

Titania
air circuit breaker



Catalogue August '07

C³ technology

630 A to 4000 A in 3 frame sizes
with 2, 3 & 4 Pole execution

INTRODUCTION

"Titania" range of Air Circuit Breakers are available from 630 A to 4000 A rating in 2 pole 3 pole and 4 pole execution, with breaking capacity of 50kA to 100kA. These ACBs have been designed keeping in mind the present day complex requirement of electrical systems which makes it essential to have a reliable product which can give un-interrupted service through out the product life meeting all the stresses that the system encounters.

These ACBs are most compact in size. The height, depth and panel door cut out are same through out the entire range. The accessories are common for the entire range and are front accessible, easy to fit without the need for cabling.

Features:

- Compact size, wide range & high breaking capacity
- 630A to 4000A available only in 3 frame sizes
- First frame available upto 2000A
- Common height, depth and panel door cutout
- Front accessible accessories without requiring any cabling
- Common accessories for the entire range
- Modular construction for pole unit
- Easily replaceable arcing contacts
- Available with communication facility



CONSTRUCTION

Operating Mechanism is of stored energy type, which operates using pre-charged springs. The springs are charged manually with the help of charging handle or with the help of charging motor, if provided. The same operating mechanism is used for the entire range. Mechanism has been developed using less number of parts resulting in more reliability, longer mechanical life and requiring very less maintenance.

Contact Mechanism

Conductor Unit is of modular design. Each pole consists of Main and Arcing contacts which are housed in the moulded housing. The contacts are made from sintered silver alloy for reliability, longer life and anti-weld properties. The construction of the contact is such that arcing contact closes before and opens later than the main contact, this substantially reduces erosion of main contact under normal and short circuit conditions.

The current transformer is placed inside the pole unit around the lower terminal.

Arc Chutes are provided for quenching the arc. Arc chute comprises of grid plates mounted in parallel in the insulated housing. The arc is divided between these grid plates which helps in its fast quenching. The arc is thus confined, divided and extinguished in the arc chute. The excellent insulation between the conducting parts and better energy dissipation after short circuit makes it possible to make the *load and line connections on either side*

The **tripping mechanism** comprises of magnet holder trigger which is linked to the trip bar unit. The electronic circuit gives a signal to this unit in case of over current fault and this unit mechanically trips the Circuit Breaker.

In **Over current protection** the sensing of the current is through the current transformers fitted on the main terminals. In case of any fault the secondary output of the CT increases. This secondary output of CT goes to the micro controller based electronic circuit. The micro controller is programmed to give a signal as per inverse time characteristics. The signal in the form of dc supply is given to magnet holder trigger which trips the ACB. The required tripping time and tripping current can be set with the help of the switches provided on the front panel of the electronic release.



TECHNICAL INFORMATION

Standard Conformity : IEC 60947-2 & IS 13947-2

Performance Series		E	S	H	V	
Rated Current (In) (Ref. Temp. 45°C)	(Amps.)	630	630	2000	2500	
		800	800	2500	3200	
		1000	1000		4000	
		1250	1250			
		1600	1600			
		2000	2000			
Rated Service voltage (Ue)	V	690 VAC 250 VDC	690 VAC 250 VDC	690 VAC 250 VDC	690 VAC 250 VDC	
Rated Insulation voltage (Ui)	V	1000 V	1000 V	1000 V	1000 V	
Rated impulse withstand voltage (Uimp)	kV	12 kV	12 kV	12 kV	12 kV	
Frequency	(Hz)	50/60	50/60	50/60	50/60	
No. of Poles *		2, 3, 4	2, 3, 4	2, 3, 4	2, 3, 4	
Rated short-circuit breaking capacity (Ics=100%Icu)	(kA)	-220/380/415/440VAC	50	65	75	100
		-500/660/690 VAC	40	55	65	85
		-250 VDC	40	55	65	75
Rated short-time withstand current (Icw)	(kA)	1sec	50	55	65	85
		3sec	36	40	50	65
Rated short-circuit making capacity (peak value) (Icm)	(kA)	-220/380/415/440	105	143	165	220
		-500/660/690	84	121	143	187
Utilization category		B	B	B	B	
Isolation behavior		Yes	Yes	Yes	Yes	
Closing time	(msec)	<70	<70	<70	<70	
Break time (max)	(msec)	30	30	30	30	
Mechanical life (No. of operations) (with regular maintenance)		25000	25000	20000	15000	
Electrical life (at 440VAC) (No. of operations)		630, 800A -15000 1000,1250A -12000 1600A -12000 2000A -10000	630, 800A -10000 1000,1250A -10000 1600A -8000 2000A -8000	10000	5000	
Overall Dimensions	(mm)					
Fixed (LxHxD)	3P	291x421x307		400x421x307	562x421x307	
	4P	381x421x307		526x421x307	652x421x307	
Draw out (LxHxD)	3P	327x460x386		435x460x386	596x460x386	
	4P	417x460x386		561x460x386	686x460x386	

* 2 Pole ACBs are available on request

OVER CURRENT RELEASE

Over Current Release

HAVELL's IPR range of over current releases (OCR) are highly-reliable, multi-functional, dedicated protection unit using advanced micro-controller with full benefits of microprocessor technology offering Overload, Short Circuit, Instantaneous and earth fault protection besides enhanced feature of field testing for all models.

These OCRs are true RMS sensing over current trip devices, requiring no external supply for their basic functioning.

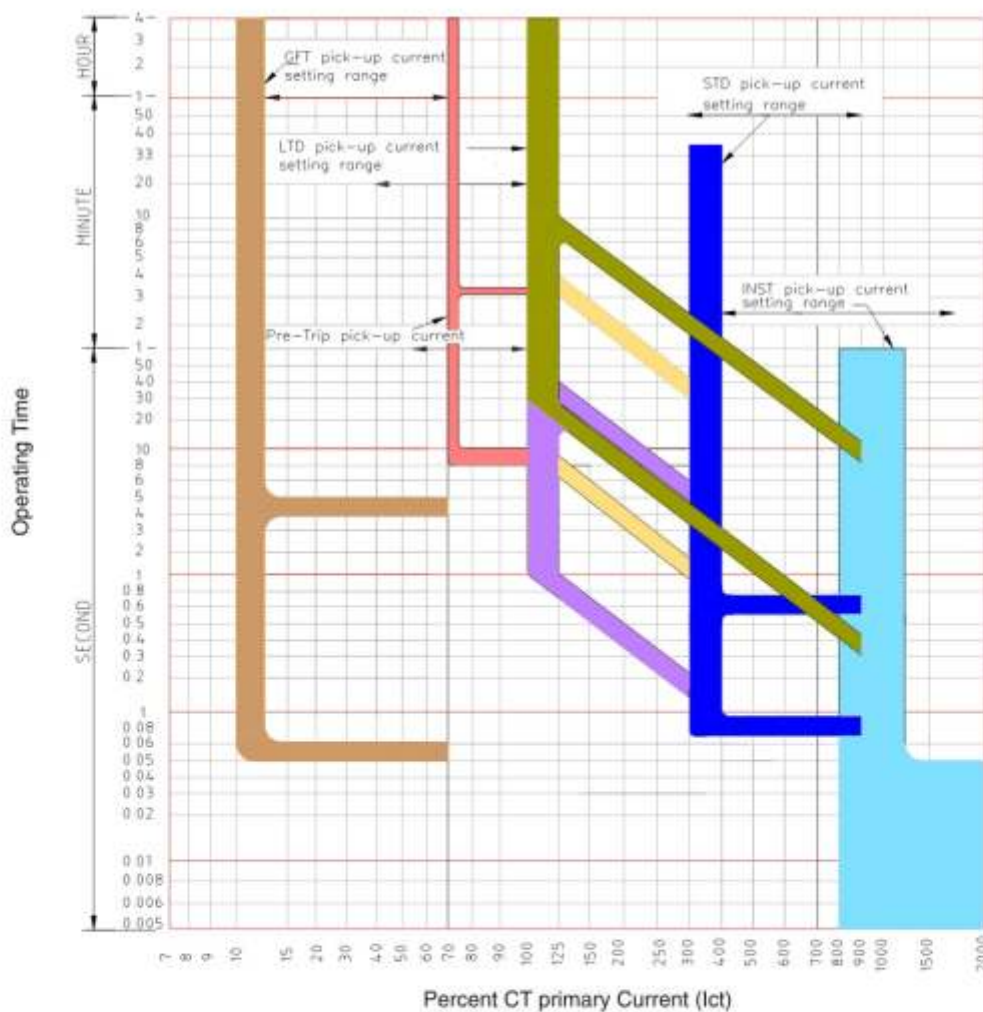
Salient features include :

