DC Supervision Relay : A27R

Introduction:

ASHIDA has designed economical, reliable & compact construction of ADITYA series A27R relay provides Protection, Control and Monitoring functions.

A27R DC / AC Supervision Relay specially designed for station batteries and battery charger as per RDSO Specifications TI-SPC-PSI-PROTCT-7101.

Functional Overview:

Key Protection & Control Functions:

- Two Independent Settings Groups.
- DC Under Voltage Protection.
- DC Over Voltage Protection.
- AC Under Voltage Protection.
- AC Over Voltage Protection.
- Programmable Inputs & Outputs.
- 16 nos. of Programmable & Target LEDs for indications with dual colours.
- Self Supervision of relay.
- Metering function.
- Event Recording (1024 nos.).
- Fault Recording on HMI display (10 nos.).
- Disturbance Recording (10 nos.)
- Fully communicable with IEC standard open protocol IE C60870-5-103, & IEC 61850.
- SCADA communication.
- Single/Dual Ethernet ports (RJ45), RS485 port.
- PC front port communication for convenient relay settings.
- User friendly local operation with key pad.
- Large Liquid crystal display (20X4) with backlight.

- Password Protection.
- Measurement of Voltage magnitudes.

Software Support:

- Online / Offline Setting Editor.
- Programmable scheme logic Editor.
- Settings upload / download.
- Online Measurement.
- Disturbance analysis.
- Relay assistant for testing relay at site.

Applications:

A27R is second generation Numerical Integrated DC supervision as well as AC Supervision Protection Relay for monitoring DC station battery and Battery Charger of typical traction sub-station. Specially designed for monitoring DC/AC Auxiliary power supply use for typical Traction sub-station.

DC Supervision Under Voltage:

A27R DC Supervision provides two indepedent stages of under voltage protection to monitor the DC auxiliary supply. The stage 1 is for pre-trip alarm and stage 2 is for trip circuit breaker.

The under voltage logic checks the auxiliary supply voltage is less than pickup value and generates under volatge Alarm / Trip after set delay.

DC Supervision Over Voltage :

A27R DC Supervision provides over voltage protection to monitor the DC auxiliary supply.

The over voltage logic checks the auxiliary supply voltage is exceeds the pickup value and generates over volatge Trip after set delay.

AC Supervision Under Voltage:

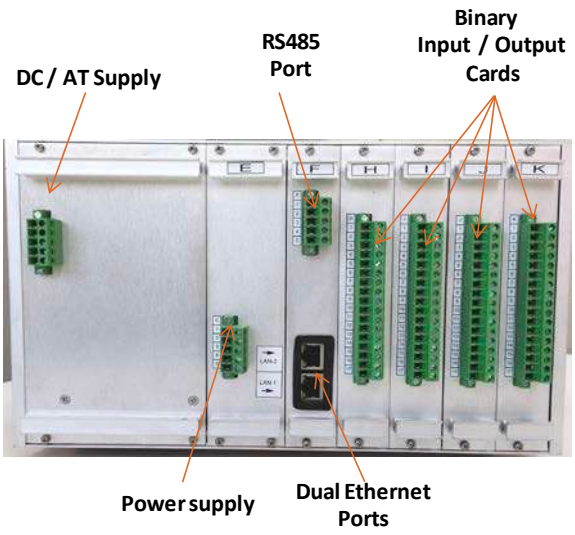
A27R provides under voltage protection for AC supply. it monitors AC voltage, when measured voltage is goes below the set pickup value, relay generates Alarm after set time delay.

AC Supervision Over Voltage:

A27R provides over voltage protection for AC supply. it monitors AC voltage, when measured voltage is exceeds the set pickup value, relay generates Alarm after set time delay.

Programmable Inputs, Outputs & Logic:

The relay is provided with tool known as AproLogic, in which user can program their logics as per the requirement. All type of gates such OR/ NOR/ NOT/ NAND/ AND/ XOR/ XNOR/ SR Flip-flop and Counters are available along with Operating and Resetting Timer. For more details please refer to Instruction Manual.



