TRANSFORMER OC + REF PROTECTION RELAY : A24R

Introduction:

ASHIDA has designed economical & reliable Multifunction A24R Protection & Control System. The simple and compact construction of ADITYA series A24R relay provides integrated Protection, Control and Monitoring functions.

A24R is OC + EF Protection Relay specially designed for Scott connected or single-phase traction transformer primary and secondary sides protection as per RDSO Specifications TI-SPC-PSI-PROTCT-7101.

Functional Overview:

Key Protection & Control Functions:

- Two Independent Settings Groups.
- Phase Over Current Protection (50/51)
- Ground Over Current Protection (50N/51N).
- Three independent stages for Phase & Ground Over Current Protection.
- Overload Protection.
- Breaker Failure Detection.
- 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 Current 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:

The A24R is second generation Numerical Integrated Feeder Protection Relay for Traction Transformer Application. It consist all the necessary protection and monitoring functions required for LV side and HV side of traction transformer feeder.

The A24R provides protection for AC Traction Overhead Equipment and various electrical network and electrical installation.

Over Current Protection:

The A24R relay is provided with three seperate over current element. There are three independent stages for each over current element, each stage can be set as Definite Time or IDMT and Operating time of over current element shall be settable instantaneous or with definite time & inverse time delay.

Ground Over Current Protection:

The A24R-M0 consists of Ground OC (EF) protection against earth faults within the transformer. The current setting is settable between 2% and 100% in step of 1%. The operating time of the relay is 25ms at 5 times of set value.

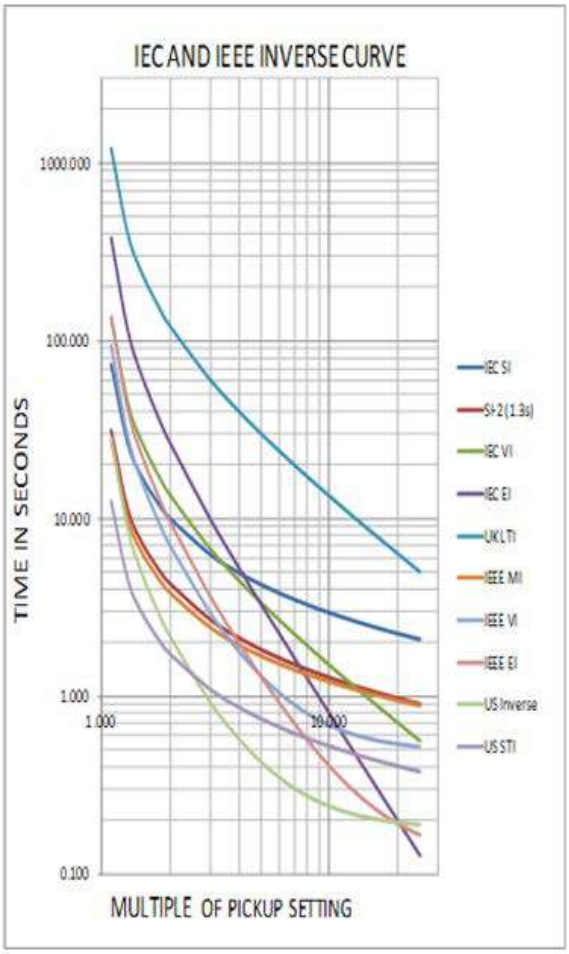
During normal load condition and through fault condition current through EF CT is zero, but during winding fault of transformer this creates unbalance and trip the relay instantly.

The following tripping characteristics are available;

- IEC Characteristic Curves
- IEEE Characteristic Curve
- Definite Time Over current

$$t = T * \left\{ \frac{K}{\left(\frac{I}{I_s} \right)^{\alpha} - 1} + L \right\}$$

Curve Description	K	α	L
IEC S Inverse	0.14	0.02	0
ST Inverse 1.3S	0.06	0.02	0
IEC V Inverse	13.5	1	0
IEC E inverse	80	2	0
UK LT Inverse	120	1	0
Define Time	-	-	-
IEEE M Inverse	0.0515	0.02	0.114
IEEE V Inverse	19.61	2	0.491
IEEE Inverse	28.2	2	0.1217
US Inverse	5.95	2	0.18
US ST Inverse	0.0239	0.02	0.0169

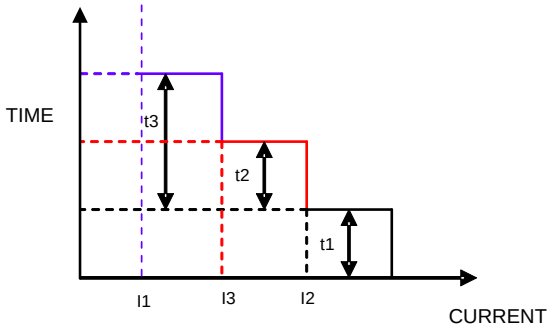


IDMT characteristic

Over Load Protection:

Traction transformer is a very robust in design. It can sustain 150% overload for 15minutes. Present practice is to use only IDMT OC relay for transformer protection. The operating time of IDMT relay must be set in such a way that it will not give more than 400ms – 500ms time during fault condition for LV Side and 800ms – 900ms for HV Side. This give very less operating time during overload condition. This result an under utilization of transformer capacity during overload condition.

The A24R is specifically design to give maximum utilisation of transformer capacity.



