

YASKAWA

MEDIUM/LARGE-CAPACITY DIGITAL THYRISTOR CONVERTER VARISPEED-590

MODEL: CDMR-D9

460V 80 to 1650A
780V 680 to 3510A



Certified for
ISO9001 and
ISO14001



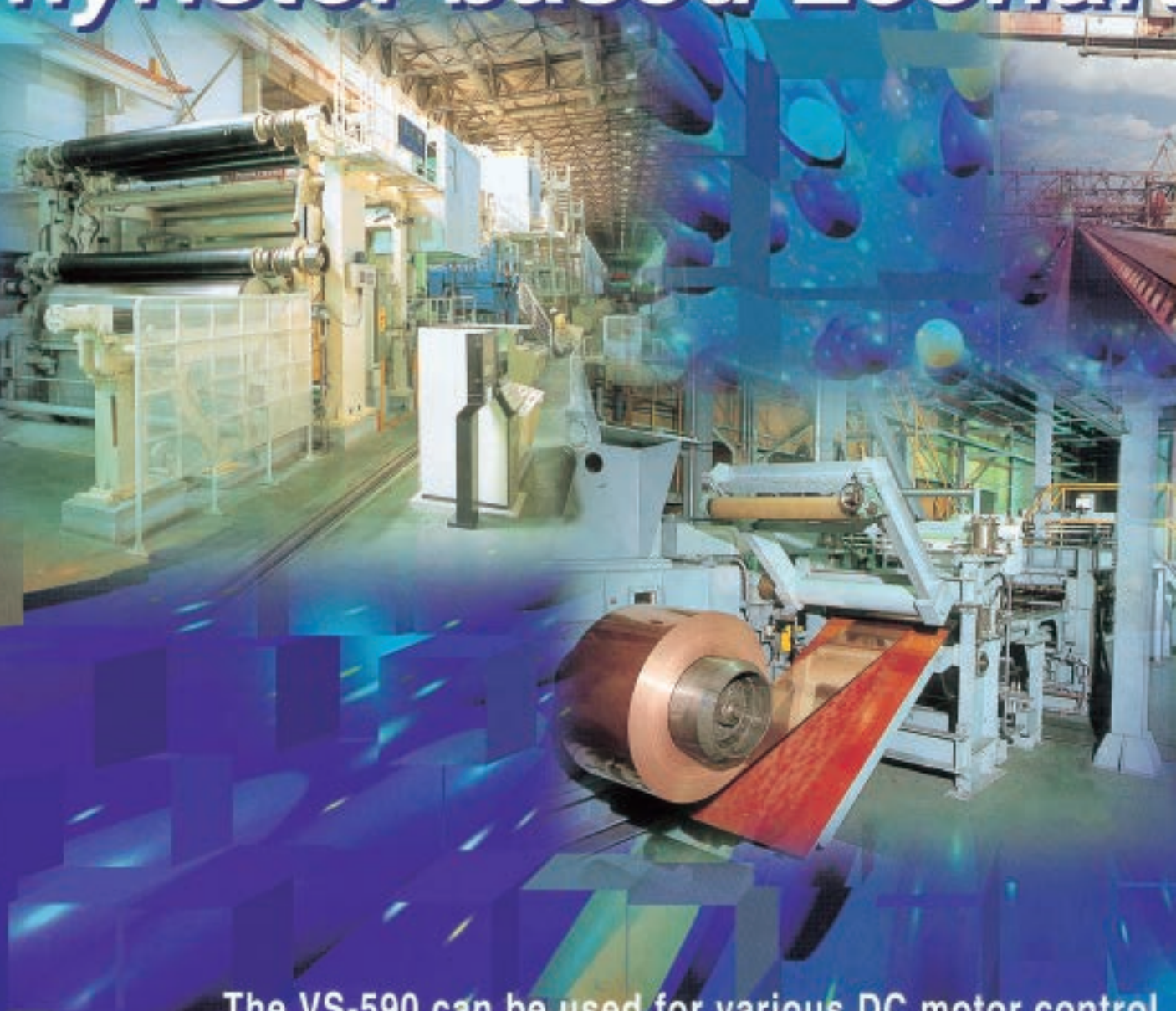
QUALITY SYSTEM



ENVIRONMENTAL SYSTEM

JQA-2800 JQA-EM0202

Achieving the Most Advanced Thyristor based Leonard



The VS-590 can be used for various DC motor control

This high-performance digital thyristor converter unit, the VARISPEED-590 (VS-590), integrates basic and variable speed operation with digital system control to meet every customer's need.

