

State of the art Manufacturing Facilities



Haridwar, Noida Ph-I
& Noida Ph-II Plant



AH-Series

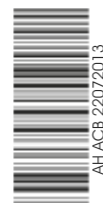


C&S Electric Ltd.

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Air Circuit Breakers

CS Air Circuit Breakers - AH Series

Salient Features

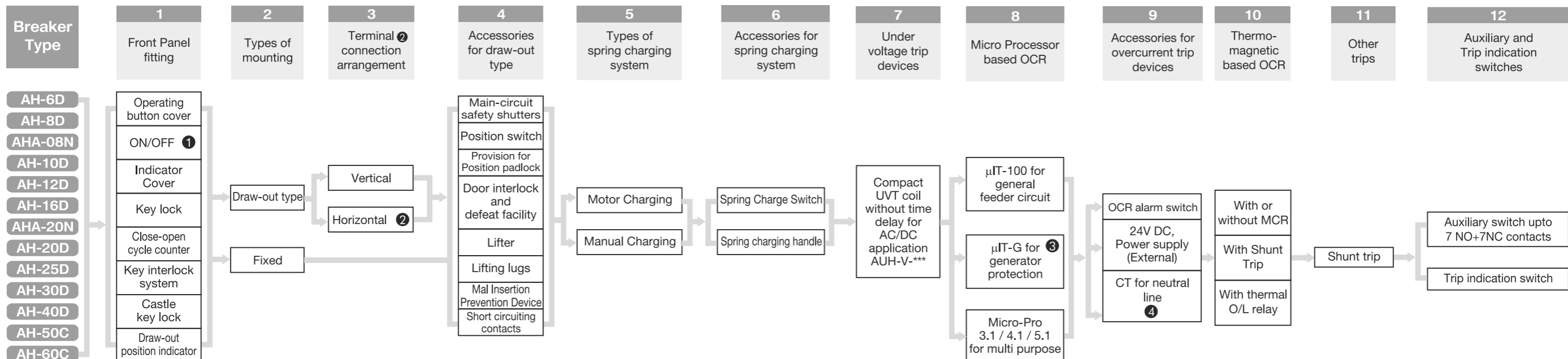
- Available in 3 or 4 pole for entire range and also fixed / draw-out version.
- Only 4 frame sizes in the entire range, 630A to 6300A, resulting in maximum interchangeability and minimum inventory of spares.
- High value of service breaking capacity, 45kA to 100kA, and making capacity, 94.5kA to 220kA at 415V AC.
- Total breaking time less than 30ms (including arcing time of less than 10ms) & closing time of 40ms.
- Highest values of mechanical and electrical endurance due to robust mechanism design and special sintered metal contacts.
- Neutral pole (in 4 pole) closes early and opens later to prevent transient over voltages in loads connected between live and neutral lines.
- Highest degree of system protection and coordination due to the use of microprocessor based / Intelligent protection releases.
 - μ IT- Standards release
 - MicroPro - multi purpose release with RS485 port & ZSI feature.
- Most simple to operate and maintain.
- High dielectric strength even in hot and humid conditions due to use of class 'B' and 'F' insulating materials.
- Fibre glass safety shutter for safety of operating personnel.
- No thermal derating for D.C. Application.
- Tested for most onerous environmental conditions and approved for marine duty application by Indian Registrar of Shipping.

Technical Specifications

Amperes Frame (based on IEC, BS or IS) TYPE (number of poles 3 & 4)	630 AH-6D	800 AH-8D	1000 AH-10D	1250 AH-12D	1600 AH-16D
* Rated Ultimate Breaking Capacity/Rated Making Capacity (Icu, RMS/Icm, Peak) kA 415V AC	50/105	50/105	55/121	55/121	55/121
* Rated Service Breaking Capacity/Rated Making Capacity (Ics, RMS/Icm, Peak) kA 415V AC	45/94.5	45/94.5	50/105	50/105	50/105
250V DC	40/40	40/40	40/40	40/40	40/40
Short time current Icw kA for 1 sec. (3 sec.) RMS	45 (25)	45 (25)	50 (25)	50 (25)	50 (45)
Total breaking time/closing time (m.sec.)	30/40	30/40	30/40	30/40	30/40