- Error free and user friendly settings of current and time delay
- True RMS sensing with immunity to system disturbances
- More Reliable and repetitive accuracy, using high end 16 bit micro-controller
- Self powered by built in Current Transformer
- Three phase protection and Earth fault protection in same unit
- LED Indication for all the tripping faults
- Function 'OFF', setting available



IPR-3 Release

TIME -CURRENT CHARACTERISTIC CURVE



- | | | |
|---|---|---|
| ■ Industrial application | ■ Pre-trip Alarm | ■ Short time Delay |
| ■ Instantaneous | ■ Ground Fault | ■ Motor application |
| ■ Generator application | | |

SPECIFICATIONS

Settings of Overload Current (LTD)

LTD Current (I_L)	:	40% to 100% of I_{cr} with function blocking option.
LTD Time	:	1sec to 35sec.

Settings of Short Circuit Current (STD)

STD Current (I_s)	:	300% to 900% of I_L with function blocking option.
STD Time	:	50ms to 700ms.

Setting of Instantaneous Current (INST)

INST Current (I_i)	:	400% to 1600% of I_L with function blocking option.
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Ground fault Setting (GFT)

GFT Current (I_g)	:	10% to 70% of I_L with function blocking option.
GFT Time	:	100ms to 5000ms.



IPR-1 Release

Besides these protection functions IPR-3 provides the following additional functions also:

RS Communication	:	Through RS485 Port
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Pre Trip Alarm Function

Current Setting (I_p)	:	60 to 100% of LTD current setting
Time Setting (T_p) (definite)	:	10 to 200 sec

Measurement function

- 3 phase current
- 3 phase voltage
- Tripping time
- KVA
- KWH
- Power factor
- Max. demand (KVA & KWH)
- Ambient temperature
- Breaker terminal temperature



IPR-2 Release

Under Voltage/ Over Voltage indication	:	Under Voltage setting from 40 to 85% of rated voltage, with a time delay of 50 to 400 mSec. Over voltage setting from 110 to 150% with a time delay of 50 to 400 msec
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Fault History	:	To record and display the last 100 faults (50 faults in IPR2)
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Self Monitoring	:	To monitor its own condition and in case of any fault same is indicated by "CPU FIT" LED.
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Temperature sensing	:	To monitor the temperature of Micro-controller and give an indication if the temperature exceeds the set value.
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Breaker fault	:	When any mechanical fault prevents the tripping of the fault zone breaker, the release of that breaker gives the tripping command to the upper zone breaker.
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Potential free contacts	:	Potential free contacts for LTD, STD/INST, PTA, GFT, TEMP, under and over voltage.
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LED Indications	:	LED Indications for faults.
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Function Blocking	:	This feature is available for LTD, STD, INST and GFT
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Operation counter	:	It records the number of operations of ACB by counting the number of trip operations through OCR and stores them in 2 different categories: a) Current less than 300%, b) Current more than 300%.
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Function Check	:	Field testing of LTD, STD & INST function can be performed with help of Field Testing Kit.
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Specifications for IPR-E

LTD Current (I_L)	:	55% to 100% of I_{cr} rating.
LTD Time	:	5 Sec. fixed at 6I, inverse time characteristics.
INST Current	:	Fixed at 6 I_L .



IPR-E Release

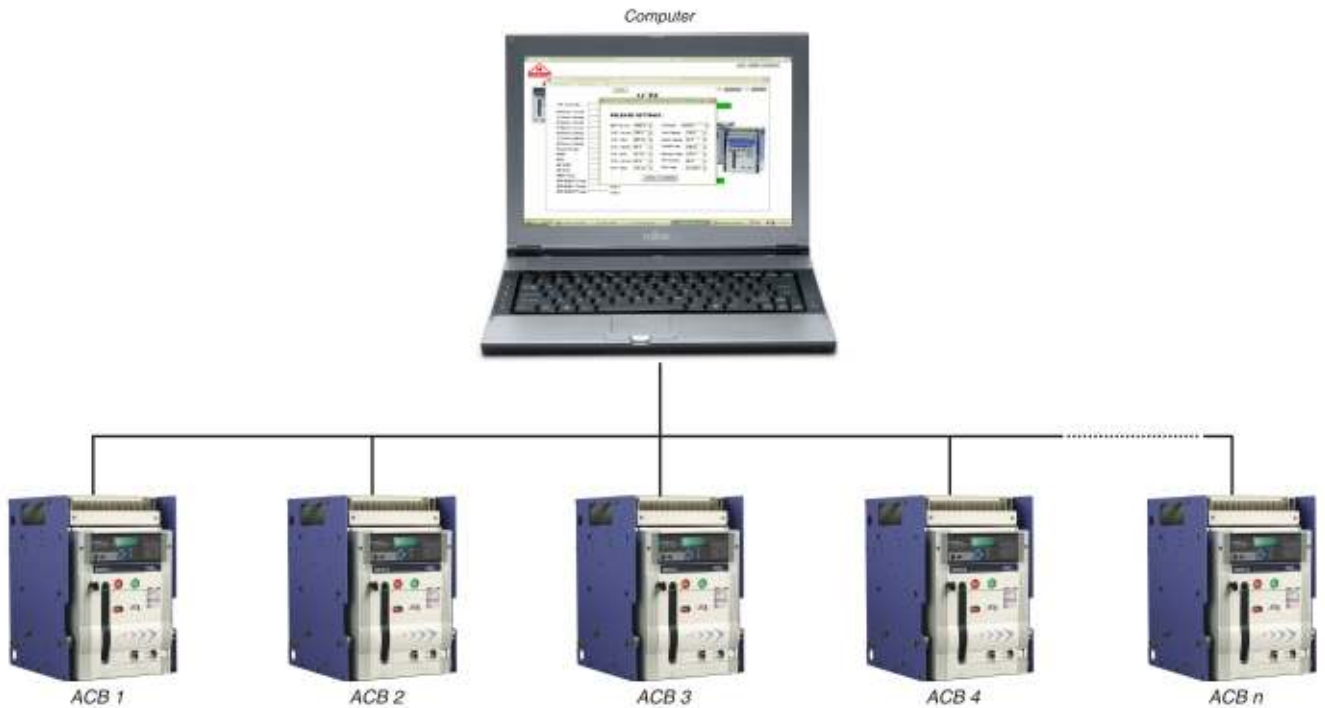
FEATURES AVAILABLE IN DIFFERENT MODELS OF OVER CURRENT RELEASE (IPR)



