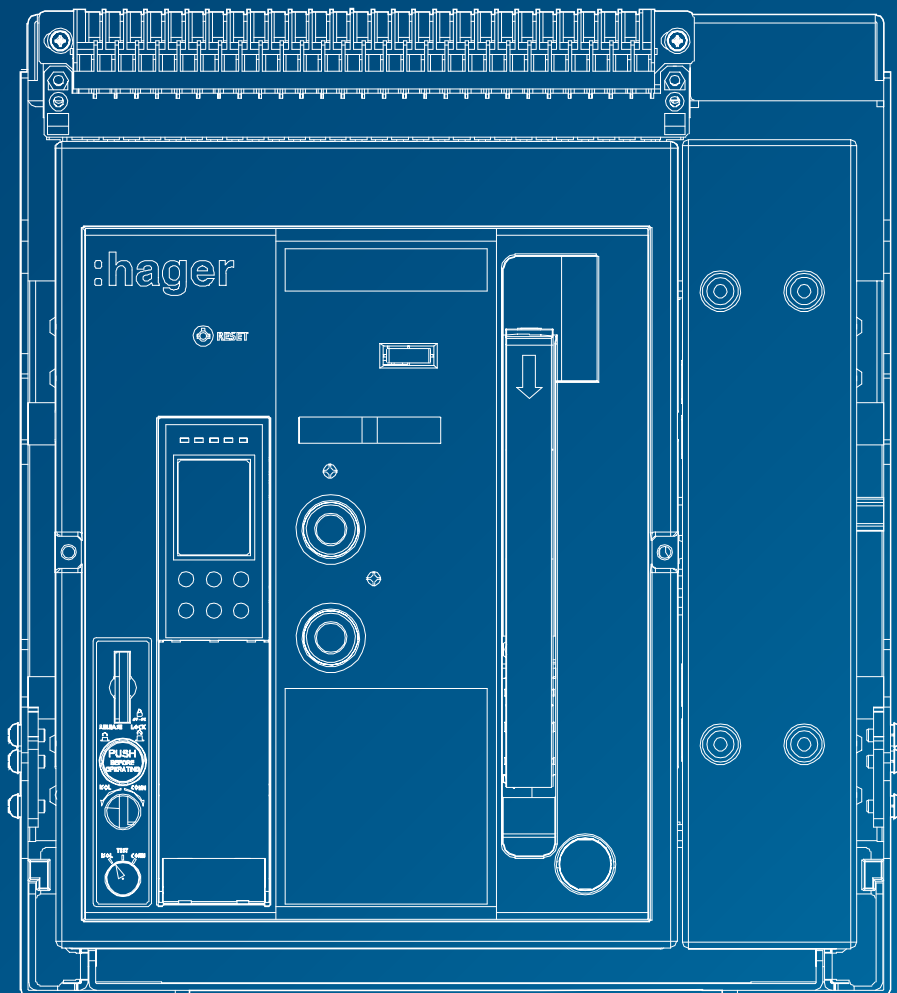


Air circuit breakers Hw



High powered

:hager

Air Circuit Breakers

Hw range

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High powered air circuit breakers Hw



The advantages for you

- High breaking capacity: full range $I_{cu}=I_{cs}$
- Optimized and compact panel size: same height and depth
- Terminal connection flexibility: horizontal/vertical terminal easy to turn at 90°
- Quick and easy mounting of accessories
- OCR: integrated communication, remote reset, ZSI, Temperature alarm
- Reliable information: fault LED info keep 1 month, fault record
- Advanced protection: low load, unbalance voltage, reserve power, low/over voltage protection
- Advanced metering: ammeter, voltage, power, energy, demand...

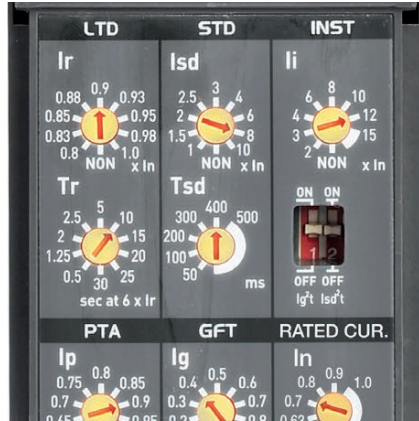
Technical data

Comply with :	IEC 60947-2 and GB14048.2
Rated current range :	630-5000A with 3 frames
Breaking capacity:	50, 65, 85, 100kA
Rated voltage:	690V
Insulated voltage:	1000V
Impulse voltage:	12KV
Switch Disconnector	
3 kinds of OCR:	Basic, Amp, Energy



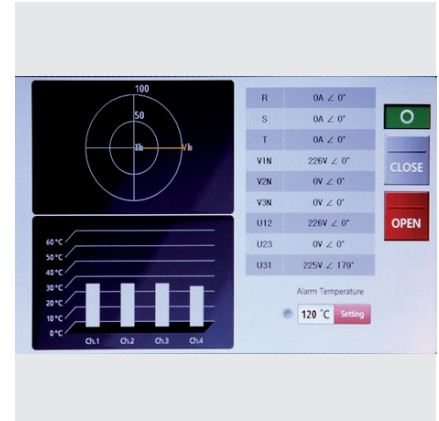
1 Intelligent OCR

LSIGN protection, LCD display, pre-trip alarm, fault recording, remote reset. Signal indication LED PTA/LSI/GF/COM.



2 Flexible protection

Can switch ON/OFF LSIGN and thermal memory separately.



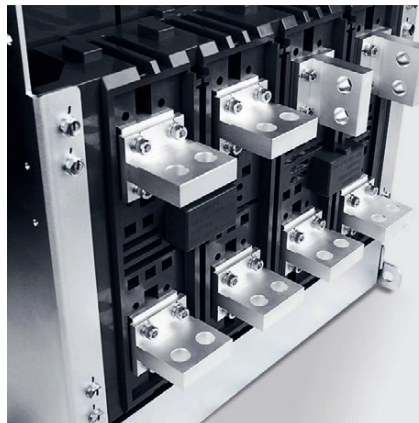
3 Fast and economic

to build up communication network. Communication module integrated in OCR.



4 Easy maintenance

Event record 200, fault record 250 (reserved for ever), OCR checker tool.



5 Flexible terminal connection

Horizontal/Vertical terminal rotate at 90° to make it easier for panel builder to mount on busbars. For frame A up to 1600A and frame B up to 3200A.



6 Wide range of accessories

Including: arc shield, phase barrier, temperature sensor, dust cover (IP54), ...

Air Circuit Breaker products get their name from the fact that their breaking chambers are in the open air to allow better energy dissipation. Their electrical and mechanical strength, breaking capacity, maintainability and accessories make them ideal for protection for low voltage installations.

Characteristics of air circuit breaker

Rated current I_n (A)	This is the maximum current value the circuit breaker can withstand on a permanent basis. This value is always given for an ambient temperature (40/50°C) in accordance with IEC 60947-2 standard if this temperature is higher, it is necessary to reduce the operating current.
Rated operating voltage U_e (V)	This is the voltage at which the circuit breaker can be used. The value indicated is usually the maximum value. At lower voltages, certain characteristics may differ or even be improved, such as the breaking capacity.
Insulation voltage U_i (V)	This is the value for the insulation performance of the device. The insulation test voltages (impulse, industrial frequency) are determined based on this value.
Impulse voltage U_{imp} (kV)	This value characterizes the ability of the device to withstand transient overvoltages such as lightning.
Ultimate breaking capacity I_{cu} (kA)	This is the maximum short-circuit current value that a circuit breaker can break at a given voltage and phase angle. The tests are executed according to the sequence O - t - CO. O represents an automatic break operation, t a time interval and CO a make operation followed by an automatic break operation. Following the test, the circuit breaker must continue to provide a minimum level of safety (isolation, dielectric strength).
Standard breaking capacity I_{cs} (kA)	This is the value expressed as a percentage of I_{cu} . It will be one of the following values: 25% (category A only), 50%, 75% or 100%. The circuit breaker must be capable of operating normally after breaking the I_{cs} current several times using the sequence O-CO-CO.
Short-time withstand current I_{cw} (kA)	This is the value of the short-circuit current that a category B circuit breaker is capable of withstanding for a defined period without altering its characteristics. This value is intended to enable discrimination between devices. The circuit breaker concerned can remain closed while the fault is eliminated by the downstream device.
Rated short-circuit making capacity I_{cm} (kA peak)	This is the maximum current intensity a device can make at its rated voltage according to the conditions of the standard. Devices without a protection function, such as switches, must be able to withstand short-circuit currents with a value and duration resulting from the action of the associated protection device.

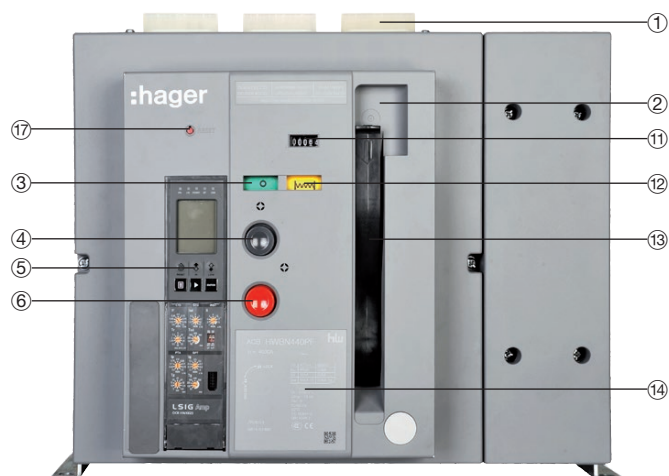
The ACB Hw offers protection trip unit (OCR) functions and, in the event of tripping, controls the opening of the circuit-breaker, preventing it from closing again unless it has been reset by the operator.

Characteristics of OCR

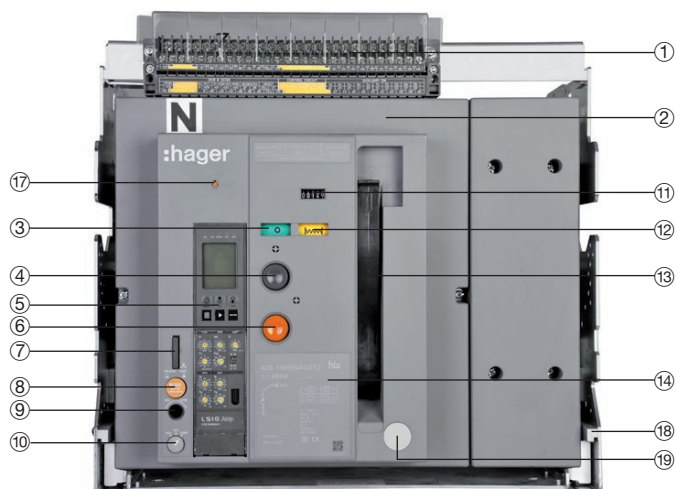
Basic functions	Long-time Overload Protection (LTD)	Long-time overload protection function is for the protection of circuit overload. The protection is based on true rms value of currents.
	Short Time (STD)	Short-time short-circuit protection prevents impedance type short-circuit of power distribution system. Such kind of short-circuit normally is caused by partial short-circuit. Current normally exceed overload range but not be too large.
	Instantaneous (INST)	Instantaneous short-circuit protection functions prevents solid type short-circuit in power distribution system, which is normally caused by inter-phase fault and will generate large short-circuit current. Then an instantaneous tripping is required. Such protection is based on true rms value of currents.
	Ground Fault Trip (GFT)	The ground fault protection for equipment is used to detect current flowing through the grounding conductors which may present a hazardous condition.
	Neutral protection	Available at 100% x I_n of the phase currents 4P, or disabled, it is applied to the overcurrent protections L, S and I.
	Thermal Memory	To prevent unacceptable repeated or periodical overload, control unit will track and record thermal effect of overload current and trigger tripping operation when accumulated thermal effect reaches predefined threshold.
	Pre Trip Alarm (PTA)	The protection unit includes an alarm indication that will be lit continuously when the current is above 100% of the pickup setting. The settable PTA indicates the set threshold is reached before the protection is tripped.
	Fail-safe	ACB must be protected against the short-circuits although I_{sd} and I_i has set as "NON". When it detects current more than $10 \times I_n$, this function is operating.
	Zone selective Interlock (ZSI)	This function allows total selective protection between upstream or downstream ACBs. Once the area has received the signal in the network, it will coordinate its trip in case of fault.
	Making Current Release (MCR)	Closing on short-circuit (MCR): this function trips the ACB when a short-circuit current flows during ACB closing operation, and lock the ACB to keep it inoperative. MCR is operated by 8 times of CT rating. The function is active with an auxiliary supply. MCR is operated by 8 times of CT rating.
	Field test	Field test on circuit breakers have long provided diagnostic for the electrical components and simulate long time, short time, instantaneous delay. This function requires a control power supply (available for Amp and Energy type OCRs).
	Override	The purpose of this function is to protect ACB and wire from a current over I_{cw} . Detects a peak value of current. This function breaks the ACB without a time delay ($< 30ms$) Pick-up : $15 \times I_{ct}$.
	Fault event	Records 256 numbers of the fault info, fault phase, current value and time stamp. This function records the last wave of that time when the trip occurs and can check the wave via the communication.
	System event	Records 200 numbers of the trip unit information, i.e trip unit power on, protection setting change and so on. This event can check via the communication.
Advanced functions (only energy type)	Under Voltage Relays and Over Voltage Relay (UVR/OVR)	- Minimum voltage protection UVR: This function calculates the minimum rms value of the three phase to phase voltages. Protection is activated when at least one of the three phase to phase voltages is below the threshold set by the user. - Maximum voltage protection OVR: This function calculates the maximum rms value of the three phase to phase voltages. Protection is activated when at least one of the three phase to phase voltages are simultaneously above the threshold set by the user.
	Unbalance voltage and current	U unbal calculates the rms value of the unbalance between the three phase to phase voltages. I unbal is activated by an unbalance between the rms values of the three phase currents. This is set by a communication and monitored.
	Reverse power rP	Calculates the value of the total active power on the three phases. Is activated when the total active power of the three phases flows in the direction opposite. The direction of flow is set by the user in the "Power Sign": "+" corresponds to the normal direction of flow, i.e from the top on the acb to the bottom; "-" is the opposite.

Front

Fixed type

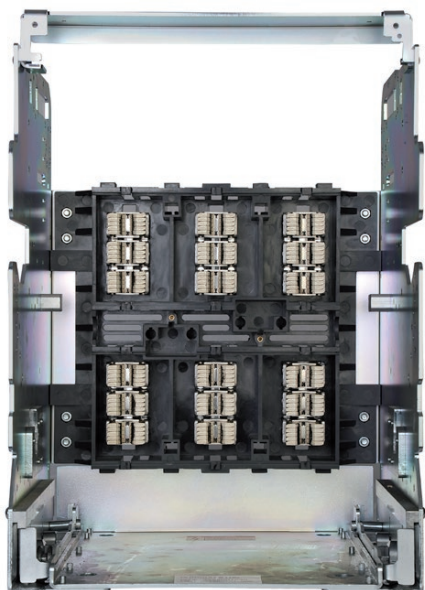


Draw-out type

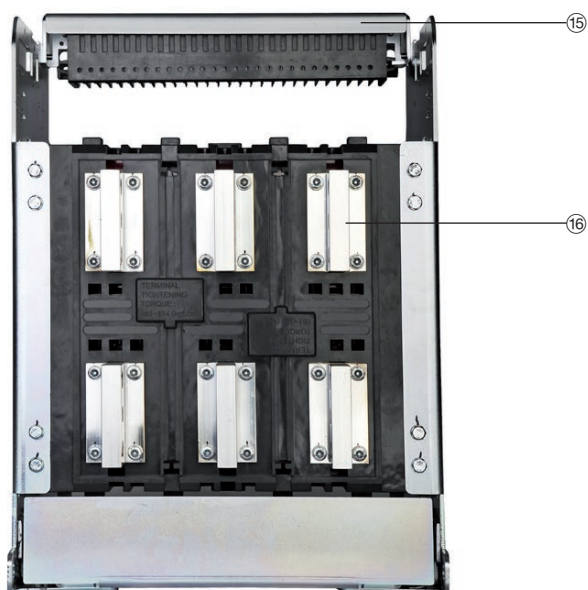


Chassis

Inside



Rear

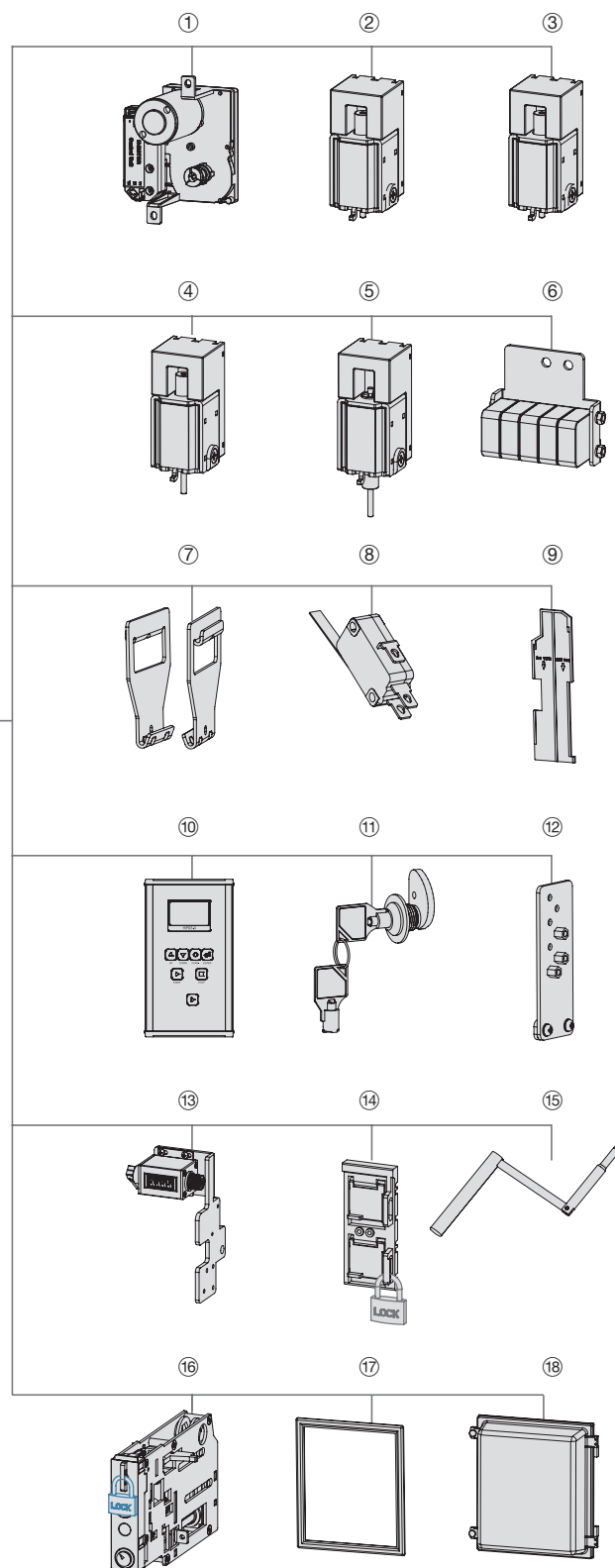


- ① Control terminal
- ② Front cover
- ③ Close/Open indicator
- ④ Close button
- ⑤ Protection trip relay (OCR)
- ⑥ Open button
- ⑦ Position lock device

- ⑧ Position lock release button
- ⑨ Draw-in/out handle insertion hole
- ⑩ Position indicator
- ⑪ Counter
- ⑫ Charged/Discharged indicator
- ⑬ Manual charging handle
- ⑭ Name plate

- ⑮ Arc shield
- ⑯ Terminal connection
- ⑰ OCR & Alarm switch reset button
- ⑱ Draw-in/out guide rail
- ⑲ Draw-in/out handle

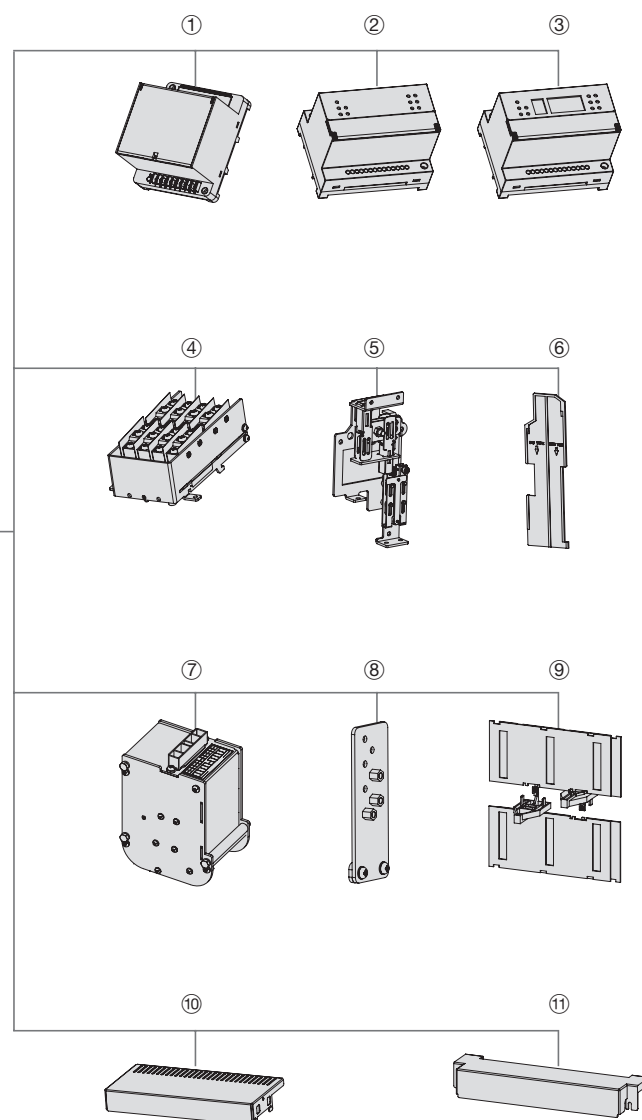
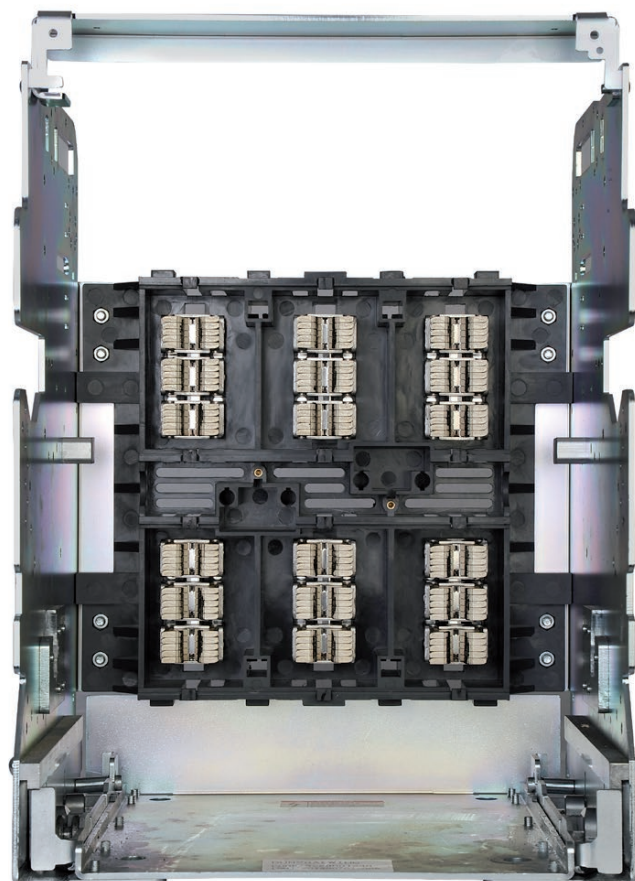
Body side



- ① Motor operator
- ② Closing coil
- ③ Shunt trip coil
- ④ Second shunt trip coil
- ⑤ Under voltage trip coil
- ⑥ Auxiliary switch
- ⑦ Lifting lug
- ⑧ Ready to close
- ⑨ Phase insulation barrier
- ⑩ OCR portable checker
- ⑪ Key lock device
- ⑫ Wrong insertion preventer

- ⑬ Counter
- ⑭ ON/OFF button cover
- ⑮ Draw-in/out handle
- ⑯ Draw-in/out mechanism
- ⑰ Door flange
- ⑱ Dust cover

Chassis side (cradle)



- ① UVT time delay controller
- ② Remote operation module (RCU)
- ③ Temperature detection module (RCTU)
- ④ Position switch
- ⑤ Mechanical interlock kit
- ⑥ Phase insulation barrier
- ⑦ Mechanical operated cell (MOC) switch

- ⑧ Wrong insertion preventer
- ⑨ Safety shutter
- ⑩ Arc shield
- ⑪ Control terminal protection cover

Accessories included as standard:

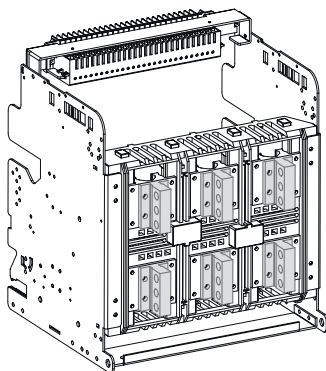
- Auxiliary switch 4NO/5NC
- Door flange for IP30
- Safety shutter lock (for draw-out type)
- Rotary handle (for draw-out type)

Flexible terminal connections

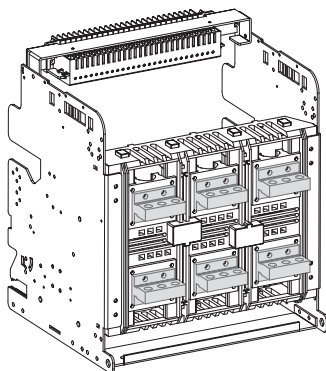
Connectors can be set horizontally and vertically, which allows an easy mounting by adapting their position to the busbars. Horizontal/vertical terminals rotate at 90° to make easier panel builder's convenience regarding busbar connection. ¹⁾

Standard connection

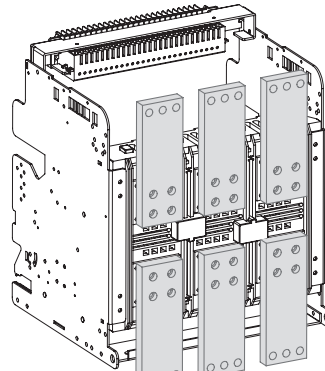
Vertical



Horizontal

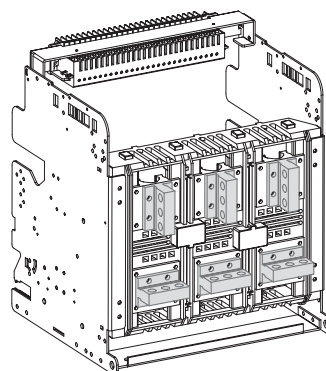


Front

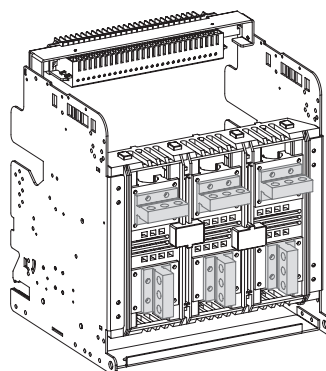


Mixed connection (top / bottom)

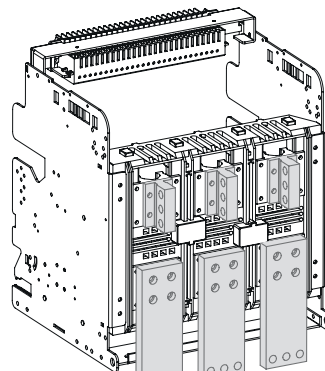
Vertical / horizontal



Horizontal / vertical



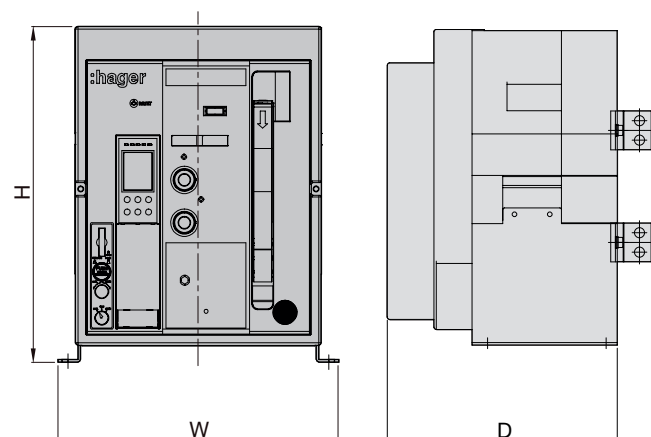
Vertical / front



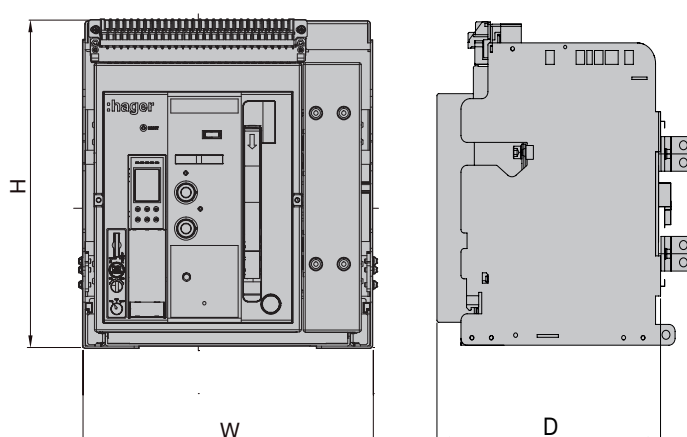
¹⁾ For frame A up to 1600A and frame B up to 3200A.

Frame				A		B			C	
Type				H	N	N	S	P	P	
Rated current			A	630-2000		630-4000			3200-5000	
Rated operating voltage (Ue)			V	690						
Rated insulation voltage (Ui)			V	1000						
Rated impulse withstand voltage (Uimp)			KV	12						
Frequency			Hz	50/60						
Number of poles			poles	3-4						
Current setting range (...x In max)			Ir	0.4-1.0						
Rated current of neutral pole (...% x In)			%/In	100%						
Rated breaking capacity (Icu)	AC 690/600/550V		KA	36	50	50	65	85	85	
	AC 415/380/220V			50	65	65	85	100	100	
Rated service breaking capacity (Ics)	AC 690/600/550V		KA	100% Icu						
	AC 415/380/220V									
Rated short-time capacity (Icw)	1s		KA	50	65	65	85	85	85	
	3s			36	36	50	55	65	65	
Rated making capacity (Icm) (kA peak)	AC 690/600/550V		KA	76	105	105	143	187	187	
	AC 415/380/220V			105	143	143	187	220	220	
Utilization category (according to IEC 60947-2)				B						
Time										
Maximum total breaking time			ms	40						
Closing operating time	motor charging time		s	5						
	max. closing time		ms	40						
Operating cycle										
Mechanical life cycle	without maintenance		times	20000		15000			10000	
	with maintenance			30000		20000			20000	
Electrical life cycle	without maintenance			5000		up to 2000A: 10000 from 2500A: 5000			2000	
	with maintenance			10000		up to 2000A: 15000 from 2500A: 10000			5000	
Dimensions										
External dimension (W x H x D, except busbar)	fixed type	3 pole	mm	337x404x296		408x404x296			633x404x296	
		4 pole		422x404x296		523x404x296			803x404x296	
	draw-out type	3 pole		328x460x368		399x460x368			624x460x368	
		4 pole		413x460x368		514x460x368			794x460x368	
Weight	fixed type	3 pole	kg	34		up to 3200A: 44 4000A: 61			76	
		4 pole		44		up to 3200A: 55 4000A: 81			81	
	draw-out type	3 pole		63		up to 3200A: 87 4000A: 107			145	
		4 pole		80		up to 3200A: 130 4000A: 161			173	

Fixed type

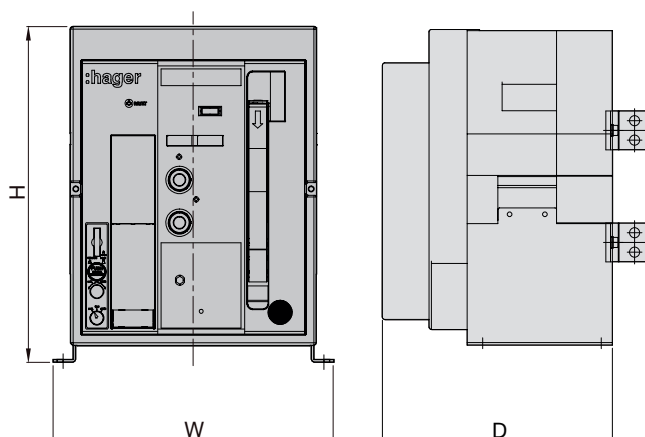


Draw-out type

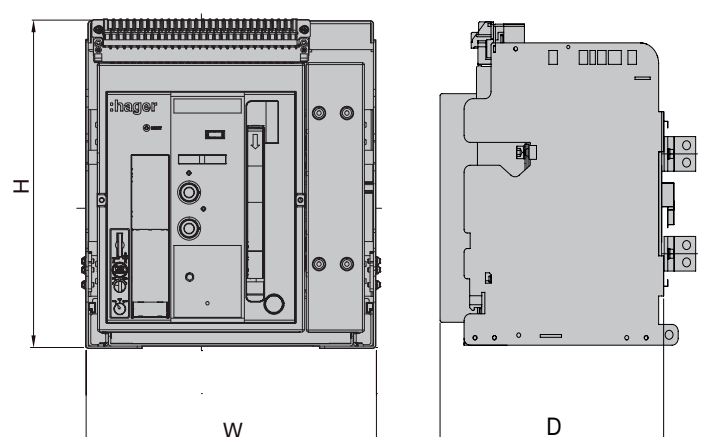


Frame			A	B	C	
Type			N.....A	N.....A	P.....A	
Rated current	A		630-2000	630-4000	3200-5000	
Rated operating voltage (Ue)	V		690			
Rated insulation voltage (Ui)	V		1000			
Rated impulse withstand voltage (Uimp)	KV		12			
Frequency	Hz		50/60			
Number of poles	poles		3-4			
Rated current of neutral pole (...% x In)	%/In		100%			
Rated short-time capacity (Icw)	1s	KA	65	65	85	
	3s		36	50	65	
Rated making capacity (Icm) (kA peak)	AC 690/600/550V	KA	105	105	187	
	AC 415/380/220V		143	143	220	
Utilization category (according to IEC 60947-3)			AC23			
Time						
Maximum total breaking time		ms	40			
Closing operating time	motor charging time	s	5			
	max. closing time	ms	40			
Operating cycle						
Mechanical life cycle	without maintenance	times	20000	15000	10000	
	with maintenance		30000	20000	20000	
Electrical life cycle	without maintenance		5000	up to 2000A: 10000	2000	
	from 2500A: 5000					
	with maintenance		10000	up to 2000A: 15000	5000	
from 2500A: 10000						
Dimensions						
External dimension (W x H x D, except busbar)	fixed type	3 pole	mm	337x404x296	408x404x296	633x404x296
		4 pole		422x404x296	523x404x296	803x404x296
	draw-out type	3 pole		328x460x368	399x460x368	624x460x368
		4 pole		413x460x368	514x460x368	794x460x368
Weight	fixed type	3 pole	kg	34	up to 3200A: 44	76
		4 pole			4000A: 61	
	draw-out type	3 pole		44	up to 3200A: 55	81
					4000A: 81	
		3 pole		63	up to 3200A: 87	145
					4000A: 107	
4 pole	80	up to 3200A: 130	173			
		4000A: 161				