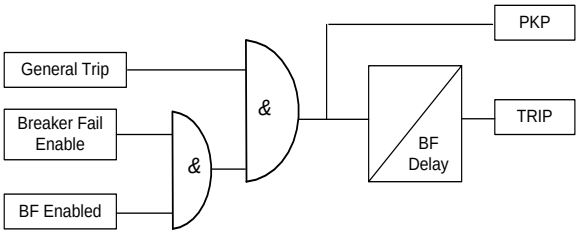
over Load Characteristic

The A24R-M0 has 3 Definite Time over load sensing element OL1, OL2 and OL3. The tripping current can be set from 50% to 400% in steps of 1%. The operating time for this element can be set from 1sec. to 900sec. The tripping current should be set in increasing order i.e. Over Load stage 3 > Over Load stage 2> Over Load stage 1 .While operating time should be set in decreasing order i.e. T3 < T2 and T2 < T1. This gives more time for overload while less operating time for higher over load.

Breaker Failure Detection:

The “Breaker Failure Timer” is initiated when a trip order is issued through the internal protection trip or by an External “BF (Breaker Failure) initiation” digital input signal, the relay issues Breaker Failure Detection (LBB function) signal when the fault is not cleared within the certain time delay (settable 0 to 5000ms in steps of 10 ms). There are two NO output contact are provided for tripping the circuit breaker,

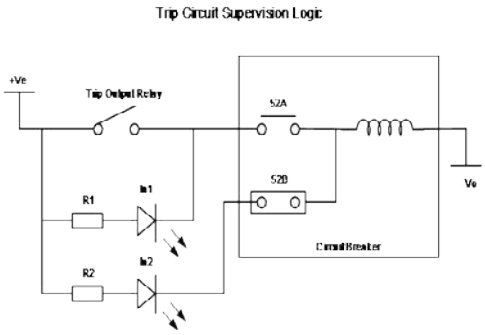
one is for local alarm and other one is for Tele signalling. If more contact are needed then that can be provided using contact multiplication relay in panel.



Breaker Fail Logic

Trip circuit super vision:

In A24R we use two separate digital opto coupler status input in XOR gate which can be used to continuously monitor continuity of trip-circuit. The following diagram explain the logic of trip circuit supervision function.

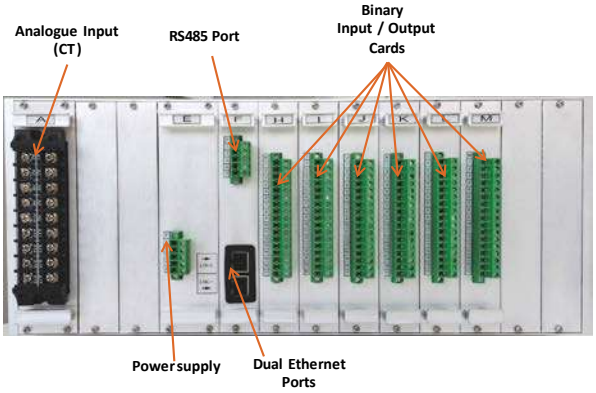


Trip Circuit Logic

A24R monitor continuity of trip circuit through either normally open (NO) or normally close (NC) contact of CB connected to opto isolator digital input assigned to TCS. If any discontinuity is observed, then the relay generates “TCS Alarm” after a 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 A24R

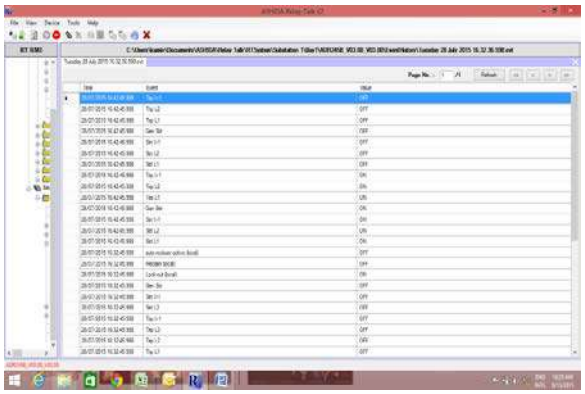
Programmable LEDs and Pushbuttons:

The A24R relay provides total 16 nos. of target and programmable LEDs with dual color indications. The LEDs can be programmed through PC software (RTV2 software).

The A24R also provides the programmable pushbuttons for circuit breaker close and open from HMI of relay. Pushbuttons can be programmed through HMI or through RTV2 software.

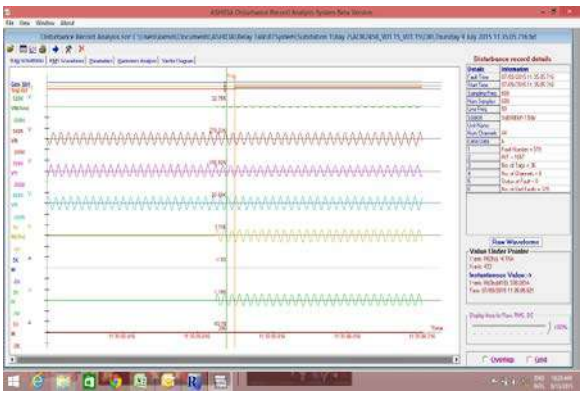
Event recording:

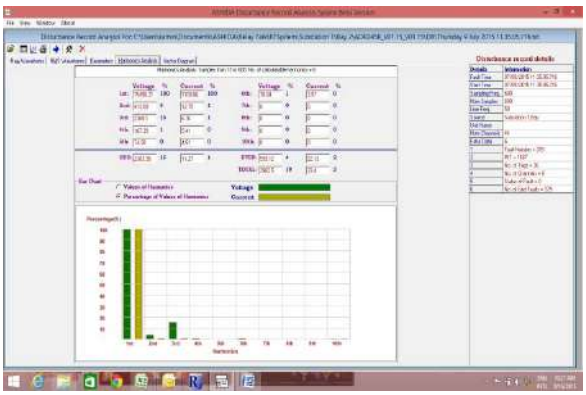
A24R relay provides a feature to record and store 1024 nos. of events (with event time stamping of 1mSec precision) in non-volatile memory through internally by protection and control functions and externally by triggering the digital inputs. And these can be extracted using communication port or can be seen on the LCD. The event can be triggered on time stamp through time synchronization or through internal clock setting.