Functions	IPRE	IPR1	IPR2	IPR3
Overload Function (LTD)	●	●	●	●
Short Circuit Function (STD)		●	●	●
Instantaneous Function (INST)	●	●	●	●
Ground fault Function (GFT)		●	●	●
Function blocking feature for all the above 4 functions		●	●	●
Pre trip alarm function			●	●
Measurement function				
• 3 phase current			●	●
• 3 phase voltage				●
• Tripping time			●	●
• KVA				●
• KWH				●
• Power factor				●
• Max.demand (KVA & KWH)				●
• Ambient temperature				●
• Breaker terminal temperature				●
Under voltage / Overvoltage alarm				●
Fault History			●	●
Self Monitoring			●	●
Temperature sensing				●
Breaker fault			●	●
Potential free contacts			●	●
LED Indications	●	●	●	●
Operation counter			●	●
Function Check	●	●	●	●
LCD display			●	●
Communication Port RS 485				●

● Available

COMMUNICATION FACILITY



Intelligent over current microprocessor release type IPR3 is available with two way communication facility through RS232/485 port. The communication facility enables the user to monitor the entire system from his controlroom on a PC/Laptop. Through this facility it is also possible to control/modify the setting of the ACB release from the PC/Laptop as per the user requirement. The complete fault history record can also be stored in the computer. The software required for this system is offered by Havells as optional at extra cost.



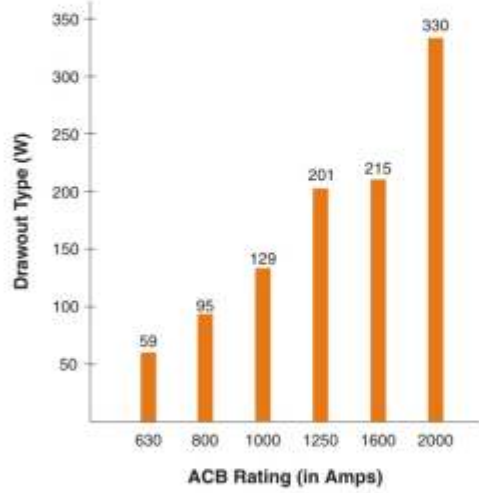
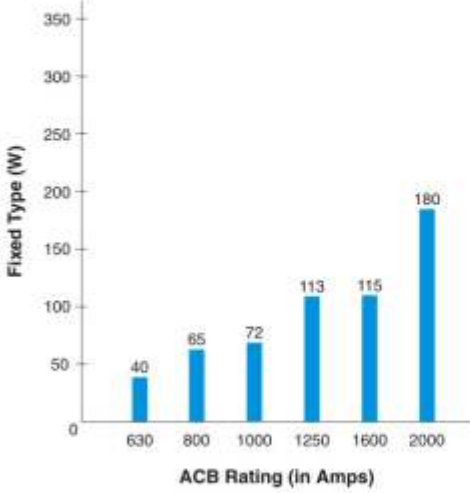
Online information of ACB

Modification of release parameters from computer

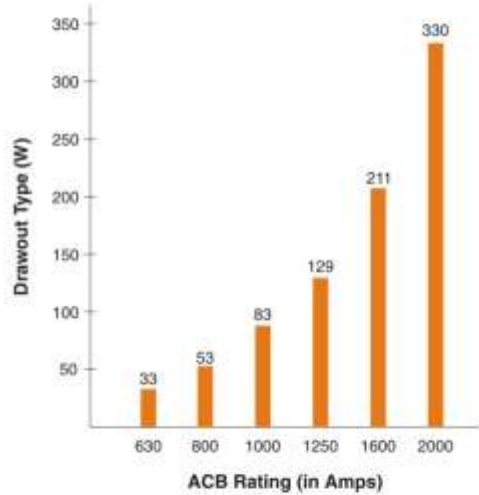
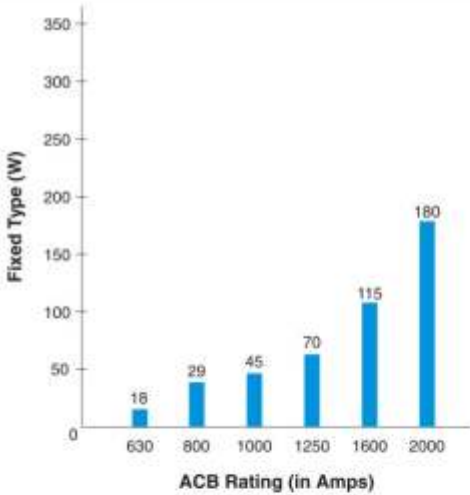


WATLOSS CHART (total for 3 Pole ACB)

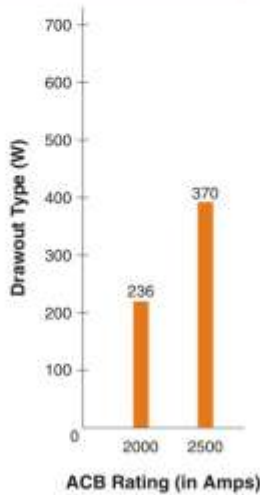
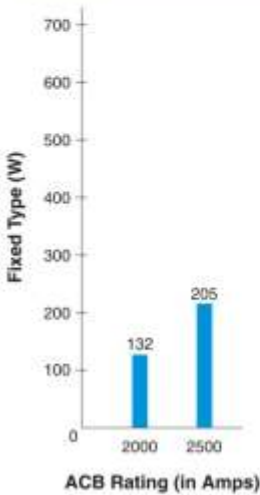
E-Series



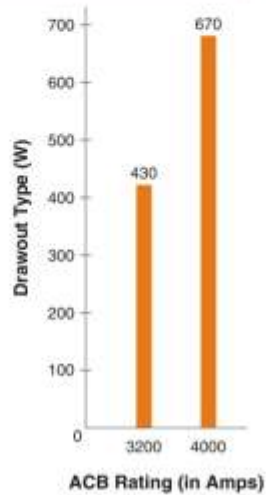
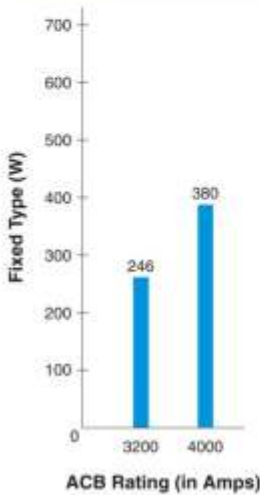
S-Series



H-Series



V-Series



■ Fixed Type
■ Drawout Type

ACCESSORIES

Electrical Accessories:

Charging Motor:

It is provided in an electrical operated ACB to charge the closing springs automatically. These are available in 110V and 220V AC/DC. The VA burden of this motor is 150 VA only and the charging time is 3 to 4 seconds.



