

DC Air Circuit Breakers Moulded Case Circuit Breakers

TemPower & TemBreak



TERASAKI ELECTRIC CO., LTD.

www.terasaki.co.jp

CAT REF. '10-I73E

TABLE OF CONTENTS

1 . General 1-1

Introduction	1-2
Cases with Application and	
Adoption of DC Power Source	1-3
Selection Chart	1-4

2 . Ratings and Specifications 2-1

Air Circuit Breakers for DC350V-800V	2-2
Moulded Case Circuit Breakers for DC350V-600V	2-3
Moulded Case Circuit Breakers for DC750V-1000V	2-5
Switch-disconnectors for DC800V-1000V	2-6

3 . Characteristics 3-1

Time/Current characteristic curves,	
Ambient Compensating Curves	
S50-GD, S125-ND, S160-ND, S250-ND	3-2
S400-ND, S800-ND, XS1000ND	3-3
XS1250ND, XS1600ND, XS2000ND	3-4
XS2500ND, PVS400-NDL, PVS400-NDH	3-5
PVS800-NDL, PVS800-NDH (500, 600, 630A)	3-6
PVS800-NDL, PVS800-NDH (700, 800A)	3-6

4 . Mounting and Connection 4-1

Wire connection for DC circuit	4-2
Insulation distance DC600V or less	4-3
Insulation distance DC750V-1000V	
PVS400-NDL, PVS400-NDH	4-4
PVS400-NNL, PVS400-NNH	4-5
PVS800-NDL, PVS800-NDH	4-6
PVS800-NNL, PVS800-NNH	4-7

5 . Outline Dimensions 5-1

DC Air Circuit Breakers Outline Dimensions	
AR216S, AR220S	5-2
AR325S, AR332S	5-4
AR325-NDH	5-6
AR440SB	5-8
AR440S	5-10
DC Moulded Case Circuit Breakers	
Outline Dimensions	
S50-GD, S125-ND	5-12
S160-ND, S250-ND	5-13
S400-ND	5-14
S800-ND	5-15
XS1000ND	5-16
XS1250ND	5-17
XS1600ND	5-18
XS2000ND	5-19
XS2500ND	5-20
S1000-ND	5-21
S1250-ND	5-22
S1600-ND	5-23
PVS160-NNL	5-24
PVS400-NDL, PVS400-NDH,	
PVS400-NNL, PVS400-NNH	5-24
PVS800-NDL, PVS800-NDH,	
PVS800-NNL, PVS800-NNH	5-25

1

General

Introduction	1-2
Cases with Application and Adoption of DC Power Source	1-3
Selection Chart	1-4

Introduction

In recent years, as part of the drive to reduce greenhouse gas emissions, significant attention is now being directed towards the energy produced by large-scale photovoltaic (solar), wind, and biomass energy power generation.

The total power generation capacity of facilities for these new energy sources is expected to exceed that produced by nuclear energy by approximately 2030. To aid and support these new technologies, Terasaki now offer a new, broad range of dedicated DC air circuit breakers and moulded case circuit breakers. The new range of Terasaki DC circuit breakers are ideally suited for all types of industries, buildings, as well as the information technology and communications sectors where highly reliable sources of electric power are required.

AR220S

DC

Air Circuit Breakers

PVS400-NDL

DC

Moulded Case Circuit Breakers

Rated current 2000A

Rated breaking capacity DC600V 40kA

Rated current 400A

Rated breaking capacity DC750V 10kA



General

DC power sources for the Uninterruptible Power Supply (UPS) market

Electrical and electronic equipment used in the advanced information and communications sectors requires a highly reliable power source. Should a power failure occur, and to assist with continuity of electrical power, it is standard practice to install an Uninterruptable Power Supply (UPS).

A data centre is where Internet servers and other systems for data communications, such as fixed, mobile, and IP telephones are installed. At the data centre, AC power from the main system power source is sent to the UPS, and is temporarily converted to DC power. A storage battery is then charged with this DC power, which is re-converted back into AC power and then sent to the information equipment.

Building and Industrial power back-up

A UPS is typically required for critical power systems in department stores, hotels, hospitals, theaters, and office buildings. For example, in semiconductor manufacturing plants that feature advanced automation as a part of their production processes, UPS systems with large battery capacities are used to take measures against any large-scale power outage affecting critical manufacturing facilities.

Photovoltaic power generation

Photovoltaic (or Solar) power generation, which is attracting attention as clean energy, ranges from simple generation of up to several kilowatts for home use, to larger systems of 100 kilowatts or greater for industrial use. In the "School New Deal" program, one of the governmental measures during the economic crisis, were for eco-friendly modifications which advocated the use of photovoltaic power generation at schools. One example is a power distribution system linked to a source of photovoltaic power generation. The current produced from the photovoltaic solar cells is sent to a power conditioner via a diode with a DC circuit breaker in a junction box and then converted into AC, which can then be supplied to a load via a distribution board.

Rationalization of use of electric power via large-capacity storage battery

Energy from new power sources such as wind and photovoltaic power generation do not have a stable output. A lithium ion battery and a sodium-sulfur (NAS) battery can suppress such fluctuations by load leveling. The battery is charged at night using a lower electrical power rate at night and discharged at daytime when the electrical power usage rate is higher, and in addition, any new electrical power generated can also be saved. For this purpose, large-capacity storage battery systems are used at wind and photovoltaic power generation facilities. The use of these types of systems is expected to grow across all user sectors requiring large amounts of power, plus as an additional measure against possible power outages.

Selection Chart

Voltage	Frame size (A)						
	50	125	160	250	400	800	
Air Circuit Breakers	800V						
	600V						
Moulded Case Circuit Breakers	1000V				PVS400-NDH 4P 5kA/5kA	PVS800-NDH 4P 5kA/5kA	
	750V				PVS400-NDL 4P 10kA/10kA	PVS800-NDL 4P 10kA/10kA	
	600V	S50-GD 4P 5kA/5kA	S125-ND 4P 5kA/5kA	S160-ND 4P 5kA/5kA	S250-ND 4P 5kA/5kA	S400-ND 3P 15kA/15kA	S800-ND 3P 20kA/10kA
	500V	S50-GD 4P 7.5kA/7.5kA	S125-ND 4P 7.5kA/7.5kA	S160-ND 4P 7.5kA/7.5kA	S250-ND 4P 7.5kA/7.5kA		
	350V	S50-GD 3P 10kA/10kA	S125-ND 3P 10kA/10kA	S160-ND 3P 10kA/10kA	S250-ND 3P 10kA/10kA	S400-ND 3P 20kA/20kA	S800-ND 3P 30kA/15kA
	250V						
	1000V				PVS400-NNH 4P	PVS800-NNH 4P	
Switch-disconnectors	800V		PVS160-NNL 4P		PVS400-NNL 4P	PVS800-NNL 4P	

1000 1250 1600 2000 2500 3200 4000

AR325-NDH
4P
30kA/30kA

AR216S
3P
40kA/40kA

AR220S
3P
40kA/40kA

AR325S
3P
40kA/40kA

AR332S
3P
40kA/40kA

AR440S
3P
40kA/40kA

XS1000ND
3P
20kA/10kA

XS1250ND
3P
20kA/15kA

XS1600ND
3P
20kA/15kA

XS2000ND
3P
20kA/15kA

XS2500ND
3P
20kA/15kA

XS1250ND
3P
50kA/25kA

XS1600ND
3P
50kA/25kA

XS2000ND
3P
50kA/25kA

XS2500ND
3P
50kA/25kA

XS1000ND
3P
30kA/15kA

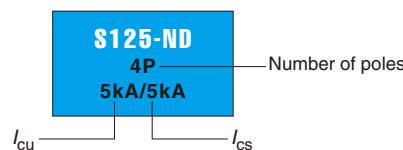
XS1000ND
2P
50kA/20kA

XS1250ND
2P
50kA/30kA

XS1600ND
2P
50kA/30kA

XS2000ND
2P
50kA/30kA

XS2500ND
2P
50kA/30kA



2

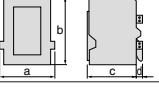
Ratings and Specifications

2

Ratings and Specifications

Air Circuit Breakers for DC350V-800V	2-2
Moulded Case Circuit Breakers for DC350V-600V	2-3
Moulded Case Circuit Breakers for DC750V-1000V	2-5
Switch-disconnectors for DC800V-1000V	2-6

Air Circuit Breakers for DC350V-800V

Sale shortly							
Frame size (A)	1600	2000	2500	2500	3200	4000	4000
Type	AR216S	AR220S	AR325S	AR325-NDH	AR332S	AR440SB	AR440S
Rated current (max.) [I_n] A	1600	2000	2500	2500	3200	4000	4000
Number of poles	3	3	3	4	3	3	3
Rated insulation voltage [U_i] V	AC 1000	1000	1000	1000	1000	1000	1000
Rated operational voltage [U_e] V	DC 600	600	600	800	600	600	600
Rated impulse withstand voltage [U_{imp}] kV	12	12	12	12	12	12	12
■ AC rated breaking cap / Making cap, kA							
JIS C 8201-2-1 Ann.1 Ann.2	DC 800V	—	—	30/30	—	—	—
IEC 60947-2	600V	40/40	40/40	—	40/40	40/40	40/40
$I_{cu}/I_{cs}(\text{sym})$ ①②	500V	40/40	40/40	—	40/40	40/40	40/40
	350V	40/40	40/40	40/40	40/40	40/40	40/40
Rated short time withstand current [I_{cw}] kA	1s 65	65	85	85	85	100	100
	3s 50	50	65	65	65	75	85
Latching current kA	65	65	85	85	85	85	100
Total breaking time (s)	0.04	0.04	0.04	0.04	0.04	0.04	0.04
■ Closing operation time							
Spring charging time (s) max.	10	10	10	10	10	10	10
Close time (s) max.	0.08	0.08	0.08	0.08	0.08	0.08	0.08
■ No. of operating cycles							
Mechanical life with maintenance	30000	25000	20000	20000	20000	15000	15000
	without maintenance	15000	12000	10000	10000	8000	8000
Electrical life without maintenance	DC 600V	1000	1000	500	500	500	500
■ Outline dimension mm							
Draw-out type		a 354	354	460	580	460	460
		b 460	460	460	460	460	460
		c 345	345	345	345	345	375
		d 40	40	40	40	140	53
Weight kg		76	79	105	125	105	126
Reverse connection		Yes	Yes	Yes	Yes	Yes	Yes

Notes:

— : "no" or "not available".

① : AGR over-current release can not be used for DC. Please prepare DC over-current relay and connect with shunt trip device.

② : The time constant (L/R) of the circuit should be,

less than 2.0ms nearby rated current

less than 15ms for short circuit

Moulded Case Circuit Breakers for DC750V-1000V

Frame size (A)	400	400	800	800					
Type	PVS400-NDL	PVS400-NDH	PVS800-NDL	PVS800-NDH					
Number of poles	4	4	4	4					
■ Ratings									
Rated current, A	250	250	500	700	500	700			
Calibrated at 40°C	300	300	600	800	600	800			
	350	350	630		630				
	400	400							
* center pole omitted									
Rated insulation voltage [U_i] V AC	1150	1150	1150	1150					
Rated impulse withstand voltage [U_{imp}] kV	8	8	8	8					
■ Rated breaking capacity, kA									
JIS C 8201-2-1 Ann.1 Ann.2 DC	1000V	—	5/5	—	5/5				
IEC 60947-2 I_{cu}/I_{cs} (sym) ①② 750V	10/10	—	10/10	—					
■ External dimensions, mm									
Diagram:		a 185	b 260	c 103	d 145	280	273	103	145
		185	260	103	145	280	273	103	145
Weight (● marked standard type) kg	5.6	5.6	11.5	11.5					
■ Connections and Mountings									
Front-connected (FC)	Terminal screws	●	●	—	—				
	With extension bars	○ (BAR)	○ (BAR)	●	●				
Rear-connected (RC)	Flat bar studs	○	○	○	○				
Plug-in (PM)	For switchboards	—	—	—	—				
	For distribution boards	—	—	—	—				
Draw-out type (DR)	—	—	—	—	—				
TemPlug70 (PG)	—	—	—	—	—				
TemPlug45B (PG4)	—	—	—	—	—				
DIN rail mount	—	—	—	—	—				
Clip-in chassis mount	—	—	—	—	—				
■ Accessories (optional)	Symbol								
Interior	Auxiliary switch	A X	●	●	●	●			
	Alarm switch	A L	●	●	●	●			
	Shunt trips	S H	●	●	●	●			
	Undervoltage trips	U V	●	●	●	●			
	Motor operator	M C	●	●	●	●			
	External operating handle	Breaker-mounted	●	●	●	●			
	handle	Door-mounted (variable depth)	●	●	●	●			
	Toggle extension	H A	—	—	●	●			
	Mechanical interlock	Slide type	●	●	●	●			
		Rear-connected type	—	—	—	—			
Exterior	Link type	M L	●	●	●	●			
	Wire type	M W	●	●	●	●			
	Toggle holder	H H	●	●	●	●			
	Toggle lock	H L	●	●	●	●			
	Terminal cover	For front-connected	●	●	●	●			
		For rear-connected and plug-in	●	●	●	●			
	Interpole barrier	B A	●⑨	●⑨	●⑩	●⑩			
	Terminal block for lead	T F	●	●	●	●			
	Door flange	D F	—	—	—	—			
■ Standard specifications									
Overcurrent trip mechanism	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic					
Color of cover	Gray	Gray	Gray	Gray					
Trip button (color)	Yes (Red)	Yes (Red)	Yes (Red)	Yes (Red)					
Handle position indication (ON: Red, OFF: Green)	Yes	Yes	Yes	Yes					
Suitability for isolation	Yes	Yes	Yes	Yes					
Reverse connection	Yes	Yes	Yes	Yes					

Notes:

● : Standard. This configuration used unless otherwise specified. ○ : Optional standard. Specify when ordering. ● : "yes" or "available". — : "no" or "not available".

① : Connect 4poles in series.

② : The time constant (L/R) of the circuit should be,

less than 2.0ms nearby rated current

less than 5ms for short circuit $\leq 10\text{KA}$

less than 10ms for short circuit $\leq 20\text{KA}$

less than 15ms for short circuit $> 20\text{KA}$

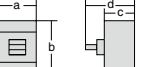
⑨ : For front connection, both line and load side interpole barriers are supplied as standard.

For rear connection, line side interpole barriers are supplied as standard.

⑩ : For front connection, 5pcs line side interpole barriers and 3pcs load side interpole barriers are supplied as standard.

For rear connection, 5pcs line side interpole barriers are supplied as standard.

Switch-disconnectors for DC800V-1000V

Frame size (A)	160	400	400	800	800		
Type	PVS160-NNL	PVS400-NNL	PVS400-NNH	PVS800-NNL	PVS800-NNH		
Number of poles	4	4	4	4	4		
■ Ratings							
Rated current, A	160	400	400	630	630		
Calibrated at 40°C				800	800		
Rated insulation voltage (U_i) V	AC 800	1150	1150	1150	1150		
Rated operational voltage V	DC 800	800	1000	800	1000		
Rated short circuit making capacity, kA peak	6	9	9	17	17		
Rated short time withstand current, kA	2 (0.3sec.)	5 (0.3sec.)	5 (0.3sec.)	10 (0.3sec.)	10 (0.3sec.)		
Rated impulse withstand voltage (U_{imp}) kV	8	8	8	8	8		
■ Performance							
Utilization category ①②	DC	DC-22B	DC-22A	DC-22A	DC-22A		
JIS C 8201-3 IEC 60947-3							
■ External dimensions, mm							
	a 140	b 185	c 165	d 280	e 280		
	a 185	b 260	c 103	d 103	e 103		
	c 68	d 145	d 145	d 145	e 145		
	d 92						
Weight (● marked standard type) kg	1.9	5.6	5.6	11.5	11.5		
■ Connections and Mountings							
Front-connected (FC)	Terminal screws	●	●	—	—		
	With extension bars	○ (BAR)	○ (BAR)	○ (BAR)	●	●	
Rear-connected (RC)	Flat bar studs	○	○	○	○	○	
Plug-in (PM)	For switchboards	—	—	—	—	—	
	For distribution boards	—	—	—	—	—	
Draw-out type (DR)	—	—	—	—	—	—	
TemPlug70 (PG)	—	—	—	—	—	—	
TemPlug45B (PG4)	—	—	—	—	—	—	
DIN rail mount	—	—	—	—	—	—	
Clip-in chassis mount	—	—	—	—	—	—	
■ Accessories (optional)	Symbol						
Interior	Auxiliary switch	A X	●	●	●	●	
	Alarm switch	A L	●	●	●	●	
	Shunt trips	S H	●	●	●	●	
	Undervoltage trips	U V	●	●	●	●	
	Motor operator	M C	●	●	●	●	
	External operating handle	H B	●	●	●	●	
	Door-mounted (variable depth)	H P	●	●	●	●	
	Toggle extension	H A	—	—	●	●	
	Mechanical interlock	Slide type	M S	●	●	●	
		Rear-connected type	M B	—	—	—	
		Link type	M L	●	●	●	
		Wire type	M W	●	●	●	
Exterior	Toggle holder	H H	●	—	—	—	
	Toggle lock	H L	●	●	●	●	
	Terminal cover	For front-connected	C F	●	●	●	
		For rear-connected and plug-in	C R	●	●	●	
	Interpole barrier	B A	●	● (9)	● (9)	● (10)	● (10)
	Terminal block for lead	T F	●	●	●	●	
	Door flange	D F	●	—	—	—	
■ Standard specifications							
Color of cover	Gray	Gray	Gray	Gray	Gray		
Trip button (color)	Yes (Red)	Yes (Red)	Yes (Red)	Yes (Red)	Yes (Red)		
Handle position indication (ON: Red, OFF: Green)	Yes	Yes	Yes	Yes	Yes		
Suitability for isolation	Yes	Yes	Yes	Yes	Yes		
Reverse connection	Yes	Yes	Yes	Yes	Yes		

Notes:

● : Standard. This configuration used unless otherwise specified. ○ : Optional standard. Specify when ordering. ● : "yes" or "available". — : "no" or "not available".