Disturbance recording:

A24R relay provides built in disturbance recording facility for recoding analogue and digital channels. Relay records 10 nos. of disturbances of 1.5 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:

A24R 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.

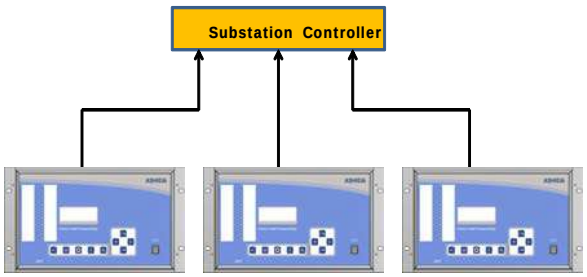
Metering:

Online metering feature of A24R relay provides metering of parameters current magnitude on HMI display or in RTV2 software.

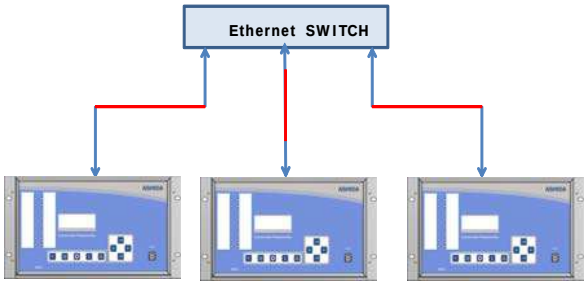
IEC 60870-5-103 Protocol:

A24R 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:

A24R relay provides internationally standardized protocol such as IEC61850 / IEC104 / MODBUS TCP for substation automation via Ethernet port of protection relays (Ref ordering information for details)

IEC61850 GOOSE and Interoperability:

A24R 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. A24R support total 16 simultaneous GOOSE signal which can publish and received by other relays having IEC61850 protocol. Similarly A24R can able subscribed total 16 nos of simultaneous signal published by other relays and can be use for interlocks. The A24R 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.	TCS Enable	Disabled / Logic Low / Logic High
3.	TCS Delay	0.1s to 10s in steps of 0.1s
4.	CB Open S'vision	Disabled / Enabled
5.	CB Open Time	50ms to 1000ms in steps of 10ms
6.	CB Open Alarm	Disabled / Enabled
7.	CB Oper. Counter	10 to 50000 in steps of 1
8.	Sigma I	Disabled / Enabled
9.	CB Rated I	1 to 5000A in steps of 1A
10.	M Constant	0.100 to 5.000 in steps of 0.001
11.	CB Control By	Disabled / Local / Remote / Local + Remote
12.	t CB Open Pulse	00.10 to 50.00sec in steps of 0.01s
13.	t CB Close Pulse	00.10 to 50.00sec in steps of 0.01s
14.	Invalid DPI Dur H	0.1 to 600s in steps of 0.01s
15.	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.	PH CT Secondary	1A / 5A
2.	PH CT Primary	10 to 30000A in steps of 1A
3.	EF CT Secondary	1A / 5A
4.	EF CT Primary	10 to 30000A in steps of 1A

PROTECTION

Sr. No	Parameter	Setting / Ranges
1.	Password	0000 to zzzz / ZZZZ

2.	Over Current 1	Disabled / Enabled
3.	Over Current 2	Disabled / Enabled
4.	Over Current 3	Disabled / Enabled
5.	Overload	Disabled / Enabled
6.	Ground OC	Disabled / Enabled
7.	Breaker Failure	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

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

Over Current 1

Sr. No	Parameter	Settings / Ranges
1.	IP1>1 Enable	Disabled / Enabled
2.	IP1>1 Curve	Definite Time / IEC S Inverse / ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse
3.	IP1>1	If DT 50% to 3000% in steps of 1% If IDMT then 5% to 400% in step of 01%
4.	tIP1>1 DT Delay	0 to 1899.9s in steps of 0.01s
5.	IP1>1 TMS	0.01 to 1.5 in steps of 0.01
6.	IP1>1 Time Dial	0.01 to 100.00 in steps of 0.01

7.	IP1>1 D/O Char	Disabled / DT / IDMT
8.	tIP1>1 tD/O Delay	0s to 100s in steps of 0.01s
9.	IP1>1 D/O TMS	0.025 to 1.2 in steps of 0.005
10.	IP1>1 2H BLK	Disabled / Enabled
11.	IP1>1 2H Thresh	5% to 70% in steps of 1%
12.	IP1>1 UB2H	400% to 2800% in steps of 1%

NOTE: *Over Current1 settings for IP1>2 Enable and IP1>3 Enable are similar to IP1>1 Enable settings.*