Shunt Trip Coil / Closing Coil :

These coils are used for electrical tripping and closing of ACB. These coils are available in 24V, 110VAC/DC, 220VAC/DC & 415VAC. The same coil can be used as a shunt trip coil or closing coil. The inrush power is 200VA.



Undervoltage release :

This release trips the ACB in case the voltage drops below the required level. It is necessary to energise the under voltage release coil before attempting to close the circuit breaker as in de-energized condition, it mechanically locks the breaker and the same can not be closed. These coils are available in 24V DC, 110V AC/DC, 220V AC/DC & 415V AC.



For energizing this coil minimum 85% of the rated voltage is required and if the voltage drops below 50% of the rated voltage it automatically trips the ACB. Inrush power of this coil is 200VA and the continuous power is 5VA only.

Auxillary Contacts :

A set of five changeover switches are provided in the circuit breaker which can be used for external circuit. Additional five changeover switches can also be provided as an optional.



Drawout Accessories:

Safety Shutter for main circuit :

It is provided on the cradle which automatically isolates the Main circuit terminals when the breaker is drawn out. A provision is also there for locking the safety shutter in the closed position with the help of Pad Lock (not supplied with ACB).



Position Indication Switch :

A set of 5 micro switches is provided in the cradle which indicates the position of breaker in the cradle i.e. CONNECTED, TEST, or DISCONNECTED position. Two switches each are provided for CONNECTED AND DISCONNECTED position and one switch is for TEST position.



Adaptor terminals for Cradle :

Special Adaptor Terminals can also be provided for 1st frame ACB which can make the terminals suitable for taking horizontal as well as vertical bus bar connections. The standard cradles are supplied with horizontal terminals. Adaptor terminals are factory fitted and are available at extra cost.



Mal insertion prevention device :

It prevents the breaker of a different rating being inserted into the cradle of different rating.

Drawout position lock :

This feature is available to lock the breaker into different drawout positions i.e. CONNECTED, TEST, or DISCONNECTED position with the help of padlock (not supplied with ACB).



ACCESSORIES

Other Accessories :

Close open cycle Counter :

It indicates the number of mechanical operations of the circuit breaker and the same is visible on the front of ACB Cover.



Spring charge Indication switch :

A micro switch is provided to get a remote signal indicating the status of Circuit Breaker closing spring.



Key Lock/ key Interlock :

It is provided to lock the ACB in open position. Once the ACB is locked it can not be switched on. For interlocking purpose three locks with two keys or two locks with one key can be supplied.



Door interlock

It prevents the opening of panel door, if the ACB is in closed (ON) position. When this interlock is fitted in the Circuit Breaker it is necessary to switch of the breaker, before opening the panel door.



ON/OFF push button cover :

A special cover can be provided on the front cover on which a pad lock (not supplied with ACB) can be fitted for locking the ON & OFF push buttons.



Lifting Plates

Titania Air Circuit Breakers are fitted with specially designed lifting plates which makes the lifting of these ACBs very convenient



Trip Indication switch :

It is provided to get a remote signal indicating that ACB has tripped due to the operation of over current release.



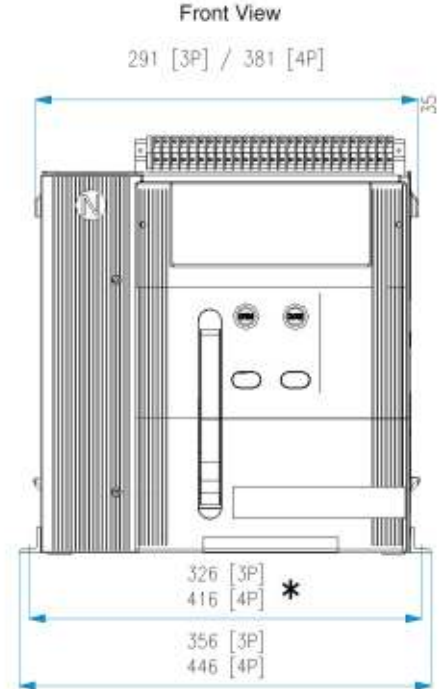
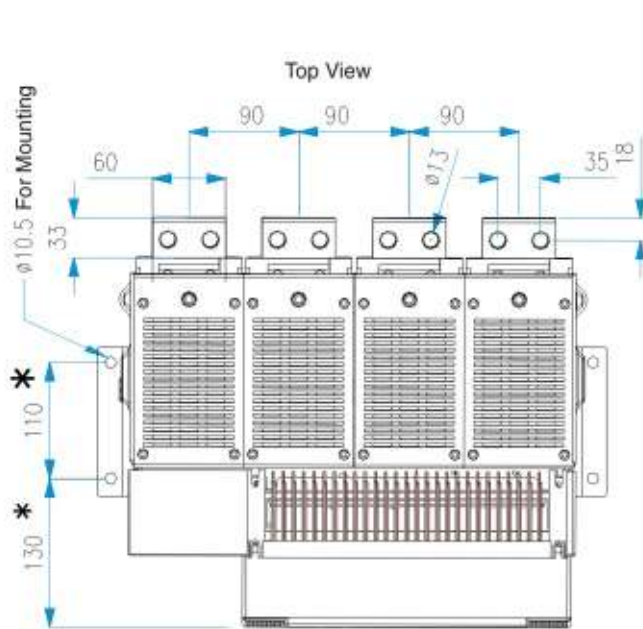
Safety shutter padlock feature

For the safety of the personnel, safety shutter can be padlocked once the breaker has been withdrawn from the cradle.