① : Connect 4poles in series.

② : The time constant (L/R) of the circuit should be,

less than 2.0ms nearby rated current

less than 5ms for short circuit $\leq 10\text{KA}$

less than 10ms for short circuit $\leq 20\text{KA}$

less than 15ms for short circuit $> 20\text{KA}$

⑨ : For front connection, both line and load side interpole barriers are supplied as standard. For rear connection, line side interpole barriers are supplied as standard.

⑩ : For front connection, 5pcs line side interpole barriers and 3pcs load side interpole barriers are supplied as standard. For rear connection, 5pcs line side interpole barriers are supplied as standard.

3

Characteristics

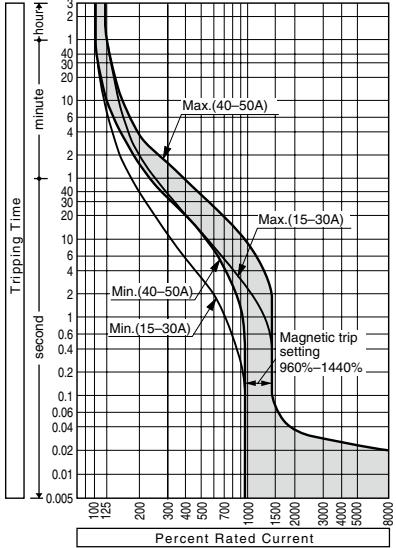
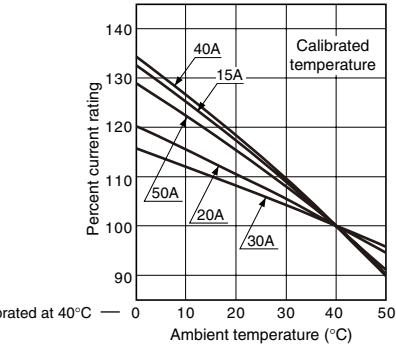
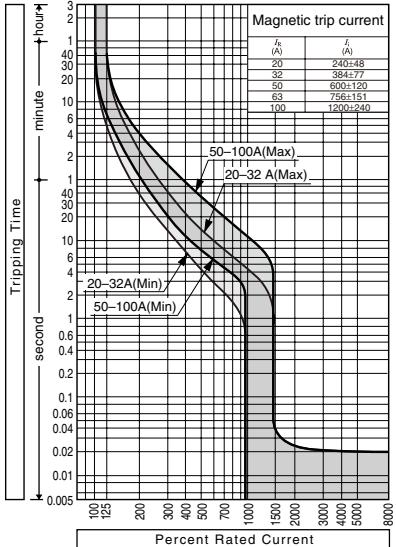
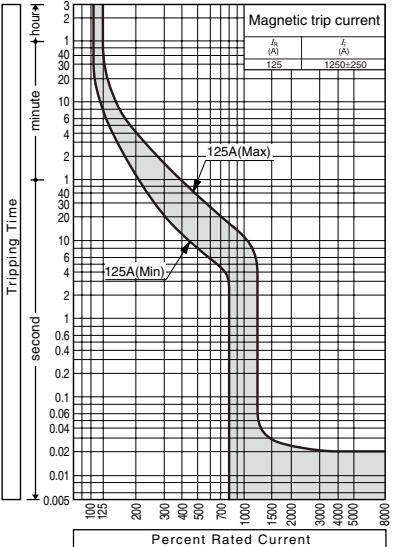
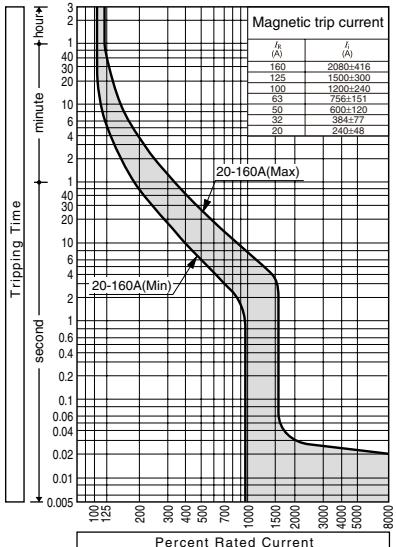
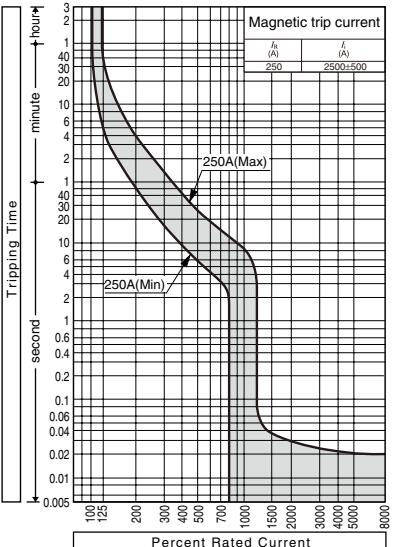
3

Characteristics

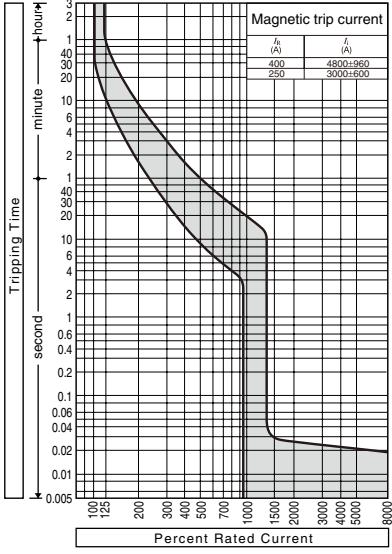
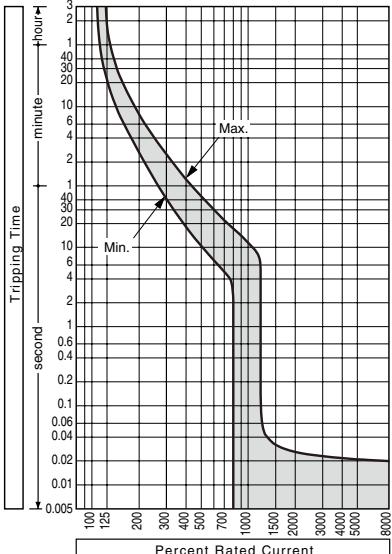
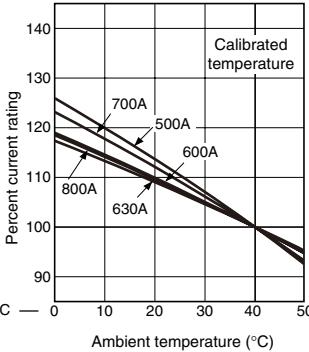
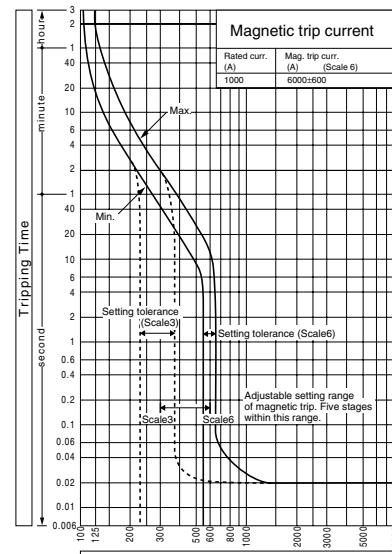
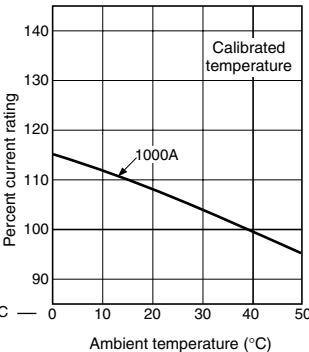
Time/Current characteristic curves, Ambient Compensating Curves

S50-GD, S125-ND, S160-ND, S250-ND	3-2
S400-ND, S800-ND, XS1000ND	3-3
XS1250ND, XS1600ND, XS2000ND	3-4
XS2500ND, PVS400-NDL, PVS400-NDH	3-5
PVS800-NDL, PVS800-NDH (500, 600, 630A)	3-6
PVS800-NDL, PVS800-NDH (700, 800A)	3-6

Time/Current characteristic curves, Ambient Compensating Curves

Type	Time/Current characteristic curves, Ambient Compensating Curves	
S50-GD	 <p>Time/Current characteristic curves for S50-GD. The graph plots Trip Time (second) on a logarithmic scale from 0.005 to 3 hours against Percent Rated Current (100 to 8000). Curves are shown for Magnetic trip setting ranges: Max. (40-50A), Min. (15-30A), and others. A vertical dashed line at 1000% current indicates the Magnetic trip setting range.</p>	 <p>Ambient Compensating Curve for S50-GD. The graph plots Percent current rating (90 to 140) against Ambient temperature (°C) (0 to 50). Curves are shown for calibrated temperatures of 40°C, 15A, 20A, 30A, and 50A. A note states "calibrated at 40°C".</p>
S125-ND	 <p>Time/Current characteristic curves for S125-ND. The graph plots Trip Time (second) on a logarithmic scale from 0.005 to 3 hours against Percent Rated Current (100 to 8000). Curves are shown for Magnetic trip current ranges: 20-32A (Min), 50-100A (Min), 20-32A (Max), and 50-100A (Max).</p>	 <p>Time/Current characteristic curves for S125-ND. The graph plots Trip Time (second) on a logarithmic scale from 0.005 to 3 hours against Percent Rated Current (100 to 8000). Curves are shown for Magnetic trip currents of 125A (Min) and 125A (Max).</p>
S160-ND S250-ND	 <p>Time/Current characteristic curves for S160-ND/S250-ND. The graph plots Trip Time (second) on a logarithmic scale from 0.005 to 3 hours against Percent Rated Current (100 to 8000). Curves are shown for Magnetic trip current ranges: 20-160A (Min) and 20-160A (Max).</p>	 <p>Time/Current characteristic curves for S160-ND/S250-ND. The graph plots Trip Time (second) on a logarithmic scale from 0.005 to 3 hours against Percent Rated Current (100 to 8000). Curves are shown for Magnetic trip currents of 250A (Min) and 250A (Max).</p>

Time/Current characteristic curves, Ambient Compensating Curves

Type	Time/Current characteristic curves, Ambient Compensating Curves							
S400-ND	 <p>Magnetic trip current</p> <table border="1"> <tr> <td>I_R (A)</td> <td>I_T (A)</td> </tr> <tr> <td>400</td> <td>4800±600</td> </tr> <tr> <td>250</td> <td>3000±600</td> </tr> </table>	I_R (A)	I_T (A)	400	4800±600	250	3000±600	
I_R (A)	I_T (A)							
400	4800±600							
250	3000±600							
S800-ND	 <p>Max. Min.</p>	 <p>Calibrated at 40°C</p> <p>Ambient temperature (°C)</p>						
XS1000ND	 <p>Magnetic trip current</p> <table border="1"> <tr> <td>Rated curr. (A)</td> <td>Mag. trip curr. (A) (Scale 6)</td> </tr> <tr> <td>1000</td> <td>6000±600</td> </tr> </table> <p>Max. Min.</p> <p>Setting tolerance (Scale3) Setting tolerance (Scale6)</p> <p>Adjustable setting range of magnetic trip. Five stages within this range.</p>	Rated curr. (A)	Mag. trip curr. (A) (Scale 6)	1000	6000±600	 <p>Calibrated at 40°C</p> <p>Ambient temperature (°C)</p>		
Rated curr. (A)	Mag. trip curr. (A) (Scale 6)							
1000	6000±600							

Time/Current characteristic curves, Ambient Compensating Curves

Type	Time/Current characteristic curves, Ambient Compensating Curves
XS1250ND	<p>Note: Magnetic trip only. Use the external over-current relay.</p>
XS1600ND	<p>Note: Magnetic trip only. Use the external over-current relay.</p>
XS2000ND	<p>Note: Magnetic trip only. Use the external over-current relay.</p>

Time/Current characteristic curves, Ambient Compensating Curves

Type	Time/Current characteristic curves, Ambient Compensating Curves	
XS2500ND	<p>Note: Magnetic trip only. Use the external over-current relay.</p>	
PVS400-NDL	<p>calibrated at 40°C</p>	
PVS400-NDH	<p>calibrated at 40°C</p>	

Time/Current characteristic curves, Ambient Compensating Curves

Type	Time/Current characteristic curves, Ambient Compensating Curves	
PVS800-NDL PVS800-NDH 500, 600, 630A		
PVS800-NDL PVS800-NDH 700, 800A		

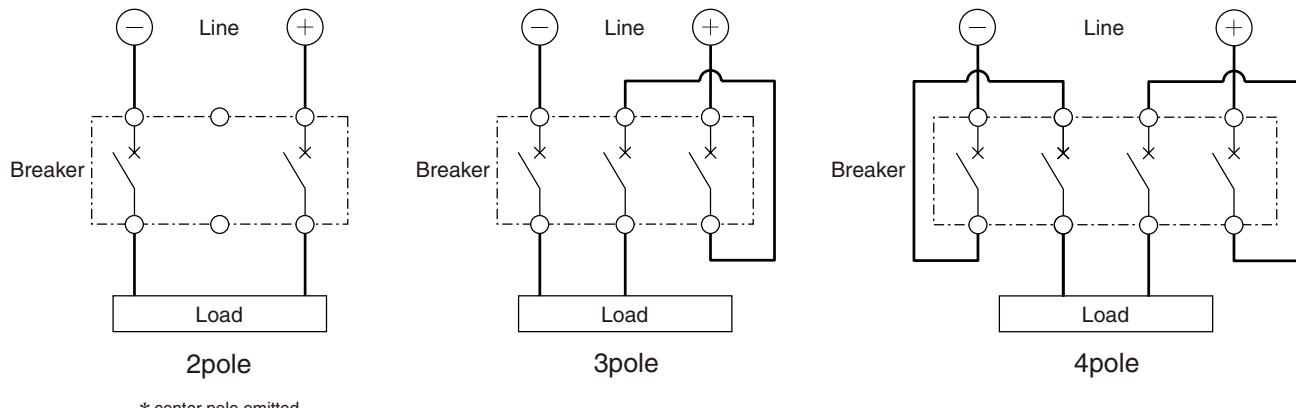
4

Mounting and Connection

Wire connection for DC circuit	4-2
Insulation distance DC600V or less	4-3
Insulation distance DC750V-1000V	
PVS400-NDL, PVS400-NDH	4-4
PVS400-NNL, PVS400-NNH	4-5
PVS800-NDL, PVS800-NDH	4-6
PVS800-NNL, PVS800-NNH	4-7

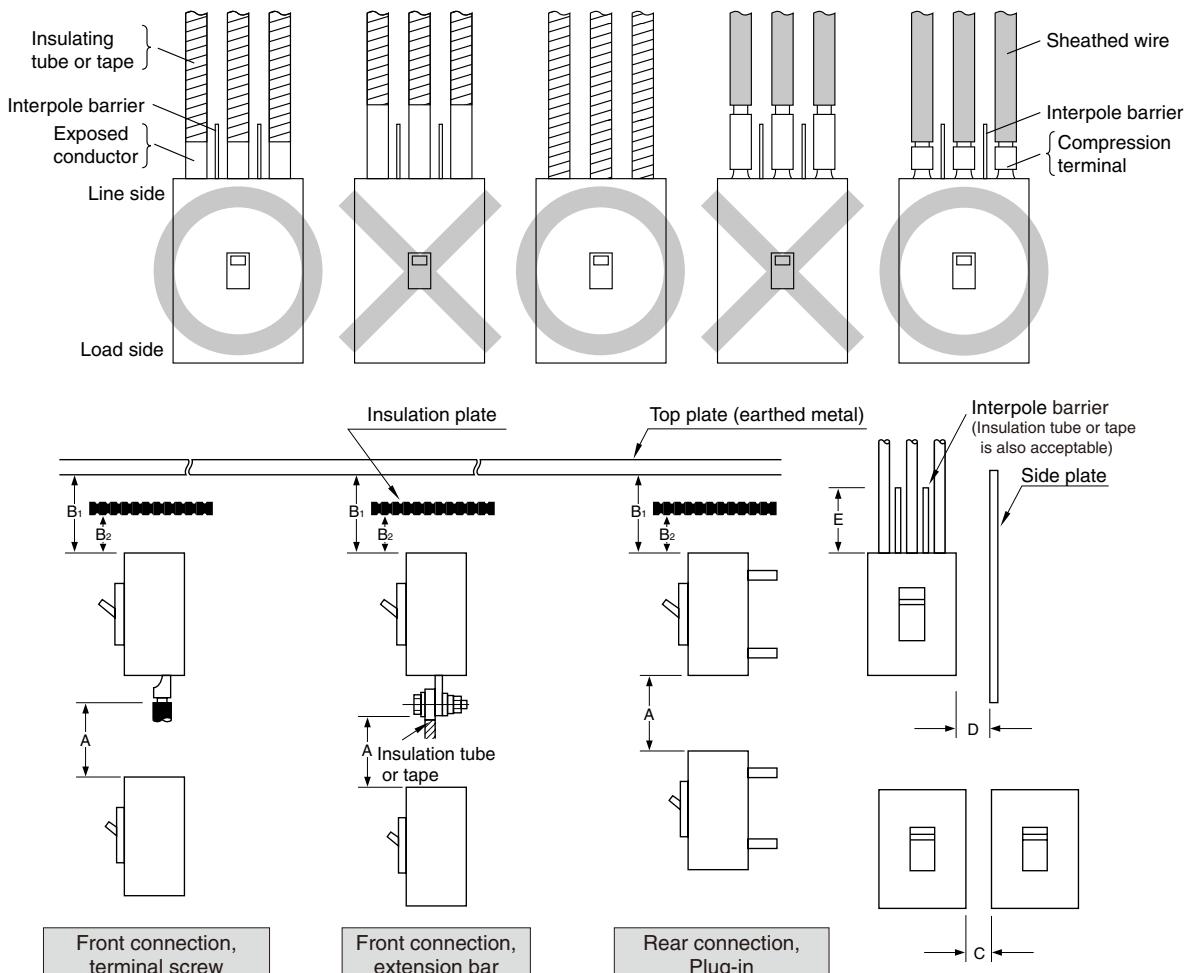
Connection of conductors to DC circuit breakers

It is more difficult to interrupt DC current than AC current because DC current does not have a zero point. Therefore for high DC voltages, 3-pole or 4-pole circuit breaker main contacts are connected in series to ensure breaking performance. As illustrated below, the main power conductors for DC-use air circuit breakers, moulded case circuit breakers, and switch disconnectors shall be connected generally as shown below but also depending on the type of breaker, the number of poles, and the DC operating voltage.



