Technical Specifications:

Ordering Cat. Nos.:	17K716QF4N	17K716QF4M	17K726QF4N	17K726QF4M
Supply Characteristics:				
Supply Voltage (⏚)	110 - 240 VAC/DC, 47-63Hz		240 - 415 VAC/DC, 47-63Hz	
Supply Variation	-20% to +10%			
Power Consumption (Max.)	6 VA			
Relay O/P Characteristics:				
Contact Rating	1 C/O (Alarm) + 1 C/O (Fault);10A (Resistive) @ 240 VAC / 25 VDC			
Contact Arrangement	SPDT (Alarm) Relay (15, 16 & 18) & SPDT (Fault) Relay (25, 26 & 28)			
Electrical Life Expectancy	$1X10^5$			
Mechanical Life Expectancy	$1X10^7$			
Contact Material	AgSnO2			
Feature Characteristics:				
Type Class	'A' True RMS measurement upto I∆1A & I∆3A (as per IEC 60947-2 Annex M) 'AC' True RMS measurement 30mA to 30A (as per IEC 60947-2 Annex M)			
Current Accuracy	± 5%			
Threshold I∆n(A) — I∆n x 1	0.03 – 0.05 – 0.075 – 0.100 – 0.150 – 0.200 – 0.300 (A) (Refer DIP switch setting)			
Threshold I∆n(A) — I∆n x 10	0.03 – 0.500 – 0.750 – 1 – 1.5 – 2 – 3 (A) (Refer DIP switch setting)			
Threshold I∆n(A) — I∆n x 100	0.03 – 5 – 7.5 – 10 – 15 – 20 – 30 (A) (Refer DIP switch setting)			
∆t settings (s)	0 – 0.06 – 0.15 – 0.25 – 0.5 – 0.8 – 1 – 2.5 – 5 – 10 (Sec.)			
LED Indication — POWER ON	ON (Green Led)			
LED Indication — ALARM	ON (Yellow Led) @ Alarm Relay Trip(60% of set I∆n)			
LED Indication — FAULT	ON (Red Led) @ 85% of set I∆ n (A) & Blink @ CT open			
Display	4 digit 7 segment display with Auto resolution select.			
Alarm Level	>=60% of I∆n (As per IEC60947-2 (B.4.2.2) The minimum value of rated residual non operating current is 0.5 I∆n)			
Auto Resets(Enable/Disable)	DIP switch OFF - Manual Reset & DIP switch ON - Auto Reset (Refer DIP switch setting)			
No. of Auto Reset Re-trials	4	None & 1 to 10 No's	4	None & 1 to 10 No's
Auto Reset Time	15 min (Fixed)	1 to 15 min.	15 min (Fixed)	1 to 15 min.
Clear auto reset re-trails	After 1 hour of healthy condition or supply interruption or device Reset			
Lockout	If leakage current is not recover in set retrials, Then product goes into permanent lockout. Recovery from lockout needs power cycle or Reset to come out in Healthy mode.			
Reset Time	<1.5 s			
Modbus Communication (RS485)	NA	Present	NA	Present
Ambient Conditions:				
Storage Temperature	-20°C to + 70°C			
Operating Temperature	-20°C to + 55°C			
Relative Humidity	5 to 95% Rh (without condensation)			
Max. Operating Altitude	2000 m			
Degree of Protection	IP-20			
Operating Position	Any			
Pollution Degree	II			
Others:				
Mounting	Panel Mounting			
Dimensions in mm (W X H X D)	96 X 96 X 83.7			
Weight Approx. (Un-packed)	272 g			
Enclosure Colour	RAL 7016			
Knob Colour	RAL 6018			

CBCT for both Type A & AC Current

CBCT Cat. ID's	Size (W X H X D) mm	Inner Diameter	I∆n setting range for Type AC current	I∆n setting range if there are pulsating DC current (Type A)
17H7NNHN3	37x91x71	38 mm	30mA to 30A	30mA to 1A
17H7NNIN3	37x117x97	57 mm	30mA to 30A	30mA to 3A
17H7NNQN3	37x133x109.3	70 mm	30mA to 30A	30mA to 3A
17H7NNJN3	37x155x132	92 mm	30mA to 30A	30mA to 3A
17H7NNLN3	37x176x153	120 mm	30mA to 30A	30mA to 3A
17H7NNKN3	37x282x250	210 mm	30mA to 30A	30mA to 3A

CBCT for only Type AC Current

17H7NNRN3	37x91x71	38 mm	30mA to 30A	Turns Ratio : 1500:1 (Common for all CBCT)
17H7NNSN3	37x133x109.3	70 mm	30mA to 30A	
17H7NNTN3	37x155x132	92 mm	30mA to 30A	
17H7NNUN3	37x176x153	120 mm	30mA to 30A	

Burden : 74Ω, 2W, to give 1.48V output at 30A.

