT.1:E3
SHT.1:D3
SHT.1:B3
SHT.3:E1
SHT.3:D1
SHT.6:C8
SHT.6:C7
SHT.6:C6
SHT.6:F2
SHT.6:F3
SHT.6:A8
SHT.2:C1
SHT.2:B1
Digitally signed by TANDU SUDEEVA KUMAR
Date: 2023.12.28 14:58:48 +05'30'
TANDU SUDEEVA N KUMAR
Chief Engineer/Projects
APTRANSCO/VS/Vijayawada.
220V/22A FC& 25A FCBC WITH DCDB
DRG. NO SCH-10-5200009550
SALE ORDER NO. 5200009550
AMARARAJA
POWER SYSTEMS LTD
Registered Office & Works,
Karakambadi-517520,Tirupati (AP)
PROJECT : M/s APTRANSCO
CUST : SHILPA ELECTRIFICATION
CONS/CONT : —
P.O.NO. : Shilpa/Pallanla/PO-347/2023-24, Dated: 22.09.2023
DRAWN PSA 06.10.23
CHKD JRB
APPD RAJ
PATH : C:\Users\psa\Desktop\5200009550_BLRS_220V-22A FC & 25A FCBC WITH DCDB\Approval- Rev.0\
ITEM CODE:
VARIANT :

NOTE: 1. DRAWING APPROVAL SUBJECT TO VALID TYPE TEST REPORTS, TO BE CHECKED DURING ACCEPTEANCE TESTS
2. FOR EPC CONTRACTS ONLY

8314351/2023/EEMRT-ENE51



CKT. DES.	FOR NVRLA BATTERY
R506	FLOAT VOLTS ADJ POT
R505	BOOST VOLTS ADJ POT
R503	EQUALIZE VOLTS ADJ POT
S502	VRLA/NVRLA BATTERY SELECT
S503	FLOAT/BOOST/EQUALIZE SELECT

CKT. DES.	FOR VRLA BATTERY
R501	FLOAT VOLTS ADJ POT
R502	BOOST VOLTS ADJ POT
S501	AUTO/FLOAT/BOOST SELECT

TANDU SUDEEVAN KUMAR

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Date: 2023.12.28 14:59:00 +05'30'

Chief Engineer/Projects
APTRANSCO/VS/Vijayawada.

Drawing approval subject to valid vendor registration

PATH : C:\Users\pra\Desktop\5200009550_BURS_220V-22A FC & 25A FCBC WITH DCDB(Approval- Rev.0\
ITEM CODE:
VARIANT :

						DATE	06.10.23	SIGN	PROJECT	: M/s APTRANSCO
						DRAWN	PSA		CUST	: SHILPA ELECTRIFICATION
						CHKD.	JRB		CONS/CONT	: —
REV.	ECO	REMARKS	DATE	APPD.	APPD.	APPD.	RAJ		P.O.NO.	: Shilpa/Pallantla/PO-34/2023-24, Dated: 22.09.2023

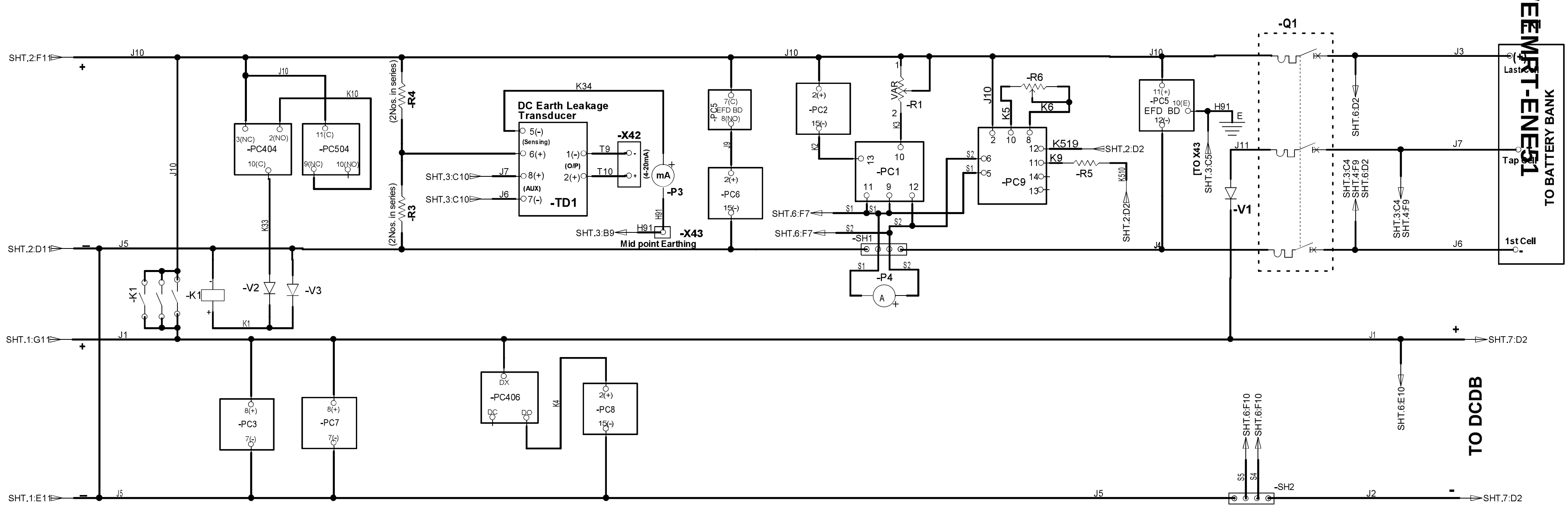
AMARARAJA POWER SYSTEMS LTD
Registered Office & Works.
Karakambadi-517520,Tirupati (AP)
Ph.(0877) 2265000

220V/22A FC& 25A FCBC WITH DCDB

DRG. NO : SCH-10-5200009550
SALE ORDER NO : 5200009550
REV : THIS 2
LOC : NEXT 3

NOTE: 1. DRAWING APPROVAL SUBJECT TO VALID TYPE TEST REPORTS, TO BE CHECKED DURING ACCEPTEANCE TESTS

2. FOR EPC CONTRACTS ONLY



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Date: 2023.12.28 14:59:12 +05'30'

Chief Engineer/Projects
APTRANSCO/VS/Vijayawada.

PATH : C:\Users\psa\Desktop\5200009550_BLRS_220V-22A FC & 25A FCBC WITH DCDB\Approval- Rev.0\
ITEM CODE:
VARIANT :

DATE	06.10.23	SIGN
DRAWN	PSA	
CHKD.	JRB	
APPD.	RAJ	

REV | ECO | REMARKS | DATE | APPD.