Amperes Frame (based on IEC, BS or IS) TYPE (number of poles 3 & 4)	2000 AH-20D	2500 AH-25D	3200 AH-30D	4000 AH-40D	5000 AH-50C	6300 AH-60C
* Rated Ultimate Breaking Capacity/Rated Making Capacity (Icu, RMS/Icm, Peak) kA 415V AC	60/132	65/143	75/165	100/200	100/200	120/264
* Rated Service Breaking Capacity/Rated Making Capacity (Ics, RMS/Icm, Peak) kA 415V AC	50/105	50/105	65/143	85/187	85/187	100/220
250V DC	40/40	40/40	40/40	40/40	40/40	40/40
Short time current Icw kA for 1 sec. (3 sec.) RMS	50(50)	50(50)	65(65)	85(70)	85(70)	100(70)
Total breaking time/closing time (m.sec.)	30/40	30/40	30/40	30/40	30/40	30/40

* Rated Service breaking capacity (Ics) & rated ultimate breaking capacity (Icu) are same at 415V. For other voltages please contact us.
Higher Breaking Capacity ACB's available on request.



OPTIONAL FEATURES AVAILABLE ON REQUEST : ① With Padlock facility ② Horizontal Terminal upto AH-25D and Vertical Terminal for 30D and above are available as Standard. Additional adaptors for changing to vertical are available as accessories. ③ On request.

④ Required for earth fault protection externally mounted for 3 pole * Dimensions for 4000A fixed breaker available on request.

Overcurrent Release

- Thermal Magnetic Trip Device: **Type TM**
- Microprocessor Based Overcurrent Trip Device: **Type μ IT-100 & μ IT-G**
- Intelligent Release: **Type MicroPro 3.1/ 4.1 & 5.1**

Thermal - Magnetic Trip Device TM

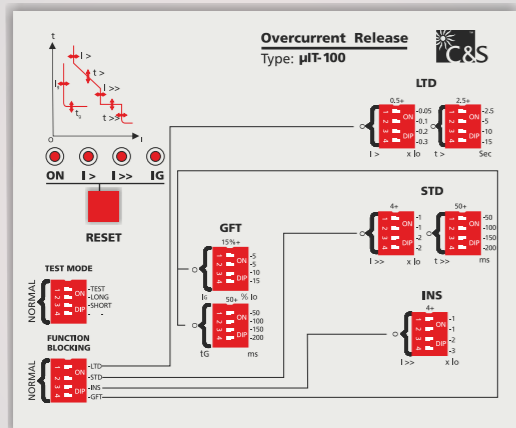
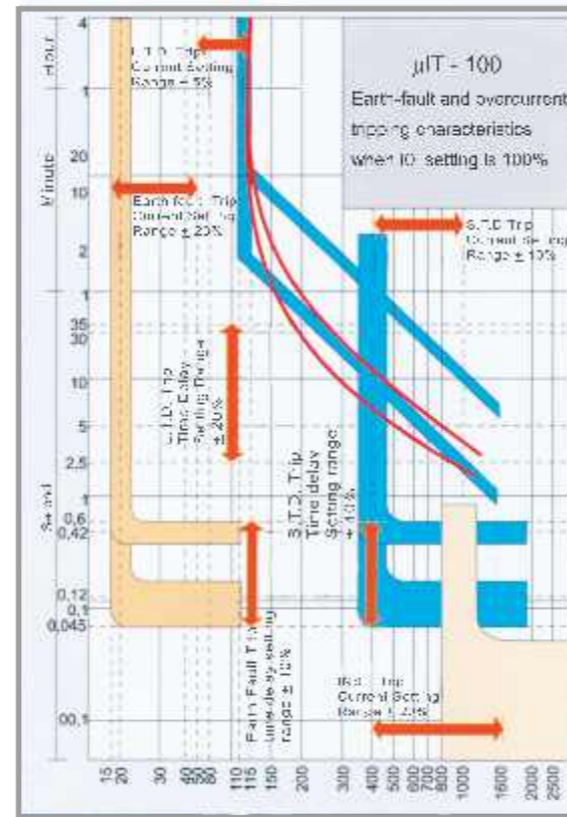
- Direct acting electromagnetic instantaneous trip device with fixed factory set release, settings 3 - 50 kA
- Adjustable overload settings 80% - 120%.
- Provision for remote tripping as optional features with overload relay.