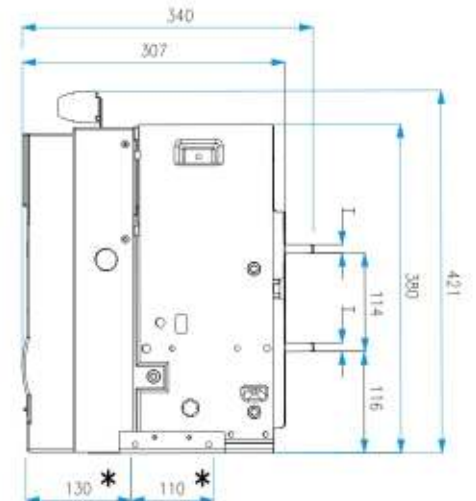


OUT LINE DIMENSIONS, MOUNTING DETAIL & TERMINAL ARRANGEMENT

Rating: 630A to 2000A (E & S Series)
Fixed Type



Panel Door Cutout



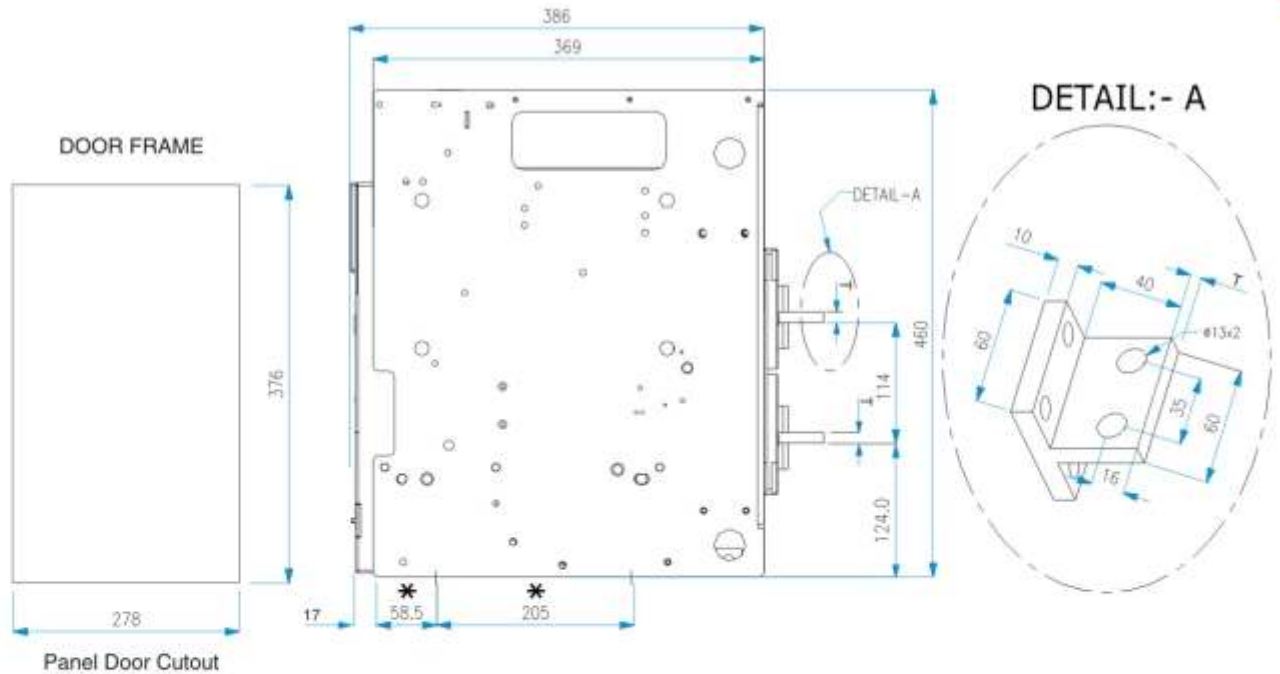
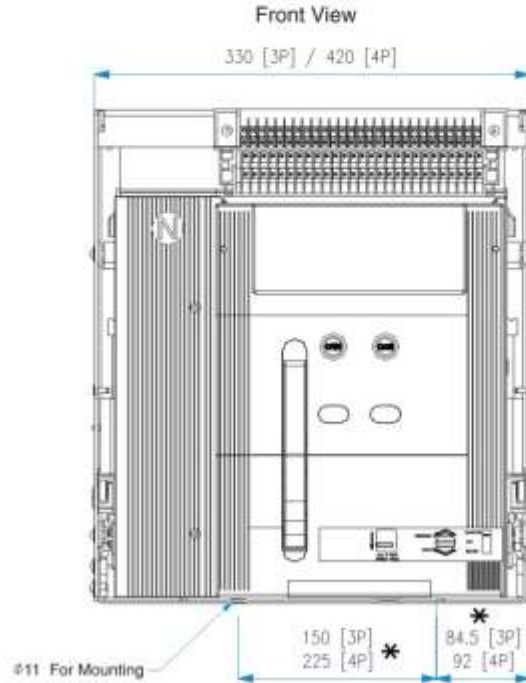
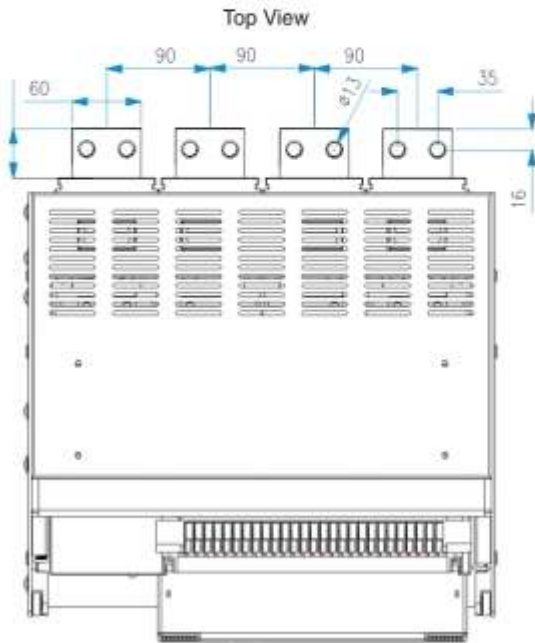
Thickness - 'T'

	E- Series	S- Series
630-800A	10	20
1000-1250A	15	20
1600A	20	20
2000A	25	25

* Mounting hole dimensions
All dimensions are in mm.

OUT LINE DIMENSIONS, MOUNTING DETAIL & TERMINAL ARRANGEMENT

Rating: 630A to 2000A (E & S Series)
Drawout Type



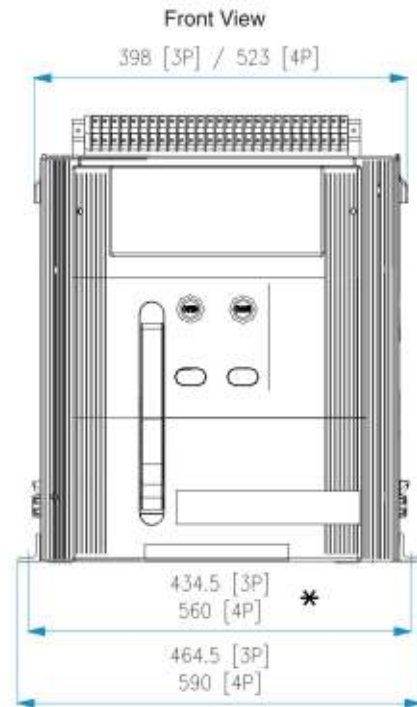
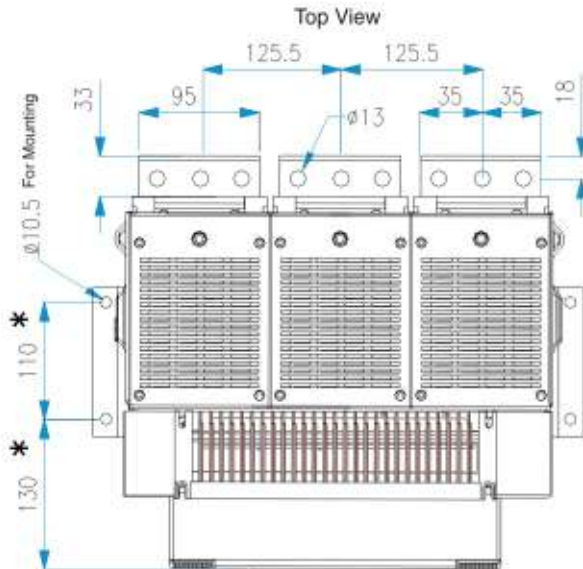
Thickness - 'T'

	E- Series	S- Series
630-800A	10	20
1000-1250A	15	20
1600A	20	20
2000A	25	25

* Mounting hole dimensions
All dimensions are in mm.