Conformity to Standards EMC:

Harmonic Current Emission	IEC 61000-3-2	Class A
Voltage Flicker and Fluctuations	IEC 61000-3-3	Class A
ESD	IEC 61000-4-2	Level II
Radiated Susceptibility	IEC 61000-4-3	Level III
Electrical Fast Transients	IEC 61000-4-4	Level IV "Criteria B"
Surge	IEC 61000-4-5	Level IV
Conducted Susceptibility	IEC 61000-4-6	Level III
Voltage Dips and Interruptions	IEC 61000-4-11	Level I, II, III, IV, V, VI, & VII
Conducted Emission	CISPR 11	Class A
Radiated Emission	CISPR 11	Class A

Safety:

Test Voltage Between I/P & O/P	IEC 60947-5-1 / UL 508	2 kV
Test Voltage Between all Terminals & Enclosure	IEC 60947-5-1 / UL 508	2.5 kV
Over Voltage Category	IEC 60947-1	IV
Impulse Voltage Between I/P & O/P	IEC 60947-5-1	4kV
Single Fault	IEC 61010-1	
Insulation Resistance	UL 508	>50 KΩ
Leakage Current	UL 508	<3.5 mA

Environmental:

Cold Heat	IEC 60068-2-1	
Dry Heat	IEC 60068-2-2	
Vibration	IEC 60068-2-6	10 to 55Hz, 5 g

If the trip time is set at '0' sec, then for 5 I∆n & 10 I∆n, the tripping time will be ⩽ 40 ms for all current ranges.

Trip Characteristics:

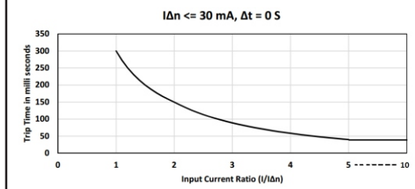
Standard IEC 60947-2 annex M indicates the operating characteristic for a non-time-delay type in table B.1 in B.4.2.4.1 in standard IEC 60947-2 annex M.

Residual current	I∆n	2I∆n	5I∆n 1)	10I∆n 2)
Maximum break time s	0.3	0.15	0.04	0.04

1) For CBRs having I∆n ⩽ 30 mA, 0.25 A may be used as an alternative to 5I∆n

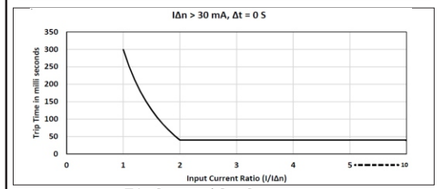
2) 0.5 A if 0.25 A is used according to note 1).

CBRs having I∆n = 30 mA shall be of the non-time-delay type.



Trip Characteristics for non delayed trip at I∆n > 30mA

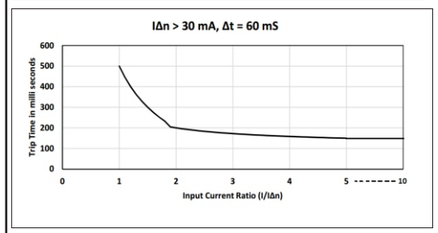
Residual current	I∆n	2I∆n	5I∆n	10I∆n
Maximum break time s	0.3	0.04	0.04	0.04

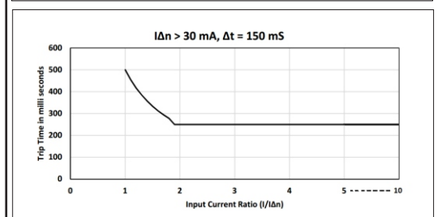


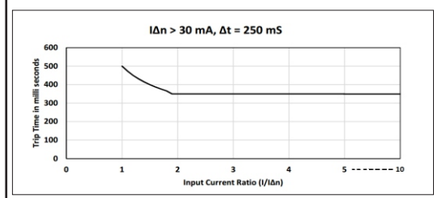
Trip Current / Set Current

For CBR's having limiting non-actuating time of 0,06 s the operating characteristic is given in table B.2. in B.4.2.4.1 in standard IEC 60947-2 annex M.