Microprocessor Based Overcurrent Trip Device: Type μ IT-100 & μ IT-G

μ IT is a true RMS sensing overcurrent trip device, requiring no external supply for its basic function. It is available in two types, i.e., μ IT-100 for industrial application and μ IT-G for generator protection.

- Error free and user friendly setting of current and time delay.
- Provides highest degree of system protection co-ordination.
- Self powered by the built in current transformer.
- No mal-operation due to external disturbances.
- Built in operation check function.
- Visual fault discrimination by LEDs.
- Three phase and earth fault in one single compact unit.
- Self monitoring of trip unit with blinking indication.
- Function Blocking facility provided.
- Certified by ERTL for

- Damp Heat Test	IS 9000 - PG4
- Dry Heat Test	IS 9000 - PG3
- Vibration Test	IEC 255 - 4
- Radio Frequency	
- Interference (RFI)	IEC 801 - 3
- Electrostatic Discharge (ESD)	IEC 801 - 2
- Electrical Fast Transient (EFT)	IEC 801 - 4
- Surge	IEC 801 - 5
- Impulse	IEC 255 - 4



Microprocessor based relay

Intelligent Release: Type MicroPro

MicroPro is a 3 Phase time overcurrent release with in built inverse characteristic for overcurrent and definite tripping characteristic for short circuit and earth fault currents. The settings can be selected by selecting the positions of DIP switches / rotary switches / Key pads on the front .The new settings become effective as soon as they are changed when the release is powered by the CTs. The microcontroller in the release ensures positive tripping of the MHT coil under any undesired conditions of overload ,short circuit or earth fault by giving the trip command as per the selected set of characteristics. There are 5 Red LEDs in the front for each type of fault indication and on occurrence of overload condition, O/L LED flashes once, every second before the tripping command is issued. If the Overcurrent condition cease to exist before the release trips, LED flashing also stops. A thermal memory is incorporated in the release and when the Overcurrent condition occurs again, the release takes into account the earlier overcurrent effect before giving the trip command.

There are three version of MicroPro series

- MicroPro 3.1
- MicroPro 4.1
- MicroPro 5.1



Micropro 3.1

C&S introduces a new release Micropro 3.1 in its range of microprocessor based ACB releases. Micropro 3.1 has been specifically designed with LSIG protective functions in a compact unit offering an economical solution for basic applications areas.

Types of protection functions

- Overload Protection
 - Pick up- 0.4 to 1.1 In and OFF • Delay- 2.5 to 35 Sec
- Short-circuit Protection
 - Pick up- 1.5 to 9.0 Ir • Delay- 50 to 800 msec
- Instantaneous Protection - 3.0 to 10 Ir and OFF
- Earth fault Protection
 - Pick up- 0.2 to 0.9 In and OFF • Delay- 50 to 800 msec
- Features
 - Individual Fault indication LED's • Tripping characteristics

MicroPro 4.1

Protection thresholds and delays are set using the adjustment dials. The running load is displayed in amperes.

Type of Protection

- Overload protection
- Short Circuit current protection
- Instantaneous current protection
- Ground Fault Protection
- Neutral Protection

Other Features

- Zone Selectivity
- Ampere Meter
- Communication: RS 485, Modbus protocol
- LCD display
- LCD display and fault LED retention in case of power failure
- One way communication from release to PC
- Thermal memory

MicroPro 5.1

Protection thresholds and delays are set using the keypad. The selected value are momentarily displayed in amperes.

Type of Protection

- Overload protection
- Short Circuit current protection
- Instantaneous current protection
- Ground Fault Protection
- Neutral Protection

