



Feeder Protection Relay : ADR141C

Introduction:

ASHIDA has designed Economical, Reliable & Compact Size Multifunction ADR141C Relay. ADR141C is non communicable Feeder Protection Relay. The simple and robust construction of Aditya series, ADR141C relay provides integrated Protection and Monitoring functions for Distributed Feeders.

Protection Features:

- 4 Element (3 OC + EF) Non Directional Over current IDMT/DMT.
- Two Independent Stages for Non Directional Phase & Ground Over Current Function (50/50N/51/51N)
- Phase & Ground Over Current Protection with IDMT / Definite Time Delay (51/51N)

- Instantaneous Phase & Ground Over Current Protection with adjustable timer (50/50N).
- Cold load pick up (CLP)
- Breaker Failure Detection (50BF)
- Trip circuit supervision function (TCS)
- Site Selectable CT Secondary 1A/5A
- Password Protection
- Fault Recording on HMI display (5 nos.)

Relay Design Features:

- Design using DSP technology
- Wide Range Power Supply Input 24V to 230V AC/DC
- Continuous monitoring of internal hardware modules and error message generation in case of failure of any critical components
- Site Selectable Frequency i.e. 50/60 Hz

- 4 Nos. of user Programmable Trip Duty Output contacts
- 2 Nos. of Dedicated digital inputs for TCS i.e. CB NO & CB NC.
- 4 Nos. of User Programmable Target LED's for indication with dual colours
- Metering function
- Non-Volatile memory
- User friendly local operation with key pad
- Liquid crystal display (16x2) with backlight
- Light weight, Compact size and suitable for LV feeder application

Applications:

ADR141C numerical multifunction relay designed for Distributed feeder protection applications. Relay designed with fast and selective tripping ensures the stability and availability of electrical network.

ADR141C relay apply for protection & monitoring of radial and ring main feeder to achieve sensitivity and selectivity on phase and ground faults.

Description:

ADR141C is second generation Numerical 3OC + 1EF Over Current Relay. It consist all the necessary protection and monitoring functions required for Normal feeder. It consist of

1. High Speed Digital DSP Controller
2. Analog Measuring Module
3. Power supply Module

4. Digital Input output module.

The High speed Digital Signal Controller continuously monitors phase, E/F current along with different optical isolated status connections. The high-speed micro-controller samples these current signals through a **A/D converter**. The Digital Signal performs powerful **Numerical Algorithms** to find out RMS of fundamental & harmonic contents of the current then this value is used for protection and metering function. All measurement is tuned to fundamental frequency i.e. 50Hz / 60Hz, thus relay remain stable during distorted waveform. All these measure values are then used for different protection function such as IDMT/DT Over current protection, Instantaneous Over current protection, Earth Fault protection, etc. These measured values are also displayed on large 16 x 2 LCD display for metering purpose. The **DSC** also monitors digital input through optical isolator and perform some monitoring function such trip circuit supervision, and control potential free contact for control CB and generate ALARM and Tele-signalling.

The power supply module is basically DC – DC converted designed using modern PWM based Switching mode technique to convert station battery supply to the 12V and 24Vdc low voltage supply for relay electronics and control circuit. It also provides necessary isolation from station

battery. The power supply module is design using very advance PWM controller which allow very wide input supply variation i.e. 24V to 230V AC/DC covering 24Vdc, 30Vdc, and 110V dc and 220Vdc station battery requirement.

The relay is having total 4 nos of high intensity dual colour LED for easy identification of type of fault for user interface. All LEDs and control outputs are fully programmable via keypad interface.