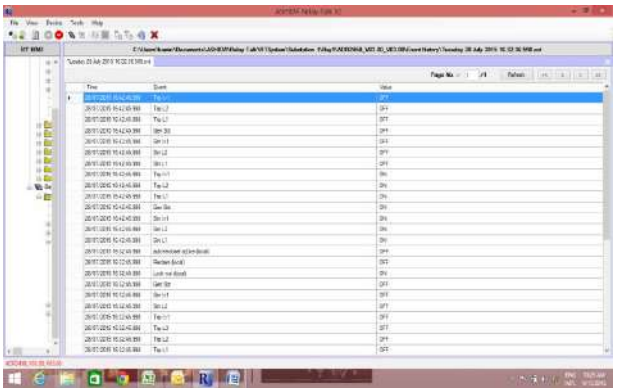
Back side Terminals A27R

Programmable LEDs and Pushbuttons:

The A27R relay provides total 16 nos. of target and programmable LEDs with dual color indications. The LEDs can be programmed through PC software (RTV2 software).

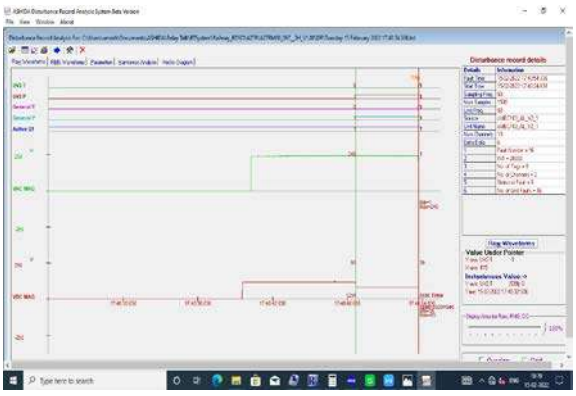
Event recording:

A27R relay provides a feature to record and store 1024 nos. of events (with event time stamping of 1mSec precision) in non-volatile memory through internally by protection and control functions and externally by triggering the digital inputs. And these can be extracted using communication port or can be seen on the LCD. The event can be triggered on time stamp through time synchronization or through internal clock setting.



Disturbance recording:

A27R relay provides built in disturbance recording facility for recoding analogue and digital channels. Relay records 10 nos. of disturbances of 30 sec each and stores it in non-volatile memory. Disturbance records can be saved in IEEE COMTRADE format and same can be analyzed in disturbance analysis software.



Fault recording:

A27R relay provides fault recording facility. The fault records can be display either on HMI displayed or in RTV2 software. The relay can record 10 nos. of fault records in non-volatile memory.

Metering:

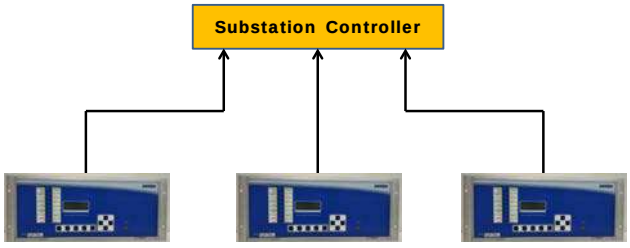
Online metering feature of A27R relay provides metering of parameters voltage magnitude on HMI display or in RTV2 software.

Independent Protection settings groups:

A27R relay provides two independent setting groups which allows the relay to operate on different power system conditions.

IEC 60870-5-103 Protocol:

A27R relay provides internationally standardized protocol for communication via RS485 port of protection relays. IEC 60870-5-103 protocol is used worldwide and supported by relay manufacturers.



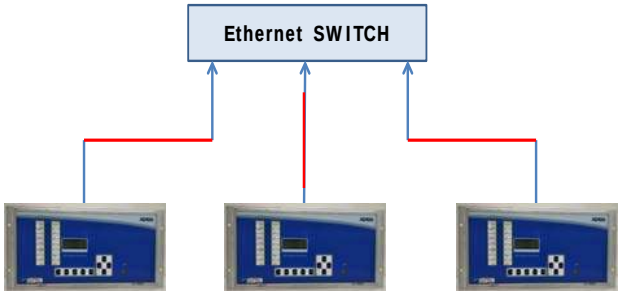
IEC 60870–5–103 star type RS232 copper conductor connection

Ethernate base Protocol:

A27R relay provides IEC61850 internationally standardized protocol for substation automation via Ethernet port of protection relays (Ref ordering information for details)

IEC61850 GOOSE and Interoperability:

A27R support standard GOOSE messaging for relay to relay communication. Any logical (pickup, trip, etc) and physical (Digital Optical Isolated signal such CBNO /NC etc) can be publish via GOOSE configurator. A27R support total 16 simultaneous GOOSE signal which can publish and received by other relays having IEC61850 protocol. Similarly A27R can able subscribed total 16 nos of simultaneous signal published by other relays and can be use for interlocks. The A27R is tested for most of other make relays.