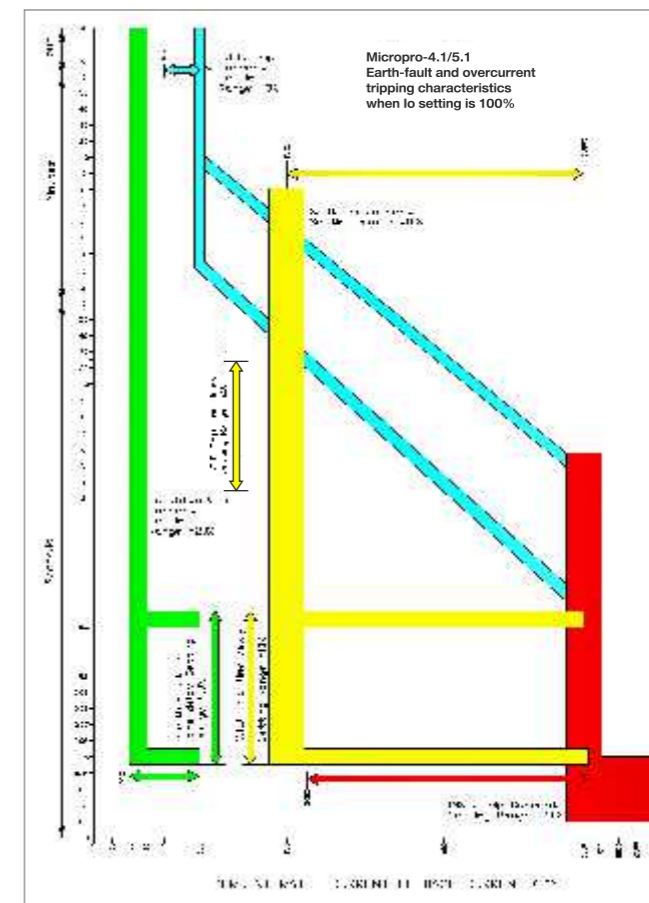
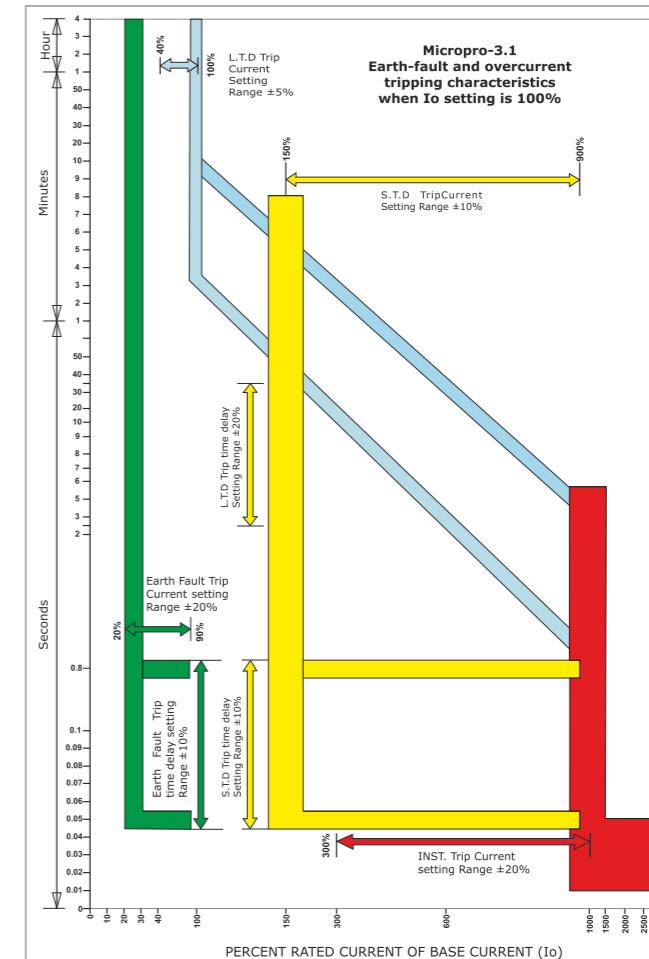
Other Features

- Zone Selectivity
- Ampere Meter
- Communication: RS 485, Modbus protocol
- LCD display
- LCD display and fault LED retention in case of power failure
- Two way communication
- Thermal memory