Functional Overview:

ANSI Code	Description
CLP	Cold load pick up
50	Instantaneous/Definite Time Phase Over current Protection
51	Inverse Time Phase Over current Protection
50N	Instantaneous/Definite Time Ground Over current Protection
51N	Inverse Time Ground Over current Protection
TCS	Trip Circuit Supervision

Non Directional Over Current Protection (50/50N/51/51N):

The ADR141C is member of Ashida Numerical Relay family design for protection general feeder. The relay has one stage of IDMT/DT setting and one stage of instantaneous setting (IP>, IP>>, IE>, IE>>). All major international IEC IDMT curves are available. Range for first stage is 10% to 250% and 50% to 3000% for instantaneous stage for phase and EF.

Although the curves tend towards infinite when the current approaches Is (general threshold), the minimum guaranteed value of the operating current for all the curves with the inverse time characteristic is 1.1Is

ADR141C relay provides two stages of externally measured ground over current protection. ADR141C relay measures ground fault current through neutral CT input. Externally ground CT input can also apply for high impedance restricted earth fault protection or sensitive ground fault protection through CBCT.

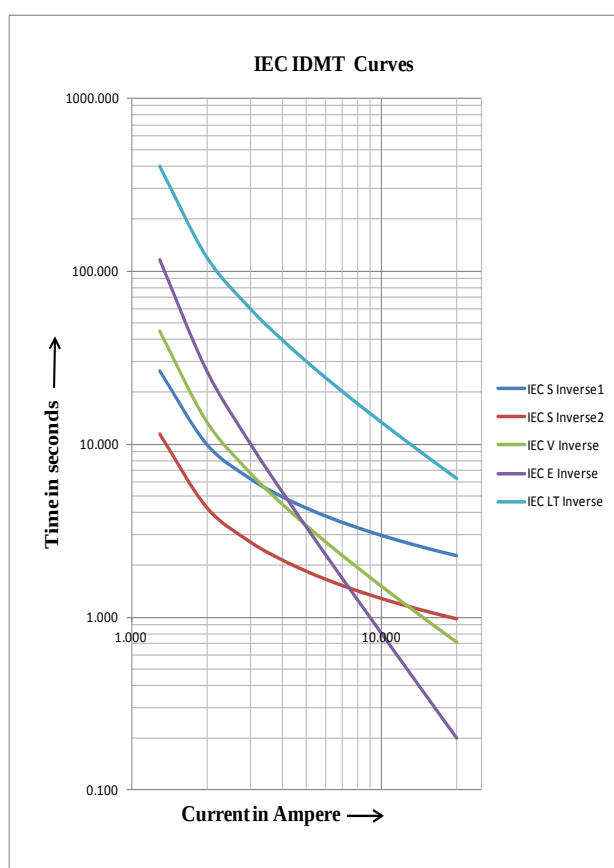
Inverse Time Curves:-

ADR141C relay provides inverse time over current characteristic for phase and ground over current elements. Selectable IEC inverse time curves with non directional over current protection will be providing greater selectivity, flexibility and sensitivity to users for better relay co-ordinations. The stage of phase (IP>) and ground (IE>) over current elements are independently settable with inverse time or definite time characteristic.

The following tripping characteristics are available;

$$t = \frac{K^* a}{\left(\frac{I}{I_{ref}}\right)^b - 1}$$

Curve Type	Description	a	b
C1	Standard Inverse_1	0.14	0.02
C2	Standard Inverse_2	0.06	0.02
C3	Very Inverse	13.5	1
C4	Extremely inverse	80	2
C5	Long Time Inverse	120	1
C6	Define Time	-	-



IEC Inverse curves for tripping of over current elements

Cold load pickup functions (CLP):

ADR141C provides the cold load pick up (CLP) functions for multiple applications. The application of this feature can be used to avoid wrong operation on inrush current

during transformer energization without compromising sensitivity of over current protection.

Digital Inputs & Outputs:

The ADR141C relay is equipped with 2 no's of optically isolated digital input dedicated for Trip Circuit Supervision.

The ADR141C relay is equipped with 4 no's of digital outputs. User can assign DO as per desired application.

Target LEDs:

The ADR141C relay provides total 4 nos. of target LEDs with dual colour indication. User can assign LED as per desired application.