The VS-590 enhances overall system performance with its user friendliness in all areas from programming to maintenance, advanced features that include multi-function inputs/outputs, and a capability of supporting a network based communication protocol. The VS-590 can be used with power supplies that fluctuate greatly because of its unique ability to compensate for disturbances in the power supply.

The VS-590 can be employed to build the most advanced systems of medium- to large-capacity thyristor based leonard drive for various industrial applications.

Advanced Drive

Applications

Suitable for various industrial applications that require high-performance, variable speed DC motor control.

- Processing lines
- Hot rolling mills
- Cold rolling mills
- Cement kilns
- Textile machines
- Loading machines
- Extruders
- Paper mills
- Other applications

Features

(See pages 4 and 5 for details.)

- 1 Functions that can be easily customized
- 2 High-accuracy controls
- 3 Easy maintenance and inspection
- 4 Supports networking



VARISPEED-590

applications

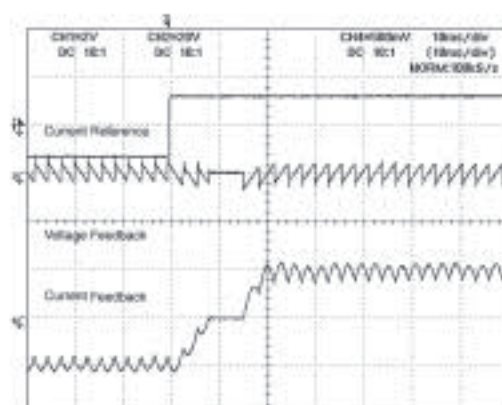
Features

Functions that can be Easily Customized

- Ladder logic based programming function enables you to efficiently achieve the desired control.
- Various control functions (e.g. voltage, current, speed, system barometers) request.

High-accuracy Speed and Current Controls

- Achieves a speed control accuracy of $\pm 0.01\%$.
(Average moving amount per second when speed detector accuracy is $\pm 0.01\%$.)
- Minimizes the forward/reverse run changeover time by its high-speed current control (10 ms or less).
- Achieves high degree of accuracy by calculating real values in its ASR and ACR sections.



Forward/Reverse Run Changeover

Easy Maintenance and Inspection

- Uses high-speed trace (0.1 ms $\times$ 720 samples) to output measured data in chart format. Charts can be recorded using a recorder, and graphs can be viewed on a PC using the EWS CP-717.

Any item of data can be selected arbitrarily.

- Simple operations using the digital operator can be used to control output-voltage and current independently.
- Dividing the thyristor into modules makes replacement of parts easier (only for 460 V 900 A or more).