Residual current	I∆n	2I∆n	5I∆n	10I∆n
Maximum break time s	0.5	0.2	0.15	0.15







Trip Characteristics for ∆t ⩾ 0.5 s(EN 60947-2:2003) B.4.2.4.2 Operating characteristic for CBR's having a limiting non-actuating time higher than 0.06 s declared by GIC. The maximum break time at I∆n, 2 I∆n, 5 I∆n, and 10 I∆n.

Residual current / Trip setting	Maximum Break Time s			
	I∆n	2I∆n	5I∆n	10I∆n
0.5 s	0.6	0.6	0.6	0.6
0.8 s	0.9	0.9	0.9	0.9
1 s	1.1	1.1	1.1	1.1
2.5 s	2.6	2.6	2.6	2.6
5 s	5.1	5.1	5.1	5.1
10 s	10.1	10.1	10.1	10.1

Modbus:

Digital ELR has widely used MODBUS RTU protocol. The MODBUS RTU communication functions implemented in ELR as shown in below table. These functions allow the supervisory program to read and modify any data of the controller.

Modbus Parameter

Sr.No.	Parameter	Description
1	Mode	MODBUS RTU
2	Number of Slaves	01 to 247
3	Baud rate	2400,4800,9600,19200
4	Parity	Even, Odd, None
5	Stop Bits	One or Two
6	Function Code	0x03:Read Holding Register 0x05:Force output coil 0x10:Write Holding Register

Function Code 0x03(Read Holding Registers):

Sr.No.	File No	Description
1	Slave ID	Byte 0
2	Function Code	Byte 1
3	Start Address MSB	Byte 2
4	Start Address LSB	Byte 3
5	No.of. Register MSB	Byte 4
6	No.of. Register LSB	Byte 5
7	CRC Low Byte	Byte 6
8	CRC High Byte	Byte 7

Function Code 0x05(Force output coil):

Sr.No.	File No	Description
1	Slave ID	Byte 0
2	Function Code	Byte 1
3	Start Address MSB	Byte 2
4	Start Address LSB	Byte 3
5	Data Byte MSB	Byte 4
6	Data Byte LSB	Byte 5
7	CRC Low Byte	Byte 6
8	CRC High Byte	Byte 7

Function Code 0x10(Write Holding Registers):

Sr.No.	File No	Description
1	Slave ID	Byte 0
2	Function Code	Byte 1
3	Start Address MSB	Byte 2
4	Start Address LSB	Byte 3
5	No. of register high	Byte 4
6	No. of register Low	Byte 5
7	Byte Count	Byte 6
8	Data Byte MSB	Byte 7
9	Data Byte LSB	Byte 8
10	CRC Low Byte	Byte 9
11	CRC High Byte	Byte 10

Sr.No.	Parameter Name	Address	Operation Allowed	Values
Addresses for write single output query (0x05):				
1	Remote reset (Output coils)	00001	Write	FF-Reset Relay
2	Clear log data	00002	Write	FF-Clear log data
Address To Read/Write Communication Parameter (0x03/0x10):				
1	Slave ID	40001	Read/Write	1 - 247
2	Baud Rate	40002	Read/Write	0(2400),1(4800),2(9600), 3(19200)
3	Parity	40003	Read/Write	0(None),1(Odd),2(Even)
4	Stop bit	40004	Read/Write	1(1 Stop Bit), 2(2 Stop Bit)
Address To Read/Write Reset Parameter (0x03/0x10):				
1	Reset Time	40011	Read/Write	60S - 900S
2	Reset Attempt	40012	Read/Write	None, 1-10
Address To Read Setting Parameter (0x03):				
1	Set Current	40021	Read	30–30000 mA
2	Set Time	40022	Read	0–10000 ms
3	Input Current	40023	Read	0–100000 mA
4	Input Current	40024	Read	
5	Switch Status	40025	Read	0–256 Note 1
6	Relay Status	40026	Read	0–3 Note 2
7	Fault Status	40027	Read	0–128 Note 3
Address To Read Log Current (0x03):				
1	Logged data 0	40031	Read	0mA–100000 mA
2	Logged data 0	40032	Read	
3	Logged data 1	40033	Read	0mA–100000 mA
4	Logged data 1	40034	Read	
5	Logged data 2	40035	Read	0mA–100000 mA
6	Logged data 2	40036	Read	
7	Logged data 3	40037	Read	0mA–100000 mA
8	Logged data 3	40038	Read	
9	Logged data 4	40039	Read	0mA–100000 mA
10	Logged data 4	40040	Read	
11	Logged data 5	40041	Read	0mA–100000 mA
12	Logged data 5	40042	Read	
13	Logged data 6	40043	Read	0mA–100000 mA
14	Logged data 6	40044	Read	
15	Logged data 7	40045	Read	0mA–100000 mA
16	Logged data 7	40046	Read	
17	Logged data 8	40047	Read	0mA–100000 mA
18	Logged data 8	40048	Read	
19	Logged data 9	40049	Read	0mA–100000 mA
20	Logged data 9	40050	Read	