Micropro with communication

Type	3.1	4.1	5.1
Over Load Protection			
Pick up	0.4-1.1 In with OFF in 9 steps: OFF, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1	0.4-1.0 In with OFF in 10 steps: OFF, 0.4, 0.5, 0.6, 0.7, 0.8, 0.85, 0.9, 0.95, 1	0.4-1.0 In with OFF in steps of 0.01
Delay	2.5 - 35 sec at 6 Ir in 14 steps: 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5, 25, 27.5, 30, 32.5, 35 sec	2.5 to 25 sec at 6 Ir in 10 steps: 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5, 25 sec	2.5 to 25 sec at 6 Ir in steps of 0.5 Sec
Short Circuit			
Pick up	1.5-9.0 Ir in 16 steps: 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5, 9.0	1.5-10 Ir in 10 steps: 1.5, 2, 2.5, 3, 4, 5, 6, 8, 9, 10	1.5-10 Ir in steps of 0.1 1.5, 2, 2.5, 3, 4, 5, 6, 8, 9, 10
Delay	0.05-0.8 sec in 16 steps: 0.05, 0.10, 0.15, 0.20, 0.25, 0.30, 0.35, 0.40, 0.45, 0.50, 0.55, 0.60, 0.65, 0.70, 0.75, 0.80	Inst - 600 msec in 7 steps: Inst. 0.1, 0.2, 0.3, 0.4, 0.5, 0.6	Inst 100 to 600 msec in steps of 50 msec
Instantaneous			
	3.0 - 10 Ir with OFF in 9 steps: OFF, 3, 4, 5, 6, 7, 8, 9, 10	2.0-12 Ir with OFF in 10 steps: OFF, 2, 3, 4, 5, 6, 8, 9, 10, 12	2.0-12 Ir In with OFF in steps of 0.5
Earth Fault			
Pick up	0.2-0.9 In with OFF in 9 steps: OFF, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9	0.2-1.0 In with OFF in 10 steps: OFF 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0	0.2-1.0 Ir with OFF in 10 steps of 0.01
Delay	0.05-0.8 sec in 16 steps: 0.05, 0.10, 0.15, 0.20, 0.25, 0.30, 0.35, 0.40, 0.45, 0.50, 0.55, 0.60, 0.65, 0.70, 0.75, 0.80	Inst-600 msec in 7 steps: Inst. 0.1, 0.2, 0.3, 0.4, 0.5, 0.6	Inst 100 to 600 msec in steps of 50 msec
N Protection			
Pick up	Not Available	OFF 25%, 50%, 100% In	OFF 25%, 50%, 75%, 100% In
Cooling time contact		30 min	30, 45, 60 min
Indication, Monitoring & Control			
Power ON LED	Available	Available	Available
Over Load Trip LED	Available	Available	Available
Short Circuit Trip LED	Available	Available	Available
Inst Trip LED	Available	Available	Available
Earth Fault Trip LED	Available	Available	Available
Neutral Protection LED	NA	Available	Available
Remote Alarm/Trip Indication	NA	Through 7 programmable relays (optional)	Through 7 programmable relays (optional)
Trip History	NA	Fault type, current and time for last 16 trip events	Fault type, current and time for last 16 trip events
Zone selectivity	NA	Available	Available
Settings Adjustment by	DIP Switches	Knob	Keypad
LCD Display	NA	YES	YES
Measurements			
Load current	NA	Phase, N & E	Phase, N & E
Fault current	NA	OL, SC, Inst, EF & N	OL, SC, Inst, EF & N
Communication			
To remote	NA	All parameters through communication module	All parameters through communication module
Connectivity & protocol	NA	To SCADA system through MODBUS	To SCADA system through MODBUS

- INDICATIONS**
- Inputs** : From The CTs with 200mA rated output One for each phase and one for Neutral current measurement.
 - Output** : Tripping signal for MHT coil in the ACB
 - Red Led** : indications for different types of fault/tripping such as Over load, Short Ckt, Earth Fault, Instantaneous, Neutral.
 - Green Led** : Power On and Healthy voltage to trip MHT
 - LCD display** : For displaying Currents, and faults/relay status



Communication Module

Communication module is an accessory of MicroPro release and is an optional module for the customer who needs additional features. The module gets connected to Micropro by two wires through general protocol & through 485 port, can be connected to Master PC. The communication module acts as a master for the MicroPro release and as a slave to the supervisor PC.

The module can accept 9 different Digital inputs and has two releases inside whose contacts are brought out on the terminals which are D/O types.

There are 3 LEDs on the front indicating status of -

1. Communication between Micro Pro and Comm. Module
2. Communication between Comm. Module and Master PC.
3. Operation of the release

The module has built in Power supply card. DC supply for the release can be obtained from this module.