Fixed type



Draw-out type





HWAN416ED

Air Circuit Breakers, Frame A

Characteristics

Icu=Ics=50KA

Icu=Ics=Icw

Description	Rating (A)	Nr. of poles	Cat.Ref draw-out type	fixed type
ACB, Frame A	630	3	HWAH306ED	HWAH306EF
ACB, Frame A	800	3	HWAH308ED	HWAH308EF
ACB, Frame A	1000	3	HWAH310ED	HWAH310EF
ACB, Frame A	1250	3	HWAH312ED	HWAH312EF
ACB, Frame A	1600	3	HWAH316ED	HWAH316EF
ACB, Frame A	2000	3	HWAH320ED	HWAH320EF
ACB, Frame A	630	4	HWAH406ED	HWAH406EF
ACB, Frame A	800	4	HWAH408ED	HWAH408EF
ACB, Frame A	1000	4	HWAH410ED	HWAH410EF
ACB, Frame A	1250	4	HWAH412ED	HWAH412EF
ACB, Frame A	1600	4	HWAH416ED	HWAH416EF
ACB, Frame A	2000	4	HWAH420ED	HWAH420EF

Air Circuit Breakers, Frame A

Characteristics

Icu=Ics=65KA

Icu=Ics=Icw

Description	Rating (A)	Nr. of poles	Cat.Ref draw-out type	fixed type
ACB, Frame A	630	3	HWAN306ED	HWAN306EF
ACB, Frame A	800	3	HWAN308ED	HWAN308EF
ACB, Frame A	1000	3	HWAN310ED	HWAN310EF
ACB, Frame A	1250	3	HWAN312ED	HWAN312EF
ACB, Frame A	1600	3	HWAN316ED	HWAN316EF
ACB, Frame A	2000	3	HWAN320ED	HWAN320EF
ACB, Frame A	630	4	HWAN406ED	HWAN406EF
ACB, Frame A	800	4	HWAN408ED	HWAN408EF
ACB, Frame A	1000	4	HWAN410ED	HWAN410EF
ACB, Frame A	1250	4	HWAN412ED	HWAN412EF
ACB, Frame A	1600	4	HWAN416ED	HWAN416EF
ACB, Frame A	2000	4	HWAN420ED	HWAN420EF



HWBN416ED

Air Circuit Breakers, Frame B

Characteristics

Icu=Ics=65KA

Icu=Ics=Icw

Description	Rating (A)	Nr. of poles	Cat.Ref draw-out type	fixed type
ACB, Frame B	630	3	HWBN306ED	HWBN306EF
ACB, Frame B	800	3	HWBN308ED	HWBN308EF
ACB, Frame B	1000	3	HWBN310ED	HWBN310EF
ACB, Frame B	1250	3	HWBN312ED	HWBN312EF
ACB, Frame B	1600	3	HWBN316ED	HWBN316EF
ACB, Frame B	2000	3	HWBN320ED	HWBN320EF
ACB, Frame B	2500	3	HWBN325ED	HWBN325EF
ACB, Frame B	3200	3	HWBN332ED	HWBN332EF
ACB, Frame B	4000	3	HWBN340ED	HWBN340EF
ACB, Frame B	630	4	HWBN406ED	HWBN406EF
ACB, Frame B	800	4	HWBN408ED	HWBN408EF
ACB, Frame B	1000	4	HWBN410ED	HWBN410EF
ACB, Frame B	1250	4	HWBN412ED	HWBN412EF
ACB, Frame B	1600	4	HWBN416ED	HWBN416EF
ACB, Frame B	2000	4	HWBN420ED	HWBN420EF
ACB, Frame B	2500	4	HWBN425ED	HWBN425EF
ACB, Frame B	3200	4	HWBN432ED	HWBN432EF
ACB, Frame B	4000	4	HWBN440ED	HWBN440EF

Air Circuit Breakers, Frame B

Characteristics

Icu=Ics=85KA

Icu=Ics=Icw

Description	Rating (A)	Nr. of poles	Cat.Ref draw-out type	fixed type
ACB, Frame B	630	3	HWBS306ED	HWBS306EF
ACB, Frame B	800	3	HWBS308ED	HWBS308EF
ACB, Frame B	1000	3	HWBS310ED	HWBS310EF
ACB, Frame B	1250	3	HWBS312ED	HWBS312EF
ACB, Frame B	1600	3	HWBS316ED	HWBS316EF
ACB, Frame B	2000	3	HWBS320ED	HWBS320EF
ACB, Frame B	2500	3	HWBS325ED	HWBS325EF
ACB, Frame B	3200	3	HWBS332ED	HWBS332EF
ACB, Frame B	4000	3	HWBS340ED	HWBS340EF
ACB, Frame B	630	4	HWBS406ED	HWBS406EF
ACB, Frame B	800	4	HWBS408ED	HWBS408EF
ACB, Frame B	1000	4	HWBS410ED	HWBS410EF
ACB, Frame B	1250	4	HWBS412ED	HWBS412EF
ACB, Frame B	1600	4	HWBS416ED	HWBS416EF
ACB, Frame B	2000	4	HWBS420ED	HWBS420EF
ACB, Frame B	2500	4	HWBS425ED	HWBS425EF
ACB, Frame B	3200	4	HWBS432ED	HWBS432EF
ACB, Frame B	4000	4	HWBS440ED	HWBS440EF



HWBS416ED

Air Circuit Breakers, Frame B

Characteristics

Icu=Ics=100KA

Icw=85KA

Description	Rating (A)	Nr. of poles	Cat.Ref draw-out type	fixed type
ACB, Frame B	630	3	HWBP306ED	HWBP306EF
ACB, Frame B	800	3	HWBP308ED	HWBP308EF
ACB, Frame B	1000	3	HWBP310ED	HWBP310EF
ACB, Frame B	1250	3	HWBP312ED	HWBP312EF
ACB, Frame B	1600	3	HWBP316ED	HWBP316EF
ACB, Frame B	2000	3	HWBP320ED	HWBP320EF
ACB, Frame B	2500	3	HWBP325ED	HWBP325EF
ACB, Frame B	3200	3	HWBP332ED	HWBP332EF
ACB, Frame B	4000	3	HWBP340ED	HWBP340EF
ACB, Frame B	630	4	HWBP406ED	HWBP406EF
ACB, Frame B	800	4	HWBP408ED	HWBP408EF
ACB, Frame B	1000	4	HWBP410ED	HWBP410EF
ACB, Frame B	1250	4	HWBP412ED	HWBP412EF
ACB, Frame B	1600	4	HWBP416ED	HWBP416EF
ACB, Frame B	2000	4	HWBP420ED	HWBP420EF
ACB, Frame B	2500	4	HWBP425ED	HWBP425EF
ACB, Frame B	3200	4	HWBP432ED	HWBP432EF
ACB, Frame B	4000	4	HWBP440ED	HWBP440EF

Air Circuit Breakers, Frame C

Characteristics

Icu=Ics=100KA

Icw=85KA

Description	Rating (A)	Nr. of poles	Cat.Ref draw-out type	fixed type
ACB, Frame C	3200	3	HWCP332ED	HWCP332EF
ACB, Frame C	4000	3	HWCP340ED	HWCP340EF
ACB, Frame C	5000	3	HWCP350ED	HWCP350EF
ACB, Frame C	3200	4	HWCP432ED	HWCP432EF
ACB, Frame C	4000	4	HWCP440ED	HWCP440EF
ACB, Frame C	5000	4	HWCP450ED	HWCP450EF



HWCP432ED



HWAN416EDA

Switch Disconnectors, Frame A

Characteristics I_{cw}=50KA

Description	Rating (A)	Nr. of poles	Cat.Ref draw-out type	fixed type
Switch Disconnector, Frame A	630	3	HWAH306EDA	HWAH306EFA
Switch Disconnector, Frame A	800	3	HWAH308EDA	HWAH308EFA
Switch Disconnector, Frame A	1000	3	HWAH310EDA	HWAH310EFA
Switch Disconnector, Frame A	1250	3	HWAH312EDA	HWAH312EFA
Switch Disconnector, Frame A	1600	3	HWAH316EDA	HWAH316EFA
Switch Disconnector, Frame A	2000	3	HWAH320EDA	HWAH320EFA
Switch Disconnector, Frame A	630	4	HWAH406EDA	HWAH406EFA
Switch Disconnector, Frame A	800	4	HWAH408EDA	HWAH408EFA
Switch Disconnector, Frame A	1000	4	HWAH410EDA	HWAH410EFA
Switch Disconnector, Frame A	1250	4	HWAH412EDA	HWAH412EFA
Switch Disconnector, Frame A	1600	4	HWAH416EDA	HWAH416EFA
Switch Disconnector, Frame A	2000	4	HWAH420EDA	HWAH420EFA

Switch Disconnectors, Frame A

Characteristics I_{cw}=65KA

Description	Rating (A)	Nr. of poles	Cat.Ref draw-out type	fixed type
Switch Disconnector, Frame A	630	3	HWAN306EDA	HWAN306EFA
Switch Disconnector, Frame A	800	3	HWAN308EDA	HWAN308EFA
Switch Disconnector, Frame A	1000	3	HWAN310EDA	HWAN310EFA
Switch Disconnector, Frame A	1250	3	HWAN312EDA	HWAN312EFA
Switch Disconnector, Frame A	1600	3	HWAN316EDA	HWAN316EFA
Switch Disconnector, Frame A	2000	3	HWAN320EDA	HWAN320EFA
Switch Disconnector, Frame A	630	4	HWAN406EDA	HWAN406EFA
Switch Disconnector, Frame A	800	4	HWAN408EDA	HWAN408EFA
Switch Disconnector, Frame A	1000	4	HWAN410EDA	HWAN410EFA
Switch Disconnector, Frame A	1250	4	HWAN412EDA	HWAN412EFA
Switch Disconnector, Frame A	1600	4	HWAN416EDA	HWAN416EFA
Switch Disconnector, Frame A	2000	4	HWAN420EDA	HWAN420EFA



HWBN416EDA

Switch Disconnectors, Frame B

Characteristics I_{cw}=65KA

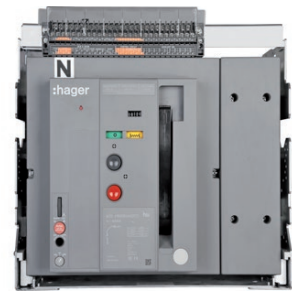
Description	Rating (A)	Nr. of poles	Cat.Ref draw-out type	fixed type
Switch Disconnector, Frame B	630	3	HWBN306EDA	HWBN306EFA
Switch Disconnector, Frame B	800	3	HWBN308EDA	HWBN308EFA
Switch Disconnector, Frame B	1000	3	HWBN310EDA	HWBN310EFA
Switch Disconnector, Frame B	1250	3	HWBN312EDA	HWBN312EFA
Switch Disconnector, Frame B	1600	3	HWBN316EDA	HWBN316EFA
Switch Disconnector, Frame B	2000	3	HWBN320EDA	HWBN320EFA
Switch Disconnector, Frame B	2500	3	HWBN325EDA	HWBN325EFA
Switch Disconnector, Frame B	3200	3	HWBN332EDA	HWBN332EFA
Switch Disconnector, Frame B	4000	3	HWBN340EDA	HWBN340EFA
Switch Disconnector, Frame B	630	4	HWBN406EDA	HWBN406EFA
Switch Disconnector, Frame B	800	4	HWBN408EDA	HWBN408EFA
Switch Disconnector, Frame B	1000	4	HWBN410EDA	HWBN410EFA
Switch Disconnector, Frame B	1250	4	HWBN412EDA	HWBN412EFA
Switch Disconnector, Frame B	1600	4	HWBN416EDA	HWBN416EFA
Switch Disconnector, Frame B	2000	4	HWBN420EDA	HWBN420EFA
Switch Disconnector, Frame B	2500	4	HWBN425EDA	HWBN425EFA
Switch Disconnector, Frame B	3200	4	HWBN432EDA	HWBN432EFA
Switch Disconnector, Frame B	4000	4	HWBN440EDA	HWBN440EFA

Switch Disconnectors, Frame B

Characteristics

Icw=85KA

Description	Rating (A)	Nr. of poles	Cat.Ref draw-out type	fixed type
Switch Disconnector, Frame B	630	3	HWBS306EDA	HWBS306EFA
Switch Disconnector, Frame B	800	3	HWBS308EDA	HWBS308EFA
Switch Disconnector, Frame B	1000	3	HWBS310EDA	HWBS310EFA
Switch Disconnector, Frame B	1250	3	HWBS312EDA	HWBS312EFA
Switch Disconnector, Frame B	1600	3	HWBS316EDA	HWBS316EFA
Switch Disconnector, Frame B	2000	3	HWBS320EDA	HWBS320EFA
Switch Disconnector, Frame B	2500	3	HWBS325EDA	HWBS325EFA
Switch Disconnector, Frame B	3200	3	HWBS332EDA	HWBS332EFA
Switch Disconnector, Frame B	4000	3	HWBS340EDA	HWBS340EFA
Switch Disconnector, Frame B	630	4	HWBS406EDA	HWBS406EFA
Switch Disconnector, Frame B	800	4	HWBS408EDA	HWBS408EFA
Switch Disconnector, Frame B	1000	4	HWBS410EDA	HWBS410EFA
Switch Disconnector, Frame B	1250	4	HWBS412EDA	HWBS412EFA
Switch Disconnector, Frame B	1600	4	HWBS416EDA	HWBS416EFA
Switch Disconnector, Frame B	2000	4	HWBS420EDA	HWBS420EFA
Switch Disconnector, Frame B	2500	4	HWBS425EDA	HWBS425EFA
Switch Disconnector, Frame B	3200	4	HWBS432EDA	HWBS432EFA
Switch Disconnector, Frame B	4000	4	HWBS440EDA	HWBS440EFA



HWBS416EDA

Switch Disconnectors, Frame B

Characteristics

Icw=85KA

Description	Rating (A)	Nr. of poles	Cat.Ref draw-out type	fixed type
Switch Disconnector, Frame B	630	3	HWBP306EDA	HWBP306EFA
Switch Disconnector, Frame B	800	3	HWBP308EDA	HWBP308EFA
Switch Disconnector, Frame B	1000	3	HWBP310EDA	HWBP310EFA
Switch Disconnector, Frame B	1250	3	HWBP312EDA	HWBP312EFA
Switch Disconnector, Frame B	1600	3	HWBP316EDA	HWBP316EFA
Switch Disconnector, Frame B	2000	3	HWBP320EDA	HWBP320EFA
Switch Disconnector, Frame B	2500	3	HWBP325EDA	HWBP325EFA
Switch Disconnector, Frame B	3200	3	HWBP332EDA	HWBP332EFA
Switch Disconnector, Frame B	4000	3	HWBP340EDA	HWBP340EFA
Switch Disconnector, Frame B	630	4	HWBP406EDA	HWBP406EFA
Switch Disconnector, Frame B	800	4	HWBP408EDA	HWBP408EFA
Switch Disconnector, Frame B	1000	4	HWBP410EDA	HWBP410EFA
Switch Disconnector, Frame B	1250	4	HWBP412EDA	HWBP412EFA
Switch Disconnector, Frame B	1600	4	HWBP416EDA	HWBP416EFA
Switch Disconnector, Frame B	2000	4	HWBP420EDA	HWBP420EFA
Switch Disconnector, Frame B	2500	4	HWBP425EDA	HWBP425EFA
Switch Disconnector, Frame B	3200	4	HWBP432EDA	HWBP432EFA
Switch Disconnector, Frame B	4000	4	HWBP440EDA	HWBP440EFA

Switch Disconnectors, Frame C

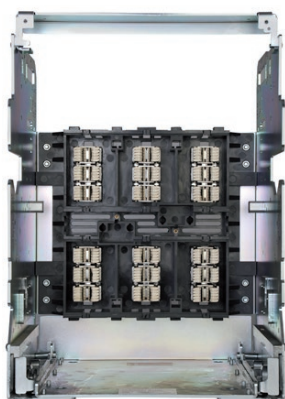
Characteristics

Icw=85KA

Description	Rating (A)	Nr. of poles	Cat.Ref draw-out type	fixed type
Switch Disconnector, Frame C	3200	3	HWCP332EDA	HWCP332EFA
Switch Disconnector, Frame C	4000	3	HWCP340EDA	HWCP340EFA
Switch Disconnector, Frame C	5000	3	HWCP350EDA	HWCP350EFA
Switch Disconnector, Frame C	3200	4	HWCP432EDA	HWCP432EFA
Switch Disconnector, Frame C	4000	4	HWCP440EDA	HWCP440EFA
Switch Disconnector, Frame C	5000	4	HWCP450EDA	HWCP450EFA



HWCP432EDA



HWY750

Chassis

Description	Pcs	Cat.Ref
Frame A, 3 pole, 630 -1600A	1	HWY750
Frame A, 4 pole, 630 -1600A	1	HWY751
Frame A, 3 pole, 2000A	1	HWY752
Frame A, 4 pole, 2000A	1	HWY753
Frame B, 3 pole, 630 -2500A	1	HWY754
Frame B, 4 pole, 630 -2500A	1	HWY755
Frame B, 3 pole, 3200A	1	HWY756
Frame B, 4 pole, 3200A	1	HWY757
Frame B, 3 pole, 4000A vertical	1	HWY758
Frame B, 4 pole, 4000A vertical	1	HWY759
Frame B, 3 pole, 4000A horizontal	1	HWY760
Frame B, 4 pole, 4000A horizontal	1	HWY761
Frame C, 3 pole, 3200-5000A vertical	1	HWY762
Frame C, 4 pole, 3200-5000A vertical	1	HWY763
Frame C, 3 pole, 3200-5000A horizontal	1	HWY764
Frame C, 4 pole, 3200-5000A horizontal	1	HWY765



HWX633

Protection trip units (OCR)

Description	Pcs	Cat.Ref
LI	1	HWX611
LSI	1	HWX612
LSIG	1	HWX613
Amp LI	1	HWX621
Amp LSI	1	HWX622
Amp LSIG	1	HWX623
Energy LSIG	1	HWX633



HWY654

Voltage module

Description	Pcs	Cat.Ref
Voltage module	1	HWY650



HWY654

Remote control units

Description	Pcs	Cat.Ref
Remote control unit	1	HWY639
Remote control temperature unit	1	HWY654
Remote control temperature unit + temperature sensor	1	HWY655



HWY640

Temperature sensor and supports

Description	Pcs	Cat.Ref
Temperature sensor	1	HWY640
Support for frame A, 3 pole	1	HWY690
Support for frame A, 4 pole	1	HWY691
Support for frame B, 3 pole	1	HWY692
Support for frame B, 4 pole	1	HWY693
Support for frame C, 3 pole	1	HWY695
Support for frame C, 4 pole	1	HWY696



HWX573

Position switches

Description	Pcs	Cat.Ref
isolated 1C, test 1C, connected 2C	1	HWX570
inserted 1C, isolated 1C, test 1C, connected 1C	1	HWX571
inserted 1C, isolated 1C, test 3C, connected 3C	1	HWX572
inserted 2C, isolated 2C, test 2C, connected 2C	1	HWX573

Motor operators (MO)

Description	Pcs	Cat.Ref
Motor operator DC 24V	1	HWX541
Motor operator DC 48V	1	HWX542
Motor operator AC/DC 110V	1	HWX543
Motor operator AC/DC 220V	1	HWX544
Motor operator AC 440V	1	HWX546



HWX544

Closing coils (CC)

Description	Pcs	Cat.Ref
Closing coil DC 24V	1	HWX551
Closing coil DC 48V	1	HWX552
Closing coil AC/DC 110V	1	HWX553
Closing coil AC/DC 220V	1	HWX554
Closing coil AC 380/415V	1	HWX555
Closing coil AC 440V	1	HWX556



HWX554

Shunt trip coils (SH)

Description	Pcs	Cat.Ref
Shunt trip coil DC 24V	1	HWX501
Shunt trip coil DC 48V	1	HWX502
Shunt trip coil AC/DC 110V	1	HWX503
Shunt trip coil AC/DC 220V	1	HWX504
Shunt trip coil AC 380/415V	1	HWX505
Shunt trip coil AC 440V	1	HWX506



HWX501

Secondary trip coils (sSH)

Description	Pcs	Cat.Ref
Secondary trip coil DC 24V	1	HWX521
Secondary trip coil DC 48V	1	HWX522
Secondary trip coil AC/DC 110V	1	HWX523
Secondary trip coil AC/DC 220/250V	1	HWX524
Secondary trip coil AC 380/415V	1	HWX525
Secondary trip coil AC 440V	1	HWX526

Under voltage trip coils - instantaneous (UVT)

Description	Pcs	Cat.Ref
Under voltage trip coil DC 24V	1	HWX511
Under voltage trip coil DC 48V	1	HWX512
Under voltage trip coil AC/DC 110V	1	HWX513
Under voltage trip coil AC/DC 220/250V	1	HWX514
Under voltage trip coil AC 380/415V	1	HWX515
Under voltage trip coil AC 440V	1	HWX516



HWX514

UVT time delay controllers

Description	Pcs	Cat.Ref
UVT time delay controller AC/DC 110V	1	HWX533
UVT time delay controller AC/DC 220/250V	1	HWX534
UVT time delay controller AC 380/415V	1	HWX535
UVT time delay controller AC 440V	1	HWX536

Mechanical operated cell switch (additional AX)

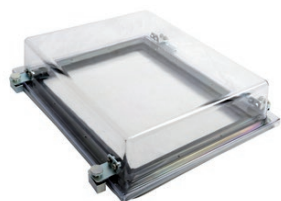
Description	Pcs	Cat.Ref
Mechanical operated cell switch 5NO+5NC	1	HWX565



HWX547

Ready to close contact RTC

Description	Pcs	Cat.Ref
Draw-out type 1NO	1	HWX547
Fixed type 1NO	1	HWX548



HWY642

Accessories

Description	Pcs	Cat.Ref
Counter	1	HWY638
Lifting lug	1	HWY648
Wrong insertion preventer for draw-out type	1	HWY636
Door flange	1	HWY641
Dust cover	1	HWY642
ON/OFF button cover	1	HWY632



HWY6xx

Key cylinder lock in open position

Description	Pcs	Cat.Ref
Type 1	1	HWY633
Type 2	1	HWY634
Type 3	1	HWY635
Type 4	1	HWY646
Type 5	1	HWY647
Type 6	1	HWY656
Type 7	1	HWY657
Type 8	1	HWY658
Type 9	1	HWY659



HWY701

Key Ronis lock in open position

Description	Pcs	Cat.Ref
Type 1 - K1L1/L4	1	HWY701
Type 2 - K2L2/L4/L5	1	HWY702
Type 3 - K3L3/L5	1	HWY703
Type 4 - K4L4	1	HWY704
Type 5 - K5L5	1	HWY705
Adaptor kit for Ronis locks	1	HWY697



HWY706

Key Castell lock in open position

Description	Pcs	Cat.Ref
Type 1 - AA	1	HWY706
Type 2 - AB	1	HWY707
Type 3 - A_	1	HWY708
Adaptor kit for Castell locks	1	HWY698



HWW268

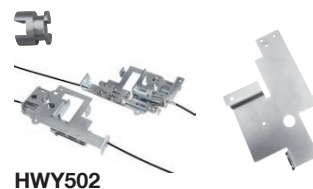
Neutral CT

Description	Pcs	Cat.Ref
Neutral CT 630A	1	HWW260
Neutral CT 800A	1	HWW261
Neutral CT 1000A	1	HWW262
Neutral CT 1250A	1	HWW263
Neutral CT 1600A	1	HWW264
Neutral CT 2000A	1	HWW265
Neutral CT 2500A	1	HWW266
Neutral CT 3200A	1	HWW267
Neutral CT 4000A	1	HWW268
Neutral CT 5000A	1	HWW269

Mechanical interlocks

with mechanism and cables

Description	Pcs	Cat.Ref
Draw-out type, 2 way	1	HWY500
Draw-out type, 3 way	1	HWY501
Fixed type, 2 way (incl. plate)	1	HWY502
Fixed type, 3 way (incl. plate)	1	HWY503



HWY502

Cables for mechanical interlocks

Description	Pcs	Cat.Ref
Cable 3m	1	HWY508
Cable 5m	1	HWY509

Phase insulation barrier

Description	Pcs	Cat.Ref
3 pole (2 units)	1	HWY630
4 pole (3 units)	1	HWY631



HWY630

Control terminal protection cover

Description	Pcs	Cat.Ref
For draw-out type	1	HWY637



HWY637

Arc shield (for draw-out type)

Description	Pcs	Cat.Ref
For frame A 3 pole, 630-2000A	1	HWY670
For frame A 4 pole, 630-2000A	1	HWY671
For frame B 3 pole, 630-4000A	1	HWY672
For frame B 4 pole, 630-4000A	1	HWY673
For frame C 3 pole, 3200-5000A	1	HWY674
For frame C 4 pole, 3200-5000A	1	HWY675



HWY672

Fixed type connector plug

Description	Length	Pcs	Cat.Ref
Pre-wired kit	3m	1	HWW065



OCR portable checker

Description	Pcs	Cat.Ref
OCR portable checker	1	HWY649

OCR manual reset and alarm switch reset (MHT)

Description	Pcs	Cat.Ref
For draw-out type	1	HWY651
For fixed type	1	HWY652

Motor controller unit only

Description	Pcs	Cat.Ref
Motor controller unit only	1	HWY068

Motor ON/OFF switch only

Description	Pcs	Cat.Ref
Motor ON/OFF switch only	1	HWY069



Safety shutters

Description	Pcs	Cat.Ref
Frame A 3 pole, 630-2000A	1	HWY660
Frame A 4 pole, 630-2000A	1	HWY661
Frame B 3 pole, 630-4000A	1	HWY662
Frame B 4 pole, 630-4000A	1	HWY663
Frame C 3 pole, 3200-5000A	1	HWY664
Frame C 4 pole, 3200-5000A	1	HWY665

Horizontal / vertical terminals

Description	Pcs	Cat.Ref
For frame A 3 pole, 630-1600A	1	HWY610
For frame A 4 pole, 630-1600A	1	HWY611
For frame B 3 pole, 630-3200A	1	HWY612
For frame B 4 pole, 630-3200A	1	HWY613



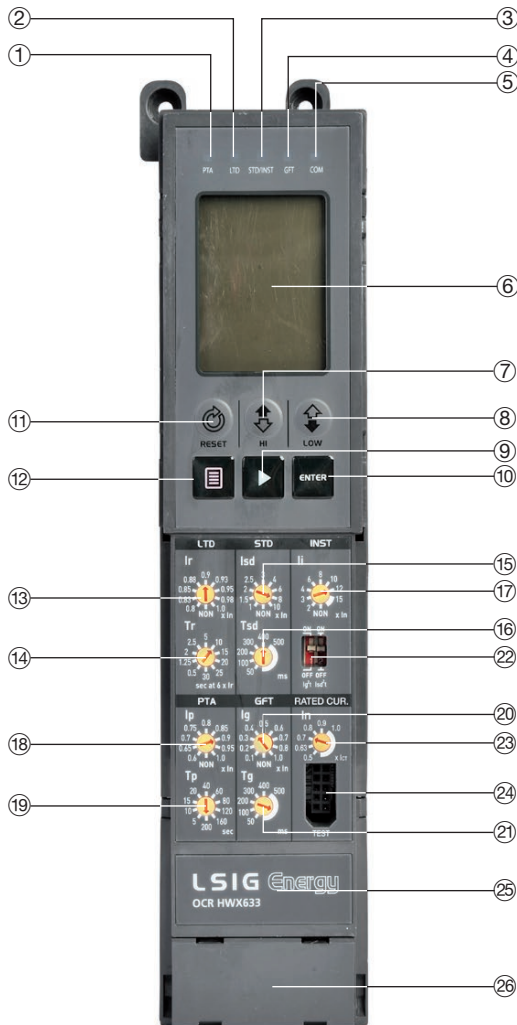
Rotary handle

Description	Pcs	Cat.Ref
For draw-out type	1	HWY644

Characteristics

Reference		HWX611	HWX612	HWX613	HWX621	HWX622	HWX623	HWX633
Type		LI	LSI	LSIG	LI Amp	LSI Amp	LSIG Amp	Energy
Frequency 50/60 Hz		•	•	•	•	•	•	•
OCR								
Power	externals	•	•	•	•	•	•	•
	self	•	•	•	•	•	•	•
Protection function	LTD	•	•	•	•	•	•	•
	STD	-	•	•	-	•	•	•
	INST	•	•	•	•	•	•	•
	PTA	-	-	-	•	•	•	•
	GFT	-	-	•	-	-	•	•
	neutral protection	100%	100%	100%	0-50-100%	0-50-100%	0-50-100%	•0-50-100%
	fail safe	•	•	•	•	•	•	•
	MCR	•	•	•	•	•	•	•
Indication	long time pick up LED	•	•	•	•	•	•	•
	fault LED	L, I	L, S/I	L, S/I, G	L, I PTA	L, S/I PTA	L, S/I, G PTA	L, S/I, G PTA
	LCD display, Amp and measurement	-	-	-	•	•	•	-
	LCD display, Amp, Energy, voltage, power, energy, demand and measurement	-	-	-	-	-	-	•
Digital output	separately continuous contact	• (2NO) L, I	• (2NO) L, S/I	• (3NO) L, S/I, G	• (3NO) L, I, PTA	• (3NO) L, S/I, PTA	• (4NO) L, S/I, G, PTA	• (4NO) L, S/I, G, PTA
ZSI		•	•	•	•	•	•	•
Reset button		•	•	•	•	•	•	•
Advanced functions	COM	-	-	-	•	•	•	•
	event / fault recording	-	-	-	•	•	•	•
	under/over voltage protection	-	-	-	-	-	-	•
	unbalanced current / voltage protection	-	-	-	-	-	-	•
	reverse power protection	-	-	-	-	-	-	•
	power P, Q, S, power factor, 3 phases voltage	-	-	-	-	-	-	•
	demand current / voltage	-	-	-	-	-	-	•

Overview



- | | |
|------------------------|--|
| ① PTA signal LED | ⑮ STD pick up setting |
| ② LTD signal LED | ⑯ STD time setting |
| ③ STD/INST signal LED | ⑰ INST pick up setting |
| ④ GFT signal LED | ⑱ PTA pick up setting |
| ⑤ Com. signal LED | ⑲ PTA time setting |
| ⑥ LCD screen | ⑳ GFT pick up setting |
| ⑦ STD/INST test button | ㉑ GFT time setting |
| ⑧ LTD test button | ㉒ GFT/STD (Inverse time setting),
MCR ON/OFF setting switch |
| ⑨ Movement button | ㉓ In (rated current) setting |
| ⑩ Enter button | ㉔ Temporary test connection jack |
| ⑪ Reset button | ㉕ Model name |
| ⑫ Menu button | ㉖ Battery |
| ⑬ LTD pick up setting | |
| ⑭ LTD time setting | |

➔ Self power works normally at larger than 10% for 3 phase, 30% for single phase.

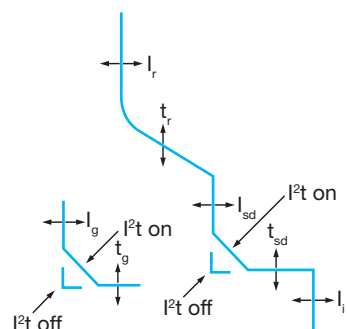
Basic OCR: HWX611, HWX612, HWX613



- Overload protection
 - Long time delay
- Short circuit protection
 - Short time delay, instantaneous trip
 - I^2t on/off optional (for STD)
- Ground fault protection
 - I^2t on/off optional (for GFT)
- Neutral wire protection
 - 3P: No protection
 - 4P: 100 % x I_n
 - LTD, STD, INST protection
- Realization of protective coordination by ZSI (zone selective interlocking)

- LI (2 digital output - NO)
- LSI (2 digital output - NO)
- LSIG (3 digital output - NO)
 - Contact specification

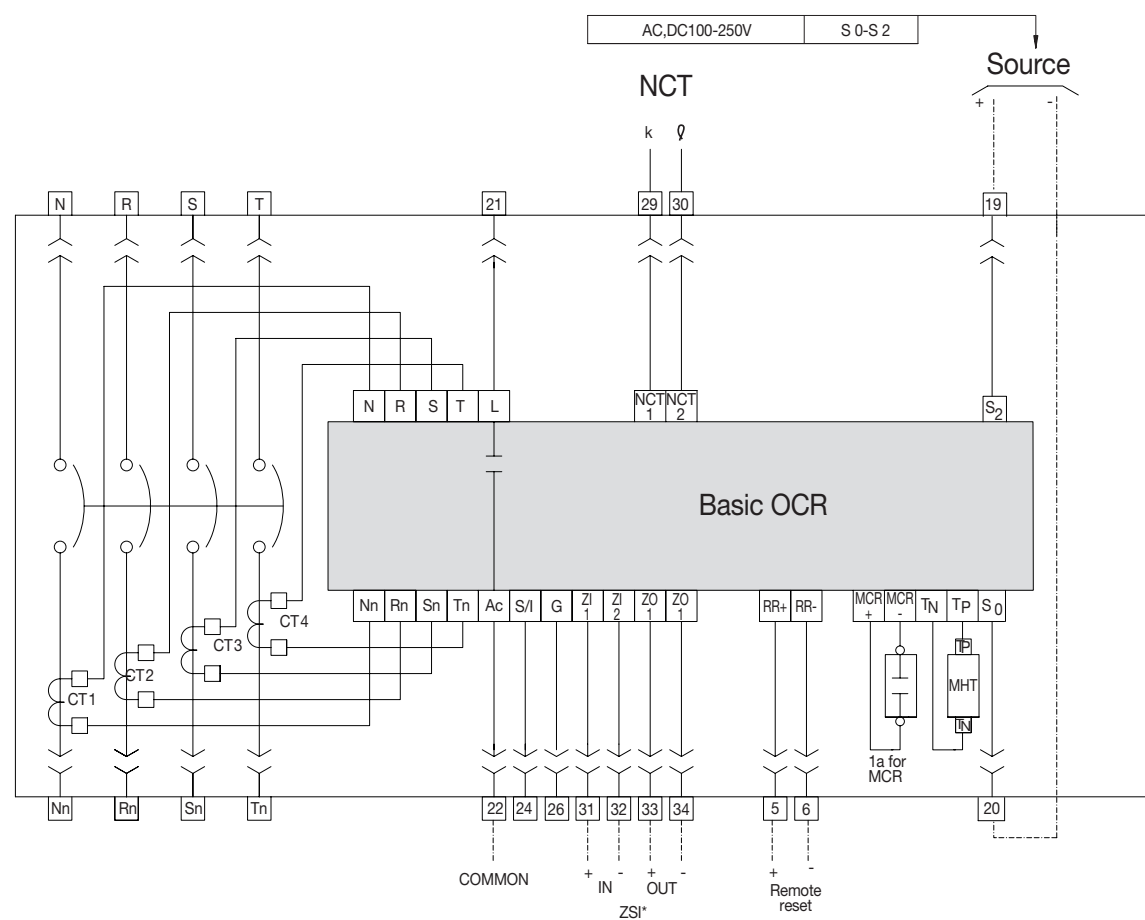
Rating	Nominal switching capacity (resistive load)	5A 277V AC
	Max. switching power (resistive load)	1,385VA
	Max. switching voltage	277V AC
	Max. switching current	5A
	Max. switching capacity (reference value)	100mA 5V DC



Protection

Long time LTD	I_{ct}	$I_n = I_{ct} \times \dots$	0.5	0.63	0.7	0.8	0.9	1				
	current setting (A)	$I_r = I_n \times \dots$	0.8	0.83	0.85	0.88	0.9	0.93	0.95	0.98	1	Non
	time delay(sec) accuracy: $\pm 15\%$ or below 100ms	t_r at $(1.5 \times I_r)$	10.4	26.1	41.7	52	104	208	312	417	521	626
		t_r at $(6.0 \times I_r)$	0.5	1.25	2	2.5	5	10	15	20	25	30
		t_r at $(7.2 \times I_r)$	0.35	0.86	1.38	1.73	3.45	6.9	10.4	13.8	17.3	20.7
Short time STD	current setting(A) accuracy: $\pm 15\%$	$I_{sd} = I_n \times \dots$	1	1.5	2	2.5	3	4	6	8	10	Non
	time delay (sec) at $10 \times I_n$	t_{sd}	I^2t off	0.05	0.1	0.2	0.3	0.4	0.5			
				0.05	0.1	0.2	0.3	0.4	0.5			
		$(I^2t \text{ off})$	min. trip time (ms)	20	80	160	260	360	460			
			max. trip time (ms)	80	140	240	340	440	540			
Instantaneous INST	current setting (A) accuracy $\pm 10\%$	$I_i = I_n \times \dots$	2	3	4	6	8	10	12	15	Non	
	trip time		below 50ms									
Ground fault GFT	current setting (A) accuracy: $\pm 20\%$ ($I_g > 0.4 I_n$) $\pm 20\%$ ($I_g \leq 0.4 I_n$)	$I_g = I_{ct} \times \dots$	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1	Non
	time delay (sec) at $1 \times I_n$ accuracy: $\pm 20\%$	t_g	I^2t off	0.05	0.1	0.2	0.3	0.4	0.5			
				0.05	0.1	0.2	0.3	0.4	0.5			
		$(I^2t \text{ off})$	min. trip time (ms)	20	80	160	260	360	460			
			max. trip time (ms)	80	140	240	340	440	540			

Basic OCR



* ZSI: contacts 31-32 are pre-wired by factory. If you use ZSI function, please remove this wire.