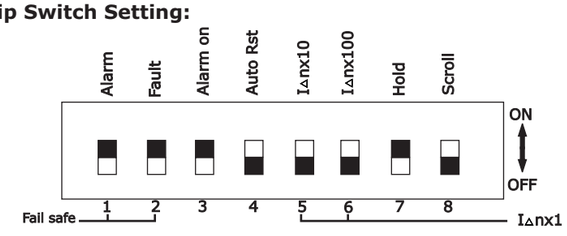
Note 1:Here each bit of holding register indicates status of each switch. Bit 0 indicates status of first switch and bit 8 indicates status of 8th switch. Status 1 indicates switch is off and switch 0 indicates switch is on.
Note 2:Here each bit of holding register indicates status of each relay. Where first bit indicates status of alarm relay & second bit indicates status of EL fault relay. Status 1 indicates relay is tripped and status 0 indicates relay is in reset condition.
Note 3:Here each bit of holding register indicates status of each fault. Fault status are arranged in following order from bit 0 to bit 8.
30% alarm fault,45% alarm fault,60% alarm fault,75% alarm fault,85% EL fault,170% EL fault,425% EL fault & CT open fault.

Note: All holding registers should be read or write in groups only. If single register read query is received or if all addresses in the group are not present in the received query then this function will send error response with error code of invalid address.

Menu mode string & description :

Sr.No.	Menu String	Description
1	"CoMS"	Communication setting menu
2	"dUId"	Device ID menu
3	"bdrt"	Baud rate menu
4	"PrtY"	Parity Menu
5	"Stbt"	Stop Bit menu
6	"nonE"	Parity edit parameter, selected from none, even or odd
7	"ILOG"	Log setting menu
8	"VIEL"	View log menu
9	"CLrL"	Clear log menu
10	"no"	Clear log editable parameter selected from yes or no
11	"ArSt"	Auto reset menu
12	"rStt"	Reset time menu
13	"AtPt"	Auto reset attempts menu

Dip Switch Setting:



Dip Switch Description:

Dip Switch No	ON state	OFF state
1	Alarm relay is de-energized to trip	Alarm relay is energized to trip
2	Fault relay is de-energized to trip	Fault relay is energized to trip
3	Alarm functionality enable	Alarm functionality disable
4	Auto reset functionality "ON"	Auto reset functionality "OFF"
5	Set current I∆n multiplied by 10	Set current I∆n multiplied by 1
6	Set current I∆n multiplied by 100	Set current I∆n multiplied by 1
7	Hold current Display "ON"	Hold current Display "OFF"
8	Scroll Display "ON"	Scroll Display "OFF"

Note: If both dip switch 5 & 6 are set to "ON" or "OFF" state, then set current I∆n is multiplied by 1.

EARTH LEAKAGE RELAY SERIES : CMR

Ordering Catalog Nos.:

17K716QF4N
17K716QF4M
17K726QF4N
17K726QF4M

CE RoHS

Features:

1.Wide range of Earth Leakage Current adjustment.
2.Adjustable Earth Leakage trip time.
3.Instantaneous trip (for details refer trip characteristic).
4.Test feature to check complete Product Functionality.
5.Manual & Auto Reset feature.
6.MODBUS feature.
7.1C/O(Alarm) + 1C/O(Fault) relay output.
8.7- segment display indications for failure conditions.
9.Menu for setting Modbus parameters.
10.Log for maximum trip leakage current.
11.Fail safe & Non fail safe relay tripping feature.
12.Panel mounting.
13.Easy to install.