Operation

When connected to MicroPro and Master PC, Communication Module:

- Can read the settings of the MicroPro .
- Can change the settings of the MicroPro as dictated by Master PC.
- Can record following data related to last 16 faults
 - a) The type of fault
 - b) In which phase the fault has occurred
 - c) At which instant the fault occurred
 - d) Fault current.
- Can record the normal currents IR, IY, IB, IE, and IN
- Operates one of the releases whose contacts are available on the terminals as soon as MicroPro exceeds the threshold of the trip.

Because of the above capabilities all the relevant information related to status of the release can be furnished to the Master. The information can also be used for zone selectivity interlocking by using the contacts of the relevant release.

Connections

Z1 ~ D19	:	Di & Do outputs
Master D (+) & Master D (-)	=	To be connected with RS 485/232 converter
M-PRO D (+) & M-PRO D (-)	=	To be connected with Micro Pro release communication in ACB
ZO / COMMON/DO	=	Zone selectivity
O/P + & GND	=	24 V DC supply can be used for Micro Pro supply
230 V I/PLI/PN...I/PE	=	Input supply 230 V AC for communication module. Phase to be connected to L & neutral at N & earth at E.



Power Supply and release Module

The module has release outputs corresponding to the type of fault occurred in the MicroPro. There are total 7 releases and contact of each release is available for feeding to alarm annunciator or any other control .

The module has built in Power supply card and DC supply for the release can be obtained from this module. If the release card is not used then the module becomes power supply module. The power supply card is common with Communication module

Operation - PSRM

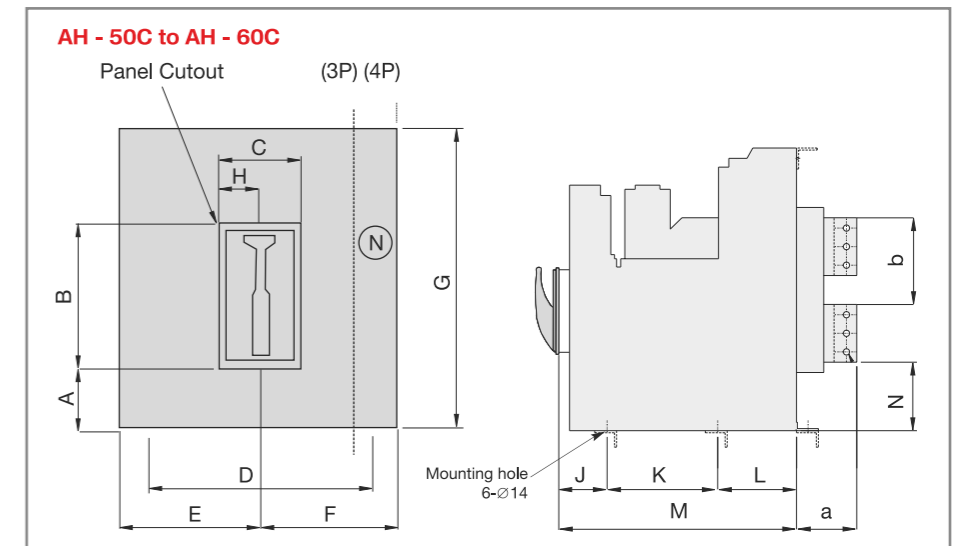
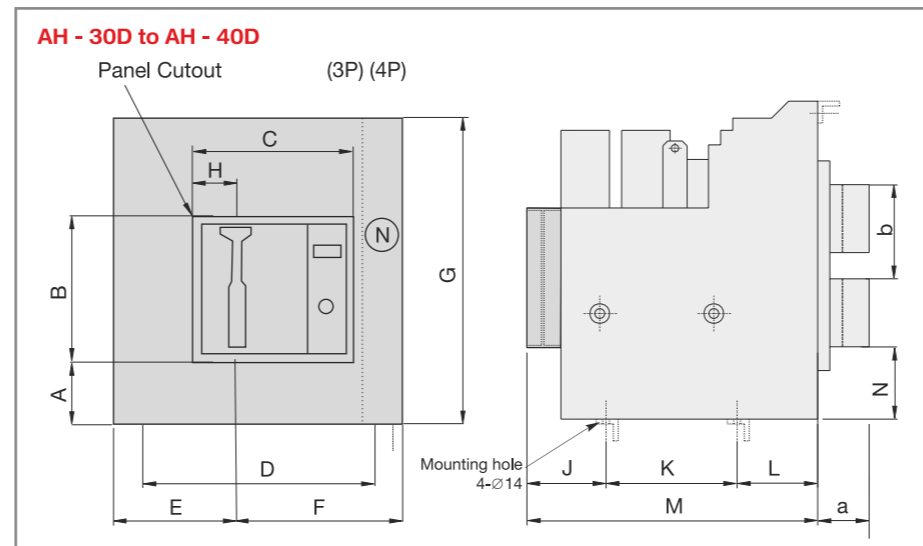
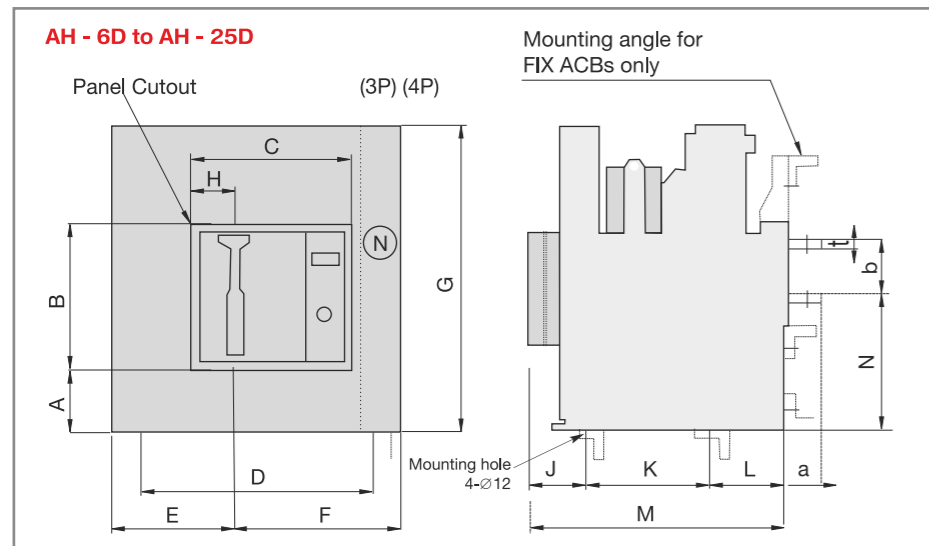
The PSRM module when connected to Micro pro will get the information of type of fault and in which phase the fault has occurred. Corresponding to this a particular releases will operate and the output contacts of the release will change the status. Through 3 DIP switches, one can block the function. Blocking ensures that the particular output contact corresponding to the function has no effect even if the function in the release device is activated. The contacts will remain open if DIP switches are used to block the function. There will be option of providing 4 or 7 releases.