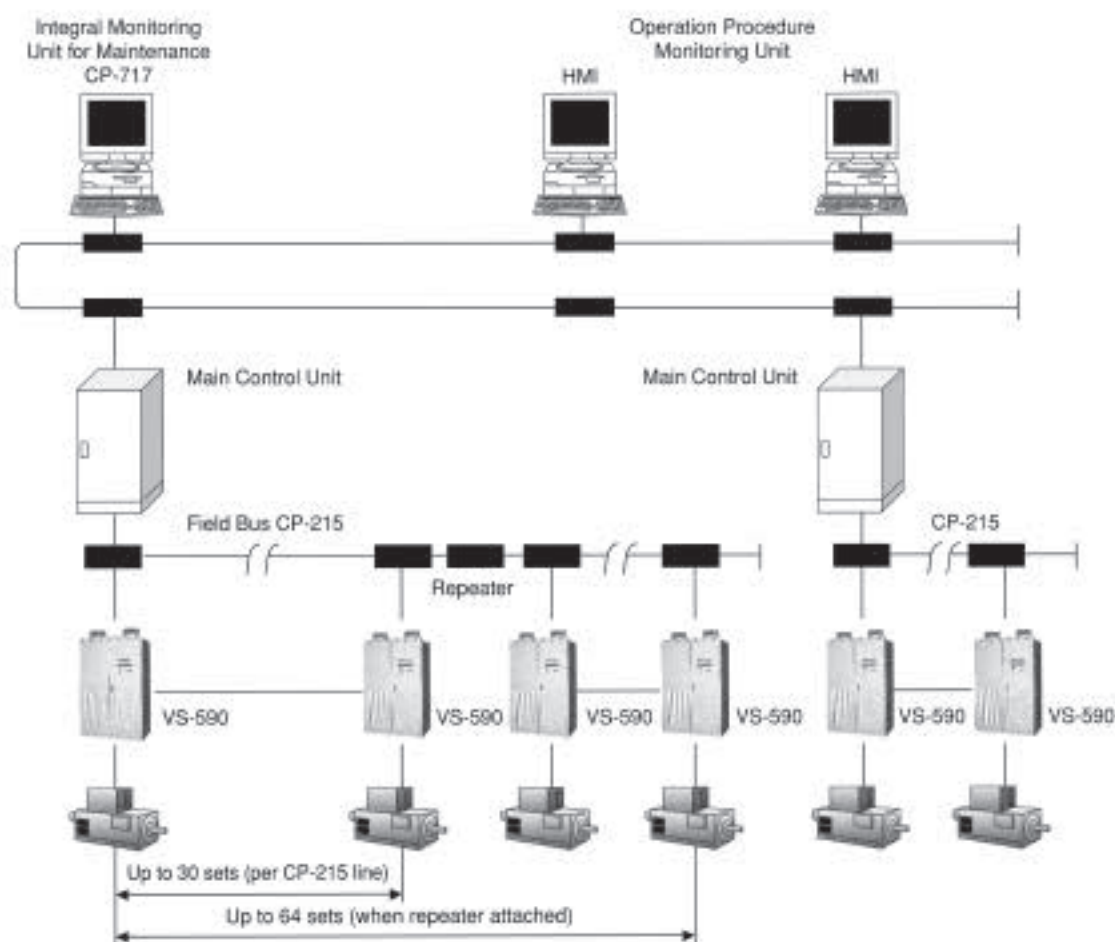
Digital Operator



Thyristor Module

Network Support System

- The VS-590 can be connected easily to the main controller using the CP-215 for high-speed transmissions even if the drives are at different locations.
- Independent adjustment by connecting the CP-717 to the serial communication port of the drive unit or multiple adjustment with the use of CP-215 is possible.



Components

■Engineering workstation (EWS)

CP-717 :

An engineering maintenance tool for controllers. From a single EWS, all controllers on the network can be accessed.

■Human-machine interface (HMI)

Windows*-based HMI designed for general-purpose PC platforms.

* Windows is a registered trademark of Microsoft Corporation.

■Main control unit

A large-capacity system controller which uses common hardware and software to integrate electrical and instrumentation controls.

■Network

CP-215 :

An N:N, high-speed, real-time network with both cyclic and message transfers. Used primarily to interconnect controllers, or HMI or EWS.

Components

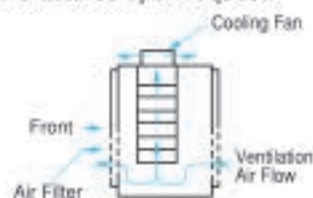
Standard Model

Nominal rated current can be reversed in symmetry or non-symmetry.

Operation Method	Model	Nominal Rated Voltage V	Nominal Rated Current A	Number of Thyristors in Parallel
Reversible Operation	CDMR-D9	460	80 / 80	1 / 1
			200 / 200	
			300 / 300	
			500 / 500	
			900 / 900	
			1500 / 1500	
		780	1650 / 1650	1 / 1
			680 / 680	
			1250 / 680	
			1250 / 1250	
			1800 / 680	
			1800 / 1250	
			1800 / 1800	2 / 1
			2410 / 680	
			2410 / 1250	
			2410 / 1800	2 / 2
			2410 / 2410	
			3510 / 680	2 / 1
			3510 / 1250	
			3510 / 1800	2 / 2
			3510 / 2410	
			3510 / 3510	

Cooling Method of Thyristor Panel

Forced air-cooled type using the cooling fan mounted on the top part of the panel is the standard. For this cooling, clean air (free from harmful gases or dust and dirt) of 40°C or below is needed. The standard ventilation type is indoor suction and indoor discharge of the air. Duct ventilation or duct exhaust can be manufactured upon request.