Relay Settings:

Global:

Sr. No	Parameter	Setting / Ranges
1.	Password	0000 to zzzz / ZZZZ
2.	RID	-
3.	SID	-
4.	System Frequency	50Hz / 60Hz
5.	Opto I/P Supply	Read only
6.	Filter Time	0 to 100ms in steps of 1ms
7.	CB Operation	CB Open / CB Close / No Operation
8.	PB-1 Operation	Disabled/ Enabled / Time Enabled
9.	tPB-1 Pulse	0.10 to 50s in steps of 0.01s
10.	PB-2 Operation	Disabled/ Enabled / Time Enabled
11.	tPB-2 Pulse	0.10 to 50s in steps of 0.01s
12.	Config Port	PORT F/ PORT R / PORT 1
13.	Timesync Master	PORT F/ PORT R / PORT 1
14.	Description	Read only
15.	Model no	Read only
16.	Serial No	Read only
17.	Software Version	Read only
18.	Hardware Version	Read only
19.	Virtual Scheme 1	Disabled / Enabled
20.	Virtual Scheme 2	Disabled / Enabled
21.	Language	Read only

Settings Group

Sr. No	Parameter	Setting / Ranges
1.	Factory Defaults	No Operation / All Settings / Setting Group 1 / Setting Group 2
2.	Active Group	G1 / G2
3.	Copy From	G1 / G2
4.	Copy To	No operation / G1 / G2
5.	G1	Disabled / Enabled / Time Enabled
6.	GroupChange Delay	0 to 400.0s in steps of 0.1s
7.	G2	Disabled / Enabled / Time Enabled
8.	GroupChange Delay	0 to 400.0s in steps of 0.1s

PORT F

Sr. No	Parameter	Setting / Ranges
1.	Unit ID	Read only

2.	Baud Rate	Read only
3.	Set Parity	Read only

PORT 1

Sr. No	Parameter	Setting / Ranges
1.	Unit ID	1 to 250 in steps of 1
2.	IP address	Range 0 to 255 in steps of 1
3.	Subnet mask	Range 0 to 255 in steps of 1
4.	Default gateway	Range 0 to 255 in steps of 1
5.	Pri. SNTP	Range 0 to 255 in steps of 1
6.	Sec. SNTP	Range 0 to 255 in steps of 1
7.	Protocol	Disabled / Enabled
8.	Ethernet Mode	Dual / fixed
9.	Operating Mode	Fail over / Switch mode
10.	Primary	LAN1 / LAN 2

PORT R

Sr. No	Parameter	Setting / Ranges
1.	Unit ID	1 to 250 in steps of 1
2.	Baud Rate	9600 / 19200 / 38400 / 57600
3.	Set Parity	None / Even / Odd

Disturbance

Sr. No	Parameter	Setting / Ranges
1.	Post Trigger	5 to 95% in steps of 1%

DATE AND TIME

Sr. No	Parameter	Setting / Ranges
1.	Password	0000 to zzzz / ZZZZ
2.	Local Time Enable	Fixed / Flexible / Disabled
3.	Local Time Offset	-720 to + 720 in steps of 15 Mins
4.	RP Time Zone	UTC / Local
5.	SET Hours	0 to 23 Hrs in steps of 1.
6.	SET Minutes	0 to 59 Mins in steps of 1.
7.	SET Seconds	0 to 59 Sec. in steps of 1.
8.	SET Date	1 to 31 Days in steps of 1.
9.	SET Month	1 to 12 Months in steps of 1.
10.	SET Year	0 to 99 Years in steps of 1.

CB Control

Sr. No	Parameter	Setting / Ranges
1.	Password	0000 to zzzz / ZZZZ
2.	Invalid DPI Dur H	0.1 to 600s in steps of 0.01s
3.	Invalid DPI Dur I	0.1 to 600s in steps of 0.01s

REPORTING

Sr. No	Parameter	Display value on LCD
1.	Event	Display of all digital events with time stamping
2.	Status	Display Status of Digital Input & Digital Output
3.	Fault Record	Display the Records of fault i.e. parameter value, flag of fault & date and time of Fault
4.	Error Log	Display of error generated by Relay if any, in case of failure of hardware
5.	CB Data	Display of Trip Counter; Breaker Operation Counter; Breaker operating time, Recl Cnt
6.	Alarm Record	Display of latest Alarm Record

SYSTEM CONFIG

CT/VT RATIOS

Sr. No	Parameter	Setting / Ranges
1.	DC Supervision	100 to 110V in step of 10V
2.	AC Supervision	220 to 250V in steps of 10V