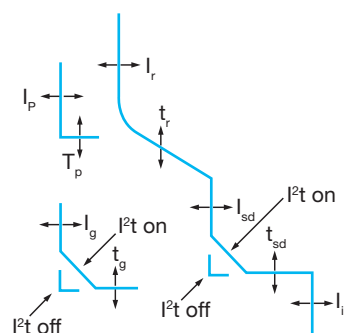
Amp type OCR: HWX621, HWX622, HWX623



- Overload protection
 - Long time delay
 - Thermal function
- Short circuit protection
 - Short time delay, instantaneous trip
 - I^2t on/off optional (for STD)
- Neutral wire protection
 - 3 Pole: No protection
 - 4 Pole: Non, 50%, 100% ($\times I_e$, I_{sd} , I_i)
- Measurement and display
 - 3 phase current
- Realization of protective coordination by ZSI (zone selective interlocking)
- Fault recording
 - Record up to 256 fault information about fault type, fault phase, fault value, occurrence time of fault.
 - Record latest fault waveform (4 period, check by communication)
- Event recording
 - Record events of device related to setting change, operation and state change up to 200
- Pre-trip alarm
 - Prevent unnecessary over load trip according to rated current (I_n)
- Field test
 - Simulation of long time, short time, instantaneous delay
- Communication : RS-485 / MODBUS-RTU

- 4 digital output NO
- Contact specification

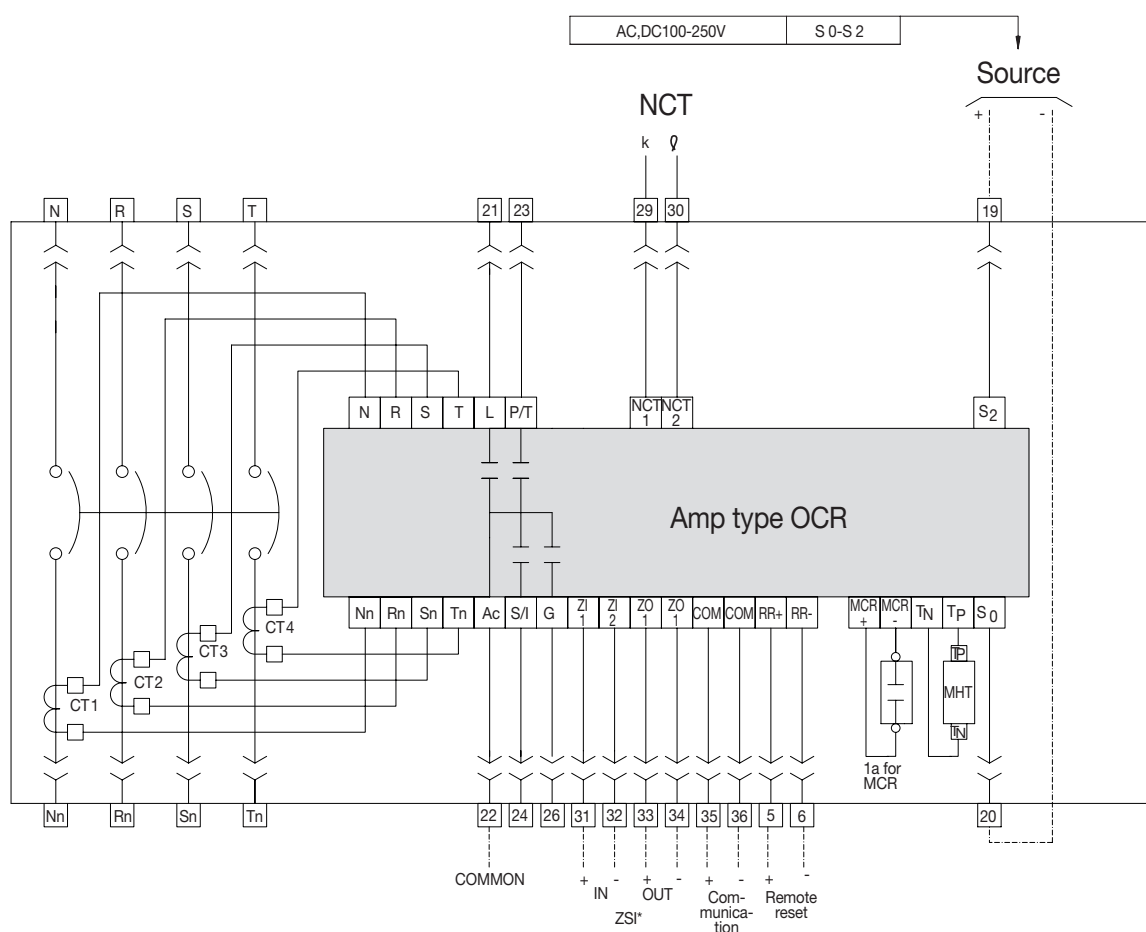
Rating	Nominal switching capacity (resistive load)	5A 277V AC
	Max. switching power (resistive load)	1,385VA
	Max. switching voltage	277V AC
	Max. switching current	5A
	Max. switching capacity (reference value)	100mA 5V DC



Protection

Long time LTD	I_{ct}	$I_n = I_{ct} \times \dots$	0.5	0.63	0.7	0.8	0.9	1				
	current setting (A)	$I_r = I_n \times \dots$	0.8	0.83	0.85	0.88	0.9	0.93	0.95	0.98	1	Non
	time delay (sec) accuracy: $\pm 15\%$ or below 100ms	t_r at $(1.5 \times I_r)$	10.4	26.1	41.7	52	104	208	312	417	521	626
		t_r at $(6.0 \times I_r)$	0.5	1.25	2	2.5	5	10	15	20	25	30
		t_r at $(7.2 \times I_r)$	0.35	0.86	1.38	1.73	3.45	6.9	10.4	13.8	17.3	20.7
Short time STD	current setting (A) accuracy: $\pm 15\%$	$I_{sd} = I_n \times \dots$	1	1.5	2	2.5	3	4	6	8	10	Non
	time delay (sec) at $10 \times I_n$	I^2t off	0.05	0.1	0.2	0.3	0.4	0.5				
			0.05	0.1	0.2	0.3	0.4	0.5				
		$(I^2t \text{ off})$	min. trip time (ms)	20	80	160	260	360	460			
			max. trip time (ms)	80	140	240	340	440	540			
Instantaneous INST	current setting (A) accuracy $\pm 10\%$	$I_i = I_n \times \dots$	2	3	4	6	8	10	12	15	Non	
	trip time		below 50ms									
Ground fault GFT	pick-up (A) accuracy: $\pm 15\%$ ($I_g > 0.4 I_n$) $\pm 20\%$ ($I_g \leq 0.4 I_n$)	$I_g = I_{ct} \times \dots$	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1	Non
	time delay (sec) at $1 \times I_n$ accuracy: $\pm 20\%$	I^2t off	0.05	0.1	0.2	0.3	0.4	0.5				
			0.05	0.1	0.2	0.3	0.4	0.5				
		$(I^2t \text{ off})$	min. trip time (ms)	20	80	160	260	360	460			
			max. trip time (ms)	80	140	240	340	440	540			
Pre trip alarm PTA	current setting (A) accuracy: $\pm 15\%$	$I_p = I_n \times \dots$	0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1	Non
	time delay (sec)	t_p at $(I_p \times 1.2)$	5	10	15	20	40	60	80	120	160	

Amp type OCR



* ZSI: contacts 31-32 are pre-wired by factory. If you use ZSI function, please remove this wire.

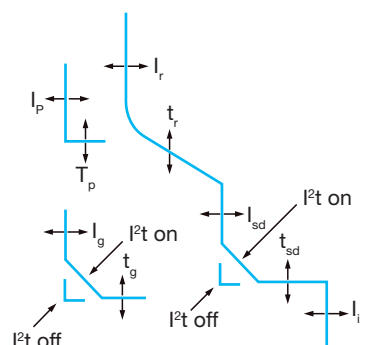
Energy type OCR: HWX633



- Overload protection
 - Long time delay
 - Thermal function
- Short circuit protection
 - Short time delay, instantaneous trip
 - I²t on/off optional (for STD)
- Ground fault protection
 - I²t on/off optional (for GFT)
- Neutral wire protection
 - 3 Pole: No protection
 - 4 Pole: Non, 50%, 100% (x Ir, Isd, Ii)
- Overload/underload/voltage imbalance protection
- Measurement and display
 - 3 phase current/Voltage/Power/Power factor/energy/phase/demand
- Realization of protective coordination by ZSI (zone selective interlocking)
- Fault recording
 - Record up to 256 fault information about fault type, fault phase, fault value, occurrence time of fault.
 - Record latest fault waveform (4 period, check by communication)
- Event recording
 - Record events of device related to setting change, operation and state change up to 200
- Pre-trip alarm
 - Prevent unnecessary over load trip according to rated current (I_n)
- Field test
 - Simulation of long time, short time, instantaneous delay

- Communication: RS-485 / MODBUS-RTU
- Must install voltage module
- 4 digital output - NO
 - Contact Specification

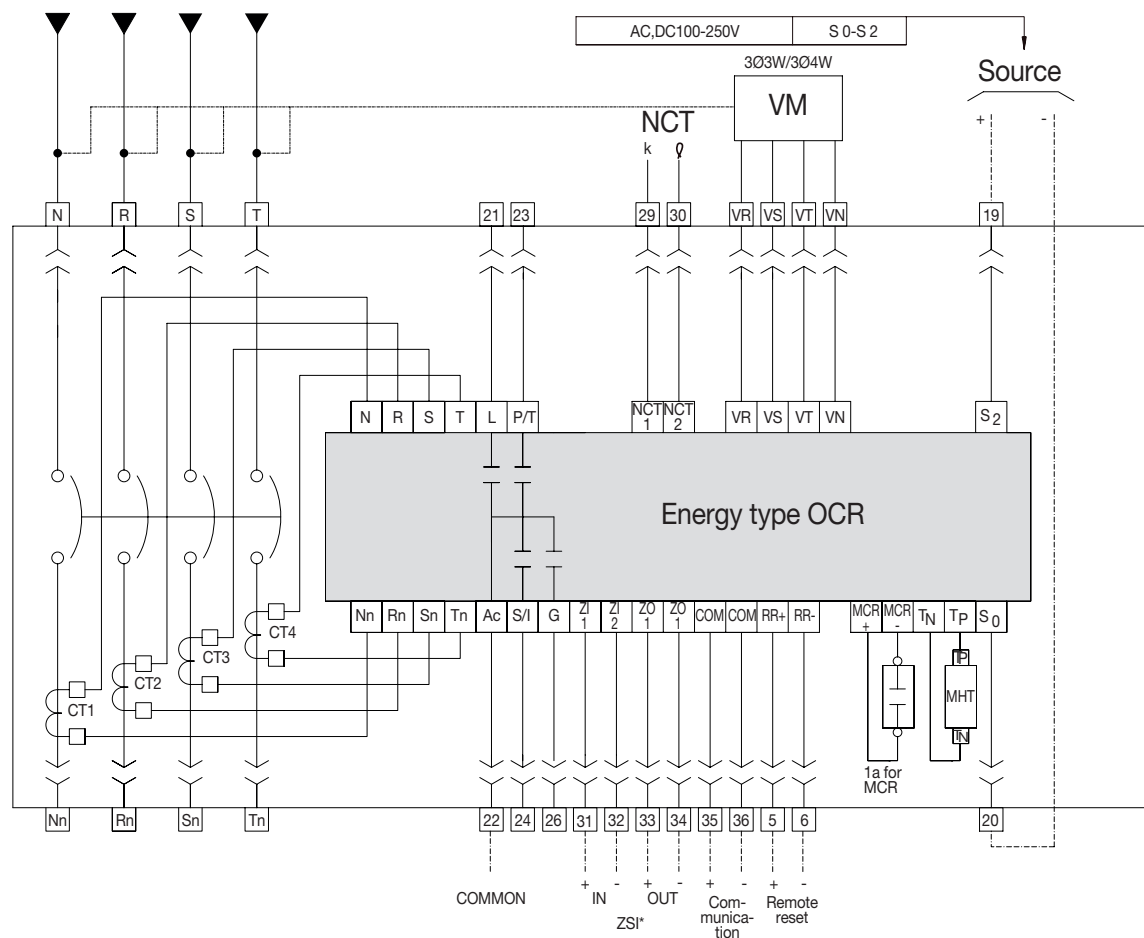
Rating	Nominal switching capacity (resistive load)	5A 277V AC
	Max. switching power (resistive load)	1,385VA
	Max. switching voltage	277V AC
	Max. switching current	5A
	Max. switching capacity (reference value)	100mA 5V DC



Protection

Long time LTD	I _{ct}	I _n =I _{ct} x...	0.5	0.63	0.7	0.8	0.9	1				
	current setting (A)	I _r =I _n x...	0.8	0.83	0.85	0.88	0.9	0.93	0.95	0.98	1	Non
	time delay (sec) accuracy: ±15% or below 100ms	tr at(1.5xI _r)	10.4	26.1	41.7	52	104	208	312	417	521	626
		tr at(6.0xI _r)	0.5	1.25	2	2.5	5	10	15	20	25	30
		tr at(7.2xI _r)	0.35	0.86	1.38	1.73	3.45	6.9	10.4	13.8	17.3	20.7
Short time STD	current setting (A) accuracy: ±15%	I _{sd} =I _n x...	1	1.5	2	2.5	3	4	6	8	10	Non
	time delay (sec) at 10xI _n	tsd	I ² t off	0.05	0.1	0.2	0.3	0.4	0.5			
				0.05	0.1	0.2	0.3	0.4	0.5			
		(I ² t off)	min. trip time (ms)	20	80	160	260	360	460			
			max. trip time (ms)	80	140	240	340	440	540			
Instantaneous INST	current setting (A) accuracy ±10%	I _i =I _n x...	2	3	4	6	8	10	12	15	Non	
	trip time		below 50ms									
Ground fault GFT	pick-up (A) accuracy: ±15%(I _g >0.4I _n) ±20%(I _g ≤0.4I _n)	I _g =I _{ct} x...	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1	Non
	time delay (sec) at 1xI _n accuracy: ±20%	tg	I ² t off	0.05	0.1	0.2	0.3	0.4	0.5			
				0.05	0.1	0.2	0.3	0.4	0.5			
		(I ² t off)	min. trip time (ms)	20	80	160	260	360	460			
			max. trip time (ms)	80	140	240	340	440	540			
Pre trip alarm PTA	current setting (A) accuracy: ±15%	I _p =I _n x...	0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1	Non
	time delay (sec)	tp at (I _p x1.2)	5	10	15	20	40	60	80	120	160	

Energy type OCR



* ZSI: contacts 31-32 are pre-wired by factory. If you use ZSI function, please remove this wire.

Values of I_{ct} and I_n

Frame	Applicable	Rated current (I_n)					
	I_{ct} (max)	I_{ct}					
	I_n (A)	x0.5	x0.63	x0.7	x0.8	x0.9	x1
A	630	315	397	441	504	567	630
	800	400	504	560	640	720	800
	1000	500	630	700	800	900	1000
	1250	625	787	875	1000	1125	1250
	1600	800	1008	1120	1280	1440	1600
	2000	1000	1260	1400	1600	1800	2000
B	630	315	397	441	504	567	630
	800	400	504	560	640	720	800
	1000	500	630	700	800	900	1000
	1250	625	787	875	1000	1125	1250
	1600	800	1008	1120	1280	1440	1600
	2000	1000	1260	1400	1600	1800	2000
	2500	1250	1575	1750	2000	2250	2500
	3200	1600	2016	2240	2560	2880	3200
	4000	2000	2520	2800	3200	3600	4000
C	3200	1600	2016	2240	2560	2880	3200
	4000	2000	2520	2800	3200	3600	4000
	5000	2500	3150	3500	4000	4500	5000

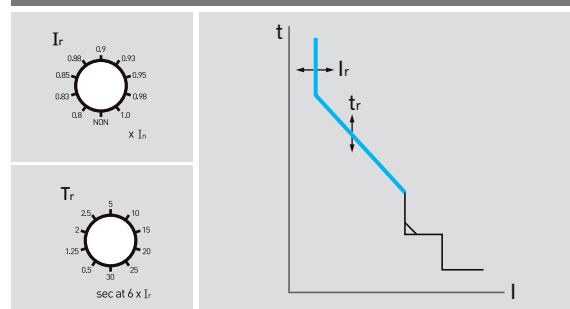
Rated Current (I_n)



- Rated current [I_n] can be adjusted to 50%, 63%, 70%, 80%, 90% and 100% of the rated primary CT current [I_{ct}].
- On the ACB nameplate, rated current [I_n] is marked.
- Rated current [I_n] can be selected by sliding the base current setting select switch, which can be set to the predetermined scale.

Operation characteristics

Long time delay (LTD)



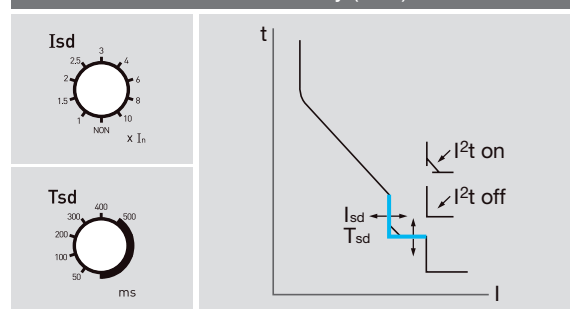
Standard current setting

- The scale is marked as magnification of [I_n].
- Setting range: (Non, 0.8, 0.83, 0.85, 0.88, 0.9, 0.93, 0.95, 0.98, 1.0) $\times I_n$ (10 modes)
- No protection in case of non setting of [I_r].
- The breaker is not tripped below 105% of [I_r], and tripped at 120%.

Time delay setting

- Standard operating time (sec) is based on the time of $600\% \times [I_r]$ with inverse time operation.
- Setting range: 0.5, 1.25, 2, 2.5, 5, 10, 15, 20, 25, 30sec (10 modes)
- The breaker is tripped at $\pm 15\%$ of setting time.

Short time delay (STD)



Standard current setting

- The scale is marked as magnification of [I_n].
- Setting range: (Non, 1, 1.5, 2, 2.5, 3, 4, 6, 8, 10) $\times I_n$ (10 modes)

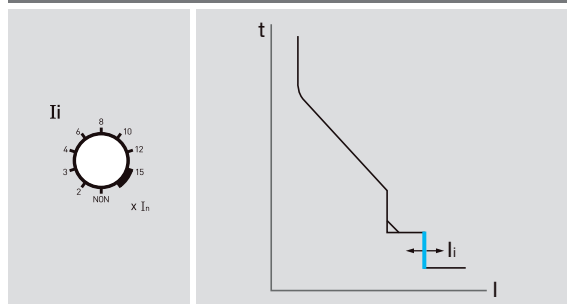
Time delay setting

- Standard operating time (msec) is based on the time of $120\% \times [I_{sd}]$ with definite time operation.
- Setting range: 50, 100, 200, 300, 400, 500msec (6 modes)
- 100% of inverse time curve applied in case of inverse time (I^2t on) setting.

DIP switch

- I_{sd}^2t ON: for inverse time characteristic, which has $I_{sd}^2t = C$ (constant) characteristic at 100% of a set point, tolerance of setting current is $\pm 20\%$
- I_{sd}^2t OFF: for definite time characteristics

Instantaneous trip (INST)



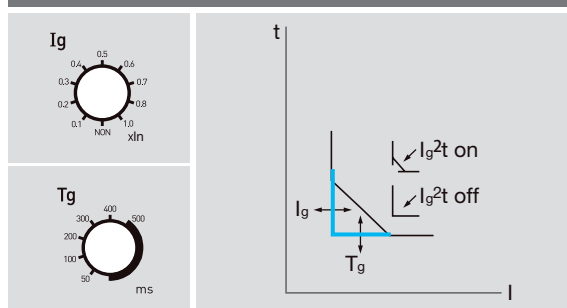
Standard current setting

- The scale is marked as magnification of $[I_{ct}]$.
- Setting range: (Non, 2, 3, 4, 6, 8, 10, 12, 15) $\times I_n$ (9 modes)
- No protection in case of non setting of $[I_i]$.

Time delay setting

- Total breaking time is below 50ms.

Ground fault trip (GFT)



Standard current setting

- The scale is marked as magnification of OCR rated primary current $[I_{ct}]$.
- Setting range: (Non, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 1.0) $\times [I_{ct}]$ (10 steps)

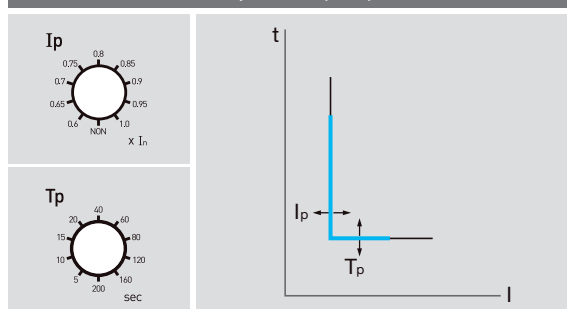
Time delay setting

- Standard operating time (msec) is based on the time of 120% $\times [I_g]$ with definite time operation.
- Setting range: 50, 100, 200, 300, 400, 500msec (6 steps)
- Inverse time operated with 100% of $[I_{ct}]$ standard in case of $[I_{2t} \text{ on}]$ setting.

DIP switch

- I_g^2t ON: for inverse time characteristic, which has $I_g^2t=C$ (constant) characteristic at 100% of a set point, tolerance of setting current is $\pm 30\%$
- I_g^2t OFF: for definite time characteristics

Pre-trip alarm (PTA)



Standard current setting

- The scale is marked as magnification of $[I_n]$ with definite time operation.
- Setting range: (Non, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95, 1.0) $\times I_n$ (10 steps)

Time delay setting

- Standard operating time (sec) is based on the time of 100% $\times [I_p]$.
- Setting range: 5, 10, 15, 20, 40, 60, 80, 120, 160, 200sec (10 steps)

Additional voltage measurement factor (Energy type)

Type		Threshold		Time delay		
		range	step	range	step	accuracy
Minimum voltage Umin	pickup	100V ~ Umax	5V	1.2s ~ 5s	0.1s	20%
	dropout	pickup ~ Umax	5V	1.2s ~ 36s	0.1s	-20%
Maximum voltage Umax	pickup	Umin pickup ~ 800V	5V	1.2s ~ 5s	0.1s	20%
	dropout	100V ~ pickup	5V	1.2s ~ 36s	0.1s	-20%
U unbal	pickup	2 ~ 30%	1%	1s ~ 40s	1s	-20%
	dropout	2 ~ pickup	50kW	10s ~ 360s	1s	-20%

- Operate Alarm contact (22, 23) without tripping ACB.

Reverse power (Energy type)

Type		Threshold		Time delay		
		range	step	range	step	accuracy
Reverse power rPmax	pickup	5 ~ 500kW	5kW	0.2s ~ 20s	0.1s	20%
	dropout	5kW ~ pickup	5kW	1s ~ 360s	0.1s	20%

- Operate alarm contact (22, 23) without tripping ACB.
- Depending on the total active power value, operates when current direction is opposite from the power direction user specified.
 - + direction : Current flow from above to below ACB terminal (default).
 - direction : Current flow from below to above ACB terminal.

Zone selective interlock function (ZSI)

Zone selective interlocking drops delay time that eliminates faults for breakers.
It minimizes the shock that all kinds of electric machinery get under fault conditions.

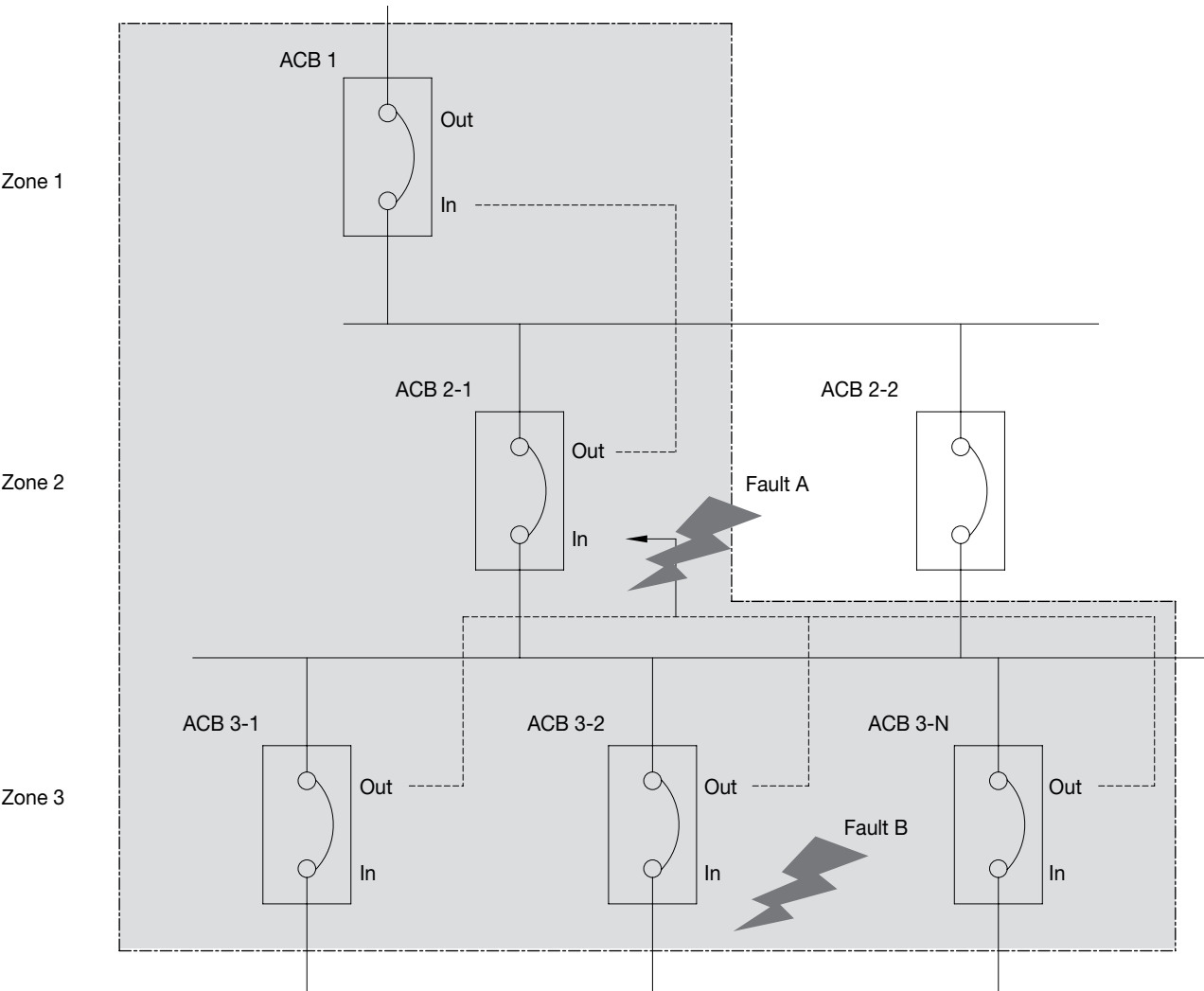
Example

- In case of that short time-delay or ground fault accident occurs at ZSI built in system, the breaker at accident site sends ZSI signal to halt upstream breaker's operation.
- To eliminate a breakdown, trip relay of ACB at accident site activates trip operation without time delay.
- The upstream breaker that received ZSI signal adhere to pre-set short time-delay or ground fault time delay for protective coordination in the system. However upstream breaker that did not receive its signal will trip instantaneously.
- For ordinary ZSI operation, it should arrange operation time accordingly so that downstream circuit breakers will react before upstream ones under overcurrent/short time delay/ground fault situations.

ZSI conditions

Type of ZSI	Number of ACBs (in total)	Max. distance between 2 ACBs
In series	2	100 m
	6	10 m
In parallel	6	10 m

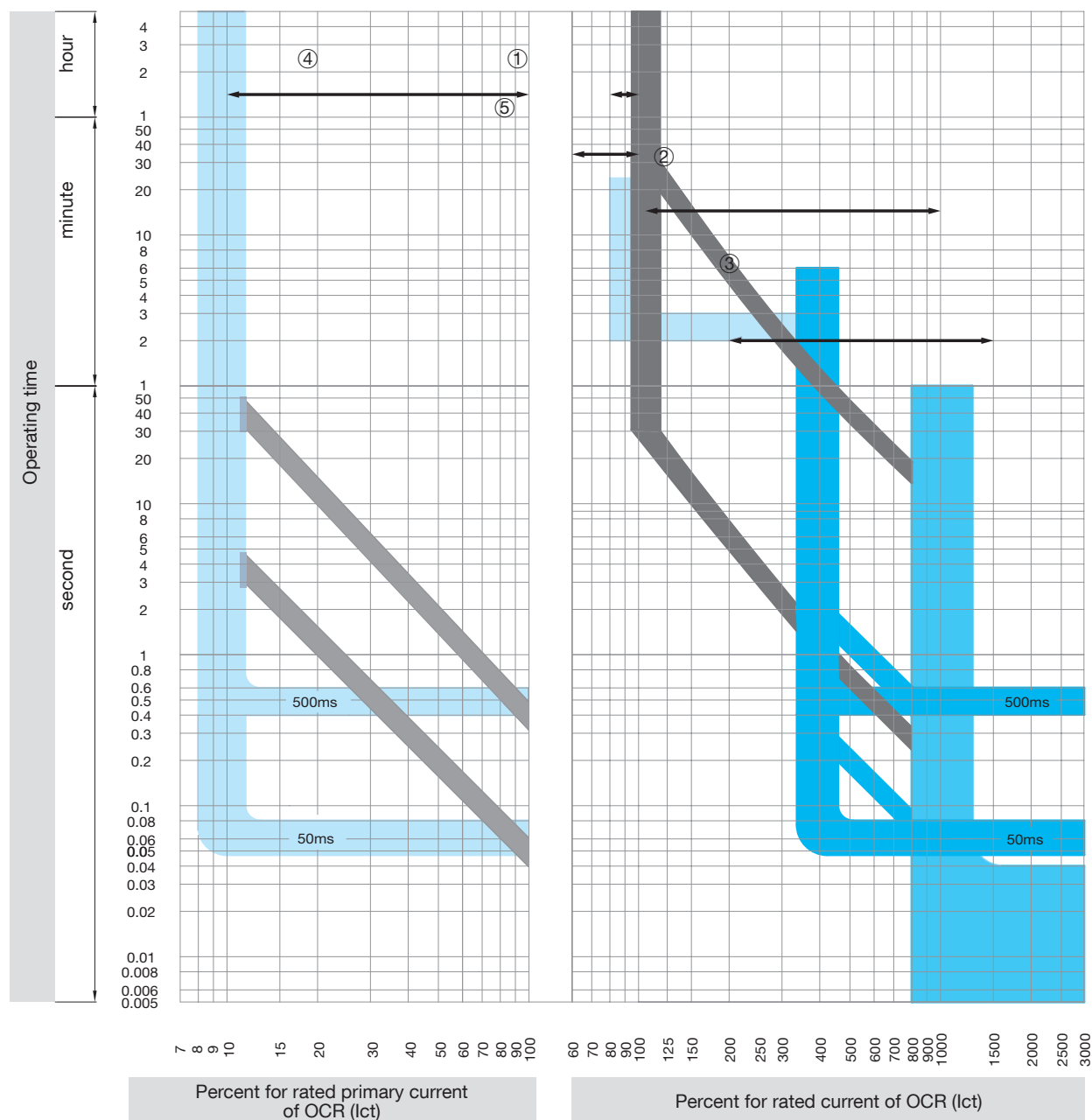
Twisted shield cable (AWG 16-22) maximum impedance: 3Ω



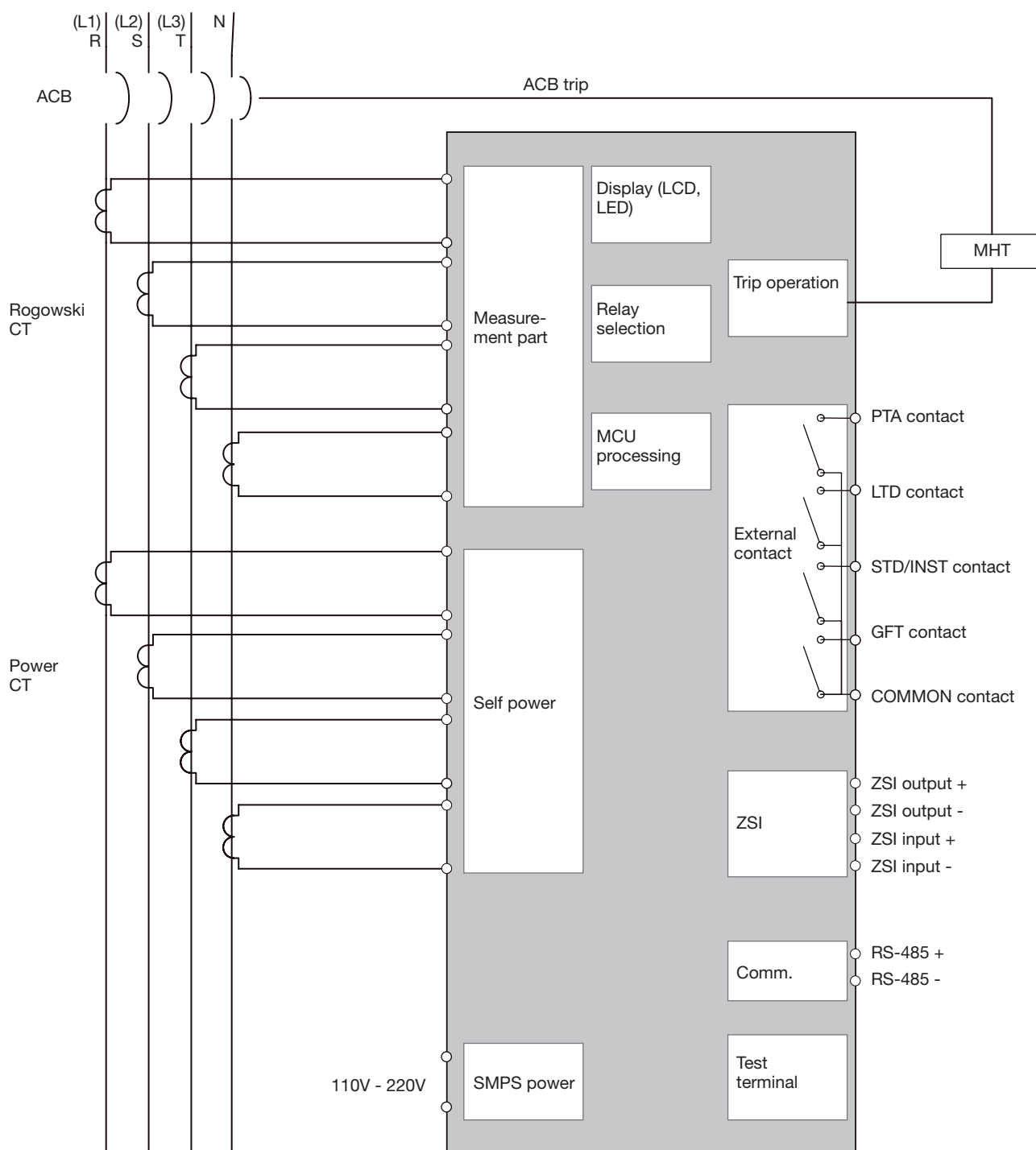
----- ZSI connecting

Pre-wired contact (31,32) as standard by factory.
If you use ZSI function between 2 breakers, please use this wire.