Insulation distance DC600V or less

The insulation distances between the breaker and earthed metal parts and insulators shown in the table below must be maintained to prevent arcing faults occurring due to conductive ionised gas. In addition, any exposed line-side conductors must be completely covered, right up the breaker casing or to below the height protected by any interpole barriers. This can be done by using an insulation tube or tape, in order to provide positive protection against short circuit or ground fault due to metal chipping, surge voltage, dust particles or salt. If terminal covers are not being used, the interpole barriers supplied with the breaker as standard must be used.



- A . Distance from lower breaker to exposed live part of upper breaker terminal (front connection) or distance from lower breaker to end face of upper breaker (rear connection).
- B1 . Distance from end face of breaker to top plate.
- B2 . Distance from end face of breaker to insulation plate.
- C . Gap between breakers.
- D . Distance from side of breaker to side plate (earthing metal).
- E . Dimension of insulation over exposed conductors.

Insulation distance, mm (DC 600 V or less) Note ①

Moulded Case Circuit Breakers		A Note ②	B1	B2	C	D	E
S50-GD	S100-ND	50	50 Note ⑤	50 Note ⑤	*	Possible to set close Note ③	25
S225-ND		65	65 Note ⑤	65 Note ⑤	*	〃	50 〃
S400-ND	S800-ND	150	120	80	〃	80	〃
XS1000ND	XS1250ND	XS1600ND	S1250-ND	150	150	100	100 〃
S1600-ND	XS2000ND	XS2500ND					

Notes:

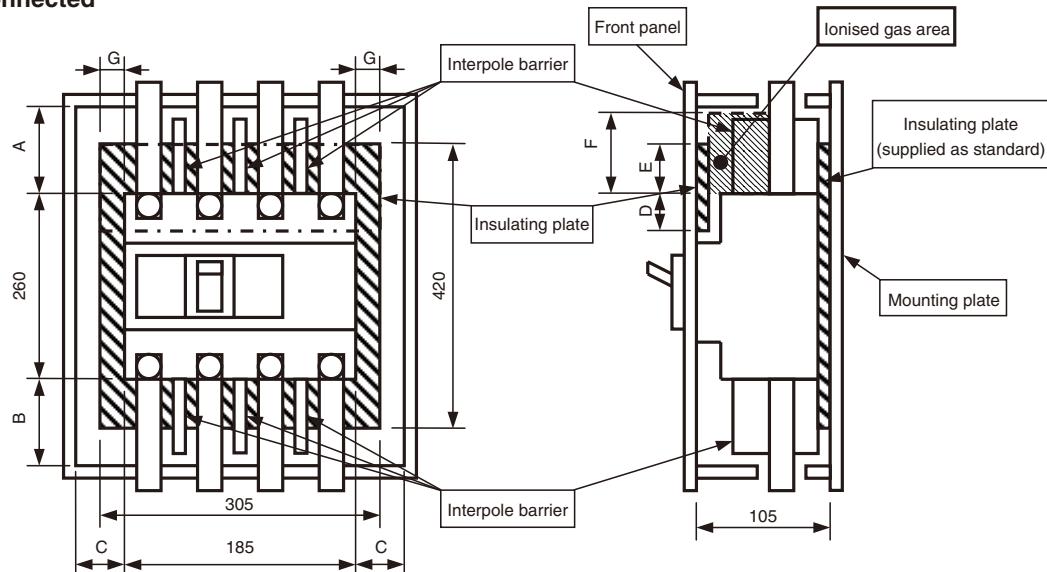
- ①. Required to allow free and uninterrupted flow of arc gases. Ensure additional clearance or insulation distance if required to perform wiring, barrier installation or electrical work or to meet the need for more insulation distance between bare live parts and grounded metal members in a switchboard or the like.
- ②. The figures are for lower breakers.
- ③. When the accessories are fitted it is not possible to set close.
- ④. For front connected breakers, insulate all exposed conductors of the line side until the breaker end. If interpole barriers are packed, be sure to use the barriers; moreover, insulate all exposed conductors by insulating tape or the like so that the tape overlaps with the barriers.
- ⑤. If the rated voltage is more than 350V DC, be sure to install the terminal covers (supplied as standard) on the line side of the 4poles breakers, and also install the insulating plates between the line side front face of the breakers and the front panel door.
- *. If using extension bars (optional), ensure the insulation distance specified for the application.

Insulation distance DC750V-1000V

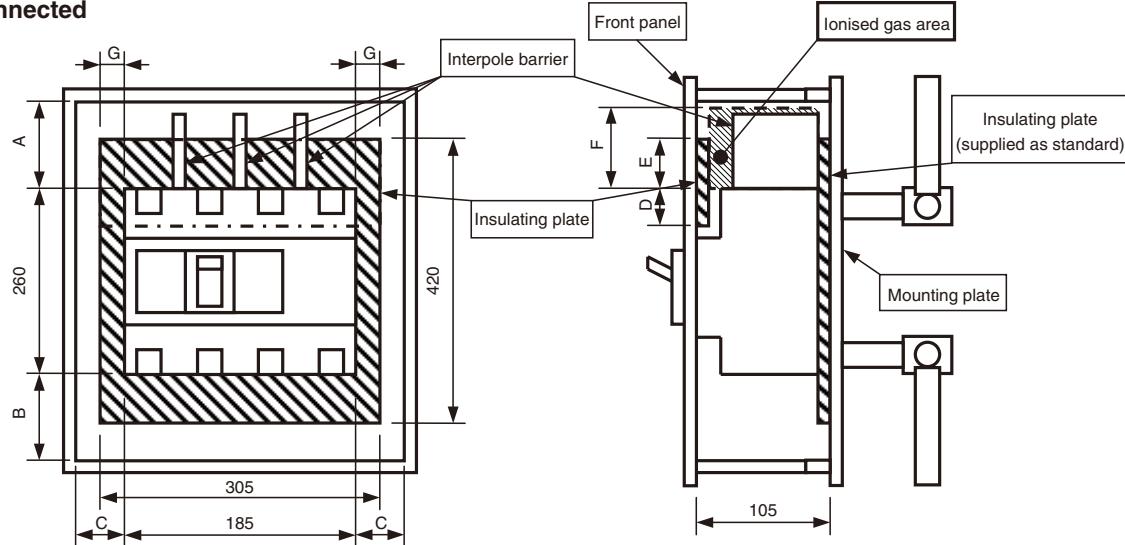
The insulation distances between the breaker and earthed metal parts and insulators shown in the table below must be maintained to prevent arcing faults occurring due to conductive ionised gas. In addition, any exposed line-side conductors must be completely covered, right up the breaker casing or to below the height protected by any interpole barriers. This can be done by using an insulation tube or tape, in order to provide positive protection against short circuit or ground fault due to metal chipping, surge voltage, dust particles or salt. If terminal covers are not being used, then the interpole barriers supplied with the breaker as standard must be used. For DC750V-1000V breakers, the front and the rear insulating plates must also be installed.

PVS400-NDL, PVS400-NDH

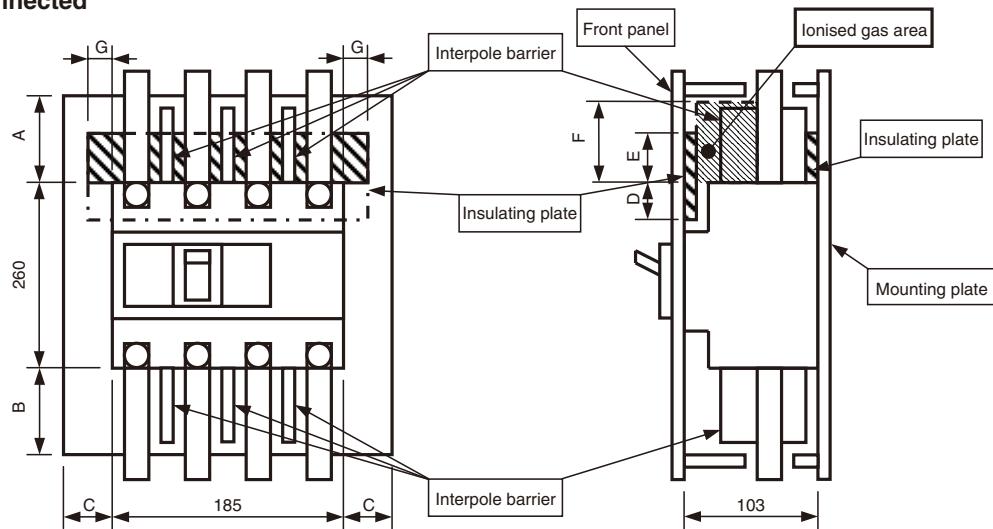
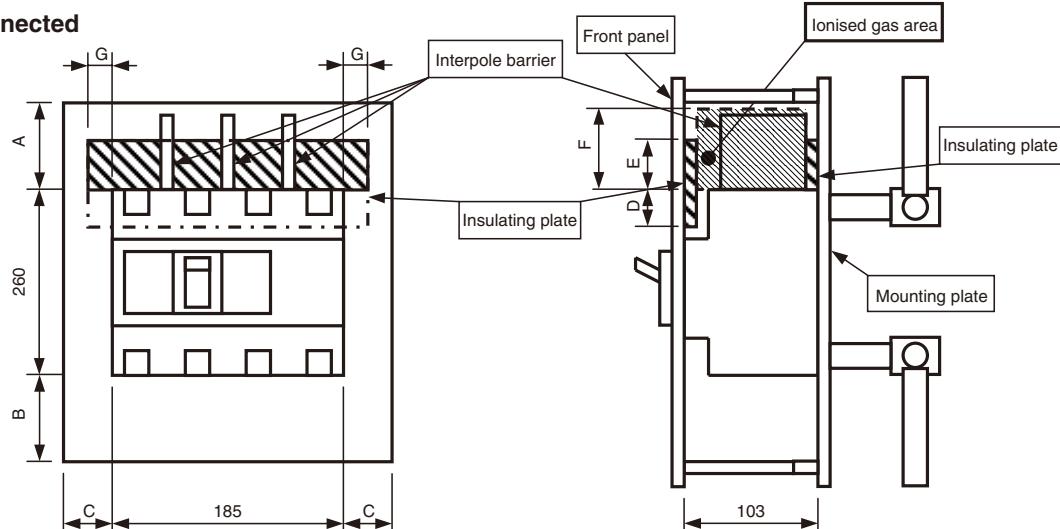
Front-connected



Rear-connected



Type	Connection	Minimum insulation distance (mm)							Insulating plate	
		A	B	C	D	E	F	G	Front panel side	Mounting plate side
PVS400-NDL PVS400-NDH	Front-connected Rear-connected	160	80	80	30	140	160	60	Not supplied	Supplied as standard

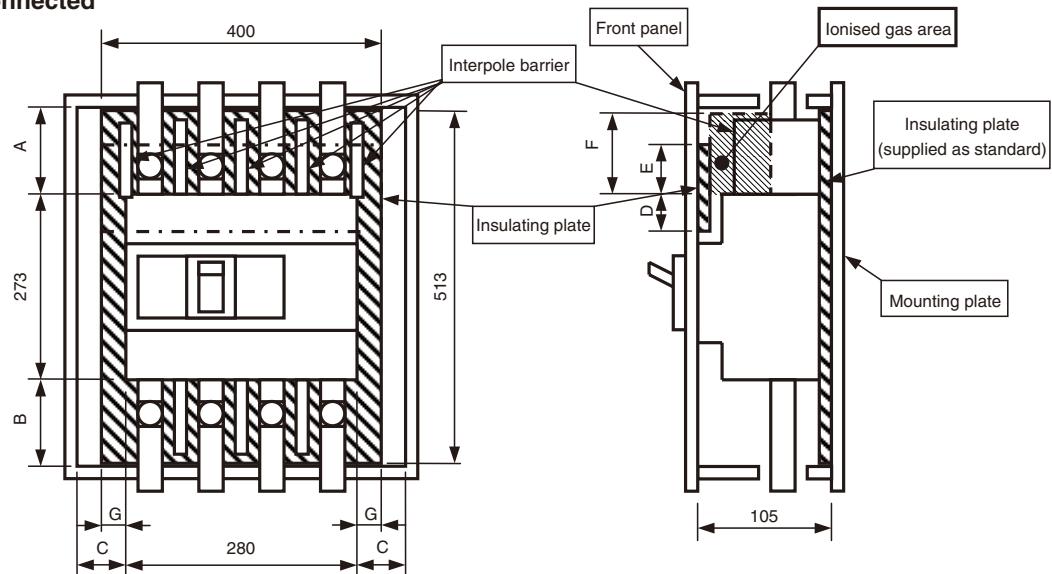
PVS400-NNL, PVS400-NNH**Front-connected****Rear-connected**

Type	Connection	Minimum insulation distance (mm)							Insulating plate	
		A	B	C	D	E	F	G	Front panel side	Mounting plate side
PVS400-NNL PVS400-NNH	Front-connected Rear-connected	120	80	80	30	80	80	40	Not supplied	Not supplied

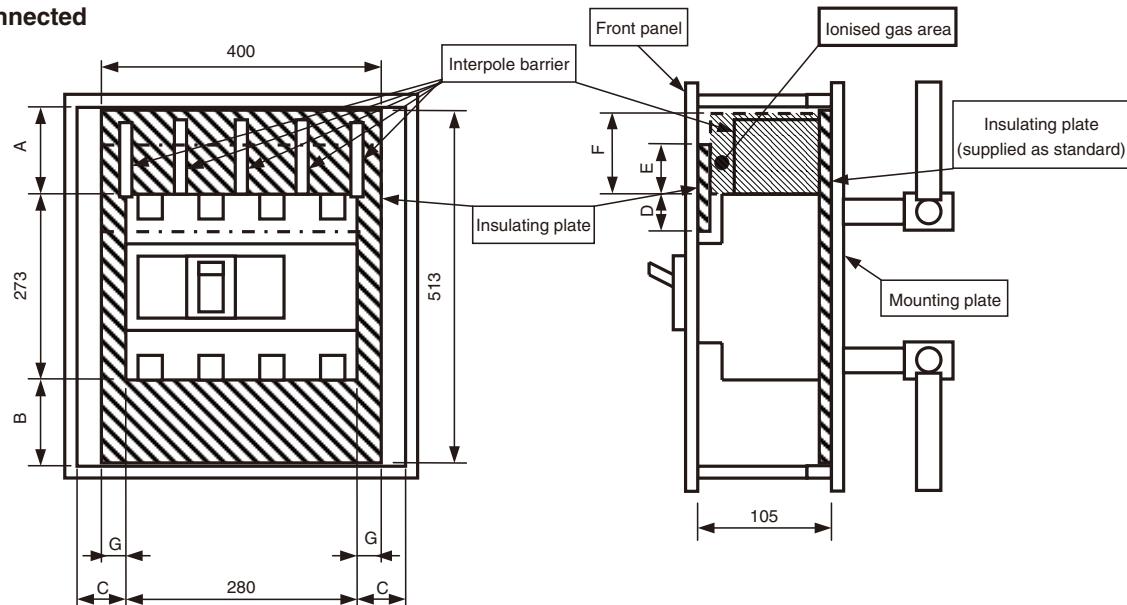
Insulation distance DC750V-1000V

PVS800-NDL, PVS800-NDH

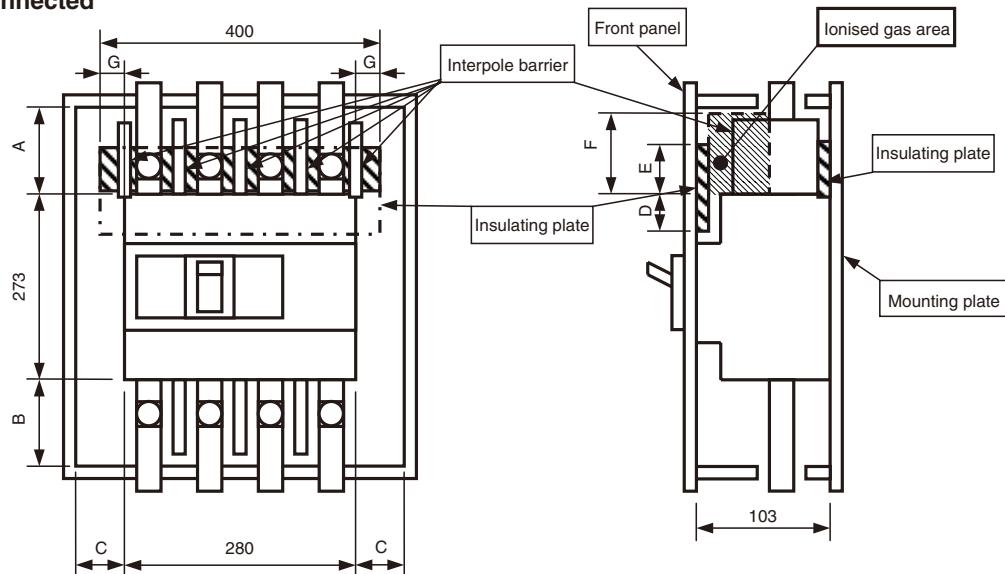
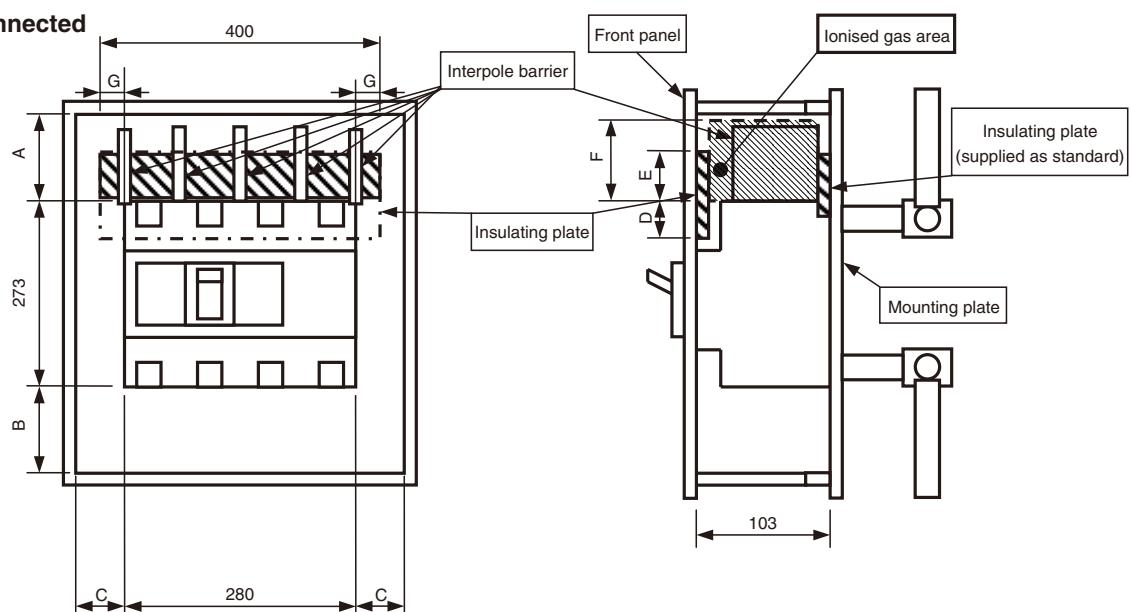
Front-connected