Recommendations:

It is recommended to use CBCT's as mentioned in the table, to ensure the trip current accuracy.

⚠ Caution:

1.Always follow instructions stated in this product leaflet.
2.Before installation, ensure that specifications agree with intended application.
3.Installation to be done by skilled electrician.
4.Suitable dampers should be provided in the event of excess vibration during installation.
5.Automation and control devices must be installed so that they are protected against any risk of involuntary actuation.
6.Disconnect power before working on equipment.
7.Use 250mA fuse in series with input supply is recommended for protection.

Terminal Details :

Ø3.5 mm	0.5 N.m (4.4 Lb.in) Terminal screw - M2.6
	1 x 2.5 mm^2 Solid/Stranded Wire
AWG	1 x 28 to 12

Use Cu Wire of 60/75°C only.

Notes:

1.Product innovation being a continuous process, we reserve right to alter any specifications w/o prior notice.
2.The unit is factory set to 30mA trip and instantaneous delay. Adjustment of these settings can be made if necessary to suit the requirements of the installation. A seal is supplied allowing the user to secure the clear window and hence prevent any unnecessary adjustment of the settings.
3.To satisfy regulations, it is recommended that the device be tested periodically to ensure correct operation.
4.In case of excess harmonics power transmission cables have more leakage because of low impedance offered by cable capacitance, I∆n setting need to keep at higher level.

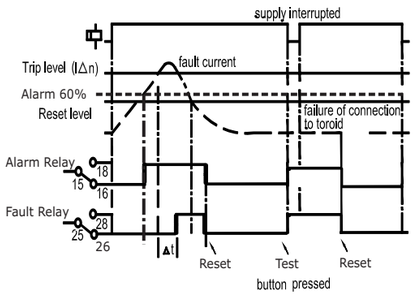
Functional Description: Earth Leakage Protection :

Earth Leakage relay is a micro controller based device meant to measure leakage current and isolate the faulty circuit from the system. Leakage current is sensed through core balance current transformer. Trip occurs when Earth Leakage Current exceeds the Set value of trip current, for the trip time which is adjustable by means of a front mounted potentiometer. For details refer trip characteristics. The Red LED "Fault" indicates the presence of Earth Leakage.

CBCT Connections :

All main primary conductors shall pass through the core area of CBCT. Use shielded wires for secondary terminal connections to B1 & B2. Connect the shield to the GND terminal of device, which is circuit ground of device. The CT wires should be placed adequately away from high current carrying conductors or source of strong magnetic field to avoid noise pickup. The Earth Leakage Relay also verifies CT connection. If CT winding is open, red LED "Fault" blinks.

FUNCTIONAL DIAGRAM :



Test/ESC :

Press & hold Tact switch Test/Esc for 2s. Product will change its state from Healthy to Test. Display indicates test mode

Remote Reset :

For Remote Reset, connect an external push button switch between Y1 and Y2.

Auto Reset :

Dip switch no. 4 kept in OFF position then product need manual reset at the time of tripping.

Dip switch no. 4 kept in ON position then product works in Auto Reset Mode.

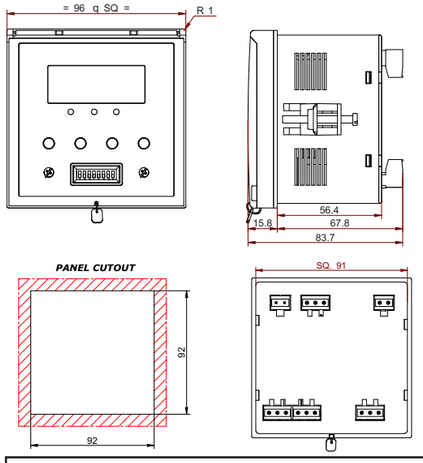
For cat id 17K716QF4N & 17K726QF4N fixed auto reset used.

Product will reset after 15 min. only for 4 attempts. Reset count is cleared after 1 hour of Healthy condition or supply interruption or press of reset switch.

For cat id 17K716QF4M & 17K726QF4M settable auto reset used.