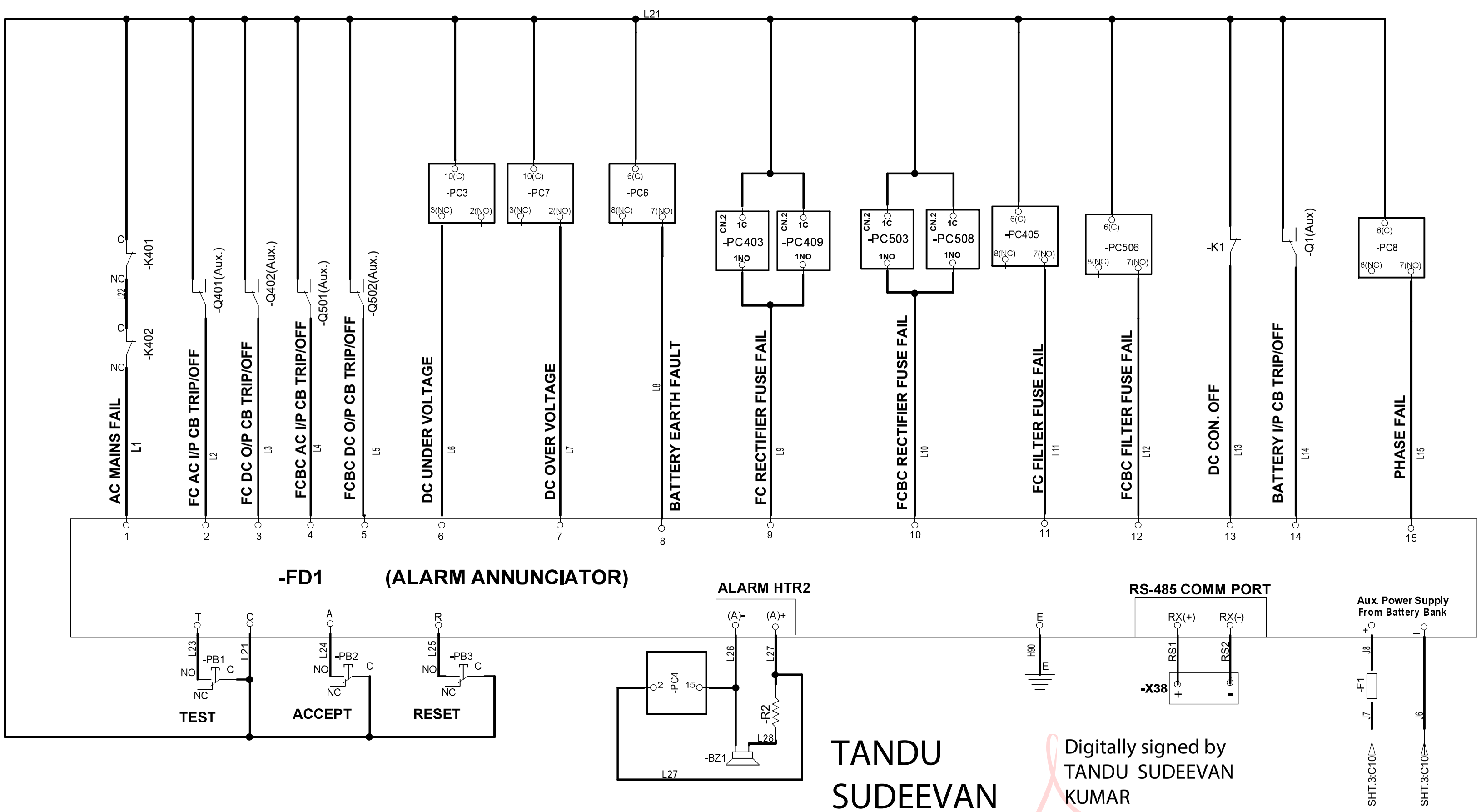
PROJECT : M/s APTRANSCO
CUST : SHILPA ELECTRIFICATION
CONS/CONT : —
P.O.NO. : Shilpa/Pallantla/PO-34/2023-24, Dated: 22.09.2023

AMARA RAJA POWER SYSTEMS LTD
Registered Office & Works, Karakambadi-517520, Tirupati (AP) Ph.(0877) 2265000

220V/22A FC& 25A FCBC WITH DCDB

DRG. NO : SCH-10-5200009550
SALE ORDER NO: 5200009550
REV :
LOC. :
THIS 3
NEXT 4

NOTE: 1. DRAWING APPROVAL SUBJECT TO VALID TYPE TEST REPORTS, TO BE CHECKED DURING ACCEPTEANCE TESTS
2. FOR EPC CONTRACTS ONLY



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Date: 2023.12.28 14:59:26 +05'30'

Chief Engineer/Projects
APTRANSCO/VS/Vijayawada.

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DATE	06.10.23
DRAWN	PSA
CHKD.	JRB
APPD.	RAJ

PROJECT : M/s APTRANSCO
CUST : SHILPA ELECTRIFICATION
CONS/CONT : —
P.O.NO. : Shilpa/Pallantla/PO-34/2023-24, Dated: 22.09.2023

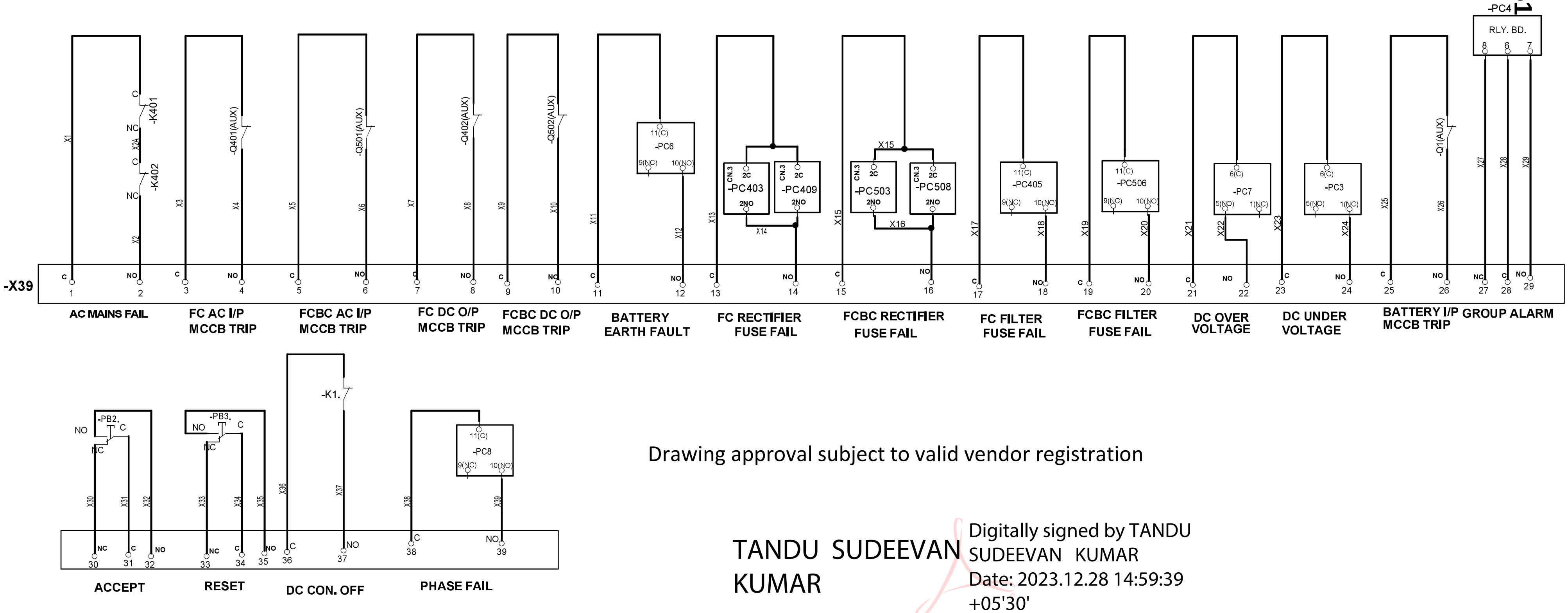
AMARA RAJA POWER SYSTEMS LTD
Registered Office & Works, Karakambadi-517520,Tirupati (AP) Ph.(0877) 2265000