Technical Specifications - PSRM

Auxiliary Supply	Input:	24V DC to 300V DC or 24V AC to 240 V AC
	Output:	24V DC ± 10%
releases	Number of releases:	4 or 7 nos.
	Contact rating:	125V AC, 0.6A or 110V DC 0.6A
	Contacts:	1 terminal pair from each release
Extension functions:	Extension provides operation of releases. Signal for such operation are sent by MicroPro on RS485 serial data communication interface. The releases operate on following faults: 1. Over current [I>] 2. Phase current High set [I>>] 3. Earth Fault [IE>] 4. Neutral Over current [IN>] 5. Circuit Breaker failure [CBF] 6. Pre-trip alarm [W] 7. Spare	
Function blocking:	DIP switches are provided for selectively blocking any of the above functions. 7 Position DIP switch works as follows: Case 1: Number of releases =7: Each position corresponds to one of the above functions and in the same sequence. When a switch is in OFF position, the corresponding function is blocked. This means that release will not trip when its assigned fault occurs. Case 2: Number of releases =4: The enabled functions are assigned to consecutive releases. Not more than 4 functions can be enabled since there are only 4 releases. For example, if switches 2, 4 and 7 are OFF, then assignment is: I> release1 IE> release2 CBF release3 W release4	
Total Terminals: 21	Break-up of terminals is as follows: Power Supply Side: 3 terminals for supply input: L, N, E. 1 terminal blank 2 terminals for 24 V output: + & - . 2 terminals for communication to micro Pro: com+, com-. release Module Side: 14 terminals for release output. One terminal pair for each of N/O contact of all seven releases.	
Communication Device Type	RS485 Master	
Size:	W x H x D in mm: 119 x 63 x 50	