Rear-connected



Type	Connection	Minimum insulation distance (mm)							Insulating plate	
		A	B	C	D	E	F	G	Front panel side	Mounting plate side
PVS800-NDL PVS800-NDH	Front-connected Rear-connected	160	80	80	80	140	160	60	Not supplied	Supplied as standard

PVS800-NNL, PVS800-NNH**Front-connected****Rear-connected**

Type	Connection	Minimum insulation distance (mm)							Insulating plate	
		A	B	C	D	E	F	G	Front panel side	Mounting plate side
PVS800-NNL PVS800-NNH	Front-connected Rear-connected	120	80	80	80	80	80	60	Not supplied	Not supplied

5

Outline Dimensions

DC Air Circuit Breakers Outline Dimensions

AR216S, AR220S	5-2
AR325S, AR332S	5-4
AR325-NDH	5-6
AR440SB	5-8
AR440S	5-10

DC Moulded Case Circuit Breakers Outline Dimensions

S50-GD, S125-ND	5-12
S160-ND, S250-ND	5-13
S400-ND	5-14
S800-ND	5-15
XS1000ND	5-16
XS1250ND	5-17
XS1600ND	5-18
XS2000ND	5-19
XS2500ND	5-20
S1000-ND	5-21
S1250-ND	5-22
S1600-ND	5-23
PVS160-NNL	5-24
PVS400-NDL, PVS400-NDH, PVS400-NNL, PVS400-NNH	5-24
PVS800-NDL, PVS800-NDH, PVS800-NNL, PVS800-NNH	5-25