Fault recording & Metering:

ADR141C relay is providing fault record facility. The relay can record 5 nos. of fault records in non-volatile memory. The fault records can be displayed on HMI display. Online metering feature of ADR141C relay is providing metering of parameters (i.e. current magnitude) on HMI display.

Technical Specifications:

General specifications		
Sr. No.	Specification	Particulars
I.	Current Input	: 1A / 5A (Site Selectable)
II.	Aux. Supply	: 24 – 230V AC/DC.
III.	VA burden on CT	: Less than 0.2VA
IV.	VA burden on Aux.	: Less than 10 Watts
V.	Operating Temp. range	: -10 deg. To + 65 deg.
VI.	Continuous carrying capacity	: 2 x of rated CT secondary
VII.	Thermal With stand for CT	: 20 x of rated CT secondary for 3.0 sec.
VIII.	Pick up	: Within 1.1 times of set value.
IX.	Reset Value	: 95% to 90% of pick up.
X.	Output Contact	: 4 Trip duty user assignable
XI.	Contact Rating	: Continuous: 5A : Make & carry for 0.5 sec : 30A : Make carry for 3 sec : 15A
XII.	Opto Isolated input	: 1 for CB NO & 1 for CB NC

Relay Settings:

General Settings			
I.	General settings	: New PassWord	0000 – FFFF in steps of 1
		: Unit Id	0 – 250 in steps of 1
		: PH CT Secondary	1A or 5A (Site Selectable)
		: PH CT Primary	10 – 3000A steps of 1A
		: EF CT Secondary	1A or 5A (Site Selectable)
		: EF CT Primary	10 – 3000A steps of 1A
		: Test Block	Yes / No
		: Trip Ckt.	Yes / No
		: BF Enable	Yes / No
		: BF Delay	50 – 800 ms. steps of 50ms
		: Frequency	50HZ / 60HZ
Relay Settings			
II.	Relay Settings	: IP> Enable	YES / NO
		: IP> Settings	10% – 250% in steps of 1%.
		: IP> TMS	x0.01 – x1.00 in steps of 0.01
		: IP>> Enable	YES / NO

		: IP>>> Settings	50% – 3000% insteps of 50%
		: IE> Enable	YES / NO
		: IE> Settings	10% – 250% in steps of 1%.
		: IE> TMS	x0.01 – x1.00 in steps of 0.01
		: IE>> Enable	YES / NO
		: IE>> Settings	50% – 3000% insteps of 50%
		: IP> Curve (Operating Time)	C1 – C6 (IDMT curve C1 – C5 or Define Time C6)
		: IE> Curve (Operating Time)	C1 – C6 (IDMT curve C1 – C5 or Define Time C6)
		: IP>> Delay	0 – 2.00 Sec in steps of 0.01Sec.
		: IE>> Delay	0 – 2.00 Sec in steps of 0.01Sec.
		: IE> C6 Delay	0 – 99.9 Sec in steps of 0.1Sec.
		: IE> C6 Delay	0 – 99.9 Sec in steps of 0.1Sec.
Cold Load settings			
III.	Cold Load Settings	: CL Enable	01: YES, 02: NO
		: CL Timer	0.1 – 10.00S in steps of 0.01 sec
		: IP> Settings	10% – 250% in steps of 1%.
		: IP> TMS	x0.01 – x1.00 in steps of 0.01
		: IP>> Enable	YES / NO
		: IP>> Settings	50% – 3000% insteps of 50%
		: IE> Enable	YES / NO
		: IE> Settings	10% – 250% in steps of 1%.
		: IE> TMS	x0.01 – x1.00 in steps of 0.01
		: IE>> Enable	YES / NO
		: IE>> Settings	50% – 3000% insteps of 50%
		: IP> Curve (Operating Time)	C1 – C6 (IDMT curve C1 – C5 or Define Time C6)
		: IE> Curve (Operating Time)	C1 – C6 (IDMT curve C1 – C5 or Define Time C6)
		: IP>> Delay	0 – 2.00 Sec in steps of 0.01Sec.
		: IE>> Delay	0 – 2.00 Sec in steps of 0.01Sec.
		: IP> C6 Delay	0 – 99.9 Sec in steps of 0.1Sec.
		: IE> C6 Delay	0 – 99.9 Sec in steps of 0.1Sec.