220V/22A FC& 25A FCBC WITH DCDB

DRG. NO SCH-10-5200009550
SALE ORDER NO: 5200009550
THIS 4 NEXT 5

NOTE: 1. DRAWING APPROVAL SUBJECT TO VALID TYPE TEST REPORTS, TO BE CHECKED DURING ACCEPTEANCE TESTS
2. FOR EPC CONTRACTS ONLY

POTENTIAL FREE CONTACTS



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TANDU SUDEEVAN KUMAR
Digitally signed by TANDU SUDEEVAN KUMAR
Date: 2023.12.28 14:59:39 +05'30'

Chief Engineer/Projects
APTRANSCO/VS/Vijayawada.

DATE	06.10.23	
DRAWN	PSA	
CHKD.	JRB	
APPD.	RAJ	

PROJECT : M/s APTRANSCO
CUST : SHILPA ELECTRIFICATION
CONS/CONT : —
P.O.NO. : Shilpa/Pallantla/PO-34/2023-24, Dated: 22.09.2023

AMARA RAJA POWER SYSTEMS LTD
Registered Office & Works, Karakambadi-517520,Tirupati (AP) Ph.(0877) 2265000

220V/22A FC& 25A FCBC WITH DCDB

DRG. NO : SCH-10-5200009550
SALE ORDER NO: 5200009550
THIS 5 NEXT 6

PATH : C:\Users\psa\Desktop\5200009550_BLRS_220V-22A FC & 25A FCBC WITH DCDB\Approval- Rev.0\
ITEM CODE :
VARIANT :

DIGITAL METERS WITH RS 485 COMMUNICATION PORT

NOTE: 1. DRAWING APPROVAL SUBJECT TO VALID TYPE TEST REPORTS, TO BE CHECKED DURING ACCEPTEANCE TESTS
2. FOR EPC CONTRACTS ONLY

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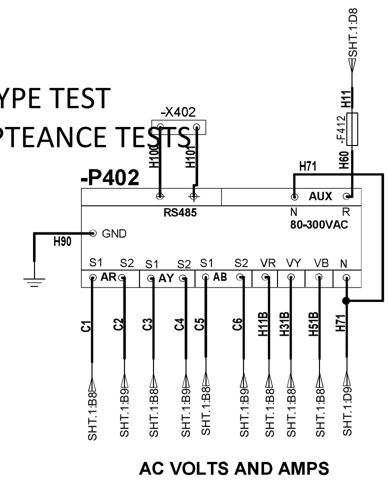

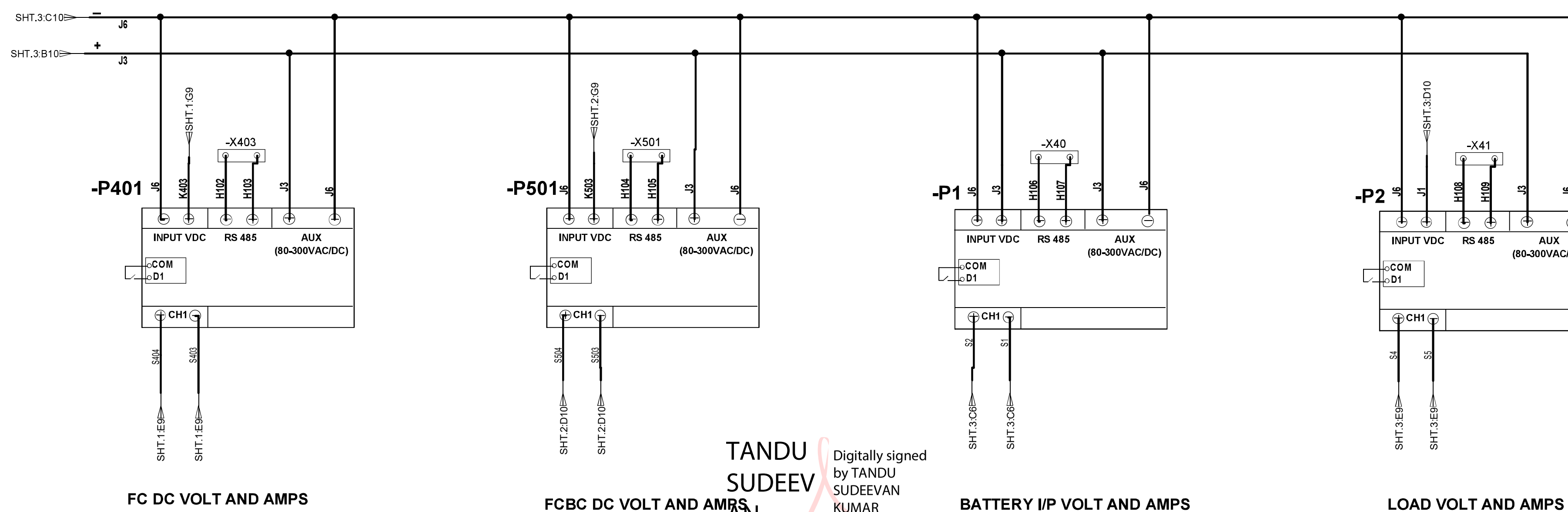

TANDU SUDEEVAN KUMAR

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Date: 2023.12.28 14:59:52 +05'30'

Chief Engineer/Projects
APTRANSCO/VS/Vijayawada.