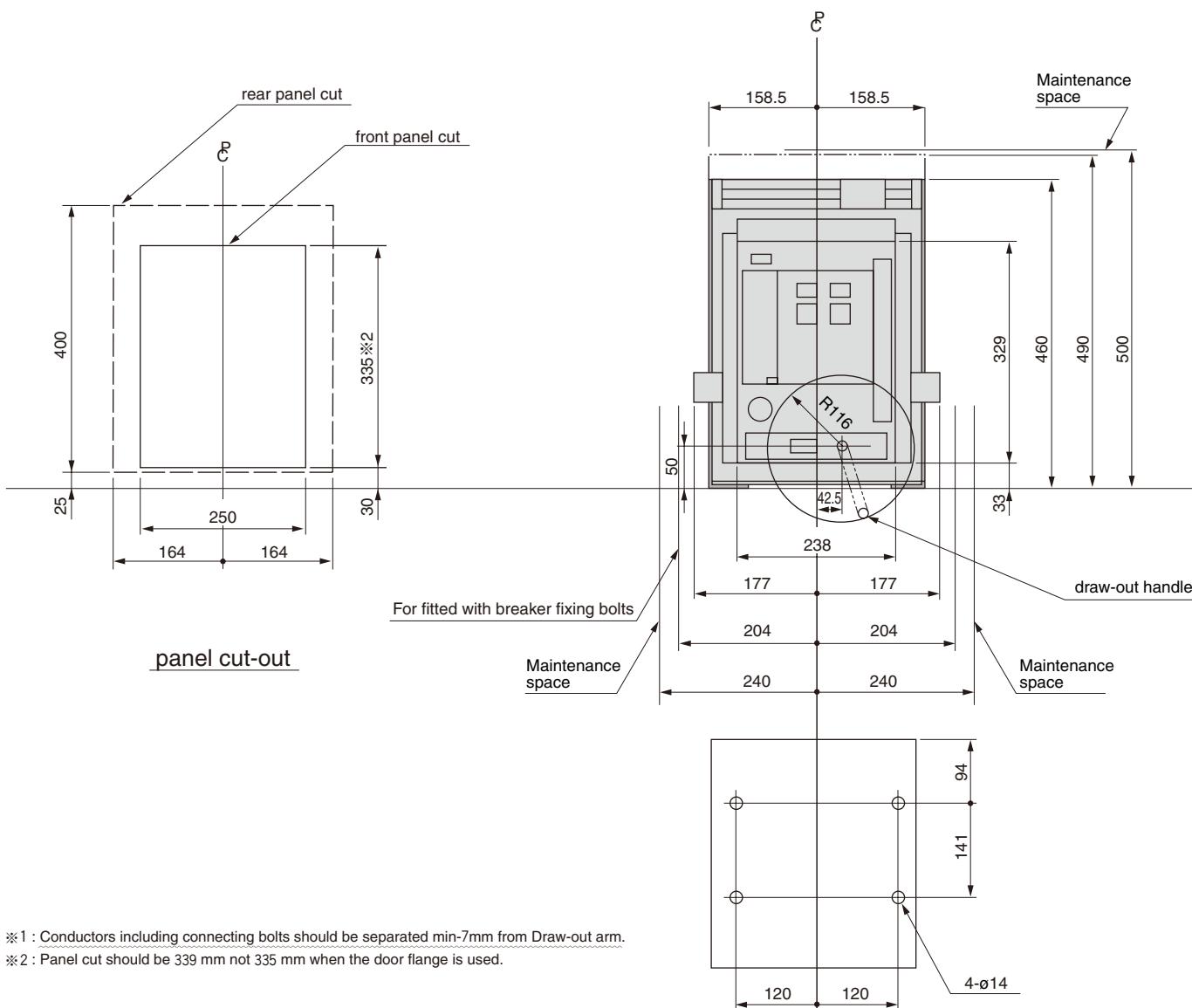
DC Air Circuit Breakerseakers

Outline Dimensions

• Type AR216S, AR220S Draw-out type

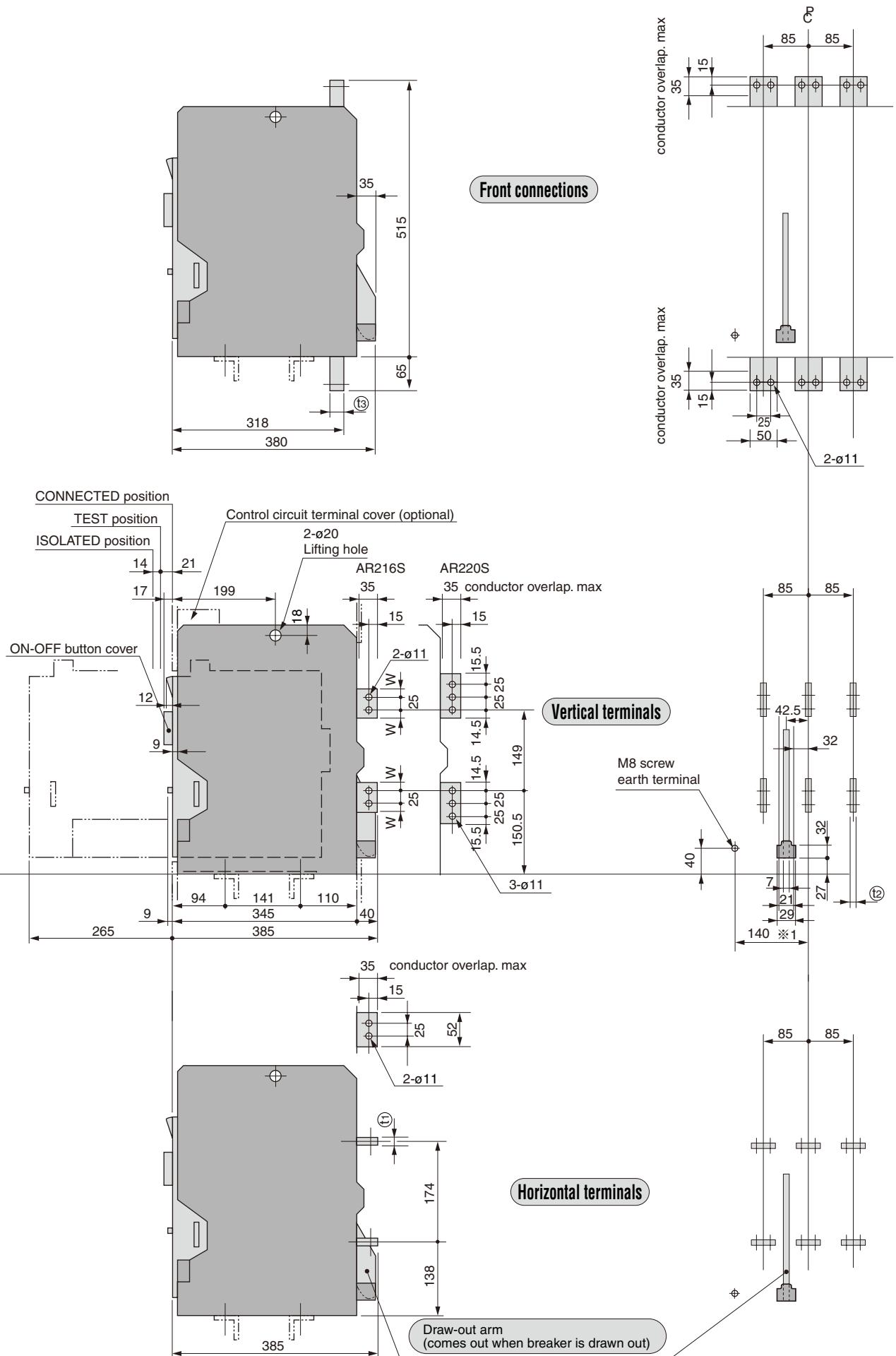
Terminal size

Type	t_1	t_2	t_3	W
AR216S	20	15	25	22.5
AR220S	20	15	25	—



C : ACB Front cover center line

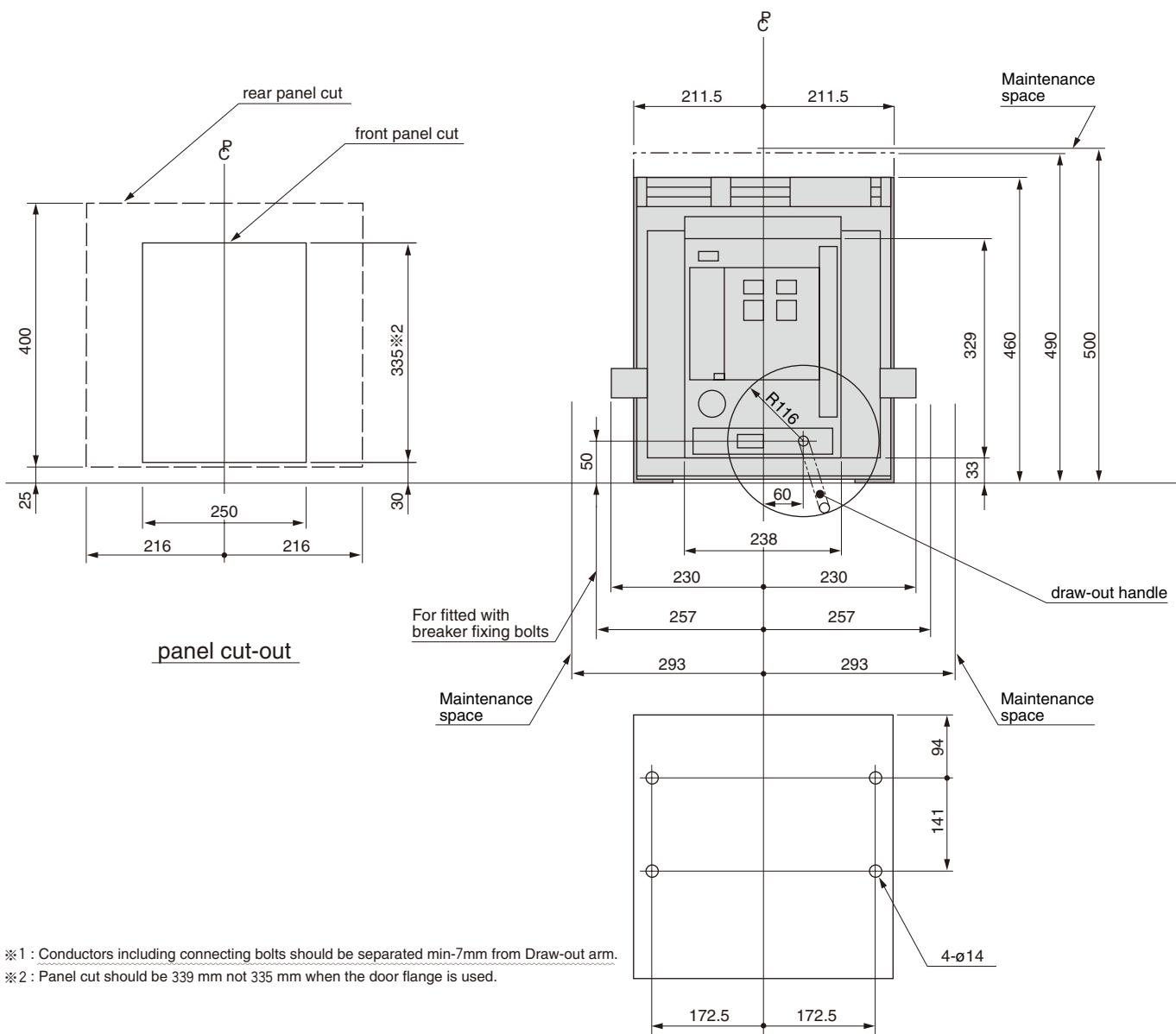
AR216S, AR220S

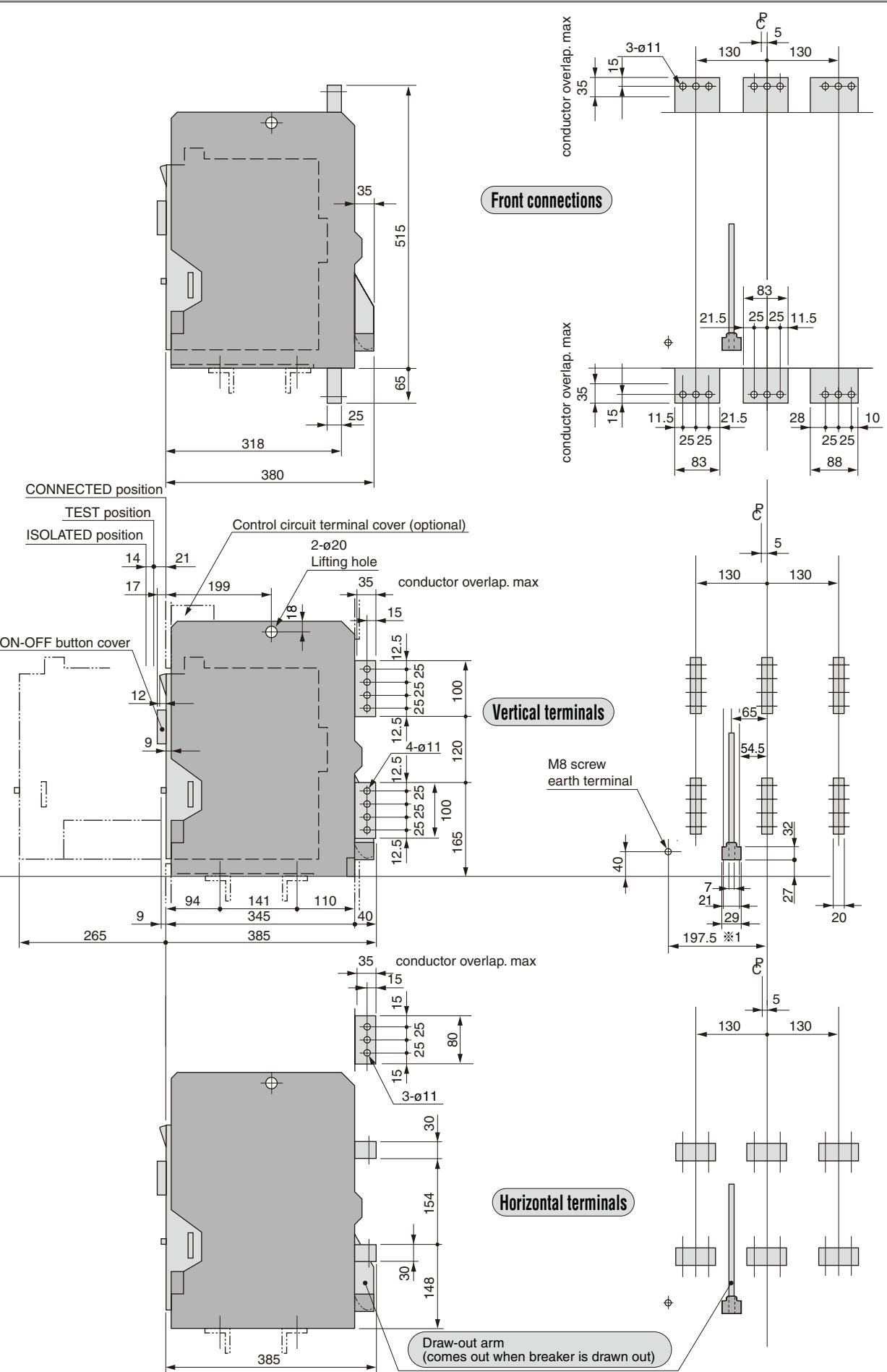


DC Air Circuit Breakerseakers

Outline Dimensions

• Type AR325S, AR332S Draw-out type

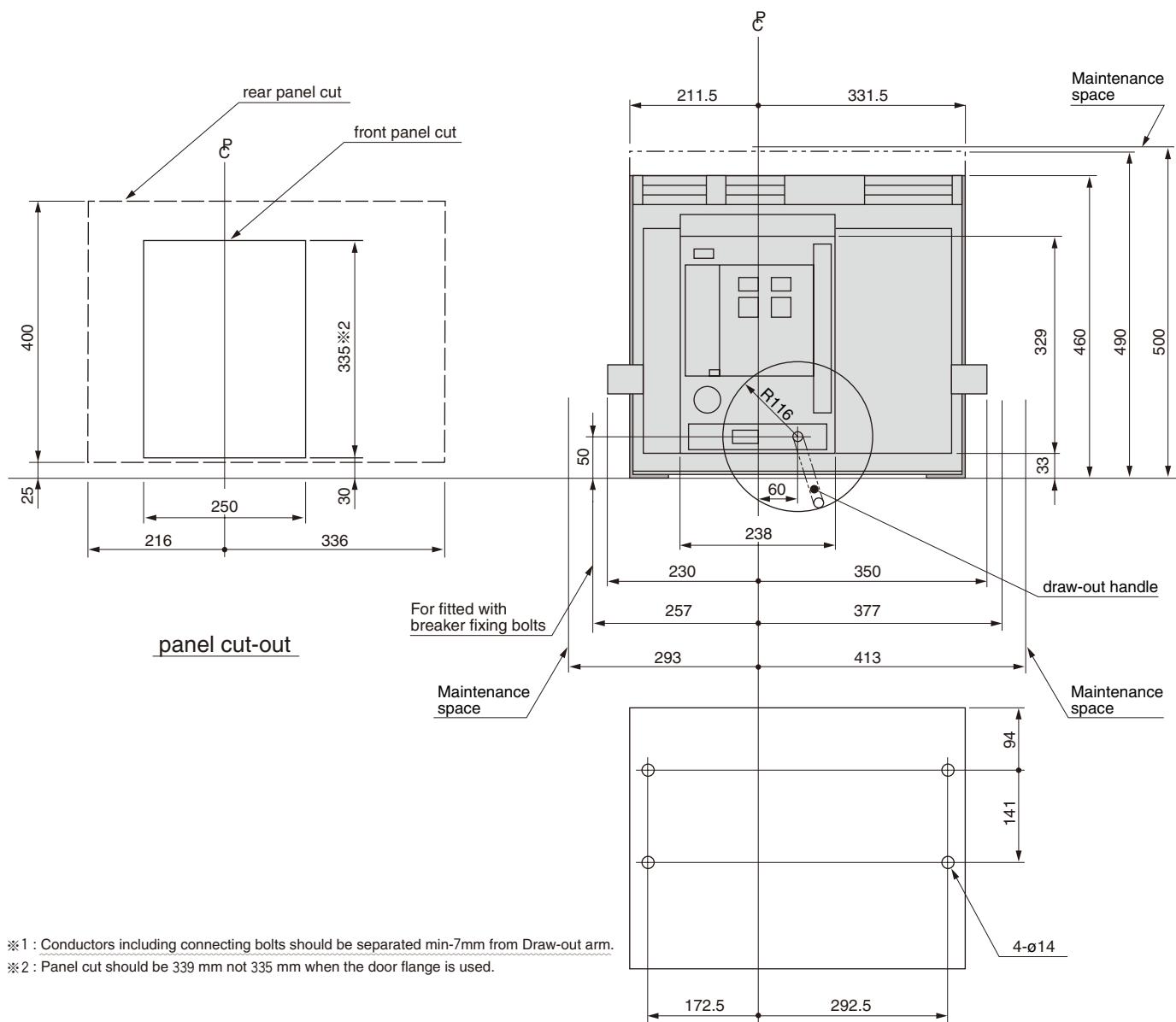


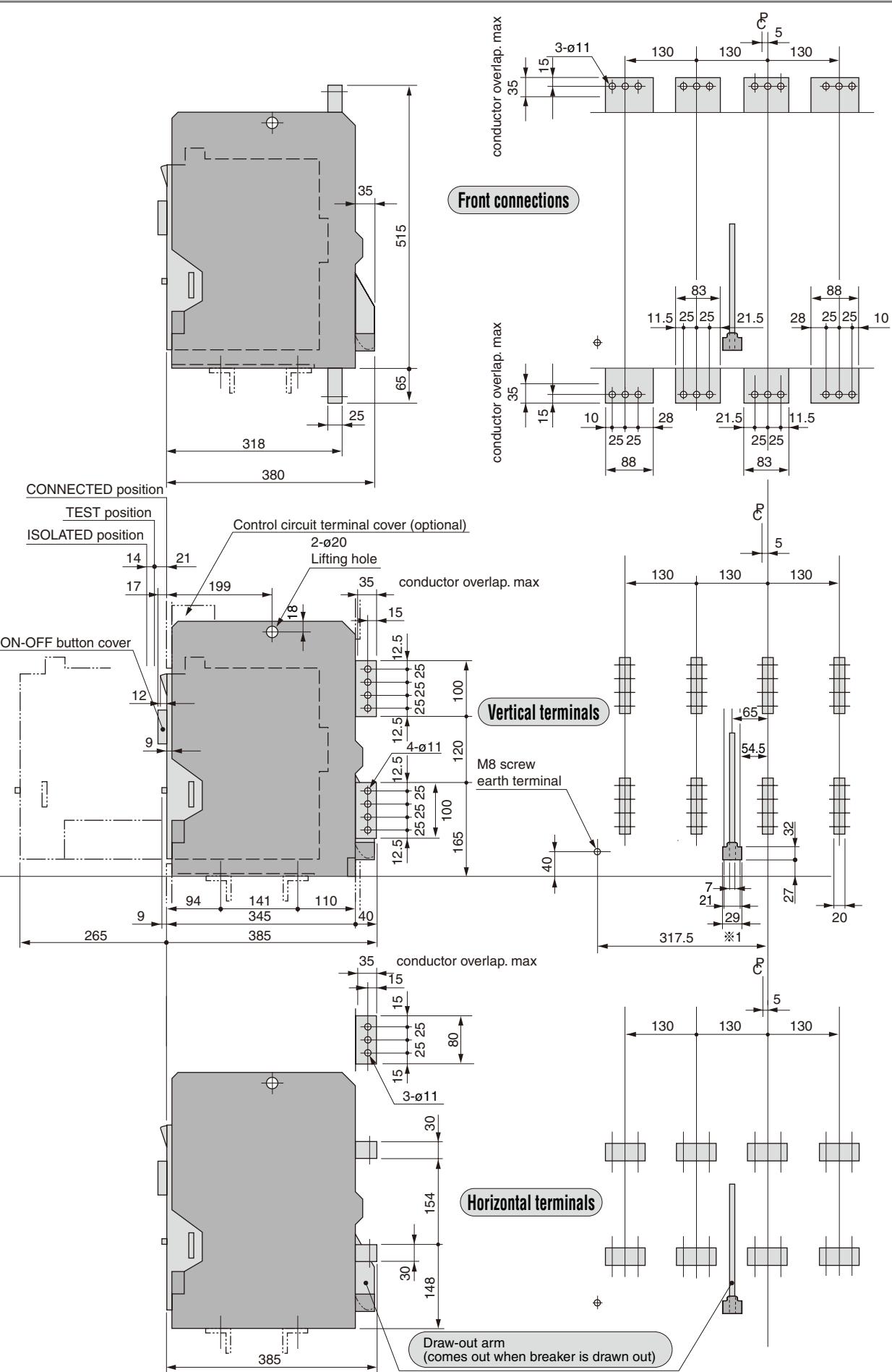


DC Air Circuit Breakerseakers

Outline Dimensions

• Type AR325-NDH Draw-out type

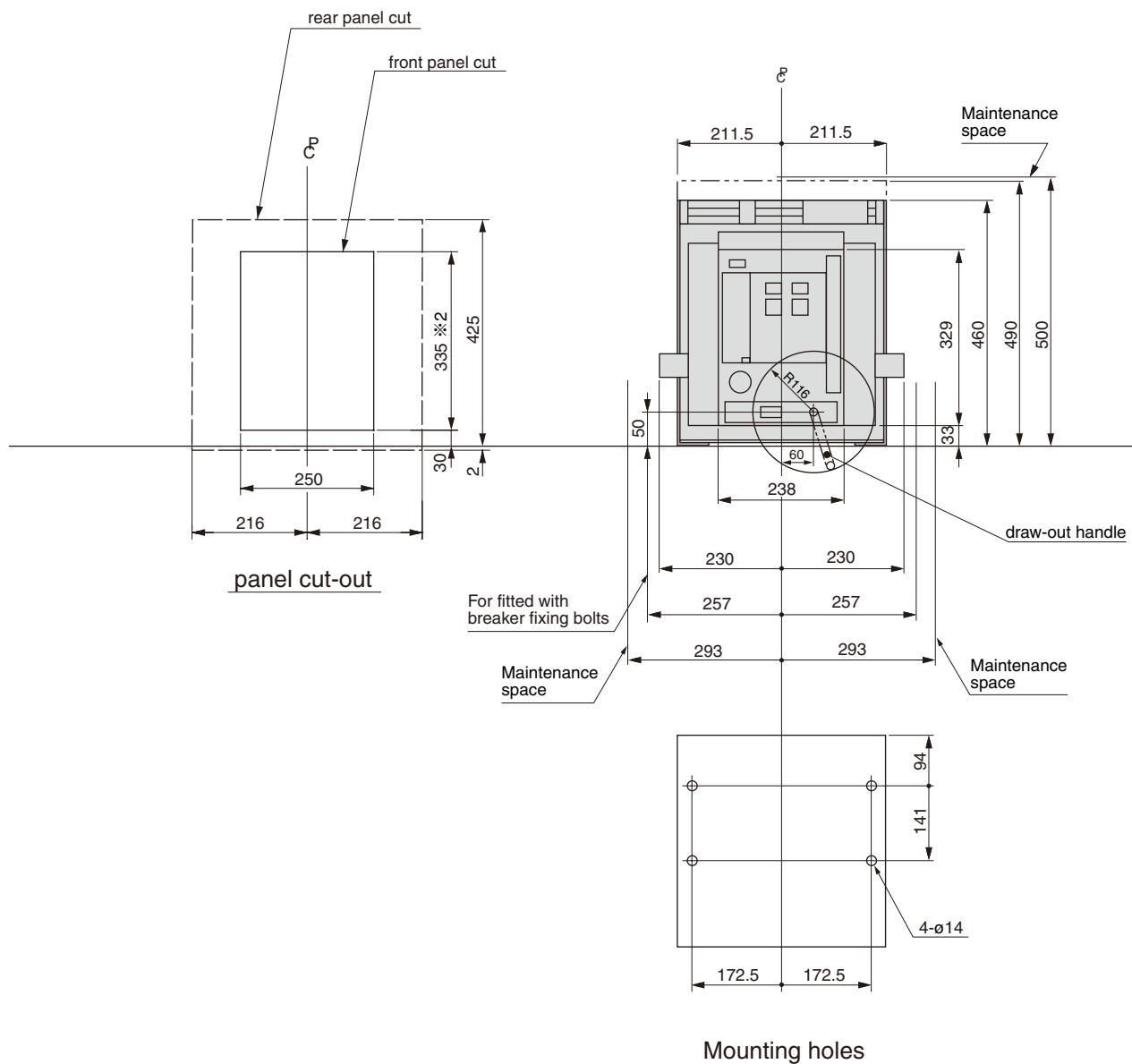




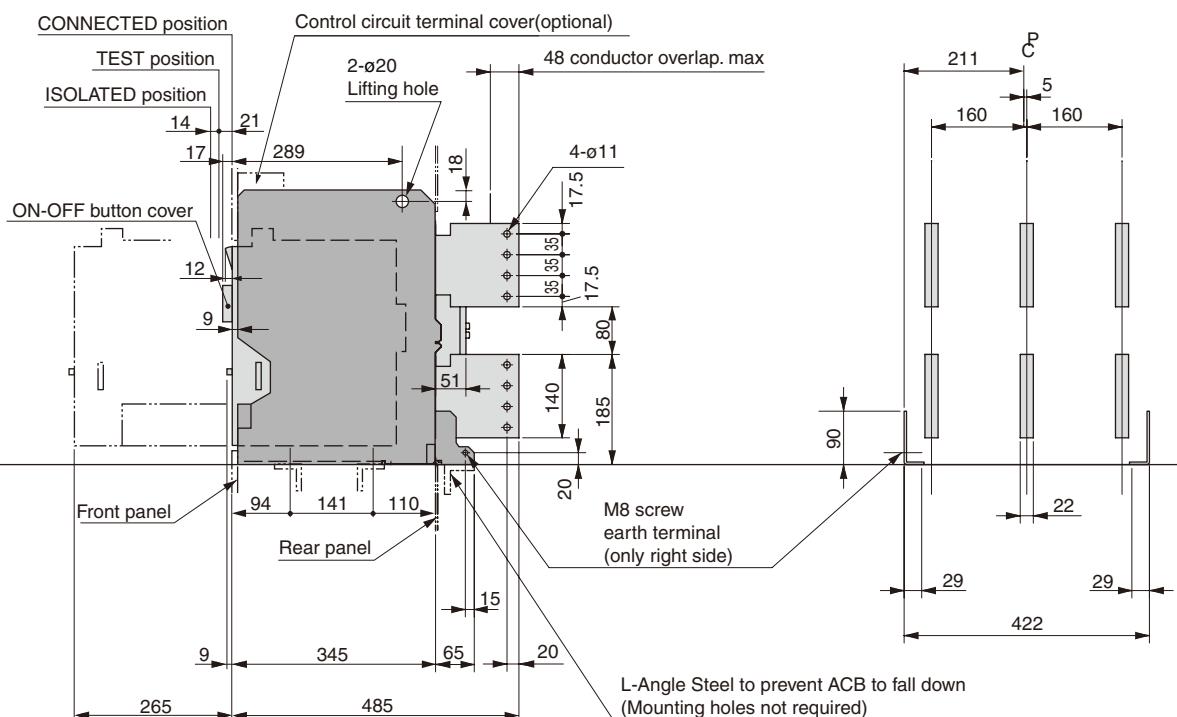
DC Air Circuit Breakerseakers

Outline Dimensions

• Type AR440SB Draw-out type



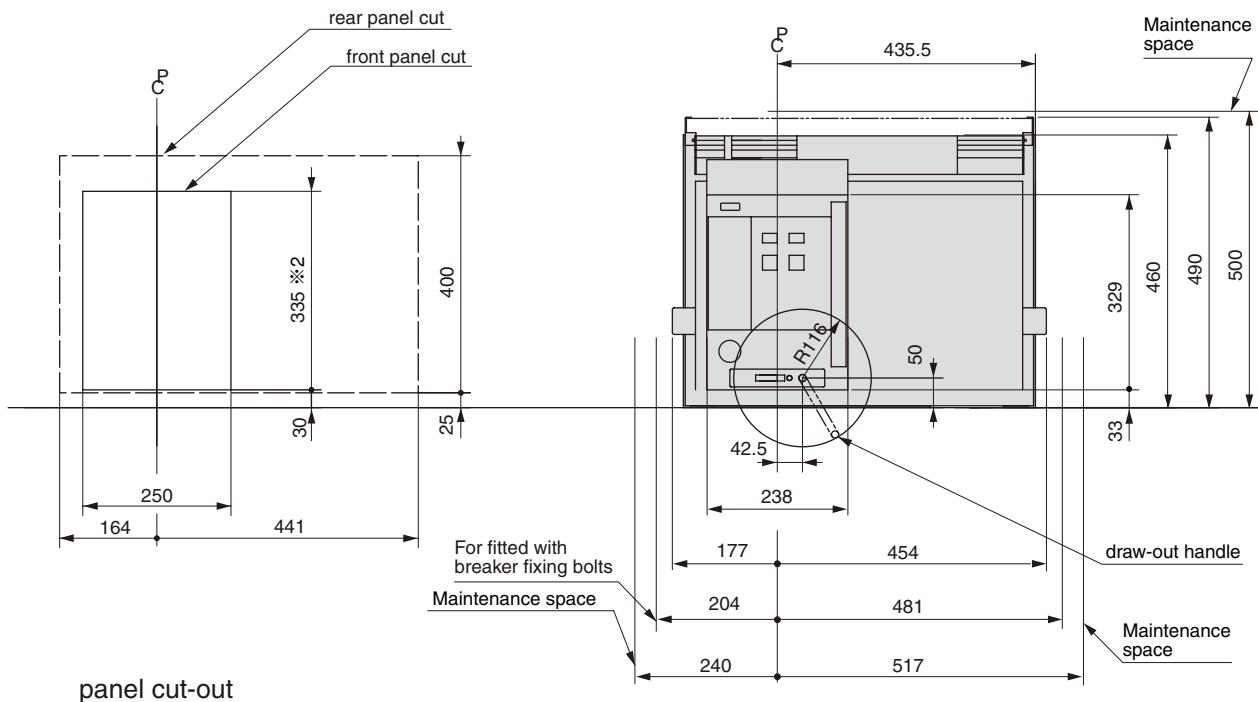
※2 : Panel cut should be 339 mm not 335 mm when the door flange is used.