General feeder



- ① Long time delay current setting range LTD
- ② Short time delay current setting range STD
- ③ Instantaneous tripping current setting range INST
- ④ Ground fault trip current setting range GFT
- ⑤ Pre-trip alarm current setting range PTA

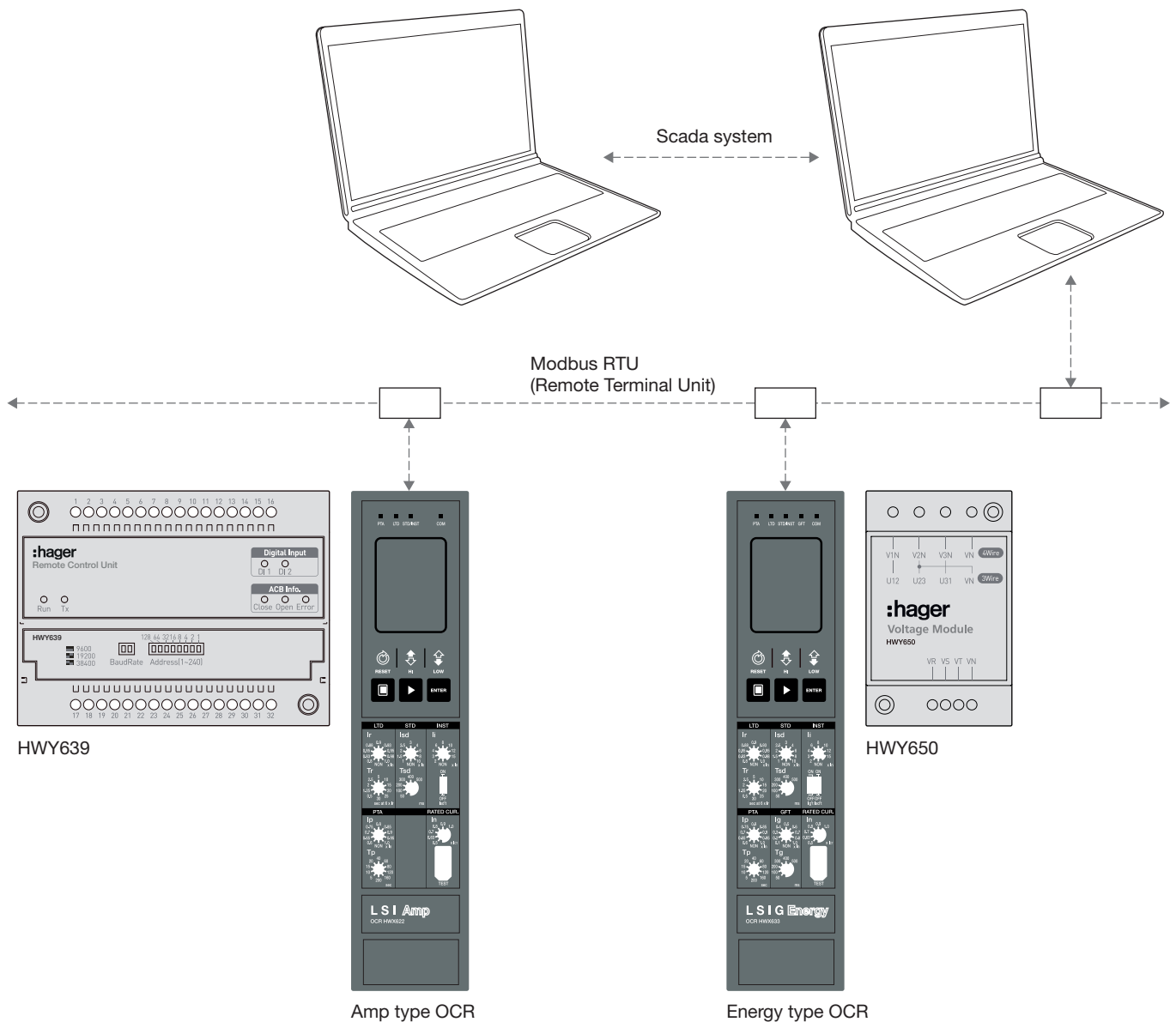


The ACB Hw series OCR Amp and Energy types are equipped with communication module.

It allows to get all breakers information from network at any location connected to the bus, such as:

- measurements: current, voltage, power, power factor, energy, frequency
- breaker status: closing, opening and other state
- fault recording: time-stamped trip information
- event logging
- protect the controller setting
- protect pre-alarm controller

In addition to the Voltage Module HWY650 and Remote Control Unit HWY639, the user can control the breaker for the following operations: opening, closing, and reset.



Characteristics

- operation mode: differential
- max. distance: 1.2 km
- baud rate: 9600; 19200; 38400 bps
- transmission method: half-duplex
- termination: 150Ω

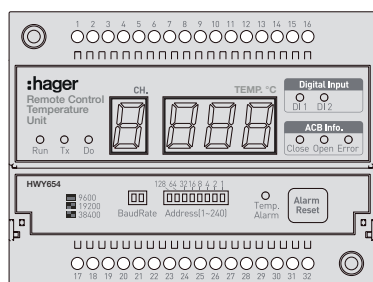
Remote control temperature unit (RCTU) and remote control unit (RCU)

- RCTU has Digital Output contact that ables to insert/disconnect ACB remotely by communication. It checkes temperature of ACB with 4 temperature channel.
- RCTU communication offers RS-485/Modbus-RTU.
- Insert/ disconnect control of ACB assures its reliability through SBO (select before operation) function.
- If the temperature rises over the user setting value, you can check it through alarm contacting point (additional connection needed).
- You can check ACB temperature through segment LED at the front.
- RCTU can be installed in side the ACB cradle or panle.
- RCU module same function with RCTU module except tempera-
ture monitoring.

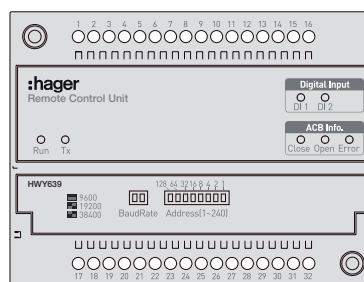
Contact specification

Type		Range of application
ACB control	contact ratings	10A 240VAC, 30VDC
	max. switching power	2400VA, 300W
Temperature alarm	contact ratings	10A 240VAC/5A 240VAC/5A 30VDC
	max. switching power	1200VA, 150W

Remote control temperature unit (RCTU)



Remote control unit (RCU)



RCTU terminal composition

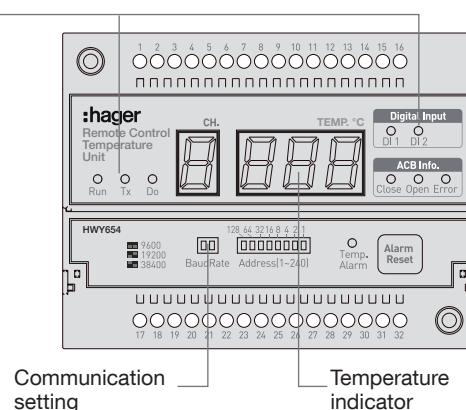
No.	Definition	No.	Definition
1	DI CB CONNECT	17	NTC Temperature sensor
2	DI CB CONNECT	18	NTC Temperature sensor
3	DI CB TEST	19	CH1 infrared light sensor AOR (black)
4	DI CB TEST	20	CH1 infrared light sensor GND (green)
5	DI CLOSE	21	CH1 infrared light sensor AOT (yellow)
6	DI CLOSE	22	CH1 infrared light sensor power (red)
7	DI OPEN	23	CH2 infrared light sensor AOR (black)
8	DI OPEN	24	CH2 infrared light sensor GND (green)
9	DO TEMP. ALARM	25	CH2 infrared light sensor AOT (yellow)
10	DO TEMP. ALARM	26	CH2 infrared light sensor power (red)
11	DO CLOSE	27	CH3 infrared light sensor AOR (black)
12	DO CLOSE	28	CH3 infrared light sensor GND (green)
13	DO OPEN	29	CH3 infrared light sensor AOT (yellow)
14	DO OPEN	30	CH3 infrared light sensor power (red)
15	AC/DC Power	31	RS485 (-)
16	AC/DC Power	32	RS485 (+)

RCU terminal composition

No.	Definition	No.	Definition
1	DI CB CONNECT	17	-
2	DI CB CONNECT	18	-
3	DI CB TEST	19	-
4	DI CB TEST	20	-
5	DI CLOSE	21	-
6	DI CLOSE	22	-
7	DI OPEN	23	-
8	DI OPEN	24	-
9	-	25	-
10	-	26	-
11	DO CLOSE	27	-
12	DO CLOSE	28	-
13	DO OPEN	29	-
14	DO OPEN	30	-
15	AC/DC Power	31	RS485 (-)
16	AC/DC Power	32	RS485 (+)

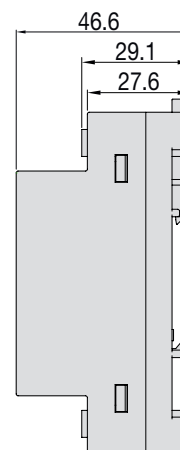
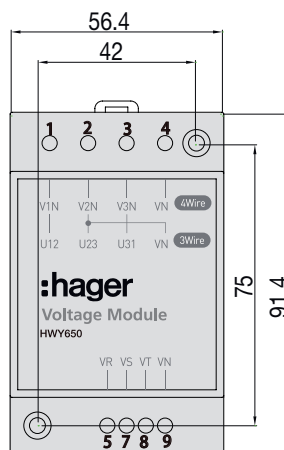
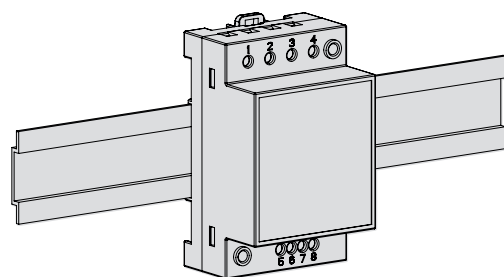
Shape

Status LED		Information
RCTU	Run LED	RCTU running LED
	Com LED	communication LED
	Temp. Alarm LED	temp. alarm LED
	Alarm DO LED	temp. alarm DO LED
General digital input	DI1	dry contact (5V)
	DI2	dry contact (5V)
ACB control	Close	ACB close LED
	Open	ACB open LED
	Error	ACB close/open terminal disconnection and controlling error



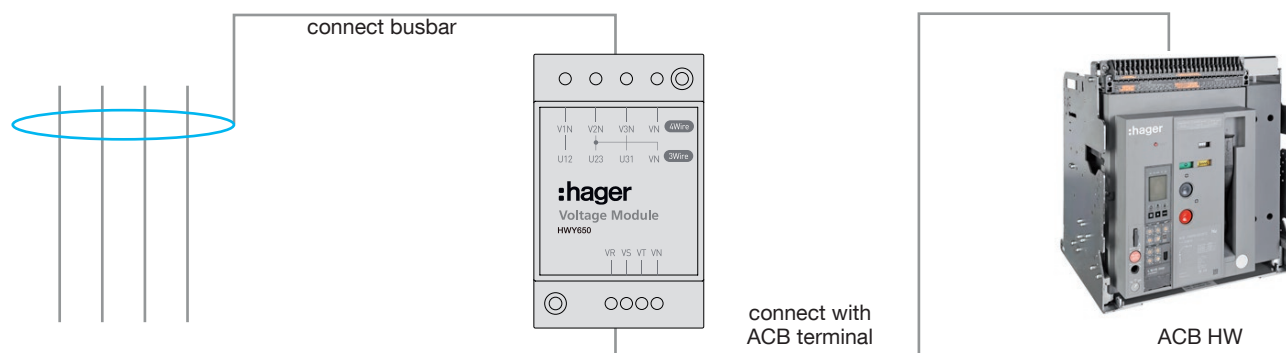
HWY650

Dimensions (mm)



Voltage connection

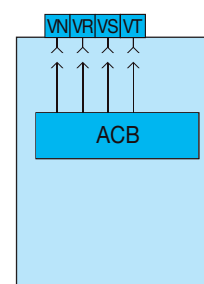
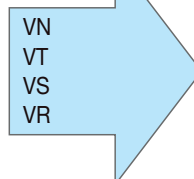
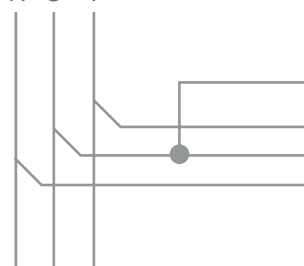
Trip unit offers VM (Voltage module) as an essential option, to measure voltage.
Voltage input range: AC 69 ~ 690V



3 pole 3 wire

(L1)(L2)(L3)

R S T

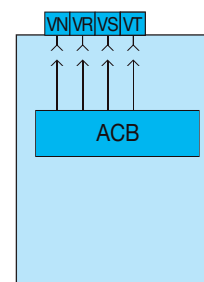
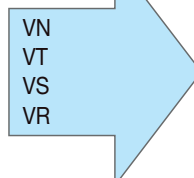
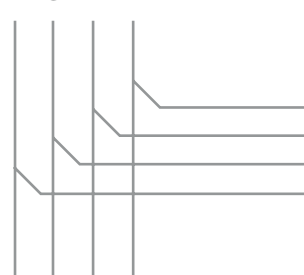


ACB terminal

4 pole 4 wire / 3 pole 4 wire

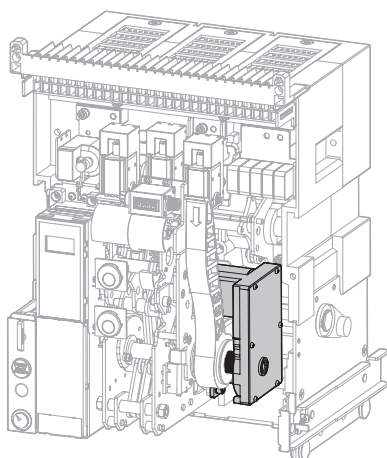
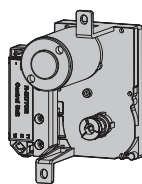
(L1)(L2)(L3)

R S T N

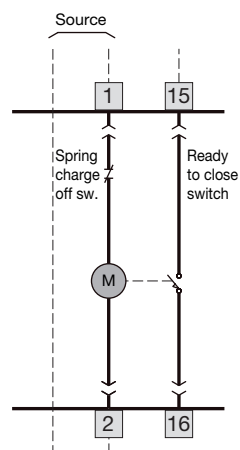


ACB terminal

Motor (MO)



Connection diagram



- Manual charging method and geared motor charging by external power source.
- Operating voltage range: 85-110%

Ratings

Rated voltage		
	DC110V	DC220V
rated current (A)	1.5	0.5
starting pick up(A)	5-6 times of rated current	
charging time (s)	within 5 sec ¹⁾	
torque (kgf)	300kgf×cm	
rated watt (W)	100	100
insulation voltage (V/min)	2,000	
insulation resistance (MΩ)	100	
ambient temperature (°C)	-15 to 60	

¹⁾ Charging time is within 10sec of rated, in case of DC24/48V.

Reference	Rating
HWX541	DC 24V
HWX542	DC 48V
HWX543	AC/DC 110V
HWX544	AC/DC 220V
HWX546	AC 440V

Wire ratings

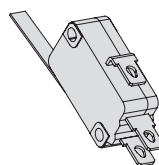
Rated voltage			
DC 24/48V and AC/DC 110/220V		AC 380/440V	
AWG	insulation level (V)	AWG	insulation level (V)
20	300	20	600

Ready to close switch and spring charge (RTC)

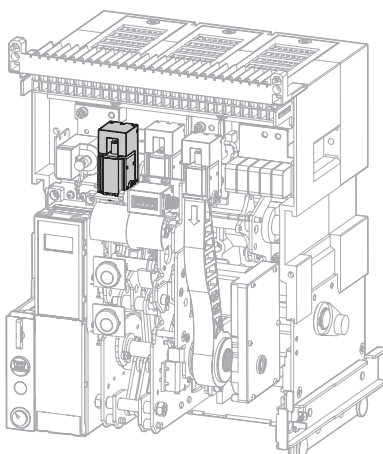
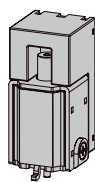
- These contacts (No.15,16) are for delivering spring charge status to outside and indicate the breaker is in a ready to close status.
- Optional device mounted on the body.

These contacts operate when the followings are valid:

- ACB is in OFF position
- spring charge indicator shows charged
- UVT is energised
- SH is not energised
- ACB is in connected position
- key lock is in open position (OFF)
- mechanical interlock is OFF

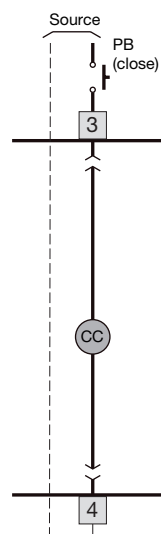


Closing coil (CC)



- A control device which closes a circuit breaker remotely, when applying 85-110% of rated control voltage over 150ms to coil terminals (3,4).

Connection diagram



Ratings

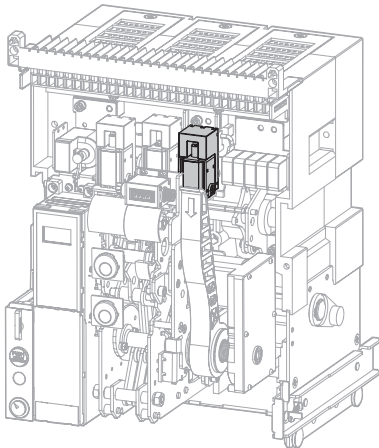
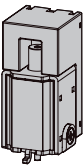
Power supply (Vn)		operating limits	Power consumption (VA)		Opening time (ms)
DC (V)	AC (V)		inrush	steady-state	
24	-	0.85-1.1Vn	300	10	80
100-130	100-130	0.85-1.1Vn			
200-250	200-250	0.85-1.1Vn			

Reference	Rating
HWX551	DC 24V
HWX552	DC 48V
HWX553	AC/DC 110V
HWX554	AC/DC 220V
HWX555	AC/DC 380/415V
HWX556	AC 440V

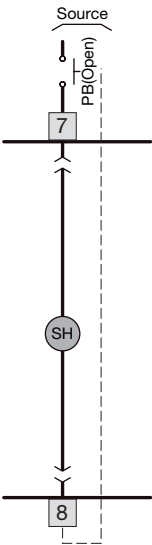
Wire ratings

Rated voltage			
DC 24/48V and AC/DC 110/220V		AC 380/440V	
AWG	insulation level (V)	AWG	insulation level (V)
20	300	20	600

Shunt trip coil (SH)



Connection diagram



- A control device which trips a circuit breaker remotely, when applying 70-110% of rated control voltage over 150ms to coil terminals (7,8).

Ratings

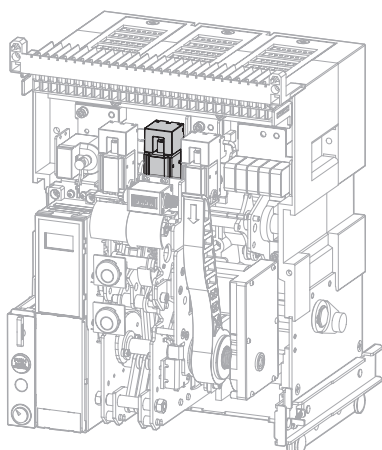
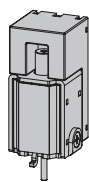
Power supply (Vn)		Operating limits	Power consumption (VA)		Opening time (ms)
DC (V)	AC (V)		inrush	steady-state	
24	-	0.7-1.1Vn	300	10	50
100-130	100-130				
200-250	200-250				

Reference	Rating
HWX501	DC 24V
HWX502	DC 48V
HWX503	AC/DC 110V
HWX504	AC/DC 220V
HWX505	AC 380/415V
HWX506	AC 440V

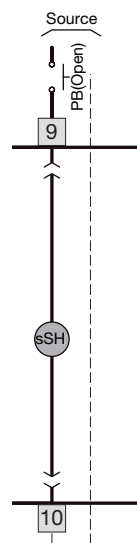
Wire ratings

Rated voltage			
DC 24/48V and AC/DC 110/220V		AC 380/440V	
AWG	insulation level (V)	AWG	insulation level (V)
20	300	20	600

Second shunt trip coil (sSH)



Connection diagram



- A control device which trips a circuit breaker doubly from the outside.
- When second shunt trip coil is installed, there is no possibility to fit the UVT coil
- Rated control voltage range 70-110%, applying voltage over 150ms to coil terminals (9,10).

Ratings

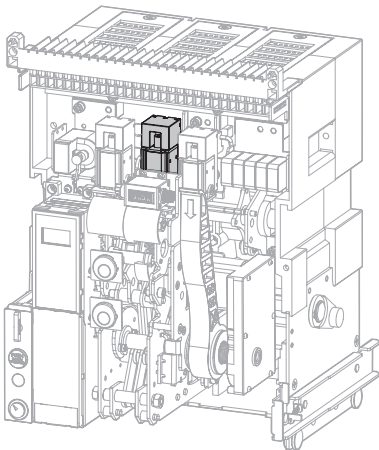
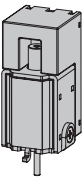
Power supply (Vn)		Operating limits	Power consumption (VA)		Opening time (ms)
DC (V)	AC (V)		inrush	steady-state	
24	-	0.7-1.1Vn	300	10	50
100-130	100-130				
200-250	200-250				

Reference	Rating
HWX521	DC 24V
HWX522	DC 48V
HWX523	AC/DC 110V
HWX524	AC/DC 220V
HWX525	AC 380/415V
HWX526	AC 440V

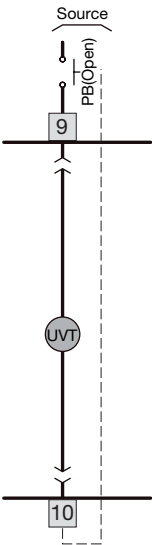
Wire ratings

Rated voltage			
DC 24/48V and AC/DC 110/220V		AC 380/440V	
AWG	insulation level (V)	AWG	insulation level (V)
20	300	20	600

Under voltage trip coil (UVT)



Connection diagram



- If the voltage of the main or the control power is under 70% of the standard, UVT breaks the circuit automatically.
- Connect instantaneous type with both terminals (9,10) and connect with time delay type in order to present time delay controller.
 - The circuit breaker is opened with trip unit power supply voltages below 70%.
 - The circuit breaker is closed with unit power supply voltage above 85%.
- Instantaneous type can not be used with double trip coil.

Ratings

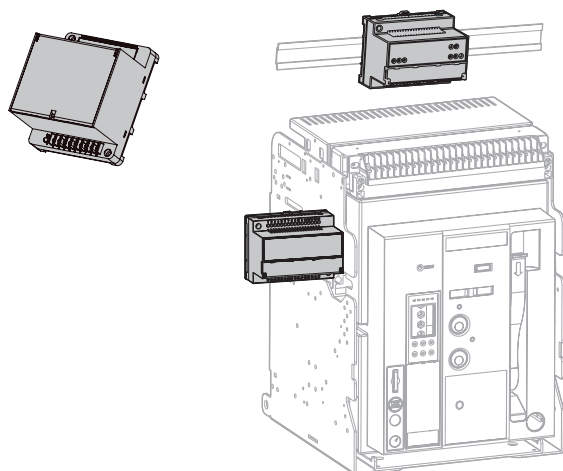
Power supply (Vn)		Pick-up	Drop	Power consumption (Vn)		Trip time (ms)
DC (V)	AC (V)			inrush	steady-state	
24	-	above 0.85Vn	below 0.35Vn	300	10	60
110 (100-130)	110 (100-130)					
200 (200-250)	200 (200-250)					
-	380					
-	440					

Reference	Rating
HWX511	DC 24V
HWX512	DC 48V
HWX513	AC/DC 110V
HWX514	AC/DC 220V
HWX515	AC 380/415V
HWX516	AC 440V

Wire ratings

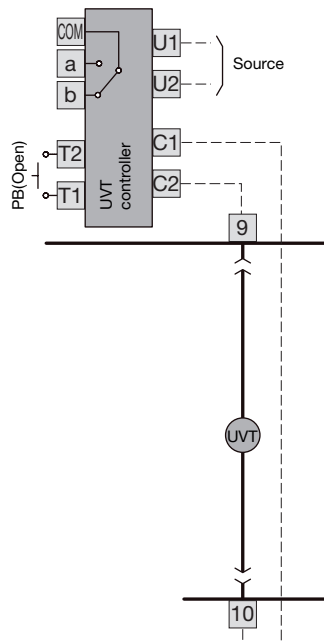
Rated voltage			
DC 24/48V and AC/DC 110/220V		AC 380/440V	
AWG	insulation level (V)	AWG	insulation level (V)
20	300	20	600

UVT time delay controller

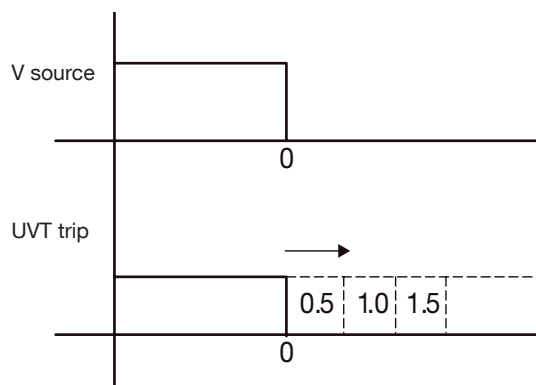


- This device is possible to delay as (0.5, 1.0, 1.5, 3 sec).
- It can be mounted on side of chassis or on the DIN rail.

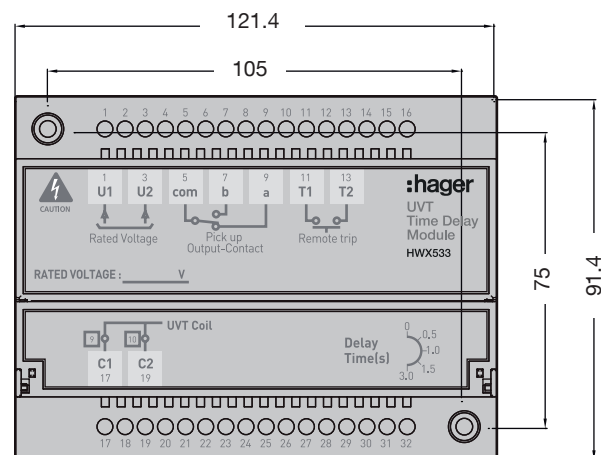
Connection diagram



Connection and operating time



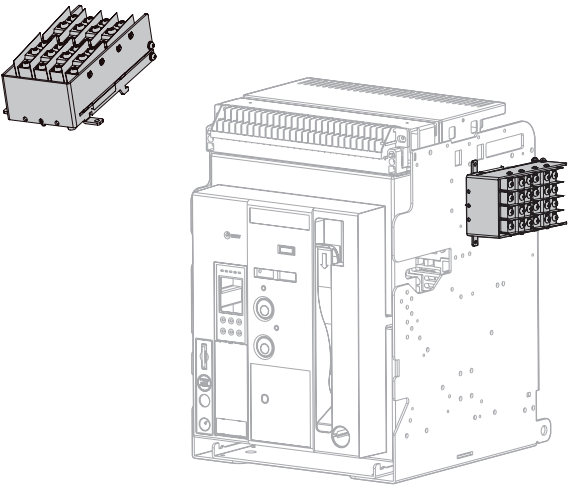
Dimensions (mm)



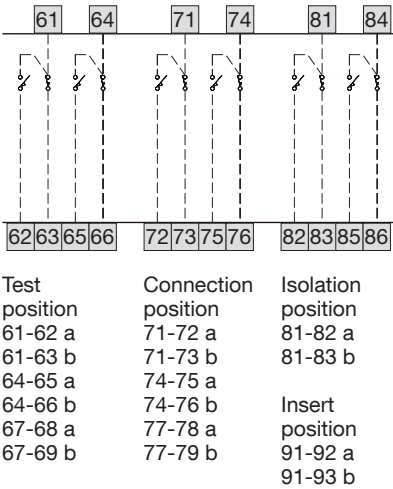
Ratings

Reference	Rating
HWX533	AC/DC 110V
HWX534	AC/DC 220V
HWX535	AC 380/415V
HWX536	AC 440V

Position switch



Connection diagram



- This switch is for indicating the position of ACB in the chassis. It is mounted on the side of chassis.
- Indicating position Connected/Test/Isol/Insert.
- Only one switch is applicable.

"a" contact = NO contact
"b" contact = NC contact

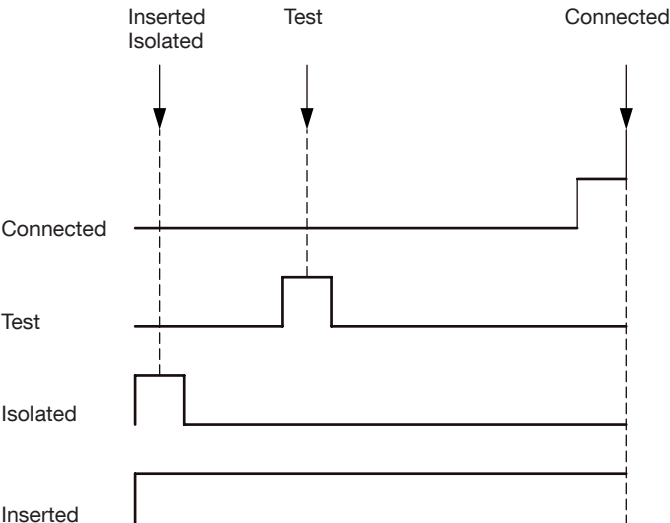
Ratings

Load	Resistance	Lamp	Inductor	Motor
AC125V	10A	1.5A	6A	2A
DC30V	6A	3A	6A	3A
DC125V	0.6A	0.1A	0.6A	0.1A
DC250V	0.3A	0.05A	0.3A	0.05A

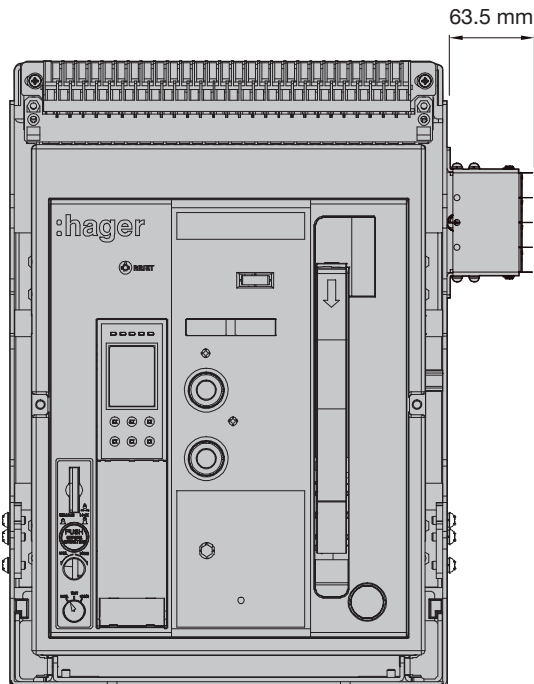
References

References	Inserted	Isolated	Test	Connected
HWX570	-	1C	1C	2C
HWX571	1C	1C	1C	1C
HWX572	1C	1C	3C	3C
HWX573	2C	2C	2C	2C

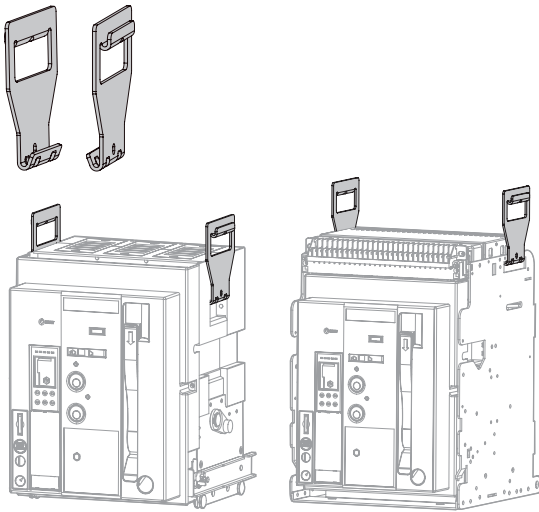
Position switch operating sequence



View

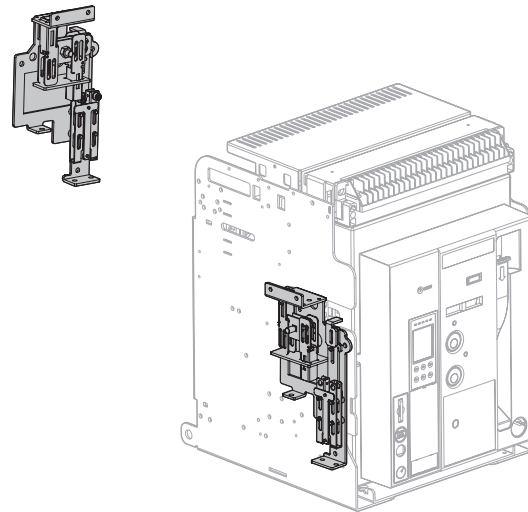


Lifting lugs



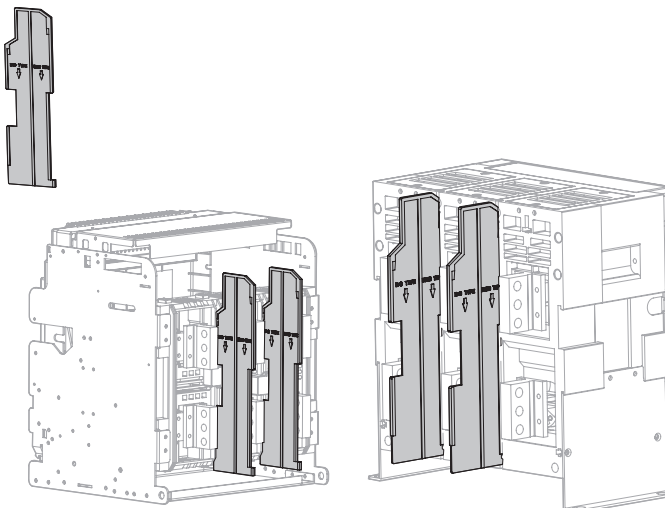
- A device to make an ACB easy to shift.
- Hang it to both handles of the arc shield, chassis, and ACB.
- When handling products, please be sure to use crane. In case of products under 3,200A and handling chassis only, please comply with safety regulation.
- Offered 2ea of 1set as a standard in 5,000A "C" frame.