PATH : C:\Users\psa\Desktop\5200009550_BLRS_220V-22A FC & 25A FCBC WITH DCDB\Approval- Rev0\
ITEM CODE :
VARIANT :

DATE	06.10.23	SIGN
DRAWN	PSA	
CHKD.	JRB	
APPD.	RAJ	

REV | ECO | REMARKS | DATE | APPD.

PROJECT : M/s APTRANSCO
CUST : SHILPA ELECTRIFICATION
CONS/CONT : —
P.O.NO. : Shilpa/Pallantla/PO-34/2023-24, Dated: 22.09.2023

AMARA RAJA POWER SYSTEMS LTD
Registered Office & Works, Karakambadi-517520, Tirupati (AP)
Ph.(0877) 2265000

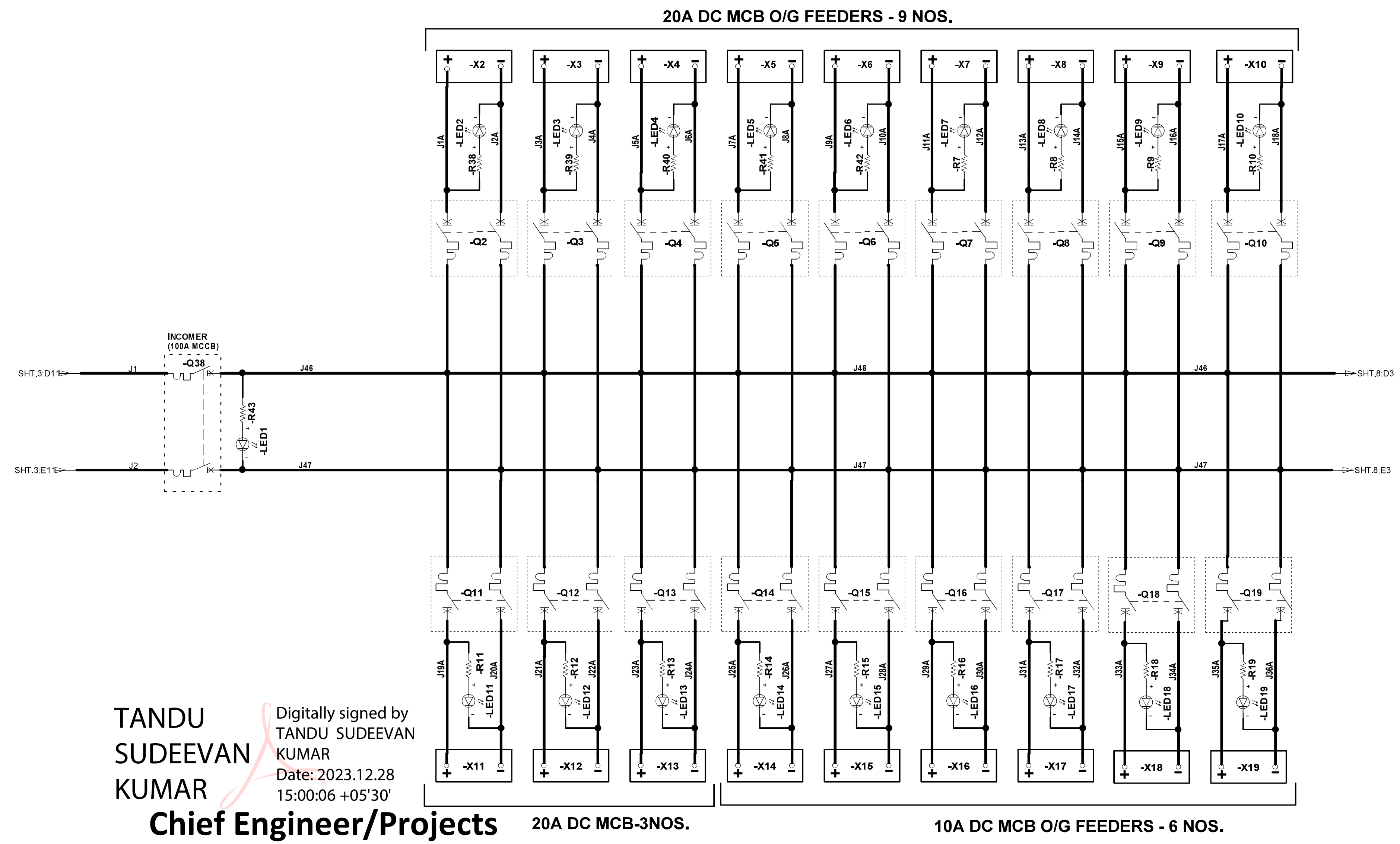
220V/22A FC& 25A FCBC WITH DCDB

DRG. NO SCH-10-5200009550
SALE ORDER NO: 5200009550
REV : | THIS 6
LOC : | NEXT 7

8314351/2023/EEMRT-ENE51

NOTE: 1. DRAWING APPROVAL SUBJECT TO VALID TYPE TEST REPORTS, TO BE CHECKED DURING ACCEPTEANCE TESTS

2. FOR EPC CONTRACTS ONLY



TANDU SUDEEVAN KUMAR

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Date: 2023.12.28 15:00:06 +05'30'

Chief Engineer/Projects
APTRANSCO/VS/Vijayawada.

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INBUILT DCDB DC DISTRIBUTION BOARD

PATH : C:\Users\psa\Desktop\5200009550_BLRS_220V-22A FC & 25A FCBC WITH DCDB\Approval- Rev0\
ITEM CODE :
VARIANT :

DATE	06.10.23	SIGN
DRAWN	PSA	
CHKD.	JRB	
APPD.	RAJ	

PROJECT : M/s APTRANSCO
CUST : SHILPA ELECTRIFICATION
CONS/CONT : ---
P.O.NO. : Shilpa/Pallantla/PO-34/2023-24, Dated: 22.09.2023