DC Air Circuit Breakerseakers

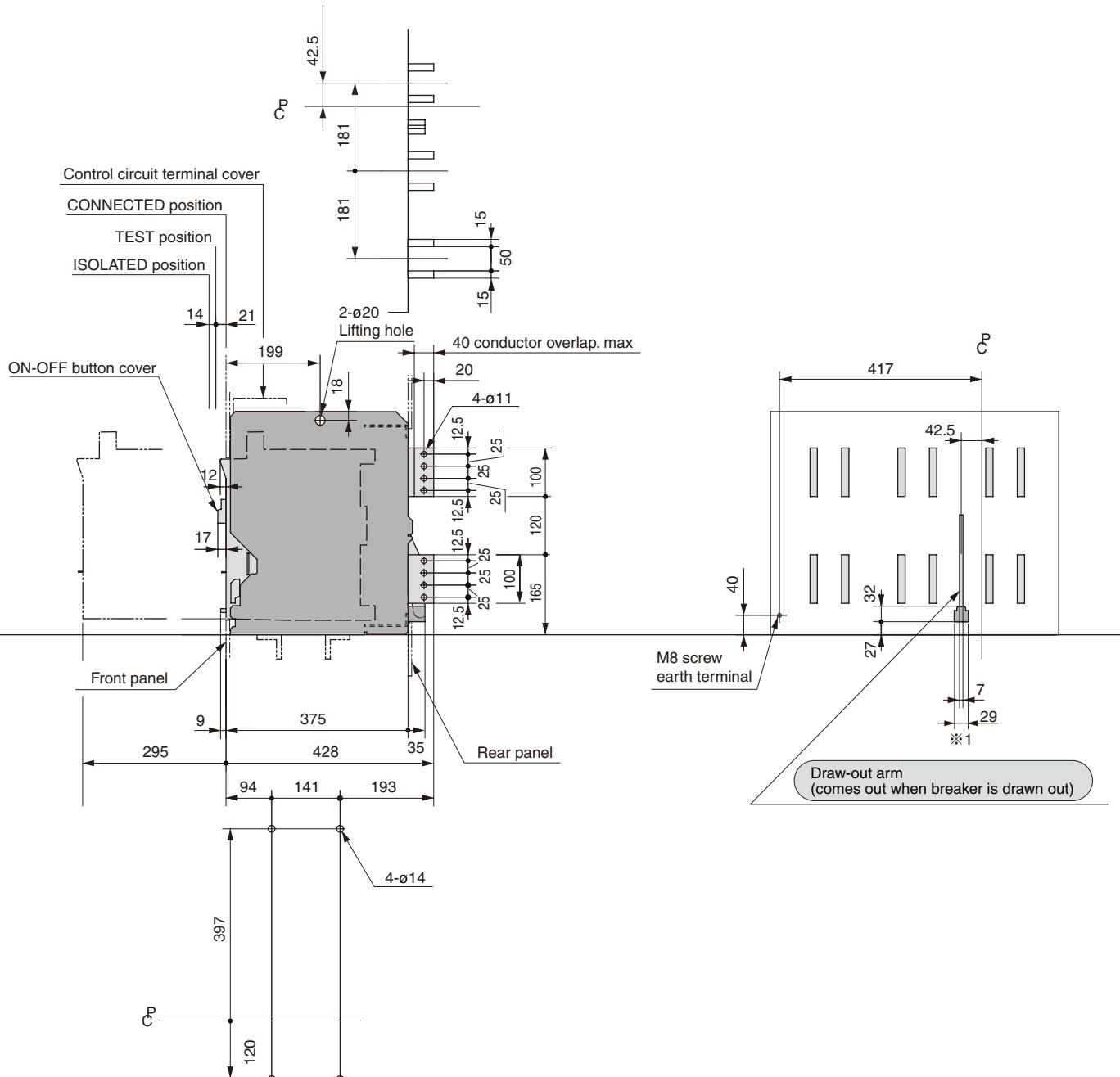
Outline Dimensions

• Type AR440S Draw-out type



※1 : Conductors including connecting bolts should be separated min-7mm from Draw-out arm.

※2 : Panel cut should be 339 mm not 335 mm when the door flange is used.



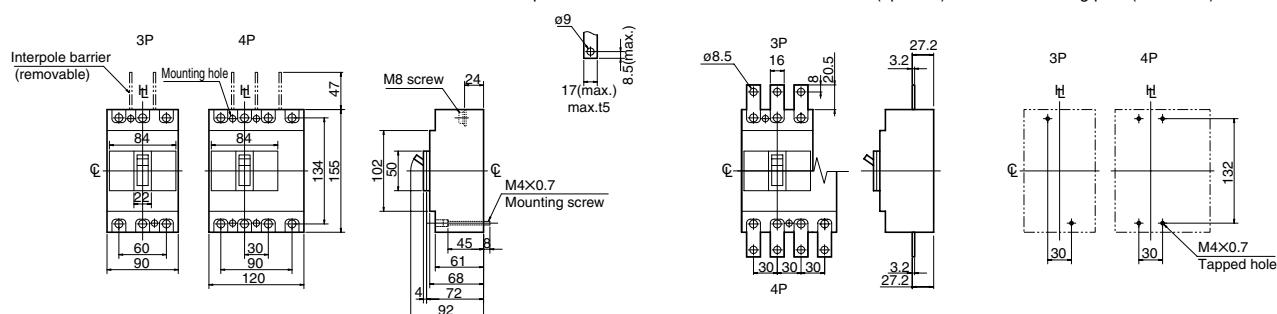
DC Moulded Case Circuit Breakers

ASL: Arrangement Standard Line
 H: Handle Frame Centre Line C: Handle Centre Line

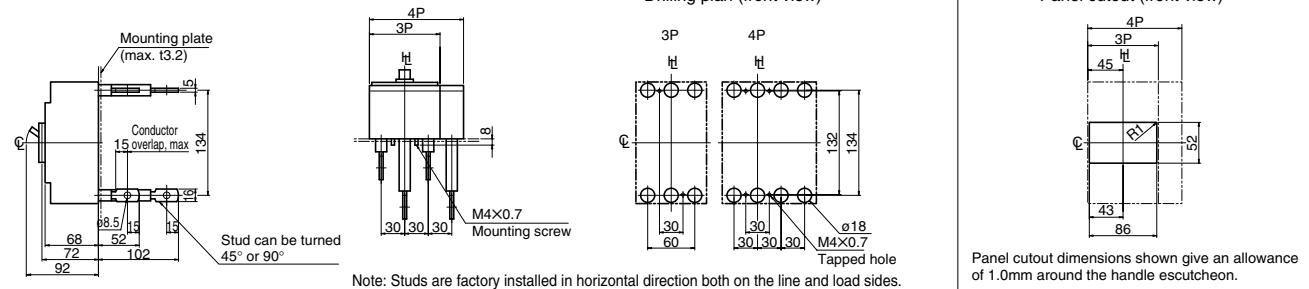
Outline dimensions (mm)

S50-GD

Front-connected



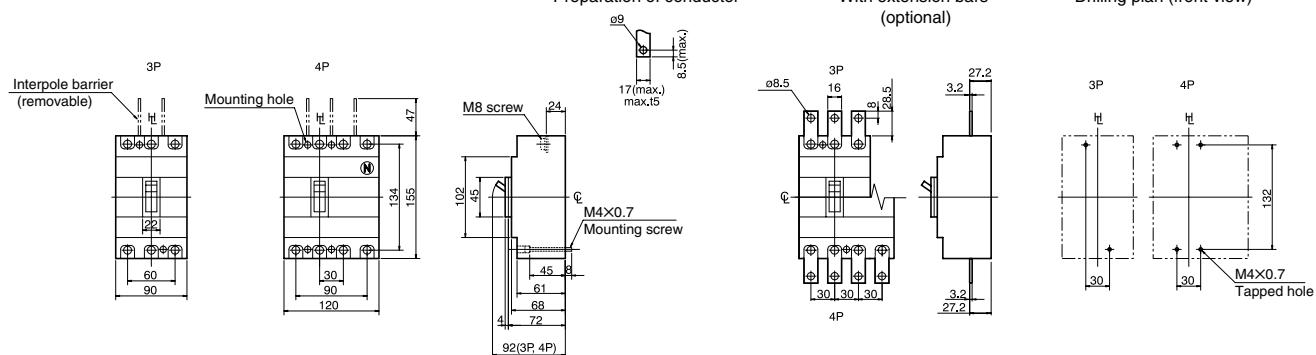
Rear-connected



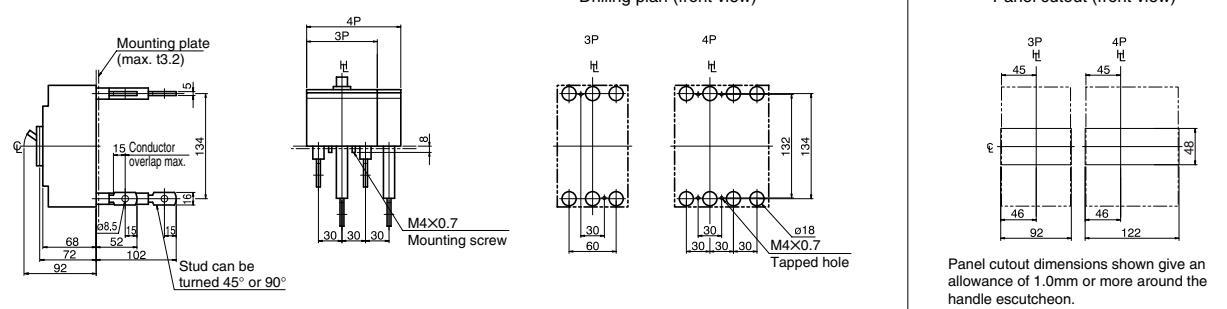
Outline dimensions (mm)

S125-ND

Front-connected



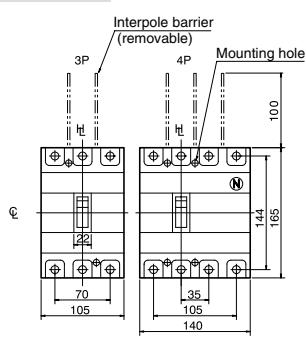
Rear-connected



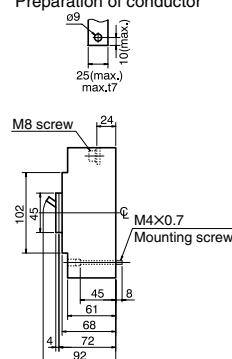
Outline dimensions (mm)

S160-ND, S250-ND

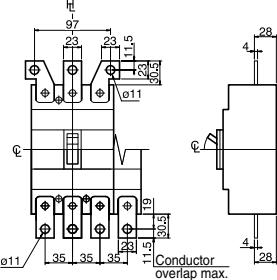
Front-connected



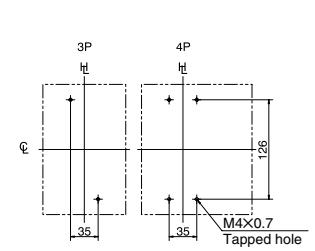
Preparation of conductor



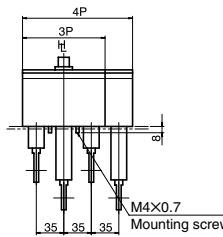
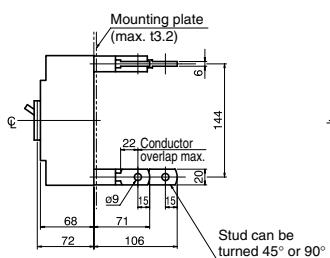
With extension bars (optional)



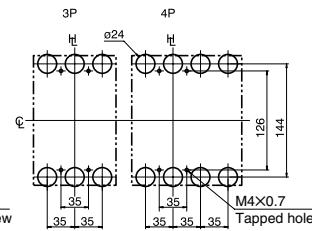
Drilling plan (front view)



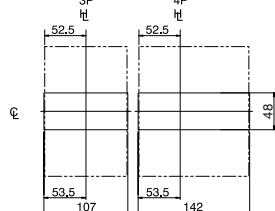
Rear-connected



Drilling plan (front view)



Panel cutout (front view)



DC Moulded Case Circuit Breakers

ASL: Arrangement Standard Line

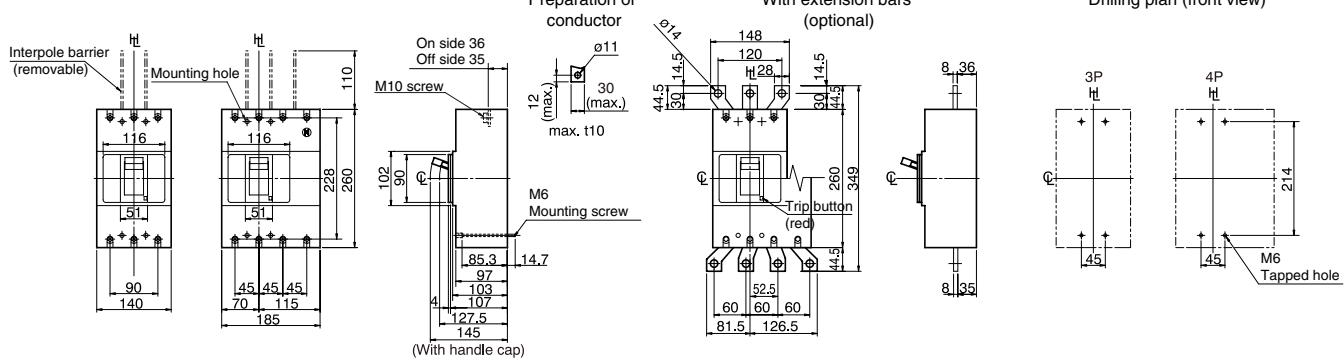
H: Handle Frame Centre Line

C: Handle Centre Line

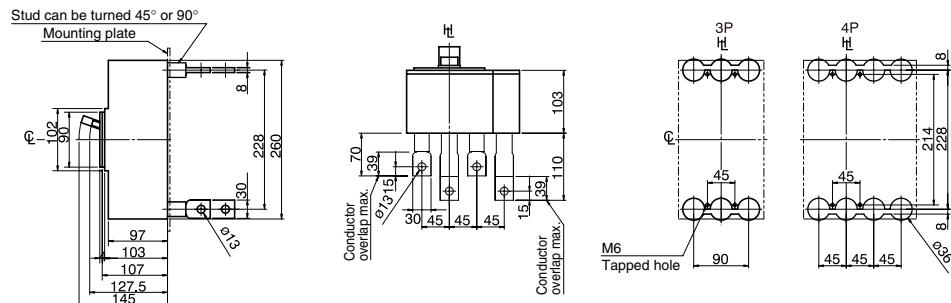
Outline dimensions (mm)

S400-ND

Front-connected

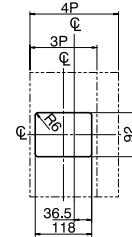


Rear-connected



Drilling plan (front view)

Panel cutout (front view)

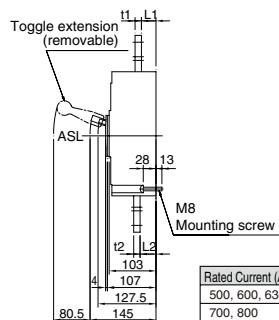
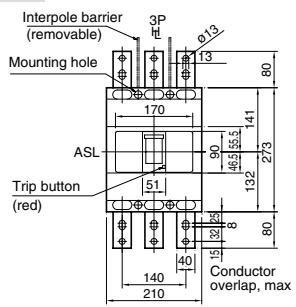


Panel cutout dimensions shown
give an allowance of 1.0mm
around the handle escutcheon.

Outline dimensions (mm)

S800-ND

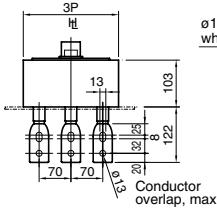
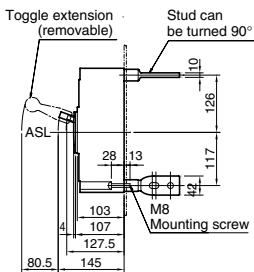
Front-connected



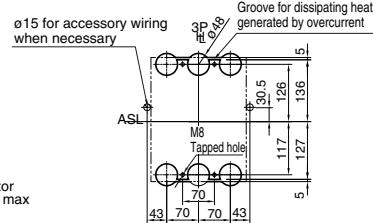
Drilling plan (front view)

Rated Current (A)	L1	L2	t1	t2
500, 600, 630	32	34	8	8
700, 800	32	35	10	10

Rear-connected

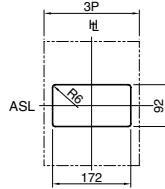


Drilling plan (front view)



Drill for accessory wiring when necessary

Panel cutout (front view)



Panel cutout dimensions shown give an allowance of 1.0mm around the handle escutcheon.

Note: Studs are factory installed in horizontal direction both on the line and load sides.