Mechanical interlock kit



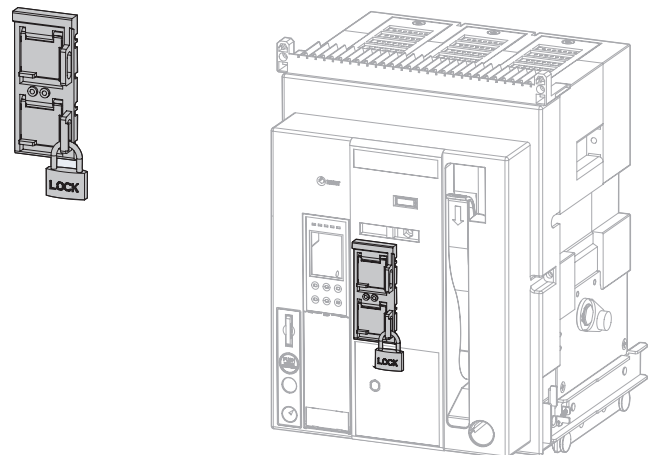
- It is used to interlock closing and trip between two or three breakers mechanically so as to prevent unintended operation at the same time.
- The MI is a safety gear installed in ACB for distribution line and it creates a mechanical interlock between two or three circuit-breakers through each ACB's open/close work.
- To operate the MI every component linked to the MI unit and the MI must be combined before use.
- MI unit is separate product. After installing ACB it is additionally attached.
- When ordering MI wire of parts all components linked to the MI unit are provided.
- MI is provided with cable length: 1.5 m.(additional cables can be ordered for 3 and 5 m)

Phase insulation barrier



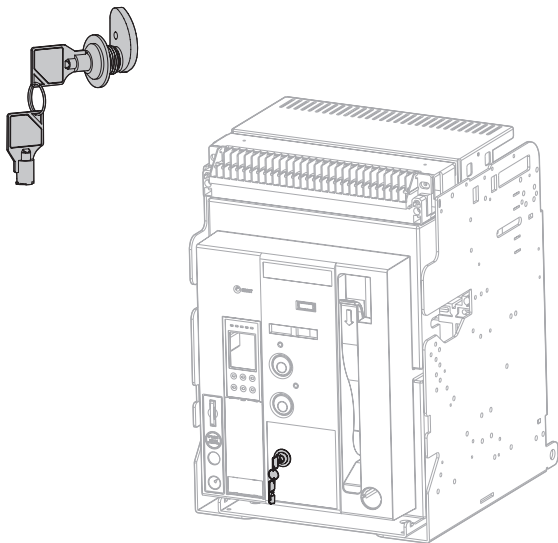
- Phase insulation barrier prevents the arc which may arise and result in short-circuit between phase in advance.

ON/OFF button lock



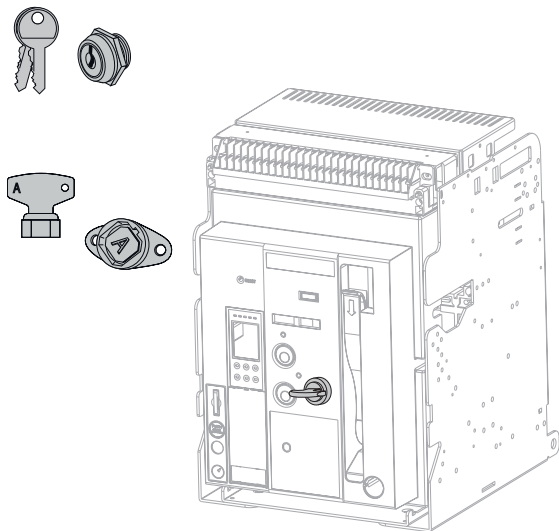
- Prevents manual operation of ACB's closing/tripping button due to user's wrong handling.
- It is not possible to handle on/off operation under the "Button lock" status.
- Padlock is not included, key locksize: Ø5-Ø8

Key lock device



- The key lock prevents the circuit breaker closing, it maintains interlock condition (Mechanical prevention).
- When the key has been unlocked you can operate spring changing/manual on or off, when the key is removed from circuit breaker it becomes interlock. The key doesn't turn to lock position until user push the off button, when the key is locked.

Key Ronis lock and key Castell lock



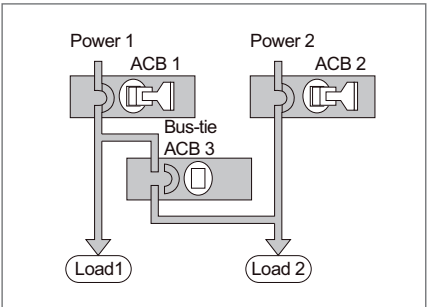
Kirk and Profalux type of locks may also be applied.

	Ref.	Key type	Suitable with Lock type	Adaptor kit ref.
Key Ronis lock	HWY701	1	1, 4	HWY697
	HWY702	2	2, 4, 5	
	HWY703	3	3, 5	
	HWY704	4	4	
	HWY705	5	5	
Key Castell lock	HWY706	1	3	HWY698
	HWY707	2	3	
	HWY708	3	-	

Key interlock

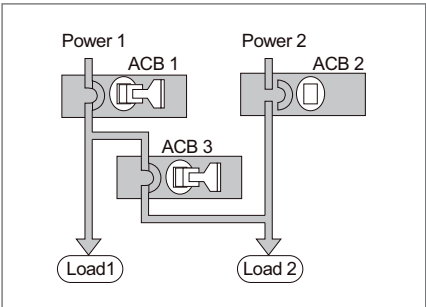
Configure the system with three breaker mounted key lock device. Only two breakers are possible to input with 2ea key, and the other breaker can supply stable load with interlocking.

- ACB 3 is interlocked



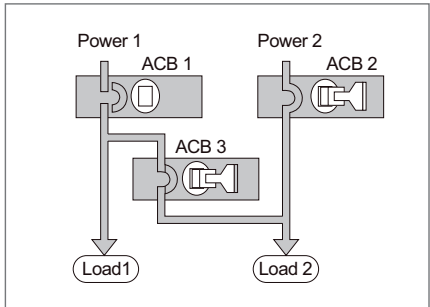
ACB 3 cannot be closed.

- ACB 2 is interlocked



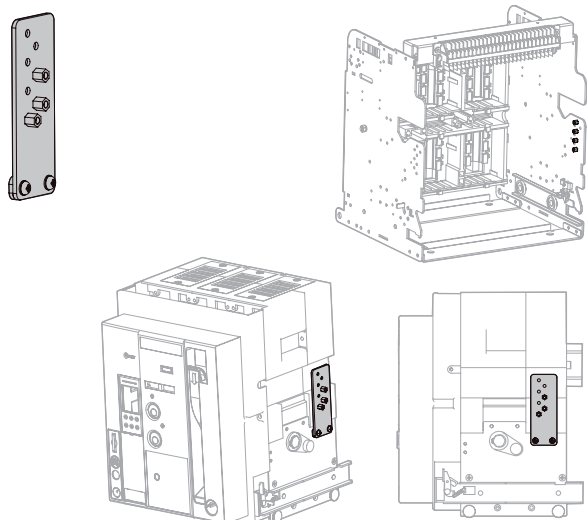
ACB 2 cannot be closed.

- ACB 1 is interlocked



ACB 1 cannot be closed.

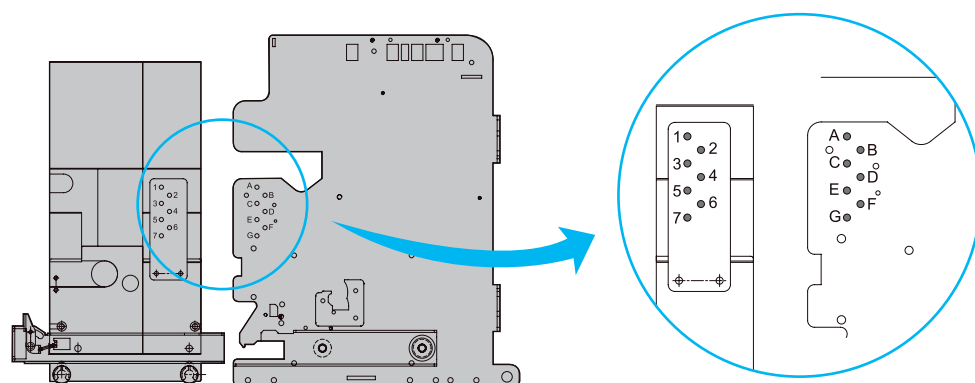
Wrong insertion preventer



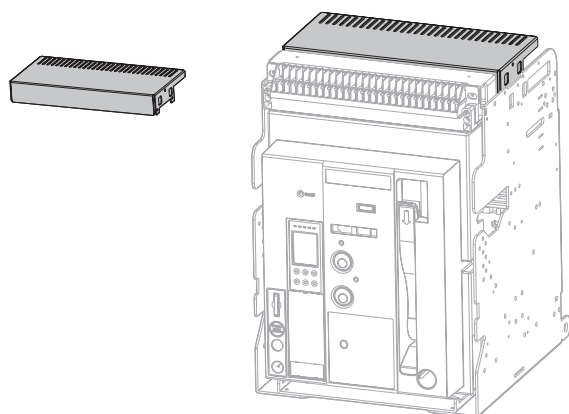
- When the main body of ACB is inserted to the chassis if the ratings of ACB do not match with chassis it mechanically prevents ACB from being inserted into chassis of ACB.
- Each part will have been installed on body or chassis.
- This device is set by CT rated current.

Mounting position according to rated current

CT	Mounting position	
	chassis	ACB
0 = without OCR	ADEG	236
T = 630A	ABDF	357
H = 800A	ABDE	367
J = 1,000A	ABCG	456
K = 1,250A	ABCF	457
L = 1,600A	ABCE	467
M = 2,000A	ABCD	567
N = 2,500A	BCDE	167
P = 3,200A	BCDF	157
Q = 4,000A	BCDG	156
S = 5,000A	BCEF	147

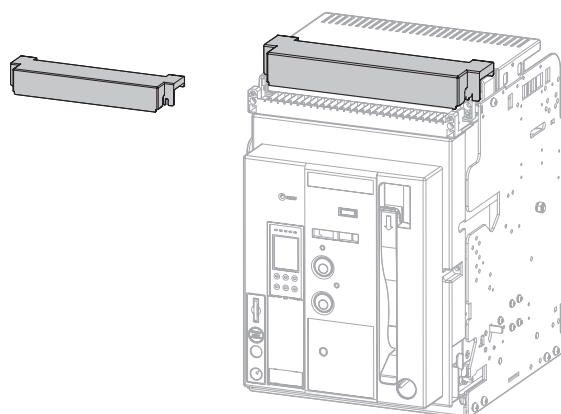


Arc shield



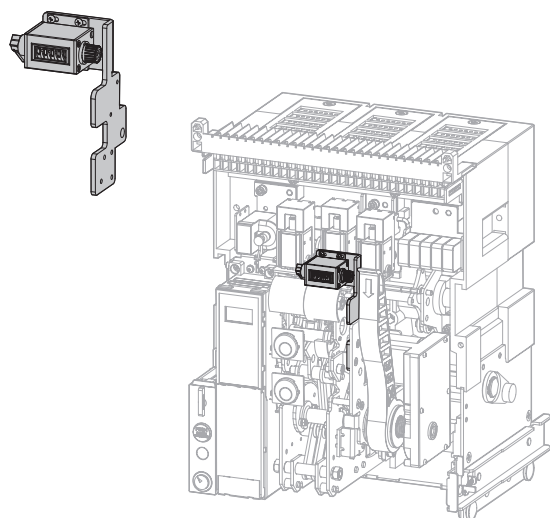
- Arc which may arise while breaking fault current is extinguished first by arc chute in main body of circuit breaker and then completely extinguished by arc cover.

Control terminal protection cover



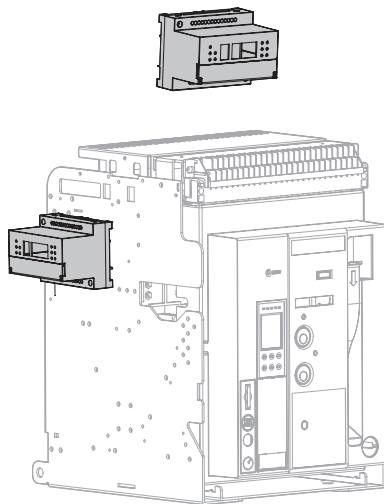
- Protects control terminals which are exposed to the outside, and prevent damage from foreign substances.

Counter



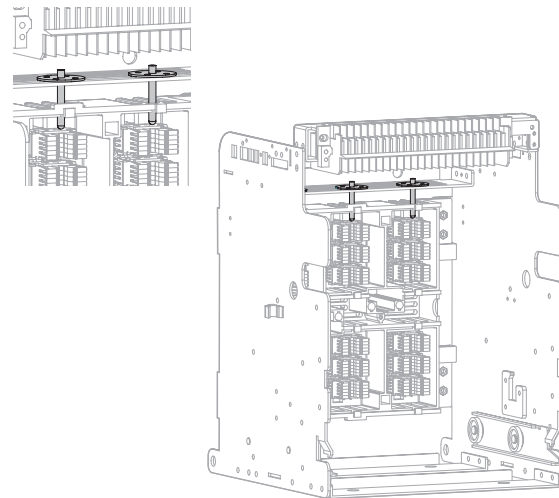
- Displays the total number of on/off operation of ACB
- The counter displays the total number of on/off operation of ACB.

Remote control temperature unit



- RCTU is installed on the chassis or inside of panel, and communicates with Modbus/RS-485 basically.
- It can be purchased separately and can be operated with temperature alarm unit at the same time: RCTU
- It is used with temperature sensor.
- Temperature alarm unit is a device to show the busbar's temperature through a sensor inside of ACB.
- Temperature sensor can be installed up to 3 and alarm can occur when it reaches the specified temperature.
- Display the maximum temperature on the segment LED and transmits through a network.
- Installed on the chassis or inside of panel, and can be operated with remote closing & trip unit at the same time.

Temperature sensor

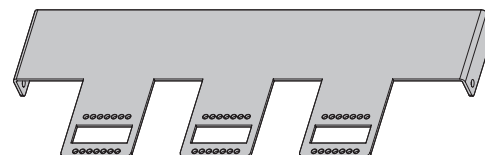


- The RCTU is used with temperature sensor installed inside of the ACB.
- The temperature sensor is installed in designated position. However user can change the position to applicable extra site.

Contact specification

Division		Range of application
ACB control	contact ratings	10A, 240V AC, 30V DC
	max. switching power	2,400VA, 300W

Temperature sensor support



Different supports are designed to make easier the installation of IR temperature sensor:

- Frame A, 3P and 4P
- Frame B, 3P and 4P
- Frame C, 3P and 4P

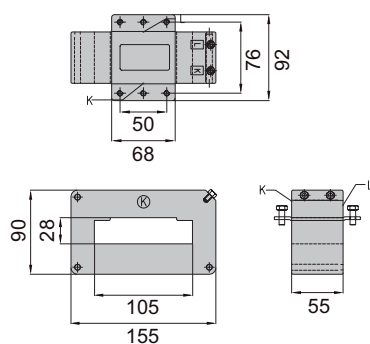
Neutral CT



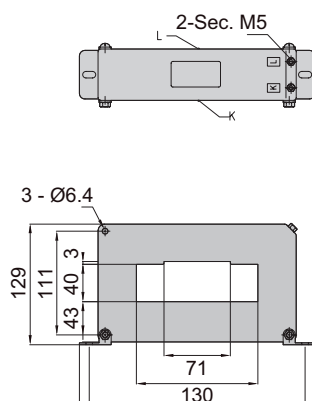
- The NCT is additionally applied for 3-pole circuit breaker when it is connected to distribution line (3 phases 4 lines).
- For distribution line (3 phases 4 lines) 3pole circuit breaker can protect the ground fault however, we can not classify unbalanced load and ground fault. To complement this when only a ground fault occurs the NCT senses the N phase load and operates the GFT.
- When connecting a relay or electric instrument checking phase is mandatory. Please connect the designated terminal.

Dimensions (mm)

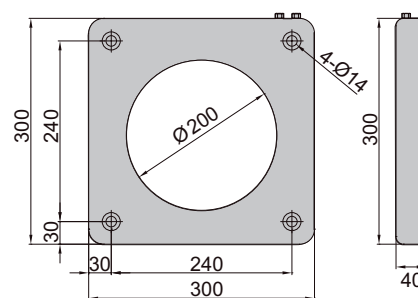
630-1,600A



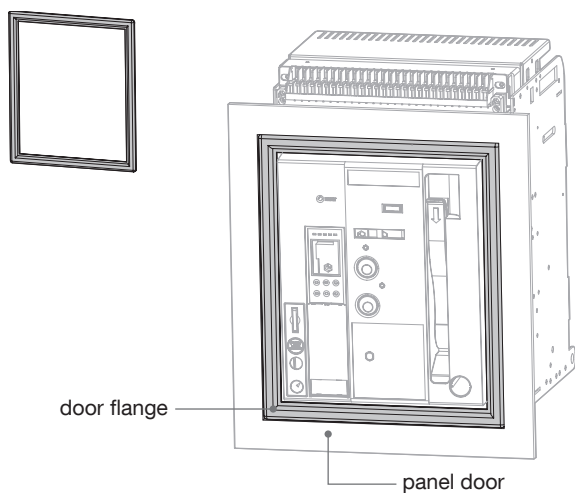
2,000-4,000A



4,000-5,000A

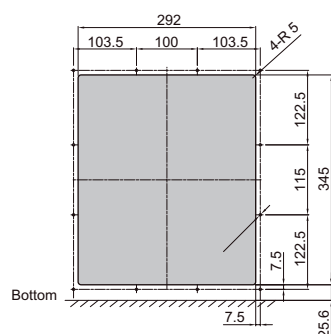


Door flange

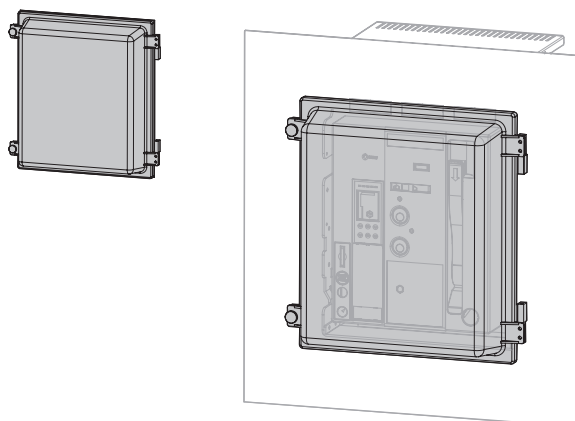


- Protects the protruding front of ACB and the cutting side of panel door by attaching it to the panel door.
- Both fixed/draw-out type are the same size of the panel cutting, even if the dust cover is installed.
- Refer to dimension for panel cutting size.
- Protection rating of IP30.

Panel door cutting dimensions (mm)

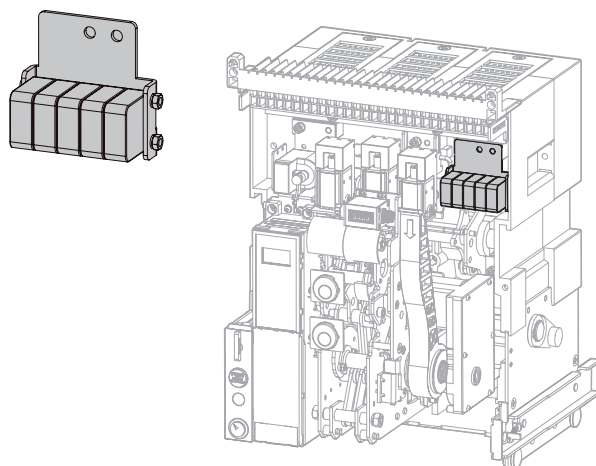


Dust cover

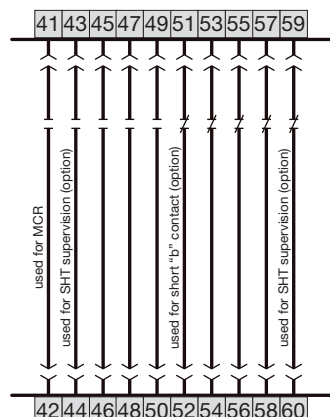


- A protective cover which completely protects the front panel of ACB from dust and moisture, with a protection rating of IP54.
- Locks the cover in the test or connected position.
- Refer to dimension for panel cutting size.

Auxiliary switch



Connection diagram



- A contact to monitor On/Off position of ACB remotely.
- 5a5b is standard for ACB HW series.
- Applicable AUX switch is up to 6a6b.
- When working with OCR's MCR function it will be 4NO, 5NC (4a5b). When both monitoring contact and MCR function working together it will be 3a4b.
- When ordering short "b" additionally it will be attached to 'b' contacts 51, 52 when the product is out. The additional short b which enclosed in the product is applicable as the number of the b contact.
- Additional AX 5a5b (MOC) can be fitted on the left side of breaker HWX565.

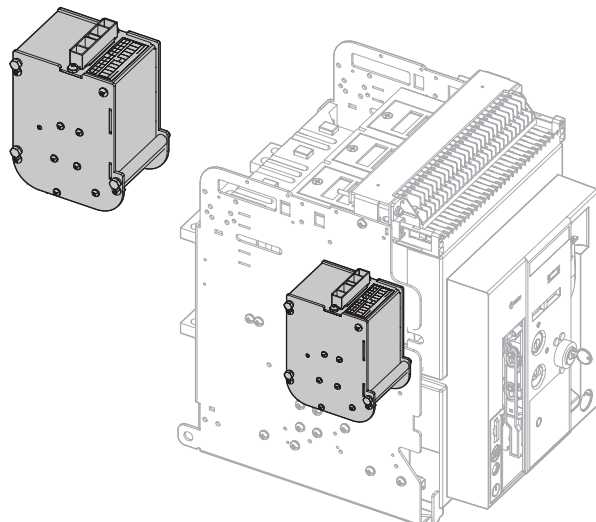
Ratings

Load	Resistance	Lamp	Inductor	Motor
AC125V	5A	0.7A	4A	1.3A
AC250V	5A	0.5A	4A	0.8A

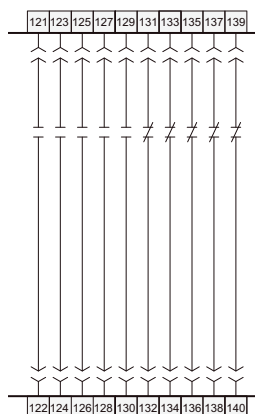
Wire ratings

Wire ratings (Un)	
AWG	insulation level (V)
20	300

Additional AX 5a5b (MOC)



Connection diagram



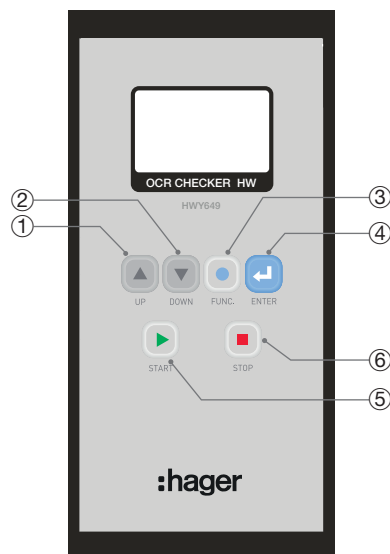
- MOC is suitable for ACB draw-out type
- When MOC is fitted, MI cannot be mounted.

OCR portable checker



- ACB HW portable checker tests for the operation of OCR (Long time/Short time delay/Instantaneous/Ground fault).
- It is possible to set current level, phases, and frequency for OCR's test.
- All testing factors are adjustable through front monitor and you can check operating time.
- Battery equipped inside (Available without external power source).

Keypad

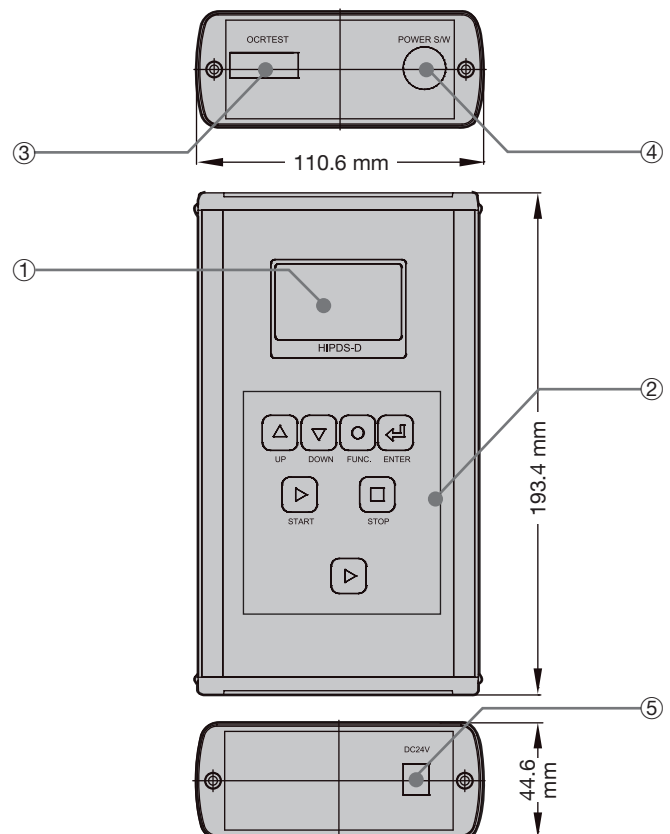


Nr	Button	Function
1	UP	move menu and increasing setpoint
2	DOWN	move menu and decrease setpoint
3	FUNC	move to the previous menu and return to the setup screen
4	ENTER	save the settings and move the number of digits of setting current
5	START	waveform occurrence
6	STOP	waveform stop

Connection diagram

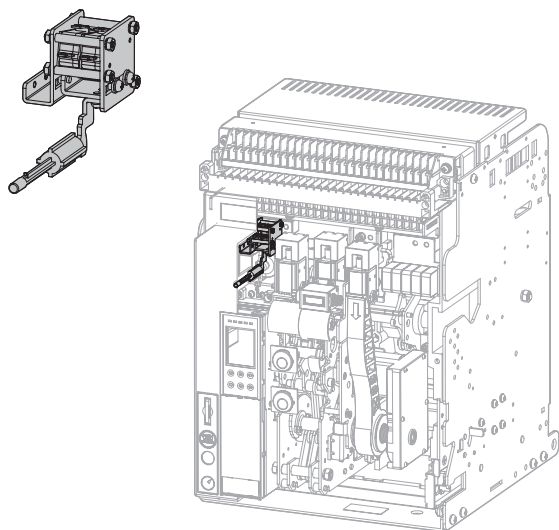
Item	Specifications
external power	input: AC/DC100-220V,50/60Hz output: DC24V,2.5A
battery	Alkaline 9V: 3EA
trip time measurement	0-999,999 sec
test output	0.3In-17In
output precision	±20% (1In-17In)
size (H×W×D)	193mm x 111mm x 45mm

Externals



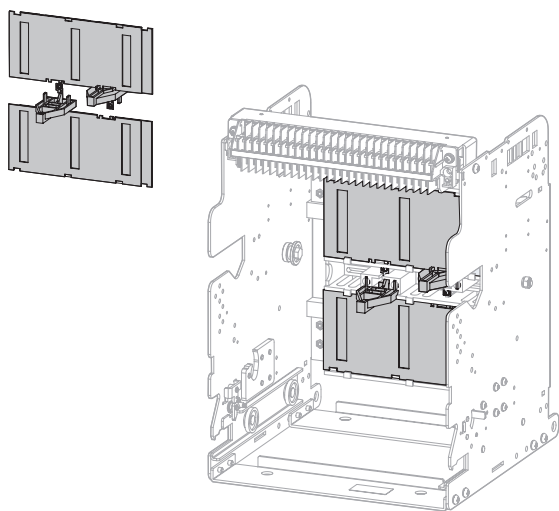
Nr	Button	Function
1	LCD	menu, setting current, trip time
2	keypad	move menu and setting
3	signal output terminal	OCR connection terminal
4	power switch	On/Off
5	terminal	control terminal of checker

OCR and alarm switch reset (MHT)



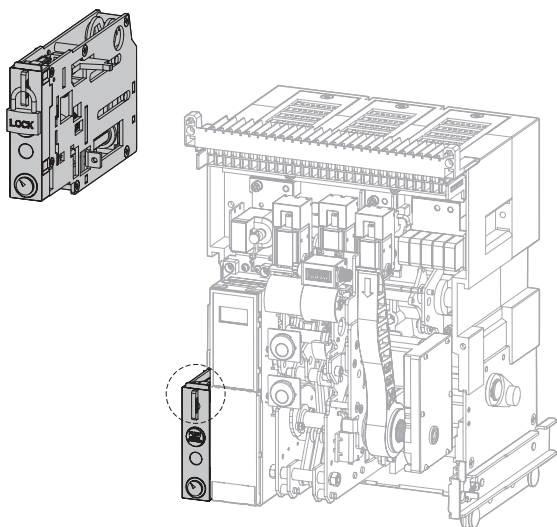
- When a circuit breaker tripped by fault current or over load and only if the circuit breaker has been tripped by OCR, the Manual Reset Button operates interlock and resets the interlock to restore electric lines after fault factors have been removed.
- When the ACB is tripped by OCR it provides functions of interlocking above mechanism and output contacts (1NO/1NC) which check operation of ACB by OCR as well. The output contact displays OCR operation by long time, short time delay, instantaneous and ground fault. And resetting above mechanism occurs.
- Except above functions when emergent restoration of electric load is needed it automatically reset itself to get ready to open immediately after trip and reset only output contacts.

Safety shutter lock



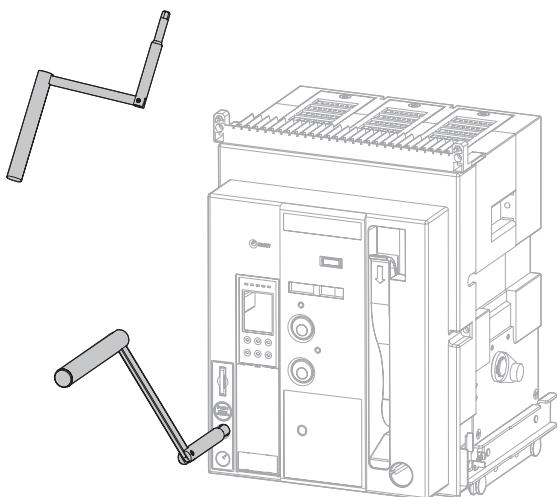
- An automatic safety device to protect the connectors of main circuit by cutting off dangerous contact from outside while the breaker is drawn out.
- Shutter lock is a locking device which prevents safety shutter from being opened when it is closed. (Key lock is not included. Size is Ø5-Ø8)

Draw-in/out device mechanism



- Draw-in/out device unit is mounted on the body of draw type ACB as standard.
- Draw-in/out device unit consists of draw-in/out handle storage space, push button, position indicator, pad lock.
- Position pad lock is a safety device as locking draw-in/out function in connected/test/sol position.
- This device is offered as standard except key lock. Available key lock size: Ø5-Ø8

Draw-in/out handle



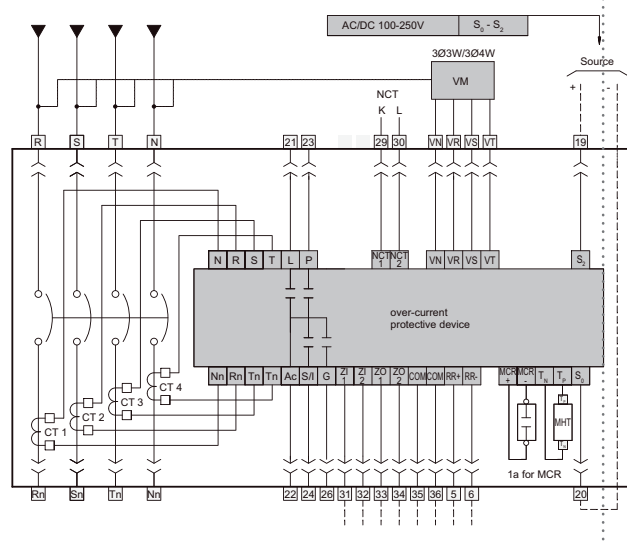
- Draw-in/out handle is included in storage place for draw-out type.