Over Current 2

Sr. No	Parameter	Settings / Ranges
1.	IP2>1 Enable	Disabled / Enabled
2.	IP2>1 Curve	Definite Time / IEC S Inverse / ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse
3.	IP2>1	If DT 50% to 3000% in steps of 1% If IDMT then 5% to 400% in steps of 01%
4.	tIP2>1 DT Delay	0 to 1899.9s in steps of 0.01s
5.	IP2>1 TMS	0.01 to 1.5 in steps of 0.01
6.	IP2>1 Time Dial	0.01 to 100.00 in steps of 0.01
7.	IP2>1 D/O Char	Disabled / DT / IDMT
8.	tIP2>1 tD/O Delay	0s to 100s in steps of 0.01s
9.	IP2>1 D/O TMS	0.025 to 1.2 in steps of 0.005
10.	IP2>1 2H BLK	Disabled / Enabled
11.	IP2>1 2H Thresh	5% to 70% in steps of 1%
12.	IP2>1 UB2H	400% to 2800% in steps of 1%

NOTE: *Over Current2 settings for IP2>2 Enable and IP2>3 Enable are similar to IP2>1 Enable settings.*

Over Current 3

Sr. No	Parameter	Settings / Ranges
1.	IP3>1 Enable	Disabled / Enabled
2.	IP3>1 Curve	Definite Time / IEC S Inverse / ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse
3.	IP3>1	If DT 50% to 3000% in steps of 1% If IDMT then 5% to 400% in steps of 01%

4.	tIP3>1 DT Delay	0 to 1899.9s in steps of 0.01s
5.	IP3>1 TMS	0.01 to 1.5 in steps of 0.01
6.	IP3>1 Time Dial	0.01 to 100.00 in steps of 0.01
7.	IP3>1 D/O Char	Disabled / DT / IDMT
8.	tIP3>1 tD/O Delay	0s to 100s in steps of 0.01s
9.	IP3>1 D/O TMS	0.025 to 1.2 in steps of 0.005
10.	IP3>1 2H BLK	Disabled / Enabled
11.	IP3>1 2H Thresh	5% to 70% in steps of 1%
12.	IP3>1 UB2H	400% to 2800% in steps of 1%

NOTE: *Over Current3 settings for IP3>2 Enable and IP3>3 Enable are similar to IP3>1 Enable settings.*

Over Load

Sr. No	Parameter	Settings / Ranges
1.	OL>1 Enable	Disabled / Enabled
2.	OL>1 Current Set	50% to 400% in steps of 1%
3.	OL>1 Delay	0 to 900s in steps of 1s
4.	OL>1 2H BLK	Disabled / Enabled
5.	OL>1 2H Thresh	5% to 70% in steps of 1%
6.	OL>2 Enable	Disabled / Enabled
7.	OL>2 Current Set	50% to 400% in steps of 1%
8.	OL>2 Delay	0 to 900s in steps of 1s
9.	OL>2 2H BLK	Disabled / Enabled
10.	OL>2 2H Thresh	5% to 70% in steps of 1%
11.	OL>3 Enable	Disabled / Enabled
12.	OL>3 Current Set	50% to 400% in steps of 1%
13.	OL>3 Delay	0 to 900s in steps of 1s
14.	OL>3 2H BLK	Disabled / Enabled
15.	OL>3 2H Thresh	5% to 70% in steps of 1%
16.	OLP Enable	Disabled / Enabled
17.	OLP Current Set	50% to 400% in steps of 1%
18.	OLP Delay	0 to 900s in step of 1s
19.	OLP Post Delay	1 to 180 min in steps of 1 min
20.	OLP 2H BLK	Disabled / Enabled
21.	OLP 2H Thresh	5% to 70% in steps of 1%

Ground OC

Sr. No	Parameter	Settings / Ranges
1.	IE>1 Enable	Disabled / Enabled

2.	IE>1 Curve	Definite Time / IEC S Inverse / ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse
3.	IE>1	If DT 2% to 1000% in steps of 1% If IDMT then 2% to 100% in steps of 1%
4.	tIE>1 DT Delay	0 to 1899.9s in steps of 0.01s
5.	IE>1 TMS	0.01 to 1.5 in steps of 0.01
6.	IE>1 Time Dial	0.01 to 100.00 in steps of 0.01
7.	IE>1 D/O Char	Disabled / DT / IDMT
8.	tIE>1 tD/O Delay	0s to 100s in steps of 0.01s
9.	IE>1 D/O TMS	0.025 to 1.2 in steps of 0.005
10.	IE>1 2H BLK	Disabled / Enabled
11.	IE>1 2H Thresh	5% to 70% in steps of 1%
12.	IE>1 UB2H	100% to 800% in steps of 1%
13.	IE>2 Enable	Disabled / Enabled
14.	IE>2 Curve	Definite Time / IEC S Inverse / ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse
15.	IE>2	If DT 2% to 1000% in steps of 1% If IDMT then 2% to 100% in steps of 1%
16.	tIE>2 DT Delay	0 to 1899.9s in steps of 0.01s
17.	IE>2 TMS	0.01 to 1.5 in steps of 0.01
18.	IE>2 Time Dial	0.01 to 100.00 in steps of 0.01
19.	IE>2 D/O Char	Disabled / DT / IDMT
20.	tIE>2 tD/O Delay	0s to 100s in steps of 0.01s
21.	IE>2 D/O TMS	0.025 to 1.2 in steps of 0.005
22.	IE>2 2H BLK	Disabled / Enabled
23.	IE>2 2H Thresh	5% to 70% in steps of 1%
24.	IE>2 UB2H	100% to 800% in steps of 1%