DC Moulded Case Circuit Breakers

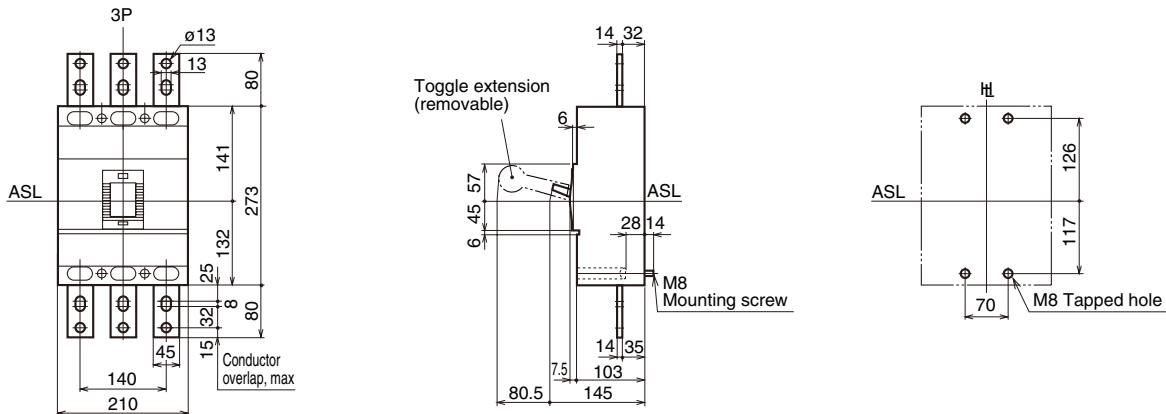
ASL: Arrangement Standard Line
 H: Handle Frame Centre Line C: Handle Centre Line

Outline dimensions (mm)

XS1000ND

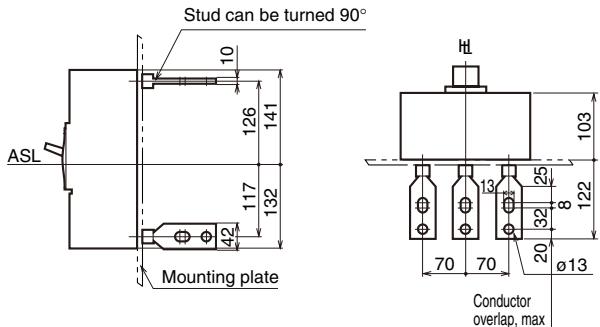
Front-connected

Drilling plan (front view)



Rear-connected

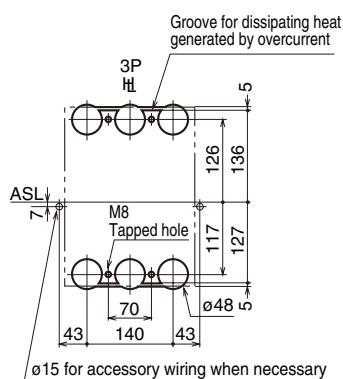
Drilling plan (front view)



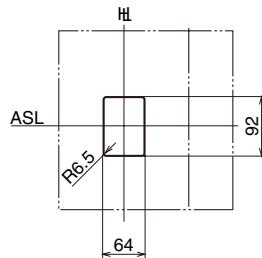
Note: Studs are factory installed in horizontal direction both on the line and load sides.

Note: 2pole breaker is a 3pole breaker with the centre pole omitted.

Panel cutout (front view)

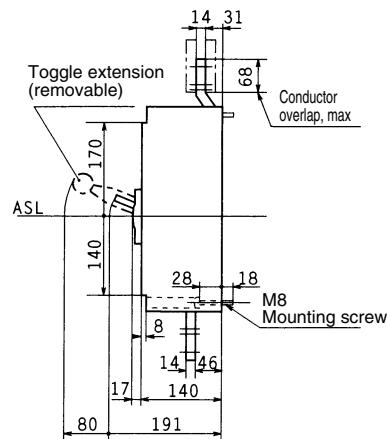
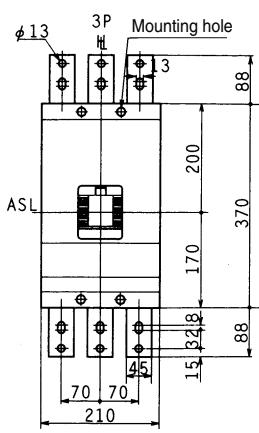


Panel cutout dimensions shown give an allowance of 1.0mm around the handle escutcheon.

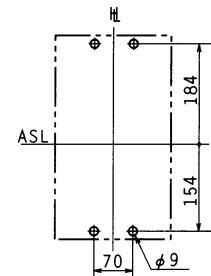


Outline dimensions (mm)

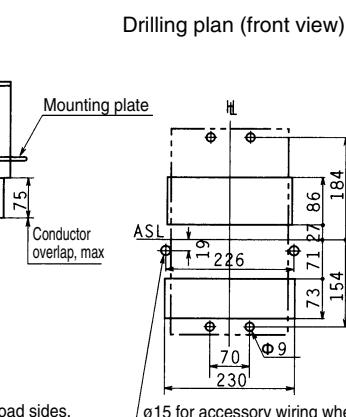
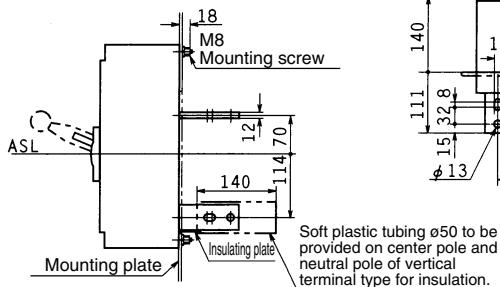
Front-connected



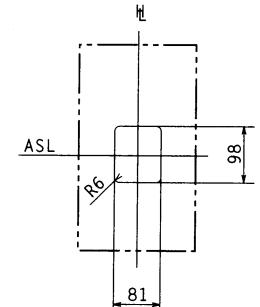
Drilling plan (front view)



Rear-connected



Drilling plan (front view)



Panel cutout dimensions shown give an allowance of 1.5mm around the handle escutcheon.

Note: 2pole breaker is a 3pole breaker with the centre pole omitted.

DC Moulded Case Circuit Breakers

ASL: Arrangement Standard Line

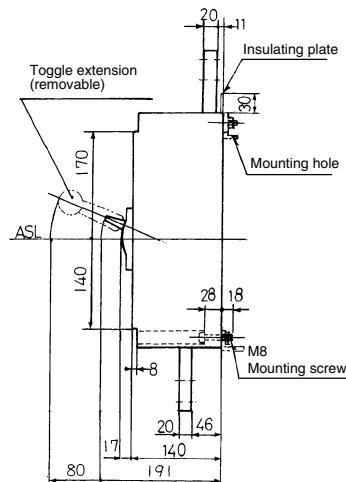
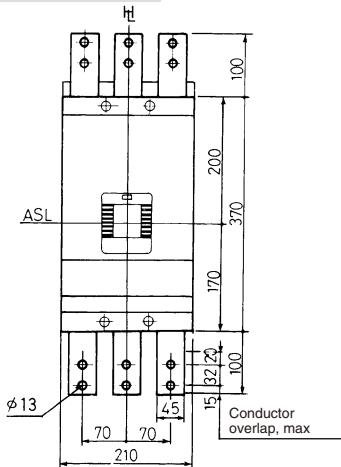
H: Handle Frame Centre Line

C: Handle Centre Line

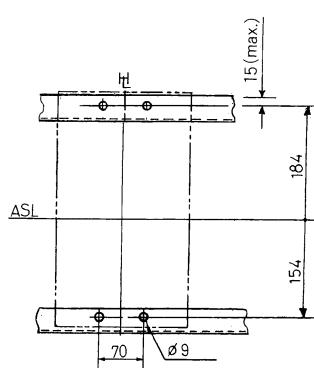
Outline dimensions (mm)

XS1600ND

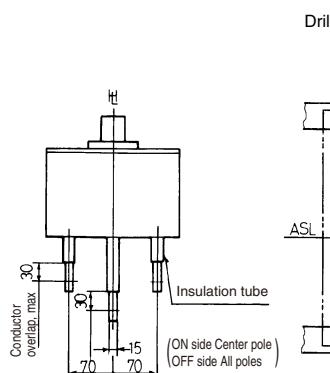
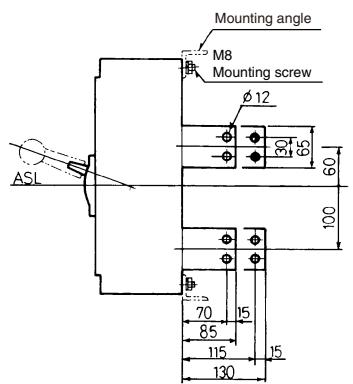
Front-connected



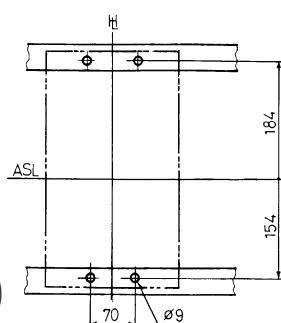
Drilling plan (front view)



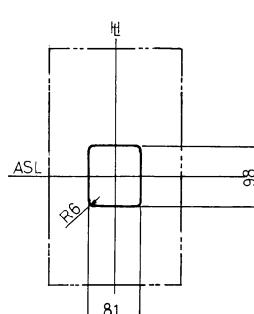
Rear-connected



Drilling plan (front view)

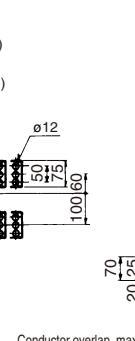
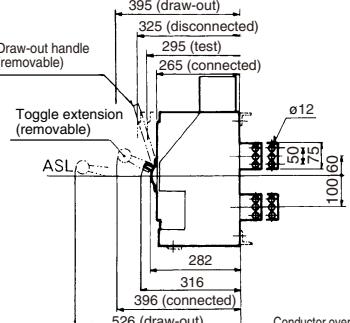
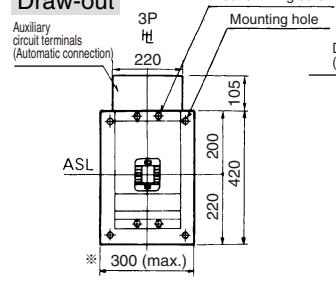


Panel cutout (front view)

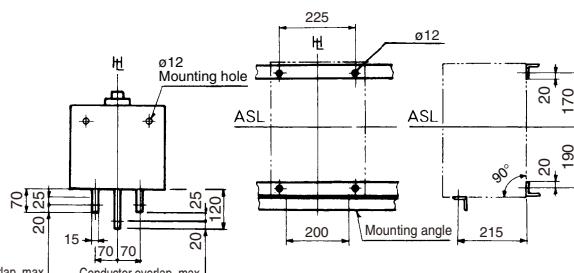


Panel cutout dimensions shown give an allowance of 1.5mm around the handle escutcheon.

Draw-out



Drilling plan (front view)



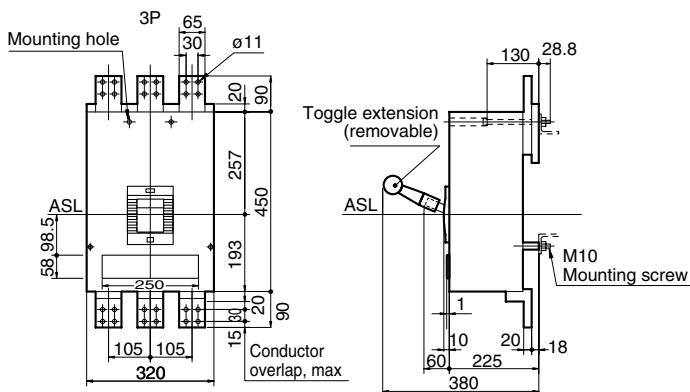
*Contact TERASAKI if manual connection is required.

Note: 2pole breaker is a 3pole breaker with the centre pole omitted.

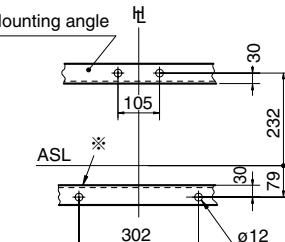
Outline dimensions (mm)

XS2000ND

Front-connected

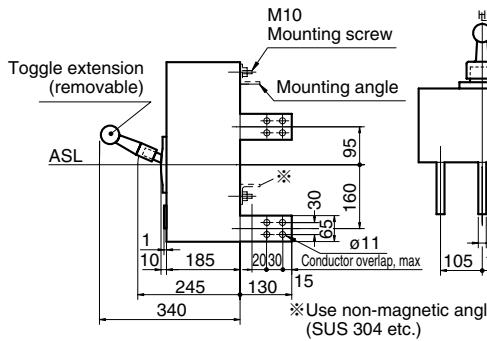


Drilling plan (front view)

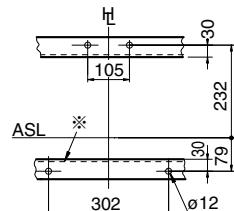


*Use non-magnetic angle (SUS 304 etc.)

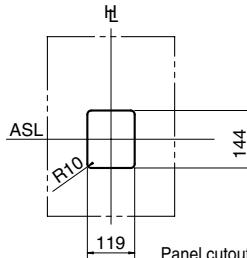
Rear-connected



Drilling plan (front view)

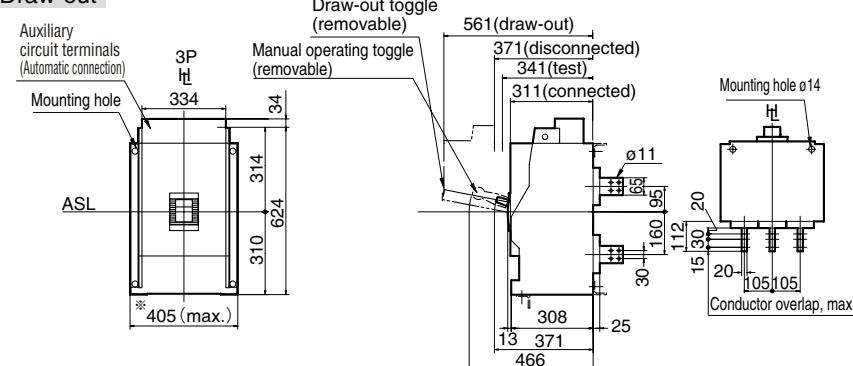


Panel cutout (front view)



Panel cutout dimensions shown give an allowance of 2mm around the handle escutcheon.

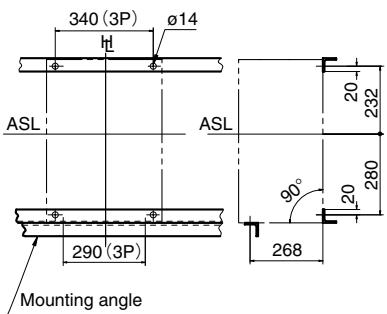
Draw-out



*Contact TERASAKI if manual connection is required.

Note: 2pole breaker is a 3pole breaker with the centre pole omitted.

Drilling plan (front view)



DC Moulded Case Circuit Breakers

ASL: Arrangement Standard Line

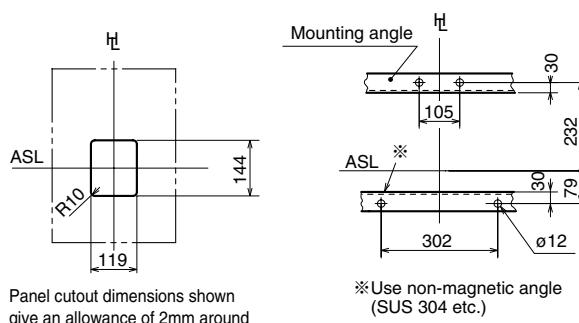
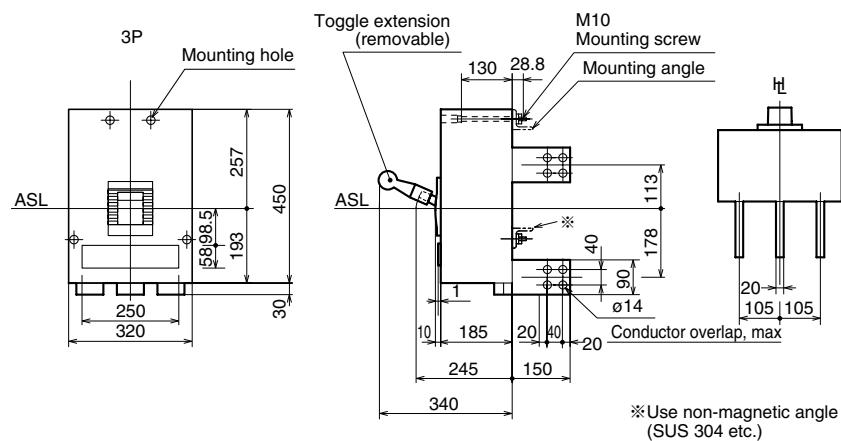
H: Handle Frame Centre Line

C: Handle Centre Line

Outline dimensions (mm)

XS2500ND

Front-connected

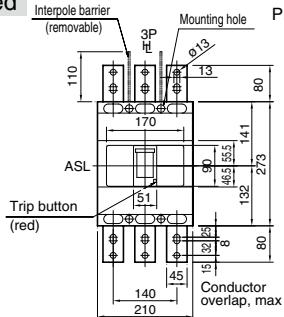


Note: 2pole breaker is a 3pole breaker with the centre pole omitted.

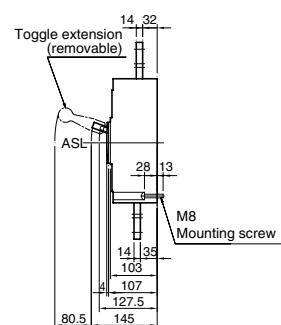
Outline dimensions (mm)

S1000-ND

Front-connected

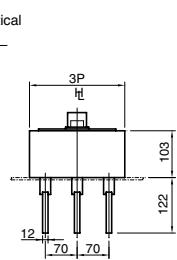
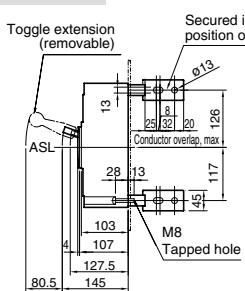


Preparation of conductor



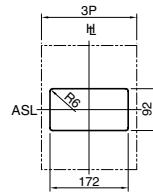
Drilling plan (front view)

Rear-connected



Drilling plan (front view)

Panel cutout (front view)



Note: 2pole breaker is a 3pole breaker with the centre pole omitted.