OCR Circuit diagram (Energy type)

Main circuit

Over-current
protective device



Common Circuit diagram

Alarm
contact

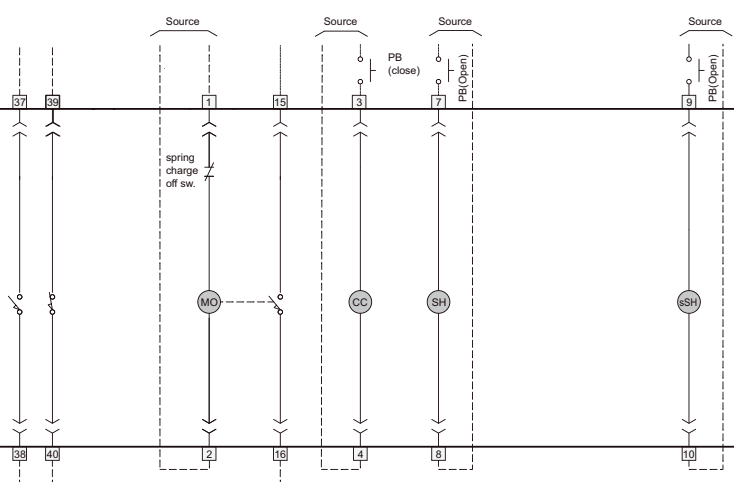
Charging
circuit

Ready
to close

Closing
circuit

Opening
circuit

Secondary
shunt
trip coil



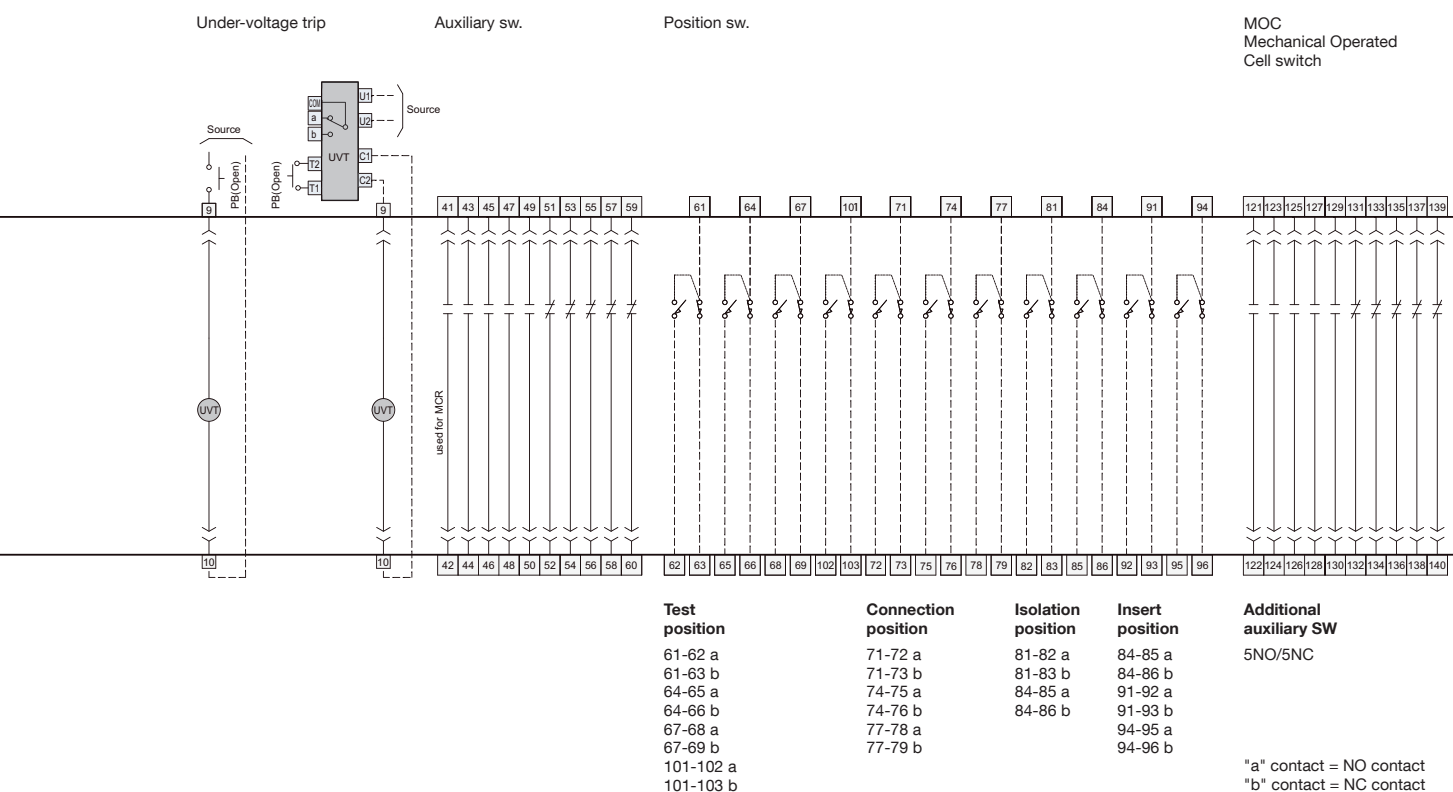
Symbol description

CT	current transformer
L	LTD terminal
P	PTA terminal
G	GFT terminal
S/I	STD/INST terminal
Ac	common terminal
NCT	neutral current transformer
ZI	zone selective input
ZO	zone selective output
COM	communication (pc)
MCR+/-	MCR input terminal
Tp/Tn	MHT input source
MO	charging motor
CC	close coil (close)
SH	shunt trip coil (open)
sSH	secondary trip coil
UVT	undervoltage trip coil
MHT	magnetic hold trigger
S0/S2	protection unit source power
RR	remote reset

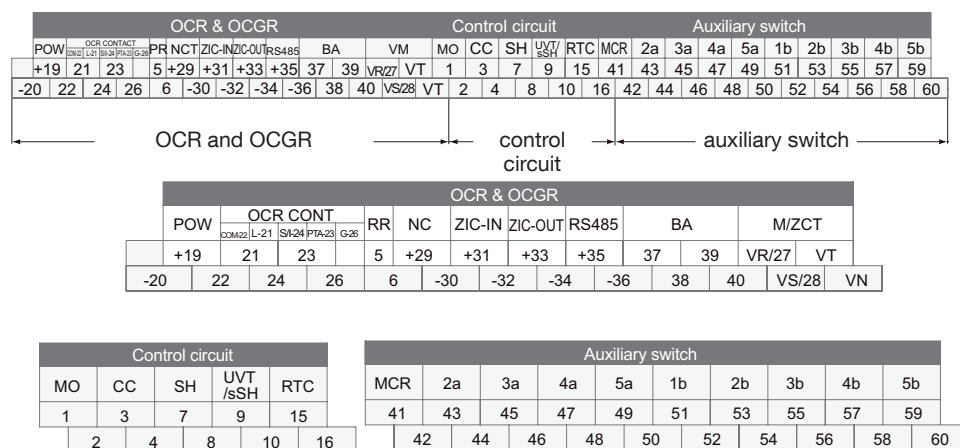
Terminal description

1-2	charging motor (MO) source power
3-4	closing coil (CC) source power
5-6	remote reset
7-8	opening coil (SH) source power
9-10	UVT coil / secondary shunt trip coil
15-16	ready to close contact (RTC)
19-20	OCR source power
22-21	LTD contact
22-23	PTA contact
22-24	STD/INST contact
22-26	GFT
29-30	NCT input terminal
31-34	ZSI input/output
35-36	communication (RS485)
37-40	OCR alarm contact
VN-VT	voltage module
43-60	AUX switch contact
61-96	position switch

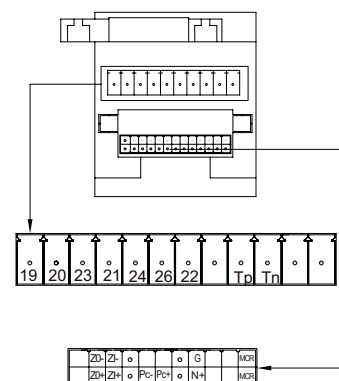
— Manufacturer's wiring
 --- User's wiring
 << Disconnecting device (Draw-out type)



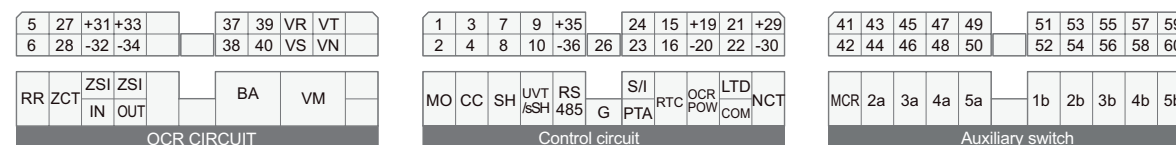
Draw-out type lay-out



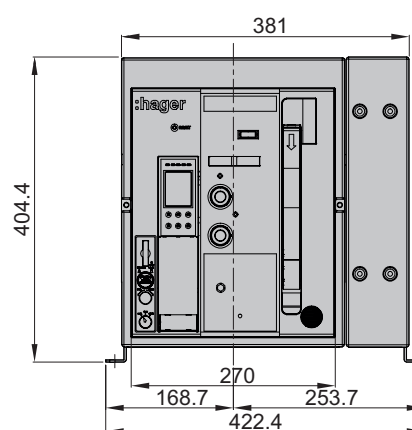
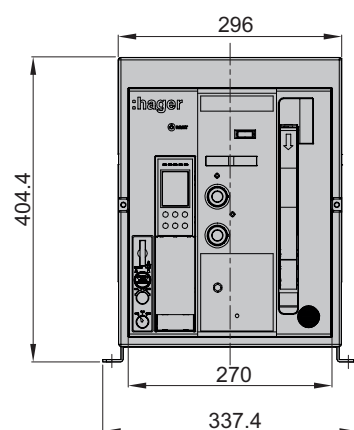
Over-current protective device (standard type)



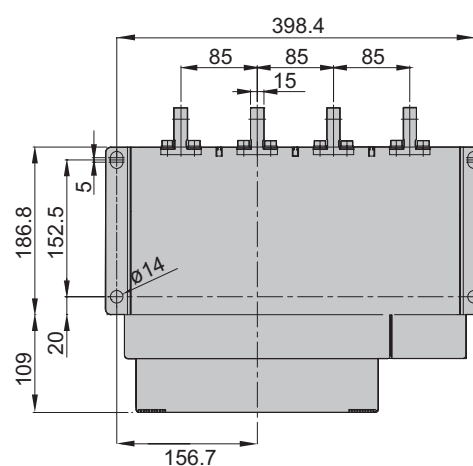
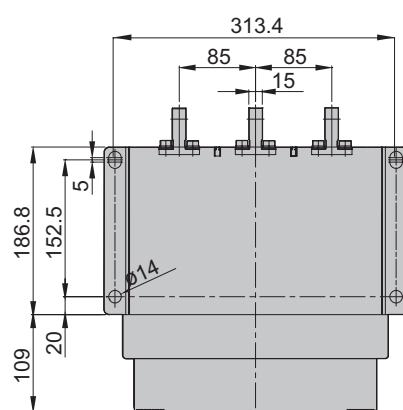
Fixed type lay-out



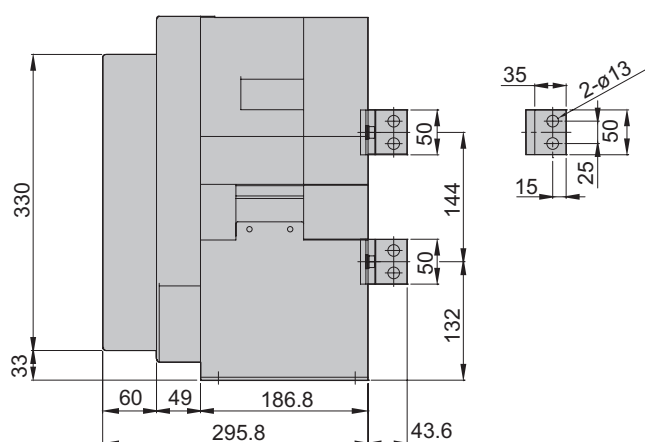
Front view (mm)



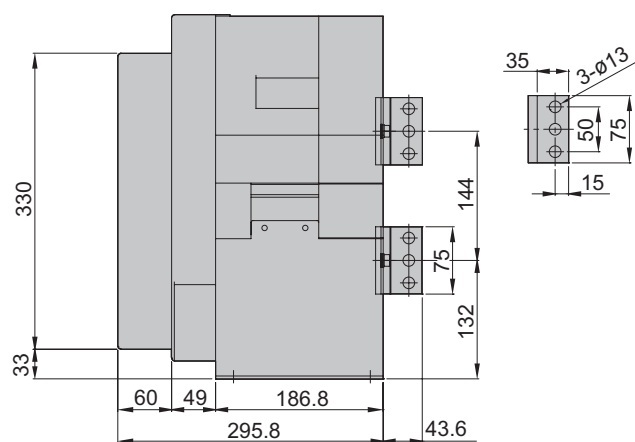
Vertical terminal connection (mm)



[630-1,600A]

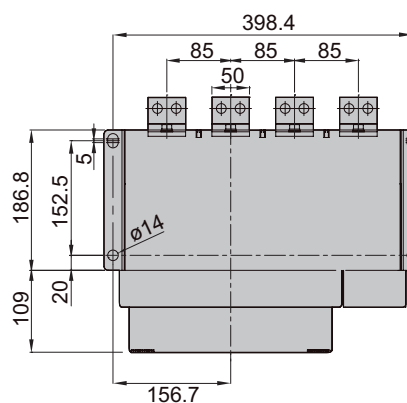
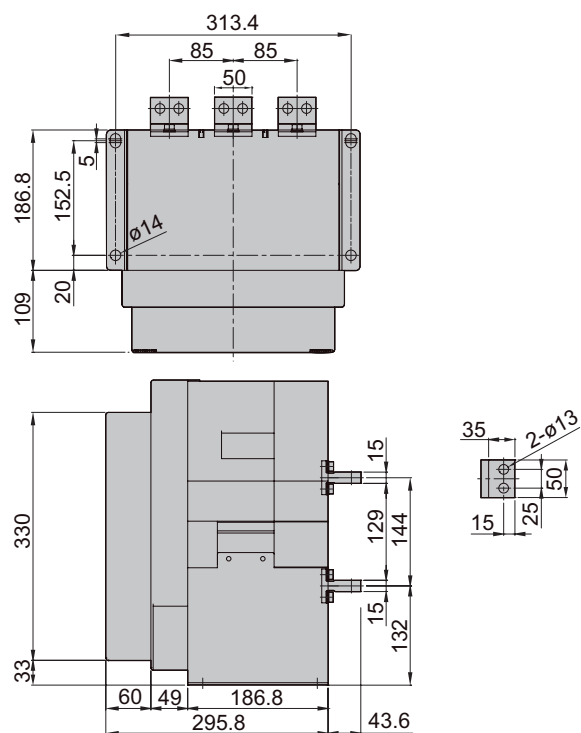


[2000A]



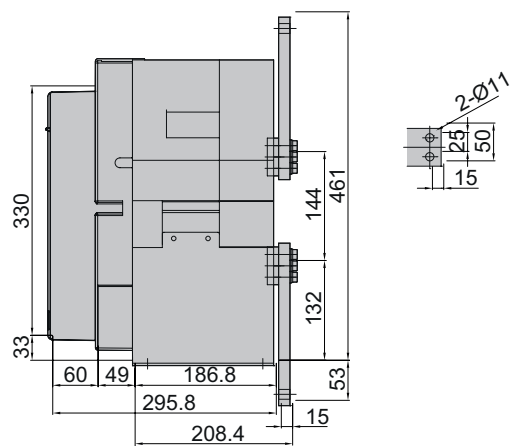
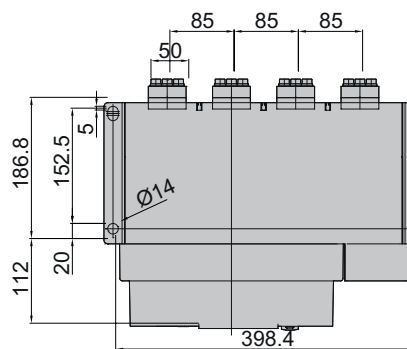
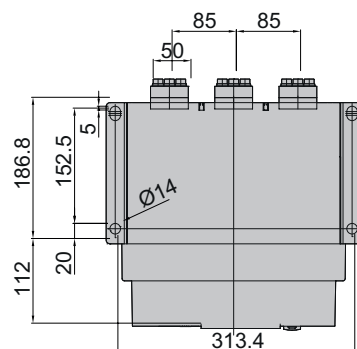
A frame 2,000A of ACB HW is applicable vertical terminal only.

Horizontal terminal connection (mm)

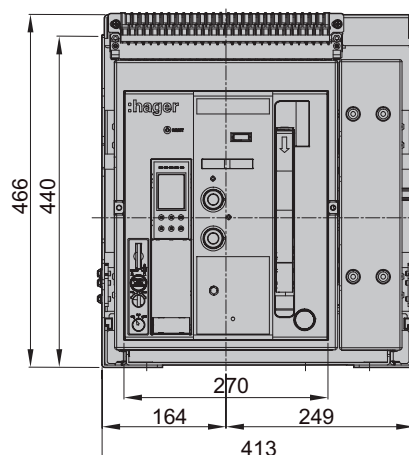
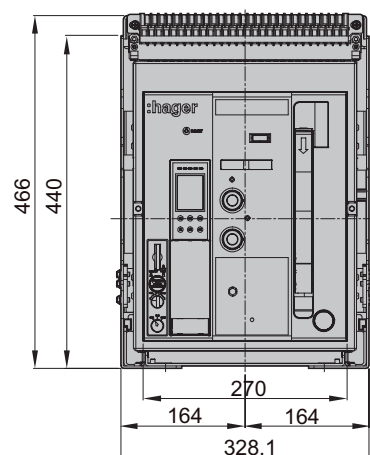


Front terminal connection (mm)

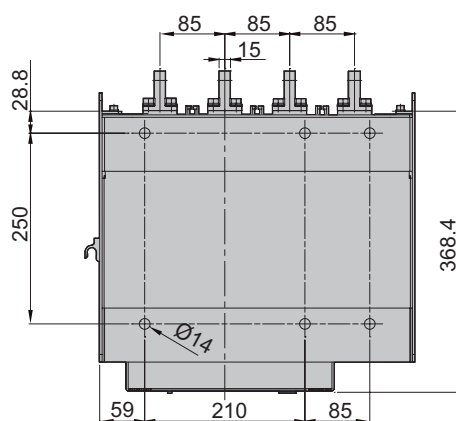
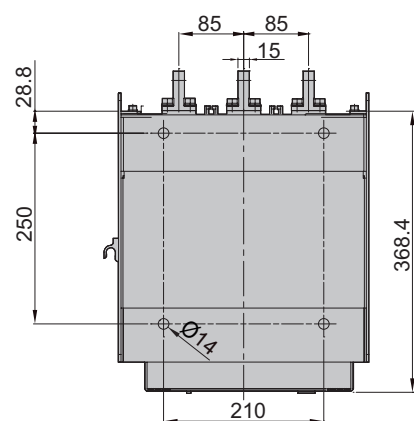
[630 - 1600A]



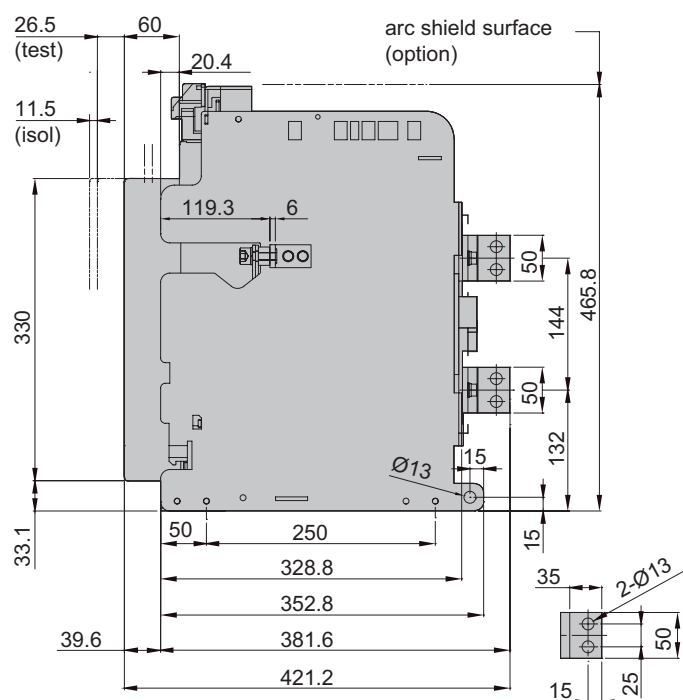
Front view (mm)



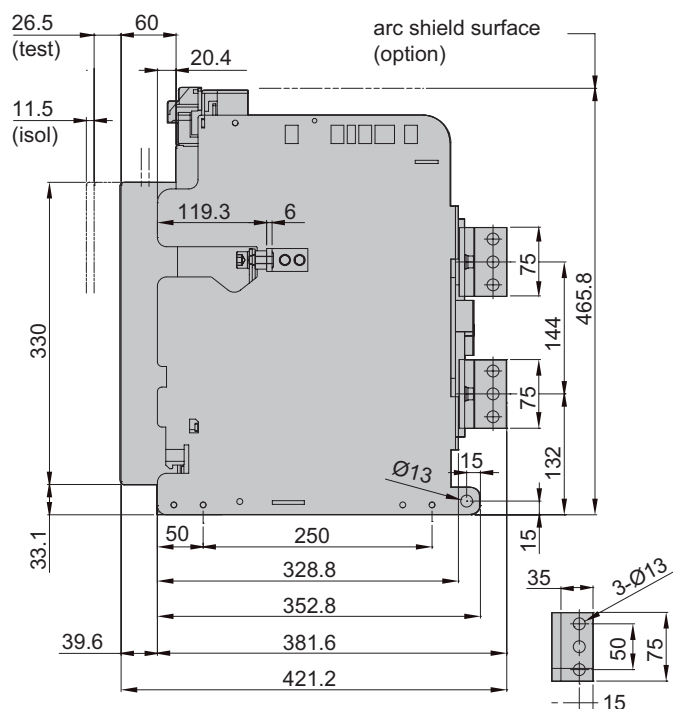
Vertical terminal connection (mm)



[630-1,600A]

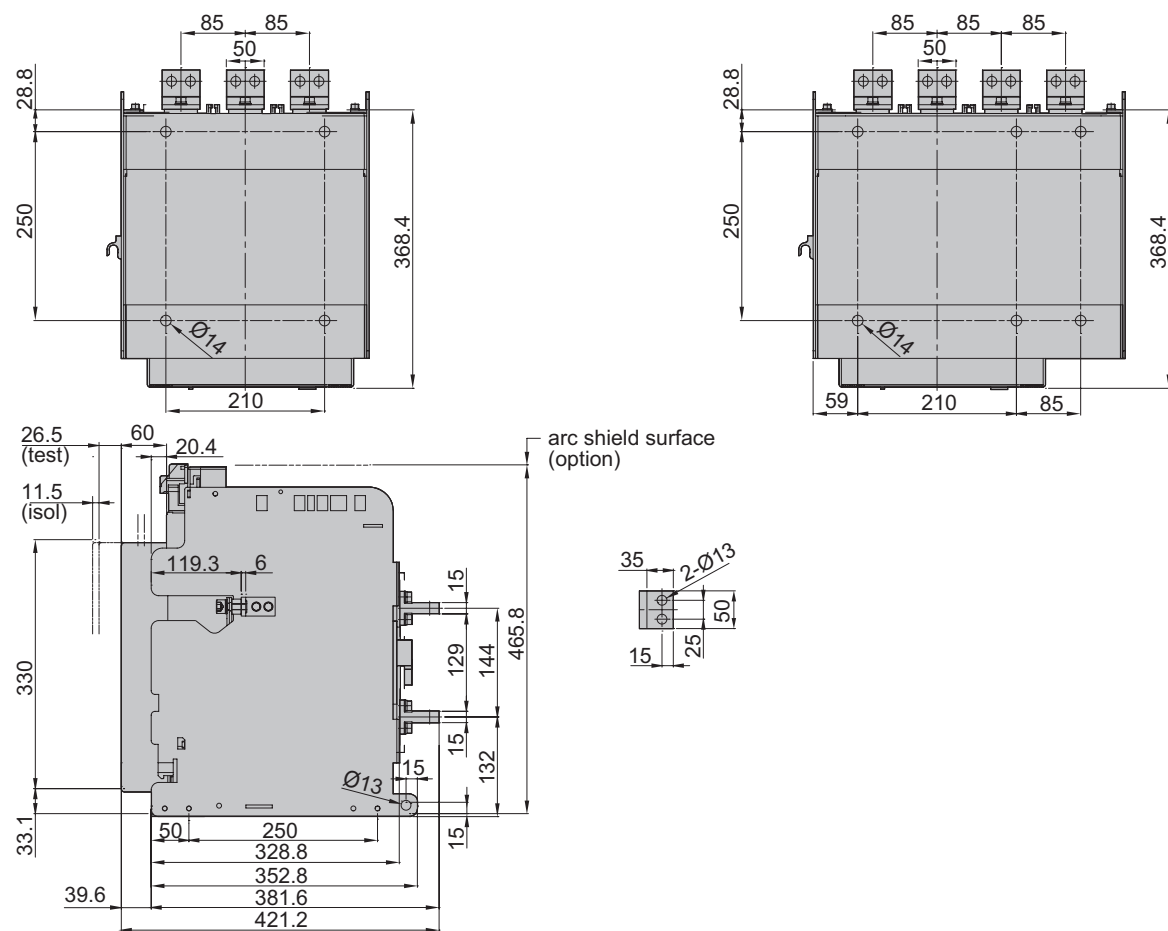


[2,000A]



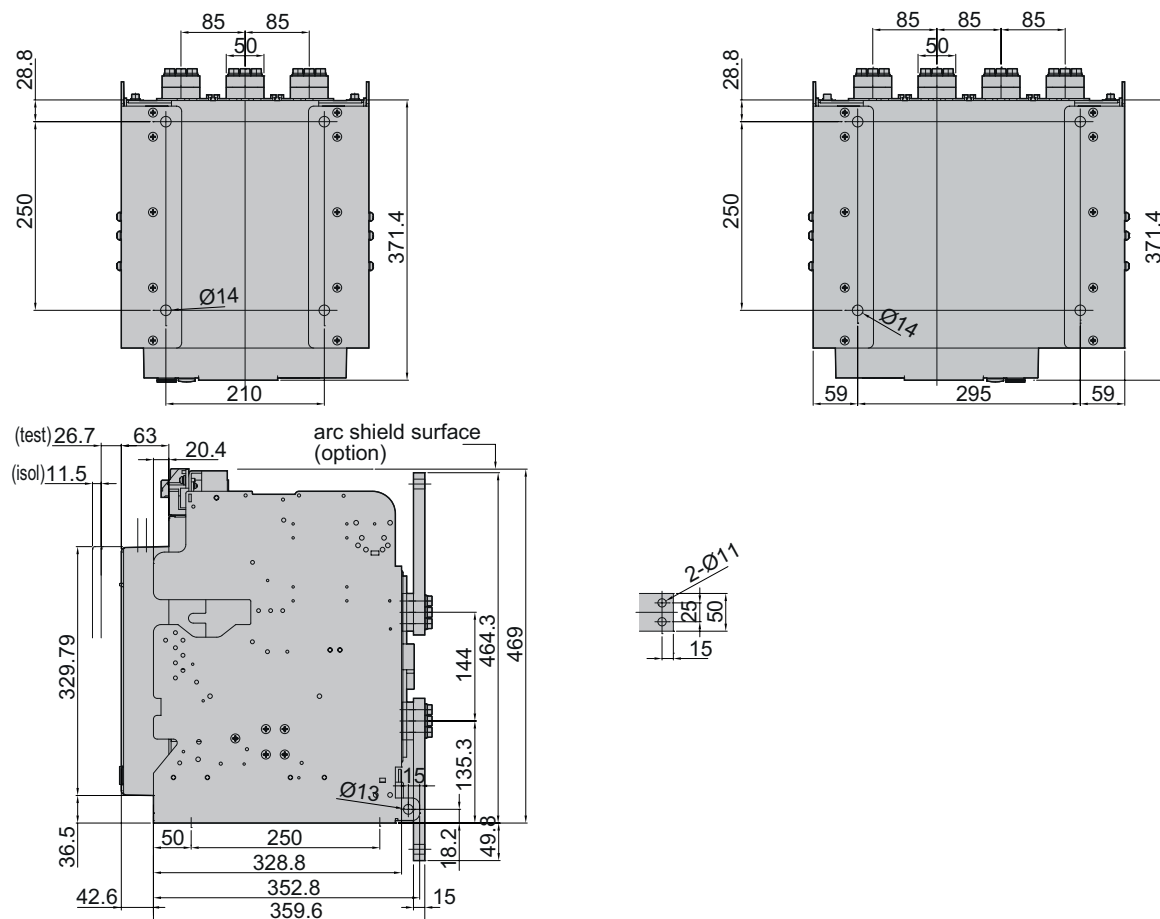
A frame 2,000A of ACB HW is applicable vertical terminal only.

Horizontal terminal connection (mm)

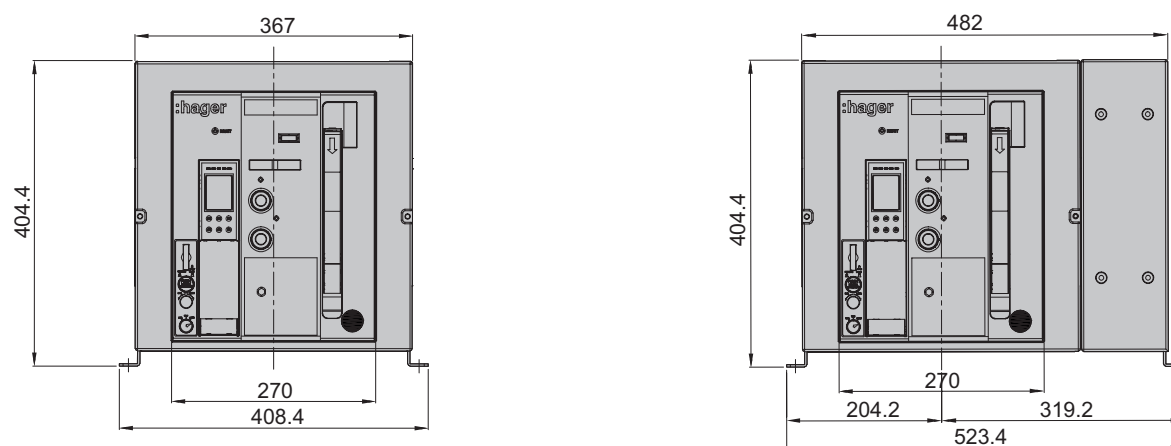


Front terminal connection (mm)

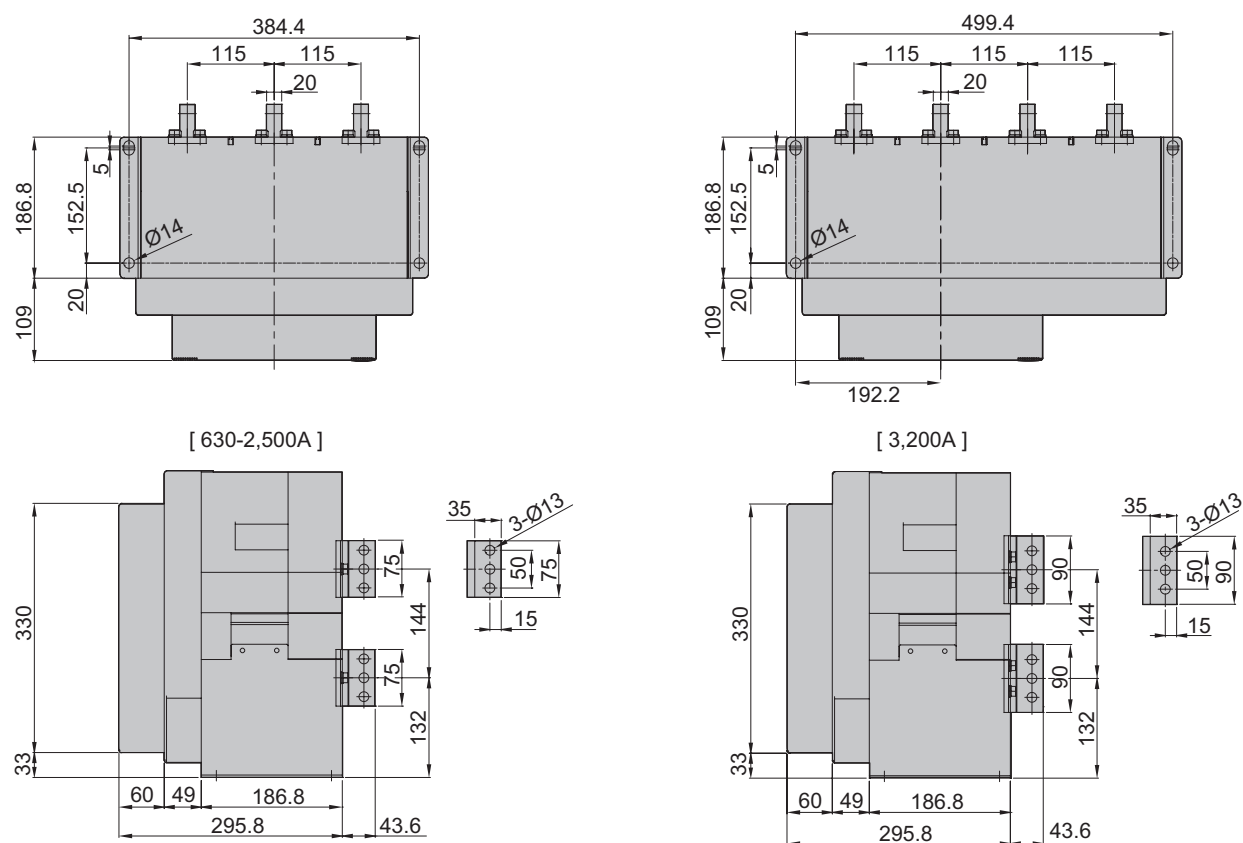
[630-1600A]



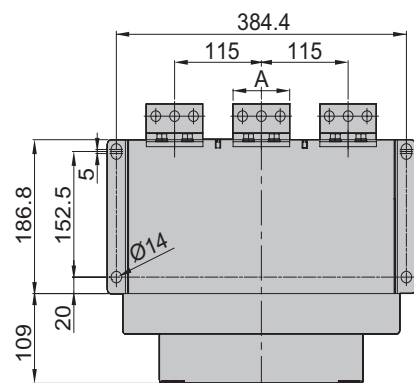
Front view (mm)



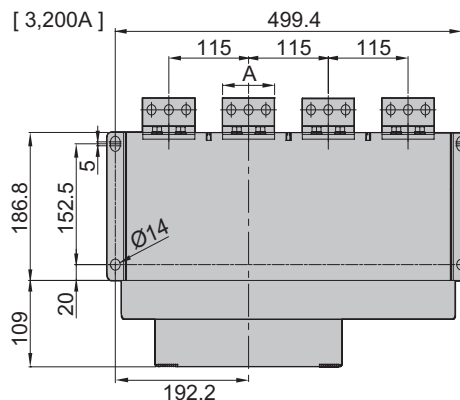
Vertical terminal connection (mm)



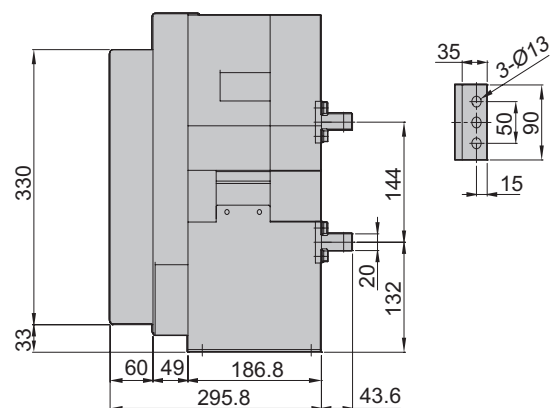
Horizontal terminal connection (mm)



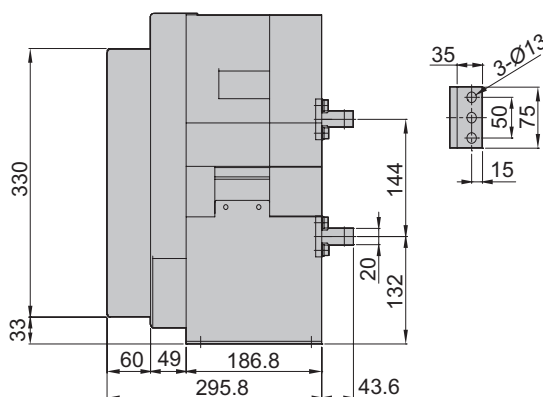
Range	A (mm)
630 - 2500A	75
3200A	90



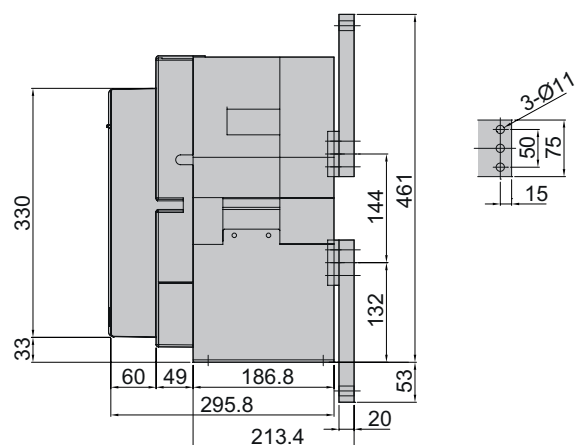
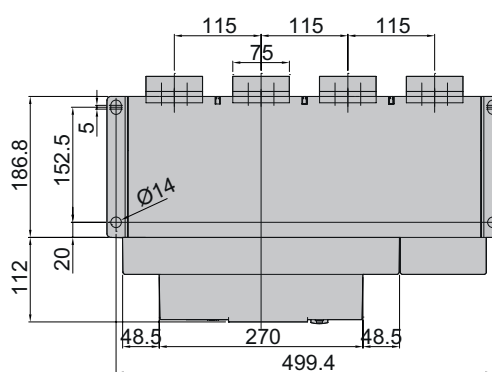
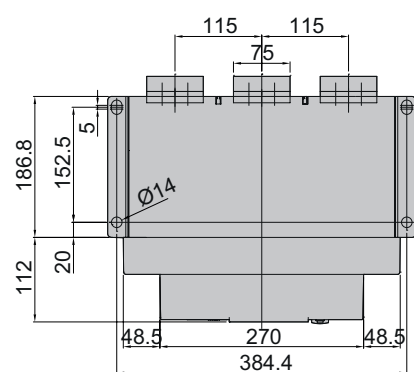
[3,200A]

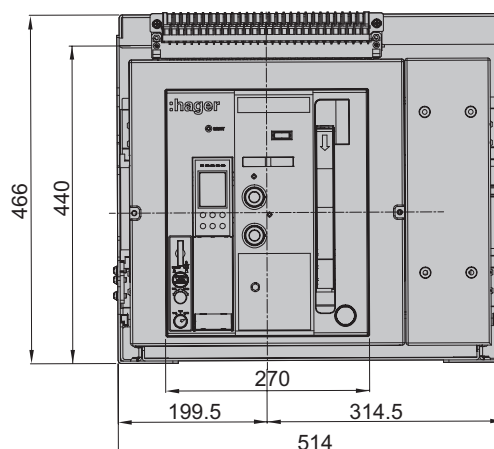


[630~2,500A]

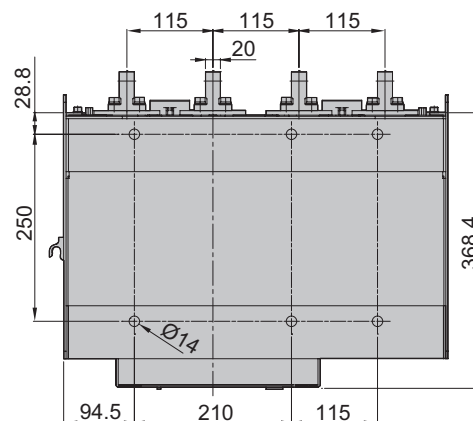


Front terminal connection (mm) [630-3200A]





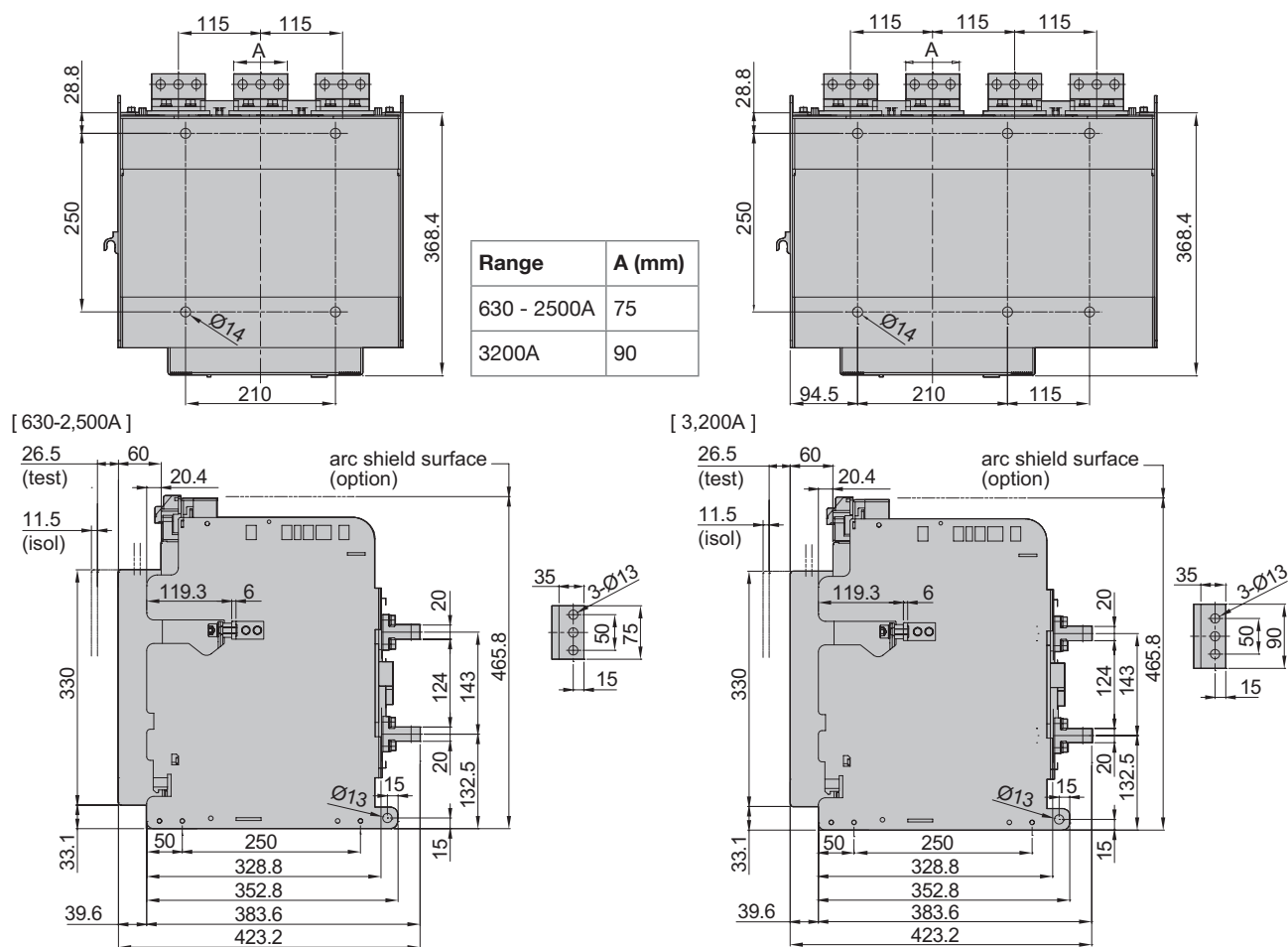
Technical drawing of the front view of a transformer. The drawing shows a rectangular core with four windings on top. Dimensions are given in millimeters: total width 210, total height 368.4, and core height 250. The distance between the centers of the windings is 115, and the width of each winding is 20. A hole with diameter $\varnothing 14$ is located at the bottom left corner of the core.