Breaker Failure

Sr. No	Parameter	Setting / Ranges
1.	Password	0000 to zzzz / ZZZZ
2.	BF Enable	Disabled/Enabled
3.	BF Delay	0 s to 5s in steps of 0.01s

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

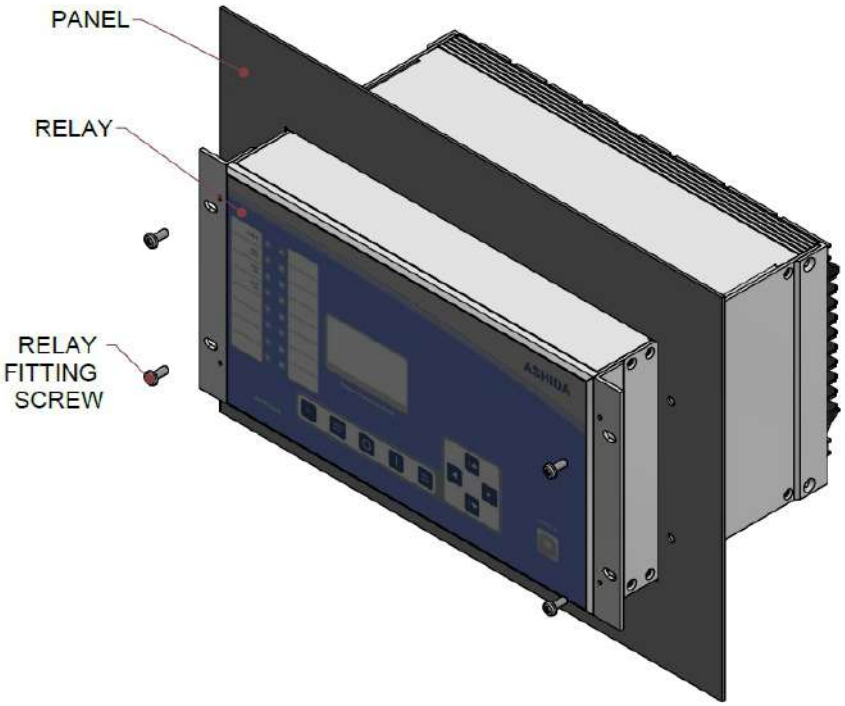
Thermal Withstand Tests		
27.	Over Current Test	IEC 60255-1
28.	Over Voltage Test	IEC 60255-1

*Detailed Type Test Reports are available on request

Drawings Information:

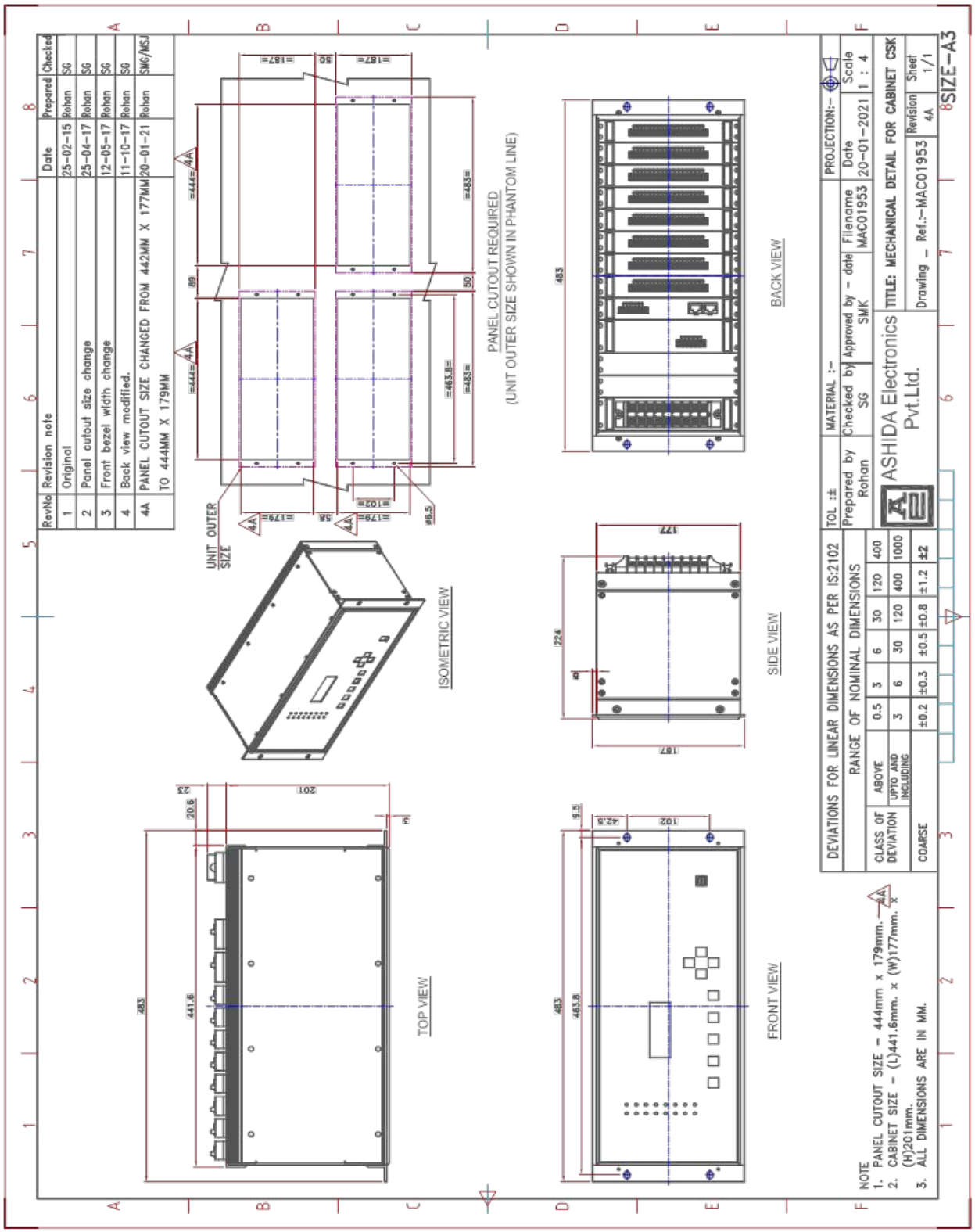
I.	Drawing References	: For Cabinet Type	MAC01953
		: For Back Connections	RLY07002
		: For Typical External Connections	ABD07002