PROTECTION

Sr. No	Parameter	Setting / Ranges
1.	Password	0000 to zzzz / ZZZZ
2.	DC Supervision	Disabled / Enabled
3.	AC Supervision	Disabled / Enabled

RECORD CONTROL

Sr. No	Parameter	Setting / Ranges
1.	Password	0000 to zzzz / ZZZZ
2.	Clear Events	Yes / No
3.	Clear Faults	Yes / No
4.	Clear Disturbance	Yes / No
5.	Clear Error Record	Yes / No
6.	CB Data	Yes / No
7.	Thermal State	Yes / No

OUTPUT & LED TEST

Sr. No	Parameter	Setting / Ranges
1.	Password	0000 to zzzz / ZZZZ
2.	Test Mode	Disabled/Test Mode/Contacts Blocked
3.	Test Output J	0 = Not Operated, 1 = Operated
4.	Test Output K	0 = Not Operated, 1 = Operated
5.	Test Output L	0 = Not Operated, 1 = Operated
6.	Test Output M	0 = Not Operated, 1 = Operated
7.	Test Apply	No Operation/Apply Test/Remove Test
8.	Test LEDs	No Operation / Apply Test

Group 1 Settings

DC Supervision

Sr. No	Parameter	Settings / Ranges
1.	UV1 Enable	Disabled / Enabled
2.	UV1 Set V	40 to 110V in steps of 1V
3.	UV1 Delay	1 to 300s in steps of 1s
4.	UV2 Enable	Disabled / Enabled
5.	UV2 Set V	40 to 110V in steps of 1V
6.	UV2 Delay	1 to 300s in steps of 1s
7.	OV	Disabled / Enabled
8.	OV set V	120 to 170V in steps of 1V
9.	OV Delay	1 to 300s in steps of 1s

AC Supervision

Sr. No	Parameter	Settings / Ranges
1.	AC High Enable	Disabled / Enabled
2.	AC High set V	240 to 300V in step of 1V
3.	AC High Delay	1 to 300s in steps of 1s
4.	AC Low Enable	Disabled / Enabled
5.	AC Low set V	240 to 300V in step of 1V
6.	AC Low Delay	1 to 300s in steps of 1s

ACTIVE GROUP

Sr. No	Parameter	Setting / Ranges
1.	G1/ G2	Read only

Typical Tests Information:

The Relay Confirm to following standard

Sr. No.	Test	Standard
Electromagnetic Compatibility Type Test:		
1.	Damped Oscillatory Wave Test	IEC 60255-26 & IEC 61000-4-18
2.	Electrostatic Discharge Test	IEC 60255-26 & IEC 61000-4-2
3.	Electrical Fast Transient or Burst Requirements	IEC 60255-26 & IEC 61000-4-4
4.	Surge Immunity Test	IEC 60255-26 & IEC 61000-4-5
5.	Immunity to Conducted Disturbances Induces by Radio Frequency Field	IEC 60255-26 & IEC 61000-4-6
6.	Radiated, Radio Frequency, Electromagnetic Field Immunity Test	IEC 60255-26 & IEC 61000-4-3
7.	Power Frequency Immunity Test	IEC 60255-26 & IEC 61000-4-16
Auxiliary Supply Tests		
8.	Effect of DC Voltage Variation	IEC 60255-1 / IEC 60255-26
9.	A.C. Ripples in DC Auxiliary	IEC 60255-26 & IEC 61000-4-17
Insulation Tests:		
10.	High Voltage Test	IEC 60255-27
11.	Impulse Voltage Test	IEC 60255-27
12.	Insulation Resistance	IEC 60255-27
Environmental tests:		
13.	Cold test (Storage & Operational)	IEC 60255-1/ IEC 60068-2-1
14.	Dry heat test (Storage & Operational)	IEC 60255-1/ IEC 60068-2-2
15.	Damp heat steady state test	IEC 60255-1/ IEC 60068-2-78
16.	Damp heat cyclic test	IEC 60255-1/ IEC 60068-2-30
17.	Change of Temperature	IEC 60255-1/ IEC 60068-2-14
18.	Enclosure Protection Test (IP51)	IEC 60529
Mechanical tests		
19.	Vibration Endurance Test	IEC 60255-21-1
20.	Vibration Response Test	IEC 60255-21-1
21.	Bump Test	IEC 60255-21-2
22.	Shock Withstand Test	IEC 60255-21-2
23.	Shock Response Test	IEC 60255-21-2
24.	Seismic Test	IEC 60255-21-3