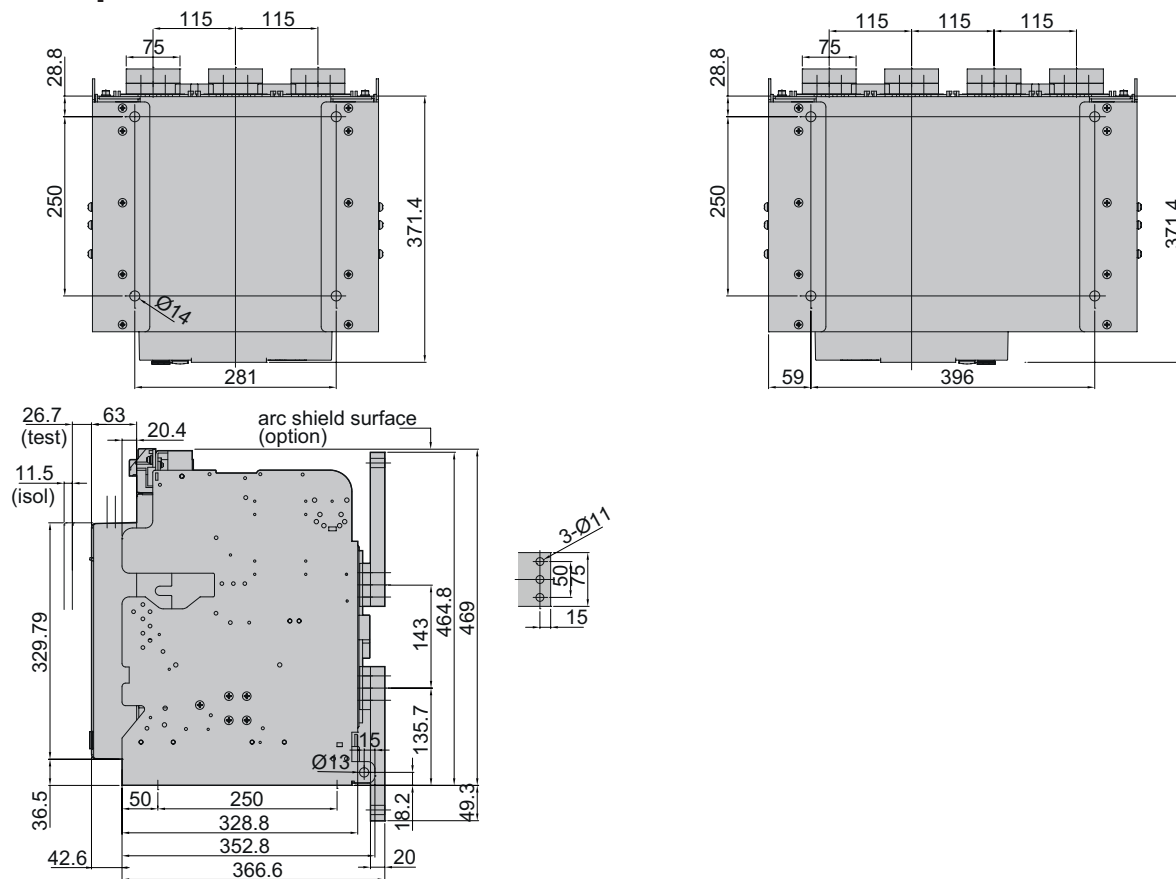
Technical drawing of the front view of the 1000 Series Power Supply Unit. The drawing shows a rectangular unit with various mounting features. Key dimensions include a total width of 465.8 mm, a total height of 330 mm, and a mounting hole pitch of 11.5 mm (isolated) and 26.5 mm (test). The front panel has a 20.4 mm wide top section and a 6 mm wide bottom section. The mounting holes are 15 mm in diameter. The drawing also shows a side view of the mounting holes, indicating a 3xØ13 hole pattern with a 35 mm spacing and a 15 mm offset.

[illegible]

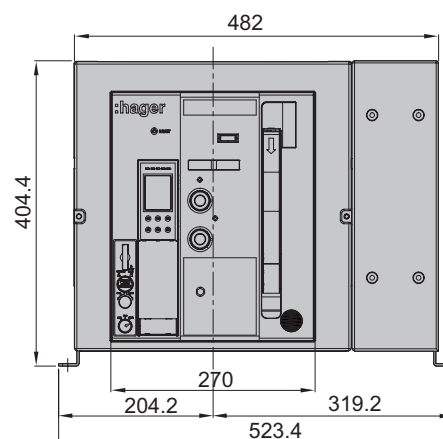
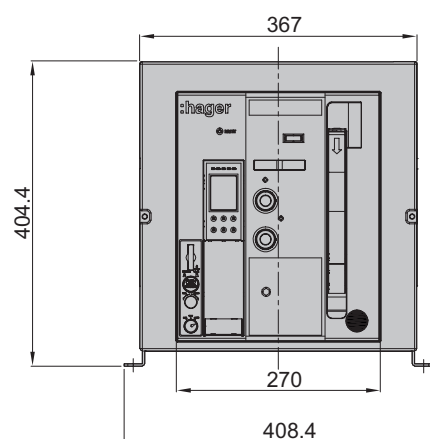
Horizontal terminal connection (mm)



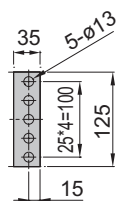
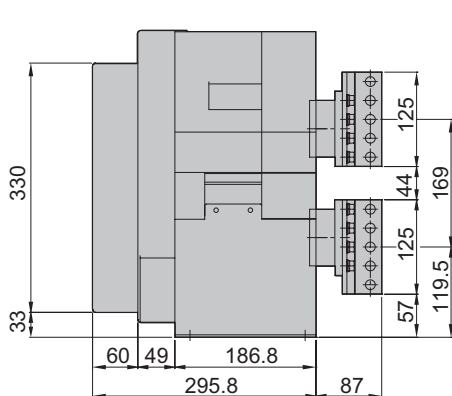
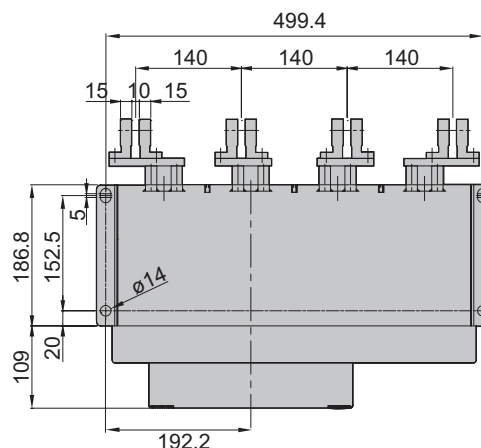
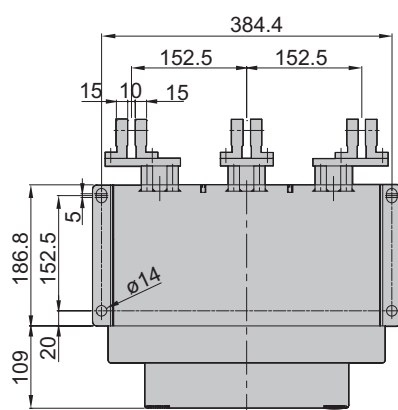
Front terminal connection (mm) [630-3200A]



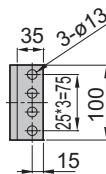
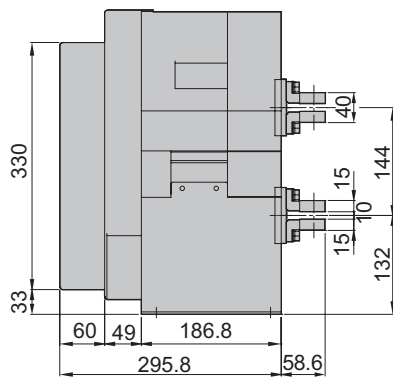
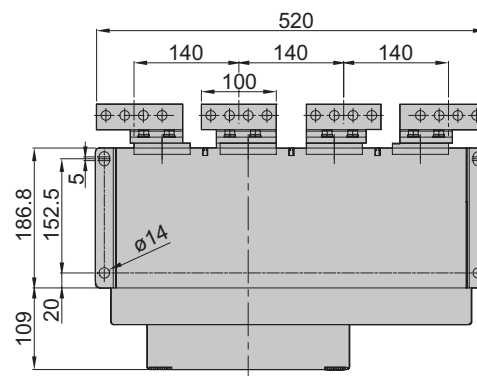
Front view (mm)

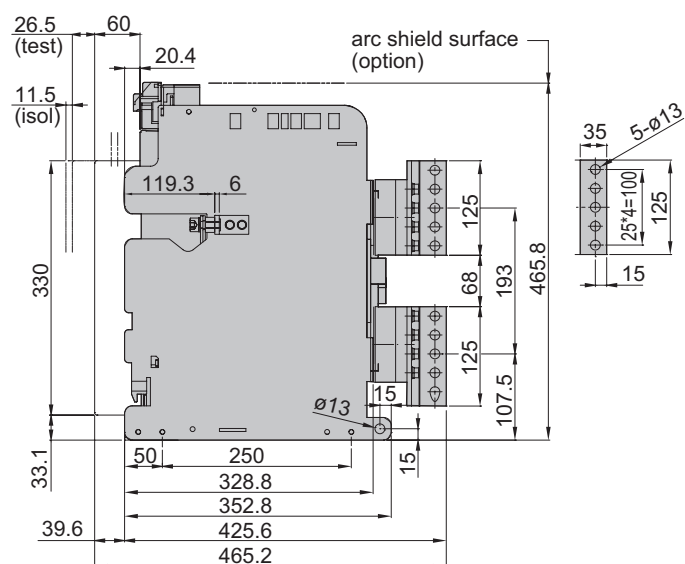
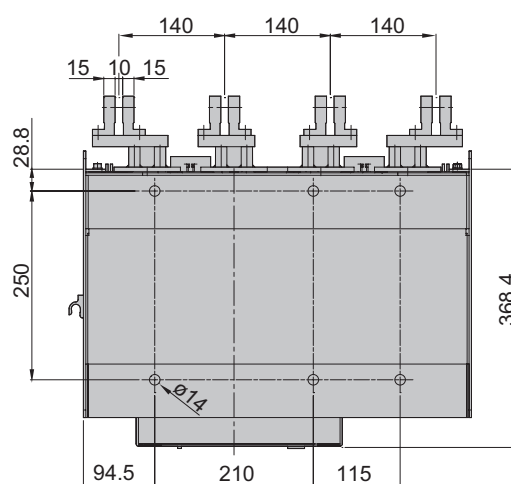
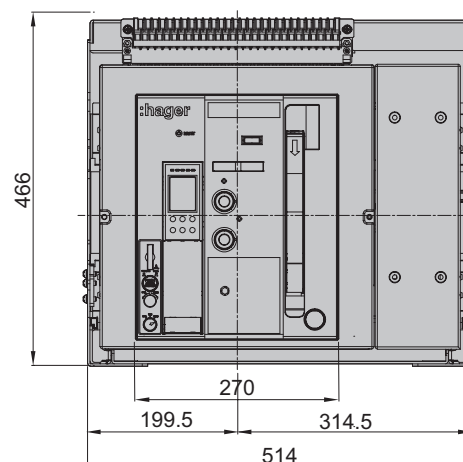


Vertical terminal connection (mm)

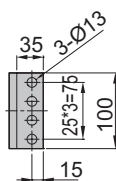
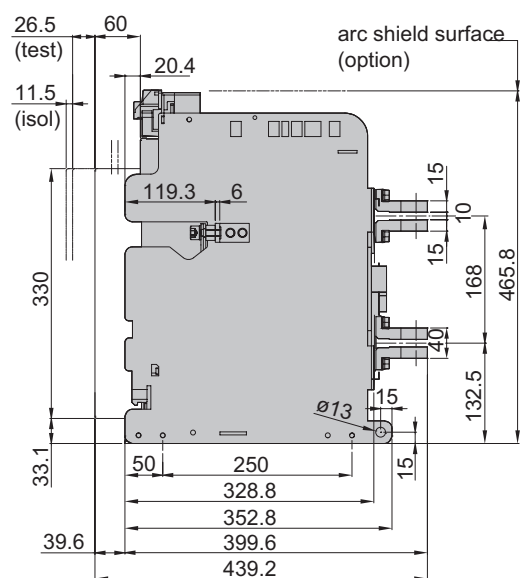
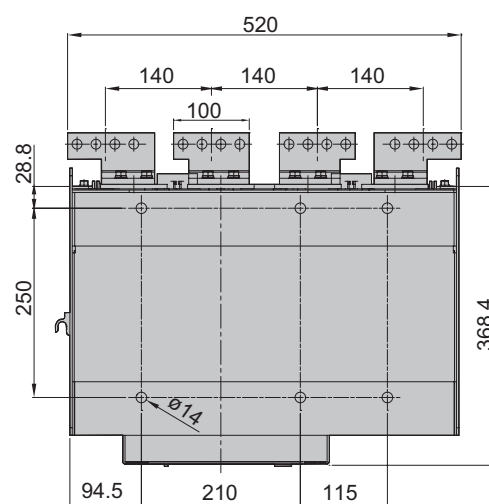
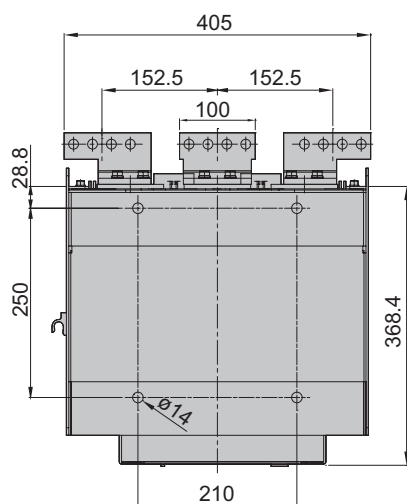


Technical drawing of a mechanical component, likely a pump housing, showing dimensions and a cross-section. The drawing includes a top view and a side view. The top view shows a rectangular base with a central circular feature and two side ports. The side view shows the profile of the component with a central vertical section. Dimensions are provided in millimeters: overall width 405, distance between side ports 152.5, distance between central ports 100, overall height 186.8, distance from base to side port center 152.5, distance from base to central port center 109, and a central vertical section width of 20. A cross-section is indicated by a dashed line and a dimension of 14.

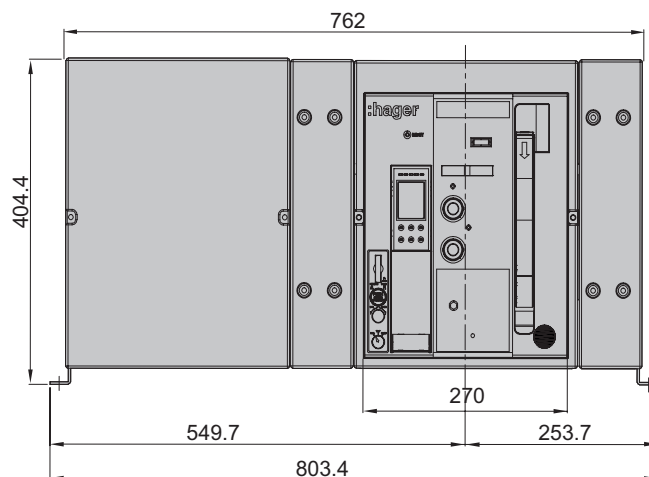
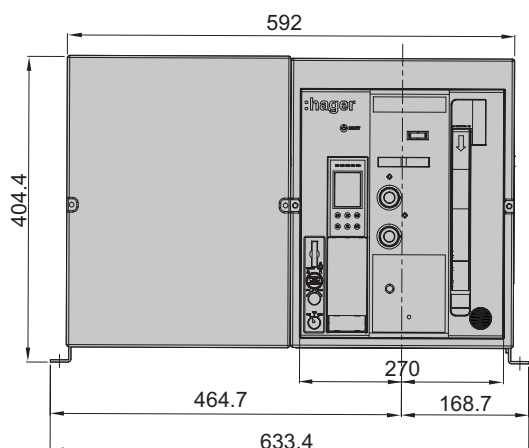


[illegible]

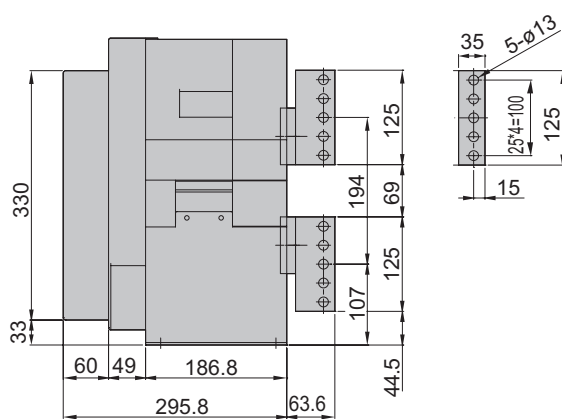
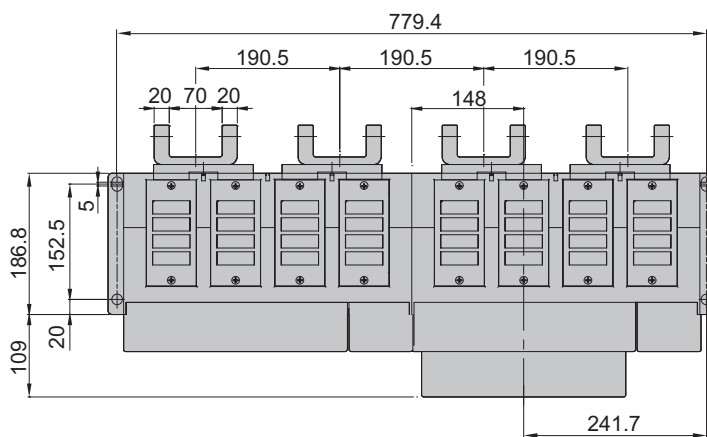
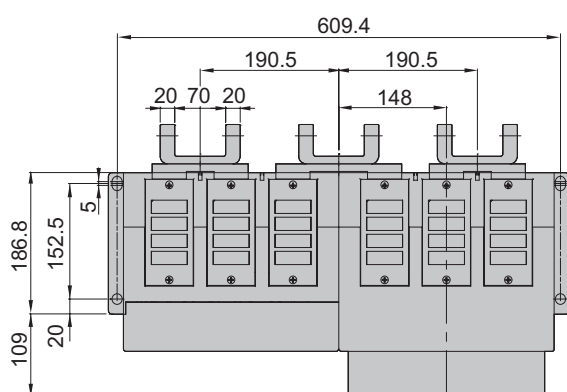
Horizontal terminal connection (mm)



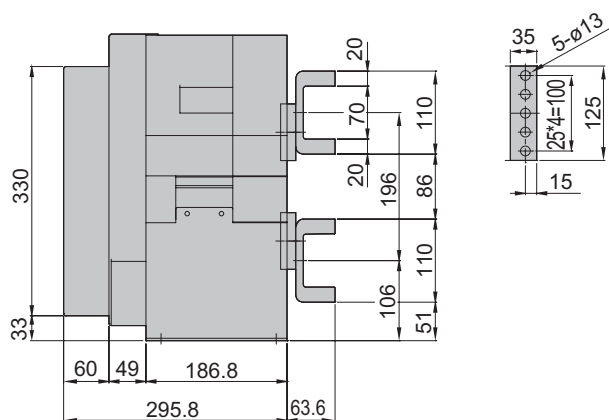
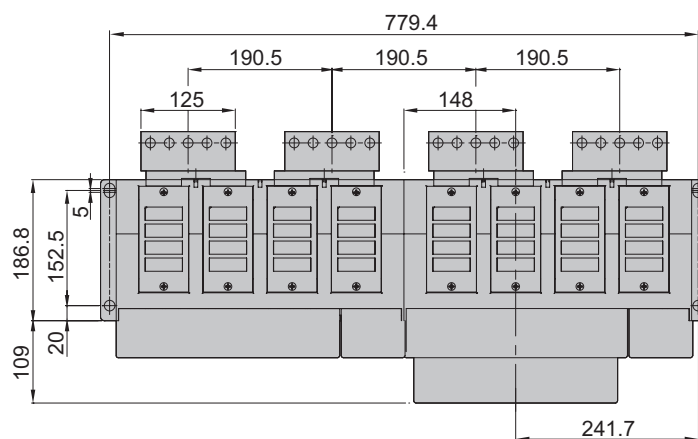
Front view (mm)



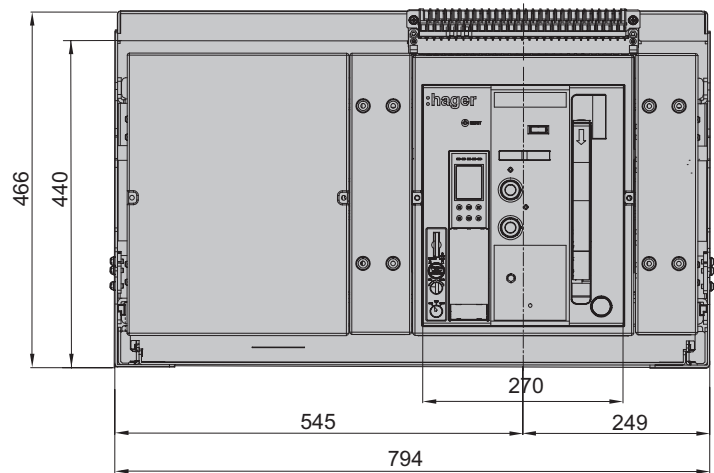
Vertical terminal connection (mm)



Technical drawing of a 609.4mm wide assembly. The drawing shows a symmetrical structure with a central vertical line. The total width is 609.4mm. The distance from the center line to the center of the first vertical slot on each side is 190.5mm. The distance between the centers of the first and second vertical slots on each side is 148mm. The total width of the first two slots on each side is 190.5mm. The height of the assembly is 186.8mm. The distance from the bottom edge to the center of the first horizontal slot is 152.5mm. The distance from the bottom edge to the center of the second horizontal slot is 20mm. The distance from the bottom edge to the center of the third horizontal slot is 5mm. The drawing includes a scale bar at the bottom left indicating 0, 20, and 109mm.

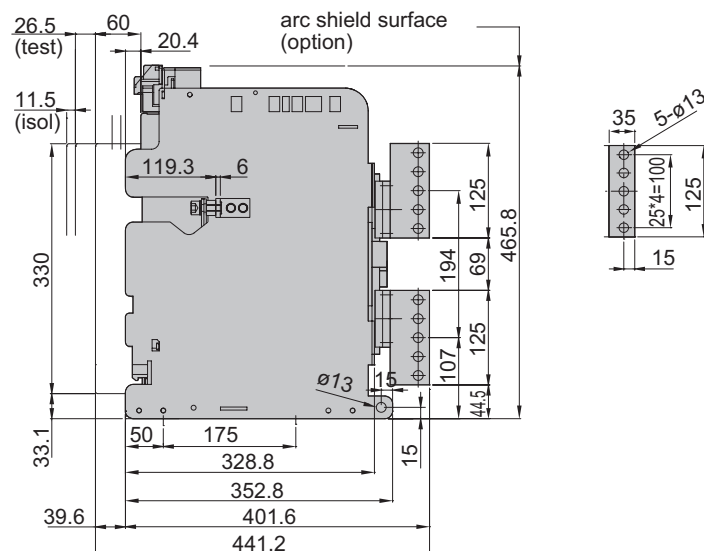
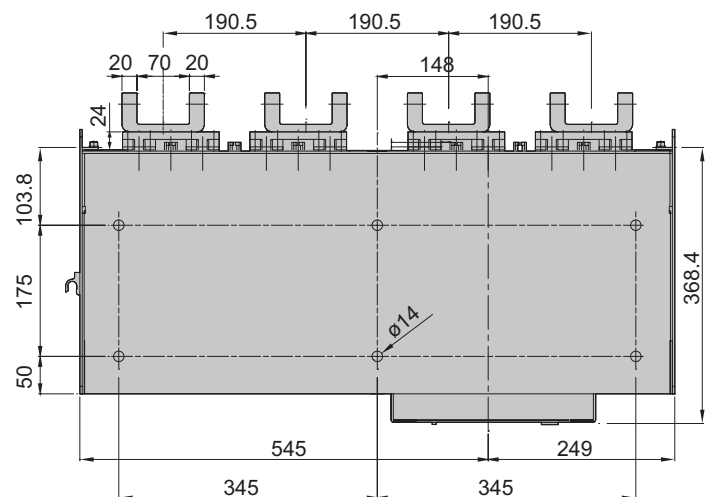


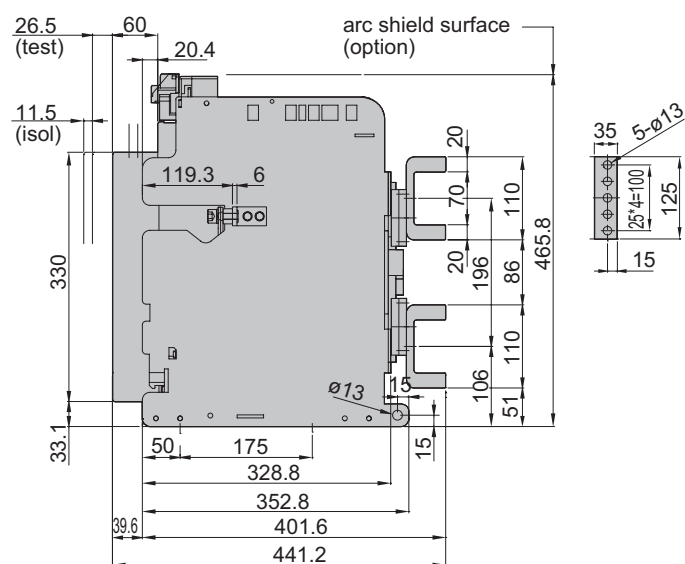
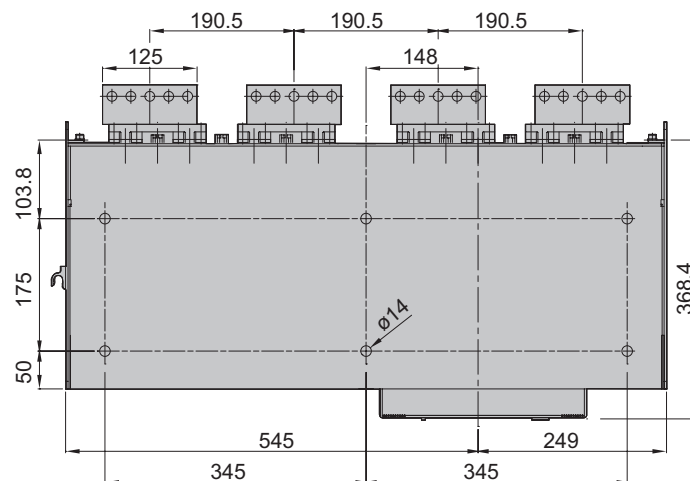
Technical drawing of the front view of the Hager HPM 1000-2000. The drawing shows a large, rectangular unit with a control panel on the right side. The control panel includes a digital display, several buttons, and two large circular components. The unit is mounted on a wall, and the drawing includes dimensions: a total width of 624, a main body width of 460, and a control panel width of 164. The height is 440, with a total height of 466 including the mounting bracket.



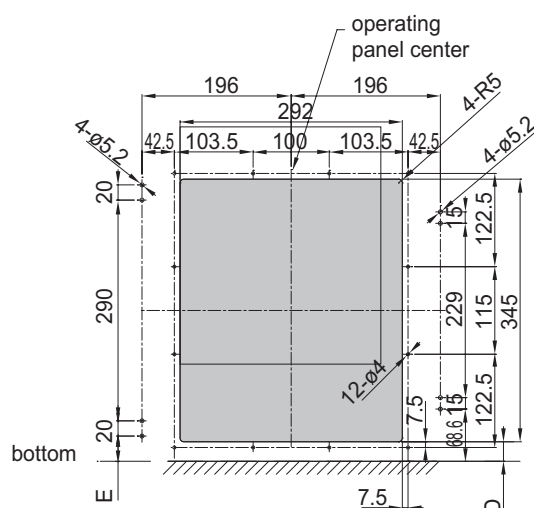
Technical drawing of a rectangular plate with the following dimensions and features:

- Overall width: 460
- Overall height: 368.4
- Top edge features:
 - Three U-shaped components (possibly for lifting or mounting) are positioned along the top edge.
 - Dimensions for the top edge: 190.5 (between the first and second U-shape), 190.5 (between the second and third U-shape), 148 (between the first and third U-shape).
 - Dimensions for the U-shapes: 20 (width of each U-shape), 70 (distance between the first two U-shapes), 20 (width of the third U-shape).
- Left edge features:
 - Dimensions: 103.8 (top section), 175 (middle section), 50 (bottom section).
- Bottom edge features:
 - Dimensions: 260 (left section), 260 (right section), 164 (bottom right corner).
- Internal features:
 - A central hole with a diameter of $\varnothing 14$ is indicated.
 - Four small circular holes are located at the corners of the plate.