Mounting Information:



A24R 19” Modular – Rack mounting arrangement

Mechanical Details :

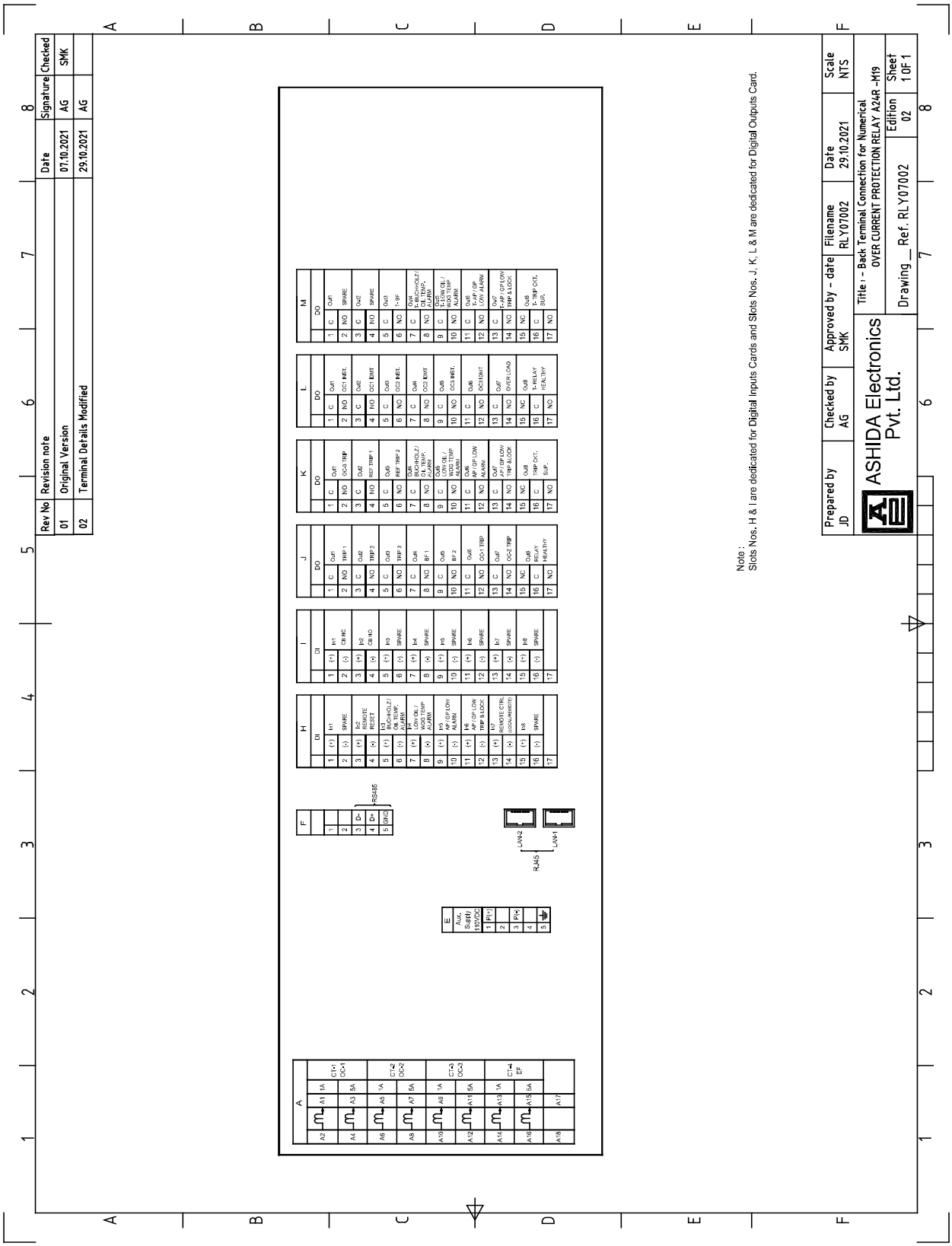


RevNo	Revision note	Date	Prepared	Checked
1	Original	25-02-15	Rohan	SG
2	Panel cutout size change	25-04-17	Rohan	SG
3	Front bezel width change	12-05-17	Rohan	SG
4	Back view modified.	11-10-17	Rohan	SG
4A	PANEL CUTOUT SIZE CHANGED FROM 442MM X 177MM TO 444MM X 179MM	20-01-21	Rohan	SWG/MSJ