Accuracy & Functional Performance Tests		
25.	Making & Breaking Capacity Tests of Contacts	IEC 60255 – 1
26.	Mechanical Endurance Tests	IEC 60255 – 1

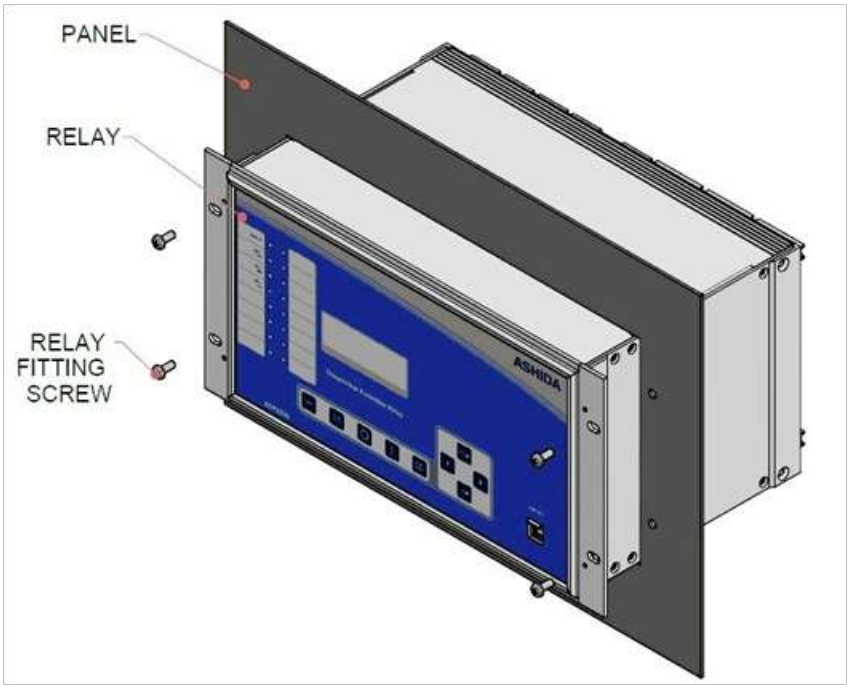
Thermal Withstand Tests		
27.	Over Current Test	IEC 60255-1
28.	Over Voltage Test	IEC 60255-1

*Detailed Type Test Reports are available on request

Drawings Information:

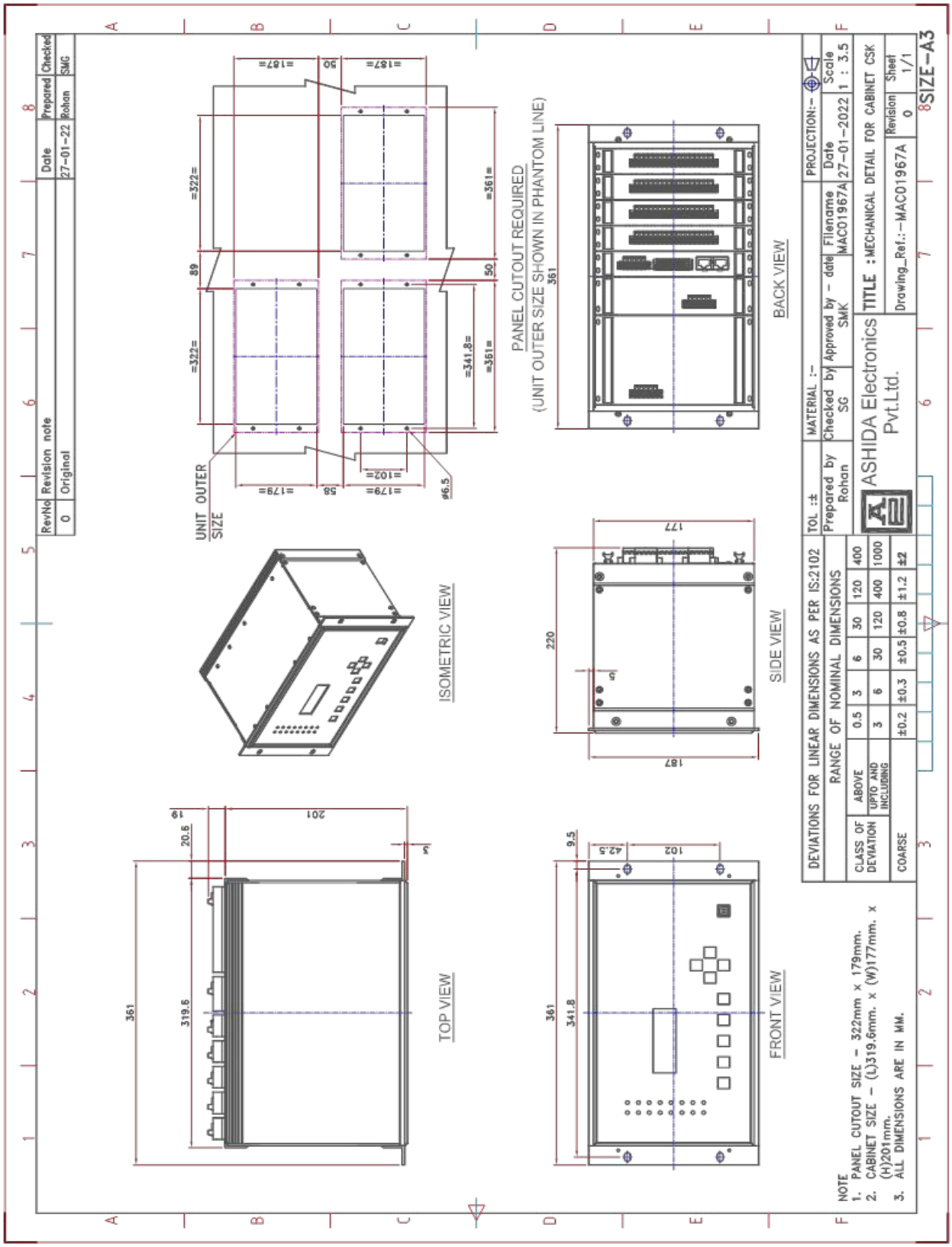
I.	Drawing References	: For Cabinet Type	MAC01967A
		: For Back Connections	RLY06903
		: For Typical External Connections	ABD06903