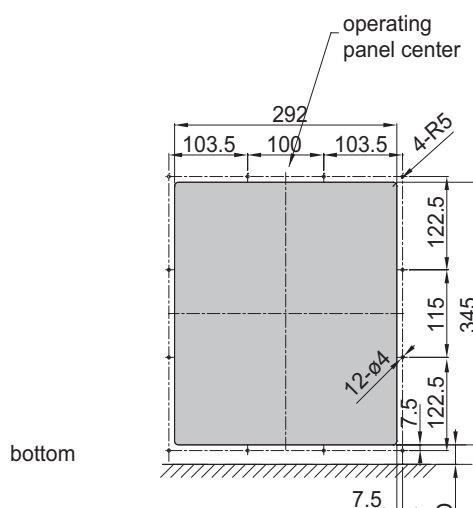


[illegible]

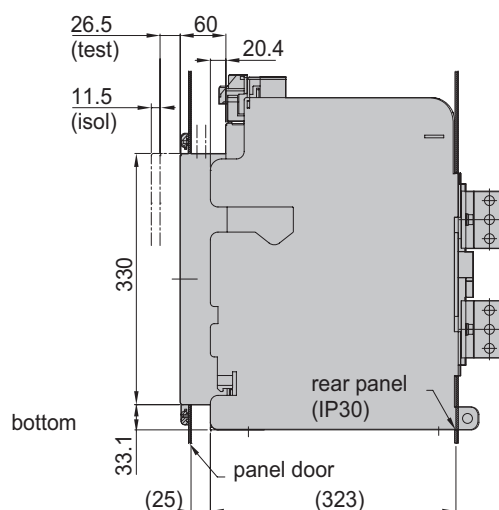
Panel door cut-out for dust cover (mm)



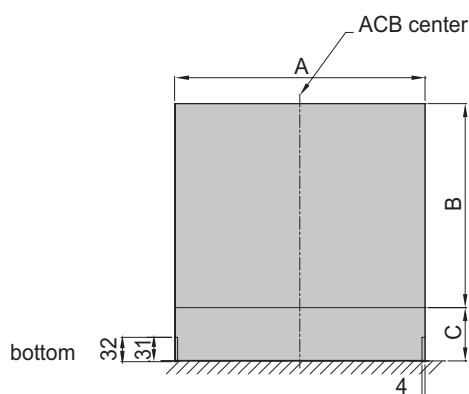
Panel door cut-out for door flange (mm)



Side view (mm)



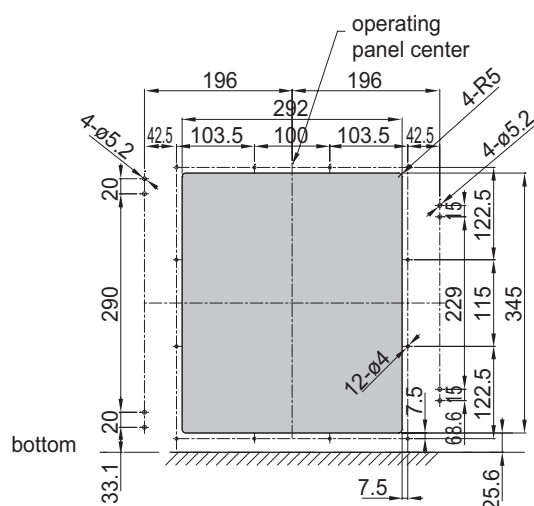
Rear panel cutting size (mm)



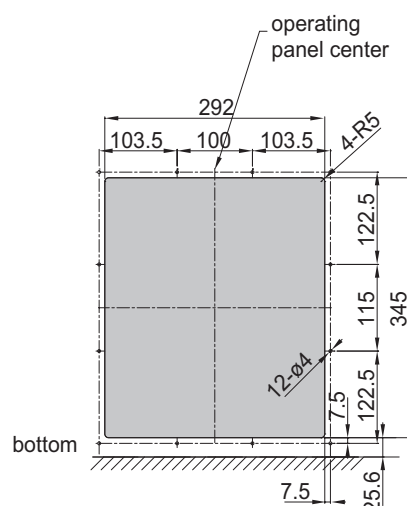
Rear panel cutting size (mm)

Model	A	B	C	D	E
frame A, 3 pole	329	268	70	28.7	36.5
frame A, 4 pole	414	268	70	28.7	36.5
frame B, 3 pole	400	298	55	28.7	36.5
frame B, 4 pole	515	298	55	28.7	36.5
frame C, 3 pole	625	338	35	48.7	56.5
frame C, 4 pole	795	338	35	48.7	56.5

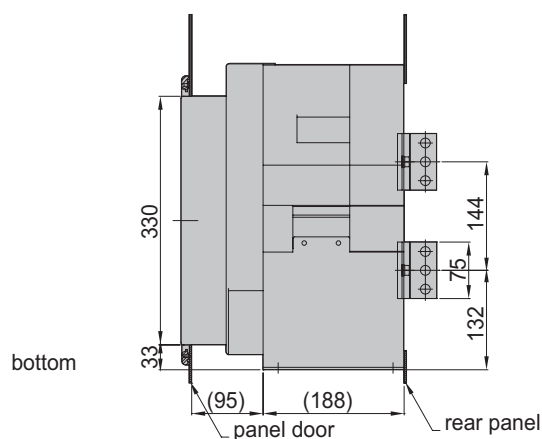
Panel door cut-out for dust cover (mm)



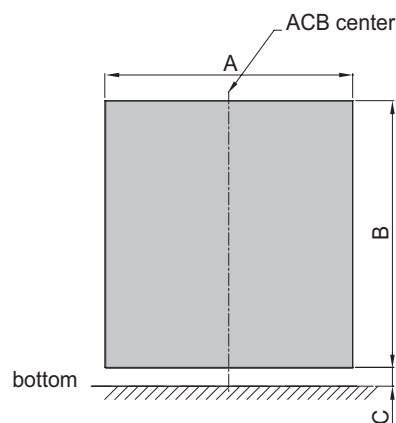
Panel door cut-out for door flange (mm)



Side view (mm)



Rear panel cutting size (mm)



Rear panel cutting size (mm)

Model	A	B	C
frame A, 3 pole	283	355	25
frame A, 4 pole	368	355	25
frame B, 3 pole	354	355	25
frame B, 4 pole	469	355	25
frame C, 3 pole	579	355	25
frame C, 4 pole	749	355	25

Internal resistance and power consumption

Model type	Rated current (A)	Fixed type		Draw-out type	
		Internal resistance (mΩ)	Power consumption (W/3Phase)	Internal resistance (mΩ)	Power consumption (W/3Phase)
frame A	630	15	18	30	36
	800	15	29	30	58
	1000	15	45	30	90
	1250	15	70	30	141
	1600	15	115	30	230
	2000	13	156	27	324
frame B	2000	10	120	20	240
	2500	10	188	20	375
	3200	10	307	20	614
	4000	8	384	11	528
frame C	4000	8	384	11	528
	5000	8	600	11	825

1) Power consumption listed is maximum power consumption for each rated current, 50/60Hz, 3/4 pole.

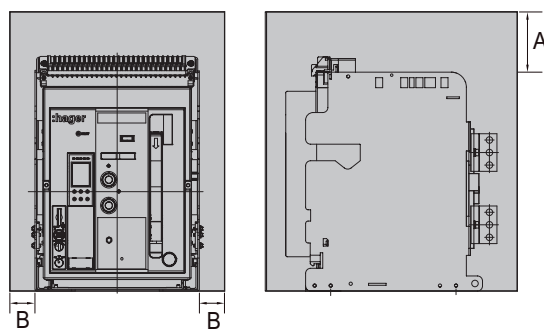
2) This is inner resistance value per pole.

3) Power factor = 1.0

Insulation distance

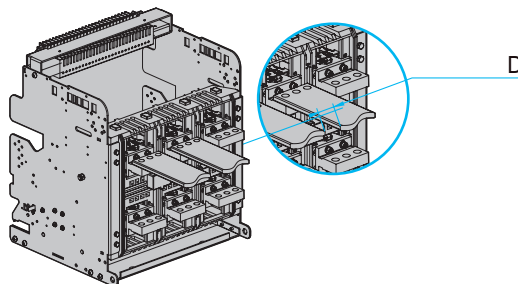
- Insulation distance from arc (in mm)

ACB		A	B
Fixed type		150 (415V) 300 (690V)	60
Draw-out type	without arc shield	150 (415V) 300 (690V)	60
	with arc shield	0	60



- Minimum insulation distance at charging side (in mm)

Insulating voltage	D
(V) ≤ 600 V	8
600 V < (V) ≤ 1000 V	14



Rectification of rated current

Frame	Rated current	Terminal connection of ACB body	Applicable busbar size										
				horizontal type					vertical type				
				40°C	45°C	50°C	55°C	60°C	40°C	45°C	50°C	55°C	60°C
frame A	630A	15t × 50mm × 1EA	5t × 50mm × 2EA	630A	630A	630A	630A	630A	630A	630A	630A	630A	630A
			10t × 60mm × 1EA										
	800A		6t × 50mm×2EA	800A	800A	800A	800A	800A	800A	800A	800A	800A	800A
			10t × 60mm × 1EA										
	1000A		8t × 50mm × 2EA	1000A	1000A	1000A	1000A	1000A	1000A	1000A	1000A	1000A	1000A
			6t × 75mm × 2EA	-	-	-	-	-					
	1250A		8t × 60mm × 2EA	1250A	1250A	1250A	1250A	1250A	1250A	1250A	1250A	1250A	1250A
			10t × 50mm × 2EA										
			6t × 75mm × 3EA	-	-	-	-	-					
1600A	10t × 60mm × 3EA	1600A	1600A	1520A	1480A	1420A	1600A	1600A	1600A	1550A	1550A		
	8t × 60mm × 3EA												
frame A	2000A	20t × 75mm × 1EA	8t × 75mm × 3EA	-	-	-	-	-	2000A	2000A	2000A	1860A	1860A
			10t × 100mm × 2EA										
frame B	630A	20t × 75mm × 1EA	5t × 50mm × 2EA	630A	630A	630A	630A	630A	630A	630A	630A	630A	630A
			10t × 60mm × 1EA										
	800A		6t × 50mm × 2EA	800A	800A	800A	800A	800A	800A	800A	800A	800A	800A
			10t × 60mm × 1EA										
	1000A		8t × 50mm × 2EA	1000A	1000A	1000A	1000A	1000A	1000A	1000A	1000A	1000A	1000A
			6t × 75mm × 2EA	-	-	-	-	-					
	1250A		8t × 60mm × 2EA	1250A	1250A	1250A	1250A	1250A	1250A	1250A	1250A	1250A	1250A
			10t × 50mm × 2EA										
			6t × 75mm × 3EA	-	-	-	-	-					
	1600A		10t × 60mm × 3EA	1600A	1600A	1600A	1600A	1600A	1600A	1600A	1600A	1600A	1600A
			8t × 60mm × 3EA										
2000A	8t × 75mm × 3EA	2000A	2000A	2000A	2000A	2000A	2000A	2000A	2000A	2000A	2000A	2000A	
	10t × 100mm × 2EA	-	-	-	-	-							
2500A	10t × 75mm × 3EA	2500A	2500A	2500A	2400A	2300A	2500A	2500A	2500A	2500A	2500A	2500A	
	8t × 75mm × 4EA												
frame B	3200A	20t × 90mm × 1EA	10t × 100mm × 3EA	-	-	-	-	-	3200A	3200A	3200A	3050A	3050A
			10t × 75mm × 4EA	3200A	3200A	3100A	3000A	2900A					
frame B	4000A horizontal	15t × 100mm × 2EA	10t × 100mm × 4EA	4000A	4000A	3900A	3800A	3640A	-	-	-	-	-
			10t × 125mm × 3EA										
	4000A vertical	15t × 125mm × 2EA	10t × 100mm × 4EA	-	-	-	-	-	4000A	4000A	4000A	3800A	3800A
			10t × 125mm × 3EA										
frame C	3200A	20t × 125mm × 2EA	10t × 100mm × 3EA	3200A	3200A	3100A	3000A	2900A	3200A	3200A	3200A	3000A	3000A
	4000A		10t × 100mm × 4EA	4000A	4000A	3920A	3860A	3800A	4000A	4000A	4000A	3900A	3900A
	5000A		10t × 125mm × 4EA	5000A	5000A	4900A	4800A	4700A	5000A	5000A	5000A	4900A	4900A

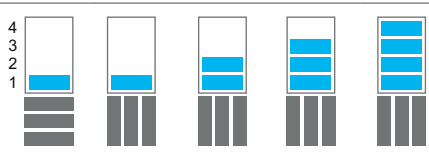
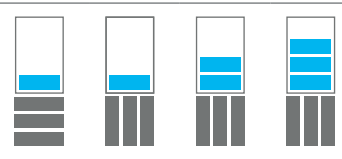
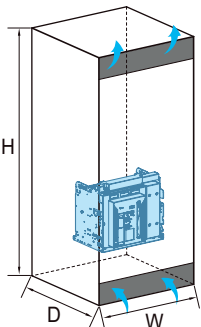
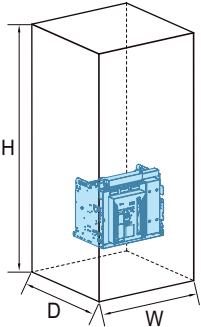
t= thickness (mm) EA=number of parts

Altitude

ACB HW is designed for operation at altitudes under 2000m. At altitudes higher than 2000m, change the ratings upon service condition.

Altitude	2000m	3000m	4000m	5000m
withstand voltage (V)	3500	3150	2500	2100
average insulating voltage (V)	1000	900	700	600
max. operation voltage (V)	690	590	520	460
rectificated rated current (A)	1×In	0.99×In	0.96×In	0.94×In

Derating table

Switchboard composition connection type													
Model type		Frame A					Frame A						
Rated current ²⁾		630 - 800A					1000A						
Busbar dimensions (mm) ³⁾		2EA x 50 x 6					2EA x 50 x 6						
ventilated switchboard (IP31) ⁴⁾ 	Ta ¹⁾ = 35°C	4					800 ↓						
		3					800 ↓	800 ↓				1000 ↓	
		2				800 ↓	800 ↓	800 ↓				1000 ↓	1000 ↓
		1	800 ↓	800 ↓	800 ↓	800 ↓	800 ↓		1000 ↓	1000 ↓	1000 ↓	1000 ↓	
	Ta = 45°C	4						800 ↓					
		3						800 ↓	800 ↓				1000 ↓
		2				800 ↓	800 ↓	800 ↓				1000 ↓	1000 ↓
		1	800 ↓	800 ↓	800 ↓	800 ↓	800 ↓	1000 ↓	1000 ↓	1000 ↓	1000 ↓	1000 ↓	
	Ta = 55°C	4						800 ↓					
		3						800 ↓	800 ↓				1000 ↓
		2				800 ↓	800 ↓	800 ↓				1000 ↓	1000 ↓
		1	800 ↓	800 ↓	800 ↓	800 ↓	800 ↓	1000 ↓	1000 ↓	1000 ↓	1000 ↓	1000 ↓	
non-ventilated switchboard (IP52) ⁵⁾ 	Ta = 35°C	4					800 ↓						
		3					800 ↓	800 ↓				1000 ↓	
		2				800 ↓	800 ↓	800 ↓				1000 ↓	1000 ↓
		1	800 ↓	800 ↓	800 ↓	800 ↓	800 ↓	1000 ↓	1000 ↓	1000 ↓	1000 ↓	1000 ↓	
	Ta = 45°C	4						800 ↓					
		3						800 ↓	800 ↓				1000 ↓
		2				800 ↓	800 ↓	800 ↓				1000 ↓	1000 ↓
		1	800 ↓	800 ↓	800 ↓	800 ↓	800 ↓	1000 ↓	1000 ↓	1000 ↓	1000 ↓	1000 ↓	
	Ta = 55°C	4						800 ↓					
		3						800 ↓	800 ↓				1000 ↓
		2				800 ↓	800 ↓	800 ↓				1000 ↓	1000 ↓
		1	800 ↓	800 ↓	800 ↓	800 ↓	800 ↓	1000 ↓	1000 ↓	1000 ↓	1000 ↓	1000 ↓	
Panel dimensions (mm) : W x H x D		800 x 2300 x 900											
Area of outlet vents (IP31)		350 cm ³											
Area of inlet vents (IP31)		350 cm ³											

1) Ta refers to atmospheric temperature outside of panel (IEC 61439-1).

2) Rated current observes temperature condition on test according to IEC60947-1,2. When installed inside the panel, derating of additional current and using indicated busbar dimension is required.

3) Busbar dimension is manufacturer recommendation. Smaller busbar requires additional derating.

4) Ventilation should be designed to drop the temperature of switchboard inside the panel.

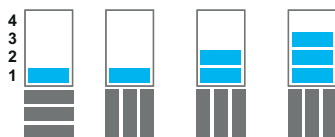
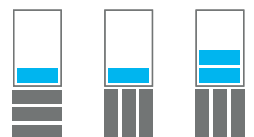
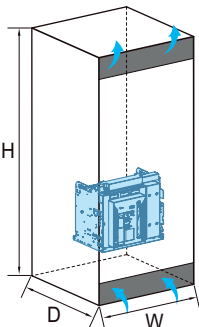
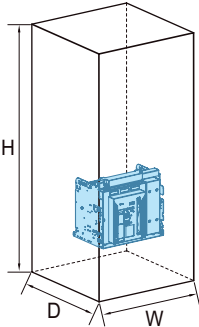
5) For non-ventilated switchboard, additional forced ventilation should be added to drop the temperature inside the panel.

 : number of ACB's

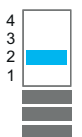
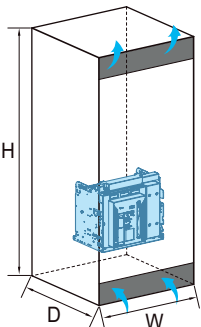
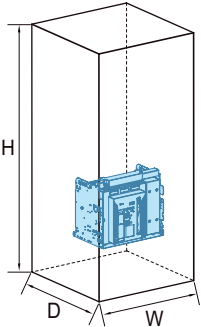
Type of connection:

 : horizontal
 : vertical

Derating table

Switchboard composition connection type											
Model type			Frame A				Frame A			Frame A	
Rated current ²⁾			1250A				1600A			2000A	
Busbar dimensions (mm) ³⁾			2EA x 78 x 8				3EA x 75 x 8			2EA x 100 x 10	
ventilated switchboard (IP31) ⁴⁾ 	Ta ¹⁾ = 35°C	4									
		3				1250 ↓					2000 ↓
		2			1250 ↓	1250 ↓			1600 ↓	2000 ↓	2000 ↓
		1	1250 ↓	1250 ↓	1250 ↓	1250 ↓	1600 ↓	1600 ↓	1600 ↓		
	Ta = 45°C	4									
		3				1250 ↓					1900 ↓
		2			1250 ↓	1250 ↓			1600 ↓	2000 ↓	2000 ↓
		1	1250 ↓	1250 ↓	1250 ↓	1250 ↓	1600 ↓	1600 ↓	1600 ↓		
	Ta = 55°C	4									
		3				1250 ↓					1800 ↓
		2			1250 ↓	1250 ↓			1470 ↓	1900 ↓	1900 ↓
		1	1250 ↓	1250 ↓	1250 ↓	1250 ↓	1520 ↓	1600 ↓	1600 ↓		
non-ventilated switchboard (IP52) ⁵⁾ 	Ta = 35°C	4									
		3				1250 ↓					1750 ↓
		2			1250 ↓	1250 ↓			1600 ↓	1850 ↓	1850 ↓
		1	1250 ↓	1250 ↓	1250 ↓	1250 ↓	1600 ↓	1600 ↓	1600 ↓		
	Ta = 45°C	4									
		3				1250 ↓				1750 ↓	1650 ↓
		2			1250 ↓	1250 ↓			1500 ↓		1750 ↓
		1	1250 ↓	1250 ↓	1250 ↓	1250 ↓	1500 ↓	1600 ↓	1600 ↓		
	Ta = 55°C	4									
		3				1250 ↓				1650 ↓	1550 ↓
		2			1250 ↓	1250 ↓			1400 ↓		1650 ↓
		1	1250 ↓	1250 ↓	1250 ↓	1250 ↓	1400 ↓	1520 ↓	1520 ↓		
Panel dimensions (mm) : W x H x D			800 x 2300 x 900								
Area of outlet vents (IP31)			350 cm ³								
Area of inlet vents (IP31)			350 cm ³								

Derating table

Switchboard composition connection type																										
Model type			Frame B			Frame B			Frame B			Frame B			Frame B			Frame B			Frame B					
Rated current ²⁾			2000A			2500A			3200A			4000A			2000A			2500A			3200A					
Busbar dimensions (mm) ³⁾			2EA x 100 x 10			3EA x 100 x 10			2EA x 125 x 10			4EA x 125 x 10			2EA x 100 x 10			3EA x 100 x 10			2EA x 125 x 10					
ventilated switchboard (IP31) ⁴⁾ 			Ta ¹⁾ = 35°C	4																						
				3			2000 ↓																			
				2	2000 ↓	2000 ↓	2000 ↓	2375	2500	3040	3200	3320	3700													
				1																						
			Ta = 45°C	4																						
				3			2000 ↓																			
				2	2000 ↓	2000 ↓	2000 ↓	2250	2380	2880	3100	3160	3500													
				1																						
			Ta = 55°C	4																						
				3			2000 ↓																			
				2	2000 ↓	2000 ↓	2000 ↓	2100	2250	2690	2900	2960	3280													
				1																						
non-ventilated switchboard (IP52) ⁵⁾ 			Ta = 35°C	4																						
				3			2000 ↓																			
				2	2000 ↓	2000 ↓	2000 ↓	2125	2275	2650	2850	3040	3320													
				1																						
			Ta = 45°C	4																						
				3			1900 ↓																			
				2	1960 ↓	1960 ↓	1960 ↓	2000	2150	2550	2700	2880	3120													
				1																						
			Ta = 55°C	4																						
				3			1780 ↓																			
				2	1800 ↓	1920 ↓	1920 ↓	1900	2020	2370	2530	2720	2960													
				1																						
Panel dimensions (mm) : W x H x D			800 x 2300 x 900																							
Area of outlet vents (IP31)			350 cm ³																							
Area of inlet vents (IP31)			350 cm ³																							

1) Ta refers to atmospheric temperature outside of panel (IEC 61439-1).

2) Rated current observes temperature condition on test according to IEC60947-1,2. When installed inside the panel, derating of additional current and using indicated busbar dimension is required.

3) Busbar dimension is manufacturer recommendation. Smaller busbar requires additional derating.

4) Ventilation should be designed to drop the temperature of switchboard inside the panel.

5) For non-ventilated switchboard, additional forced ventilation should be added to drop the temperature inside the panel.

 : number of ACB's

Type of connection:

 : horizontal

 : vertical

Derating table

Switchboard composition connection type						
Model type		Frame C				
Rated current ²⁾		4000A				
Busbar dimensions (mm) ³⁾		4EA x 125 x 10				
ventilated switchboard (IP31) ⁴⁾	Ta ¹⁾ = 35°C	4				
		3				
		2	3900	4000	4550	4850
		1				
	Ta = 45°C	4				
		3				
		2	3850	3900	4350	4650
		1				
	Ta = 55°C	4				
		3				
		2	3800	3850	4100	4400
		1				
non-ventilated switchboard (IP52) ⁵⁾	Ta = 35°C	4				
		3				
		2	3800	3900	4200	4500
		1				
	Ta = 45°C	4				
		3				
		2	3650	3800	3950	4250
		1				
	Ta = 55°C	4				
		3				
		2	3550	3650	3750	4050
		1				
Panel dimensions (mm) : W x H x D		1000 x 2300 x 900				
Area of outlet vents (IP31)		500 cm ³				
Area of inlet vents (IP31)		500 cm ³				

		OCR: LI, LSI, LSIG,LI Amp, LSI Amp, LSIG Amp, LSIG Energy I _R , t _R of the ACB > I _R , t _R of the MCCB / I _{sd} , t _{sd} of the ACB > I _{sd} , t _{sd} of the MCCB / I _i = 16xI _n , NON,MCR ON																					
	I _{cc} (kA)	Upstream	Frame A, type HWAH max. rated current 2000A I _{cu} = I _{cs} = 50kA at 415V							Frame A, type HWAN max. rated current 2000A I _{cu} = I _{cs} = 65kA at 415V							Frame B, type HWBN max. rated current 4000A I _{cu} = I _{cs} = 65kA at 415V						
	Downstream	(A)	630	800	1000	1250	1600	2000	630	800	1000	1250	1600	2000	630	800	1000	1250	1600	2000			
HDA HHA HNA	x160 TM 18/25/40kA	16	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		20	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		25	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		32	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		40	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		50	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		63	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		80	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		100	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		125	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		160	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
HHB HNB	x250 TM 25/40kA	100	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		125	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		160	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		200	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
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HHG HNG HEG	h250 TM 25/50/65kA	20	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		32	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		50	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		63	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		100	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		125	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		160	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		200	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
250	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T					
HNN HEH	h250 TM+ 50/70kA	20	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		32	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		50	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		63	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		100	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		125	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		160	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		250	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
HNC HEC	h250 LSI 50/70kA	40	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		125	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		250	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
HND HND HKD	h400 TM 25/50/70kA	250	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		300	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		350	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		400	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
HND HED	h630 LSI 50/70kA	250	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		400	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		500	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
		600		T	T	T	T	T		T	T	T	T	T	T	T	T	T	T	T			
		630		T	T	T	T	T		T	T	T	T	T		T	T	T	T	T			
HNK HEK	h800 TM 50/70kA	630		T	T	T	T	T		T	T	T	T	T		T	T	T	T	T			
		800			T	T	T	T			T	T	T	T		T	T	T	T	T			
HNE HEE	h1000 LSI 50/70kA	630		T	T	T	T	T		T	T	T	T	T		T	T	T	T	T			
		700		T	T	T	T	T		T	T	T	T	T		T	T	T	T	T			
		800			T	T	T	T			T	T	T	T			T	T	T	T			
		1000				T	T	T				T	T	T				T	T	T			
HNF HEF	h1600 LSI 50/70kA	800			T	T	T	T			T	T	T	T			T	T	T	T			
		1250					T	T					T	T					T	T			
		1600						T					T	T						T			

[illegible]

				Upstream						
				Frame A, type HWAH			Frame A, type HWAN			
				630-800A	1000-1250A	1600-2000A	630-800A	1000-1250A	1600-2000A	
IEC 60947-2				50kA			65kA			
Downstream	x160 TM	HDA	18kA	18	18	18	18	18	18	
		HHA	25kA	25	25	25	25	25	25	
		HNA	40kA	40	40	40	40	40	40	
	x250 TM	HHB	25kA	25	25	25	25	25	25	
		HNB	40kA	40	40	40	40	40	40	
	h250 TM	HHG	25kA	25	25	25	25	25	25	
		HNG	50kA	50	50	50	50	50	50	
		HEG	65kA	50	50	65	65	65	65	
	h250 TM+	HNH	50kA	50	50	50	50	50	50	
		HEH	70kA	50	50	50	65	65	65	
	h250 LSI	HNC	50kA	50	50	50	50	50	50	
		HEC	70kA	50	50	50	65	65	65	
	h400 TM	HHD	25kA	25	25	25	25	25	25	
		HND	50kA	50	50	50	50	50	50	
		HKD	70kA	50	50	50	65	65	65	
	h630 LSI	HND	50kA	50	50	50	50	50	50	
		HED	70kA	50	50	50	65	65	65	
	h800 TM	HNK	50kA	50	50	50	50	50	50	
		HEK	70kA	50	50	50	65	65	65	
	h1000 LSI	HNE	50kA		50	50		50	50	
		HEE	70kA		50	50		65	65	
	h1600 LSI	HNF	50kA			50			50	
		HEF	70kA			50			65	

Max. cascading value in kA rms according to IEC 60947-2.
Network: 3 phases + neutral 220/380 ~ 240/415 VAC.

	Frame B, type HWBN			Frame B, type HWBS			Frame B, type HWBP			Frame C, type HWCP
	630-800A	1000-1250A	1600-4000A	630-800A	1000-1250A	1600-4000A	630-800A	1000-1250A	1600-4000A	3200-5000A
	65kA			85kA			100kA			100kA
	18	18	18	18	18	18	18	18	18	18
	25	25	25	25	25	25	25	25	25	25
	40	40	40	40	40	40	40	40	40	40
	25	25	25	25	25	25	25	25	25	25
	40	40	40	40	40	40	40	40	40	40
	25	25	25	25	25	25	25	25	25	25
	50	50	50	50	50	50	50	50	50	50
	65	65	65	65	65	65	65	65	65	65
	50	50	50	50	50	50	50	50	50	50
	65	65	65	70	70	70	70	70	70	70
	50	50	50	50	50	50	50	50	50	50
	65	65	65	70	70	70	70	70	70	70
	25	25	25	25	25	25	25	25	25	25
	50	50	50	50	50	50	50	50	50	50
	65	65	65	70	70	70	70	70	70	70
	50	50	50	50	50	50	50	50	50	50
	65	65	65	70	70	70	70	70	70	70
		50	50		50	50		50	50	50
		65	65		70	70		70	70	70
			50			50			50	50
			65			70			70	70

Ambient temperature

- Operating condition: -5°C to 50°C is recommended.
- Chassis is fixed to a switchboard.
- The average temperature for 24 hours should be within 35°C.
- Reduce the continuous conducting current when the temperature is over 50°C (45°C for horizontal type connection).

Relative humidity

- Relative humidity should be under 85%.

Load (I/In)

Load	Using	Effect	Installation
$I/I_n \leq 100\%$	24/24 hours	-	normal condition (recommended)
$80 < I/I_n \leq 100\%$	24/24 hours	-	periodic inspection
$I/I_n = 100\%$	24/24 hours	plastic insulator color changed	exhaust added

Storage conditions

- Device without its control unit: -25°C to 85°C
- Device with control unit: -15°C to 70°C
- The product with charging motor should be stored in open position.

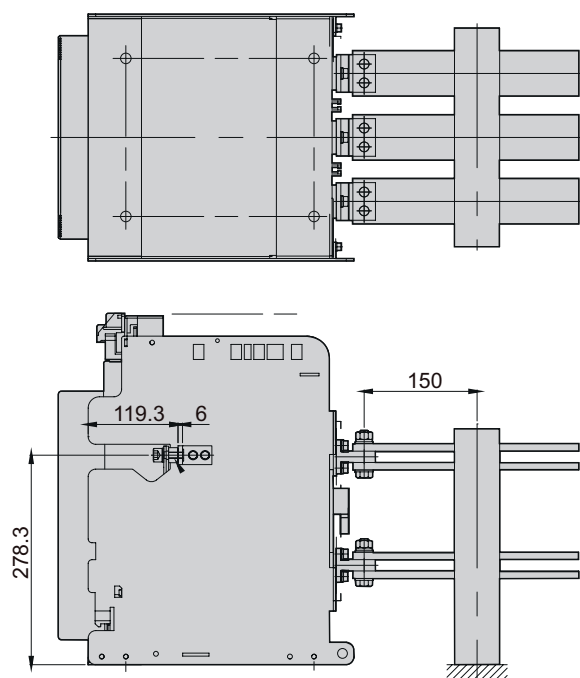
Atmospheric conditions

- Do not apply under corrosive or ammonia gas circumstances (H₂S, SO₂, NH₃).
- Use in clean air condition.

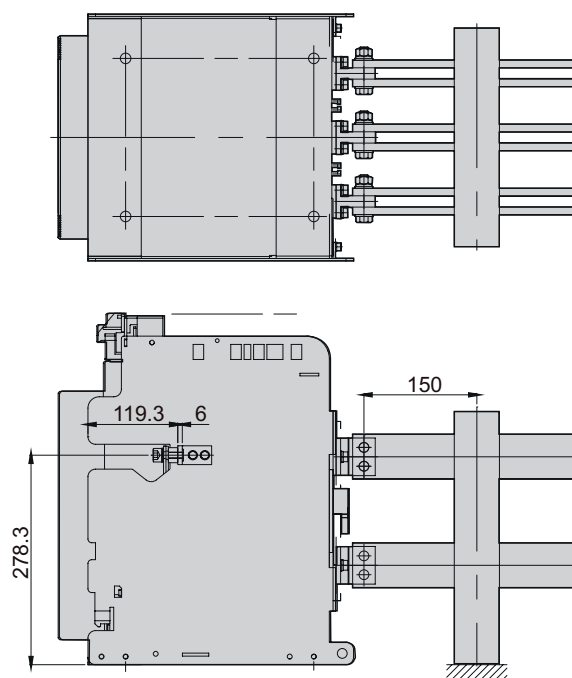
Altitude

Item	Altitude		
	2000 m	2600 m	3900 m
Isolating voltage (V)	1,000	950	800
Operating voltage (V)	690	655.5	552
Allowed current (V)	$I \times I_n$	$0.99 \times I_n$	$0.96 \times I_n$

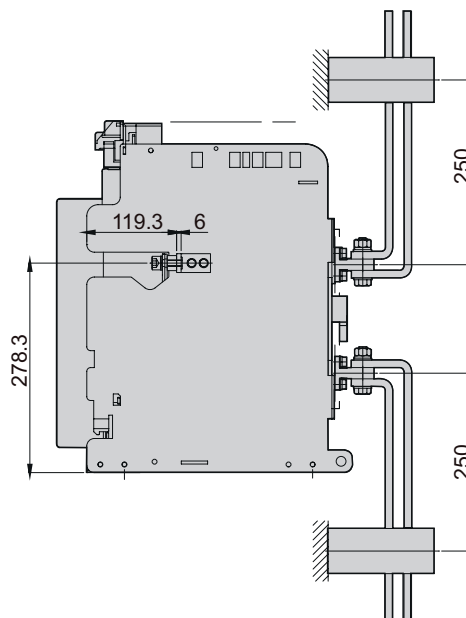
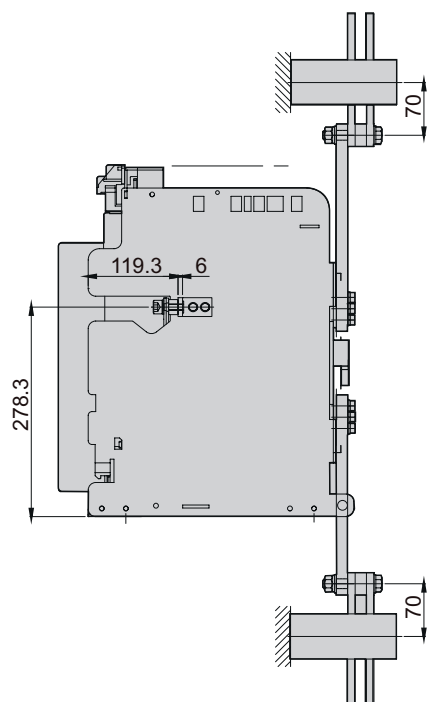
Horizontal type (mm)



Vertical type (mm)



Front type (mm)



H	W	A	H	3	16	E	F	A	0	A	A	0	A	0	A	0
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ACB series name

Frame size

A = Frame size A
B = Frame size B
C = Frame size C

Product Family + Breaking capacity

H = breaker with breaking capacity of 50kA
N = breaker with breaking capacity of 65kA
S = breaker with breaking capacity of 85kA
P = breaker with breaking capacity of 100kA

Number of poles

3 = 3 poles
4 = 4 poles

Rated current (In)

06 = 630A	20 = 2000A
08 = 800A	25 = 2500A
10 = 1000A	32 = 3200A
12 = 1250A	40 = 4000A
16 = 1600A	50 = 5000A

Market

E = Market letter

Version

F = fixed
D = draw-out

Trip unit

A = no OCR switch disc.	E = OCR LCD display Amp LI
B = OCR STD LI	F = OCR LCD display Amp LSI
C = OCR STD LSI	G = OCR LCD display Amp LSIG
D = OCR STD LSIG	H = OCR LCD display Energy LSIG

Terminal connection

0 = without	5 = front terminal (FC/FC)
1 = horizontal terminal (HC/HC)	6 = front terminal and horizontal terminal (FC/HC)
2 = vertical terminal (VC/VC)	7 = front terminal and vertical terminal (FC/VC)
3 = horizontal and vertical (HC/VC)	8 = horizontal terminal and front terminal (HC/FC)
4 = vertical and horizontal (VC/HC)	9 = vertical terminal and front terminal (VC/FC)

Position switch (only DO ACB)

- 0 = without
- 1 = isolated 1C, test 1C, connected 2C
- 2 = inserted 1C, isolated 1C, test 1C, connected 1C
- 3 = inserted 1C, isolated 1C, test 3C, connected 3C
- 4 = inserted 2C, isolated 2C, test 2C, connected 2C

OFF lock (key lock device)

- A = without
- B = type 1 (key lock device)
- C = type 2 (key lock device)
- D = type 3 (key lock device)
- E = type 4 (key lock device)
- F = type 5 (key lock device)
- G = Ronis type 1 - K1-L1/L4
- H = Ronis type 2 - K2-L2/4/5
- I = Ronis type 3 - K3-L3/5
- J = Ronis type 4 - K4-L4
- K = Ronis type 5 - K5-L5
- L = Castell type 1 - AA
- M = Castell type 2 - AB
- N = Castell type 3 - A_

MOC 2nd Auxiliary Switch & Counter & Arc Shield (only DO ACB)

- 0 = without Counter & without MOC & without Arc Shield
- 1 = with Counter & without MOC & without Arc Shield
- 2 = without Counter & with MOC & without Arc Shield
- 3 = with Counter & with MOC & without Arc Shield
- 4 = without Counter & without MOC & with Arc Shield
- 5 = with Counter without MOC & with Arc Shield
- 6 = without Counter & with MOC & with Arc Shield
- 7 = with Counter & with MOC & with Arc Shield

Under voltage release or 2nd SH coil

- | | |
|--------------------------------|-------------------------------------|
| A = without | K = AC 440V with time delay |
| B = AC/DC 110V | L = DC 24V with time delay |
| C = AC/DC 220V | M = DC 48V with time delay |
| D = AC 380V | N = AC/DC 110V double shunt release |
| E = AC 440V | O = AC/DC 220V double shunt release |
| F = DC 24V | P = AC 380V double shunt release |
| G = DC 48V | Q = AC 440V double shunt release |
| H = AC/DC 110V with time delay | R = DC 24V double shunt release |
| I = AC/DC 220V with time delay | S = DC 48V double shunt release |
| J = AC 380V with time delay | |

Closing release

- | | |
|----------------|-------------|
| 0 = without | 4 = AC 440V |
| 1 = AC/DC 110V | 5 = DC 24V |
| 2 = AC/DC 220V | 6 = DC 48V |
| 3 = AC 380V | |

Motor operator & ready to close switch

- | | |
|---------------------------|-------------------------------|
| A = without | N = AC/DC 110V motor with RTC |
| B = AC/DC 110V motor only | O = AC/DC 220V motor with RTC |
| C = AC/DC 220V motor only | P = AC 380V motor with RTC |
| D = AC 380V motor only | Q = AC 440V motor with RTC |
| E = AC 440V motor only | R = DC 24V motor with RTC |
| F = DC 24V motor only | S = DC 48V motor with RTC |
| G = DC 48V motor only | U = without motor with RTC |

Shunt release

- | | |
|----------------|-------------|
| A = without | E = AC 440V |
| B = AC/DC 110V | F = DC 24V |
| C = AC/DC 220V | G = DC 48V |
| D = AC380V | |



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