DEVIATIONS FOR LINEAR DIMENSIONS AS PER IS:2102		RANGE OF NOMINAL DIMENSIONS							
CLASS OF DEVIATION	ABOVE	0.5	3	6	30	120	400	1000	
	UPTO AND INCLUDING	3	6	30	120	400	1000	2000	
COARSE		±0.2	±0.3	±0.5	±0.8	±1.2	±2	±3	

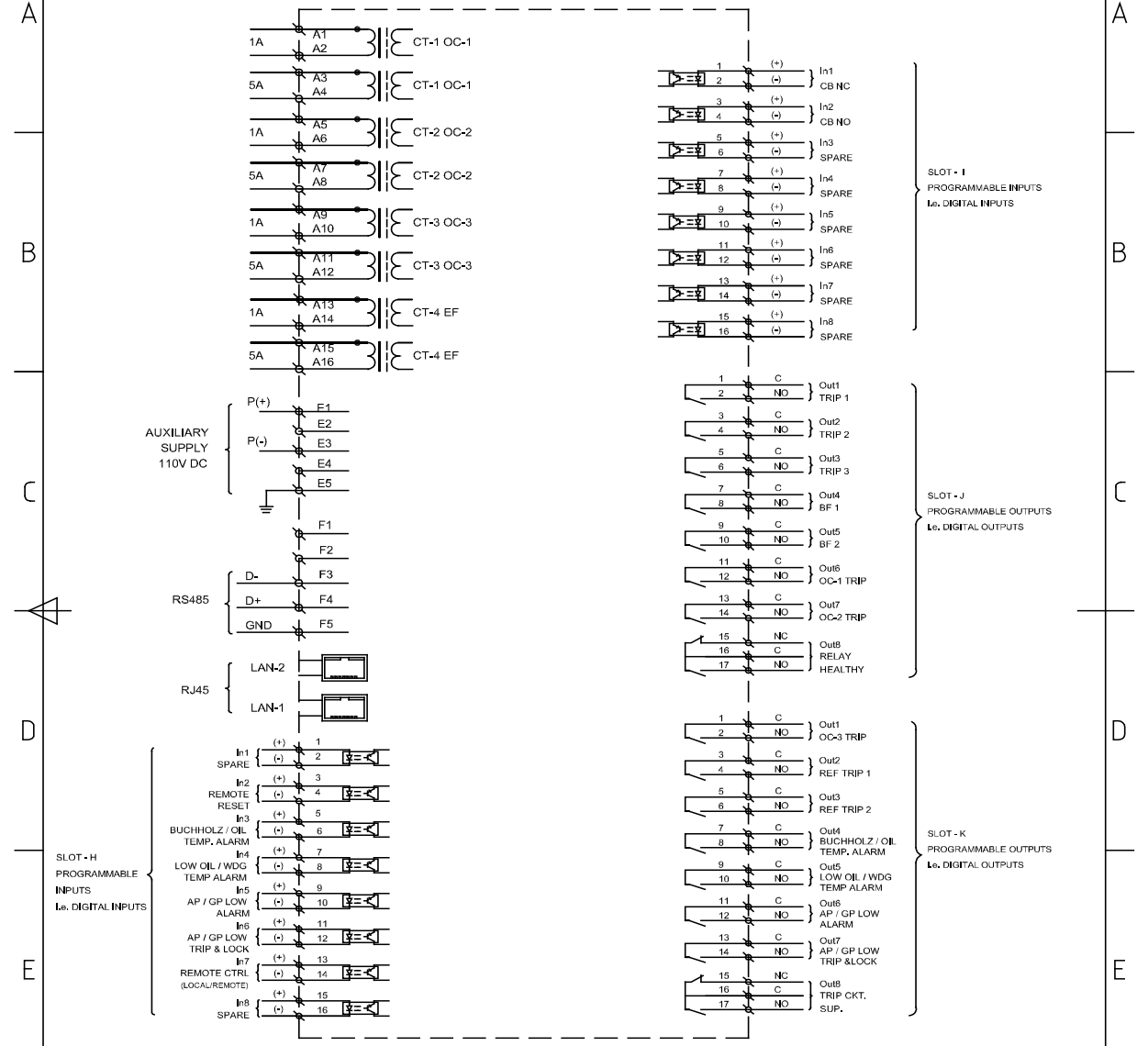
TOL :±	MATERIAL :-	PROJECTION:-
Prepared by Rohan	Checked by SG	Approved by - date SMK
Filename MAC01953	Date 20-01-2021	Scale 1 : 4
Drawing _ Ref.:-MAC01953	Revision 4A	Sheet 1/1

Back Terminal Details :



Electrical Connection Details :

Rev No	Revision note	Date	Signature	Checked
01	Original Version	07.10.2021	AG	
02	Terminal Details Modified	29.10.2021	AG	



Note :
Slots Nos. H & I are dedicated for Digital Inputs Cards and Slots Nos. J, K, L & M are dedicated for Digital Outputs Card.