Mounting Information:

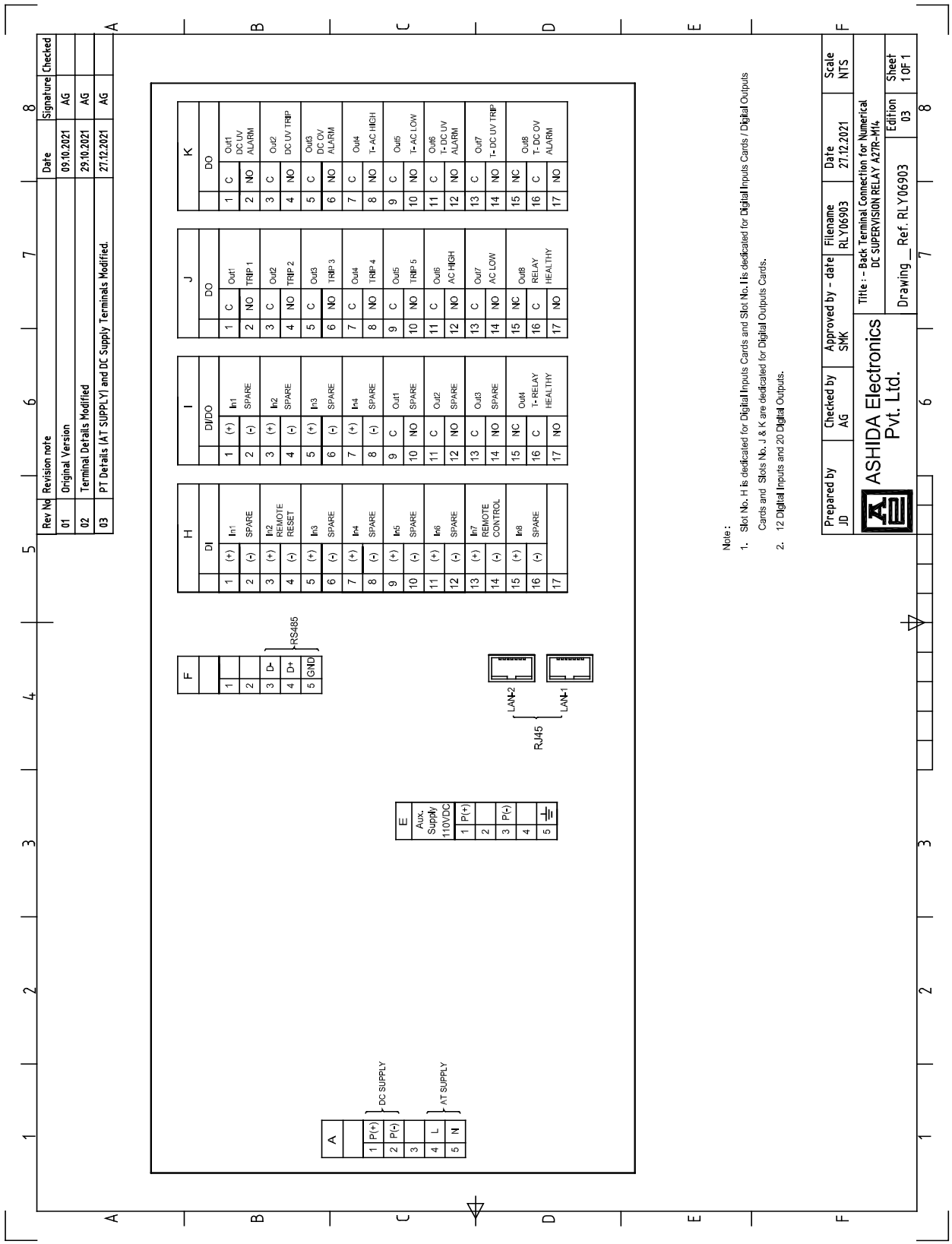


A27R 14" Modular – Rack mounting arrangement

Mechanical Details :