Number of auto reset retrial's is 0 to 10 no's & auto reset time is 1 to 15min.

Overall Dimensions and Mounting Details:



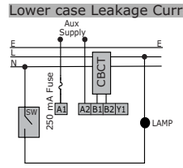
Note:

1. For CT Connections use shielded wire and connect shield to GND terminal .
2. For single phase applications, only Live and Neutral need to be passed through CBCT.
3. Do not pass Earth conductor through CBCT.
4. Do not apply supply voltage across CT and switch terminal.
5. Connect the wires between CBCT and ELR with respect to B1 B2. (B1-Black start & B2-White wire end)
6. This unit satisfies the requirements for Type A ⏦ devices which only need to detect residual alternating Currents.

ELR Operating condition	Contact Positions	
	1 C/O (PSO/Fail safe)	1 C/O (SO/Non fail safe)
No Auxiliary Supply	25 26 28	25 26 28
Healthy / Reset State	25 26 28	25 26 28
Trip state	25 26 28	25 26 28

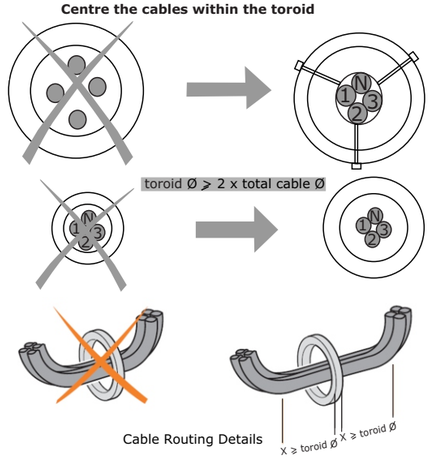
PSO - Positive safety output
SO - Standard Output

Lower case Leakage Current Emulation



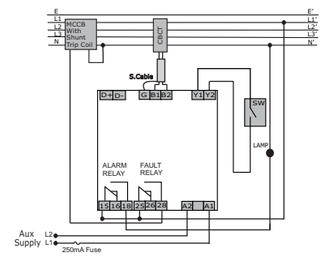
Press switch to emulate leakage
Use 5 W LAMP for 30 mA setting

Centre the cables within the toroid

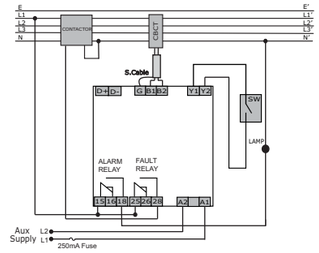


Connection Diagram:

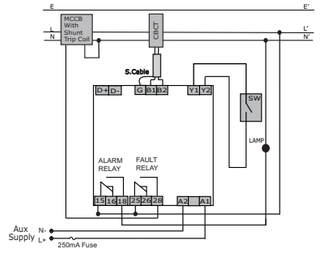
NON-FAIL SAFE MODE (SHUNT TRIP COIL/UV TRIP COIL)
THREE PHASE APPLICATION



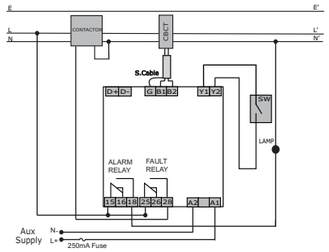
FAIL SAFE MODE (CONTACTOR)
THREE PHASE APPLICATION



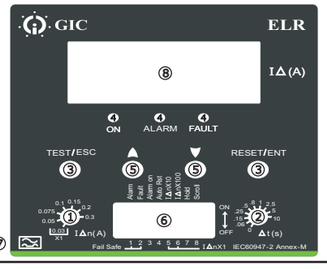
NON-FAIL SAFE MODE (SHUNT TRIP COIL/UV TRIP COIL)
SINGLE PHASE APPLICATION



FAIL SAFE MODE (CONTACTOR)
SINGLE PHASE APPLICATION



Front Facia :



1. Potentiometer for Earth leakage current setting.
2. Potentiometer for Trip time set setting.
3. Test/ESC & Reset/Ent function keys.
4. Power ON, ALARM & FAULT LED Indication.
5. UP/DOWN keys for Modbus menu setting.
6. 8 Dip switches for mode setting.
7. Type A/AC indication.
8. 4 Digit 7 segment display