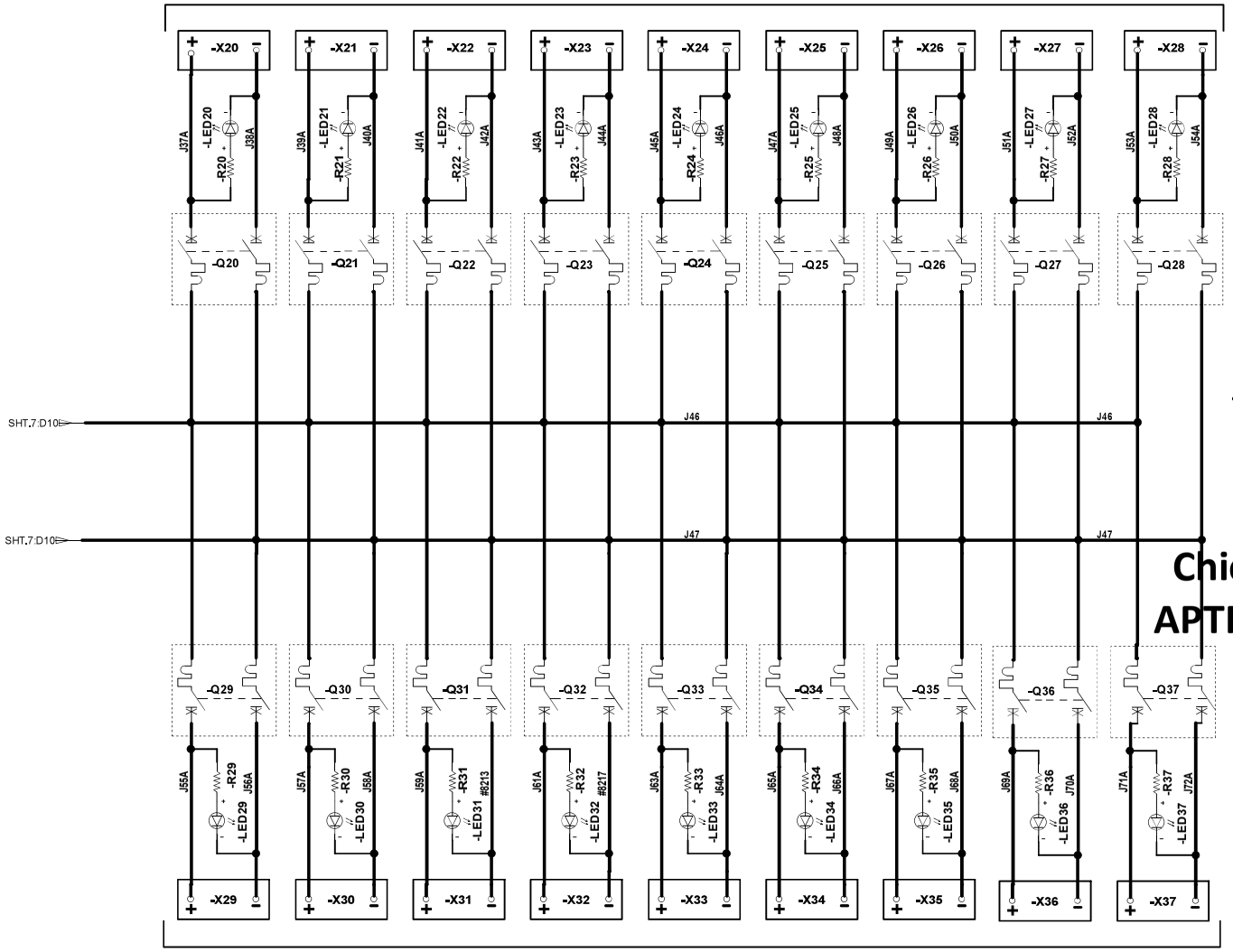
AMARA RAJA POWER SYSTEMS LTD
Registered Office & Works, Karakambadi-517520,Tirupati (AP)
Ph.(0877) 2265000

220V/22A FC& 25A FCBC WITH DCDB

DRG. NO SCH-10-5200009550
SALE ORDER NO: 5200009550
REV : THIS 7
LOC : NEXT 8

NOTE: 1. DRAWING APPROVAL SUBJECT TO VALID TYPE TEST
REPORTS, TO BE CHECKED DURING ACCEPTEANCE TESTS
2. FOR EPC CONTRACTS ONLY

10A DC MCB O/G FEEDERS - 9 NOS.



10A DC MCB O/G FEEDERS - 9 NOS.

TANDU SUDEEVAN KUMAR
Digitally signed by TANDU SUDEEVAN KUMAR
Date: 2023.12.28 15:00:19 +05'30'

Chief Engineer/Projects
APTRANSCO/VS/Vijayav

INBUILT DCBB DC DISTRIBUTION BOARD

Drawing approval subject to valid vendor registration

						DATE	06.10.23	SIGN	PROJECT	: M/s APTRANSCO	
						DRAWN	PSA		CUST	: SHILPA ELECTRIFICATION	
						CHKD.	JRB		CONS/CONT	: ---	
REV.	ECO	REMARKS	DATE	APPD.	APPD.	APPD.	RAJ		P.O.NO.	: Shilpa/Pallantla/PO-34/2023-24, Dated: 22.09.2023	

AMARARAJA POWER SYSTEMS LTD
Registered Office & Works,
Karakambadi-517520,Tirupati (AP)
Ph.(0877) 2289000

220V/22A FC& 25A FCBC WITH DCDB

DRG. NO : SCH-10-5200009550
SALE ORDER NO: 5200009550
REV : THIS 8
LOC : NEXT

PATH : C:\Users\psa\Desktop\5200009550_BUS_220V-22A FC & 25A FCBC WITH DCDB(Approval- Rev.0)\
ITEM CODE:
VARIANT :

NOTE: 1. DRAWING APPROVAL SUBJECT TO VALID TYPE TEST
REPORTS, TO BE CHECKED DURING ACCEPTEANCE TESTS
2. FOR EPC CONTRACTS ONLY