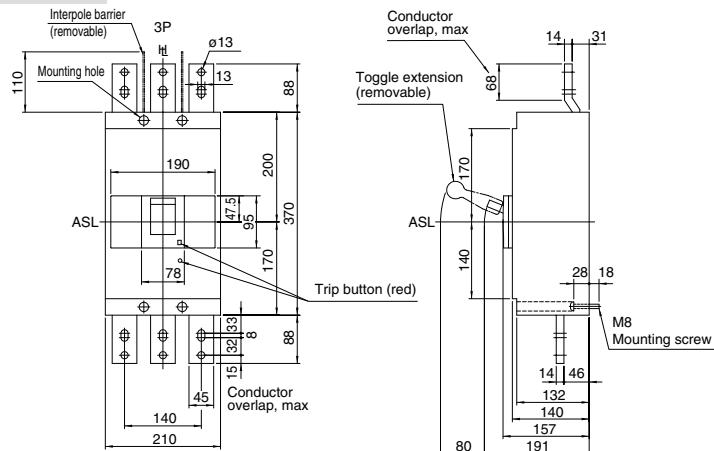
DC Moulded Case Circuit Breakers

ASL: Arrangement Standard Line
 H: Handle Frame Centre Line C: Handle Centre Line

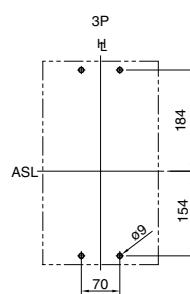
Outline dimensions (mm)

S1250-ND

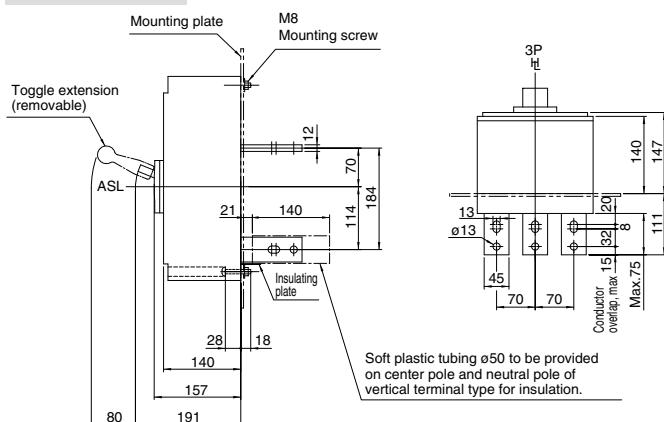
Front-connected



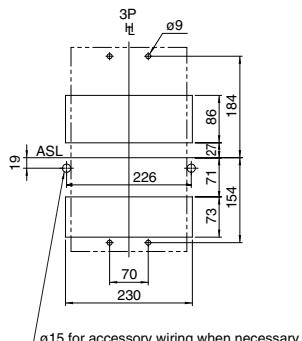
Drilling plan (front view)



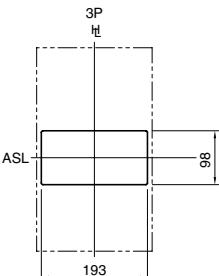
Rear-connected



Drilling plan (front view)



Panel cutout (front view)



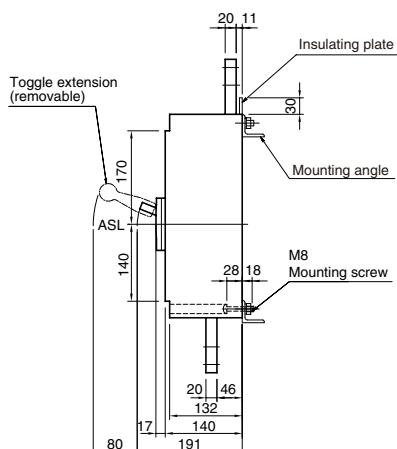
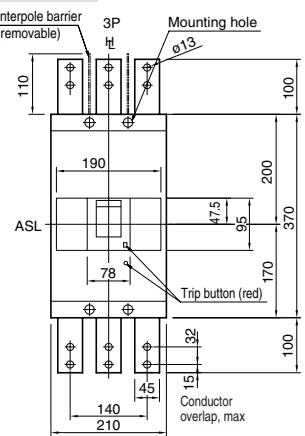
Note: 2pole breaker is a 3pole breaker with the centre pole omitted.

Panel cutout dimensions shown give an allowance of 1.5mm around the handle escutcheon.

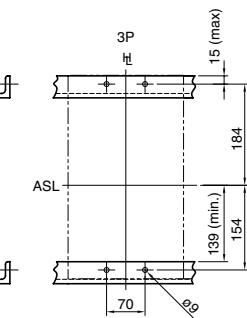
Outline dimensions (mm)

S1600-ND

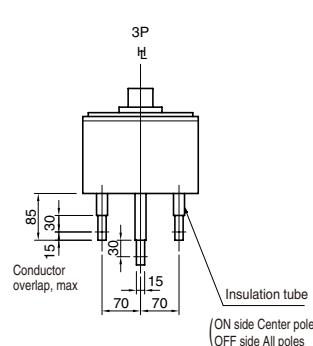
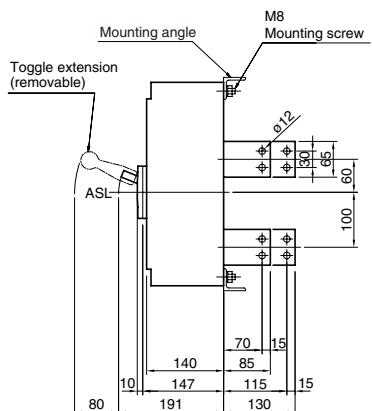
Front-connected



Drilling plan (front view)

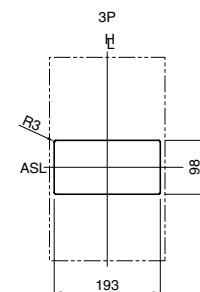


Rear-connected



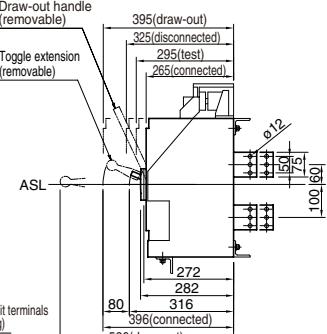
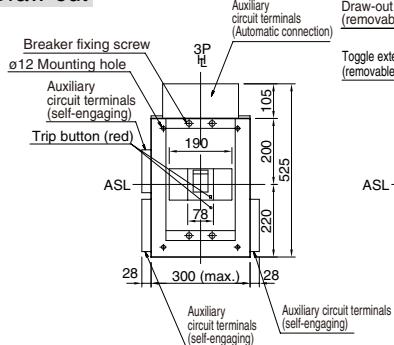
Drilling plan (front view)

Panel cutout (front view)

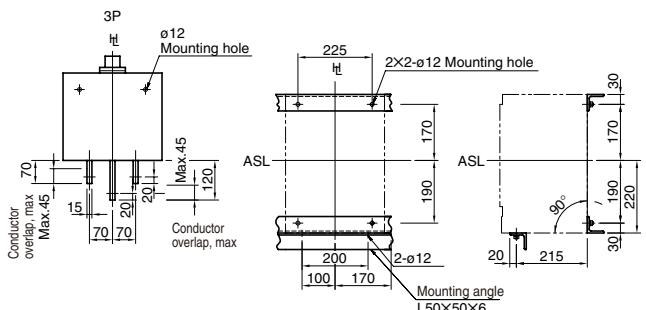


Panel cutout dimensions shown give an allowance of 1.5mm around the handle escutcheon.

Draw-out



Drilling plan (front view)



Note: 2pole breaker is a 3pole breaker with the centre pole omitted.

DC Molded Case Circuit Breakers

ASL: Arrangement Standard Line

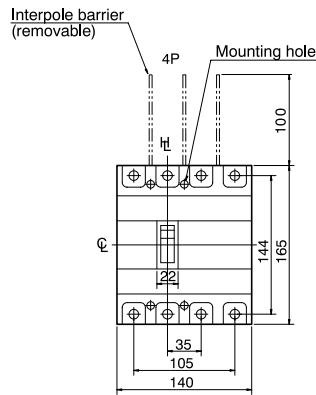
H: Handle Frame Centre Line

C: Handle Centre Line

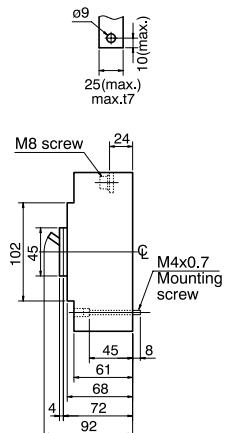
Outline dimensions (mm)

PVS160-NNL

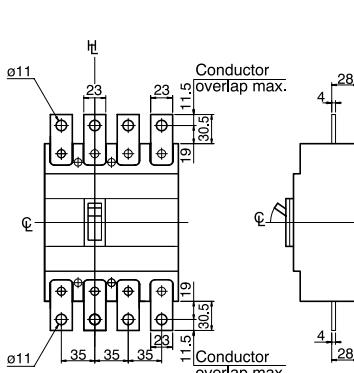
Front-connected



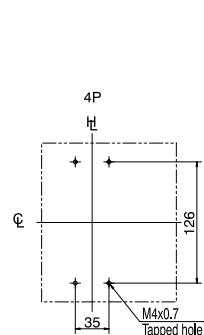
Preparation of conductor



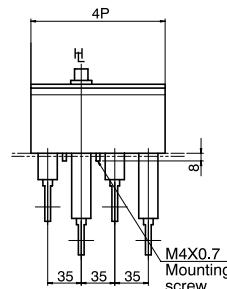
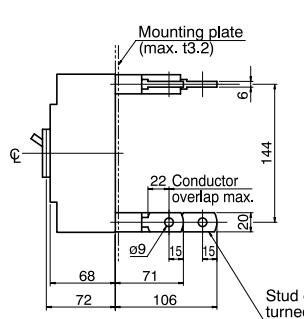
With extension bars (optional)



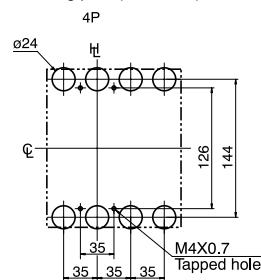
Drilling plan (front view)



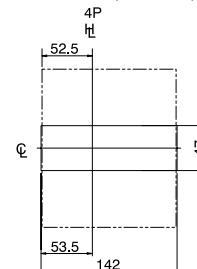
Rear-connected



Drilling plan (front view)



Panel cutout (front view)

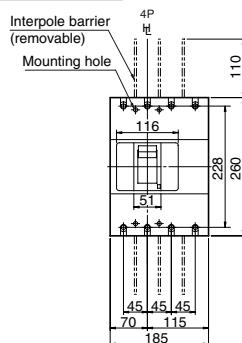


Panel cutout dimensions shown give an allowance of 1.0mm around the handle escutcheon.

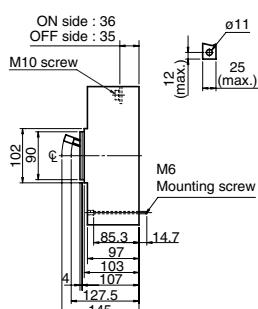
Outline dimensions (mm)

PVS400-NDL, PVS400-NDH, PVS400-NNL, PVS400-NNH

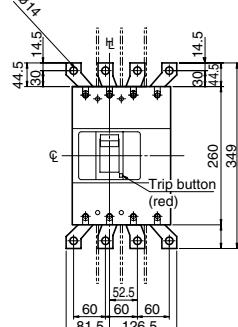
Front-connected



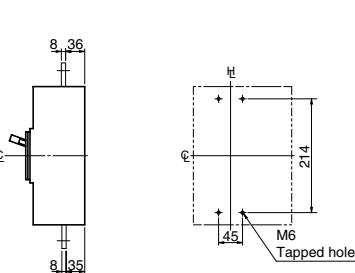
Preparation of conductor



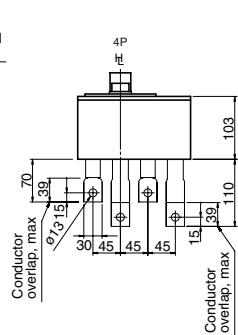
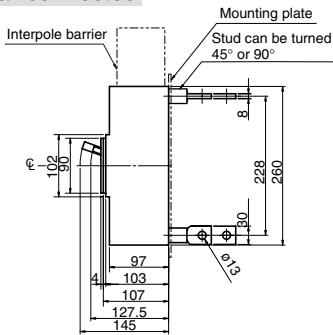
With extension bars (optional)



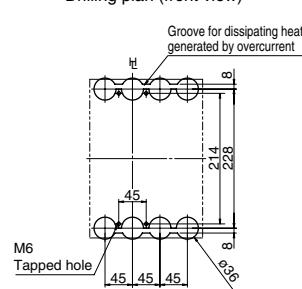
Drilling plan (front view)



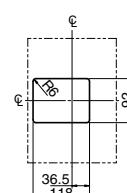
Rear-connected



Drilling plan (front view)



Panel cutout (front view)



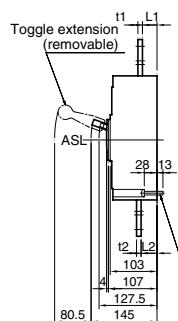
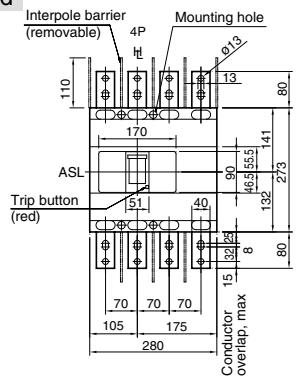
Note: Studs are factory installed in horizontal direction both on the line and load sides.

Panel cutout dimensions shown give an allowance of 1.0mm around the handle escutcheon.

Outline dimensions (mm)

PVS800-NDL, PVS800-NDH, PVS800-NNL, PVS800-NNH

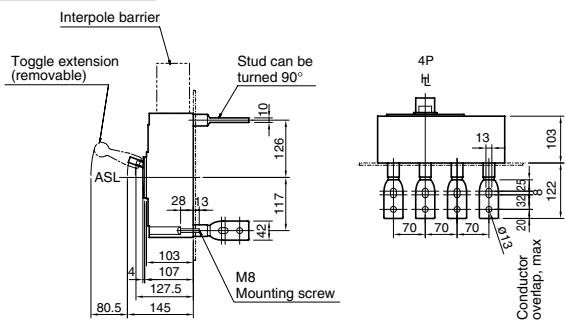
Front-connected



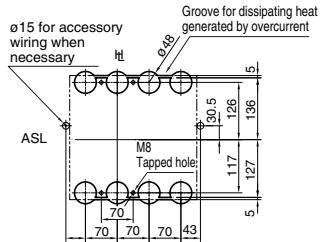
Drilling plan (front view)

Rated Current (A)	L1	L2	t1	t2
500, 600, 630	32	34	8	8
700, 800	32	35	10	10

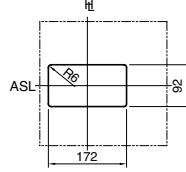
Rear-connected



Drilling plan (front view)



Panel cutout (front view)



Note: Studs are factory installed in horizontal direction both on the line and load sides.

Panel cutout dimensions shown give an allowance of 1.0mm around the handle escutcheon.

MEMO

MEMO

5

Outline Dimensions



TERASAKI ELECTRIC EUROPE LTD.

79 Beardmore Way, Clydebank Industrial Estate
Clydebank, Glasgow, G81 4HT, Scotland (UK)
Telephone: 44-141-941-1940
Fax: 44-141-952-9246
Email: marketing@terasaki.co.uk
<http://www.terasaki.com/>

TERASAKI ITALIA S.R.L.

Via Ambrosoli, 4A-20090 Rodano, Milano, Italy
Telephone: 39-02-92278300
Fax: 39-02-92278320
Email: terasaki@terasaki.it
<http://www.terasaki.it/>

TERASAKI ESPAÑA S.A.U.

C/ Galileu Galilei, 19-21 P. Ind. Coll De La Manya
E-08403 Granollers Barcelona, Spain
Telephone: 34-93-879-60-50
Fax: 34-93-870-39-05
Email: terasaki@terasaki.es
<http://www.terasaki.es/>

TERASAKI SKANDINAViska AB

Box 2082 SE-128 22 Skarpnäk Sweden
Telephone: 46-8-556-282-30
Fax: 46-8-556-282-39
Email: info@terasaki.se
<http://www.terasaki.se/>

TERASAKI CIRCUIT BREAKERS (S) PTE. LTD.

9 Toh Guan Road East 03-01 Alliance Building
Singapore 608604
Telephone: 65-6425-4915
Fax: 65-6425-4351
Email: tec@pacific.net.sg

TERASAKI ELECTRIC (M) SDN. BHD.

Lot 3, Jalan 16/13D, 40000 Shah Alam, Selangor Darul Ehsan, Malaysia
Telephone: 60-3-5549-3820
Fax: 60-3-5549-3960
Email: terasaki@terasaki.com.my

TERASAKI DO BRASIL LTDA.

Rua Cordovil, 259-Parada De Lucas, 21250-450
Rio De Janeiro-R.J., Brazil
Telephone: 55-21-3301-9898
Fax: 55-21-3301-9861
Email: terasaki@terasaki.com.br
<http://www.terasaki.com.br>

TERASAKI ELECTRIC (CHINA) LTD.

72 Pacific Industrial Park, Xin Tang Zengcheng,
Guangzhou 511340, China
Telephone: 86-20-8270-8556
Fax: 86-20-8270-8586
Email: terasaki@public.guangzhou.gd.cn

TERASAKI ELECTRIC GROUP SHANGHAI REPRESENTATIVE OFFICE

Room No. 1405-6, Tomson Commercial Building
710 Dong Fang Road, Pudong, Shanghai, 200122, China
Telephone: 86-21-58201611
Fax: 86-21-58201621
Email: terasaki@vip.163.com

TERASAKI ELECTRIC CO., LTD.

Head Office: 7-2-10 Hannancho, Abenoku
Osaka, Japan
Circuit Breaker Division: 7-2-10 Kamehigashi, Hiranoku Osaka, Japan
Telephone: 81-6-6791-9323
Fax: 81-6-6791-9274
Email: int-sales@terasaki.co.jp
<http://www.terasaki.co.jp/>