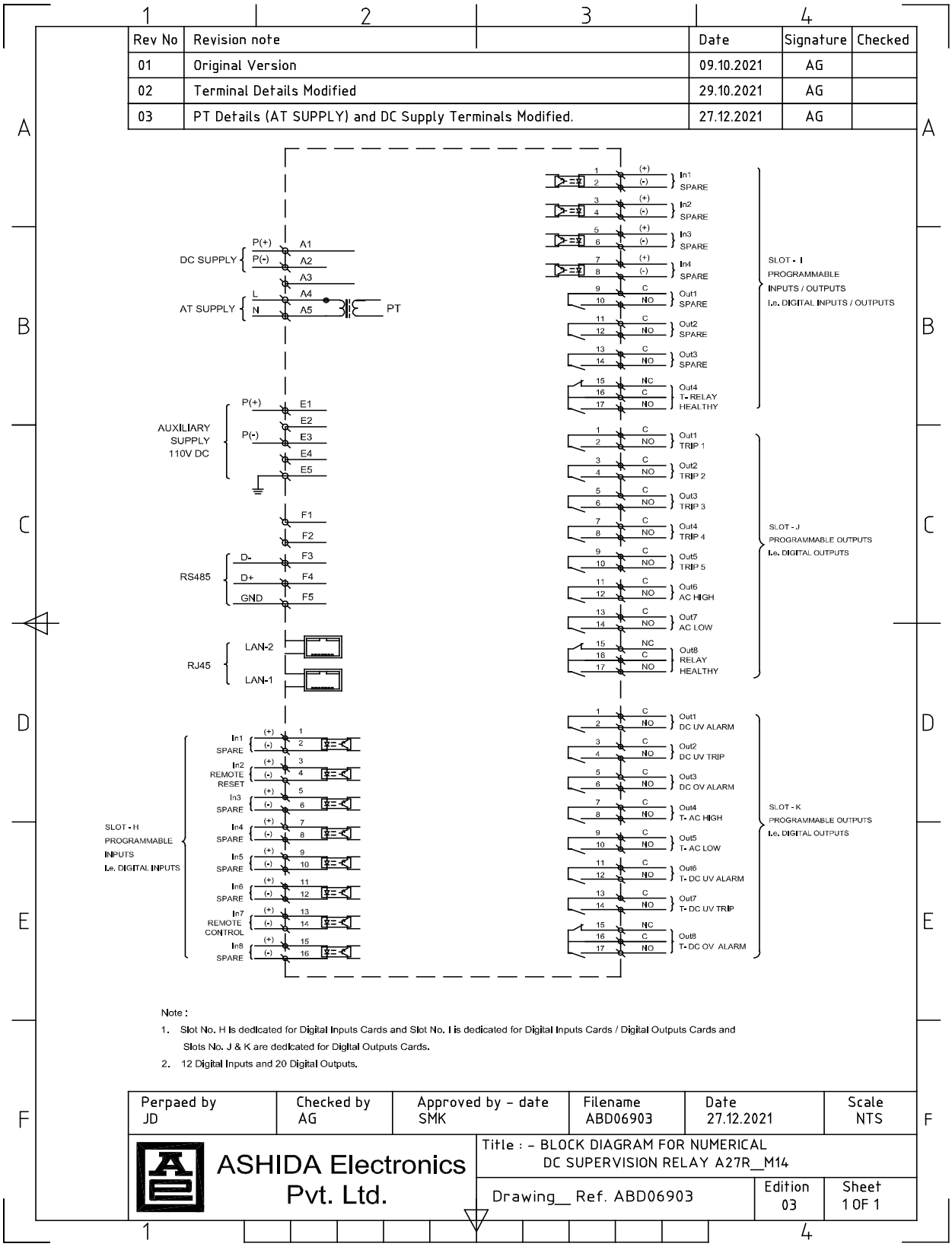


Back Terminal Details :



Electrical Connection Details :

Rev No	Revision note	Date	Signature	Checked
01	Original Version	09.10.2021	AG	
02	Terminal Details Modified	29.10.2021	AG	
03	PT Details (AT SUPPLY) and DC Supply Terminals Modified.	27.12.2021	AG	



Note :

1. Slot No. H is dedicated for Digital Inputs Cards and Slot No. I is dedicated for Digital Inputs Cards / Digital Outputs Cards and Slots No. J & K are dedicated for Digital Outputs Cards.
2. 12 Digital Inputs and 20 Digital Outputs.

Perpaed by	Checked by	Approved by – date	Filename	Date	Scale
JD	AG	SMK	ABD06903	27.12.2021	NTS

ASHIDA Electronics Pvt. Ltd.

Title : – BLOCK DIAGRAM FOR NUMERICAL DC SUPERVISION RELAY A27R__M14

Drawing__ Ref. ABD06903 | Edition 03 | Sheet 1 OF 1

General Specifications:

DC Voltage Inputs:

Nominal Voltage 110V +50% /-70% dc

Rated Insulation Voltage: 2.5kV

Burden: <20 Watt

AC Voltage Inputs:

1.15 X Vn for Continuous

1.5 X Vn for 10s

Over Voltage Category III

Pollution Degree 2

Rated Insulation Voltage: 2.5kV

Burden: <20VA

System Frequency:

50Hz / 60Hz

Frequency Tracking: 45 – 55Hz for 50Hz and 55 55 – 65Hz for 60Hz

Power Supply:

Range: 110 V DC +15%, -30%

Burden: < 20 Watt

Digital Outputs:

Continuous carry: 5A at 110V DC

Make: 30A for 200 ms at 110V DC

Breaking capacity: 1000 watts @ 110Vdc resistive, 30 watts @ 110Vdc inductive (L/R = 45ms)

Digital Inputs:

Operating range: 77 – 230 Vdc

Communication Ports:

Front Port – USB

Rear Ports – RJ45 (10-100/Base T Copper) & RS485