BILL OF MATERIALS

AMARA RAJA POWER SYSTEMS LIMITED **REV.0, DATED: 30.10.2023**

CUSTOMER: APTRANSCO
S. O. NO: 5200009550
LINE NO: 10

CHARGER RATING: 220VDC/22A FC & 25A FCBC WITH DCDB SUITABLE FOR BOTH VRLA/NVRLA Battery

Sl. No	Circuit Designation	Component Description	Quantity	UOM	Manf Part No.
1	-B1	THERMAL SW-SET AT65`C-NC	1	NOS	UTILITYAPPLIACES
2	-BZ1	Buzzer-12V-20mm-CE-27-01	1	NOS	CBCE27
3	-C401,-C501	CAP-ELEC-3300MFD-350V DC,85 Deg C,63X120	2	NOS	KI013503320LM0H120
4	-CT401,-CT402,-CT403	CT-RING50/5ACL-1.0-10VA-ID30MMTAPE,TP-2	3	NOS	CT TYPE : T1D01M
5	-DL1*,-DL2*	Bulb holder-Straight Batten type-B22	2	NOS	Anchor-39800/38538
6	-DL1,-DL2	Doorlamp-LED-7W-230VAC	2	NOS	PHILIPS-7W LED
7	-DS1,-DS2	PB-door lamp-NC-(Refrig switch)	2	NOS	STDVendor
8	-E1	Space Heater-100W-240VAC with Gland	1	NOS	Encore-ESH-01G-100W
9	-F1*,-F(403-410)*,-F412*,-F(503-506)*	Fuse base-1A-6.3A-800V W/O fuse	14	NOS	Connectwell-CF4U
10	-F1,-F(403-409),-F412,-F(503-506)	Glass Fuse-fast-1A-250VAC-20MM	13	NOS	PROTECTRON-PSF1A
11	-F401,-F402,-F501,-F502	Semiconductor fuse-fast-25A-690V AC	4	NOS	Bussman-25ET
12	-F410	Glass Fuse-Fast-6A-250Vac-20mm	1	NOS	PROTEC-PSF6A
13	-F411*,-F507*	Fuse base-32A-415/500V AC	2	NOS	Bussmann-FA32
14	-F411,-F507	HRC fuse-slow-16A-415/550V AC-clip on	2	NOS	BUSSMAN-NSD16
15	-FD1	Facia display-20Point-90-270V AC/DC	1	NOS	Sun Indus-SMA20WUS
16	-Fuse Fail Sense Bd Connectors	Connector-Molex-Female-2W-3.96mm	4	NOS	Molex : 09-50-3021
17	-Fuse Fail Sense Bd Connectors	Conn-Housing-ST-F-2W-3.96 mm	8	NOS	Tyco : 2132813-2
18	-Fuse Fail Sense Bd Crimps	Crip terminal-suitable for 2132813 model	16	NOS	TYCO-1744201-1/16-20
19	-Fuse Fail Sense Bd Crimps	Crip terminal-suitable for 2132813 model	8	NOS	MOLEX:8500105
20	-H401	Clustered LED-220-240VAC-22.5mm-red	1	NOS	L&T ESBE: EIL R 240A
21	-H402	Clustered LED-220-240VAC-22.5mm-yellow	1	NOS	L&T ESBE: EIL Y 240A
22	-H403	Clustered LED-220-240VAC-22.5mm-Blue	1	NOS	L&T ESBE: EIL B 240A
23	-H404,H501	Clustered assly-22.5mm-220VDC-Green	2	NOS	L&T ESBE: EIL G 220D
24	-K1	Contactor-26A-3P-(250-500V) AC/DC Coil	1	NOS	ABB-AF26-30-00-14
25	-K1 (Auxiliary)	Cont Aux Block-2NO+2NC for AF09--AF80/NF	1	NOS	ABB-CA4-22/E/M/U
26	-K401,-K402	Cont-10A-(250-500)VAC/DC Coil-2NO+2NC	2	NOS	NF22E-14
27	-L401,-L501	Filter choke-5.0mH-0030253	2	NOS	ARP-AT-6315
28	-LED(1-37)	LED-GREEN-ROUND-5mm	37	NOS	KL53LBYGD1N-N

TANDU SUDEEVAN KUMAR
Digitally signed by TANDU SUDEEVAN KUMAR
Date: 2023.12.28 15:00:34 +05'30'

Chief Engineer/Projects
APTRANSCO/VS/Vijayawada.

NOTE: 1. DRAWING APPROVAL SUBJECT TO VALID TYPE TEST
REPORTS, TO BE CHECKED DURING ACCEPTEANCE TESTS
2. FOR EPC CONTRACTS ONLY

BILL OF MATERIALS

AMARA RAJA POWER SYSTEMS LIMITED **REV.0, DATED: 30.10.2023**

CUSTOMER: APTRANSCO
S. O. NO: 5200009550
LINE NO: 10

CHARGER RATING: 220VDC/22A FC & 25A FCBC WITH DCDB SUITABLE FOR BOTH VRLA/NVRLA Battery

29	-LED(1-37)*	LED Holder-5mm round-press fit-white	37	NOS	Lalwani Elect-LHO-5
30	-MOV(401-406),-MOV(501-506)	MOV-40V-14mm	12	NOS	Epcos
31	-P3	DC ammeter-100-0-100mA-1.5-240D	1	NOS	Beemet-DVF96
32	-P4	DC ammeter-100-0-100A/75mV-1.5-240D-96	1	NOS	Beemet-DVF96
33	-P401,-P501,-P1,-P2	MFM_500VDC_75mVDC_Aux:80-300VAC/DC_CL1%	4	NOS	EDC1100-96X96SQ.MM
34	-P402	MFM_500V AC_5A AC_Aux:80-300VAC/DC_CL1%	1	NOS	SL1300-96X96SQ.MM
35	-PB1*,-PB2*,-PB3*	PB-contact block-1NC	3	NOS	RB2-BE-102
36	-PB1*,-PB2*,-PB3*	PB-contact block-1NO	5	NOS	RB2-BE-101
37	-PB1,-PB2,-PB3	PB-activator-shrouded-22.5mm-black	3	NOS	RCB2-BA2
38	-PC1	PCB-MST-ACDB-48VDC	1	NOS	AREPL-P02018202
39	-PC2,-PC405,-PC504,-PC506,-PC6,-PC8	PCB-PLA-RELAY-260VDC-2C/OCONT.	6	NOS	AREPL-P02002015
40	-PC4	PCB-PLA-RELAY-12VDC-3C/O CONT.	1	NOS	AREPL-P02002000
41	-PC401*,-PC501*	PCB-POWERSUPPLYBD-6P	2	NOS	AREPL-P02009011
42	-PC401*,-PC501*	PCB-REGCTRL-6P-220V	2	NOS	AREPL-P02009022
43	-PC401*,-PC501*	PCB-GATE PULSE DRIVE-6P	4	NOS	AREPL-P02009031
44	-PC401,-PC501	PCB-CHGR-6P-MOTHERBD	2	NOS	AREPL-P02009000
45	-PC402,-PC502	PCB-Snubber bd for i-C/D	2	NOS	ARE12001334
46	-PC403,-PC503,-PC409,-PC508	PCB-FUSE FAIL SENSE BD-220V-AREL	4	NOS	P22004244~0
47	-PC404,-PC3,-PC7	PCB-VOLTAGEDETECTORBd-260VDC	3	NOS	AREPL-P02008202
48	-PC406	PCB-RELAY-SPP-OEN	1	NOS	AREPL-P02018400
49	-PC407,-PC505	PCB-FILTER-1MFD-10K-10W	2	NOS	AREPL-P02001109
50	-PC408,-PC507	PCB-MST-Short circuit board-220VDC	2	NOS	AREPL-P02018265
51	-PC5	FED Module-220V	1	NOS	ARPSL
52	-PC9	PCB-CURLIMIT-INT-260VDC	1	NOS	AREPL-P02008405
53	-Q(14-37)	MCB-10A-2P-10KA-DC	24	NOS	Schn-A9N61528
54	-Q(2-13)	MCB-20A-2P-DC	12	NOS	Schn-A9N61532-6kA
55	-Q(401-2)Aux,-Q(501-2)Aux,-Q1Aux	Auxillary switch(1NO/1NC)-CVS 100-630	10	NOS	Schneider-29450
56	-Q1,-Q38	MCCB-100A-25KA-3P-415VAC	2	NOS	Schneider-LV510307
57	-Q401,-Q501	MCCB-3P-25KA-25A-415 VAC	2	NOS	LV510301N