Example of 780 V Class 2P Type

Main Circuit Wiring Method

- Main Circuit power supply:
Pull-in to panel bottom
- DC output:
Pull-in to panel bottom

Model Designation

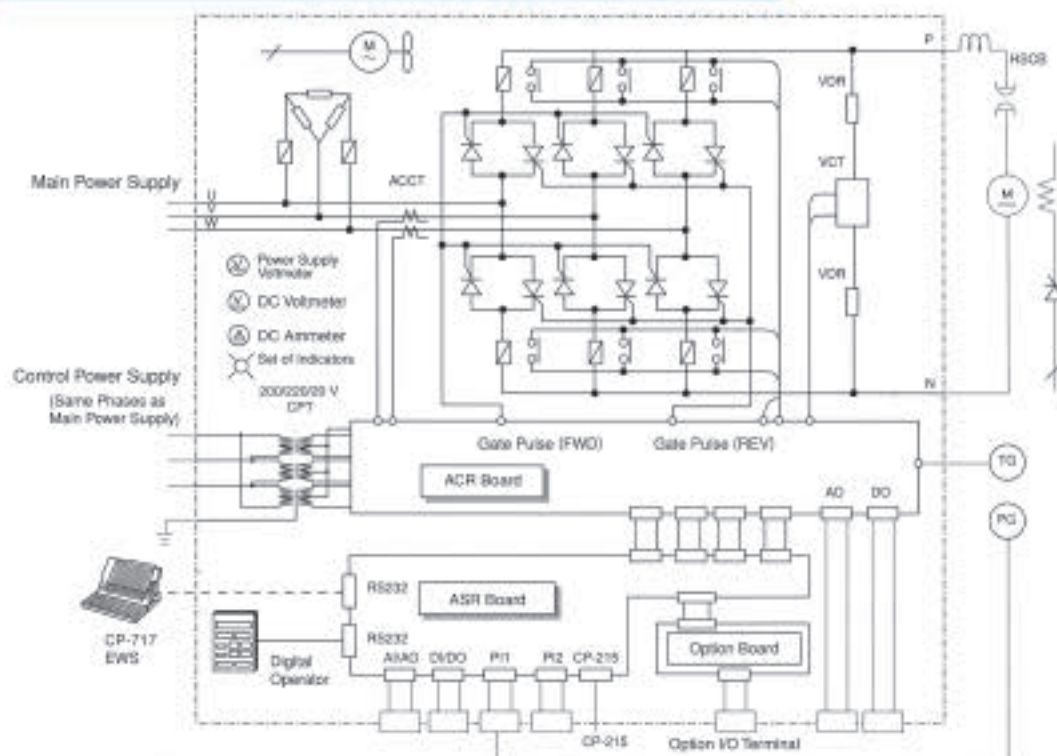
CDMR-D9 V A FAN V

Nominal rated voltage
460 : 460 V
780 : 780 V

Nominal rated current
(Values from the above table will be inserted.)

FAN voltage specification
(FAN voltage will be inserted for some models of 460 V.)

Operation Method (Non-circulation Current Reverse Parallel Connection Method)



* The above diagram shows the basic configuration. Connection configuration or devices provided may differ from the delivered product.

Optional Equipment

Name	Specifications	Mounting
Analog Master Card	4 analog inputs (2 insulation inputs) -10 V to +10 V/11 bits + sign type 8 digital inputs, 24 VDC 10 mA	Only one of the listed option cards can be mounted on the thyristor control section.
CP-215 Transmission Card	1 transmission line Transmission speed 1/2/4 Mbps N:N link transmission, message transmission	

Peripheral Devices

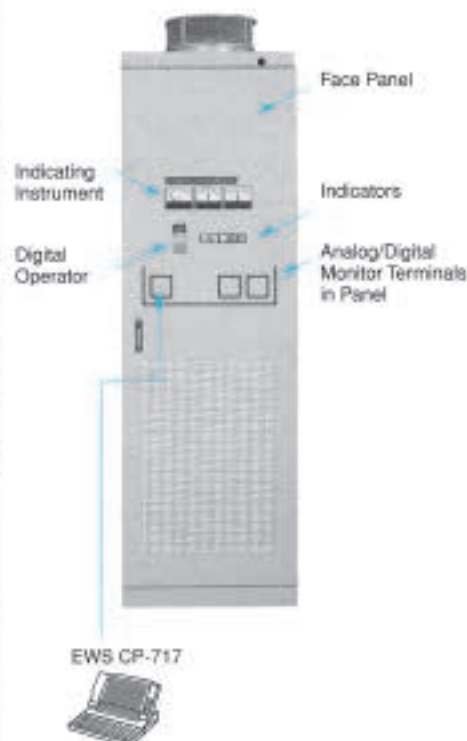
For the 460 V class (standard panel feature for the 780 V class)