Operating Temperature:

Operating Temperature: -25^{O}C to +65^{O}C

Storage Temperature: -25^{O}C to +70^{O}C

Humidity: 95% RH

Weight: < 6.5 kg Approximate

Ordering Information:

Ordering Information												
	1-4	5	6	7	8	9	10	11	12	13	14	15
Model	A27R	X	X	X	X	X	X	X	X	X	X	X
Example	A27R	0	0	2	0	6	7	2	3	2	H	0
DC SUPERVISION												
Cabinet Details												
Modular Version		M										
Variant												
2x25			0									
Language												
English				0								
Protocol												
IEC 103 (for all other protocol 103 will native)					0							
IEC 61850					2							
CT / PT												
1PT: 240.0V AC						0						
Digital Outputs												
16 DO							1					
20 DO							3					
Digital Inputs												
16 DI								1				
12 DI								3				
DI Setting Threshold												
18VDC									0			
35VDC									1			
77VDC									2			
154VDC									3			
Auxiliary Supply												
24VDC – 230 VDC										2		
110VDC										3		
Cabinet Details												
Modular Version M-14											2	
Modular Version M-19											3	
Communication Ports												
Disable / No Rear Port												0
RS-485 Rear Port												B
10/100 Base-T Ethernet RJ45 Rear Port												C
10/100 Base-T Ethernet RJ45 Rear Port & RS-485 Rear Port												E

DUAL 10/100 Base-T Ethernet RJ45 Rear Port	F
DUAL 10/100 Base-T Ethernet RJ45 Rear Port & RS-485 Rear Port	H
DUAL 10/100 Base-T Ethernet RJ45 Rear Port & RS-485 Rear Port + IRIGB Port	M
DUAL FO Ethernet Rear Port & RS-485 Rear Port	N

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