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Chief Engineer/Projects
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NOTE: 1. DRAWING APPROVAL SUBJECT TO VALID TYPE TEST REPORTS, TO BE CHECKED DURING ACCEPTEANCE TESTS
2. FOR EPC CONTRACTS ONLY

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BILL OF MATERIALS

AMARA RAJA POWER SYSTEMS LIMITED — **REV.0, DATED: 30.10.2023**

CUSTOMER: APTRANSCO
S. O. NO: 5200009550
LINE NO: 10

CHARGER RATING: 220VDC/22A FC & 25A FCBC WITH DCDB SUITABLE FOR BOTH VRLA/NVRLA Battery

58	-Q402,-Q502	MCCB-3P-25KA-40A-415AC-Adj O/L-Fixed S/C	2	NOS	Schneider-LV510303N
59	-R(11-43)	Resistor-68K-2W-5%-wire wound	37	NOS	STDVendor
60	-R1 (2 in series each)	Resistor-variable-2.5K-25W-Wire wound	2	NOS	STDVendor
61	-R2, -R5	Resistor-1K-2W-5%-Wire wound	2	NOS	STDVendor
62	-R3,-R4(2 IN SERIES)	Resistor-2.5K-25W-5%-wire wound	4	NOS	STDVendor
63	-R401,-R501,-R502,-R(503,505,506)	POT with Lock Nut-Panel Mount-20K-3W-10T	6	NOS	Pavan:20K-10T-3W
64	-R403,-R504	Resistor-10K-10W-5%-wire wound	2	NOS	STDVendor
65	-R404,-R405,-R406	Resistor-12K-25W-5%-wire wound	3	NOS	STDVendor
66	-R407,-R408,-R402	Resistor-5K-5W-5%-wire wound	3	NOS	STDVendor
67	-R6	POT-panel mount-100K-2W-10T	1	NOS	BOURNS-3590-S2-104L
68	-S(401-403)	Toggle switch-pm-SPST-ON/OFF-10A	3	NOS	RECOM-RT121B
69	-S501,-S503	Rotary switch-6A-2P-3W-DC	2	NOS	SAL-61069SAB13TDYR
70	-S502	Rotary switch-6A-2P-2W-ACDC	1	NOS	Sal-61038SAB13TDYR
71	-SC1	SOCKET-3PIN-5A	1	NOS	Anchor
72	-SCR(401-406/501-506)	Dual SCR Block-Slow-27A-1600V	6	NOS	Semikron-SKKT27B/16E
73	-SCR(401-406/501-506)*	Heat sink-PI-80AD-300mm	2	NOS	Standard Vendor
74	-SH1,-SH2	Shunt-100A/75mV-±0.5%	2	NOS	Beemet
75	-SH401-2,-SH501-2	Shunt-50A/75mV- ±0.5%	4	NOS	Beemet
76	-T401	Charger I/P Xfr--415V/136.2V,7.4KVA	1	NOS	ARP-AT-5779
77	-T402,-T502	Control Xformer-415V/2 x 23.5V-0.16KVA	2	NOS	ARP-AT-3696
78	-T501	CHARGER I/P XFR-415V/166.08V,10.2 KVA	1	NOS	ARP-AT-5791
79	-TD1	TD_100-0-100mA/4-12-20mA_1I/P&O/P_85-230	1	NOS	ET08-117005500J000
80	-V1	Diode-Forward-150A-1200V-stud	1	NOS	RIR-150LM120
81	-V1*	Heat sink-PI-120HD-150mm	1	NOS	STD VENDOR
82	-V2	Diode-Forward-12A-1200V-stud	1	NOS	RIR-12FM120
83	-V2*	Bus bar-aluminium-50x6sqmm	1	KG	Standard Vendor
84	-V3	Diode-GP-3A-1000V-DO-27/DO-201AD	1	NOS	Vishay:1N5408-E3/54
85	-V401*,-V501*	Heat sink-PI-20-100mm	2	NOS	GLOBAL :3027-100MM
86	-V401,-V501	Diode-Forward-70A-1200V-stud	2	NOS	RIR-70HM120

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BILL OF MATERIALS

AMARA RAJA POWER SYSTEMS LIMITED **REV.0, DATED: 30.10.2023**

CUSTOMER: APTRANSCO
S. O. NO: 5200009550
LINE NO: 10

CHARGER RATING: 220VDC/22A FC & 25A FCBC WITH DCDB SUITABLE FOR BOTH VRLA/NVRLA Battery

87	-V402,-V502	Diode-GP-1A-1000V-SOD-81-1N4007	2	NOS	Vishay:1N4007-E3/54
88	-X(2-37)	Terminal Block-Power-76A-Single-M5	72	NOS	ELMEX-CBTM5
89	-X(38-43),-X(402-403),-X501	Terminal block-power-57A-single-studtype	56	NOS	Elmex-KBT M4
90	-X1,-X401	Terminal block-power-110A-single	7	NOS	ELMEX-CBT110
91	Ground Bus Bar	Bus bar-copper-25x6sqmm	1	KG	STD VENDOR

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NOTE: 1. DRAWING APPROVAL SUBJECT TO VALID TYPE TEST REPORTS, TO BE CHECKED DURING ACCEPTEANCE TESTS