Name	Model and Specifications	Remarks
Power Supply Synchronous Transformer	UAB-500VA, Three-phase 220/200/20 V	Control power supply to create synchro signals
Voltage Detector	HC-PSF001V4B15H Input ± 0.1 A/output ± 4 V Withstand voltage: 3000 V	Current/voltage converter (isolated) for DC output voltage detection
Voltage Detection Resistor	SMR90WA4748J 90 W 3 K Ω X2	Coarse current setting resistor for voltage detection
Capacitor for Power Loss	LNT1H333MSM 50 V 33000 μ F	For control power supply backup during power loss
Digital Operator	JVOP-130	For reading/setting of constants, and for test run

Maintenance and Inspection

Location	Name	Function
Face Panel	Indicator Instrument	AC Voltmeter Displays effective value of AC main circuit input power supply.
		DC Voltmeter Indicates average value of thyristor converter output voltage.
		DC Ammeter Indicates average value of thyristor converter output current.
	Indicators	Main Circuit Power Supply Indicator Displays AC main circuit input power supply.
		Control Power Supply Indicator Displays thyristor control power supply.
		Operation Ready Indicates that operations including thyristor converter peripheral devices are ready.
	Digital Operator	Faults (Batch Display) Displays batch faults including thyristor converter peripheral devices.
		Fault Display Displays fault names, order, and history.
		Constant Reading/Setting System constants, Leonard constants
		Variable Reading System variables, Leonard variables
		Reference Reading/Setting Operation references such as speed or current
		Test Run Output voltage, Output current
Interior of Panel	Analog Monitor Terminal	8 monitor outputs such as current reference, output current, voltage, etc. - Any item can be selected for 6 points out of 8. - Measured data and trace-back data outputs can be selected.
	Digital Monitor Terminal	16 monitor outputs such as fault bits, status bits, etc. - Any item can be selected for 4 points out of 16. - Measured data and trace-back data outputs can be selected.
Exclusive EWS Outside of Panel*	EWS CP-717	- Application programming and download/upload to/from ASR board - Reading/setting of constant and variable. - Display of parameters during monitoring/tuning - Trace-back data displayed in graphs or lists - Data sampling every 0.1 ms (720 samples)

* Exclusive EWS CP-717 is optional.



Specifications

460V Class Thyristor Unit

Provided Devices

	Name	Description	Remarks
Main Circuit	Thyristor Converter with Fuses	Three-phase full-wave control, full-wave rectification Reverse parallel connection	
	Cooling Fan		
	Surge Voltage Absorber	Provided at AC and DC sides	
Control Circuit	Molded Case Circuit Breaker	—	Provided in the panel (optional)
	Current Controller (ACR)	Detection circuit, current controller, gate control circuit, voltage detection, DC tachogenerator input terminal	
	System Controller (ASR)	Programming function (equivalent to 10k step), AI/AO/DI/DO/PLG inputs, CP-215 port, programming panel input terminals	
	Option Card	Analog master (AI/DI), CP-215 transmission card	Only one card can be mounted.
Protection	Hardware Detection	Overcurrent detection, overvoltage detection	
	Thermal switch	Detection of temperature rise in panel	Provided in the panel (optional)
	Software Detection	Failures related to AC power supply, overload, overcurrent, overvoltage, self-diagnostics	
Monitoring Devices	Digital Operator	Constant settings, display, etc.	
	AC Voltmeter	For AC circuit	Provided in the panel (optional)
	DC Voltmeter	For DC circuit	
	DC Ammeter	For DC circuit	
Indicators	Power Supply Indication	Main circuit power supply	Provided in the panel (optional)
		Control circuit power supply	
	Sequence Indication	Operation ready	
	Fault Indication	Faults (batch display)	

Specifications of Power Supplies

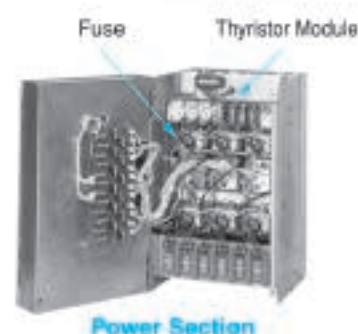
Power Supply	Specifications		Remarks
	Voltage	Frequency	
Main Circuit	Three-phase 340 to 510V	50/60Hz ±5%	
Control Circuit Cooling Fan Circuit	Three-phase 200/220V ±10%	50/60Hz ±5%	Transformer for control circuit is provided in the panel.