OUT LINE DIMENSIONS, MOUNTING DETAIL & TERMINAL ARRANGEMENT

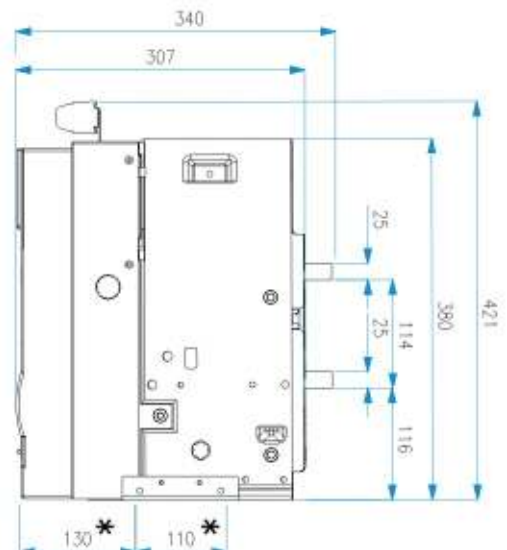
Rating: 2500A (H Series)
Fixed Type



DOOR FRAME



Panel Door Cutout

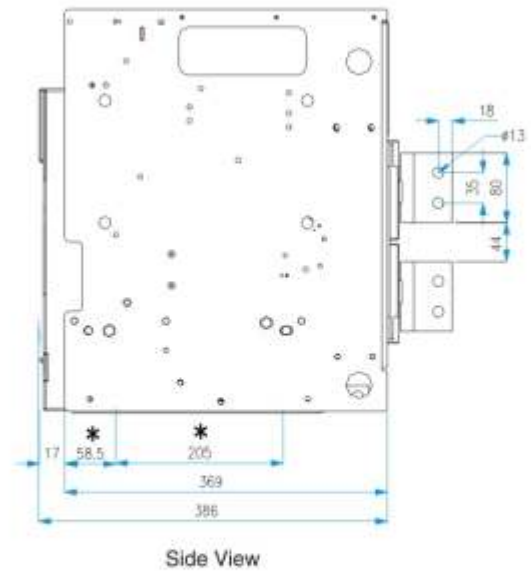
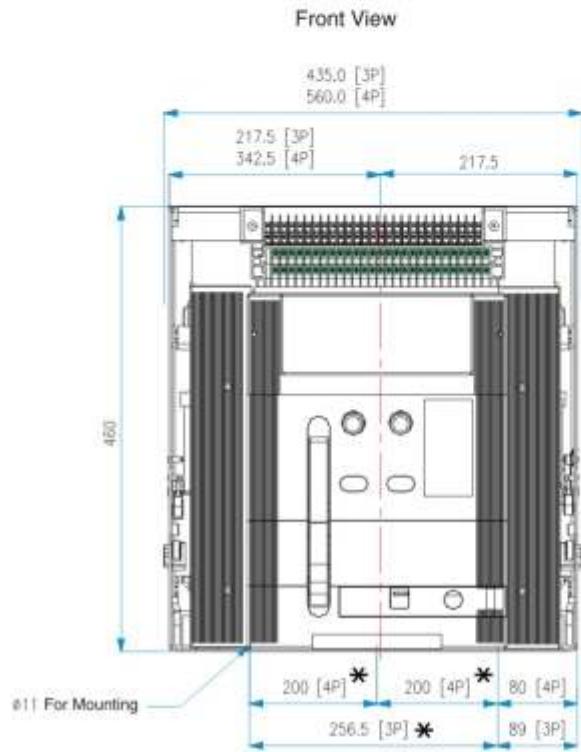
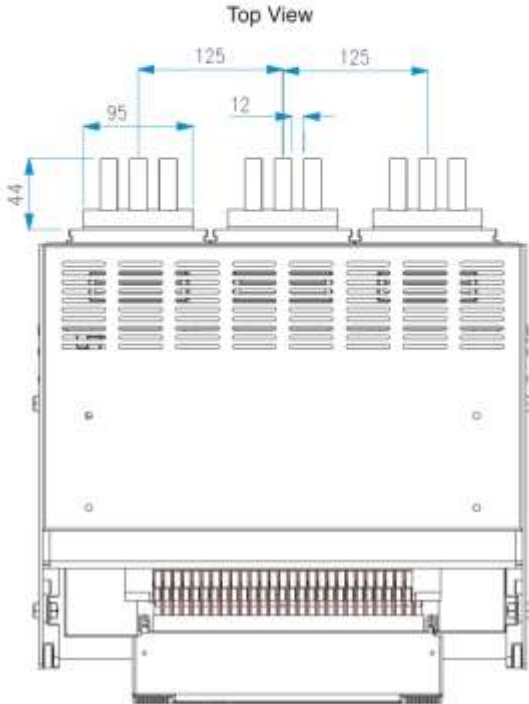


Side View

* Mounting hole dimensions
All dimensions are in mm.

OUT LINE DIMENSIONS, MOUNTING DETAIL & TERMINAL ARRANGEMENT

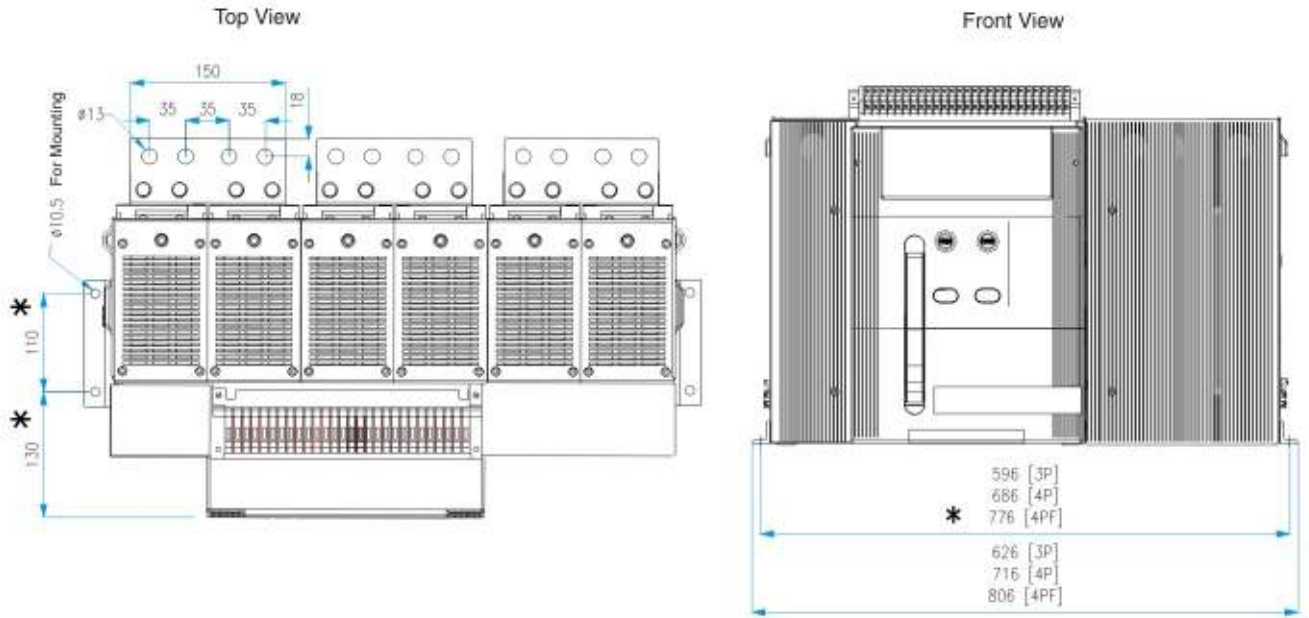
Rating: 2500A (H Series)
Drawout Type



* Mounting hole dimensions
All dimensions are in mm.