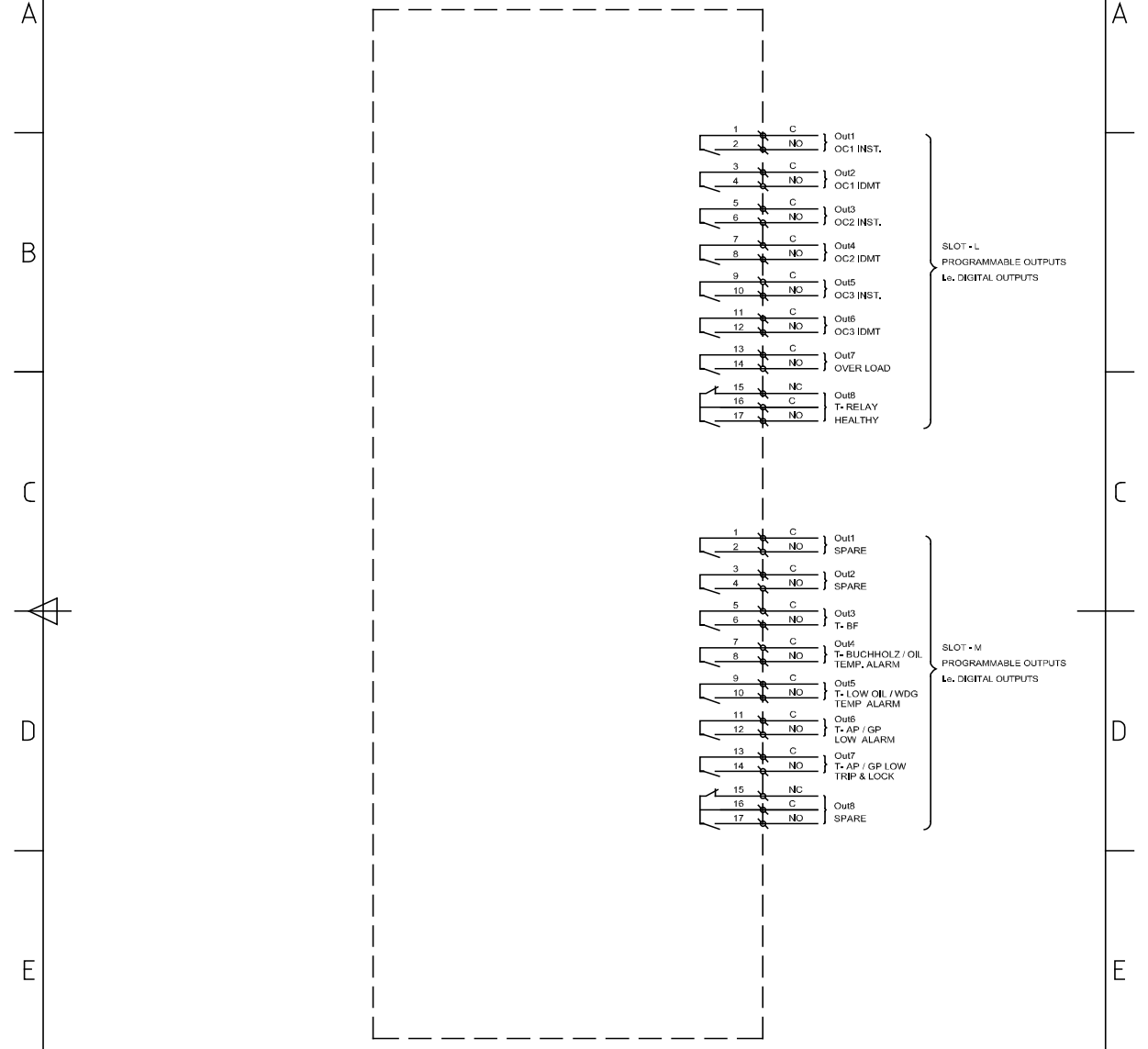
Perpaed by	Checked by	Approved by – date	Filename	Date	Scale
JD	AG	SMK	ABD07002	29.10.2021	NTS

ASHIDA Electronics Pvt. Ltd.

Title : – BLOCK DIAGRAM FOR NUMERICAL OVER CURRENT PROTECTION RELAY A24R –M19

Drawing__ Ref. ABD07002 | Edition 02 | Sheet 1 OF 2

Rev No	Revision note	Date	Signature	Checked
01	Original Version	07.10.2021	AG	
02	Terminal Details Modified	29.10.2021	AG	



Note :
Slots Nos. H & I are dedicated for Digital Inputs Cards and Slots Nos. J, K, L & M are dedicated for Digital Outputs Card.

Perpaed by	Checked by	Approved by – date	Filename	Date	Scale
JD	AG	SMK	ABD07002	29.10.2021	NTS

ASHIDA Electronics Pvt. Ltd.

Title : – BLOCK DIAGRAM FOR NUMERICAL OVER CURRENT PROTECTION RELAY A24R –M19

Drawing__ Ref. ABD07002 | Edition 02 | Sheet 2 OF 2

General Specifications:

AC Current Inputs:

1A Nominal

5A Nominal

Thermal Withstand Capacity:

40 X In for 1s

4 X In for Continuous

Burden Rating:

< 0.2VA for 1A Nominal

< 0.2VA for 5A Nominal

System Frequency:

50Hz / 60Hz

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

Power Supply:

Range: 110 VDC

Burden: < 20 W with all status & output energies

Digital Outputs:

Continuous carry: 5A at 110 VDC

Make: 30A for 0.2s at 110 VDC

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: < 7kg Approximate

Ordering Information:

Ordering Information												
	1-4	5	6	7	8	9	10	11	12	13	14	15
Model	A24R	X	X	X	X	X	X	X	X	X	X	X
Example	A24R	M	0	0	2	0	3	1	2	3	3	H
TRACTION OC + EF PROTECTION												
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												
4CT, CT Selection: 1A/5A,						0						
Digital Outputs												
16 DO							1					
32 DO							3					
Digital Inputs												
16 DI								1				
32 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-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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