Note: For 80A to 900A models, there are two separate models for FAN voltage 200V and 220V.

Rated Current

Nominal Rated Voltage	Nominal Rated Current A	Rated Current A				
		A ₀	A	B ₀	B, C	D, E
460V	80	80	80	60	55	42
	200	200	200	172	159	120
	300	300	300	285	252	192
	500	500	500	430	360	255
	900	900	900	780	720	500
	1500	1500	1500	1190	1030	740
	1650	1650	1650	1440	1330	925

Notes : 1 List of ratings are in accordance with JEC-188A "Thyristor Converters".
2 These rated currents are obtained when the unit intake air is 45°C or below.



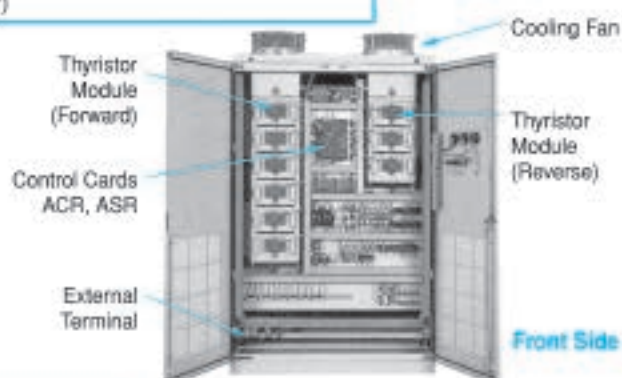
780V Class Thyristor Unit

Provided Devices

	Name	Description
Main Circuit	Thyristor Converter with Fuse	Three-phase full-wave control, full-wave rectification Reverse parallel connection
	Cooling Fan	
	Surge Voltage Absorber	Provided at AC and DC sides
Control Circuit	Molded Case Circuit Breaker	
	DC Power Supply for Control	
	Current Controller (ACR)	Detection circuit, current controller, gate control circuit, voltage detection, DC tachogenerator input terminal
	System Controller (ASR)	Programming function (equivalent to 10k step), AI/AO/DI/DO/PLG inputs, CP-215 port, programming panel input terminals
Protection	Option Card	Analog master (AI/DI), CP-215 transmission card; only one card can be mounted.
	Hardware Detection	Overcurrent detection, overvoltage detection
	Thermal switch	Detection of temperature rise in panel
Monitoring Devices	Software Detection	Failures related to AC power supply, overload, overcurrent, overvoltage, self-diagnostics
	Digital Operator	Constant settings, display, etc.
	AC Voltmeter	For AC circuit
	DC Voltmeter	For DC circuit
Indicators	DC Ammeter	For DC circuit
	Power Supply Indication	Main circuit power supply Control circuit power supply
	Sequence Indication	Operation ready
	Fault Indication	Faults (batch display)

Specifications of Power Supplies

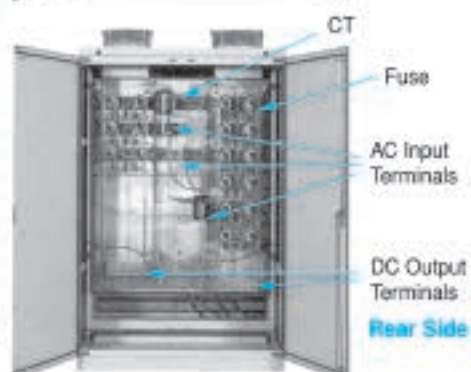
Power Supply	Specifications	
	Voltage	Frequency
Main Circuit	Three-phase 700 to 855V	50/60Hz ±5%
Control Circuit Cooling Fan Circuit	Three-phase 200/220V +10%, -15%	50/60Hz ±5%



Rated Current

Nominal Rated Voltage	Nominal Rated Current A	No. of Thyristors in Parallel	Rated Current A				
			A ₀	A	B ₀	B, C	E, D
780V	680	1P	745	678	631	581	417
	1250		1378	1254	1157	1056	758
	1800		2011	1805	1604	1483	1084
	2410	2P	2644	2407	2220	2026	1454
	3510		3910	3509	3119	2883	2107

Notes : 1 List of ratings are in accordance with JEC-188A "Thyristor Converters".
2 These rated currents are obtained when the unit intake air is 40°C or below.