OUT LINE DIMENSIONS, MOUNTING DETAIL & TERMINAL ARRANGEMENT

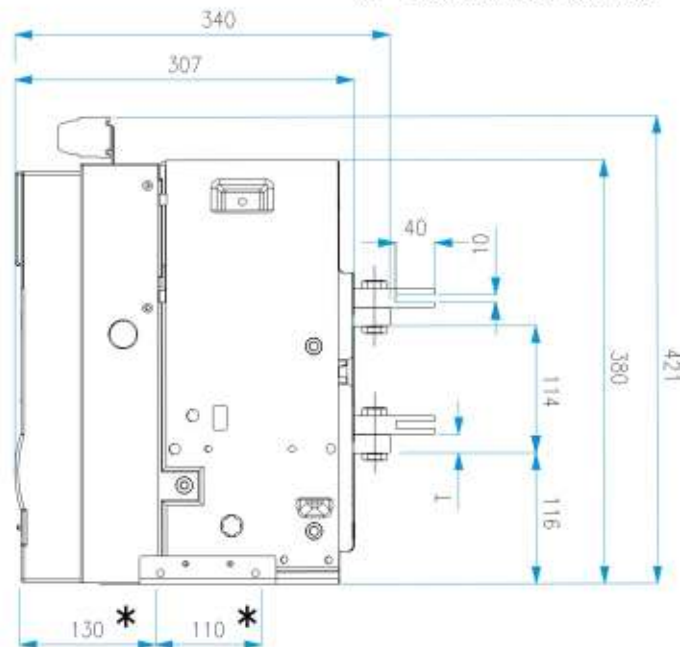
Rating: 3200A to 4000A (V Series)
Fixed Type



4P- 50% RATED NEUTRAL
4PF- 100% RATED NEUTRAL



Panel Door Cutout



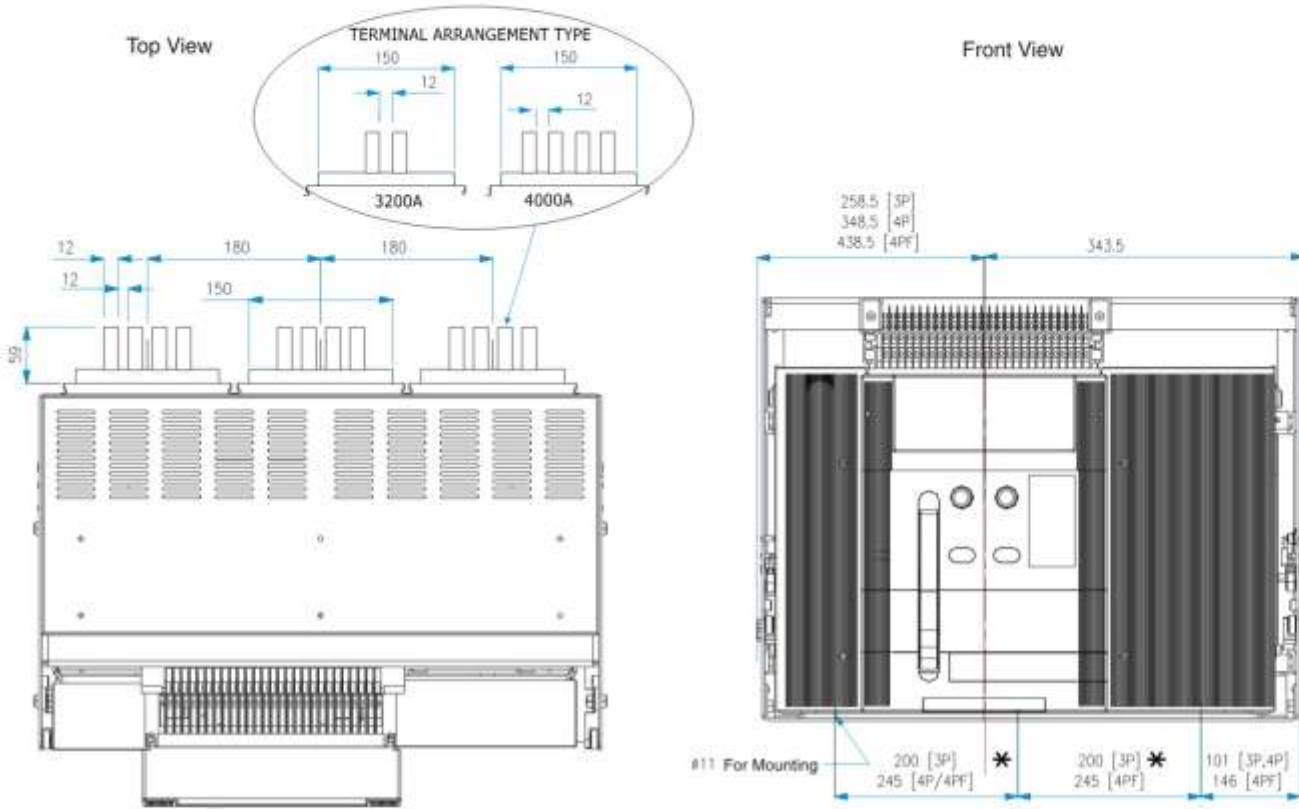
Side View

RATING	'T'
3200A.	20mm.
4000A.	25mm.

* Mounting hole dimensions
All dimensions are in mm.

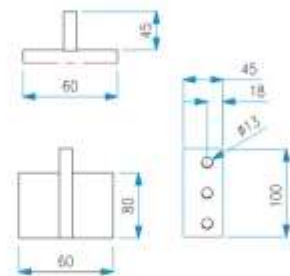
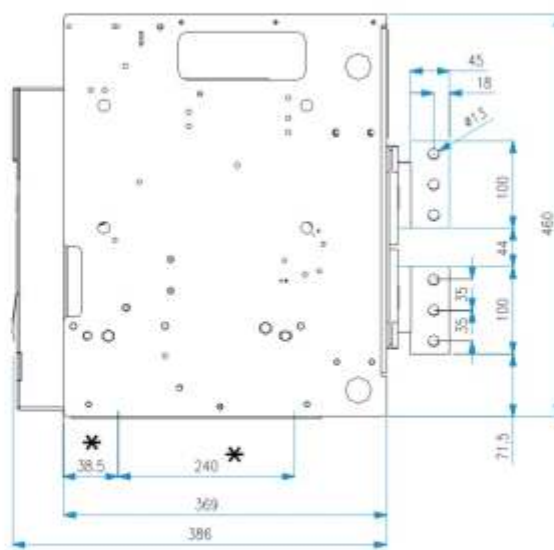
OUT LINE DIMENSIONS, MOUNTING DETAIL & TERMINAL ARRANGEMENT