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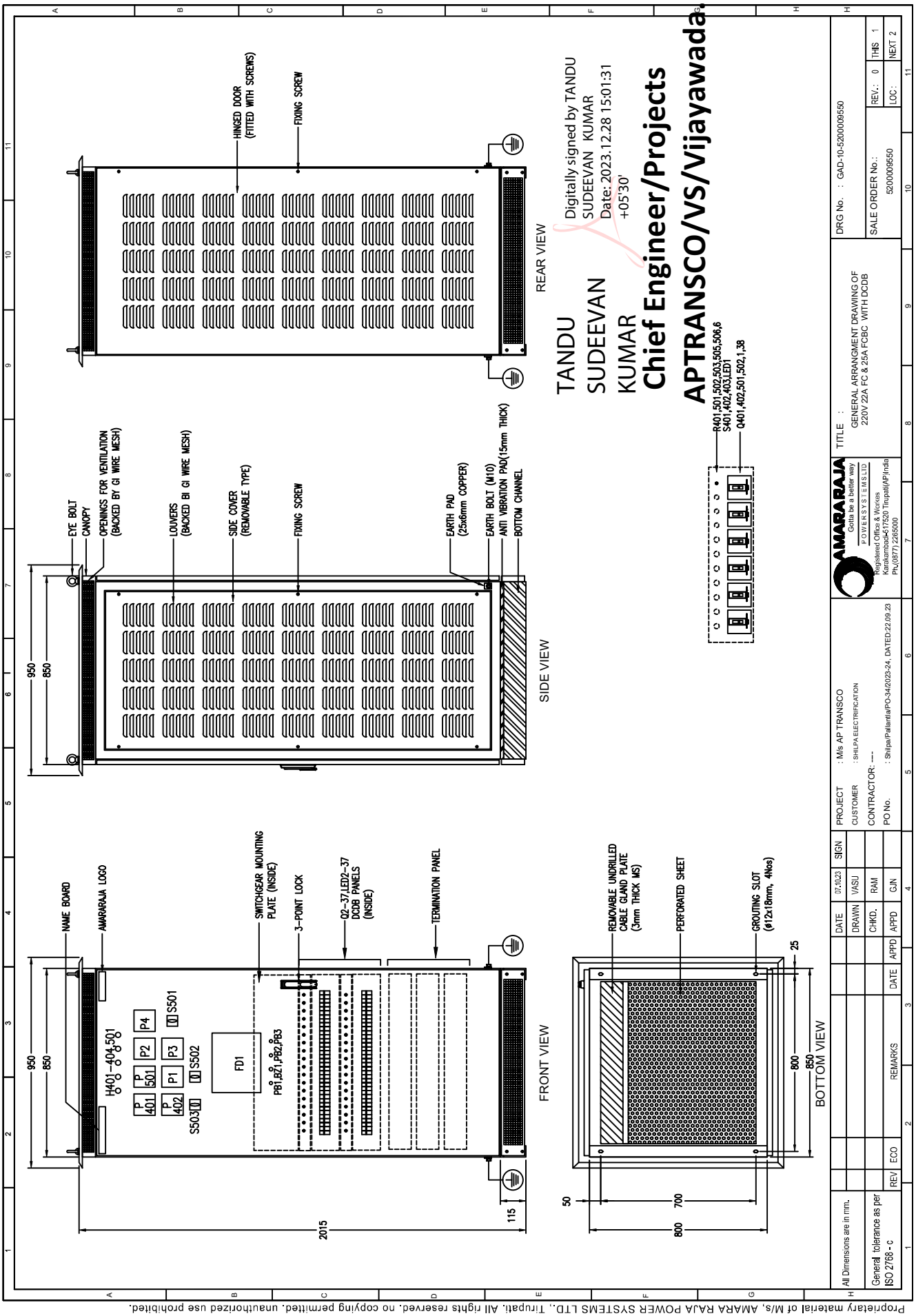

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NOTE: 1. DRAWING APPROVAL SUBJECT TO VALID TYPE TEST
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CONSTRUCTION DETAILS

FRONT PANEL DESCRIPTION DETAILS

CKT.DES	DESCRIPTION
BZ	BUZZER
FD1	FACIA DISPLAY
H401–403	AC MAINS ON
H404	FC ON
H501	FCBC ON
P401/501	DC MULTIFUNCTION METER (FC/FCBC)
P402	AC MULTIFUNCTION METER (FC/FCBC)
P1	BATTERY MULTIFUNCTION METER
P2	LOAD MULTIFUNCTION METER
P3	EARTH LEAKAGE AMMETER
P4	BATTERY CHARGER/DISCHARGE AMMETER
PB1	TEST PUSH BUTTON
PB2	ACCEPT PUSH BUTTON
PB3	RESET PUSH BUTTON
Q401/501	AC INPUT CIRCUIT BREAKERS (FC/FCBC)
Q402/502	DC OUTPUT CIRCUIT BREAKERS (FC/FCBC)
Q1	BATTERY INPUT CIRCUIT BREAKER
Q2–37	DCDB OUTPUT CIRCUIT BREAKERS
Q38	DCDB INPUT CIRCUIT BREAKER
R401/501	FLOAT VOLTAGE ADJUST POT (FC/FCBC)
R502	BOOST VOLTAGE ADJUST POT
R503	EQUALIZE ADJUST POT
R505	BOOST VOLTAGE ADJUST POT
R506	FLOAT VOLTAGE ADJUST POT
R6	CURRENT LIMIT ADJUST POT
S401	SPACE HEATER POWER SUPPLY SWITCH
S402	DOOR LAMP POWER SUPPLY SWITCH
S403	SOCKET POWER SUPPLY SWITCH
S501	MODE SELECTOR SWITCH
S502	BATTERY SELECTOR SWITCH
S503	MODE SELECTOR SWITCH

1. TYPE OF CONSTRUCTION : FOLDED SHEET STEEL (MILD STEEL)
2. SHEET THICKNESS
   FRAME : 2.5mm
   DOORS & COVERS : 2mm
3. PAINT SHADE
   FRAME : 631 OF IS:5 (BOTH EXTERIOR & INTERIOR)
   DOORS & COVERS
   EXTERIOR : 631 OF IS:5 (STRUCTURE)
   INTERIOR : 631 OF IS:5 (STRUCTURE)
   BOTTOM CHANNELS : RAL–9005 (STRUCTURE)
   COMPONENT MOUNTING PLATES : RAL–9003 (GLOSSY)
4. PROTECTION CLASS : IP–42
5. COMPONENT ACCESSIBILITY : FRONT & REAR
6. CUSTOMER CABLE ENTRY POSITION : FRONT BOTTOM
7. EARTH POINT LOCATION : SIDE BACK
8. AISLE SPACE REQUIRED FOR INSTALLATION
   FRONT & REAR : 1.0mtr
   SIDES : 0.30mtr
9. LOUVERS SHOWN ARE TENTATIVE MAY VARY DURING DETAILED ENGINEERING STAGE

TANDU SUDEEVAN KUMAR
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All Dimensions are in mm.						DATE	07.10.23	SIGN	PROJECT : M/s AP TRANSCO	AMARA RAJA Gotta be a better way POWER SYSTEMS LTD Registered Office & Workes Karakambadi-517520 Tirupati(AP)India Ph.(0877) 2265000	TITLE : GENERAL ARRANGMENT DRAWING OF 220V 22A FC & 25A FCBC WITH DCDB	DRG No. : GAD-10-5200009550	
						DRAWN	VASU		CUSTOMER : SHILPA ELECTRIFICATION				
General tolerance as per ISO 2768 - c						CHKD.	RAM		CONTRACTOR: ----			SALE ORDER No.: 5200009550	REV.: 0 THIS 2
	REV	ECO	REMARKS	DATE	APPD	APPD	GJN		PO No. : Shilpa/Pallantla/PO-34/2023-24, DATED:22.09.23				LOC : NEXT ----

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