Dimensions

460V Class Thyristor Unit

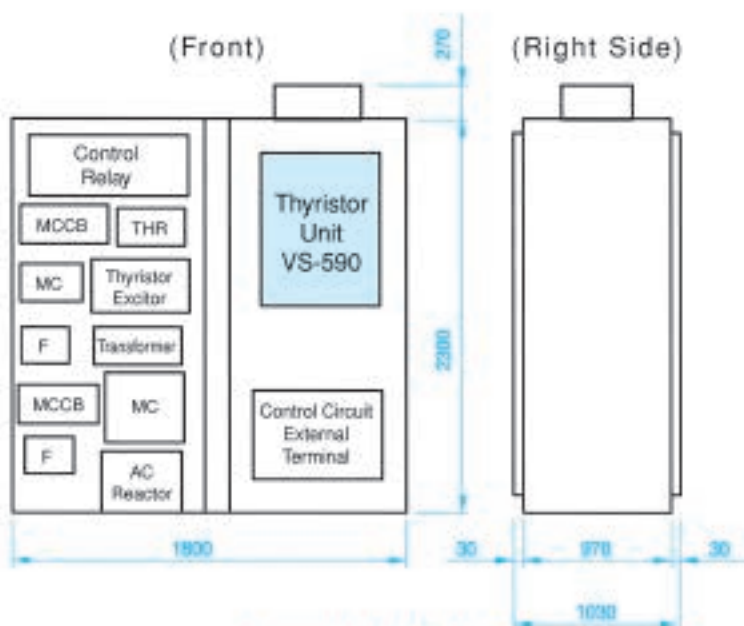


Example of 800A

Nomal Rated Current A	External Dimensions mm			Approx. Mass kg
	W	D	H	
80	405	450	600	65
200	405	450	600	65
300	405	450	600	65
500	405	450	600	65
900	510	460	650	120
1500	535	490	1015	200
1650	535	490	1015	200

●Control Panel Storing 460V Class Thyristor Unit

Panel size depends on the system component of the electric facility.



Example of 460V 900A

F: Fuse

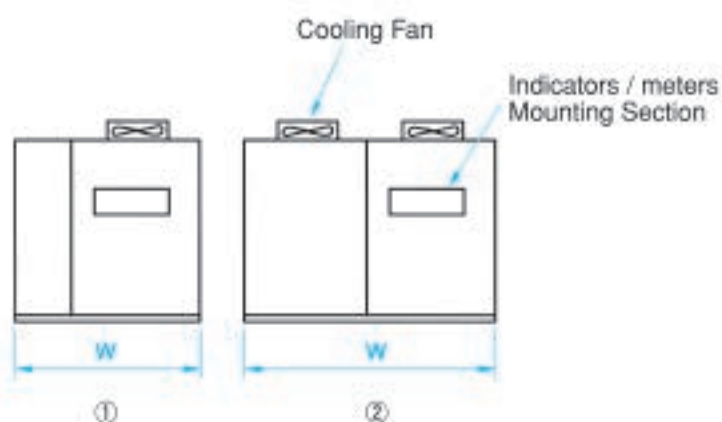
MCCB: Molded case circuit breaker

MC: Magnetic contactor

THR: Thermal type overcurrent relay

780V Class Thyristor Unit

The following figures show dimensions of the panel.
The depth is the same for all types.



Operation method	Nominal Rated Current A	Number of Panel	External Dimensions mm			Approx. Mass kg	Number of Cooling Fans
			DWG No.	W	H		
4 quadrant Operation	680/680	1	①	1000	2670	800	1
	1250/680			1200		1100	
	1250/1250			1200		1100	
	1800/680			1200		1100	
	1800/1250			1200		1100	
	1800/1800			1200		1100	
	2410/680			1400		1300	
	2410/1250			1600		1500	
	2410/1800	1	②	1600	2720	1500	2
	2410/2410			1600		1600	
	3510/680			1400		1300	
	3510/1250			1600		1500	
	3510/1800			1600		1500	
	3510/2410			1600		1600	
	3510/3510			1600		1600	

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LITERATURE NO. KAE-C715-5B <5>-0

Published in Japan February 2018
17-9-28