Operational Indicators (Flags) :

4 nos. of user assignable dual color output LED Default assignment		
I.	LED1 - PROT.H /ON	: Green LED indicates Relay OK (Protection Healthy) : Red LED indicates Fault in following conditions. Problem in relay Hardware. Trip Circuit Faulty
	LED 2 - PICK-UP	: Red LED indicate Start of timer Self Reset (SR) Type
	LED 3 - FAULT	: Red LED indicate Relay Operated Flag (HR)
	LED 4 - TRIP	: Red LED indicates Output TRIP relay contact closer (SR) Type

Drawing Reference:

Drawing References			
I.		: For Typical External connection	- ADV02708
		: For Cabinet Type	- AEM1906001

Mechanical Specification:

Mechanical Specifications		
I.	Net Weight	: Approx. 1.7 Kg.

Typical Tests Information:

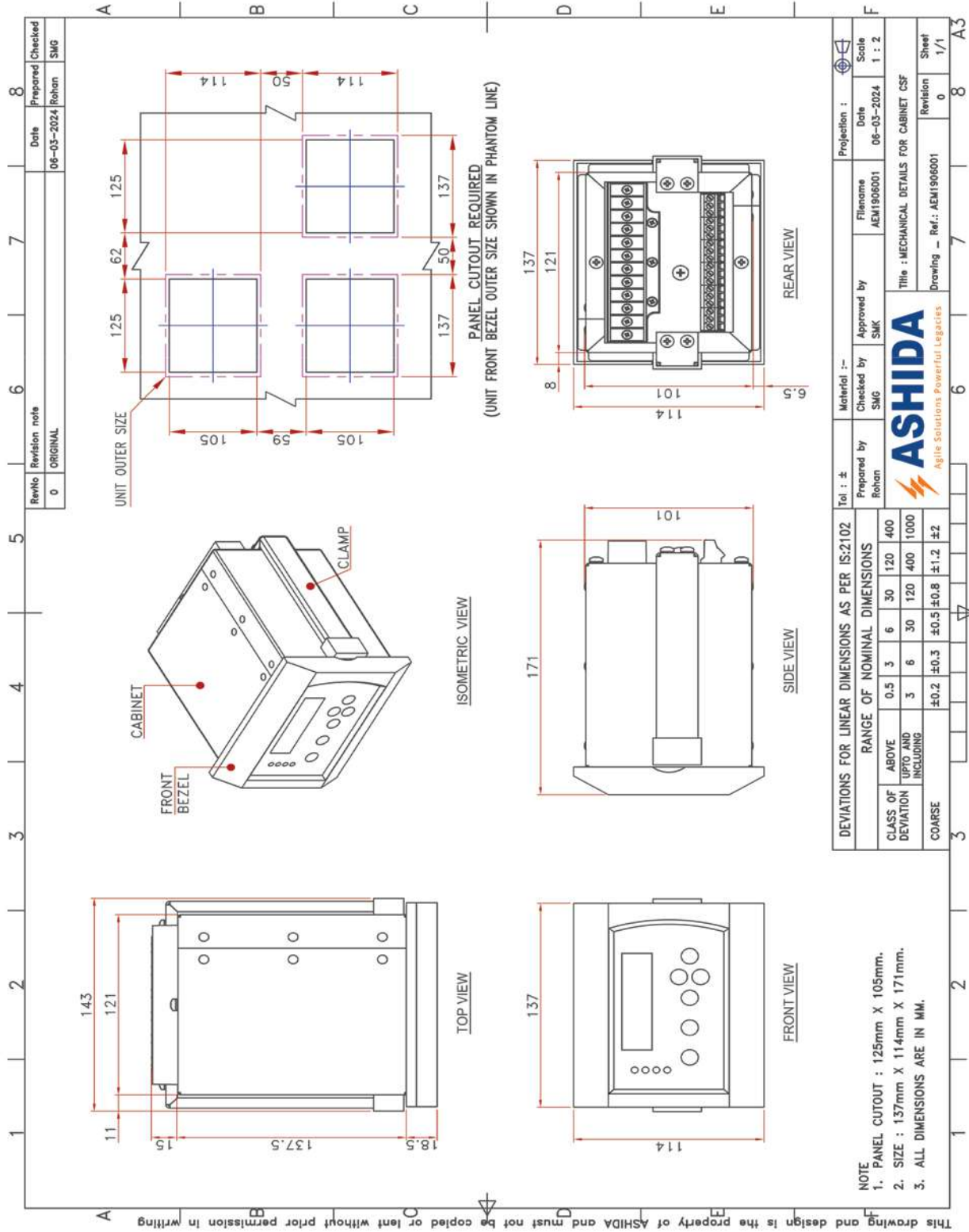
The Relay Confirm to following standards