Rating: 3200A to 4000A (V Series)
Drawout Type



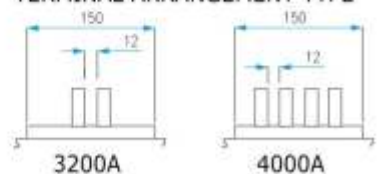
DOOR FRAME

4P- 50% RATED NEUTRAL
4PF- 100% RATED NEUTRAL



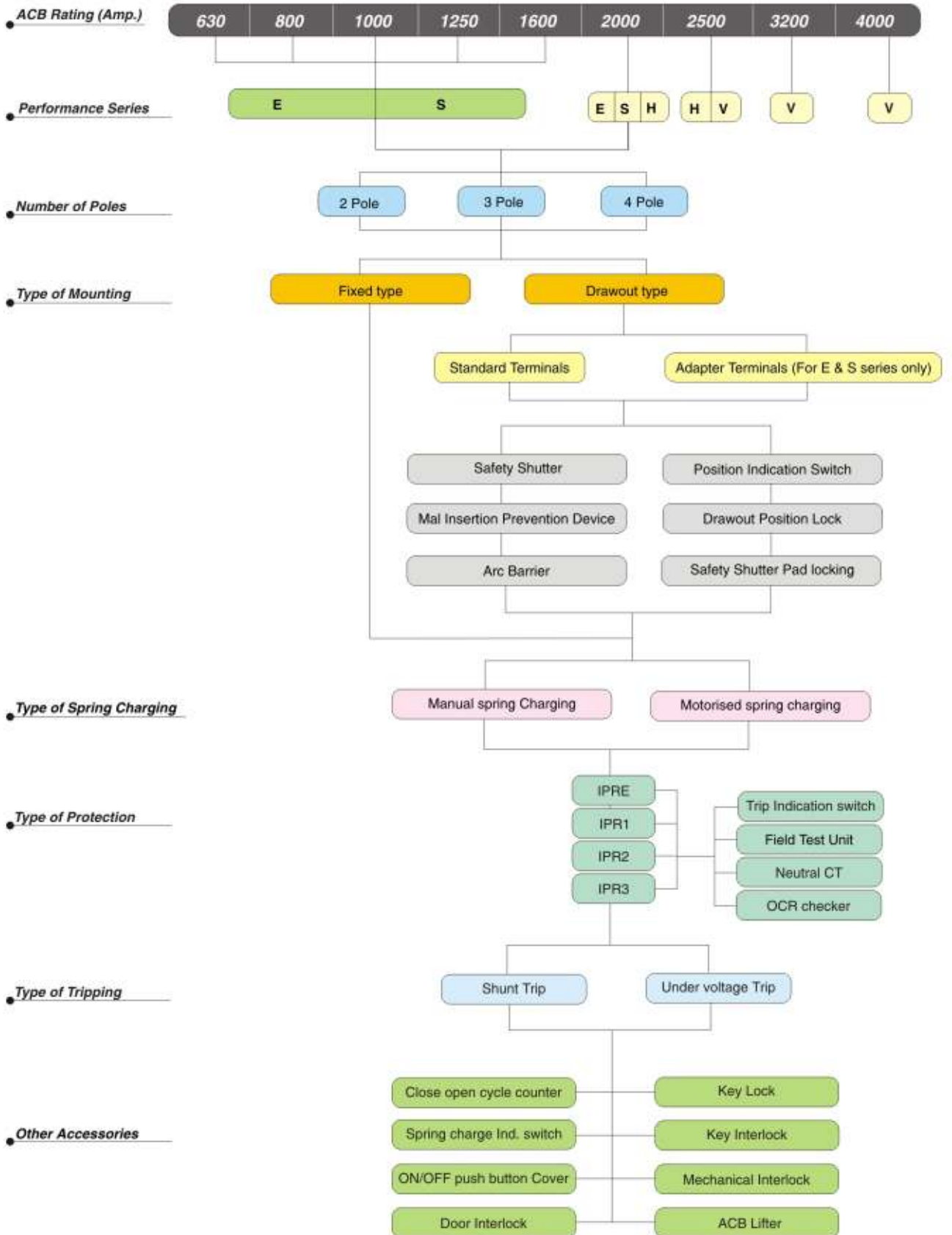
50% N-POLE FOR
4000A- 4P ACB

TERMINAL ARRANGEMENT TYPE



* Mounting hole dimensions
All dimensions are in mm.

SELECTION CHART



MCCB



Digital MCCB



On-Load Changeover Switch



MCCB Panel Board



Contactor & Overload Relay



Motor Starter



Switch Disconnector



Off-Load Changeover



Carlock fuse holder



HRC Fuse



ATS



Capacitor



Branch Offices :

NORTH

Chandigarh: SCO 12, 1st Floor, Sector-26, Madhya Marg, Chandigarh-160019.
Tel: 0172-5006661 5006662, Fax: 0172-5006680

Dehradun: HCL Compound, Saharanpur Road, Niranjanpur, Dehradun.
Tel: 0135-2521025, 2520440

Delhi: 1831, Bhagirath Palace, Delhi-110 006.
Tel: 91-011-23873875, 23873877, 23873878 Fax: 23863177

Noida: D-6, Sector 8, Noida (U.P.)
Tel : 0120 - 2424243 / 2424244 / 2424245. Fax: 0120- 2424081

Haryana: E-1, Sector 59, Noida-201307.
Tel: 91-120-3075848/953885, Fax: 0120-3075667

Ludhiana: SCO-64, 2nd Floor, Roshan Market, Millar Garj, Near Vishwakarma Chowk, Ludhiana.
Tel: 0161-5028892

Jaipur: 430-431, Ganpati Plaza, M.I. Road, Jaipur.
Tel: 0141-2368211, 5108013, Fax: 0141-2364024,

Kanpur: 87/8, Bhannana Purwa, Kanpur Tannery Compound, Kanpur-208003.
Tel : 0512-2521464, Telefax: 0512-2521464

EAST

Bhubaneswar: Plot No. 168/169A, KAC House, Bapuji Nagar, Bhubaneswar-751009.
Tel: 0674-2539471, Fax: 0674-2535591

Guwahati: Bank of Baroda Building, 4th Floor, G.S. Road, Bharatpur, Bhangagarh, Guwahati-781005.
Tel: 0361-2458923, Fax: 0361-2460355

Kolkata: Namdang Building, 27 Shakespeare Sarani, 3rd Floor, Kolkata-700017.
Tel: 033-22873945 / 22873948, Fax: 033-22873928

Ranchi: 4th Floor, Commerce House, Sharda Babu Street, Main Road, Ranchi-834001.
Tel: 0651-2208661, 2208716, Fax: 0651-2207316

Siliguri: Commerce House, Bidhan Market Road, Opp. Hotel Broadway, Siliguri.
Tel: 0353-2581646

Patna: 104, Hem Plaza, Fraser Road, Patna-1,
Tel: 0612-3244218

WEST

Ahmedabad: 914-915, 9th Floor, Atma House, Opp. LA-GAJJAR Chambers, Ashram Road, Ahmedabad-380009.
Tel: 079-26574793, 26574719, 26577830, Fax: 079-26584419

Indore: KBC House, 1st Floor, GF-33, Scheme No.54, Meghdoot Park Road, Opp. Hotel Sayaji, Vijay Nagar, Indore-452010.
Tel: 0731-2572341, 5009998, Fax: 0731-2572340

Mumbai: 315/316, "D" Wing, Floral Deck Plaza, MIDC Road, Marol, Andheri (East), Mumbai-400093.
Tel: 022-28236955, 28236956, Fax: 022-28235267

Nagpur: 'Shree Niwas' 155, Farmland, Behind Nagpur Times, New Ramdaspath, Nagpur-440010.
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Although every effort has been made to ensure accuracy in the compilation of the technical detail within this publication, specifications and performance data are constantly changing. Current details should, therefore, be checked with Havells's Group.

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