Dimensional Drawings & Terminal Arrangements

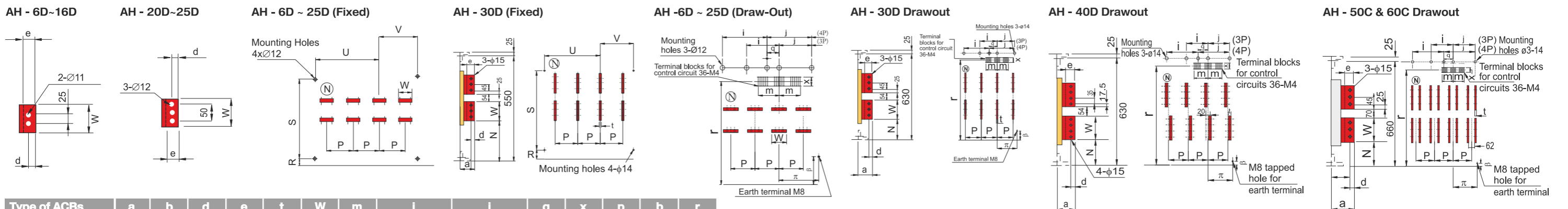
Dimension Details



Outline Dimensions and Panel Mounting Details (in mm)

Type of ACBs	A	B	C	D		E		F		G	H	J		K		L		M	N	P		R		S		U		V	
				3P	4P	3P	4P	3P	4P			3P	4P	3P	4P	3P	4P			3P	4P	3P	4P	3P	4P	3P	4P	3P	4P
D/O (6D-16D)	98	247	295	316	416	215	215	215	332	530	120	122	122	270	270	117	117	509	205	100	100	-	-	-	-	-	-	-	-
FIX (6D-16D)	80	247	295	368	468	199	199	199	299	512	120	100	100	-	-	-	-	379	187	100	100	15	15	334	334	154	254	154	154
D/O (20D-25D)	134	308	363	416	546	270	270	270	400	680	138	163	163	270	270	137	137	570	289	130	130	-	-	-	-	-	-	-	
FIX (20D-25D)	110	308	363	466	596	248	248	248	378	600	138	100	100	-	-	-	-	396	269	130	130	15	15	480	480	198	328	198	198
D/O (30D-40D)	134	308	363	498	658	311	311	311	471	680	93	163	163	270	270	166	166	599	149	160	160	-	-	-	-	-	-	-	
FIX (30D)	110	308	363	548	708	289	289	289	449	600	93	100	100	-	-	-	-	422	129	160	160	40	40	480	480	236	396	236	236
D/O (50C-60C)	141	285	180	590	780	373.5	373.5	373.5	563.5	710	90	125	125	268	268	191	191	584	166	190	190	-	-	-	-	-	-	-	

Terminal Arrangements



Type of ACBs	a	b	d	e	t	W	m	i		j		q	x	p	b	r
								3P	4P	3P	4P					
AH																
D/O(6D,8D)	46.8	107	20	30	8	45	112.5	112.5	175	112.5	175	50	48	157	65	440
FIX (6D,8D)	60	107	15	30	8	45	-	-	-	-	-	-	-	-	-	-
D/O (10D, 12D)	46.8	107	20	30	12	50	112.5	112.5	175	112.5	175	50	48	157	65	440
FIX (10D, 12D)	60	107	15	30	12	45	-	-	-	-	-	-	-	-	-	-
D/O (16D)	46.8	115	20	35	20	55	112.5	112.5	175	112.5	175	50	48	157	65	440
FIX (16D) &	60	115	15	30	20	45	-	-	-	-	-	-	-	-	-	-
D/O (20D-25D)	60	117	25	50	15	80	112.5	175	240	175	240	65	48	213	150	553
FIX (20D-25D)	80	117	20	35	15	80	-	-	-	-	-	-	-	-	-	-
D/O (30D)	106	194	25	55	15	140	112.5	175	255	175	255	80	48	200	30	578
FIX (30D)	119	194	25	55	15	140	-	-	-	-	-	-	-	-	-	-
D/O (40D)	106	194	25	55	22	140	112.5	175	255	175	255	80	48	200	30	578
D/O (50C-60C)	146	210	25	55	16	140	112.5	225	320	225	320	95	48	246	30	619.5