SR. NO.	TEST	STANDARDS
Impulse, Dielectric and Insulation Requirement		
i.	Impulse Voltage Test	IEC 60255-27:2005 (incl. corrigendum 2007)
ii.	Dielectric Voltage Withstand Test	IEC 60255-27:2005 (incl. corrigendum 2007)
iii.	Insulation Resistance Test	IEC 60255-27:2005 (incl. corrigendum 2007)
Immunity Test		
iv.	High Frequency Disturbance Test	IEC60255-26(ed3.0)-2013
v.	Electrostatic Discharge	IEC60255-26(ed3.0)-2013
vi.	Surge Test	EN61000-4-5. IEC60255-26(ed3.0)-2013
vii.	Fast Transient	EN 61000-4-4:2004, IEC60255-26(ed3.0)-2013
viii.	Radiated radio freq. Electromagnetic field	EN 61000-4-3: 2006+A1:2008 IEC60255-26(ed3.0)-2013

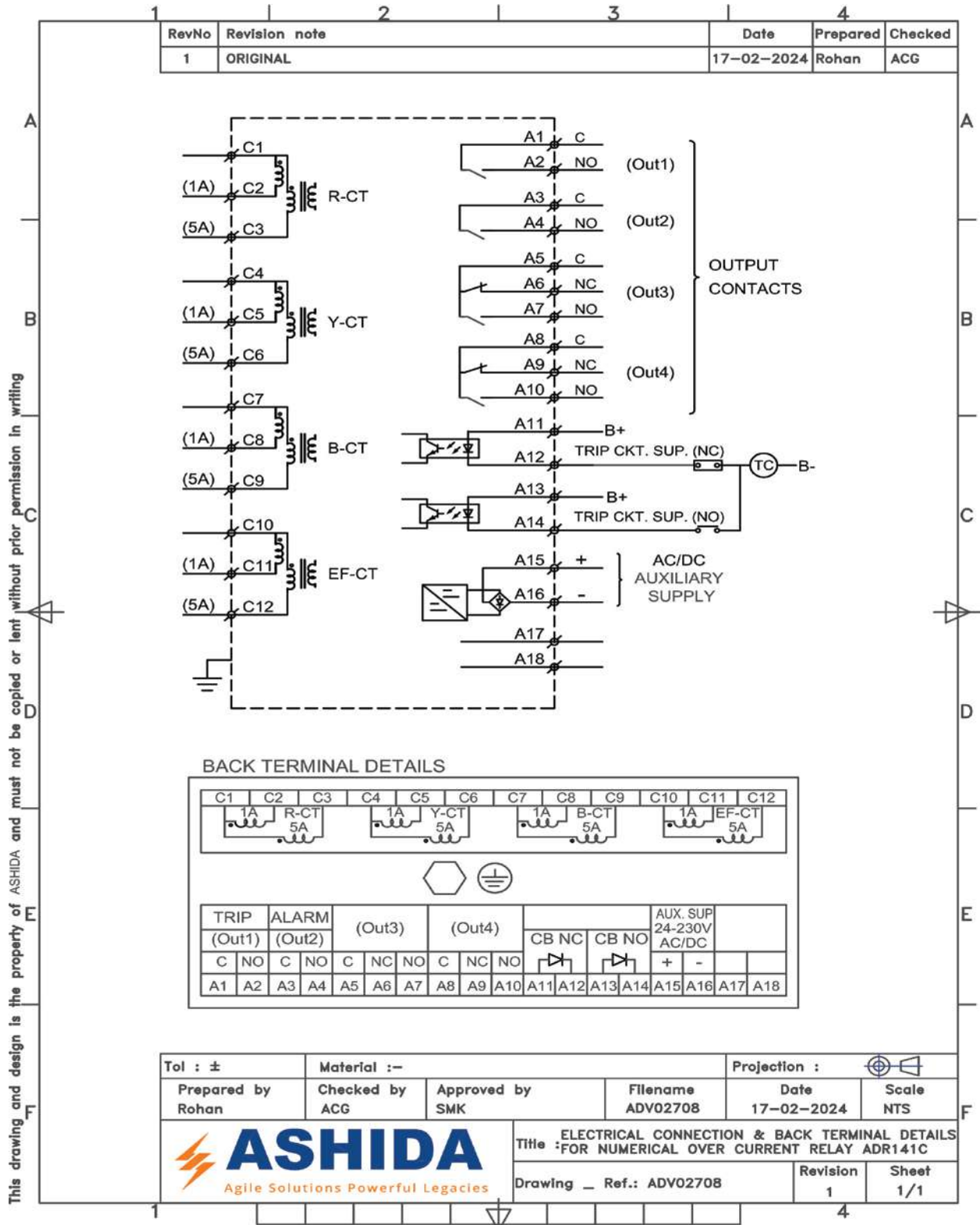
Mechanical Tests		
ix.	Vibration Response Test	EN 60255-21-1:1996 Class 2
x.	Shock Response Test	EN 60255-21-2:1996 Class 2
Environmental Tests		
xi.	Dry Heat Operational Test	IEC 60068-2-2 Bd
xii.	Dry Heat Storage Test	IEC 60068-2-2 Bd
xiii.	Cold Operational Test	IEC 60255-1, EN 60068-2-1
xiv.	Cold Storage Test	IEC 60255-1, EN 60068-2-1

***NOTE:** Detailed Type Test Reports are available on request.

Mechanical Dimensions:



Electrical connection & Back Terminal Details:



Ordering Information:

While Ordering Specify the following Information for ADR141C Relay

Ordering Information														
	1-4	5	6	7	8	9	10	11	12	13	14	15		
Model	141C	X	X	X	X	X	X	X	X	X	X	X		
Example	141C	B	0	0	X	0	1	1	0	2	0	0		
FEEDER PROTECTION														
Sub Type														
Basic Version	B													
Variant														
Standard	0													
Language														
English	0													
Protocol														
Not Applicable		X												
CT / PT & RTD														
Default: 4CT, CT Selection: 1A/5A												0		
Digital Outputs														
4 DO												1		
Digital Inputs														
2 DI												1		
DI Setting Threshold														
18VDC												0		
77VDC												2		
Auxiliary Supply														
24 – 230 VDC / VAC													2	
Cabinet Details														
Non-Draw Out											0			
Communication Ports														
Disable / No Rear Port												0		

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